

A Guide to the Multi, Single-Strand Cruciform Turk's Head

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Previous publications

On Various Cruciform Turk's Heads
April 1997

Sliding Template Method for Designing Cruciform Turk's Heads
1998

Supplements to previous publications
April 2001

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ISBN 0 9515506 7 5

Preface

This book is a rewrite and update of two booklets I have written and published on the subject of Cruciform Turk's heads. Titles being *On Various Cruciform Turks Heads* and *Sliding Template for Designing Cruciform Turk's Head*, thus enabling me to provide additional tables, more details for reference, more diagrams and correction of errors; and that the text will be easier to follow.

Finally, I have been a member of the International Guild of Knot-Tyers for 18 years and wish to thank members for encouraging me to put into print my findings on this difficult subject. My special thanks to Geoffrey Budworth for his advice and encouragement without which I would have found it more difficult to compile this book; a staunch pillar of the Guild.

Abbreviations

B	= bights
CTH	= Cruciform Turk's head
CD	= common divisor
CYLIN	= cylindrical
e.g.	= example
E/W	= east/west
KM	= Knotting Matters
L	= leads
N/S	= north/south
R	= run
SS	= single-strand
STR	= strand
TH	= Turk's head
U	= unit
X	= column of leads
Y	= row of leads

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I first became interested in Cruciform Turk's heads after reading Captain Allan McDowall's most excellent article on the subject in *Knotting Matters*, Volume 17 (1986). It was about three years before I made any serious attempt at researching the subject, I was successful with Allen's 'T' shape, and two stranded CTH but with further research I was eventually successful.

The 'Origami' method also illustrated in *Knotting Matters*, Volume 16 is highly recommended. This is the method I use to tie my spherical, cruciform, and conical shaped knot coverings.

Turk's heads have always had a special place in the knot-tyers repertoire, especially in the field of decorative knot-work. The main variants of the Turk's head are well documented in the *Ashley Book of Knots* relating to SS runs and the rule of the 'common divisor'.

Spheres are quite often covered with a running Turk's head, the appearance of the finished knot not always meeting with the approval of the knot-tyer.

Pieter van de Griend showed us in his *S4C* publication, how the Turk's head with the application of a very clever mathematical formula, was transposed to make a far superior spherical and cone covering.

To my knowledge very little has been written on this special category of Cruciform Turk's head, which does have its own unique problems; hence my attempt to shed a little light on the subject by publishing my two earlier booklets.

The degree of competence in knot-tying is understandably very varied among Guild members ranging from the expertise of the specialist and the more experienced knot-tyer to the amateurism of the beginner. So it is imperative that the exchange of knowledge and ideas between members is essential for the Guild to continue to flourish. One should not be afraid to express ones ideas, be assured some knot-tyer will only be too pleased to put one on the right track; part of the learning process. This was brought home to me at the October 1997 Guild meeting in Liverpool. I was discussing further ideas I had on the overall complexities of the Cruciform Turk's head with a couple of prominent Guild members, one a well known author and prolific subscriber of articles in *Knotting Matters*. They emphasised that it was my duty as a

Guild member to write and publish any extra findings I had made on the Cruciform Turk's head irrespective of errors I had made in my earlier publications.

One needs to be clear on the definition of a Cruciform Turk's head. There being two types, the cylindrical that is the orthodox Turk's head and the Turk's head made and tied in mat form, and seen in Celtic knot-work. I emphasise this so that there is no confusion reference the drawings and illustrations. They are all cylindrical Turk's heads and Cruciform Turk's heads. Two drawings are needed to place round the former to complete the knot Fig. 1 (p9). A Cruciform Turk's head is simply the crossing of one Turk's head by one other, hence the word 'cruciform'. To tie the knot with a single strand it is essential one Turk's head has an odd number of leads and the crossing Turk's head has an even number of leads. The knot is asymmetrical. The rule of the common divisor does not always apply with every set of parameters. I refer to Fig. 1 as being basic, there are three other basic shapes see line drawings Fig. 2 (p9).

Place the two drawings round the former and glue at the overlaps allowing a little slack, this makes it easier to sew in the pilot lead with thin twine (Origami method). This pilot lead serves two purposes, first, by measuring the length of twine used to tie the knot, this measurement plus an extra couple of feet is the length necessary of the cordage to cut to complete the knot without running short; nothing more annoying. Secondly, by following the pilot lead one is less likely to make mistakes when tying the knot. To complete, dispose of pilot lead and drawing and work the knot up snugly round the former. I have adopted Captain McDowall's 'Origami' method with slight modifications to suit my own method of planning and tying Cruciform Turk's heads. I am aware, and I am sure Captain McDowall is aware that origami is the Japanese art of paper folding; so please do not pick up on this point.

The centre from rolls of kitchen foil and cling film make ideal formers Fig. 3 (p10), which can be stained and varnished, mahogany gives a good background effect.

All illustrations and parameters are for 6 bight Cruciform Turk's heads with single and multi-strand runs.

I have designated the north/south perpendicular Turk's head as the X column having the odd number of leads, and the east/west Turk's head having the even number of leads as the Y rows. By sliding the Y row in any direction of the four points of the compass one can alter the lengths, and therefore the number of leads in each arm of a Cruciform Turk's heads knot. This is explained in more detail in the Sliding-Template method section. The single strand Cruciform Turk's head in Fig 1 has the parameters as follows $X17L-6B + Y18L-6B = 35L-12B$, but, using the same total i.e. $35L-12B$ arrived at by a different set of parameters i.e. $X15L + Y20L$ the number of strands it takes to tie is 3. The common divisor does not apply in either example. Refer to table 'A' 6B Fig. 16 (p24) for number of strands to tie any Cruciform Turk's head with combination of X + Y leads, 36 sets of parameters in all; bearing in mind the rule of the common divisor is not always applicable.

The area where the two Turk's heads bisect each other I refer to as a 'unit'. This unit area becomes the axis when the sliding template is rotated to find new Cruciform Turk's head shapes. The unit is in fact a $6L \times 6B$ Turk's head, see Fig. 5 A and B (p12). By blanking this unit Fig. 5, one finds that the Cruciform Turk's head is comprised of four separate Turk's heads, one tyable single-strand the other three not so. Reintroduce the unit to complete Cruciform Turk's head, remove the northern arm to produce a 'T' shape, tyable single-strand, Fig. 5D. To form a Crucifix lengthen the southern arm by additional units, Fig. 6 (p13), tyable single-strand.

The next point to consider is the direction of the string run at the four crotches. Fig. 7a (p14) shows an open crotch where the string run gives a hexagonal shape at each of the four crotches. Fig. 7b shows a crossed crotch where the string run gives two pentagonal shapes, each of the four crotches. The two types of string run cannot be mixed during the tying of the knot. With certain parameters the type of crotch can determine the number of strands it takes to tie the knot.

Rings or circles can be used in the design and shape of Cruciform Turk's head knots used for covering Celtic Crosses, ships steering wheels, wheel valves etc. The number of strands it takes to cover a ring with a Turk's head ring-knot is equal to the number of bights of the

Turk's head. I have worked out a formula for tying the ring-knot with two strands, which will give a symmetrical basket weave, Fig. 8 (p15). Convert to metric a seven-inch by one inch ring

$$\text{formula} = \begin{array}{l} 7'' \text{ dia.} = 560 \text{ mm} \\ 1'' \text{ dia.} (80 \text{ 6B}) \end{array} \quad \times 2 = 84 \text{ mm} = 84\text{L} \times 6\text{B}$$

reduce or increase the 84L by two to 82L or 86L, the ring knot can then be tied with two strands. This formula holds good for any Turk's head ring-knot, irrespective of the number of bights. In the 6B example just given, the number of Leads will increase by 14 for each increase of a Bight, i.e. 5B = 70L, 6B = 84L, 7B = 98L, constant for that size ring. I call this Progression of Leads. Every different sized ring will have it's own Progression of Leads, i.e. a 8 inch dia. x 1 inch thick ring will Progress by 16, 5B = 80L, 6B = 96L, 7B = 112L, again a 7 1/2 inch x 5/8 inch will progress by 30 Leads i.e. 5B = 150L, 6B = 180L, 7B = 210L.

The Celtic cross is a member of the family of Cruciform Turk's head knots. A study of George and Iain Bain's book on Celtic knot-work illustrates various types of cruciform crosses in mat form. The Celtic cruciform cross is seen extensively in churchyards throughout the British Isles. Here we are concerned with the Celtic cross in its cylindrical form of a Cruciform Turk's head. A combination of a circle and a Cruciform Turk's head make the whole. Extra care is needed when following the strand run at the crutch there are four extra axes to contend with, see Fig. 10 (p17), also the circle having two radii does make it a little more difficult to tie single-strand.

Celtic cross No.2 takes two strands to tie. The main difference between the two crosses is that the four arms of No. 2 cross, have the same equal number of leads, the common divisor rule applies. One can extend the southern arm by additional units. The string run at each of the five axes produces four pentagonals, again, extra care needed when tying. After gluing the two drawings round the former a careful study of Fig. 11a (p18) is advisable to avoid errors at the crotches.

The use of two coloured cords helps, and adds to the attractiveness of the knot, see Fig. 9 (p16) for example.

Multi and single strand Cruciform Turk's heads can be used to cover ship steering wheels, and smooth rimmed racing yachts helm. Figs.

12 and 12a (p19) are simple basic examples of the two types of wheel referred to, Fig. 13 (p20) is a photograph of a boat's four-spoked wheel which I have covered single-strand. Note the hub is incorporated in the knot.

The parameters are $X53L - 6B = 17 - 6B$ = single-strand,
 $Y54L - 6B = 18L - 6B$

ring leads of 72 not necessary in calculations. The illustration in Fig. 13a is of a standard ship's wheel, hub not covered,

parameters are $X25L - 6B = 13L - 6B$ = 5 strand to tie,
 $Y168L - 6B = 12L - 6B$

ring leads of 96 not necessary in calculations. Reason for the omission of the ring leads is that they constitute an even number of units and being divisible by 12 cancel themselves out when reducing the quoted parameters by 12 to read off, using Table 'A' 6 Bight, the number of strands needed to tie the knot. With a slight adjustment of the parameters for covering an eight-spoke wheel e.g. just increase the king spoke by one lead and reduce the remaining seven spokes by one lead.

After researching single and multi-strand Cruciform Turk's heads and the covering rings with a symmetrical basket weave, I decided to find out if it was possible to tie a Cruciform Turk's head which I have called a Globular Frame. Four longitudes passing through the equator and the north/south poles. So far I have not been able to connect the southern ends of the longitudes together to complete the whole Fig 14 (p22), it takes two strands to tie.

A study of Fig. 15 (p23) will show that the global frame Fig. 14 is a Celtic cross shape, the dotted lines representing the equator Global frame, and ring of Celtic cross shape. The new shape Fig. 15, has the same parameters as Fig. 14 but takes six strands to tie. By reducing the number of leads at the equator by eight the new shape Fig. 15, can then be tied with two strands. Again one has the choice of using coloured strands for multi-strand knots.

