

BUCCANEER CLASS ASSOCIATION RACING RULES

Incorporating all changes through January 2022.

I. Introduction

The objectives of the Racing Rules are:

- A. To provide clear, precise, and universally understandable rules and drawings.
- B. To keep each boat as equal, simple and inexpensive as possible by maintaining its One-Design features.
- C. To provide a level playing field so that race results are determined by each team's sailing skills.

II. Definitions

The following definitions apply to the Racing Rules:

- A. "Championship Regattas". All Regional Championship Regattas, the North American Championship Regatta, and all other BCA-sanctioned regattas such as the MacAlpine-Downie/Gibbs Regatta shall be considered "Championship" Regattas for the purpose of these rules.
- B. The term "team" shall denote the group of sailors sailing a single boat.
- C. The term "helmsman" refers to the team member controlling the tiller.
- D. The term "crew" refers to all other members of the team aside from the helmsman.
- E. The term "Family Member" refers to the spouse, son or daughter of a Full Member, an Associate Member, or a Lifetime Member, provided the son or daughter is below the age of 21.
- F. The term "Race Organizer" is the BCA member who has arranged for the Buccaneer Class to participate in a regatta. For the Buccaneer North American Championship (BNAC) Regatta it is the current BCA Race Chairman.
- G. "Windows" shall be defined as transparent or semi-transparent material with or without reinforcement weighing less than 3.8 oz. per sailmakers yard.

III. Championship Regattas

A. The following Buccaneer 18 sailboats shall be entitled to compete in Championship Regattas:

1. Sailboats with a measurement certificate.
2. Sailboats manufactured by a licensed or appointed builder unless the boat has been found noncompliant by a National Measurer. Licensed or appointed builders include Chrysler Marine, Texas Marine (TMI), Gloucester Yachts, Cardinal Yachts, and Nickels Boatworks.
3. Starwind 18s manufactured by Wellcraft Boats.

B. Eligibility. A Buccaneer is eligible to participate in a Championship Regatta as long as one member of the sailing team is a BCA member (full, associate, family or lifetime).

C. Reserved.

D. Reserved.

E. The following rules apply to Championship Regattas:

1. Inspection: All boats shall be subject to inspection at the discretion of the “Race Organizer”. Boats, sails, and other equipment shall be determined to comply or not to comply with the BCA Racing Rules prior to the first race of a regatta. Objections to such determinations should be raised and determinations reconsidered prior to the first race. However, objections can be made after racing begins and up to the end of the protest period for the last race, if an infraction went unnoticed earlier.

2. Controlling Rules. Racing shall be in accordance with (1) the current Racing Rules of Sailing, which are published by the International Sailing Federation (ISAF) and (2) with the BCA Racing Rules, in this order.

The “Race Organizer” shall include in both the Notice of Race and the Sailing Instructions a full description of any racing rules that will be changed. See Rule 86 and Appendix J of the current ISAF rules for more details. In particular the “Race Organizer” should specify the entity that will determine if crew, sail, or equipment switching will be approved, if this entity is different than that specified in the ISAF or BCA Racing Rules. Also, the “Race Organizer” should specify the entity that is responsible for measuring boats and the entity that is responsible for determining if a boat complies with the BCA Racing Rules, if these entities are different than those specified in the ISAF or BCA Racing Rules.

3. Scoring. The Low Point Scoring System, Appendix A of the current ISAF Racing Rules, shall be used. A minimum of three races shall comprise a Championship Regatta.

4. Right to Protest. A competitor has the right to protest to the Race Committee any Buccaneer that does not conform to the BCA Racing Rules.

F. Junior Buccaneer North American Championship Regatta

1. This event will be scheduled and sanctioned by the National Committee and is subject to all of the BCA Racing Rules except for sections III.B, III.C and III.D.
2. All entrants shall be approved by the National Committee or the Race Organizer. All sailing team members shall be below the age of 18.
3. Entrants may race in any boat as approved by the sponsoring fleet.
4. A minimum of three boats is required for this event.

IV. General Rules

A. Safety Equipment

All Buccaneers shall carry the following safety equipment while racing:

1. A wearable, USCG-approved Personal Flotation Device (PFD) for each person in the boat. PFD's shall be worn, if so directed by the Race Committee.
2. One USCG-approved, type IV (throwable) PFD.
3. A paddle.
4. An effective anchor and a minimum of 100 feet of line ¼" diameter or larger.
5. A bailing device of at least two-quart capacity.
6. It is recommended that the rudder assembly include a retainer or safety line so it will remain attached to the boat in the event of a capsize. Note, "spring" and "pivot" retainers often fail and can result in the loss of the rudder assembly. A retainer with a pin that is inserted in a hole drilled in the bottom of a pintle or a separate line that connects the rudderhead to the hull is more reliable.
7. A radio or other communication device may be carried on board.

