

INTERNATIONAL TEN RATER CLASS

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INTERNATIONAL YACHT RACING UNION
MODEL YACHT RACING DIVISION



I Y R U
RECOGNISED
ORGANISATION

INTERNATIONAL 10 RATER CLASS RULES 1994

1 GENERAL

1.1 Purpose of the Measurement Rules

1.1.1 The Ten Rater is a Development Class.

1.1.2 The intention of these class rules is to give the designer and builder the freedom in design and construction, within the scope of these class rules, to build and produce boats which rate no greater than 10 calculated by the following formula:

$$\text{Rating} = L \times S \times 8$$

where L is the measured waterline length given in 3.4.3

and where S is the total measured sail area of the largest rig given in 6.5.1.

1.1.3 Anything not specifically prohibited by these class rules is permitted.

1.5 Units of Measurement

1.5.1 Unless specified to a greater number of decimal places, measurements and calculated values shall be taken and recorded as follows:

| Item | Units | Decimal places Measurement | Decimal Places Calculation |
|---------------------------|--------------------------|-------------------------------|-------------------------------|
| Length | millimetres | 0 | 0 |
| Measured waterline length | metres | 3 | - |
| Area | millimetres ² | - | 0 |
| Total measured sail area | metres ² | - | 6 |
| Rating | - | - | 2 |

1.5.2 Maximum and minimum values shall be taken as absolute limiting values. Measurements shall not be rounded before comparison.

1.5.3 Calculated values shall be correctly rounded to the required number of decimal places before recording.

1.5.4 Any previously calculated value used in subsequent calculations shall be the correctly rounded recorded value.

3 HULL

3.1 General

3.1.1 The boat shall be a monohull.

3.2 Hull

3.2.1 On every section below the waterline no point A shall be more than 3 mm below any other point which is on the skin girth between point A and the underwater centreline.

3.2.2 There shall be no hollows in the surface of the hull except:

- (a) 40 mm or more above the waterline.
- (b) 15 mm or less from the centreline.
- (c) hollows which do not exceed 1 mm in depth when checked with a straight edge of length 300 mm.

3.2.3 The forward 15 mm of the hull shall be made of elastomeric material. From the foremost point of the hull to the point where the bow profile is 45 degrees to the waterline, the thickness of elastomeric material shall not be less than 5 mm.

3.3 Identification Marks

3.3.1 The boat shall carry, either painted, engraved or moulded in, the boat's national letters and registration number.

3.3.2 On the external surface of the hull or deck these marks shall be displayed clearly and legibly, with a minimum height of 20 mm.

3.4 Flotation and Waterline Length

3.4.1 The waterline shall be established with the boat floating in fresh water in sailing trim and dry with the heaviest rig, including spinnaker and spinnaker boom in their normal positions if used.

3.4.2 Waterline denotes the water surface level remote from the hull.

3.4.3 The measured waterline length is the horizontal distance at the waterline between the inboard edges of the two waterline measurement marks placed as in 3.5.3 and 3.5.4.

3.4.4 The boat's waterline endings shall not fall more than 30 mm inboard of the inboard edges of the waterline measurement marks.

3.5 Measurement Marks

3.5.1 Measurement marks shall be of a colour which contrasts strongly with the the colour of the hull and shall be of uniform width between 2 mm and 6 mm wide.

3.5.2 A waterline measurement mark of minimum length 25 mm shall be placed near each waterline ending.

3.5.3 The aft edge of the forward waterline measurement mark shall be placed forward of the forward waterline ending.

3.5.4 The forward edge of the aft waterline measurement mark shall be placed aft of the aft waterline ending.

4 APPENDAGES AND BALLAST

4.1 Appendages

4.1.1 Appendages which join the hull more than 15 mm from the centreline and retracting appendages are not permitted.

4.1.2 No part of any appendage shall cut the water surface beyond the waterline measurement marks.

4.2 Ballast

- 4.2.1 Ballast material shall not have a density higher than lead (11.3 kg/dm³).

5 RIG

5.1 Spars

- 5.1.1 The measured area of the spar(s) of the largest rig shall be found using Appendix 1.

