

# **International Thunderbird Class Association Black Book**

This edition of the Black Book incorporates all revisions to the Constitution and Specifications through January, 2011. The Specifications section was reorganized to place all information on one item (e.g. "mast") at one location. In general revisions can be made only once per year. The basic definition of the Thunderbird Class boat is fixed and further changes to this Black Book will not invalidate the measurement certificate of existing Boats. Revisions that are officially accepted since printing of this addition will be published in International (I.T.C.A.) newsletters. Update information is available by writing to:

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## **SPECIFICATIONS**

These specifications define the construction, equipment and measurement of the International Thunderbird Class sloop. Incorporated as part of these specifications are all of the Official Plans listed in the Reference Section below.

The issuance of an official measurement certificate and Gold Seal are dependent on the observance of these specifications, both in fact and

spirit. Tolerances are specified to accommodate inaccuracies. However any boat measuring within these tolerances will meet the specifications regardless of the intentions or motives of the builder.

Specifications, however complete, cannot anticipate every possible situation which may arise. Anything that is not clearly covered in these specifications shall be brought to the I.T.C.A. Measurement Committee for a ruling.

These specifications shall be used in conjunction with the official set of plans. These specifications are requirements and the plans generally provide guidance, except where the specification requirement refers to the plans with such language as "as shown by" or "set forth in", in which case that part of the plans becomes a requirement. Where differences exist between the plans and the specifications, the text of these specifications shall prevail.

The builder shall supply a certificate to the Class Measurer stating that the yacht has been built to conform with the current International Class specifications and to the current official plans.

## TIPS TO BUILDERS

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#### 1. REFERENCES (Official Plans distributed by the I.T.C.A)

1.1. Douglas Fir Plywood Association (American Plywood Association) Plan Number 85 (26' Racing -Cruising Sloop) Sheets 1,2,3, and 4. \*\*\*Note: Revised Thunderbird Wood Boat Plans will be issued in the near future to replace the Original Plans

1.2. International Thunderbird Class Association Templates. ( an unnumbered drawing ). \*\*\*Note: These Template Plans will be updated in the near future and issued to Fleet Measurers.

1.3. Cruising Cabin Detail, Thunderbird 26 foot Racing-Cruising Sloop. Additional Sheet 3A to Plan No.85 Sheet 1 to 4. Issued by the International Thunderbird Class Association, December, 1979 (1 Sheet).

1.4. Thunderbird Cruising Cabin Construction Procedure and Material Identification (No document number, 6 Sheets). Instructions for the Construction of a One-Off Fiberglass Thunderbird Sailboat. I.T.C.A. Publication 20, Issued June, 1982 (28 Sheets).

1.5. One-Off Fiberglass Thunderbird Plan, I.T.C.A Publication 21. (4 Sheets).

#### 2. ARRANGEMENT

2.1. The external appearance of the yacht shall conform with that set forth in the official plans.

2.2. Hull shape shall conform with that set forth by the official plans (Reference 1), within the tolerances noted below in these

specifications.

NOTE: Table of offsets on several issues of the original plans will result in a hull length of 26'-2" (7.930m). See Section 4.1.1 for proper hull length requirements. Following the construction instructions, the plans will yield a hull with the proper length.

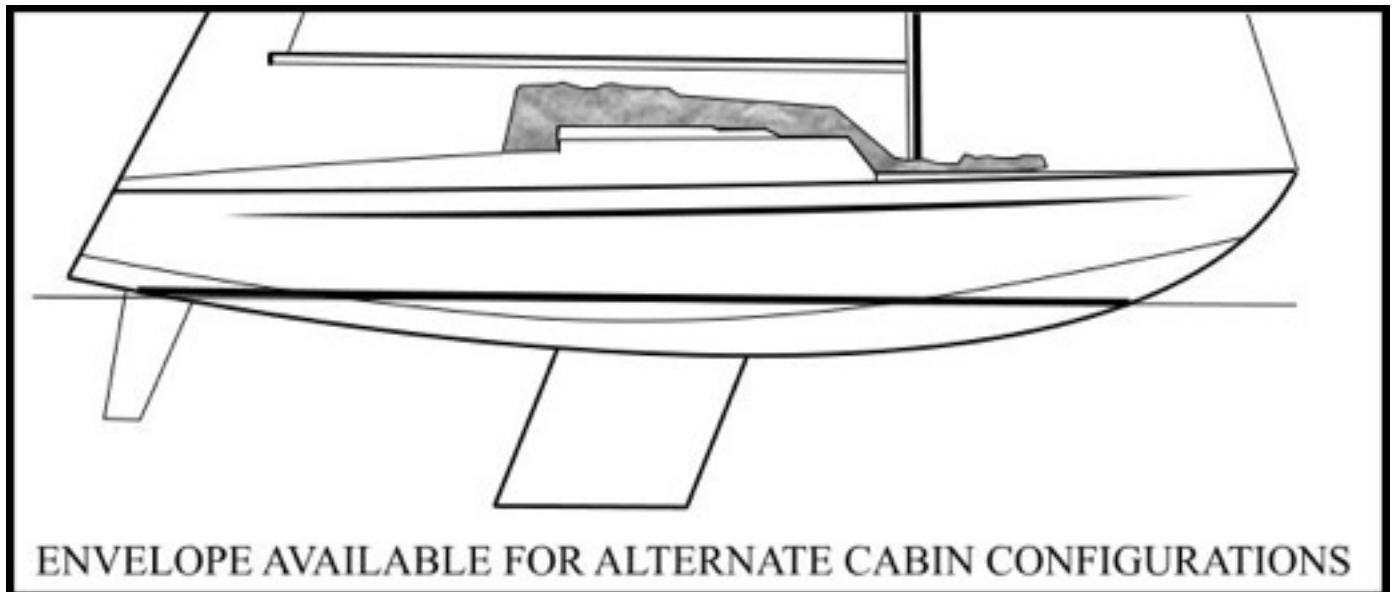
2.3. Cabin location and size shall conform to that shown on Douglas Fir Plywood Association (American Plywood Association) Plan No.85 as amended by the I.T.C.A or on the One-Off Fiberglass Thunderbird Plan, I.T.C.A Publication 21, or alternate versions approved by the Board of Governors. The Board of Governors shall consider for approval as alternate versions only those that comply with the following criteria:

2.3.1. The cabin height, width, length, camber, location, and angles (slopes) shall be within the extremes defined on Plan 85 and Publication 21 except for the angle of the front of the cabin, which shall not be less than 33 degrees when measured against the sheer.

2.3.2. The cabin profile should be essentially flat.

2.3.3. The cabin shall be in keeping with the Thunderbird Class racing and cruising function and appearance.

For an alternate version to be considered for and receive approval, drawings shall be submitted to the Board of Governors prior to the start of construction. These drawings shall be accurately scaled and dimensioned plan and profile views, showing the entire deck, cabin with window layouts, the cockpit and the coamings. Section views at Bulkheads 2, 3, and 4 and a bill of material shall be included on the drawings. Upon approval, the drawings shall be official plans and shall be the property of the I.T.C.A.