B. Buoyancy

1. The BCA is concerned about fittings, hatch covers, inspection ports and any other features that can allow water to enter the area between the deck and hull parts of the boat ("between deck area"), either from water coming over the foredeck or gunwales or from a capsize. The BCA is on record as advising owners of potential serious problems of reduced buoyancy caused by excessive water in the between deck area, which may prevent a team from self-righting a boat after a capsize or may cause the boat to turtle.

This applies to all Buccaneers, regardless of the manufacturer. It is the responsibility of the owner to ensure the water-tight integrity of the hull.

2. Positive flotation (foam, etc) may be installed in the spars.

C. Sailing Team

1. The team shall consist of a helmsman and either one or two crew.
2. The same team (helmsman and crew) shall be used throughout a race or regatta. There shall be no additions, deletions, or substitutions of any members of the team without prior approval by the Race Committee. In general the Race Committee should not allow a team change, if the change will give the boat a competitive advantage.
3. In the event that a team change is made prior to approval by the Race Committee, the Race Committee shall review and vote on the application as soon as practical. If the Committee votes against the team change, all races sailed with the new team shall be scored DSQ.

D. Sails

1. Anyone shall be allowed to manufacture Buccaneer sails, provided the sails conform to the Sail Specifications, Section VI, below.
2. All sails shall have a sewn-on or durably attached BCA Royalty Patch, which has been numbered, dated, and initialed by the Class Measurer or one of the Measurer's deputies. Older patches, which were not numbered, and older sails without patches, which were only stamped (or initialed) and dated, are grand-fathered.
3. No more than one new sail of each type (mainsail, jib, spinnaker) may be purchased in a calendar year. If a sail is lost, stolen, or damaged to such an extent that repair is not practical that one sail may be replaced with a new sail. A sail may be recut to change its size or shape. If so, it shall be re-measured and the new date and measurer's initials added to the Royalty Patch before it can be used in competition. Note, "repair" of a damaged sail is not considered to be a "recutting" as long as the intent of the repair is to not to change the size or shape of the original sail.
4. A maximum of two sets of sails per boat shall be measured for a regatta, a primary set and a backup set. Whichever set the team uses in the first race shall be the primary set for the entire regatta.
5. Sail switching is not permitted during a race or a regatta without prior approval by the Race Committee. The Race Committee shall allow a sail change to the backup sail only when a sail meets all three of the following criteria:

- a. It is damaged.
 - b. It cannot be quickly repaired (ie: with repair tape).
 - c. It is either unusable or at risk of further failure that would render it unusable.
6. In the event that a sail change is made prior to approval by the Race Committee, the Race Committee shall review and vote on the application as soon as practical. If the Committee votes against the sail change, all races sailed with the new sail shall be scored DSQ.
7. There are no restrictions on number, size or location of telltales on any sails.
8. The headboard, tack, and clew of the main sail may only be located within the inner edges of the racing bands (See V.C.1).
9. Zippers are prohibited on all sails.

E. Miscellaneous

- 1. Weights worn by any team member for the purpose of acting as movable “ballast” are prohibited. This includes water-retaining sweaters or sweatshirts, weight belts, or similar apparel.
- 2. Equipment Switching.

V. Hull, Blades, Spars, Rigging and Other Equipment Rules

A. Hull

- 1. Altering of the basic shape of the hull is prohibited.
- 2. Weight. The boat with mast, boom, spinnaker pole, stays, halyard, main and jib sheets, centerboard, rudder, tiller, jib, and all permanently attached hardware shall weigh at least 500 lbs. The mainsail, spinnaker, spinnaker sheets, PFD's, anchor w/rode, bailer, and other items not specifically listed above should not be in the boat when it is weighed. If the weight is less than 500 lbs, correction weights shall be installed as close to the centerline and main bulkhead and as low as practical. Weights shall be attached to the hull with bolts, glue, resin, or other means approved by the Class Measurer.
- 3. Hulls may be rubbed, sanded, painted, waxed, or polished. Polyester and epoxy resin with fillers may be used to fill in depressions, holes, gouges, and other deviations from the original hull shape, which along with sanding is considered “fairing” of the hull.

Such fairing shall be closely scrutinized with regard to Rule V.A.1 as part of the measuring process.

4. The centerboard trunk may be stiffened by adding resin, fiberglass, wood, metal, or any combination of these materials, to either the internal or external surfaces of the trunk. Reinforcing braces between the trunk and the seats or the floor are not allowed. A horizontal centerboard cap may be installed which may extend beyond the top surface of the fiberglass trunk to either side and to the rear. A seat may be installed on the centerboard cap.
5. The mast step may be raised provided the mast upper racing band complies with paragraph V.C.1.a. If the mast step has been installed above the top of the deck, it shall not be located forward of the original vertical mast channel located at the bulkhead.
6. Hiking straps may be installed with no restrictions on number, design or location except that their attachment points shall be no higher than the top of the horizontal portion of the seats. No hiking aids other than hiking straps are permitted.
7. A spray deflector may be installed, located on the foredeck. There are no restrictions on design or material.
8. A spinnaker launcher may be installed for hoisting and dousing the spinnaker. There are no restrictions on the design or material except the opening in the deck shall be forward of the jib tack.
9. Hand holds may be installed to assist the crew when boarding the boat from the water. They may be located on the transom, on the deck or in the cockpit, no further forward than 3 feet from the top of the transom.
10. Hull and Blade Coatings. See ISAF Rule 53.