- 5.1.2 Where the measured area of the spar(s) found in 5.1.1 does not exceed 10% of the maximum permitted sail area:

- (a) this area shall be used to calculate the total measured sail area and
- (b) the measured area of spar(s) of smaller rigs found using Appendix 1 shall not exceed the measured area of the spar(s) of the largest rig.

- 5.1.3 Where the measured area of the spar(s) found in 5.1.1 exceeds 10% of the maximum permitted sail area:

- (a) the measured area of the spar(s) used to calculate the total measured sail area shall be found using Appendix 2 and
- (b) the profile of alternative spars shall fall entirely within the profile of the spar(s) of the largest rig.

- 5.1.4 A spar shall be considered to include any fitting that is faired into the spar.

- 5.1.5 One spar which does not exceed 22 mm in diameter is permitted to extend the tack and/or clew of each sail. These spars are not included in the total measured sail area.

- 5.1.6 The measured area of all other spars shall be found using Appendix 1 or 2 as appropriate and included in the total measured sail area.

- 5.1.7 Outriggers are permitted.

5.2 Spinnaker Boom

- 5.2.1 The spinnaker boom shall not extend more than J from the mast where J is given by the following formula:

$$(1.4 \times S) - \frac{\text{Area of mainsail plus supporting spar (or other sail area whichever is greater)}}{I}$$

where the area of the mainsail plus supporting spar and other sail area are as given in 6.5.1

and where I is the distance from the deck to the lower edge of the spinnaker hoist measurement band.

- 5.2.2 The spinnaker boom shall be controlled independently from the spar which extends the mainsail tack and/or clew.

5.3 Fittings

- 5.3.1 Fittings not faired in to a spar and no bigger than is reasonably required for their purpose shall not be included in the total measured sail area.

5.4 Measurement Bands

- 5.4.1 Measurement bands shall be of a colour which contrasts strongly with the the colour of the spar and shall be of uniform width between 2 mm and 6 mm wide.

5.5 Spinnaker Hoist

- 5.5.1 If a spinnaker is used, a spinnaker hoist measurement band shall be placed on each spar distance 1 from the deck.
- 5.5.2 The spinnaker hoist shall not be above the lower edge of the spinnaker hoist measurement band.

6 SAILS

6.1 General

- 6.1.1 Sails shall be made and measured in accordance with the current 'IYRU Sail Measurement Rules', except where varied herein. Where a term defined or a measurement given in the IYRU Sail Measurement Rules is used in these rules it is printed in '*italic*' type.
- 6.1.2 Battens need not be removed from sails during measurement.
- 6.1.3 Hollows in the profile of a spar or sail shall be bridged with a straight edge of length 200 mm to determine the length of any cross width measurement. The largest cross width formed by the bridge shall be the recorded cross width.
- 6.1.4 Discontinuous attachments on a sail *luff* shall be disregarded for the purpose of measurement provided their total length, measured along the *luff*, does not exceed 10% of the length of the *luff*.
- 6.1.5 Where a sail is fitted with a bolt rope or sliders which is/are held in a recess in a spar, the sail shall be measured ignoring the bolt rope or the sliders in the recess.
- 6.1.7 The profile of alternative rigs shall fall entirely within the profile of the largest rig.

6.2 Headsails

- 6.2.1 The mid girth of a headsail, measured between the mid point of the *luff* and the *half leech point*, may exceed 50% of the length of the *foot*.
- 6.2.2 Forestays and jib tacks need not be fixed approximately in the centreline of the boat.

6.3 Spinnakers

- 6.3.1 The construction shall be: *Soft sail*.
- 6.3.2 No battens or headboards are permitted.
- 6.3.3 A spinnaker may be attached by the head, clew and tack only.

6.4 Identification Marks

6.4.1 Sails shall carry identification marks in accordance with the IYRR.

6.4.2 The class insignia shall be **10 R** with figures not less than the following minimum dimensions

| | |
|-----------|--------------------------|
| Height | 24 mm |
| Width | 18 mm (except '1', 5 mm) |
| Thickness | 5 mm |
| Spacing | 5 mm |

6.5 Sail Area

6.5.1 The total measured sail area is the area of the largest rig excluding: spars as in 5.1.5, rigging with a diameter of less than 2 mm, spinnaker and fittings as in 5.3.1.