It is not every knot tier who wants to tie Cruciform Turk's heads with a single strand. One should have the option of tying a Cruciform Turk's head with more than one strand. This option gives the tyer the use of coloured strands and enhances the beauty of the knot. From the tables

Figs. I6 (p24) and 17 (p25) the tyer does have this choice.

Each table is the square of the bights it represents i.e. Table 'A' 6B, gives a total of 36 individual Cruciform Turk's heads. The shape at the crotch of a Cruciform Turk's head can take two forms, one shape being hexagonal, I refer to as an open crotch. A crossed crotch is when the strand run crosses at the crotch to give two pentagonals Fig. 7a (p14). All three tables have been tabulated with the strand run crossed at the crotch. I purposefully draw ones attention to the crotches for I have found that certain sets of parameters when tied with either a open or crossed crotch take a different number of strands to tie;

for example $\begin{matrix} X23L - 10B \\ Y24L - 10B \end{matrix}$ from table 'C' 10B

takes five strands to tie with a crossed crotch, when tied with an open crotch the knot takes seven strands to tie.

There are similar examples in all three tables, which I have not recorded, also more anomalies occur when the rule of the common divisor applies.

Table 'C' 10B, has been compiled to show the number of strands it takes to tie Cruciform Turk's head with a crossed crotch. Compare with table 'D' which shows the number of strands to tie when using the same parameters heavily underlined in table 'D', compare parameters, table 'C' 10B columns X 19L and X 21L and row Y20L with the same parameters table 'D' 10B,

There appears to be a lack of conformity where the sum of the XL's + YL's are divisible by five only the Y30L's, row ten bight tables appear to comply, examples blocked out table 'D'. One can well understand the knot-tyer being confused and even discouraged by these apparent contradictions.

It is not necessary to enlarge the tables to find the number of strands it takes to tie Cruciform Turk's heads with much larger parameters; simply reduce the X + Y Leads by multiples of bights one is using to tie

the knot, e.g. using table 'C' $\begin{matrix} X143L - 10B \\ Y124L - 10B \end{matrix}$ divide by 10, number of

bights, = $\begin{matrix} X23L - 10B \\ Y24L - 10B \end{matrix}$ read off the result table 'C' the larger

Cruciform Turk's head takes five strands to tie.

I have doubled checked the correctness of the four tables, Figs. 16 and 17, by tying, but not with cord, all combinations of XL's + YL's which give the number of strands to tie the Cruciform Turk's head. Using the appropriate former, Fig. 3, and with a soft leaded pencil mark off the Cruciform Turk's head parameters on each arm, select a bight to start from and follow the weave spot marking each bight on arrival. When one has returned to the start with all bights spotted, the knot is tyable single-strand. If more starts are needed to account for unspotted bight, then the number of strands it takes to tie the knot is equal to the number of starts. Erase all pencil markings with a soft rubber (eraser) repeat process with a new set of parameters. The method is fast and provable. Half a dozen knots can easily be tied within an hour.

In this final section I will be explaining the use of the 'Sliding Template' which, will, I feel sure greatly assist the knot tyer to form a variety of Cruciform Turk's head shapes. Assemble template as Fig. 18 (p26). Illustrated measurements for guidance only, basket weave on all surfaces to be drawn as for normal former. A study of Fig. 18 is reasonably understandable.

Additional double and single components are needed, Fig. 19 (p27), so that more Turk's heads can be used as branch Turk's heads thereby developing new shapes and of course new sets of parameters Fig. 20 (p28). These extra components for use with the sliding template reminds me of the Meccano sets I played with in my childhood.

The movement of the sliding template rotating round the axes of column X11L + rows Y12L to Y22L's six bight table 'A', gives the shapes and number of leads, where applicable for the arms of all Cruciform Turk's heads formed. Fig. 21 (p29) is the full table. The axes are heavily outlined and tied with an open crotch. The columns on either side of the central column are mirror images of each other, Fig. 22 (p30) is complimentary to Fig. 21 giving the number of strands needed to tie the shapes produced by the rotating movement of the sliding template. The total number of Cruciform Turk's head shapes that can be formed and tied sets of parameters table 'A' 6B is 1188. A breakdown of this total is given in Fig. 23 (p31). Only the X11L's column has been used to

produce these tables, the total for this column being 108 shapes, the five remaining columns have yet to be assessed. Knot tyers are familiar with the Cross and Tee shapes of Cruciform Turk's heads, but, possibly, not with the right angle shape, Fig 24 (p31), which I discovered when using the sliding template. Do not confuse this right angle with the 90°-curved Turk's head, which is in fact only a straight Turk's head. I tied this knot and gave it to Pieter van de Griend, who at the time was editor of the *Dutch Knotting Matters*, when he visited me late 1997. Pieter remarked that he had no knowledge of this knot. He published two articles in the *Dutch Knotting Matters* No. 13 and No. 17 on my sliding template method and included a drawing of the knot, which he referred to as a 'Knee knot'. The name sounded appropriate and about right and so a 'Knee knot' it shall be called. On a lighter note, considering the odds against, can I lay claim to discovering a new knot?

I feel that there has to be more research done on Cruciform Turk's heads considering the contradictions I have encountered. The enclosed photographs I think will show that my effort into this field of knot tying is proof that I have to some degree got it reasonably right, especially the single-strand knots, one hasn't a load of ends to dispose of.

More patience is needed when tying Cruciform Turk's heads knots to avoid errors and when working up the knot as great lengths of cord are sometimes needed to tie them; especially when doubling or trebling the knots. I hope this book will be of some help to all knot tyers.

Fig. 1

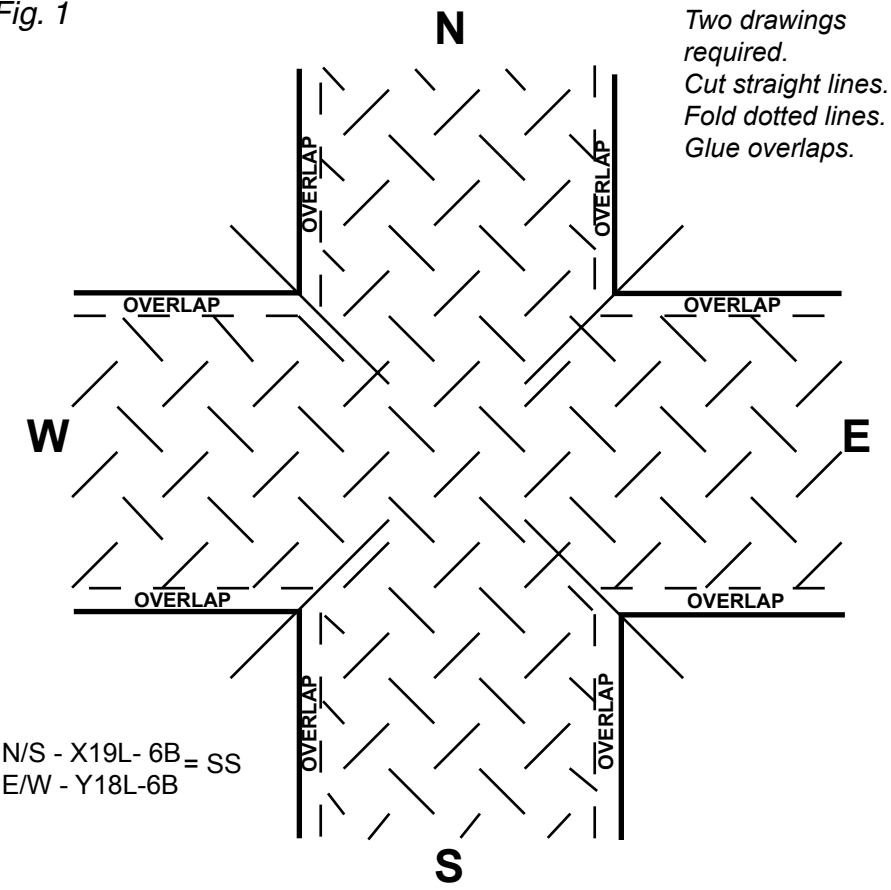
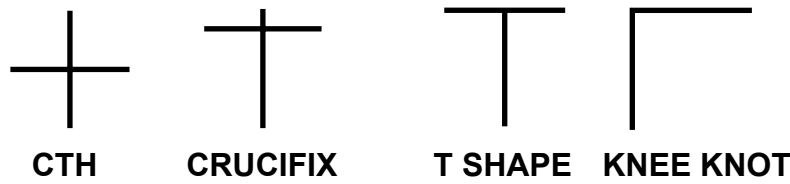
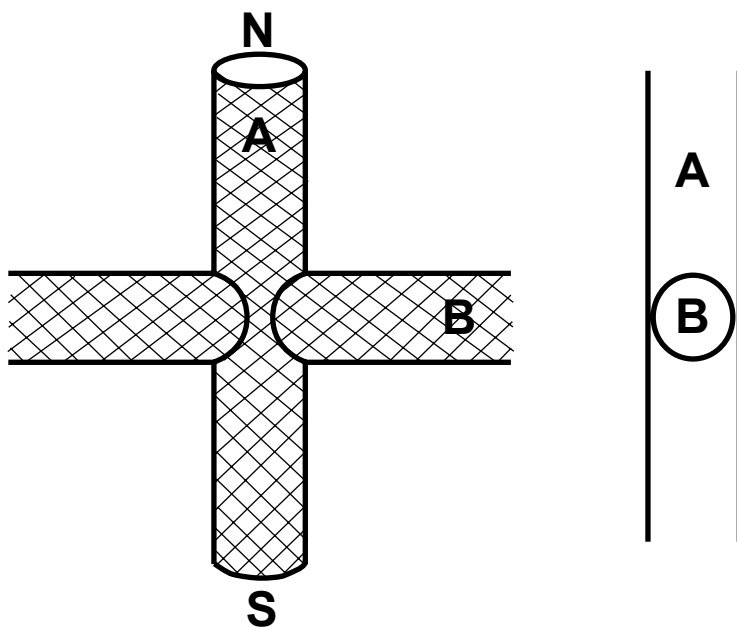