B. Blades

1. Centerboards and rudder blades may be rubbed, sanded, painted, waxed, or polished. Polyester and epoxy resin with fillers may be used to fill in depressions, holes, gouges, and other deviations from the original blade shape.
2. Replacement Blades. Replacement blades may be purchased a licensed or appointed Buccaneer-builder or an after-market parts manufacturer. A used blade produced by any former licensed or appointed Buccaneer builder may be used as a replacement blade. Home-made blades are permitted as long as they are made only of wood, foam, fiberglass, polyester or epoxy resin, resin fillers or any combination of these materials and the shape is consistent with the original blade.

3. Jibing Centerboard. A jibing centerboard is one that can be rotated to the left or right from the centerline of the boat when viewed from the top (not viewed from the rear) when the CB is in the full-down position. Modifications to the centerboard and/or the centerboard well that allow such rotation are prohibited. Also, any procedure to physically rotate the CB such as by jamming temporary, movable shims between the CB and the trunk is prohibited. Permanent shimming of the CB to reduce play between the CB and trunk is allowed since this reduces the potential for rotation.

4. The centerboard shall be attached to the hull with a set of fittings that allow it to pivot up and down within the CB trunk. These fittings shall be fixed to prevent the pivot point location from being moved forward or aft while sailing.

C. Spars

1. Racing bands a minimum of ½ inch wide shall be painted or permanently marked so as to be difficult to move in contrasting color on the mast and booms follows:

- a. Mast Upper Band. The lower edge shall be no higher than 301" and no lower than 298" above a point on the bottom of the hull, on the centerline, 6" forward of the front of the centerboard slot. For the purposes of this rule, the distances above may be reduced by 29" if measuring from the centerline deck height directly above the mast step.
- b. Mast Lower Band. The upper edge shall be 21'3" below the lower edge of the upper band.
- c. Boom Band. The inner edge shall be 9'0" from the aft-edge of the mast when the boom is attached to the mast, is perpendicular to the mast, and is on the centerline of the hull.
- d. Only two bands are allowed on the mast and one band on the boom.

2. The maximum overall spinnaker pole length is 7'-1". There are no restrictions on pole material or diameter. The mast-mounted spinnaker pole bail (ring) shall extend no further than 2 ½ " from the front-edge of the mast. The bail may be attached directly to the mast or mounted on a vertical track.

3. A jib whisker pole with a maximum overall length of 8'-8" may be used on boats not carrying a spinnaker. The whisker pole shall only be set on the side of the boat opposite the boom.

4. Replacement Spars.

- a. Replacement spars may be new or previously used.
- b. Replacement masts shall utilize aluminum-alloy extrusions with the same cross

section as used by any current or former licensed or appointed Buccaneer builder.

c. Replacement booms shall utilize aluminum-alloy extrusions with the same cross section as used by any current or former licensed or appointed Buccaneer builder, or shall utilize any other aluminum-alloy extrusion conforming to the following dimensional ranges: 1 7/8 - 2 3/4 inches in width, 2 1/4 - 3 1/2 inches in height (including integral bolt-rope slot), and 0.065 inches in minimum wall thickness.

d. No spar shall be replaced during a regatta, unless approved by the race committee.

D. Standing Rigging

1. For the purpose of the Racing Rules “standing rigging” is defined as the two side shrouds, the forestay/jib halyard, and the optional “safety” forestay. A portion of the forestay/jib halyard is located within the jib luff and is used to tension the rig.

2. The side shrouds shall be 1/8” diameter stainless steel wire rope of 1 x 19 construction. The end fittings shall be swaged terminals or Norseman fittings (or equivalent).

3. Shrouds shall be connected to the chainplates using simple shroud adjusters (without levers) or turnbuckles. Connections between shroud end fittings, the adjusters or turnbuckles, and the chainplates shall be by clevis pin, quick-release pin, or locknut and bolt. Adjustment of shroud adjusters or turnbuckles during a race is prohibited. Such adjustments may be made between races of a regatta.

4. The forestay/jib halyard shall be either:

a. One piece of 1/8” diameter stainless steel wire rope of 7 x 19 construction (for the original Chrysler tube-on-tube furling system) or

b. One piece of 1/8” diameter stainless steel wire rope of either 7 x 19 or 1 x 19 construction contained within the luff of the jib (wire luff furling system) plus a separate jib halyard which shall be 1/8 “ diameter stainless steel wire rope of 7 x 19 construction. A synthetic rope tail may be spliced or otherwise connected onto the end of this jib halyard for use in a multi-block jib-tensioning device.