6.5.2 The measured area of *soft sails* and spars shall be found using Appendix 1.

6.5.3 The measured area of solid sails or solid/*soft sail* combinations including *double luff sail*/spar combinations shall be found using Appendix 2.

Effective 1 June 1994

APPENDIX 1

Sail Area Measurement for Spars and Soft Sails

1 SPARS

1.1 Un-tapered and Evenly Tapered

1.1.1 The measured area A_m of an un-tapered or evenly tapered spar is calculated as

$$A_m = 0.5 \times h \times (m_0 + m_n)$$

where h is the length of the spar above deck including any fittings and where m_0 is the width of the spar at its lower end and where m_n is the width at its upper end.

1.2 Other Profiles

1.2.1 The spar shall be positioned over the measurement grid perpendicular to the grid lines and with a grid line at deck level. Figure 1.

1.2.2 With the spar supported so that its maximum profile area is projected, crosswidths m_0 to m_n shall be measured from the leading edge to the trailing edge at and along all gridlines which the spar cuts.

1.2.3 The area of spar A_t above the uppermost gridline cutting the spar is calculated as

$$A_t = 0.7 \times m_n \times E$$

where E is the perpendicular distance from m_n to the highest point of the mast.

1.2.4 The measured area of the spar is calculated as

$$A_m = 50 (m_0 + m_n) + 100 (m_1 + m_2 + \dots + m_{n-1}) + A_t$$

2 SOFT SAILS

2.1 General

2.1.1 Where there is no clearly defined *tack point* or *clew point* on the perimeter of the sail, the sail shall be permanently marked to show the point(s) taken.

2.1.2 The sail shall be positioned over the measurement grid with the *tack point* and *clew point* on the same grid line. Where there is no clearly defined *tack point* or *clew point*, the marked position(s) shall be used instead. Figure 2.

2.1.3 The foot, leech and luff shall be tensioned sufficiently to remove any wrinkles.

2.1.4 The measured area of the sail is the sum of the areas A_1 , A_2 and A_3 .

2.2 Main Area - A_1

2.2.1 Crosswidths c_0 to c_n shall be measured from the *leech* to the *luff* at and along all gridlines which the sail cuts. Figure 3.

2.2.2 The upper boundary of area A_1 shall be shown by marking the *leech* and *luff* where they pass over the upper grid line.

2.2.3 The area A1 is calculated as

$$A1 = 50 (c_0 + c_n) + 100 (c_1 + c_2 + \dots c_{n-1})$$

2.3 Head Area - A2

2.3.1 The area A2 above the uppermost gridline cutting the sail is taken as

$$A2 = 0.7 \times c_n \times E$$

where E is the perpendicular distance from c_n to the highest point of the *sail*.

2.4 Rounded Foot Area - A3

2.4.1 The foot of the sail shall be placed on the measurement grid so that the points used in 2.1.2 are positioned on grid lines. The sail shall be so placed that the *foot* cuts the maximum number of grid lines. Figure 4.

2.4.2 Depths d_1 to d_n shall be measured from a straight line joining the *tack point* and *clew point* at and along all gridlines which the *foot* cuts.

2.4.3 The area of A3 is calculated as

$$A3 = 50 (d_1 + d_2 + \dots d_n)$$

Effective 1 June 1994

APPENDIX 2

Sail Area Measurement for solid and solid/soft combination (including double luff sail/spar combination) rigs.

1 MEASUREMENT METHOD

- 1.1 Rigs incorporating solid sails may have complex profiles. The measurement method given here describes the measurement of the larger elements of such a rig. *Soft sails* and small elements, such as small areas of supporting spars not enclosed by the sails, and end-plates shall be measured using the methods given in Appendix 1 where appropriate or, where these are unsuitable, by any suitable method. Details of all such measurements and calculations shall be given on the MF.
- 1.2 Each element within a group of elements, including those which retract into a parent, shall be treated as a separate larger element. Figure 5.

2 LARGER ELEMENTS

2.1 General

- 2.1.1 Where there is no clearly defined lower forward or aft corner of the element, it shall be permanently marked to show the points taken. Figure 6.
- 2.1.2 The element shall be positioned over the measurement grid with the lower forward corner and the lower aft corner on the same grid line. Where there is no clearly defined lower forward corner or lower aft corner the marked position(s) shall be used instead. Figure 6.
- 2.1.3 The measured area of the element is the sum of the areas A1, A2 and A3.