Fig. 2





x 17L x 6B
y 14L x 6B
= SS CTH

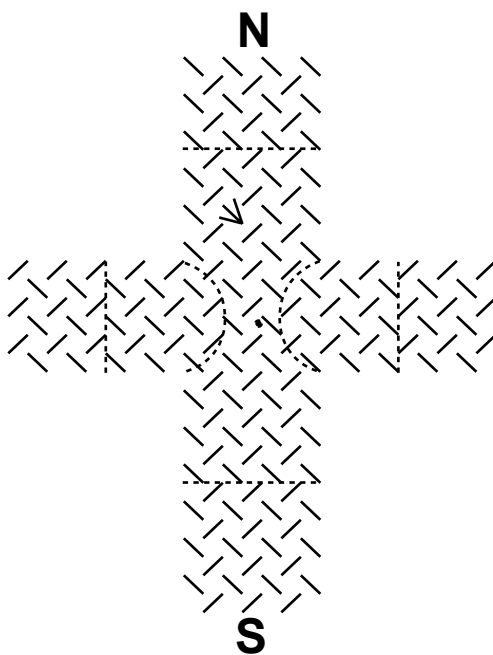


Fig. 3

Fig. 4

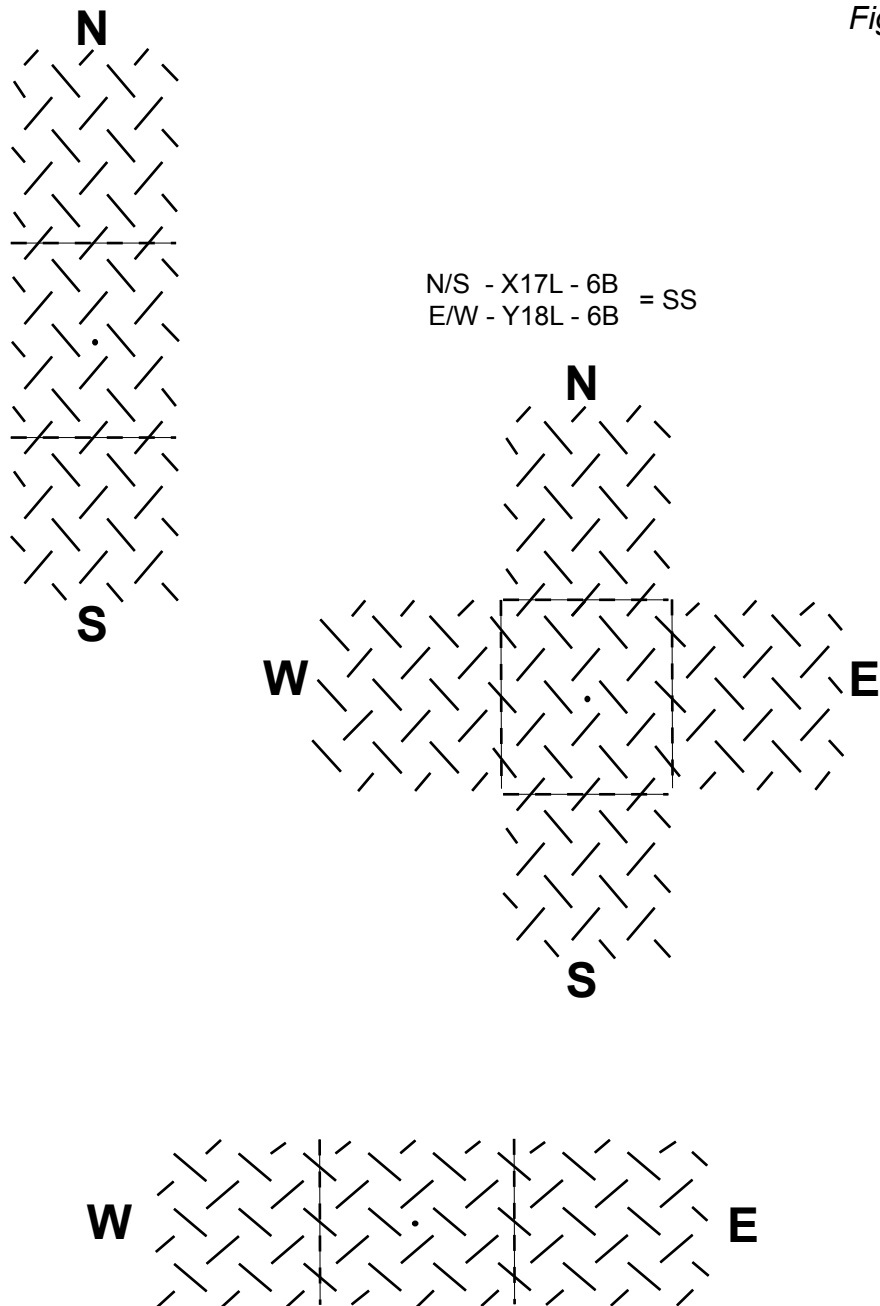


Fig. 5A

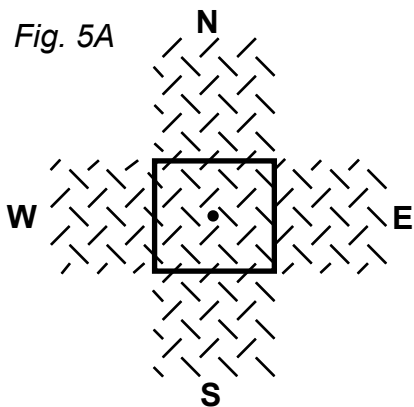


Fig. 5B

6L x 6B
One unit

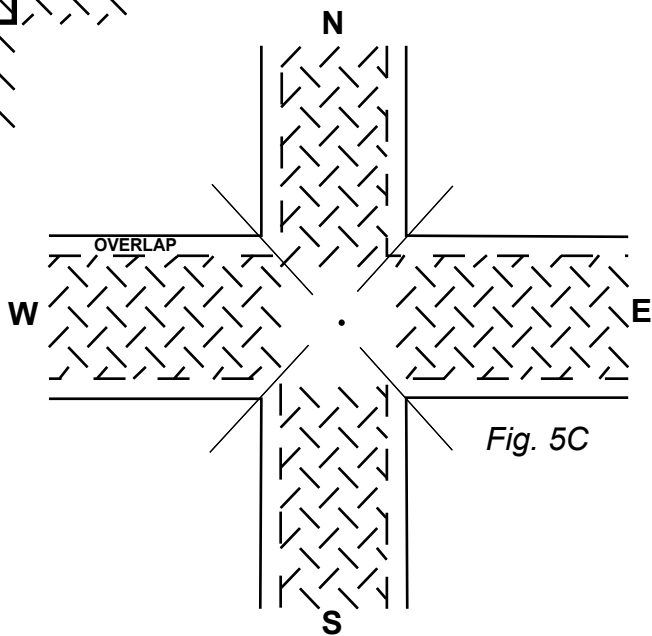


Fig. 5C

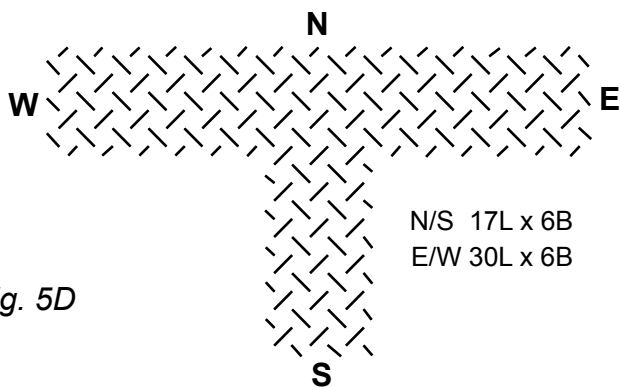


Fig. 5D

N/S 17L x 6B
E/W 30L x 6B

Fig. 6

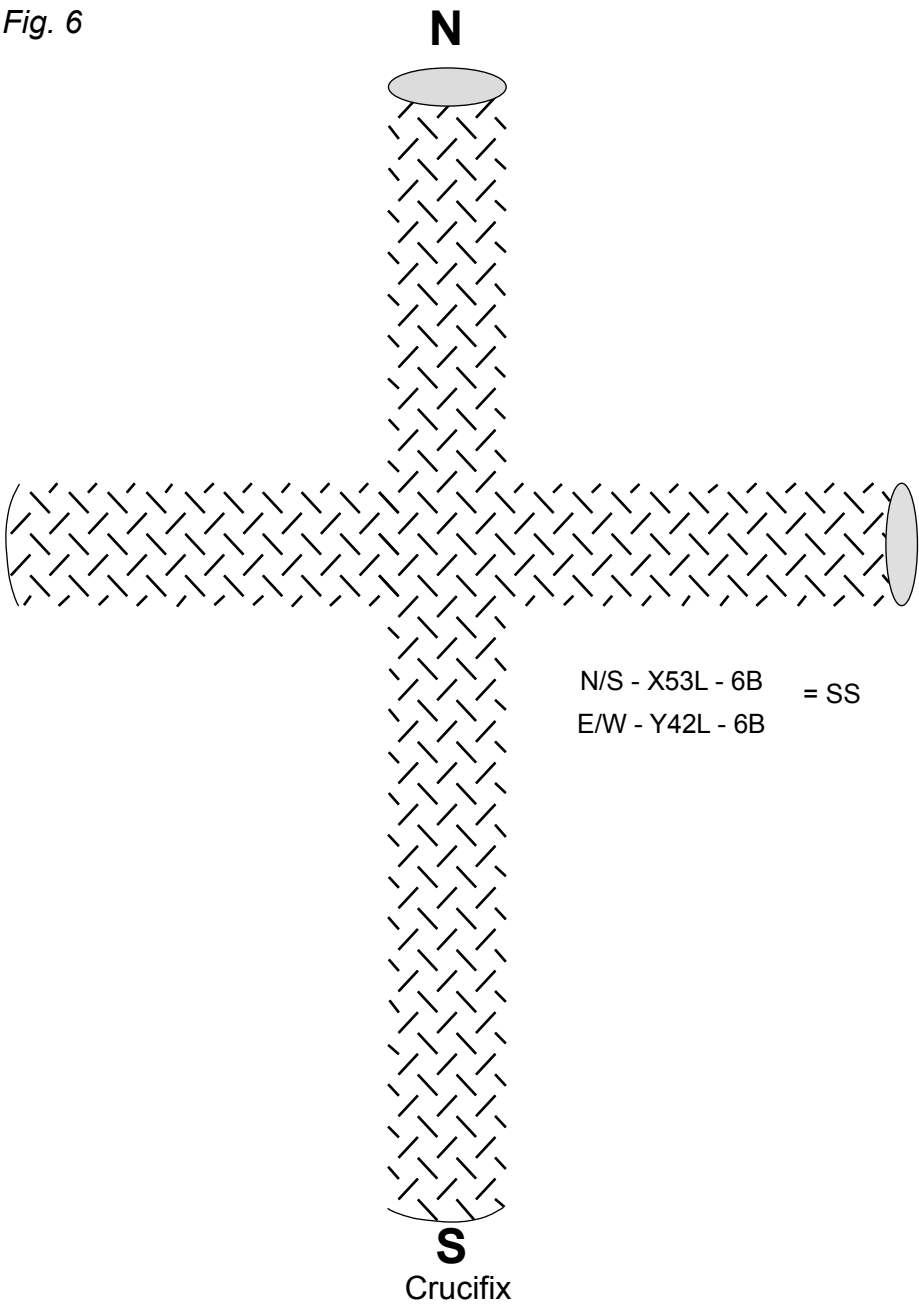
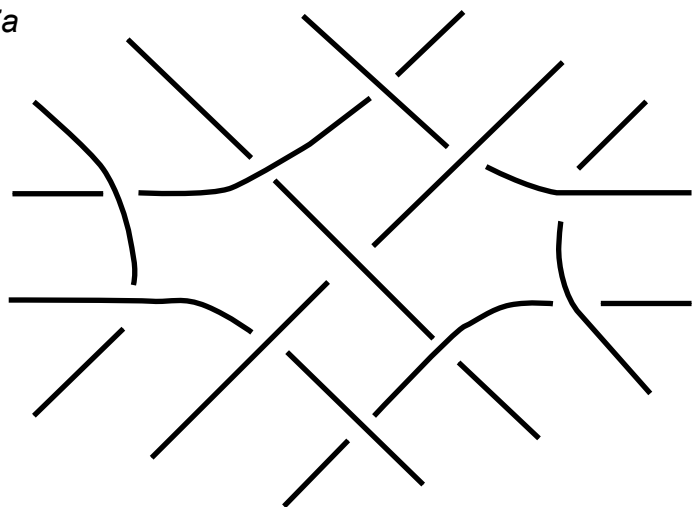
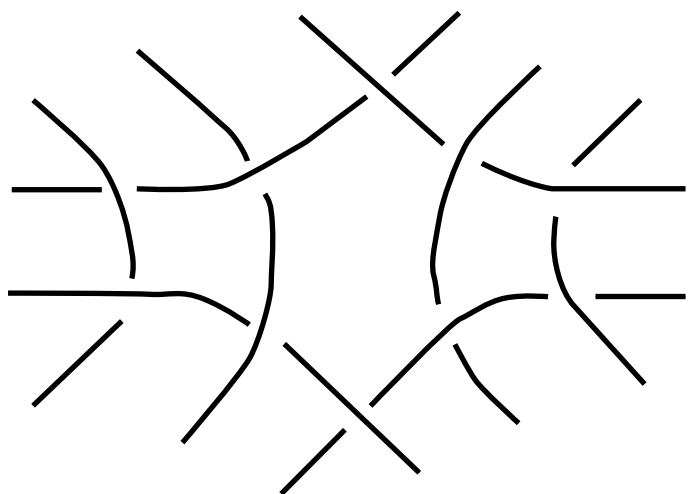