The end fittings for the wire rope shall be swaged terminals, SS thimbles with Nicopress oval sleeves, or Norseman fittings (or equivalent). The forestay/jib halyard may run inside or outside the mast.

5. The tensioning device for the forestay/jib halyard shall be a Hyfield lever, a "Magic" box, a multi-block system, or a turnbuckle. There are no restrictions on the location of the tensioning device. Adjustment of the tensioning device is allowed at any time.

6. The forestay/jib halyard shall include a jib furling system of one of the following types:

a. Tube-on-Tube System where the forestay/jib halyard is contained within a solid tube, which fits within the jib luff sleeve.

b. Wire Luff System where the jib luff wire is connected directly to the jib furling drum on the bottom and to a swivel connected to the jib halyard on the top.

7. The chainplates may be replaced but the location of the chainplates shall not be changed.

8. The deck fitting for a wire luff jib system and the support washer for a tube-on-tube jib system may be changed but the location of the fitting shall not be changed.

9. Tangs connecting side shrouds to the mast may be changed, but the location of the tangs shall not be changed, unless the mast step has been raised. Tangs, blocks, and other fittings that connect the forestay/jib halyard to the mast may be changed, but the location on the mast shall not be changed, unless the mast step has been raised. If the mast step has been raised the tangs may be lowered an amount similar to the change in mast step height.

10. A “safety” forestay may be installed forward of the forestay/jib halyard. There are no restrictions on material and design. However, the “safety” forestay shall not be used for tensioning the rig. It shall remain slightly slack with the rig tensioned by the forestay/jib halyard.

E. Running Rigging

1. For the purpose of the Racing Rules “running rigging” is defined as the lines, blocks, fairleads, and cleats that control the sails and the position of the rudderblade and centerboard. Each type of control system that was offered by a licensed Buccaneer manufacturer shall be considered a "standard control system". The following list shows all of the standard control systems.

Main halyard

Mainsheet

Main Outhaul

Main Downhaul

Boom vang

Cunningham

Jib sheets

Jib barber haulers

Jib furling line

Spinnaker halyard and dousing line (whether one line or two separate lines)
Spinnaker sheets
Spinnaker Pole topping lift
Spinnaker Pole holddown
Twings/guy hooks
Rudder holddown
Rudder uphaul
CB holdup
CB holddown

A control system that was never offered by a licensed Buccaneer manufacturer shall be considered an "innovative control system". Examples of innovative control systems are an adjustable backstay and a mainsheet traveler.

2. There are no restrictions on the system design, equipment, materials, or location for a "standard control system" with the following exceptions. However, the class retains the right to review standard control systems with unique designs to determine if they violate the One-Design principal. Designs that are determined to violate this principal will be added to this exception list.

- a. The distance from the deck (next to the mast) to the top of the spinnaker halyard block sheave shall not exceed 216".
- b. All blocks and fairleads in the mainsheet control system shall be located either on the boom or on the centerline of the top of the centerboard trunk.

3. All "innovative control systems" are subject to a preliminary determination by the measuring authority at a BCA-sanctioned regatta, followed by a review by the National Committee. Such reviews shall be based on the principals set forth in Section I of this document. The NC may recommend to the membership that the Racing Rules be modified to allow the new design or to prohibit it. The following list of innovative control systems have been determined to violate the One-Design principal and are prohibited:

- a. Any device that affects the lead between the mainsheet blocks on the boom and the mainsheet blocks on the top, centerline of the centerboard trunk is prohibited. Travelers and main sail barber haulers are two examples of such systems.

F. Other Equipment

1. A maximum of two suction bailers with a total, combined, effective cross sectional area at the bailer outlet of two square inches may be located in the cockpit floor.
2. A masthead wind indicator may be installed.
3. Analog or digital timers with audible alarms may be used.

4. Analog or digital compasses with tactical scales and fixed or adjustable lubber lines may be used. Digital compasses may not perform other calculations or provide warnings.
5. Devices that provide boat speed, location, distance, wind speed, or water current information and electronic devices that provide wind direction are prohibited.

VI. Sail Specifications

A. Mainsail (See Figure I)

1. Tack, clew, and head definitions are shown in Figure I. Sail overall dimensions shall not exceed:

Luff 21'-3"
Foot 9' - 0"
Leech 22'-7 1/4".

The leech is measured from the back of the headboard when the headboard is perpendicular to the luff. If the headboard is not perpendicular to the luff, use an imaginary point 4 3/4" back from the front edge of the bolt rope perpendicular to the luff at the top of the sail.

2. Girth dimensions shall not exceed:

1/4 height of sail - 7' - 11 7/8"
1/2 height of sail - 6' - 1 3/8"
3/4 height of sail - 3' - 6 3/8"

The mid-height girth is the distance between the points on the luff (not including the bolt rope) and the leech, found by folding the sail with the upper inner corner of the headboard to the tack (mid-luff) and the outer upper corner of the headboard to the clew (mid-leech).

The 3/4 height girth is the distance between points on the luff and the leech found by folding the sail with the headboard at the mid-height point on the luff and leech.