2.2 Main Area - A1

- 2.2.1 Crosswidths measurement points shall be permanently marked on the luff and leech where they pass over the gridlines.
- 2.2.2 Skin girths g_0 to g_n shall be measured at and along all gridlines which the element cuts. Figure 7.
- 2.2.3 The skin girth at each gridline shall be taken as the distance from the trailing edge, round the surface of the element, to the same point. Any flaps shall be in a position to give the greatest girth. Figure 9.
- 2.2.4 The half girth c_n at a gridline is one half of the skin girth g_n at that gridline.
- 2.2.5 The area A1 is calculated as
- $$A1 = 50 (c_0 + c_n) + 100 (c_1 + c_2 + \dots c_{n-1})$$

2.3 Head Area - A2

- 2.3.1 The area A2 above the uppermost gridline cutting the element is taken as
- $$A2 = 0.7 \times c_n \times E$$

where E is the perpendicular distance from c_n to the highest point of the element.

2.4 Rounded Foot Area - A3

2.4.1 The foot of the element shall be placed on the measurement grid so that the points used in 2.1.2 are positioned on grid lines. The element shall be so placed that the foot cuts the maximum number of grid lines. Figure 8.

2.4.2 Depths d_1 to d_n shall be measured from a straight line joining the lower forward corner and the lower aft corner at and along all gridlines which the element cuts.