2.6. Cockpit arrangement is optional, except for the following restrictions.

2.6.1. Coamings may slope outward up to 15 degrees from vertical. Their design should approximate the shape shown on the referenced wood or fiberglass construction drawings. Height measurements will be from the sheer (sheer is the external deck edge at side) to the top of the coaming specified at two (2) locations: Bulkhead #6 and at the back of the cabin. The minimum heights are 4-1/2" (114.3 mm) above the sheer at Bulkhead #6 and 7-1/2" (190.5 mm) above the sheer at the cabin. The top of the coaming may not deviate more than 3/4" (19.1 mm) from a straight line drawn between Bulkhead #6 and the cabin.

2.6.2. Provision for self-draining must be equivalent to that shown on the plans.

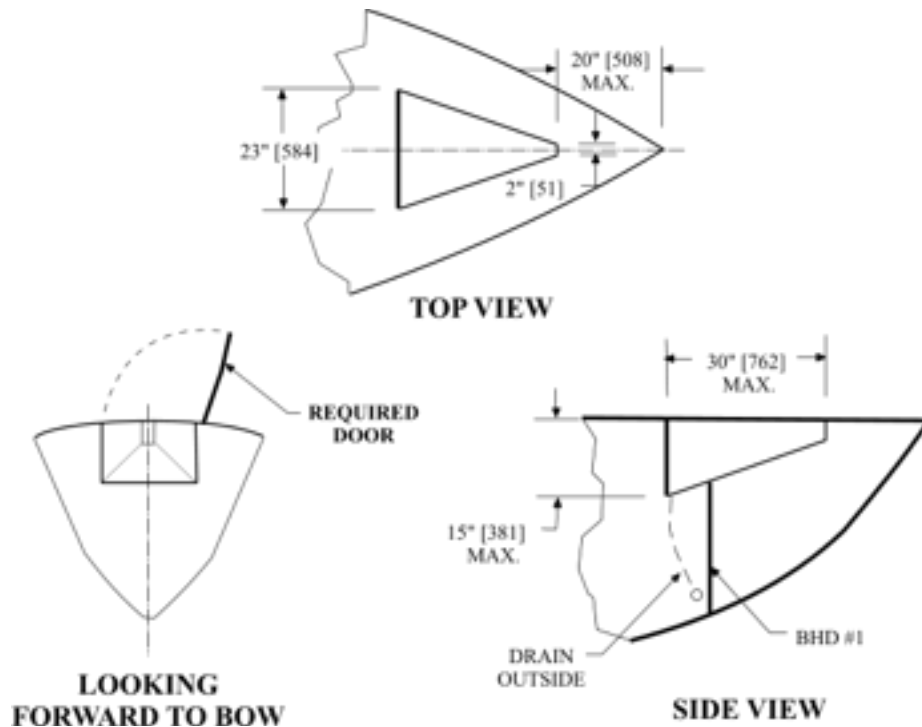
2.6.3. Volume may not be greater than shown on the plans. Various methods of lifting and/or sliding cabin hatch covers are permitted. Cabin hatch construction shall use materials in accordance with Section 3.1 Hatch strength shall be



equivalent to the hatches shown on Reference I. The entry hatch must be capable of being readily closed to the height of the cockpit seats to insure the self-draining capability of the cockpit. Drop slides or double doors meet this requirement.

## 2.7. Deck Hatch, Anchor Wel

2.7.1. The foredeck area shall have no holes or depressions, except for vents (4" (101.6mm) max.), anchor well, and hatch which are all optional. If they are installed they must be sized and located according to plan(s). They shall have a cover or door of material in accordance with Section 3.1, with strength equivalent to the hatch shown on Reference 1. The anchor well shall have a drain to the outside of the hull. The anchor well shall be utilized for the storage and use of the yacht's anchor and ground tackle. Any use associated with sail handling is not permitted.



2.7.2.The Anchor Well Arrangement shown above is to control size and location. Detail design is at the discretion of the builder.

2.7.3.Location, dimensions and construction of the aft storage and motor well hatches are optional. Hatch strength shall be equivalent to the hatches shown on Reference 1. The construction material must be in accordance with Section 3.1. This is to permit various motor well designs, particularly that which allows a tilting motor arrangement. This does not permit the relocation of Bulkhead #6.

2.8.Equivalent suitable hardware may be substituted for that specified on the official plans.

2.9.Engine must be located entirely aft of Bulkhead #5 and the propulsion unit must be fully retractable.

2.10.Openings in the exterior of the hull for the toilet, sink, cockpit self-drainers and outboard well may not be taped or sealed off at anytime so as to render them inoperative.

2.11.Hiking assists are permitted provided that they are attached to the cabin, coaming or cockpit structure. and that they do not extend beyond an imaginary line projecting from the gunwale which is parallel to the vertical center line of the boat.

### 3. CONSTRUCTION SPECIFICATION

3.1.Building Materials - Traditional materials such as wood, steel, aluminum, bronze, iron, lead, lexan, Plexiglas, polyester, fiberglass, balsa cored fiberglass panels, foam cored fiberglass panels, paint and epoxies may be used. Carbon fiber and kevlar, shall not be used. Hull, deck, and house must be made from wood or fiberglass. Further material restrictions for individual items are located in their respective paragraph.Titanium will not be used on Thunderbirds after January 26,1994. Titanium

installed on Thunderbirds prior to January 29, 1994 may remain. The use of materials not listed above as acceptable must be approved by the I.T.C.A. Measurement Committee. The selection of wood is at the option of the builder except as listed below but all woods must weigh in excess of 20 lb. per cubic foot (320 kg/cu. m) at 15% moisture content. All plywood is to be of Marine or Exterior type. It is expected that the yacht shall be constructed in accordance with materials and techniques normally considered sound for yacht construction.

### 3.2. Wood Hull and Deck

- 3.2.1. Planking, bulkheads and inner transom are to be 1/2" (12.7 mm.) plywood as specified in the official plans.
- 3.2.2. Cabin sole, cockpit floor and decks are to be 3/8" (9.53 mm.) plywood or equivalent suitable material.
- 3.2.3. Cabin top is to be constructed with two (2) layers of 1/4" (6.35 mm.) plywood as specified in the official plans.
- 3.2.4. Cabin sides and cabin face are to be not less than 3/4" (19.0 mm.) thick.
- 3.2.5. Wood keel and false keel are to be of the minimum total thickness shown in the plans and shall not exceed these dimensions by more than 1/4" (6.35 mm.).
- 3.2.6. Stringers, sheer clamp and sheer batten shall not be smaller in cross section than shown in the official plans.
- 3.2.7. The chine shall be shaped from wood of the dimensions shown in the official plans and shall not be less than 3" (76.2 mm.) in width inside the planking after shaping.
- 3.2.8. Floor timbers are to be not less than 2" (50.8 mm.) in thickness.

3.2.9.A yacht's official registration number, (Thunderbird Hull No.) shall be carved or burned into the stem, forward of Bulkhead #1. Minimum number size: 2" (50.8 mm.) high and 3/16" (4.7 mm.) deep.

3.3.Fiberglass Hull And DeckFiberglass construction, with or without cores, may be substituted for the construction of the hull and/or deck and cabin prescribed in the plans, provided that they meet the following specifications.