The 1/4 height girth is the distance between points on the luff and the leech found by folding the sail with the tack to the mid-height point on the luff and the clew to the mid-height point on the leech.

3. The mainsail plies shall be made of woven polyester (e.g. Dacron) or polyester laminate (e.g. Mylar). For either cloth type the manufacturer's published finished weight shall be no less than 3.8 oz. per sailmaker's yard (36" x

28.5"). Any combination of legal sailcloth, clear or opaque, shall be permitted in the main sail and the use of clear plies of polyester laminate in a predominantly woven Dacron or opaque polyester laminate sail, provided they meet the 3.8 oz. per sailmakers yard minimum specification, shall not be construed a "safety window" or a "tell tale window" as defined in the BCA Racing Rules. Reinforcing fibers containing non- polyester material shall be permitted in the construction of the laminated sail cloth.

4. The mainsail foot may be loose or have a sewn boltrope. A shelf-foot design may be used.

5. The mainsail luff shall have a sewn boltrope, contained within the mast slot.

6. Battens shall be limited to four, not to exceed: 44" top, 30" next down, 36" next down, and 30" bottom batten. Battens shall be evenly spaced along the leech with a tolerance of plus or minus 2". There are no restrictions on batten material, width, or thickness.

7. The length of the headboard from front to back shall not exceed 4" measured at right angle to the luff. The distance from the aft-edge of the luff rope to the top aft corner of the headboard shall not to exceed 4 ¾".

8. Safety windows of any size may be installed in the lowest 5 ft of the mainsail measured from a line between the tack and clew as long as they do not compromise the structural integrity of the sail. Up to two tell-talewindows each fitting within a 10" x 18" rectangle may be installed.

9. A Cunningham grommet may be installed.

10. Sail numbers (10" high - minimum) in a contrasting color to the sail shall be located midway between the second and third battens.

11. The optional, but recommended, Buccaneer class insignia should be located midway between the top two battens.

12. There are no restrictions on installing reef points on the mainsail.

13. Foam Head Option. The mainsail may incorporate a foam head section to provide flotation and reduce the risk of turtling. The design is to be determined by the sailmaker providing the sail.

B. Jib (See Figure II)

1. Tack, clew and head definitions are shown in Figure II. Sail dimensions shall not exceed:

Luff 16' - 9"

Leech 15' - 7"

Foot 8' – 2 3/4"

Roach 8"

Measure the roach as follows:

- a. Holding the clew and tack, tension the sailcloth between these two points to remove wrinkles.
 - b. Place a straight edge from the tack to the clew.
 - c. Measure the maximum distance at 90 degrees from the straight edge to the sail edge. Note: If the sail edge curves up, just hold it down.
2. The leech shall be straight or concave. Convex leeches are prohibited.
 3. The jib plies shall be made of woven polyester (e.g. Dacron) cloth or polyester laminate (e.g. Mylar). For either cloth type the manufacturer's published finished weight shall be no less than 3.8 oz. per sailmakers yard (36" x 28.5"). Any combination of legal sailcloth, clear or opaque, shall be permitted in the jib and the use of clear plies of polyester laminate in a predominantly woven Dacron or opaque polyester laminate sail, provided they meet the 3.8 oz. per sailmakers yard minimum specification, shall not be construed a "safety window" or a "tell tale window" as defined in the BCA Racing Rules. Reinforcing fibers containing non-polyester material shall be permitted in the construction of the laminated sail cloth.
 4. No battens are allowed in the jib.
 5. Safety windows of any size may be added in the lower 3 ft. of the jib measured from a line between the tack and clew as long as they do not compromise the structural integrity of the sail. Up to two telltale windows may be installed with each window fitting within a 10" diameter circle.
 6. The width of the luff sleeve for a tube-on-tube furling system shall not exceed 2 1/2". Measure the width with the luff sleeve flat from the crease at the front edge of the luff sleeve to the forward-most row of stitches holding the luff sleeve to the main body of the sail.

C. Spinnaker (See Figure III)

1. The spinnaker shall be a symmetrical, three-cornered sail. The sail shall have no reinforcing patches other than at the head, clew, and retractor tab or tabs.
2. Sail dimensions shall not exceed:

Head to clew	18' - 1"
Clew to center of foot	5' – 1 1/2"
Width at the mid-girth/2	6' - 2"