Fig. 7a



Crossed Crotch
Two Pentagonal shapes

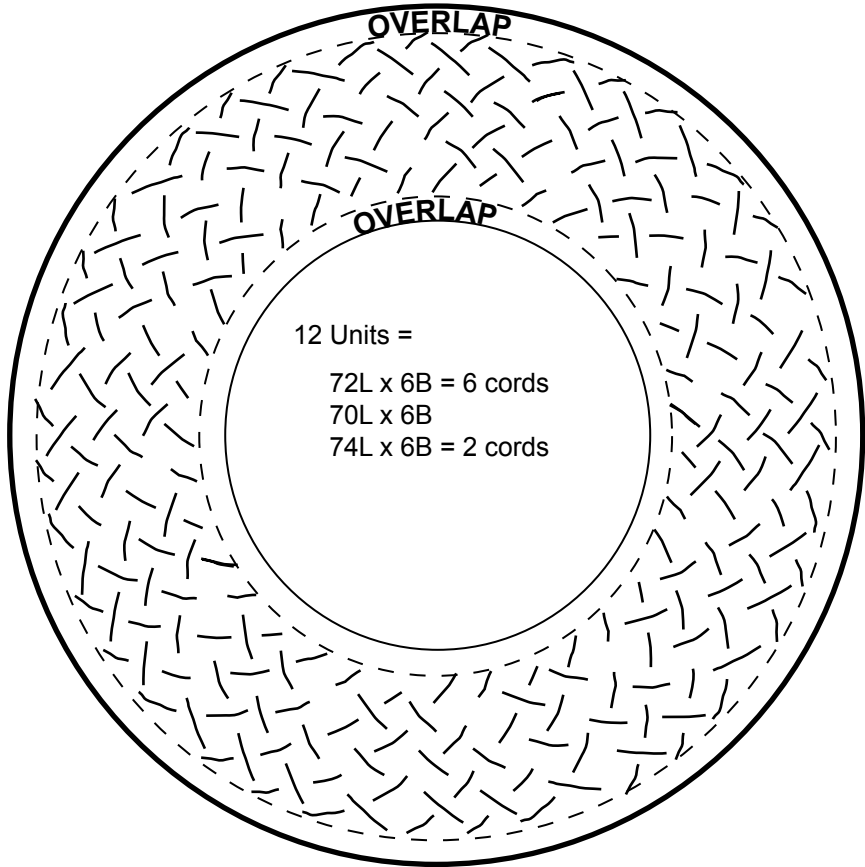
Fig. 7b



Open Crotch
Hexagonal shape centre

Fig. 8

Two drawings required
Cut solid lines
Fold dotted lines
Glue overlaps



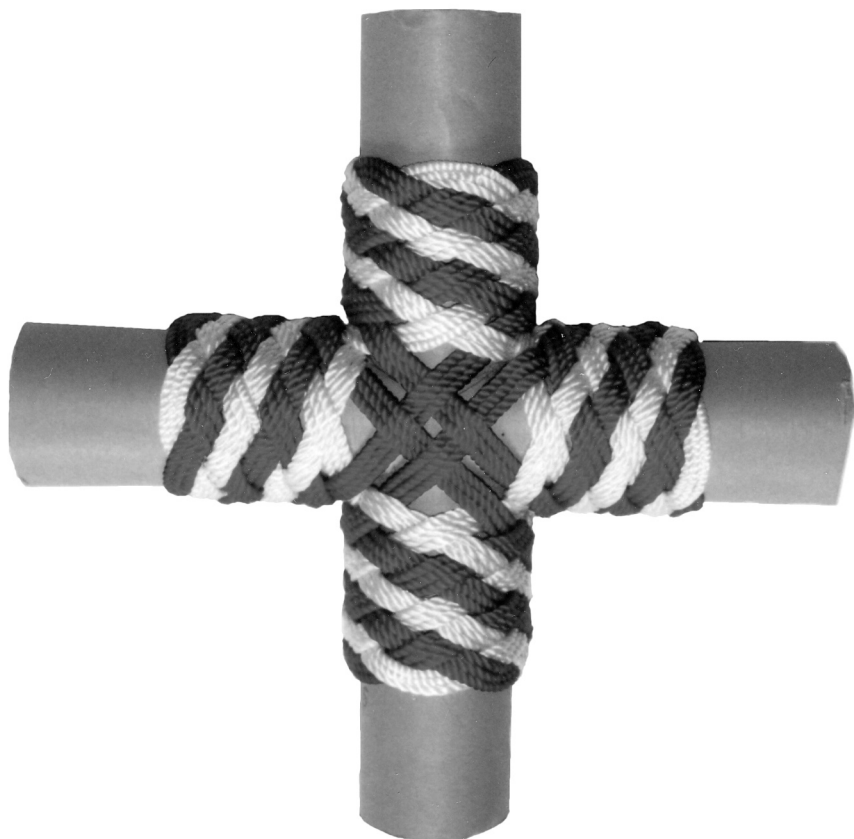


Fig. 9

Parameters/

White
Coloured

12L x 3B
10L x 3B = 2 STR's to tie

CELTIC CROSS SINGLE STRAND

Two drawings
required.

