

## A Reference Guide for Double Weave

There are a number of challenges for the weaver who encounters the technique called double weave for the first time. The fact that two or more cloth layers can be woven at the same time and that the weaver sees only the top layer while weaving is a bit unnerving. Are there weaving errors occurring in the lower layers that can't be detected until the entire weaving is completed? Well, yes there is always that possibility but frequent examination of the weaving plus the confidence that arises with experience tends to minimize this problem. On the other hand it pays to unweave when an error is discovered because it is much much harder to correct errors after the cloth is removed from the loom.

There are two intimidating aspects of double weave before even beginning to weave a project. First the tieups for double weave look very mysterious and second the traditional drawdown which shows all of the threads in a weaving does not look anything like the results of carrying out double weave on the loom. There are a few weaving programs on the market that are able to print out the true appearance of the two cloth layers but most cannot do this.

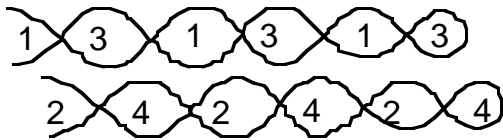
After teaching many workshops on double weave and publishing several books on loom controlled double weave, I have tried out many teaching ideas on the workshop participants. Some have proved very useful, some not so useful. This reference book summarizes the basic ideas for 4 or 8 shaft double weave. It includes the way in which I develop tieups and how to separate these tieups so that drawdowns for the two cloth layers can be obtained.

The purpose is to provide a short reference source for double weave, particularly for those who have taken my workshops and need a quick refresher on certain basic points. Above all don't forget the most important aspect of double weave.

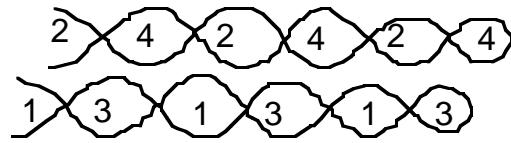
To weave a layer of double weave, all warp threads in layers above that layer must be raised out of the way.

## Weave Structures in 4 Shaft Double Weave

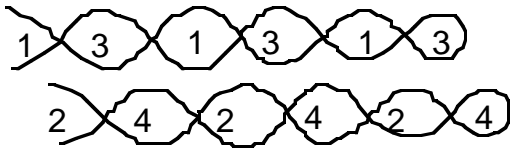
Two Separate Cloth Layers



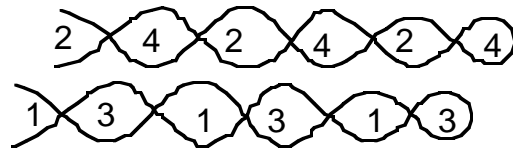
Two Separate Cloth Layers Interchanged



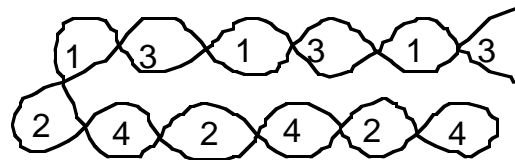
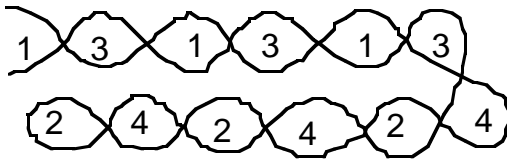
Opposite Weft Colors



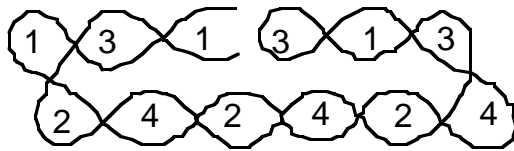
Opposite Weft Colors



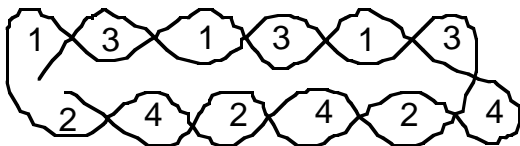
Double Width Weaving, with Opening at either Selvage



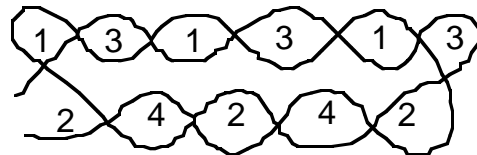
Double Width Weaving with Opening at Middle of Top Layer