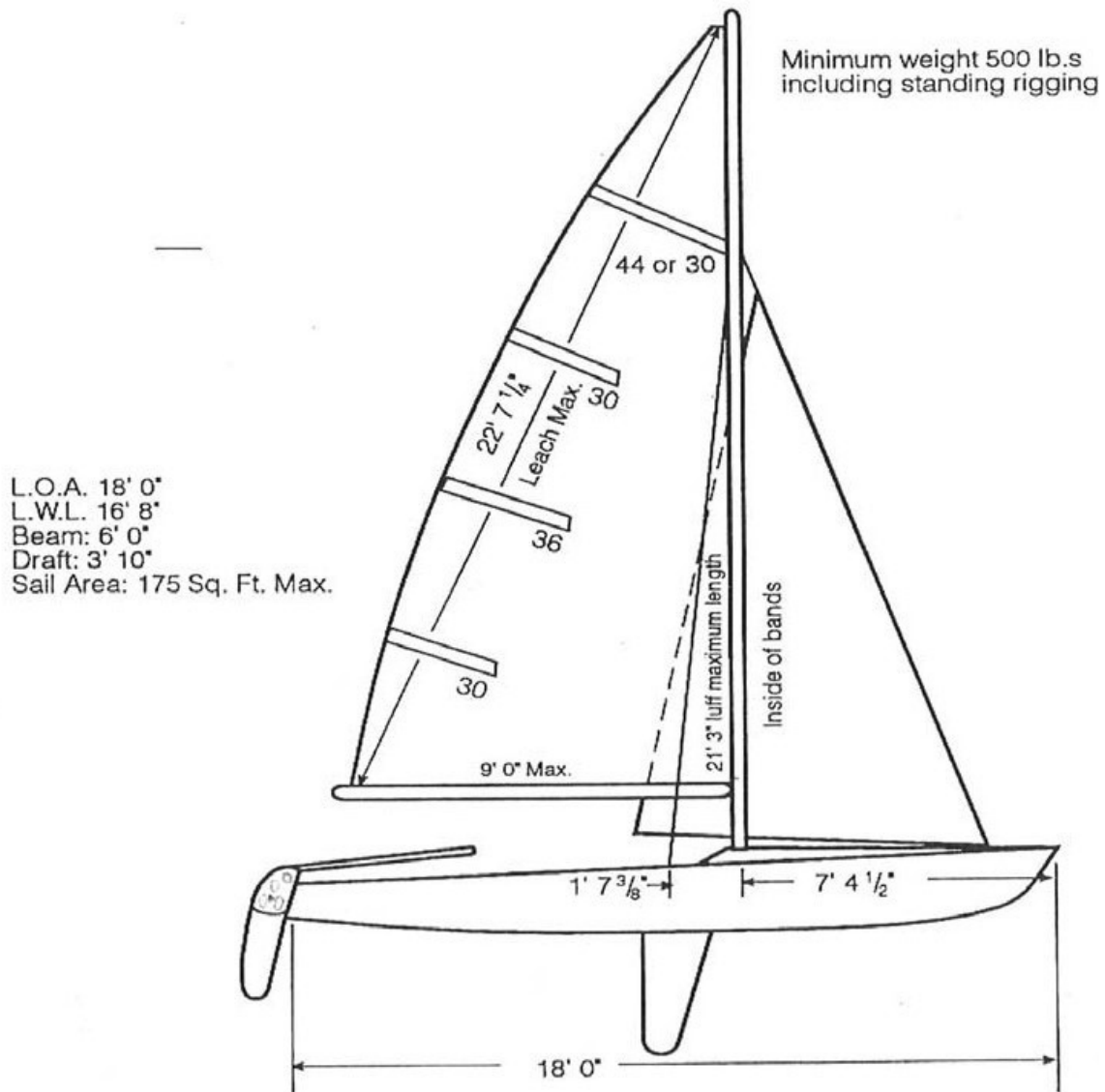
Measure the sail as follows:

- a. Fold the sail in half (left to right) so that the clews coincide. The three corners of the half sail so formed shall then be pulled hand-taut and held in position. Measure the Head to Clew dimension. Measure the Clew to Center of Foot dimension.
 - b. Fold the head onto the clews and smooth the sail into the fold (see Figure III). Measure the length along the fold in a straight line to get the Mid-girth/2 dimension.
3. The spinnaker shall be made of nylon fabric having a manufacturer's published finished weight greater than or equal to 0.93 oz. per sailmakers yard (36" x 28.5"), which equals 40 grams/square meter.
4. Sail numbers (10" high - minimum) in a contrasting color to the sail may be located in the upper third of the sail.