2.4.3 The area of A3 is calculated as

$$A3 = 50 (d_1 + d_2 + \dots d_n)$$

Effective 1 June 1994

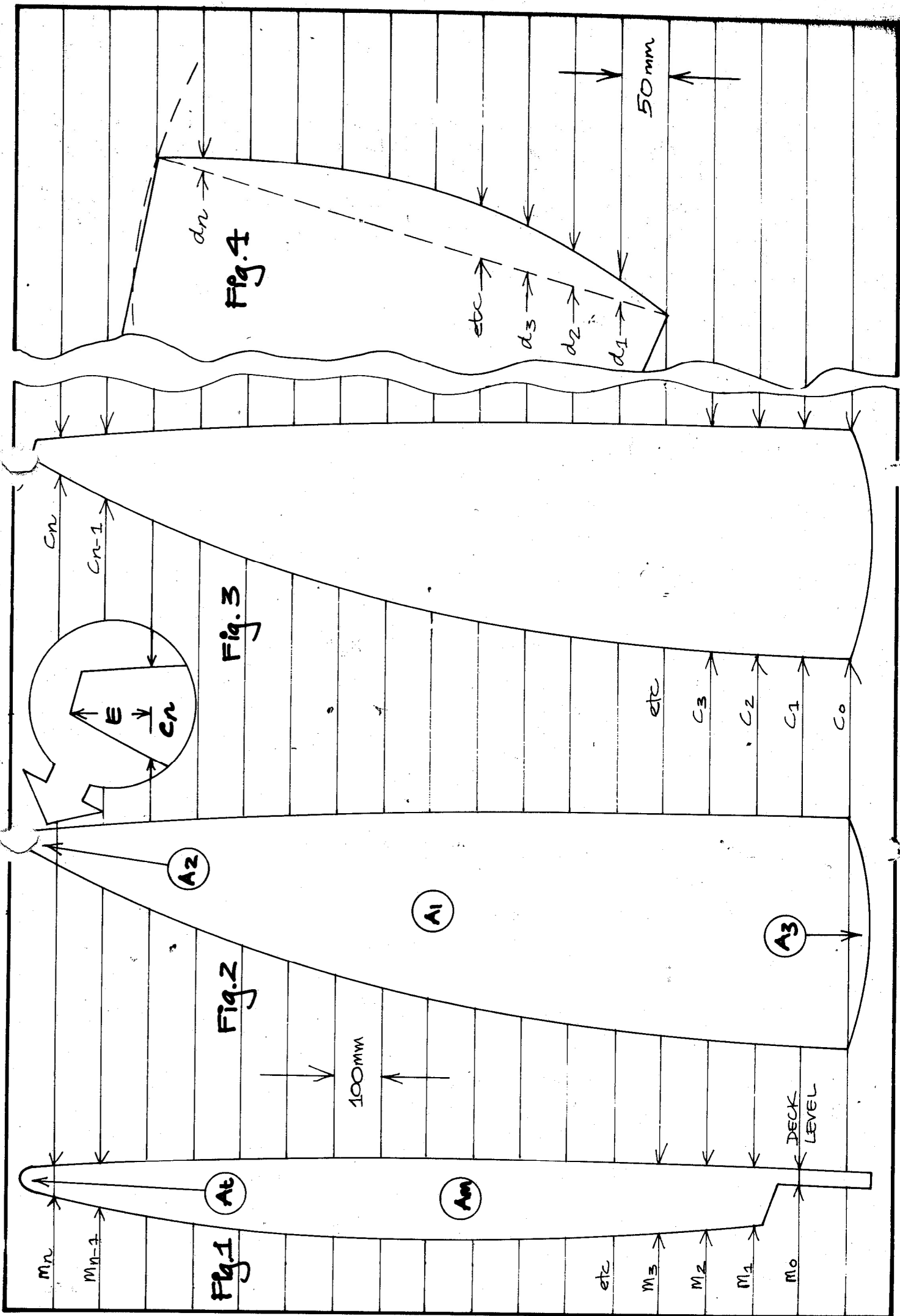


Figure 5

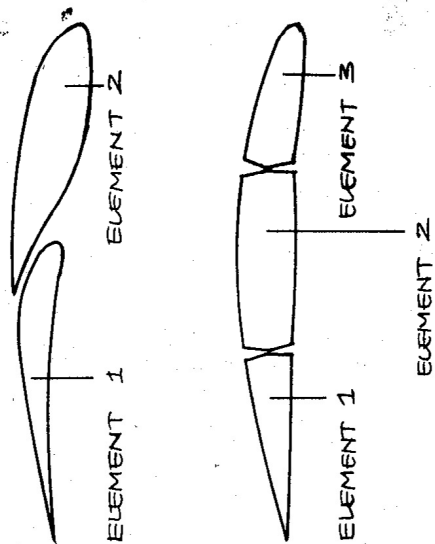