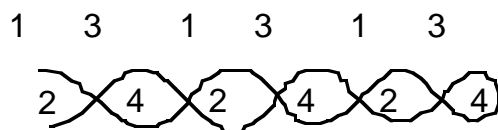
Tubular Weave, with Weaving Error



Tubular Weave, Error Corrected

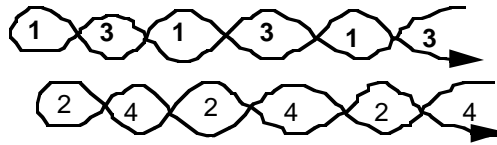


One Layer Not Woven





Two Layer Weave

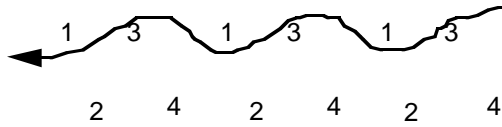


Two Shuttle Weave

Threading

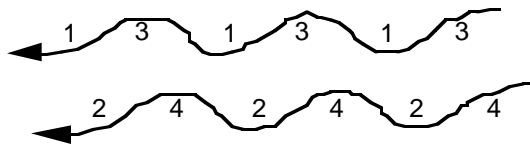
Shafts

4			L			L
3		D			D	
2	L			L		
1	D			D		



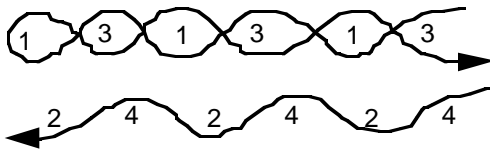
First Weft Shot

Raise Shaft 1  
Use Shuttle 1    Dark



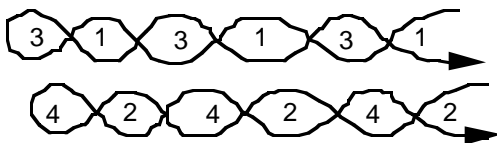
Second Weft Shot

Raise Shafts 1 and 3  
Raise Shaft 2  
Use Shuttle 2    Light



Third Weft Shot

Raise Shaft 3  
Use Shuttle 1    Dark



Fourth Weft Shot

Raise Shafts 1 and 3  
Raise Shaft 4  
Use Shuttle 2    Light

In diagrams like these shaft #'s are shown vertically and pick #'s horizontally

4				
3				
2				
1	T			
	1	2	3	4

4				
3		.		
2		B		
1	T	.		
	1	2	3	4

4				
3		.	T	
2		B		
1	T	.		
	1	2	3	4

4				B
3		.	T	.
2		B		
1	T	.		.
	1	2	3	4

This Tieup Weaves

13/24

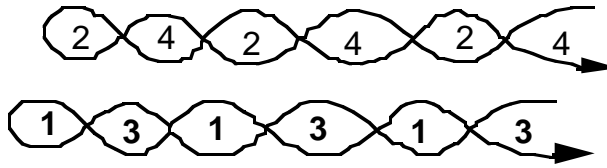
4				4
3		3	3	3
2		2		
1	1	1		1
	1	2	3	4

Dark Top Layer  
Light Bottom Layer





Two Layer Weave

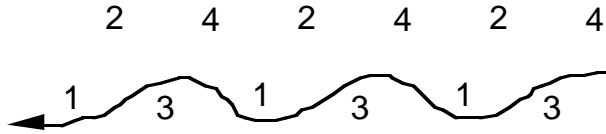


Two Shuttle Weave

Threading

Shafts

4			L				L
3		D				D	
2		L				L	
1	D			D			

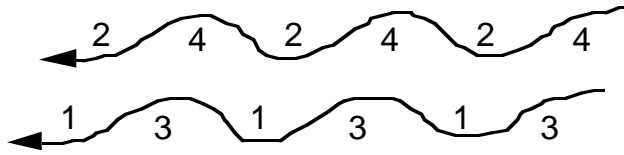


First Weft Pick:

Raise shafts 2 & 4

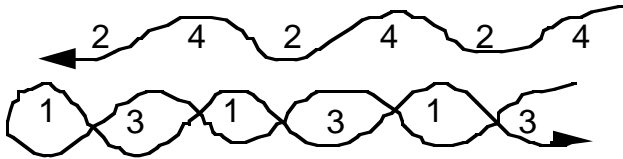
Raise Shaft 1

Use Shuttle 1, Dark W



Second Weft Pick: Raise Shaft 2

Use Shuttle 2, Light W

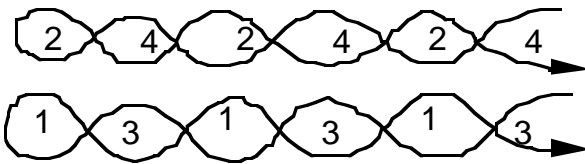


Third Weft Pick:

Raise Shafts 2 & 4

Raise Shaft 3

Use Shuttle 1, Dark W



Fourth Weft Pick: Raise Shaft 4

Use Shuttle 2, Light W

4	.			
3				
2	.			
1	B			
	1	2	3	4

4	.			
3				
2	.	T		
1	B			
	1	2	3	4

4	.		.	
3			B	
2	.	T	.	
1	B			
	1	2	3	4

4	.		.	T
3			B	
2	.	T	.	
1	B			
	1	2	3	4

This Tieup Weaves 24/13

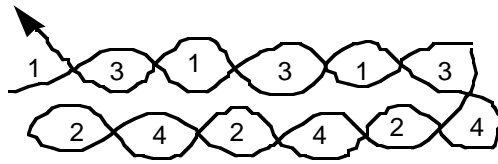
4	4		4	4
3			3	
2	2	2	2	
1	1			

Light Top Layer

Dark Bottom Layer



Double Width Fabric  
Selvage open at the Left

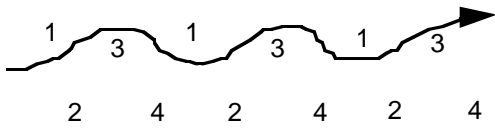


One Shuttle Weave

Threading

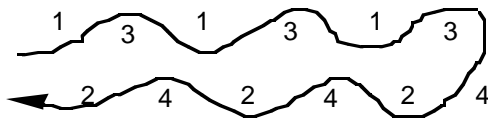
Shafts

4			L			L
3		D			D	
2	L			L		
1	D			D		



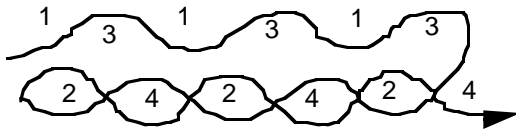
First Weft Shot

Raise Shaft 1



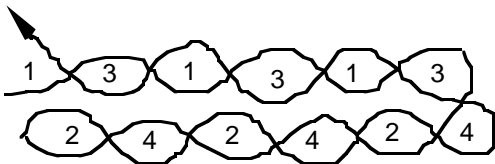
Second Weft Shot

Raise Shafts 1 and 3  
Raise Shaft 2



Third Weft Shot

Raise Shafts 1 and 3  
Raise Shaft 4



Fourth Weft Shot

Raise Shaft 3

4				
3				
2				
1	T			
	1	2	3	4

4				
3		.		
2	B			
1	T	.		
	1	2	3	4

4			B	
3		.	.	T
2	B			
1	T	.	.	
	1	2	3	4

4			B	
3		.	.	T
2	B			
1	T	.	.	
	1	2	3	4

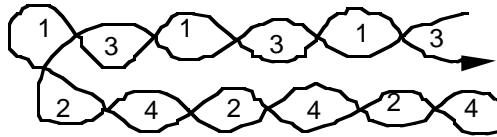
This Tieup Weaves 13/24

4			4	
3		3	3	3
2		2		
1	1	1	1	
	1	2	3	4





Double Width Fabric  
Selvage Open at the Right



One Shuttle Weave

Threading

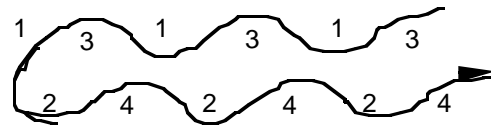