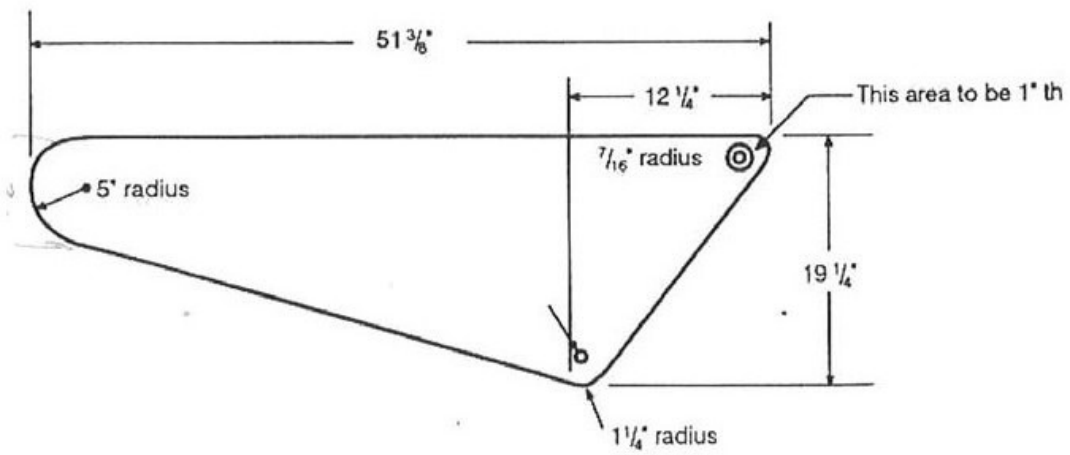
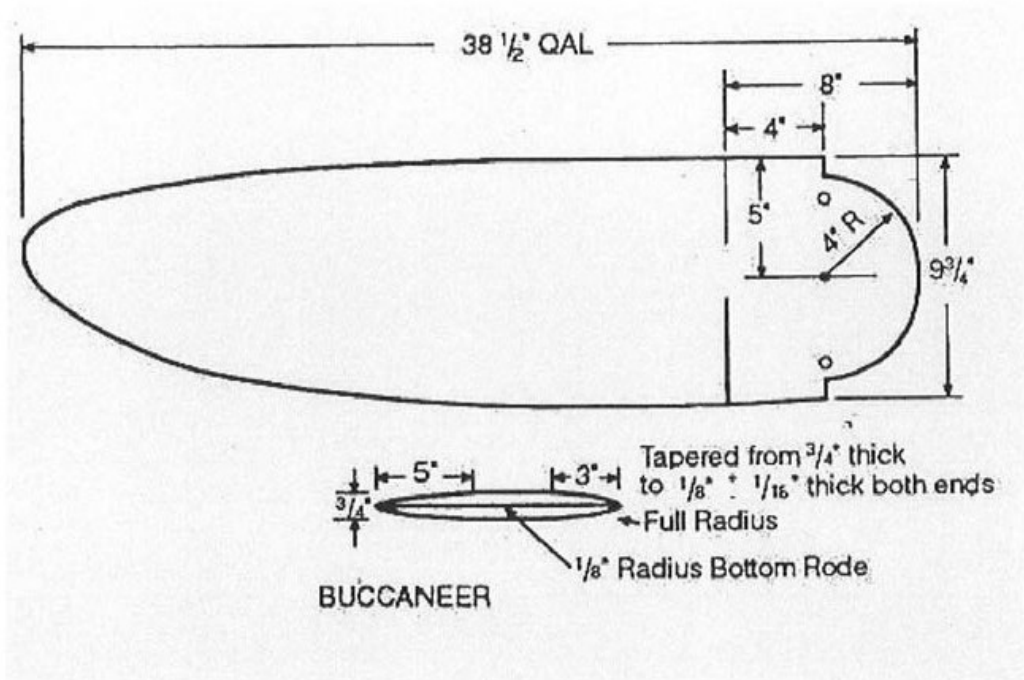
D. Measuring

1. When completely dry all sails shall be stretched by hand sufficiently to remove wrinkles adjacent to the measurement being taken.