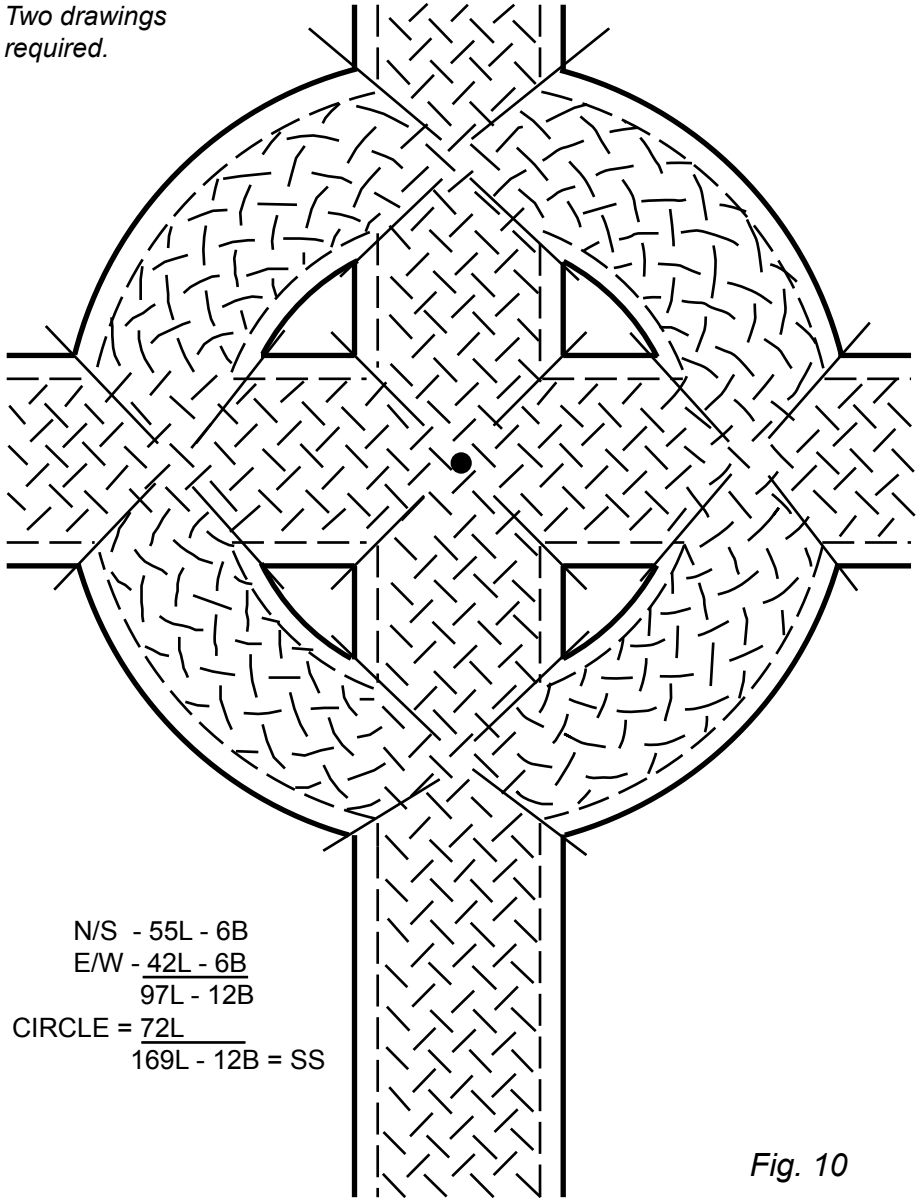


Fig. 10

CELTIC CROSS No. 2

*Two drawings
required.*

Fig. 11

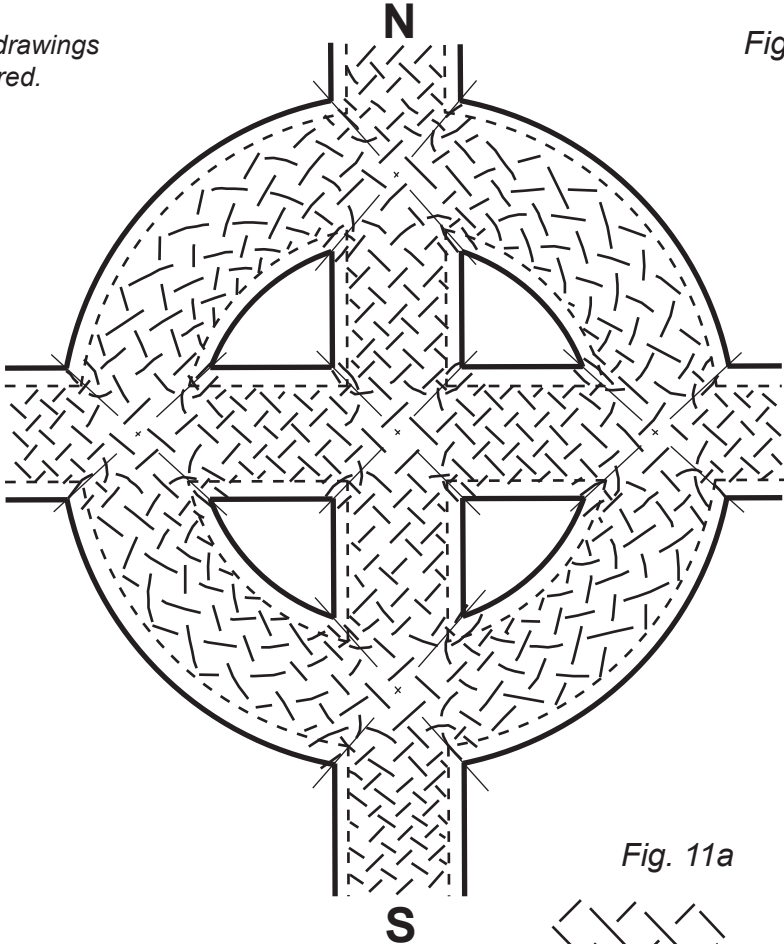


Fig. 11a

*Four arms each have
21 leads. Southern arm
can be extended by units
of 6 leads.
Takes two strands to
tie. See text.
Fig. 11a illustrates
cut lines.*

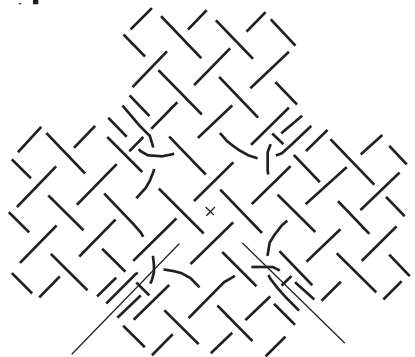


Fig. 12

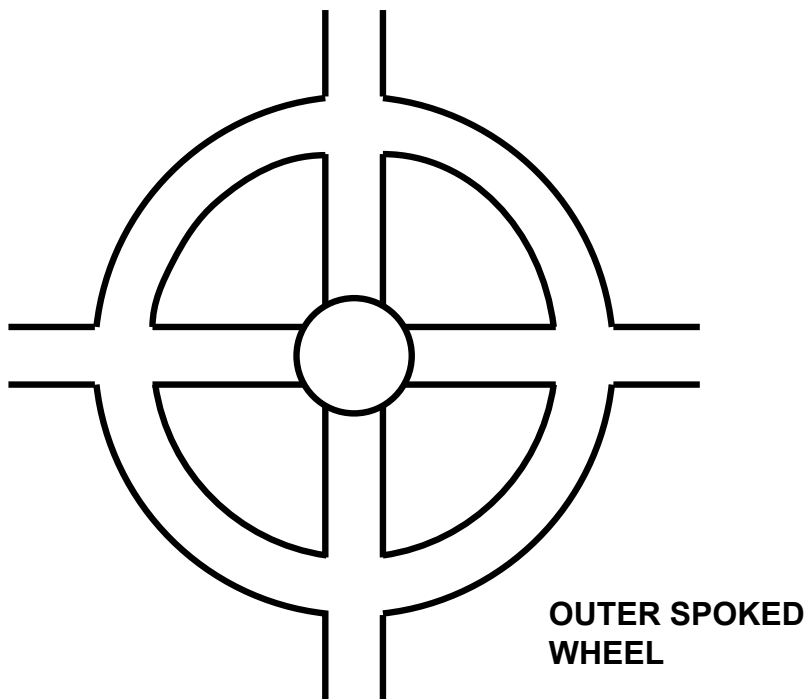
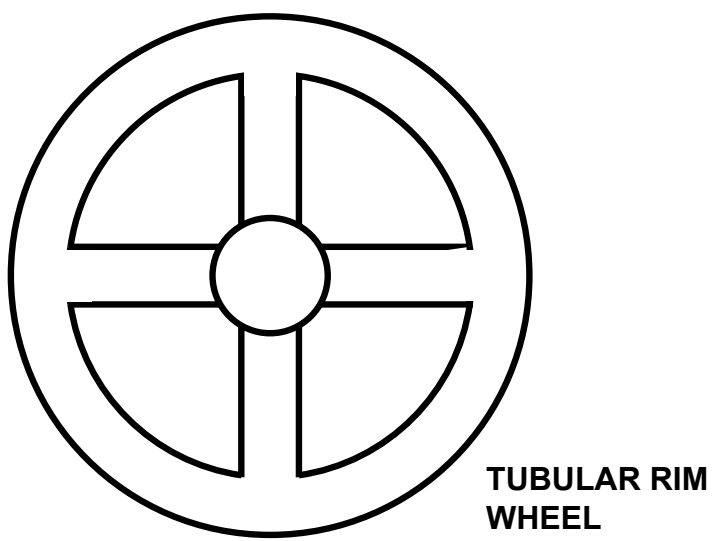


Fig.12a



**Four Spoked Wheel
covered with single-strand Cruxiform Turk's head**

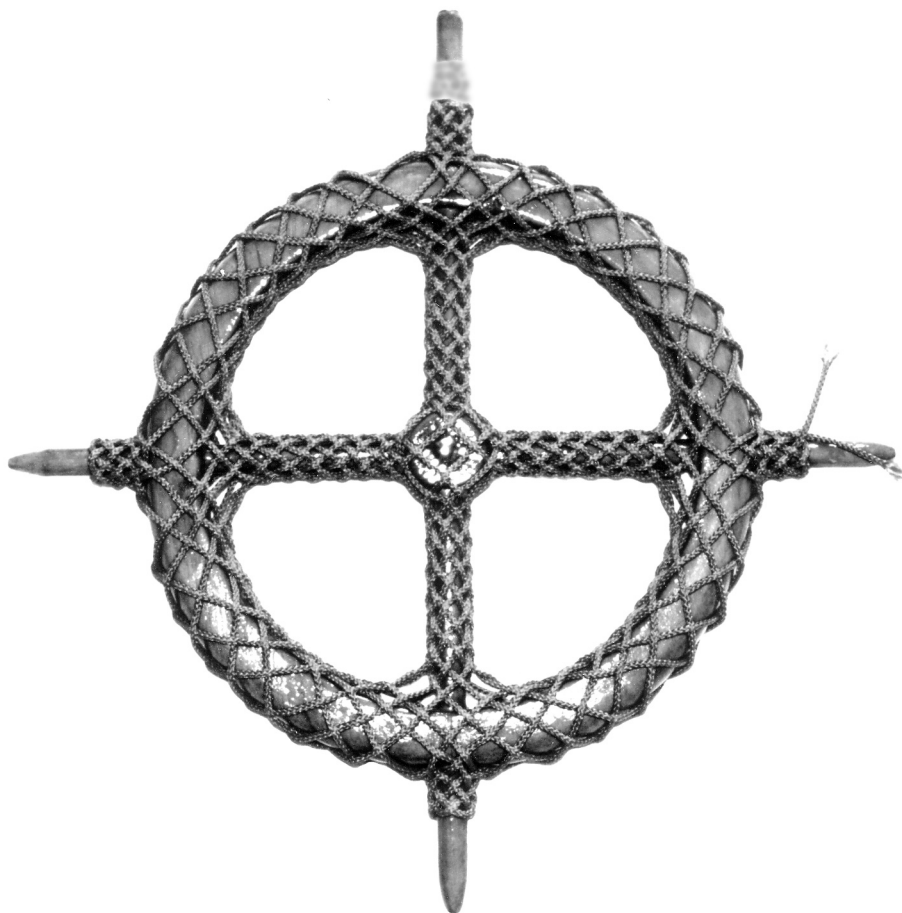
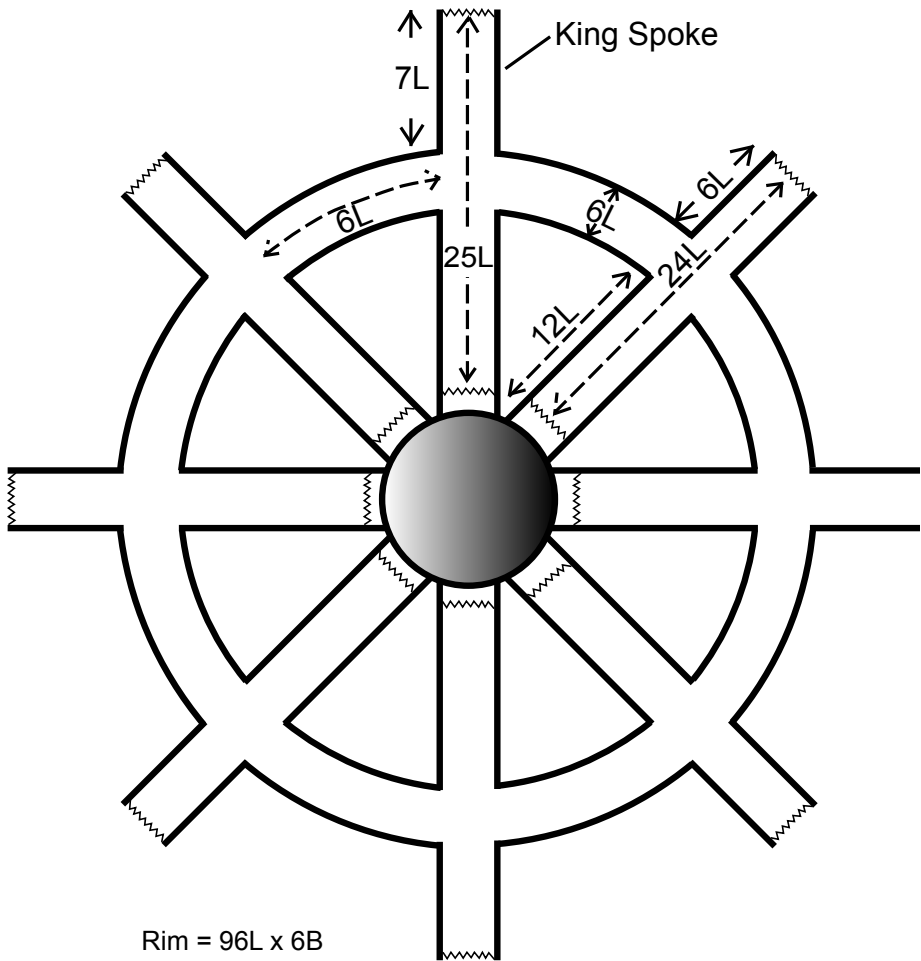