Figure 9

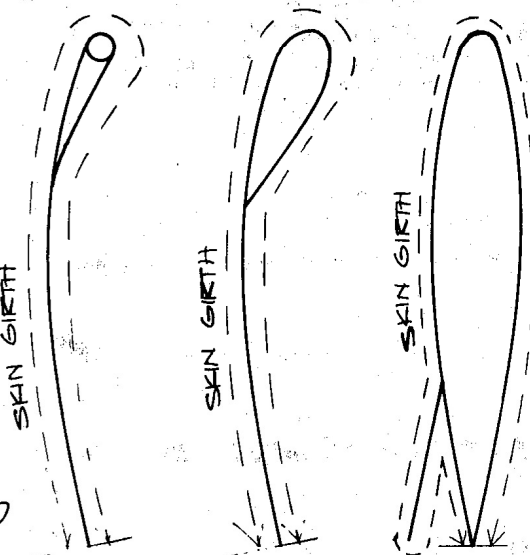


Figure 6

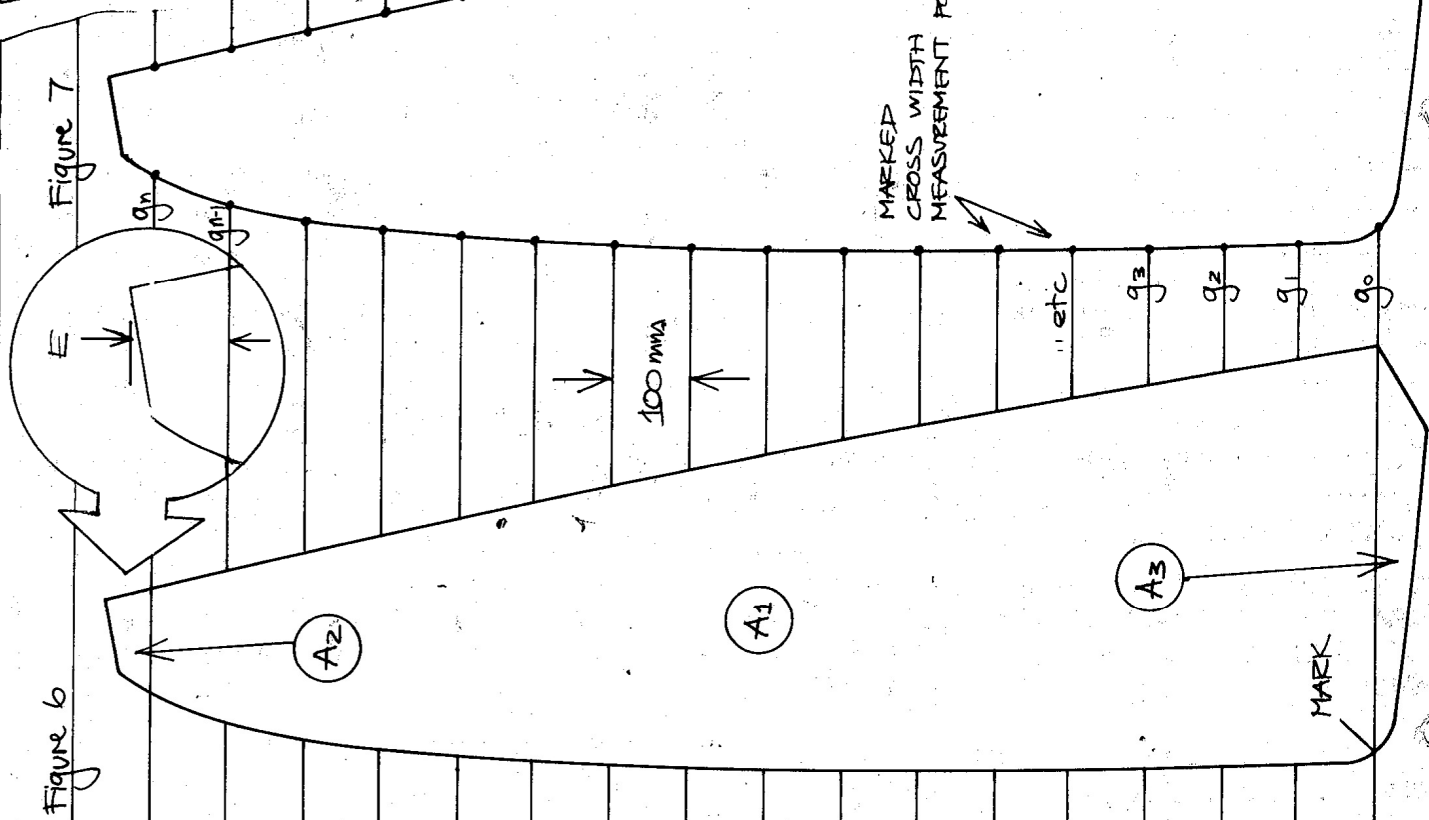


Figure 7

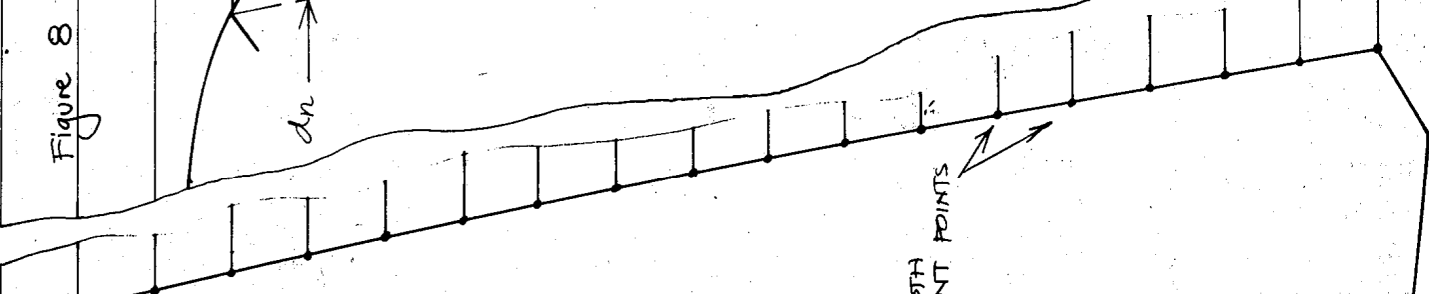


Figure 8