3.3.1.Weight. The basic hull with Bulkheads numbers 2, 4, and 5, the outboard motor well, chain plate supports and keel support structure shall weigh between 825 and 1,000 lb. (374.5 to 454kg.). The hull thickness shall not be less than 3/16" (4.8 mm.) of hand lay-up fiberglass reinforced plastic at any location. The deck, cabin and cockpit shall weigh between 380 and 480 lb. (172.5 and 218kg.) trimmed and ready to install. Deck thickness shall not be less than 3/16" (4.8 mm) of hand lay-up fiberglass reinforced plastic in any horizontal unreinforced areas. The deck weight shall include all hatch covers.

3.3.2.Center of Gravity. The center of gravity of the hull shall be 13' 8" +/- 5"(4.17 m +/-127 mm) from the stem head measured parallel to the waterline, and 2' 4"+/- 4"(0.71 m +/- 102 mm) below the sheer.

3.3.3.Radius of Gyration. The hull shall have a radius of gyration of 6' 11" +/- 8" (2.11 m +/- 203 mm) determined by measuring the period of oscillation when swung on a pivot at or near the sheer. vertically above the center of gravity, and using the formula:  $k = (aT^2 h - h^2)^{1/2}$  where T is the period of one complete oscillation in seconds; h is the distance of the center of gravity below the pivot; and a = 0.248 if h is measured in meters and 0.81 if h is measured in feet.

3.3.4.Certification. An affidavit shall be provided by the builder attesting to the weight, center of gravity location, period of oscillation and radius of gyration of each hull and the weight of each deck. The measurement of the first three hulls and first three decks produced by a builder shall be performed by the builder in the presence of and to the satisfaction of a fleet measurer. A builder shall inform the fleet measurer at least three days in advance of the time and place at which he will measure subsequent hulls and decks. The measurer or his representative shall have the right to be present at the measurement. The builder and measurer shall sign the affidavit and forward the original to the International Measurer. NOTE: A builder may choose to install additional components into the hull before removing it from the mold. In this case, the weight, center of gravity and radius of gyration shall be determined with these components installed, and the builder's affidavit shall include a list of these additional components. their individual weights and their positions measured from the stemhead parallel to the waterline and below the sheer.

3.3.5.Shape. The hull shall be measured, after the deck has been permanently mounted, per the specifications of Section 4.1. When three hulls from a mold have been measured, a builder may apply to the International Measurer for a waiver of the measurements of Section 4.1 for subsequent hulls from that mold. In this case, the beam at Bulkheads No.2 and 4 shall be checked for compliance after the deck has been permanently mounted, unless a complete measurement is requested by the International Measurer.

3.3.6.The hull shall bear external datum reference marks on the centerline and on both sheers coinciding exactly with the aft edge of Bulkhead #2 projected to the outside of the hull. The datum reference marks shall be permanent and

detectable. (It is recommended that corresponding reference marks be placed inside the hull to aid the builder.)

3.3.7.A yacht's official registration number (Thunderbird Hull No.) shall be permanently recorded on the vessel, with raised or recessed numerals on the shell inside near the stem at a visible location.

## 4. HULL

### 4.1.Shape

4.1.1. L.O.A. 25' 9-3/4" (7.868 m.) minimum. 25' 11-3/4" (7.918 m.) maximum.

4.1.2. Cross sections shall be checked by official template at Bulkheads #2, #4 and #6. Allowable tolerances shall be tight against template to 1/2" (12.7 mm.) minus.

4.1.3. Deck crown at Bulkhead #2 shall be 1" (25.4 mm.) to 7" (178 mm.) maximum.

4.1.4. Chine radius shall be 1-1/4" (31.8 mm.) maximum measured at Bulkheads #4 and #6.

### 4.2.Chainplates

4.2.1. Chainplates shall be not less than dimensions shown on the plans, except that thickness may be reduced to 1/8" (3.2mm) minimum, provided the material is corrosion resistant steel. Turnbuckle pins have created elongated holes in 1/8" (3.2mm) chainplates on some existing boats, hence 3/16" (4.8mm) chainplates are recommended. Locations are listed below.

4.2.2. Forward lower shrouds (optional) shall be located not more than 22" (559 mm.) forward of Bulkhead #2 and not more than 4-1/2" (114 mm.) inboard from the sheer.

4.2.3. Upper shrouds shall be snug against the forward side of Bulkhead #2 and not more than 4-1/2" (114 mm.) inboard from the sheer.

4.2.4. After lower shrouds shall be located 19" (483 mm.) to 22" (559 mm.) aft of Bulkhead #2 and not more than 4-1/2" (114 mm.) inboard from the sheer.

#### 4.3. Mast hole at deck

4.3.1. Mast hole length shall be centered on aft edge of Bulkhead #2,  $\pm 1/2$ " (12.7 mm.).

4.3.2. Hole shall be maximum 5" (127 mm.) wide and maximum 6" (152 mm.) long.

4.4. Mast shall be chocked at the deck so that the "J" dimension of 8' 0" (2.44 m.) cannot be exceeded. ("J" dimension is the distance from the forward surface of the mast to the extension of the forestay, measured along the deck.)

### 5. RUDDER

5.1. Rudder Construction Two rudders are shown in the official plans, referred to herein as the "Original Rudder" and the "Spade Rudder". The Spade Rudder is recommended, although either design may be used. Rudders shall comply with the following specifications. Rudder materials shall be in accordance with Section

5.1.1. The rudder shall be constructed as per the plans with the tiller head located above deck.

5.1.2. The rudder tube shall be located according to plan with the centerline of the rudder shaft 15' 8-1/8" (4.79 m.) +/- 1/2" (12.7 mm.) aft of the after side of Bulkhead #2.

5.1.3. The original rudder shaft shall be of corrosion resistant material having a minimum yield strength of 55,000 psi (379.2 N/sq.m) and shall be 1" (25.4 mm.) minimum diameter. The spade rudder (see 5.3) shall have a shaft of 1-1/8" (28.5 mm) minimum diameter. A spade rudder may have a 1" diameter shaft provided the material has a minimum yield strength of 100,000 psi (689.5 N/sq.m).

5.1.4. The position of the shaft in the original rudder shall be as shown in the official plans. The position of the shaft in the spade rudder shall be no more than 3" (76 mm) from the location shown on the Spade Rudder Diagram.

## 5.2. Original Rudder Shape

5.2.1. The rudder shall be not less than 1-7/8" (47.6 mm.) thick for 75% of its vertical dimension at a horizontal distance 5-3/8" (136.5 mm) abaft its leading edge.

5.2.2. The rudder side profile must be within 1/2" (12.7 mm.) of the plan dimensions.

5.2.3. The rudder cross-sectional shape is optional. The recommended shape is as shown in the official plans.

## 5.3. Spade Rudder Shape (Modified Rudder)

5.3.1. The rudder shall not be less than 2-1/4" (57.2 mm.) thick at control section B-B and 1-1/4" (31.75 mm.) thick at control section C-C, as shown in the Spade Rudder Diagram.