Fig. 13

Parameters

N/S - 53L x 6B = 17L x 6B = SS
E/W - 54L x 6B = 18L x 6B
Circle 72L

Fig. 13a



$$\begin{array}{r} \text{Rim} = 96\text{L} \times 6\text{B} \\ \text{N/S} = 25\text{L} \times 6\text{B} \\ 7 \times 24\text{L} = \underline{168\text{L}} \\ \quad \underline{289\text{L} \times 6\text{B}} \\ \quad = 5 \text{ STR} \end{array}$$

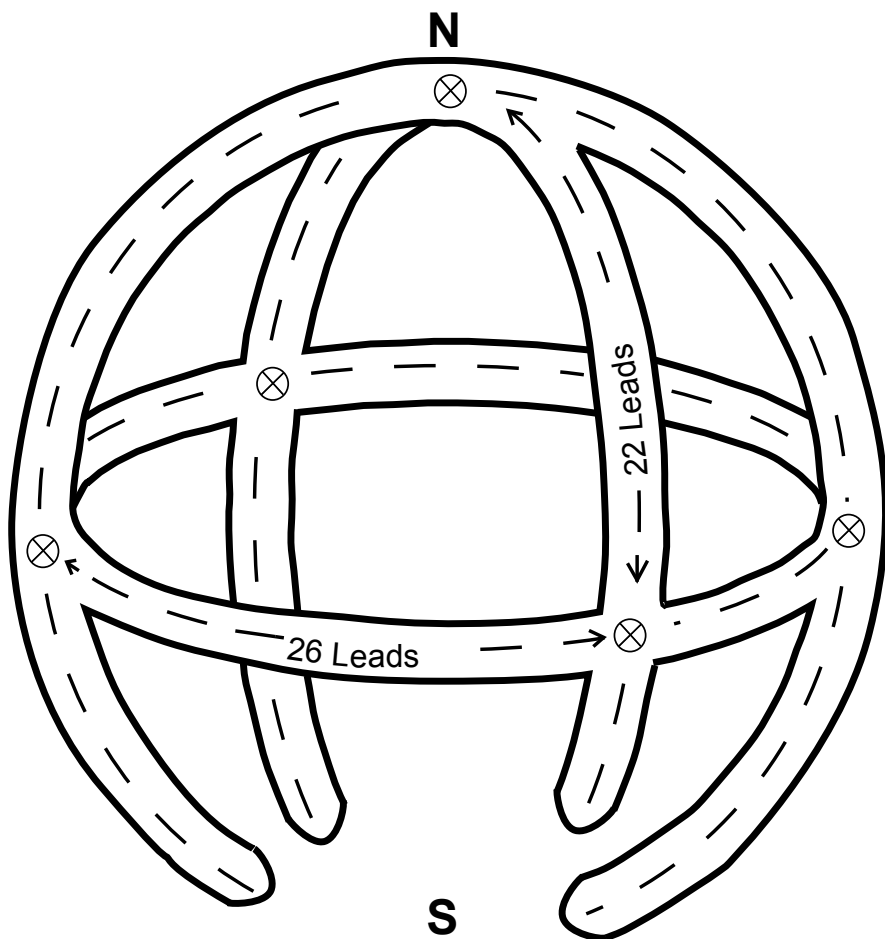
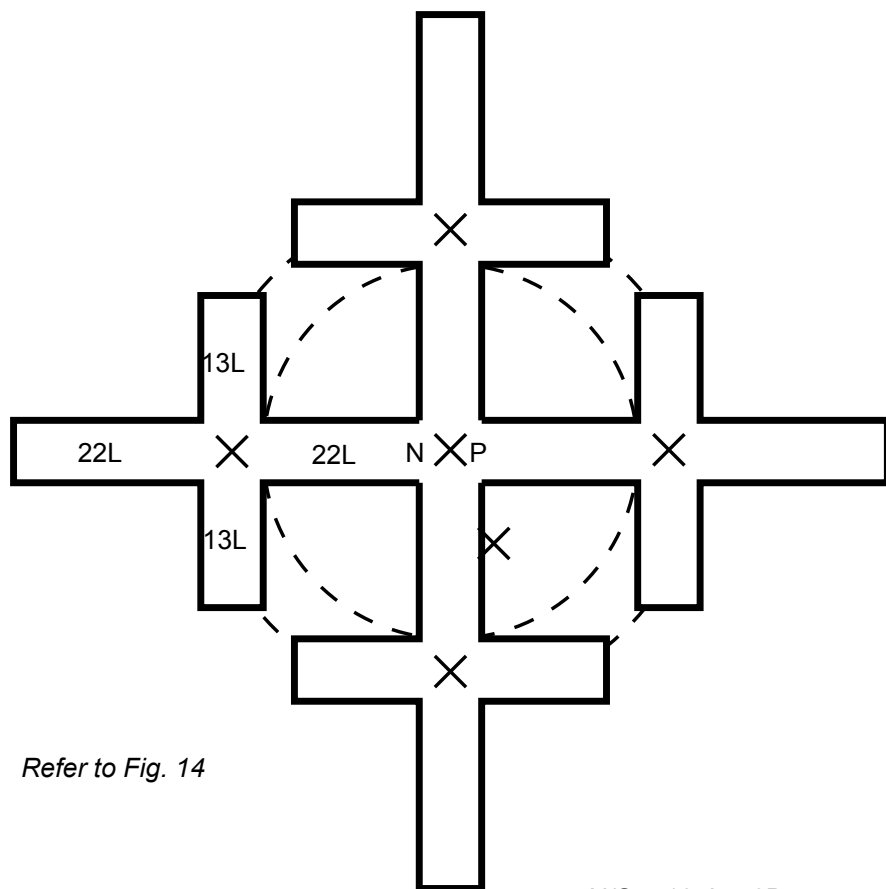


Fig. 14

GLOBULAR FRAME

Two drawings
required.



Refer to Fig. 14

$$\begin{aligned} \text{N/S} &- 104\text{L} \times 6\text{B} \\ \text{E/W} &- 176\text{L} \times 6\text{B} \\ \hline 280\text{L} \times 6\text{B} &= 2 \text{ STR} \\ &\text{to tie} \end{aligned}$$

Fig. 15

Fig. 16

TABLE 'A' 6 BIGHT

LEADS

L E A D S	Y/X	11	13	15	17	19	21	23
	12	5	5	3	5	5	3	5
	14	1	3	3	1	3	3	1
	16	3	3	3	3	3	3	3
	18	1	1	3	1	1	3	1
	20	3	3	3	3	3	3	3
	22	5	1	3	3	1	3	5
	24	5	5	3	5	5	3	5

TABLE 'B' 8 BIGHT

LEADS

L E A D S	Y/X	11	13	15	17	19	21	23	25	27
	12	5	5	1	1	3	3	1	1	5
	14	3	7	7	3	3	5	5	3	3
	16	3	3	7	7	3	3	5	5	3
	18	5	3	3	5	5	3	3	5	5
	20	3	3	1	1	3	3	1	1	3
	22	3	3	3	3	3	3	3	3	3
	24	1	1	1	1	1	1	1	1	1
	26	3	3	3	3	3	3	3	3	3
	28	5	5	1	1	3	3	1	1	5

Fig. 17

TABLE 'C' 10 BIGHT
LEADS

L E A D S	Y/X	15	17	19	21	23	25	27	29	31	33	35
	16	7	7	3	3	3	5	5	3	3	3	7
	18	1	9	9	1	1	1	5	5	1	1	1
	20	3	3	9	9	3	3	3	7	7	3	3
	22	1	1	1	7	7	1	1	1	5	5	1
	24	5	3	3	3	5	5	3	3	3	5	5
	26	3	3	3	5	3	3	3	3	5	3	3
	28	3	3	3	3	5	3	3	3	3	5	3
	30	5	1	1	1	1	5	1	1	1	1	5
	32	3	5	3	3	3	3	5	3	3	3	3
	34	5	3	3	3	3	3	3	3	3	5	5
	36	7	7	3	3	3	5	5	3	3	3	7

TABLE 'D' 10 BIGHT
OPEN CRUTCH
LEADS

L E A D S	Y/X	15	17	19	21	23	25	27	29	31	33	35	37
	16	7	7	3					3				
	18		9	9				3					3
	20	3		11	11		3					3	
	22				9	9					5		
	24				3	7	7			3			
	26			3			5	5	3				
	28		3					3	3				
	30	5					5		1	1		5	
	32					3				3	3		
	34				3					3	5	5	
	36			3					3		7		