Shafts

4			L			L
3		D			D	
2	L			L		
1	D			D		



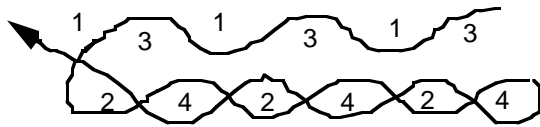
First Weft Shot

Raise Shaft 1



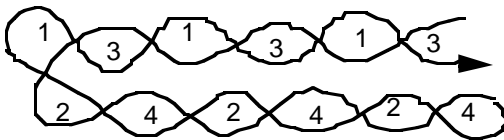
Second Weft Shot

Raise Shafts 1 and 3  
Raise Shaft 2



Third Weft Shot

Raise Shafts 1 and 3  
Raise Shaft 4



Fourth Weft Shot

Raise Shaft 3

4				
3				
2				
1	T			
	1	2	3	4

4				
3		.		
2		B		
1	T	.		
	1	2	3	4

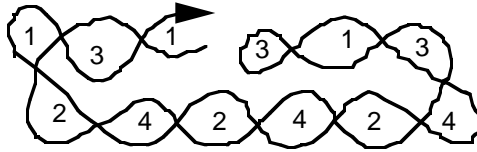
4			B	
3		.	.	
2		B		
1	T	.	.	
	1	2	3	4

4			B	
3		.	.	T
2		B		
1	T	.	.	
	1	2	3	4

This Tieup Weaves 13/24

4			4	
3		3	3	3
2		2		
1	1	1	1	
	1	2	3	4

Double Width Fabric  
Opening in Top Middle

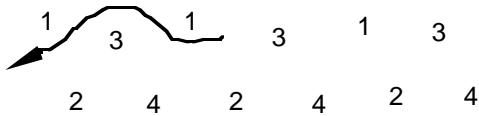


One Shuttle Weav

Threading

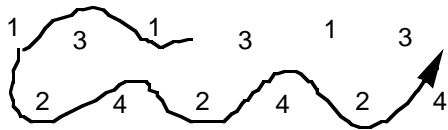
Shafts

4			L				L
3			D				D
2		L				L	
1	D				D		



First Weft Shot

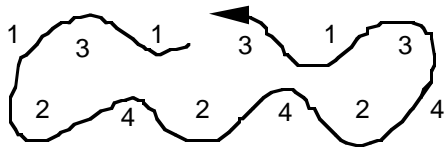
Raise Shaft 1



Second Weft Shot

Raise Shafts 1 and 3

Raise Shaft 2



Third Weft Shot

Raise Shaft 1



Fourth Weft Shot

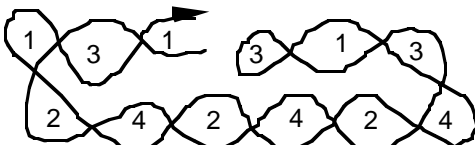
Raise Shaft 3



Fifth Weft Shot

Raise Shafts 1 and 3

Raise Shaft 4



Sixth Weft Shot

Raise Shaft 3

Double Width Fabric  
Opening in Top Middle

(Continuation)

4						
3						
2						
1	T					
	1	2	3	4	5	6

4						
3		.				
2		B				
1	T	.				
	1	2	3	4	5	6

4						
3		.				
2		B				
1	T	.	T			
	1	2	3	4	5	6

4						
3		.		T		
2		B				
1	T	.	T			
	1	2	3	4	5	6

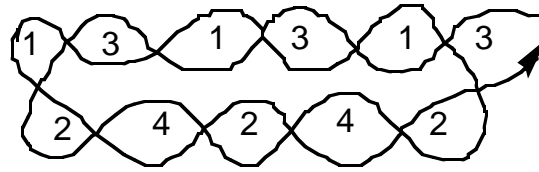
4				B		
3		.		T	.	
2		B				
1	T	.	T	.		
	1	2	3	4	5	6