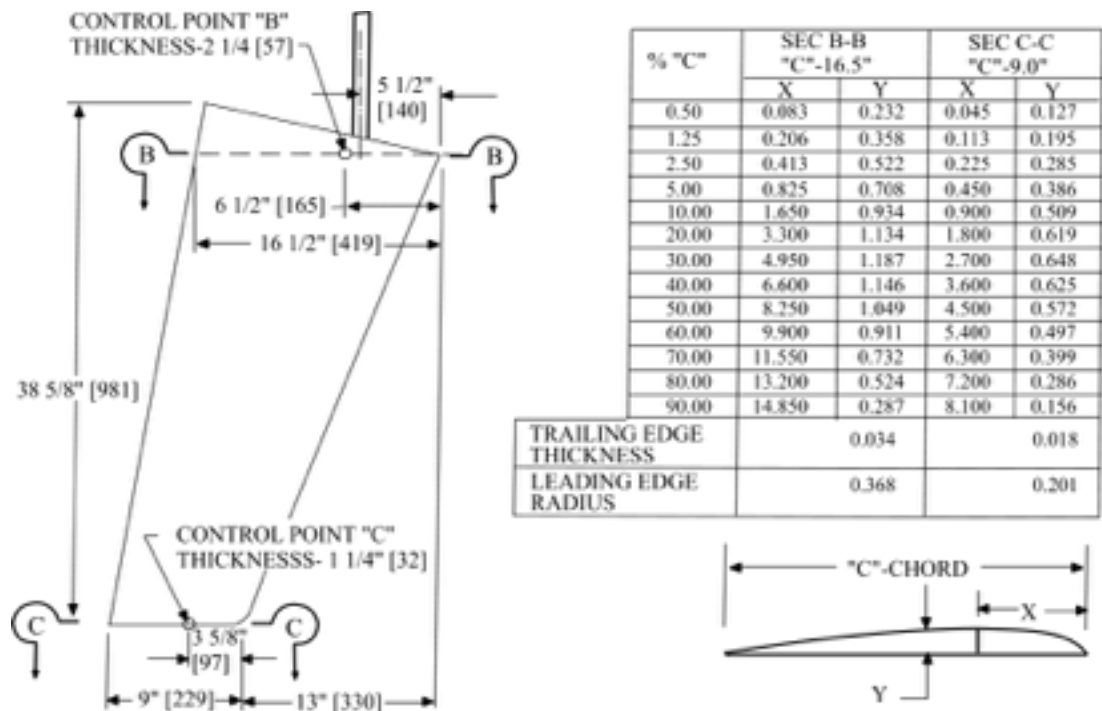
5.3.2. Rudder side profile dimensions are to be within 1/2" (12.7 mm.) of those shown in the Spade Rudder Diagram. Corners



may be rounded to a maximum of 1/2" (12.7 mm) radius, where not specified in the Diagram.

5.3.3. The rudder horizontal cross-sectional shape is optional, with a recommended shape shown in the Spade Rudder Diagram.

5.3.4. Rudder shall taper uniformly between control sections.



Notes: All measurements are in inches. (1 inch = 25.4 mm). Measurement control point "B" is on Section B-B at 40% Chord. Measurement control Point "C" is on Section C-C at 40% Chord.. The 5-1/2" rudder stock location shown is recommended, not required.

## 6. KEEL

6.1. Material The keel shall be of cast iron or cast steel having the following minimum properties:

6.1.1.Tensile strength: 35,000 psi (2460.8 kg/sq. cm).

6.1.2.Transverse bending strength:2600-3000 lb. (1179-1360.8kg) (1.2" dia. bar 18" centers) (30.48 mm. dia. bar 457 mm. centers).

6.1.3.Deflection: .22"-.34" (5.59 mm. -8.64 mm.).

6.2.Weight. Weight as specified by a certificate from the foundry shall be 1500 lb. (680.4kg.) minimum, 1560 lb. (707.6kg.) maximum. If no foundry certificate is produced, the keel must be weighed separate from the hull on a certified scale and verified by the measurer. Foundry weight for keels must be verified by a fleet measurer. For keels found to be over maximum weight, the additional weight must be removed by drilling holes at the bottom and sealed by welding. Holes must not exceed 6" (152.4 mm) in depth.

6.3.Shape The keel drawing in Reference 1 shall be referred to when applying this Section of the Specifications.

6.3.1.Horizontal profile (Section "B-B" of the plans, Ref 1) shall be measured by half section templates produced from expanding the profile of the two B-B sections (bottom of flange radius and 1/2" (12.7 mm) above the bottom of keel) by 1/8" (3.18 mm.) from the profile shape. Allowable tolerances are : tight against the template to 1/4" (6.35 mm.) minus with the exception of the trailing edge. This overall dimension is controlled by section 6.3.5.

6.3.2.Vertical profile (Section "A-A" of the plans, Ref. 1) shall be within 1/4" (6.35 mm.) of the sections as shown on the plans.

6.3.3.Radius at bottom edge shall be 0" to 1/2" (12.7 mm.) maximum.

6.3.4. Absolute side profile dimensions as shown on the plans shall be 3'8" (1.12 m.) +/- 1/2" (12.7 mm.) vertically and 48" (1.22 m) +/- 1/2" (12.7 mm) horizontally.

6.3.5. Location – The leading edge of the keel where it intersects the bottom of the yacht shall be 42" (1.06m.) +/- 1/2" (12.7 mm.) aft of the after side of Bulkhead #2. Boats with approved original measurement certificates which did not require recording this dimension are exempt from this measurement except if the keel is removed for other reasons. Re-installation of a keel shall be in accordance with this location specification.

6.3.6. Keel Thickness – The point of maximum thickness at the bottom of the flange radius including port and starboard halves is to be 1-3/8" (34.9 mm) minimum and 2" (50.8 mm) maximum. The point of maximum thickness at 1/2 inch above the bottom of keel, including port and starboard halves is to be 6-5/16 (160 mm) minimum and 6-7/8" (175 mm) maximum.

## 7. SPARS

### 7.1. Mast Construction

7.1.1. Construction shall be of wood or aluminum alloy. Wooden masts shall be constructed from mono-specie wood, weighing in excess of 20 lb./cu. ft. (320 kg/cu. m) at 15% moisture content. Aluminum masts shall be constructed from corrosion resistant, marine alloy. (Type 6061, heat treated to T6 condition, or equivalent. is recommended.)

7.1.2. The mast shall not be stepped above berth level, i.e., the mast butt shall not be shortened more than 16" (406.4 mm.) from its length if it was stepped on the keel.

7.1.3. The mast top shall be tapered for a length of not less than 10' (3.05 m.)

7.1.4. The mast shall not rotate and the butt of the mast shall not be moved during a race.

7.1.5. Equivalent suitable hardware may be substituted for that on the official plans provided that all standing rigging is per plan, and is attached to the mast with tangs external to the mast or with 'T' bar swage fittings and corresponding keyhole slot hardware. If desired, the lower end of the jumper shroud and the upper end of the lower shroud may be attached to the mast by means of a single tang. Running rigging, including the use of internal halyards, is optional.

7.1.6. A fixed stop shall be installed at the masthead to prevent the mainsail from being hoisted above the position as defined by the upper black band and/or the main halyard shall be suitably marked to effect the same results. See Section 7.3.1 for black band location.