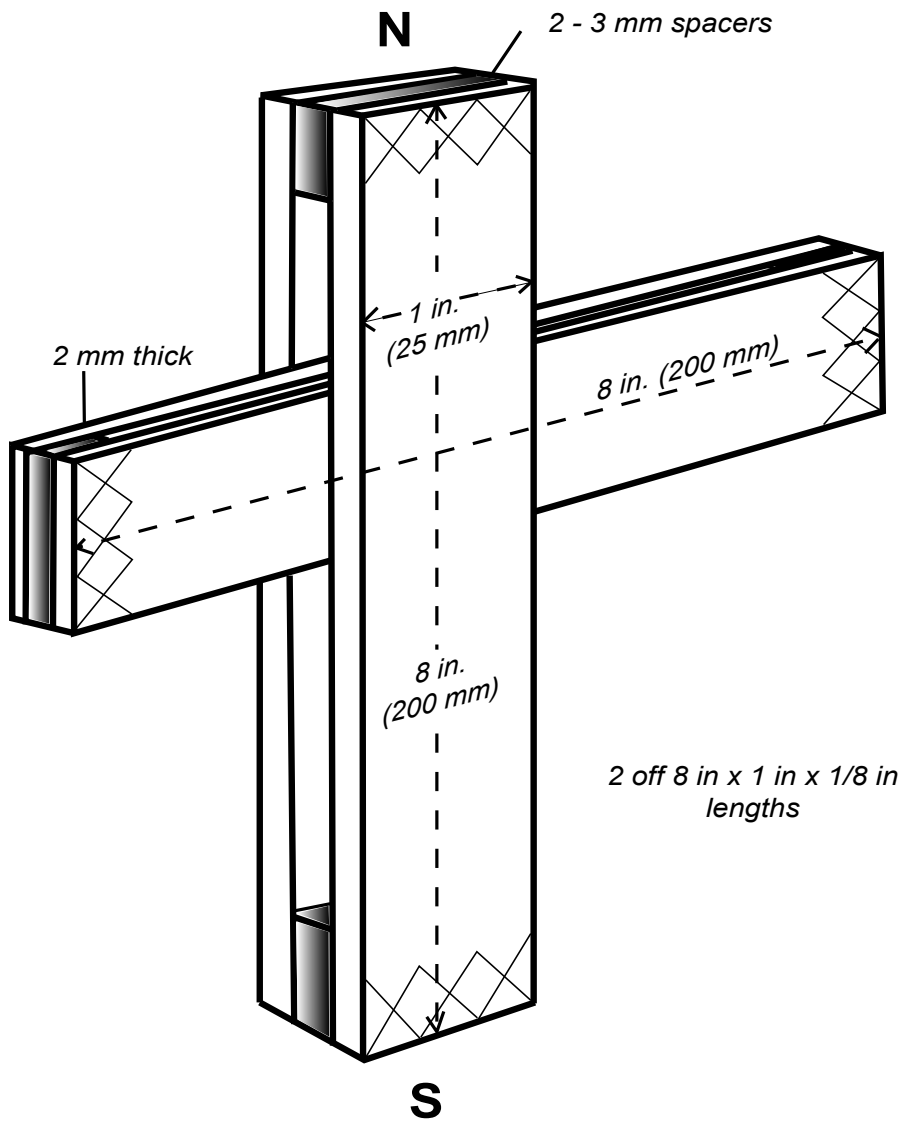
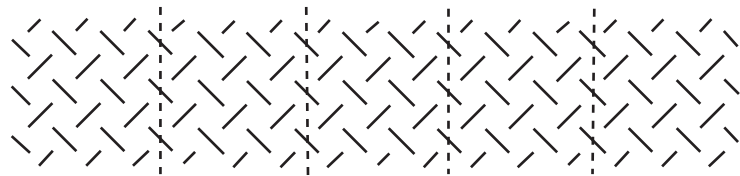
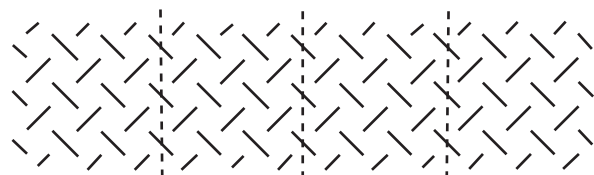


Fig. 18

Fig. 19



5 units = 30 Leads

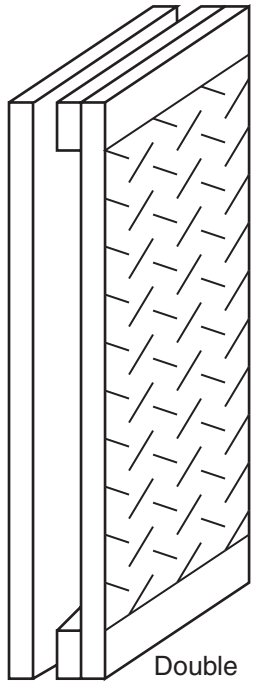


4 Units



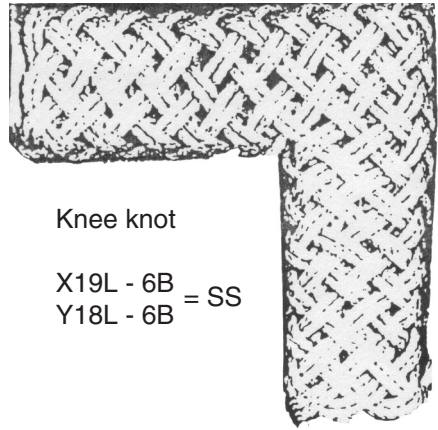
3 Units

Make a mix of doubles and singles



Double

18L

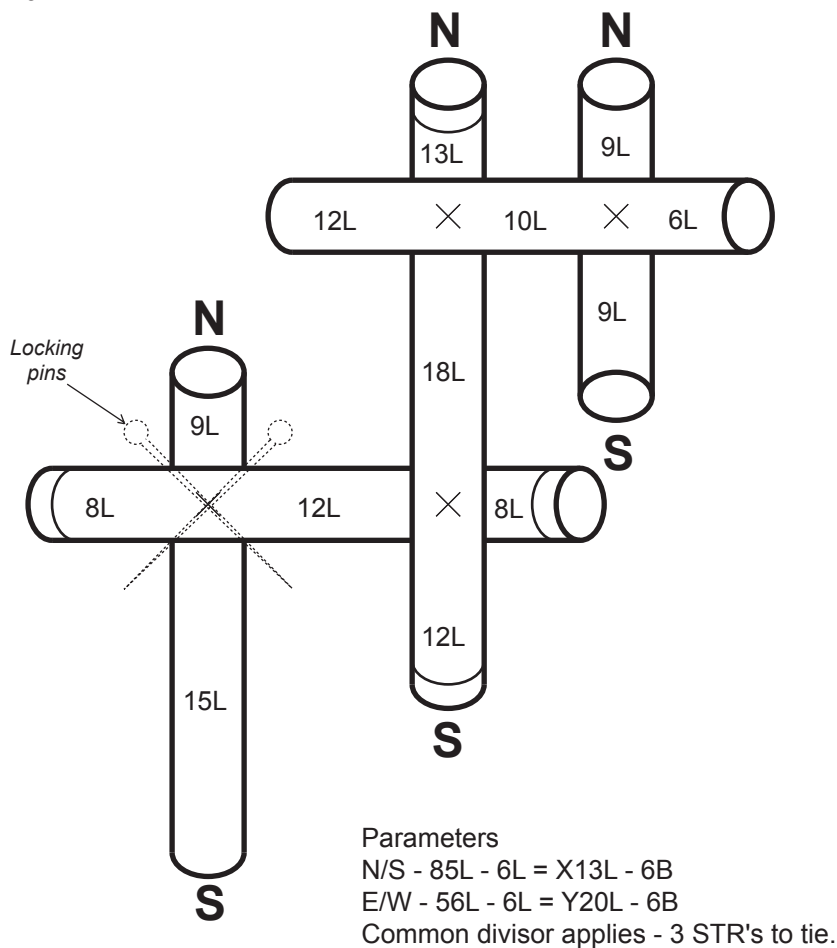


Knee knot

X19L - 6B = SS
Y18L - 6B

19L

Fig. 20



**Multi-branch Cruxiform Turk's Head
developed from 'Sliding Template'**

Fig.21

11 leads											CTH	T Shape	Knee					
12L	<div><div><div>3</div><div>4 8</div><div>8</div></div><div><div>3</div><div>6 8</div><div>8</div></div><div><div>3</div><div>8 4</div><div>8</div></div></div> <div><div><div>5</div><div>4 8</div><div>6</div></div><div><div>5</div><div>6 6</div><div>6</div></div><div><div>5</div><div>8 4</div><div>6</div></div></div> <div><div><div>7</div><div>4 8</div><div>4</div></div><div><div>7</div><div>6 6</div><div>4</div></div><div><div>7</div><div>8 4</div><div>4</div></div></div>										X11L+Y12L 9 shapes	<div><div>+</div></div>	<div><div>└</div></div>	<div><div>┐</div></div>				
	6	3	-															
	14L	<div><div><div>3</div><div>3 11</div><div>8</div></div><div><div>3</div><div>5 9</div><div>8</div></div><div><div>3</div><div>7 7</div><div>8</div></div><div><div>3</div><div>9 5</div><div>8</div></div><div><div>3</div><div>11 3</div><div>8</div></div></div> <div><div><div>5</div><div>3 11</div><div>6</div></div><div><div>5</div><div>5 9</div><div>6</div></div><div><div>5</div><div>7 7</div><div>6</div></div><div><div>5</div><div>9 5</div><div>6</div></div><div><div>5</div><div>11 3</div><div>6</div></div></div> <div><div><div>7</div><div>3 11</div><div>4</div></div><div><div>7</div><div>5 9</div><div>4</div></div><div><div>7</div><div>7 7</div><div>4</div></div><div><div>7</div><div>9 5</div><div>4</div></div><div><div>7</div><div>11 3</div><div>4</div></div></div>										X11L+Y14L 15 shapes	6	7	2			
		16L	<div><div><div>4</div><div>4 12</div><div>6</div></div><div><div>4</div><div>6 10</div><div>8</div></div><div><div>4</div><div>8 8</div><div>10</div></div><div><div>4</div><div>10 6</div><div>12</div></div><div><div>4</div><div>12 4</div><div>8</div></div></div> <div><div><div>5</div><div>4 12</div><div>6</div></div><div><div>5</div><div>6 10</div><div>8</div></div><div><div>5</div><div>8 8</div><div>10</div></div><div><div>5</div><div>10 6</div><div>12</div></div><div><div>5</div><div>12 4</div><div>8</div></div></div> <div><div><div>7</div><div>4 12</div><div>4</div></div><div><div>7</div><div>6 10</div><div>8</div></div><div><div>7</div><div>8 8</div><div>10</div></div><div><div>7</div><div>10 6</div><div>12</div></div><div><div>7</div><div>12 4</div><div>8</div></div></div>										X11L+Y16L 15 shapes	10	5			
18L			<div><div><div>3</div><div>3 15</div><div>8</div></div><div><div>3</div><div>5 13</div><div>8</div></div><div><div>3</div><div>7 11</div><div>8</div></div><div><div>3</div><div>9 9</div><div>8</div></div><div><div>3</div><div>11 7</div><div>8</div></div><div><div>3</div><div>13 5</div><div>8</div></div><div><div>3</div><div>15 3</div><div>8</div></div></div> <div><div><div>5</div><div>3 15</div><div>6</div></div><div><div>5</div><div>5 13</div><div>6</div></div><div><div>5</div><div>7 11</div><div>6</div></div><div><div>5</div><div>9 9</div><div>6</div></div><div><div>5</div><div>11 7</div><div>6</div></div><div><div>5</div><div>13 5</div><div>6</div></div><div><div>5</div><div>15 3</div><div>6</div></div></div> <div><div><div>7</div><div>3 15</div><div>4</div></div><div><div>7</div><div>5 13</div><div>4</div></div><div><div>7</div><div>7 11</div><div>4</div></div><div><div>7</div><div>9 9</div><div>4</div></div><div><div>7</div><div>11 7</div><div>4</div></div><div><div>7</div><div>13 5</div><div>4</div></div><div><div>7</div><div>15 3</div><div>4</div></div></div>											X11L+Y18L 21 shapes	10	9	2	
			20L	<div><div><div>4</div><div>4 16</div><div>8</div></div><div><div>4</div><div>6 14</div><div>8</div></div><div><div>4</div><div>8 12</div><div>10</div></div><div><div>4</div><div>10 10</div><div>12</div></div><div><div>4</div><div>12 8</div><div>14</div></div><div><div>4</div><div>14 6</div><div>16</div></div><div><div>4</div><div>16 4</div><div>8</div></div></div> <div><div><div>5</div><div>4 16</div><div>6</div></div><div><div>5</div><div>6 14</div><div>8</div></div><div><div>5</div><div>8 12</div><div>10</div></div><div><div>5</div><div>10 10</div><div>12</div></div><div><div>5</div><div>12 8</div><div>14</div></div><div><div>5</div><div>14 6</div><div>16</div></div><div><div>5</div><div>16 4</div><div>8</div></div></div> <div><div><div>7</div><div>4 16</div><div>7</div></div><div><div>7</div><div>6 14</div><div>8</div></div><div><div>7</div><div>8 12</div><div>10</div></div><div><div>7</div><div>10 10</div><div>12</div></div><div><div>7</div><div>12 8</div><div>14</div></div><div><div>7</div><div>14 6</div><div>16</div></div><div><div>7</div><div>16 4</div><div>8</div></div></div>											X11L+Y20L 21 shapes	14	7	
	22L			<div><div><div>3</div><div>3 19</div><div>8</div></div><div><div>3</div><div>5 17</div><div>8</div></div><div><div>3</div><div>7 15</div><div>8</div></div><div><div>3</div><div>9 13</div><div>8</div></div><div><div>3</div><div>11 11</div><div>8</div></div><div><div>3</div><div>13 9</div><div>8</div></div><div><div>3</div><div>15 7</div><div>8</div></div><div><div>3</div><div>17 5</div><div>8</div></div><div><div>3</div><div>19 3</div><div>8</div></div></div> <div><div><div>5</div><div>3 19</div><div>6</div></div><div><div>5</div><div>5 17</div><div>6</div></div><div><div>5</div><div>7 15</div><div>6</div></div><div><div>5</div><div>9 13</div><div>6</div></div><div><div>5</div><div>11 11</div><div>6</div></div><div><div>5</div><div>13 9</div><div>6</div></div><div><div>5</div><div>15 7</div><div>6</div></div><div><div>5</div><div>17 5</div><div>6</div></div><div><div>5</div><div>19 3</div><div>6</div></div></div> <div><div><div>7</div><div>3 19</div><div>4</div></div><div><div>7</div><div>5 17</div><div>4</div></div><div><div>7</div><div>7 15</div><div>4</div></div><div><div>7</div><div>9 13</div><div>4</div></div><div><div>7</div><div>11 11</div><div>4</div></div><div><div>7</div><div>13 9</div><div>4</div></div><div><div>7</div><div>15 7</div><div>4</div></div><div><div>7</div><div>17 5</div><div>4</div></div><div><div>7</div><div>19 3</div><div>4</div></div></div>												X11L+Y22L	14	11
		Grand Total = 108										60	42				6	