4				B		
3		.		T	.	T
2		B				
1	T	.	T	.		
	1	2	3	4	5	6

This Tieup Weaves 13/24

4					4	
3		3		3	3	3
2		2				
1	1	1	1		1	
	1	2	3	4	5	6

Tubular Weaving  
Odd # Warp Threads

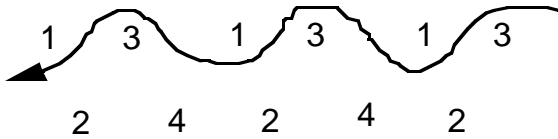


One Shuttle Weave

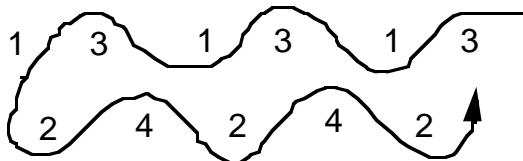
Threading

Shafts

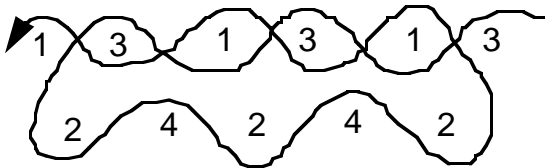
4			L		
3		D			D
2	L			L	
1	D			D	



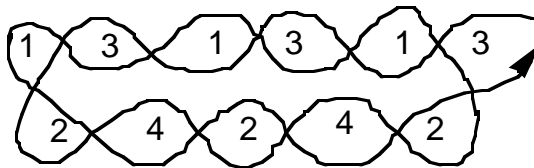
First Weft Pick : Raise Shaft 1



Second Weft Pick: Raise Shafts 1 & 3  
Raise Shaft 2



Third Weft Pick: Raise Shaft 3



Fourth Weft Pick: Raise shafts 1 & 3  
Raise Shaft 4

Tieup Development and Treading Order

4				
3				
2				
1	T			
	1	2	3	4

4				
3		.		
2		B		
1	T	.		
	1	2	3	4

4				
3		.	T	
2		B		
1	T	.		
	1	2	3	4

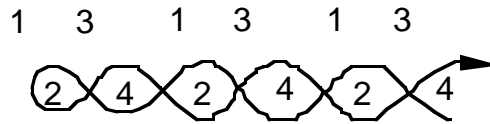
4			B	
3		.	T	.
2		B		
1	T	.		.
	1	2	3	4