7.1.7. A fixed stop shall be installed below the gooseneck to prevent the mainsail from being set below the position defined by the lower black band. See Section 7.3.1 for black band location.

7.2. Aluminum Mast Weight . Aluminum mast weight includes sail track, spreaders, jumper struts, jumper stays, tangs, sheaves, gooseneck track, and pole track or fittings and main, jib and spinnaker halyards. When weighing masts, halyards shall be in their hoisted position with external tails supported and not weighed. Forestay, backstay and all shrouds are to be removed. Jumper stays are to be installed.

7.2.1. Mast weight shall not be less than 94 lb. (42.7 kg).

7.2.2. Mast center of gravity shall not be less than 11'-3" (3.43 m.) above the upper edge of the lower black band.

7.2.3. Ballasting of the mast is permitted to achieve the requirements of Sections 7.2.1 & 7.2.2. Location and amount of ballast weight shall be recorded on the measurement certificate. Method to determine weight and center of gravity of mast:

7.2.3.1. Set up scales (platform type is preferred, or spring type bathroom style will do) on sawhorses or top of oil drum.

7.2.3.2. Lift mast on to scale and maneuver until balance position is achieved.

7.2.3.3. Determine difference between scale reading and required 94 lb. (42.7 kg). If less than 94 lb., obtain lead weights (1 lb. fish weights work well) to make up the difference.

7.2.3.4. Mark the required center of gravity on the mast; support the mast at this location with a single point support.

7.2.3.5. Place the lead weights at various positions to produce a balanced condition. This is usually at the butt and/or spreader areas.

7.2.3.6. If mast is in excess of 94 lb., but C. of G. is too low, remove weight from butt area and/or add to top part of mast.

### 7.3. Mast Dimensions

7.3.1. Two (2) 1" (25.4 mm.) black bands, or bands of contrasting color, shall be fixed to indicate the extremities of

the mainsail position on the mast. Position of upper edge of lower band shall be 32' 0"  $\pm$  1/8" (9.760 m  $\pm$  4 mm.) from truck (extreme top of mast). Position of lower edge of upper band shall be 12"  $\pm$  1/8" (305 mm.  $\pm$  4 mm.) from truck.

7.3.2. Spreader centerline position shall be 19' 0"  $\pm$  1/2" (5.80 m  $\pm$  13 mm.) from truck.

7.3.3. Jumper strut centerline position shall be 7' 9"  $\pm$  1/2" (2.36 m  $\pm$  13 mm.) from truck. Where port and starboard jumper struts are at different heights, the average location shall meet this dimension.

7.3.4. Intersection of the centerline of the forestay with the forward face of the mast shall be 7' 9-1/2"  $\pm$  1/2" (2.375  $\pm$  13 mm.) from truck.

7.3.5. The genoa halyard block shall be below the mast / forestay intercept.

7.3.6. The spinnaker halyard fittings shall be arranged so the lead to the spinnaker head is not be more than 1" (25.4 mm.) higher than the extension of the forestay to the mast and no more than 3" (76.2 mm.) from the leading edge of the mast.

7.3.7. Mast/Sheerline intercept shall be 34' 9-1/2"  $\pm$  1/4" (10.611 m  $\pm$  7 mm) from truck. (This mark may be a screw, copper tack, for wooden masts; or a center punch, file mark for aluminum masts.) Locate this mark on the rear centerline of mast.

7.3.8. Vertical position of mast, as installed in the boat, shall meet the following. The mast/sheerline intercept mark shall be within  $\pm$  1/2" (13 mm.) of a string which has been drawn tight between port and starboard sheerlines at back of Bulkhead #2. The sheerline is the external deck edge at side. An alternate method of locating the vertical position of the

mast is as follows: Lay a straight beam transversely across the boat along the aft edge of Bulkhead #2. Measure down to the sheerlines, port and starboard, and average the two readings. This average reading will be the distance from the center of the beam down through the mast hole in the deck to the mast/sheerline intercept mark. Measure from the beam to the mast step and use these values to calculate the length of mast below the mast/sheerline intercept mark.

7.3.9. Spinnaker pole attachment to front face of mast shall be 4' 3-3/4" (1.315 m) maximum above upper edge of lower 1" (25.4 mm.) black band.

#### 7.4. Mast Section measurements

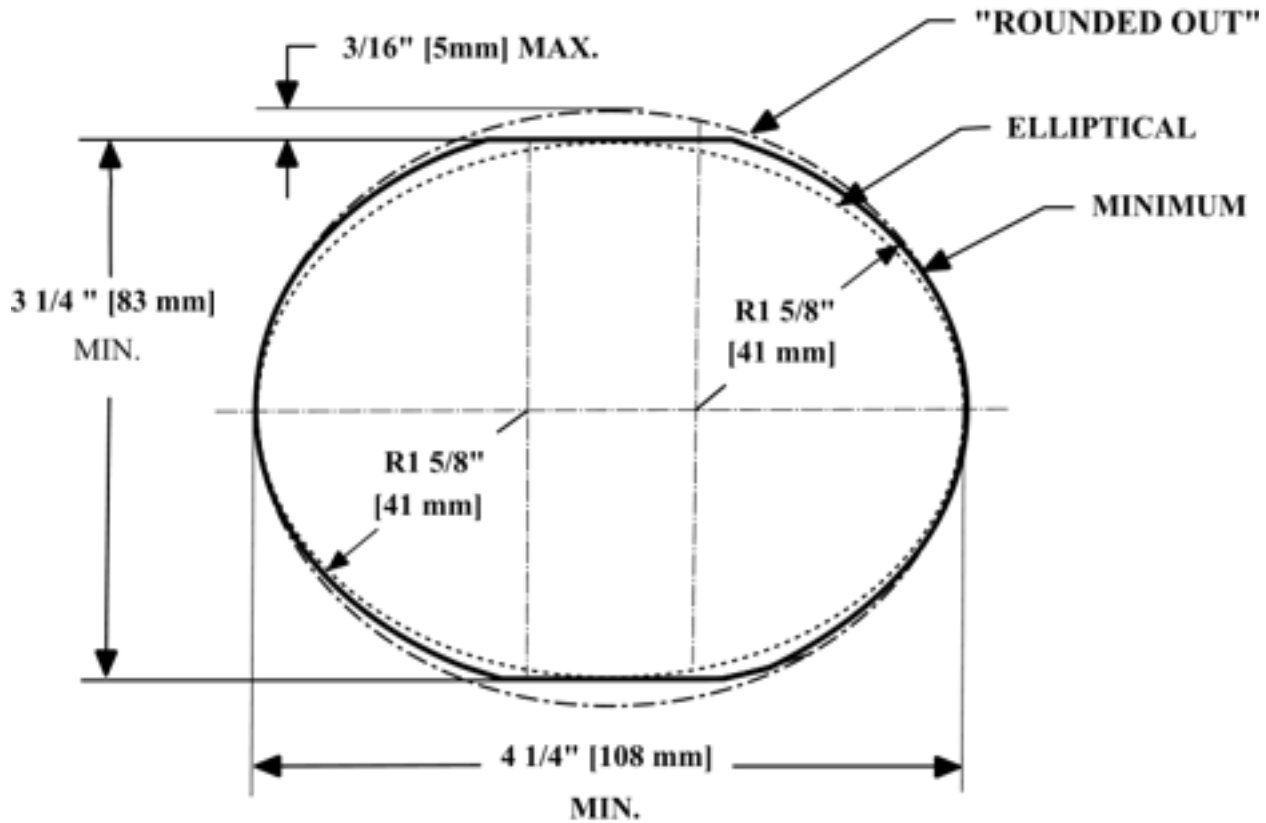
7.4.1. Except for existing wood masts measured before 15 August 1972, mast sections shall be as per plan, with a tolerance of - 0" + 5/8" (15.9 mm.).