Complementary to Fig. 21
Number of strands to tie.

30

Fig. 23	11 Leads	13 Leads	15 Leads	
12L	$3 \times 3 = 9$	$4 \times 3 = 12$	$5 \times 3 = 15$	
14L	$3 \times 5 = 15$	$4 \times 5 = 20$	$5 \times 5 = 25$	
16L	$3 \times 5 = 15$	$4 \times 5 = 20$	$5 \times 5 = 25$	
18L	$3 \times 7 = 21$	$4 \times 7 = 28$	$5 \times 7 = 35$	
20L	$3 \times 7 = 21$	$4 \times 7 = 28$	$5 \times 7 = 35$	
22L	$3 \times 9 = 27$	$4 \times 9 = 36$	$5 \times 9 = 45$	
Totals	108	144	180	= 432

	17 Leads	19 Leads	21 Leads	
12L	$6 \times 3 = 18$	$7 \times 3 = 21$	$8 \times 3 = 24$	
14L	$6 \times 5 = 30$	$7 \times 5 = 35$	$8 \times 5 = 40$	
16L	$6 \times 5 = 30$	$7 \times 5 = 35$	$8 \times 5 = 40$	
18L	$6 \times 7 = 42$	$7 \times 7 = 49$	$8 \times 7 = 56$	
20L	$6 \times 7 = 42$	$7 \times 7 = 49$	$8 \times 7 = 56$	
22L	$6 \times 9 = 54$	$7 \times 9 = 63$	$8 \times 9 = 72$	
Totals	216	252	288	= 756
			Grand total =	1188

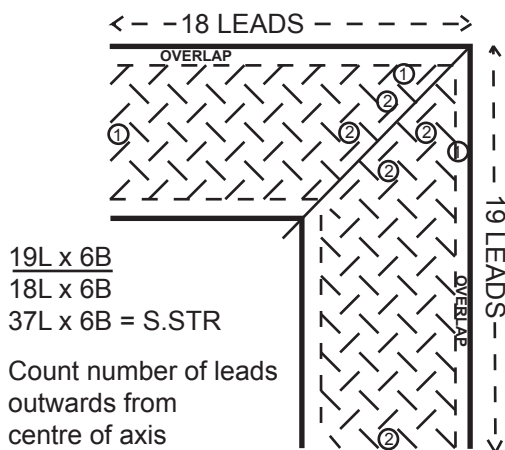


Fig. 24

Two drawings required.
Place both round former
and glue overlaps.
Cut straight lines and
fold dotted lines.

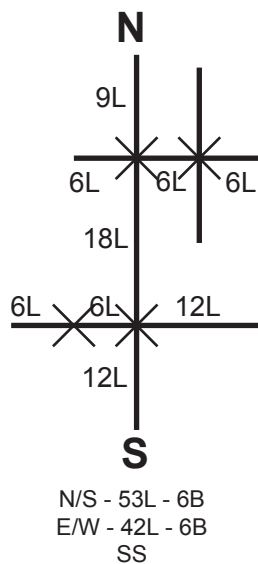
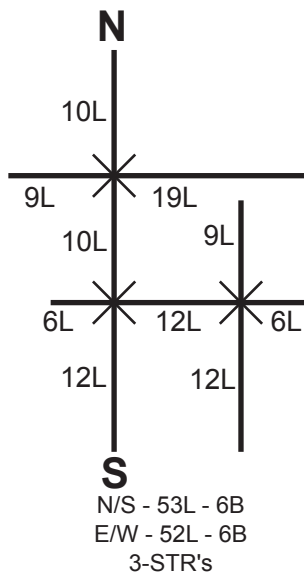
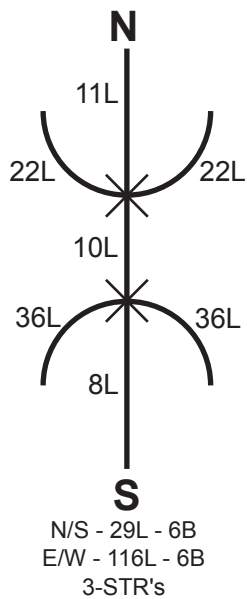
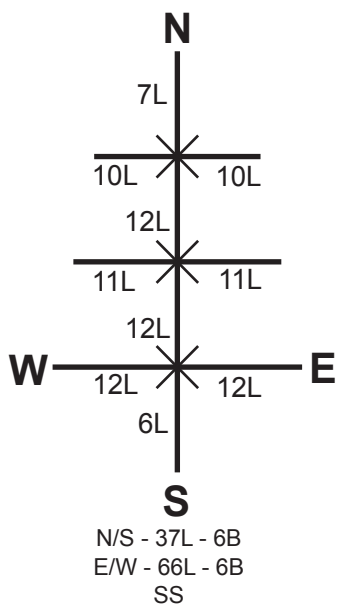


Fig. 25



Fig. 26

12 Bight Cruxiform Turk's head

N/S - 37L x 12B

E/W - 28L x 12B

65L x 12B = SS

Square Former

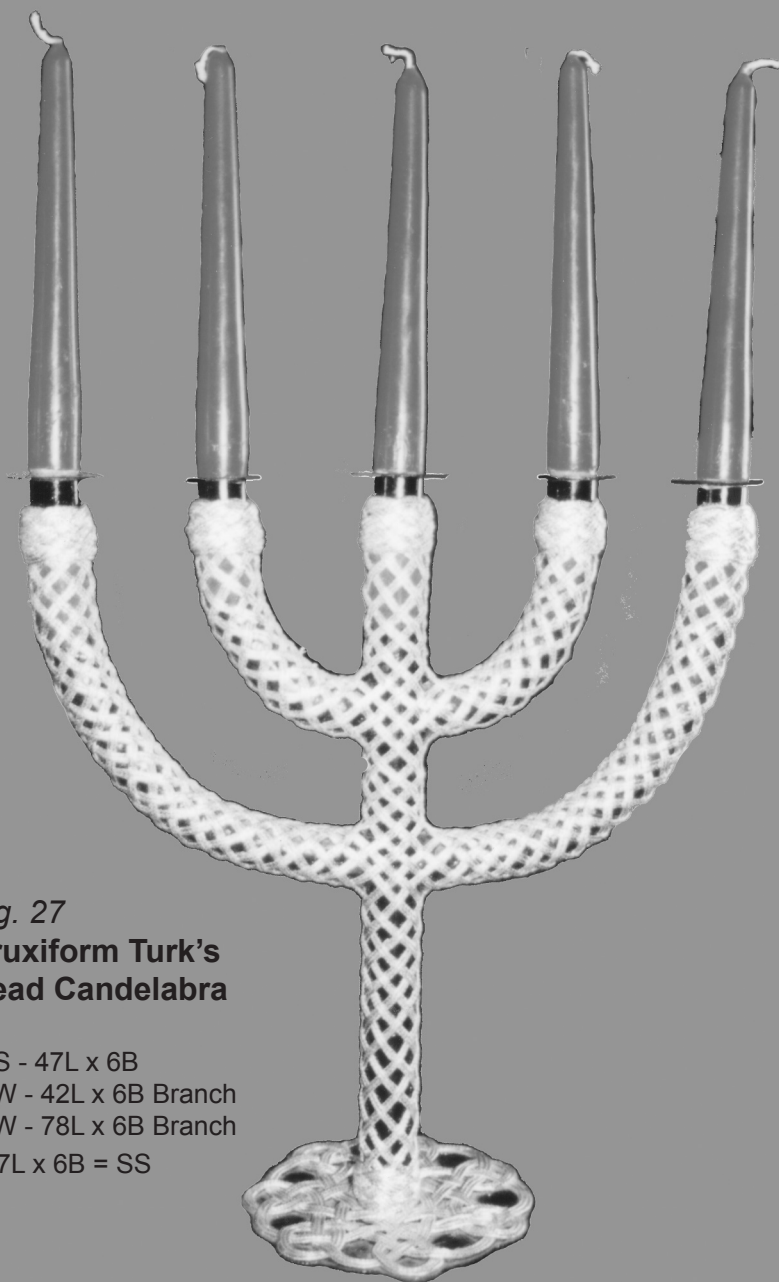


Fig. 27
**Cruxiform Turk's
Head Candelabra**

N/S - 47L x 6B
E/W - 42L x 6B Branch
E/W - 78L x 6B Branch
167L x 6B = SS