Drawings



Blades



Main Sail Definitions

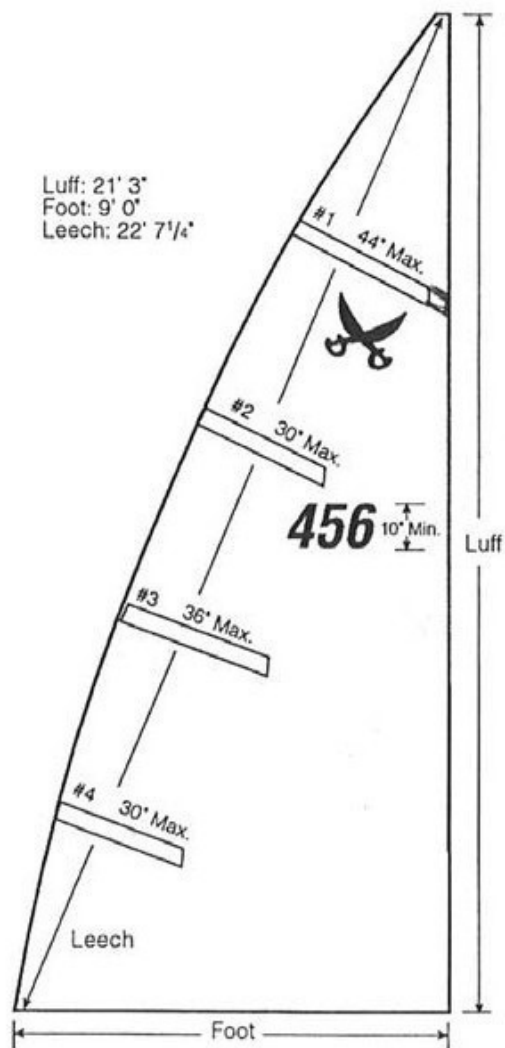


Figure IA

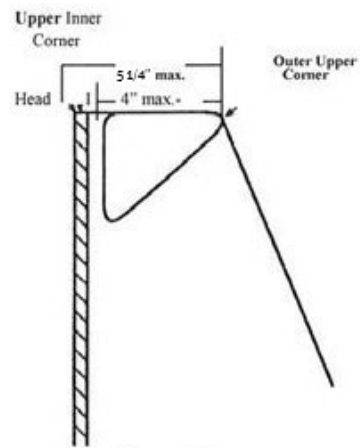


Figure IB
Head

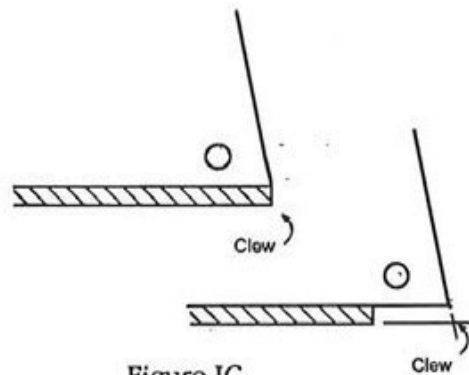


Figure IC
Clew

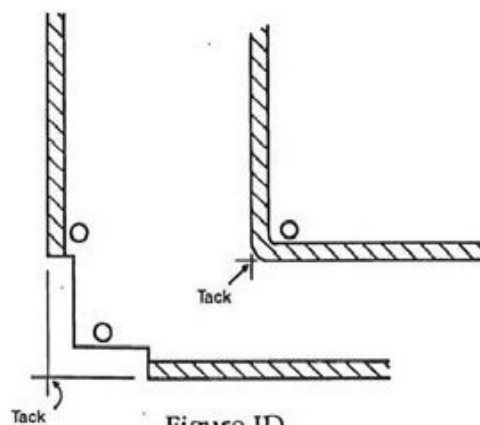


Figure ID
Tack

Jib Definitions

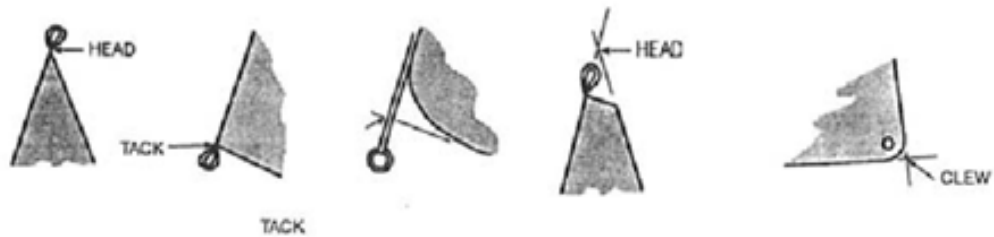


Figure IIA

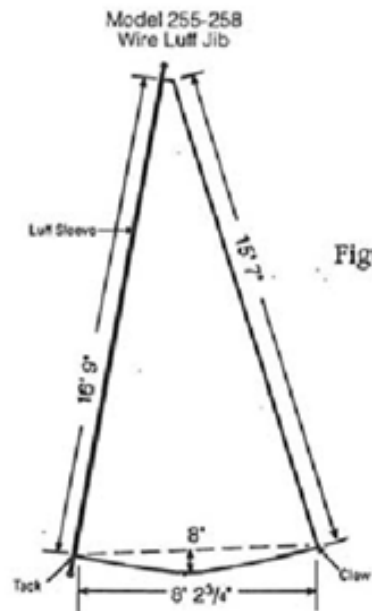
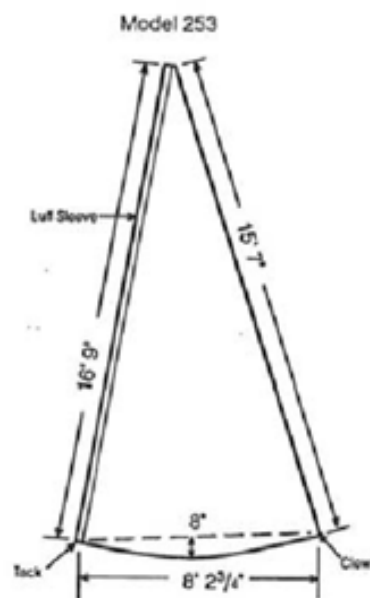


Figure IIC

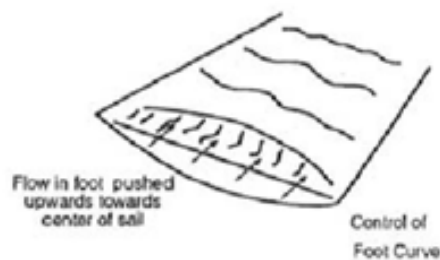


Figure IIB

Spinnaker Definitions

Figure IIIA



Figure IIIB