7.4.2. At deck and spreaders: 3-1/4" x 4-1/4" (82.6 mm x 108 mm.) minimum. Corner radii: 1-5/8" (41.2 mm.) maximum.

7.4.3. At jumpers - 2-15/16" wide x 3-11/16". minimum. (74.6 mm. x 94 mm.). Corner radii: 1-1/2" (38 mm.) maximum.

7.4.4. At upper black band - 1-3/4" (44.4 mm.) x 2-1/8" (54 mm.) minimum. NOTE: There shall be no taper from the butt to the spreaders and taper above shall be as shown on the plans. Although only four measurements for cross-sections are listed, it is the intent that plan dimensions be followed and when this is in doubt, measurers shall apply all the sections as listed on the plans. These are minimums but the resultant taper must be a fair curve with no hollows.

\_\_\_\_\_ MIN. SECTION  
 - - - - - "ROUNDED OUT" SECTION - OK  
 ..... ELLIPTICAL SECTION - NOT ALLOWED



**MAST CONSTANT SECTION**

## 7.5.Spreaders

7.5.1.Construction shall be of wood or corrosion resistant metal. Aluminum alloy is recommended.

7.5.2.Spreaders shall be positioned in accordance with 7.3.2 and shall be solidly affixed to the mast. For maximum strength, the spreaders may be angled upwards length-wise from the mast attachment point. Swinging spreaders are not permitted.



7.5.3. Distance tip to tip (and shroud to shroud) shall be 55-1/4" (1.403 m.) minimum to 57-1/4" (1.454 m.) maximum with spreaders positioned in accordance with 7.5.2.

7.5.4. Wooden spreaders shall be constructed of solid wood and sized according to the plans (except that the length may be reduced to minimum as per 7.5.3).

7.5.5. Wooden spreaders shall be installed with the fore and aft width at right angles to the mast length, i.e., the spreaders may not be aligned with the heeled, close-hauled relative wind direction.

7.5.6. Wooden spreader edges may be rounded to a 1/2" (12.7 mm.) radius at the inner end decreasing linearly to a 3/8" (9.5 mm.) radius at the outer end. Streamlining or tapering in the fore and aft direction is not permitted.

7.5.7. Cross-section of wooden spreaders at mast shall be 4-1/4" (108 mm.) x 1" (25.4 mm.) minimum at mast.

7.5.8. Metal spreaders shall be untapered round tube of not less than 1-1/4 (31.7 mm.) OD.

## 7.6. Jumper Struts

7.6.1. Construction shall be of wood or corrosion resistant metal.

7.6.2. Jumper struts shall be positioned in accordance with 7.3.3, and shall be solidly affixed to the mast.

7.6.3. Length of struts from face of mast to strut tip shall be 18" (457.2 mm) minimum and 20" (508 mm.) maximum.

7.6.4. The cross tie between struts is preferred but shall be optional.

7.6.5. The angle between the struts shall be 85 to 95 degrees.

7.6.6. Wooden jumper struts shall be installed with their fore and aft width at right angles to the mast length. Their cross-section at mast shall be 1-7/8" (47.6 mm.) x 1" (25.4 mm.) minimum.

7.6.7. Corner radii of wooden struts shall be 1/2" (12.7 mm.) maximum at inner end decreasing linearly to 3/8" (9.52 mm.) maximum at outer end. i.e.; edges may be square or up to a full round but streamlining or tapering in the fore and aft direction is not permitted.

7.6.8. Metal jumper struts shall be untapered round tube of 1.0" (25.4 mm.) minimum diameter.

## 7.7. Boom

7.7.1. Material may be of wood or aluminum alloy as specified in Section 7.1.1.

7.7.2. Vertical depth (overall external dimension) shall not exceed the overall width of the narrowest cross section by more than 60% at any point along the boom.

7.7.3. An upright "T" boom section which conforms with the above dimensions is permitted.

7.7.4. Roller reefing is permissible.

7.7.5. A 1" (25.4 mm.) wide black band, or band of contrasting color, shall be fixed to indicate the aft extremity of the mainsail on the boom. The forward edge of the black band shall be 13' (3.962 m.) aft of the fair extension of the aft face of the mast sail track. For masts with internal sail tracks, the aft face of the sail track is the aft face of the mast. A

fixed stop shall be installed to prevent extension of the sail beyond the forward edge of the black band.

## 7.8.Spinnaker Pole

7.8.1.Construction material and cross-section dimensions are optional. Material may be wood or aluminum alloy as recommended in Section 7.1.1.

7.8.2.The overall length of the spinnaker pole, including fittings, shall be not more than 2896 mm or 9' 6".

7.8.3.The spinnaker pole attachment to the mast shall be positioned in accordance with 7.3.9.

7.8.4.Other Spars. No other spars are permitted. However, the spinnaker pole may be used from its normal point of attachment on the mast to the clew of the genoa or working jib provided it is carried on the opposite side from the main boom.

## 8. RIGGING

8.1.Standing rigging shall be of wire rope of diameter and strength not less than specified below.

8.2.Shrouds Adjustment shall be by turnbuckle only located above the deck. Position, number and length shall be as indicated in the plans except for the optional addition of one set of forward lower shrouds. See Section 4.2.2 for the location of the chain plates.

8.2.1.Forward lower shrouds – No minimum, no maximum.  
(5/32" (4 mm) recommended)

8.2.2.Upper shrouds – Minimum dia. 5/32" (4 mm.), no maximum.

8.2.3. After lower shrouds – Minimum dia. 5/32" (4 mm.), no maximum

### 8.3. Jumper Strut Stays

8.3.1. Minimum diameter 1/8" (3.2 mm.), no maximum.

8.3.2. Shall be affixed according to plan except that the lower ends may be extended to connect with the corresponding after lower shroud tang on the sides of the mast at the spreaders.

8.3.3. Adjustment shall be by turnbuckle only located above the spreaders.

### 8.4. Forestay

8.4.1. Minimum diameter 1/8" (3.2 mm.), no maximum.

8.4.2. Adjustment shall be by turnbuckle only located above the deck.

8.4.3. May be located aft of the bow extreme to comply with "J" measurements.

### 8.5. Backstay

8.5.1. Minimum diameter 1/8" (3.2 mm.), no maximum.

8.5.2. Backstay may be tightened by optional means up to a maximum of twelve (12) inches (304.8 mm.) after the owner has established a desired fore and aft position of the mast; provided that the means of adjustment incorporates a "fail-safe" device to assure the integrity of the rig.

### 8.6. Running Rigging

8.6.1. Running rigging may be sized, led and located at the owner's option provided that, in doing so, access to and use of cruising facilities and entrance to the cabin through the companion way is not restricted.

8.6.2. Sheeting arrangements for the mainsail are optional. The barney post may be omitted in favor of travelers or other devices.

## 9. SAILS

### 9.1. Sail Materials

9.1.1. No material other than woven Dacron shall be used in the mainsail and headsails, except that the genoa may, alternatively, be made of Kevlar reinforced, Dacron (polyester) substrate/mylar (polyester film) laminate, woven and/or laminated ply of either polyester, HMPE or aramid may be used, . No material other than woven nylon shall be used in spinnakers.

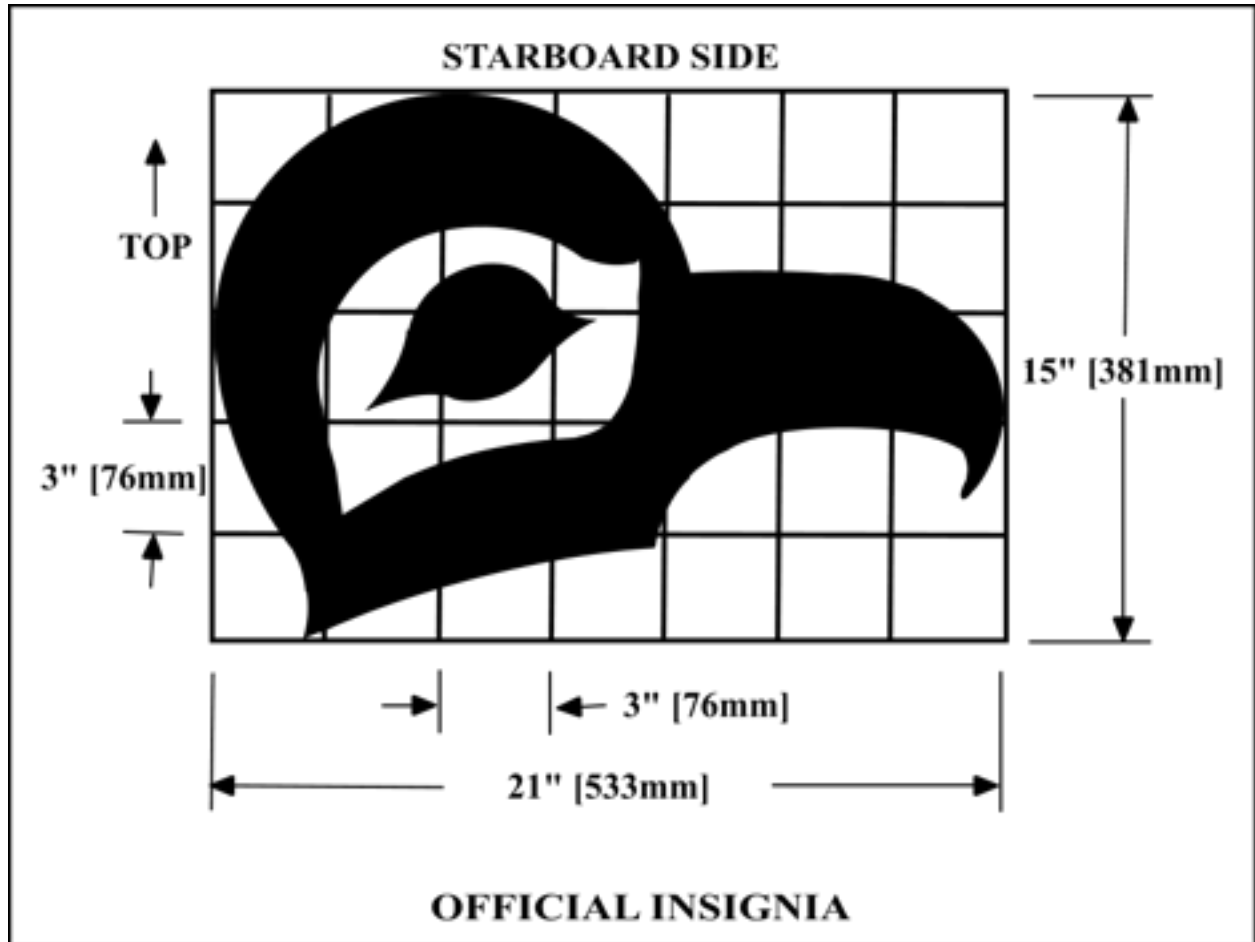
9.1.2. A certificate from the sailmaker stating the type and weight of the material used in each sail shall be available to the measurer for the initial measurement of a new sail. A sail maker's invoice shall be considered satisfactory.

9.2. Sail Windows Transparent windows the total area of which do not exceed 6 square feet (0.5574 sq. m.) may be fitted in each sail. Revised

### 9.3. Insignia and Numbers

9.3.1. The official Thunderbird class insignia, as set forth herein, will be fixed to both sides of the mainsail and to both sides of the spinnaker if obliged to do by the National Authority of the country in which the yacht is normally sailed. This official insignia will be fixed "back to back" on the mainsail

approximately 9'-5" (2.87 m.) from the head. Color shall be black unless designating a champion (see Section 9.3.3).



9.3.2. Each yacht shall carry the official registration number assigned by the Association, fixed to the mainsail and to both sides of the spinnaker if obliged to do so by the National Authority of the country in which the yacht is normally sailed. Numbers shall always be black and shall be sized and affixed to the mainsail according to current International Yacht Racing Rules.

9.3.3. Champions may use the following colored sail insignia: (Numbers shall be black)

- a.) International – Gold
- b.) National – Orange
- c.) Regional – Blue
- d.) Fleet – Red

These distinctive colors are the sole property of the skipper and shall remain with him if he should buy or build another yacht in which case the insignia on the original yacht shall be changed to reflect the status of the new owner.

#### 9.4.Sail Measurement Techniques

9.4.1.Main genoa and jib Dimensions shall be taken with the sails laid on the floor with only such tension applied to them to remove wrinkles. The corner of each sail shall be located by the intersections of the adjacent edges of the sail (extended if necessary) except for the mainsail head. At this location the corner shall be the forward upper corner of the headboard.

9.4.2.Spinnakers Dimensions shall be taken with the sail stretched between two people with no more than 5 pounds tension and no intermediate support for the sail between measurement points. Measuring tape shall assume same curve as the sail.

9.4.3.Any genoa or jib that has been previously measured and approved in accordance with the Black Book, but subsequently does not conform to one or more of the allowable minimum dimensions, shall be considered legal provided that;

- a.) No dimension of the sail exceeds the allowable maximum and the sail conforms in every other way to the requirements of the Black Book; and

b.) The sail has not been altered in any way since measurement and approval, except for localized repair of damage.

## 9.5.Mainsail

9.5.1. Minimum fabric weight: 4 oz./ 28" x 36" (113.4 grams / 711.2mm. x 914.4mm.)

9.5.2.The mainsail shall be attached to the mast so that the sail may be lowered and re-hoisted without the necessity of re-engaging the sail with the mast. Insertion of the luff rope in the slot or track is not permitted.

9.5.3.A loose footed mainsail is allowed

9.5.4.Adjustment to the foot of the main such as zippers, foot roach reefing strings and similar devices are permitted.

9.5.5.There shall be four (4) battens evenly spaced along the leech according to plan and shall measure: Upper – maximum length 33" (838.2 mm.). Intermediates – maximum length 55" (1397 mm.). Lower – maximum length 41"(1041.4 mm.).

9.5.6.Mainsail dimensions. Luff- 31' (9.449 m.) maximum.

Foot – 13' (3.962 m.) maximum.

Leech – 33' 3"(10.135 m.) maximum.

Mid-girth shall be found by folding the peak to tack and peak to clew, marking these mid-points and measuring width of sail between them. Maximum shall be 8' (2.438 m.).

Upper-girth shall be found by folding peak to mid-luff and peak to mid-leech, marking these mid-points and measuring between them. Maximum shall be 4' 9" (1.448 m.).

Lower-girth shall be found by folding tack to mid-luff and



clew to mid-leech, marking these mid-points and measuring width of sail between them. Maximum shall be 11' (3.353 m.).

The leech shall not deviate more than 3/4" (19 mm.) from straight lines between aftermost corner of headboard and top batten, between adjoining battens and between lower batten and clew.

Headboard shall not exceed 4-11/16" (119.1 mm.) horizontally.

## 9.6. Genoa

9.6.1. Minimum fabric weight: 3.25 oz/28" x 36" (92.13 grams/711.2 mm. x 914.4 mm.); Except the minimum fabric weight for a dacron (polyester) substrate/mylar (polyester film) laminate genoa shall have an average weight of not less than 4.5 oz/28" x 36" (127.5 grams/711.2 mm. x 914.4 mm.).

9.6.2. Means of genoa attachment to the forestay and on luff are optional provided (1) The sail may be lowered and stowed below deck without detaching forestay to remove sail; and (2) The sail is not hoisted in a grooved device.

9.6.3. Genoa Luff shall measure 24' 3" (7.391 m.) maximum, 23' 9" (7.239 m.) minimum.

9.6.4. Genoa Foot shall measure 14' 0" (4.267 m.) maximum, 13' 6" (4.115 m.) minimum.

9.6.5. Genoa leech shall measure 24' 0" (7.315 m.) maximum, 23' 6" (7.163 m.) minimum.

9.6.6. Headboard is not allowed.

## 9.7. Working Jib

9.7.1. Minimum fabric weight: 4 oz./28" x 36" (113.4 grams/711.2 mm x 914.4 mm)

9.7.2. Means of jib attachment to the forestay and on luff are optional provided (1) The sail may be lowered and stowed below deck without detaching forestay to remove sail; and (2) The sail is not hoisted in a grooved device.

9.7.3. Battens: Maximum of three (3) battens are permitted. They shall be evenly spaced along the leech according to plan. The upper batten length is not restricted provided the sail complies with 9.7.7. The remaining battens shall measure 28" (711.2 mm) maximum. – Revised

9.7.4. Jib luff shall measure 24' 3" (7.391 m.) maximum, 23' 9" (7.239 m.) minimum.

9.7.5. Jib LP (luff perpendicular) shall measure- 9' 0" (2.744 m.) maximum, 7' 6" (2.286 m.) minimum.

9.7.6. Headboards and/or clewboards are not allowed.

9.7.7. With the sail corners drawn tight, no portion of the jib leech may extend aft of a straight line between the head and the clew by more than 2 inches.

## 9.8. Spinnaker

9.8.1. The minimum weight fabric shall be 40 grams per square meter.

9.8.2. Spinnaker leeches shall measure 8130 mm or 26' 8" maximum.

9.8.3. Spinnaker girth shall measure 5220 mm or 17' 1" maximum.

## 10. WEIGHT REQUIREMENTS

### 10.1. Bare Boat Weight

10.1.1. The following equipment must be aboard when weighing and when racing:

- a.) Spars, standing and running rigging.
- b.) Floor boards.
- c.) Rigid bunk bottoms or bunk cushions
- d.) Mechanical toilet complying with local regulations.
- e.) Permanently installed sink complying with local regulations.
- f.) Permanently installed water tank of not less than ten (10) U.S. gallons (37.9 liters) capacity (tank empty).

10.1.2. Yachts will be weighed with all other removable equipment off-loaded. Hatches will be left on hoard. Permanently installed electronic gear, stoves, ice chests and drawers may be left in place but will be listed on the measurement form as comprising the minimum weight.

10.1.3. Yacht weight shall be not less than 3650 pounds (1659.1 kg.) when equipped as above. If the yacht weighs less than 3650 pounds (1659.1 kg.), compensating ballast shall be attached to the underside of the main deck.

### 10.2. Racing Weight

10.2.1. Class racing weight shall be 4000 pounds (1818.2kg.) minimum with the following required On board when racing:

a.) Engine, weighing 35 lb. (15.91 kg.) (minimum) as defined in manufacturer's specifications for net weight, stored aft of Bulkhead #5.

b.) Three U.S. Gallons (11.4 liters) of engine fuel minimum and a suitable fuel tank.

c.) 30 pounds (13.64 kg.) of ground tackle.

d.) Safety equipment required must comply with the regional Coast Guard (or equivalent agency) requirements and include at least:

1) Fire extinguisher – 2 lb. (.91 kg.) dry chemical or 4 lb.(1.81 kg.) CO<sub>2</sub>

2) Bilge pump.

3) One buoyant cushion or life preserver for each person aboard.

4) Hand, mouth or power operated whistle or horn capable of producing a blast of at least 2 seconds duration and audible for a distance of at least 1/2 mile (.804 km.).

5) Running lights.

10.2.2. The equipment added to the bare yacht weight to arrive at the minimum racing weight is to be normal racing and cruising equipment and not ballast. Personal clothing and consumable stores including water and engine fuel in excess of the minimum may not be included in the minimum weight.

## 11. INSTRUMENTATION

11.1. Only the following instruments and/or electronic devices shall be installed and capable of operation on the boat during any Thunderbird onedesign race.

11.1.1. VHF Marine radios.

11.1.2.Devices to decipher radio navigational signals (Loran, GPS, Differential GPS, etc.) that are not coupled to any other device(s) other than a cockpit repeater display.

11.1.3.Inclinometers.

11.1.4.Depth-measuring devices.

11.1.5.Water thermometers.

11.1.6.Knot-meters and logs.

11.1.7.Devices to measure windspeed relative to the boat (apparent windspeed).

11.1.8.Devices to measure angle of wind relative to the boat (apparent wind angle).

11.1.9.Devices to display instantaneous data only derived from Items 11.1.6, 11.1.7 and/or 11.1.8 only (i.e. VMG to windward, true windspeed, true wind angle).

11.1.10.Compasses which record and display previous boat heading data which may be coupled to any other device except 11.1.8 (wind angle measurement device).

11.1.11.Voltmeters, ammeters and the like which monitor the boats electrical system.

11.1.12.Engine-related devices which operate only while the engine is running.

11.1.13.Air thermometers, barometers and the like.

11.1.14.Stopwatches, timers and clocks.

11.1.15.Entertainment systems