The Complete Tieup to Weave

13/24

4			4
3		3	3
2		2	
1	1	1	1

One Layer Weave with  
Warp Floats in Top Layer

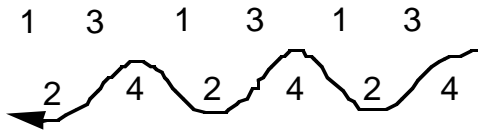


One Shuttle Weave  
One Weft Weave

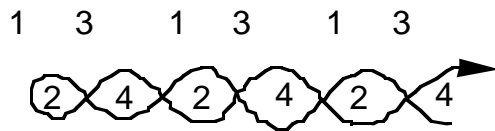
Threading

Shafts

4				L				L
3			D				D	
2		L				L		
1	D				D			



First Weft Pick: Raise shafts 1 & 3  
Raise Shaft 2



Second Weft Pick: Raise Shafts 1 & 3  
Raise Shaft 4

Tieup Development and Treading Order

4		
3	.	
2	B	
1	.	
	1	2

4		B
3	.	.
2	B	
1	.	.
	1	2

The Complete Tieup to Weave

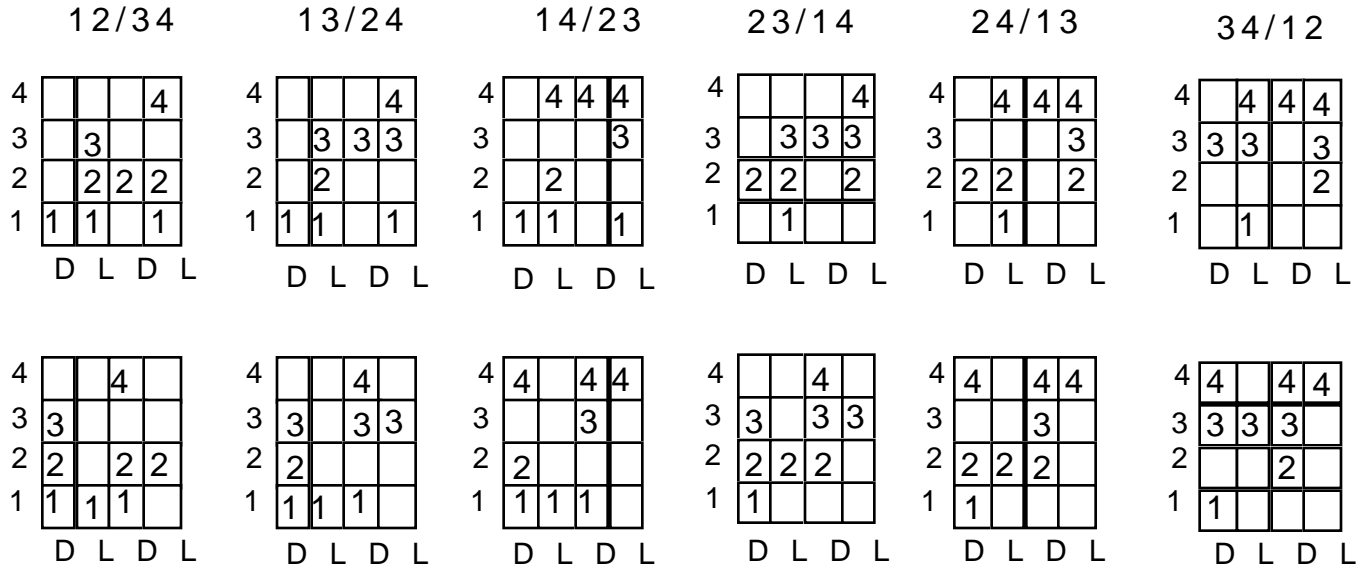
13/24

4		4
3	3	3
2	2	
1	1	1
	1	2

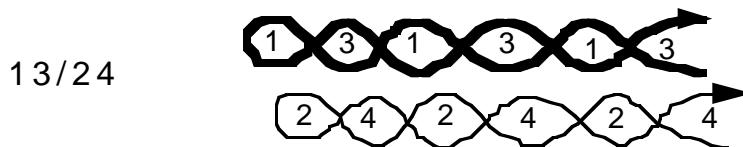


## The Six Tieups for 4 Shaft Double Weave

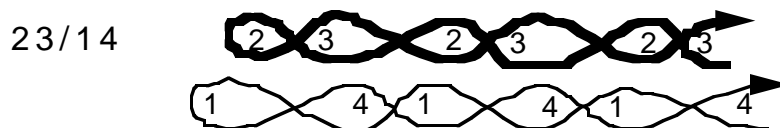
The two basic tieups for double weave can be described as 13/24 and 24/13. There are four additional tieups for double weave: 12/34, 14/23, 23/14, and 34/12. These are given here in two treading forms with weft picks in the order D L D L across the bottom of each grid. These different tieups become important for the discussion of color in double weave.



The weave structure for the example 13/24 is repeated here to show that the top layer lies almost directly over the bottom layer.

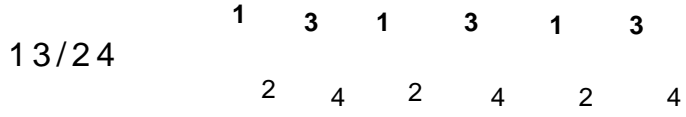


The example 23/14 shows how the top layer does not seem to lie directly over the bottom layer. However except at the beginning and the end of the woven block, the threads in the top layer readily occurs after the weaving is removed from the loom and washed

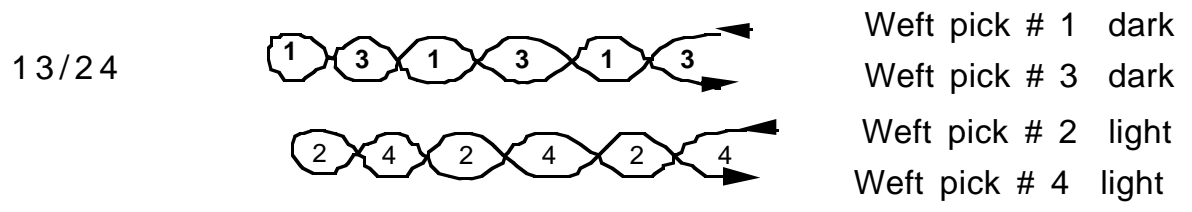


# A Foolproof Method to Determine the Tieup or Peg Plan for Double Weave

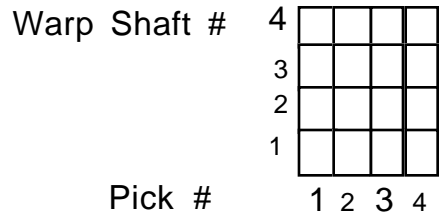
1. Choose the shorthand notation you want to weave ( such as 13/24)  
Specify the warp threads by shaft number and color in the two layers



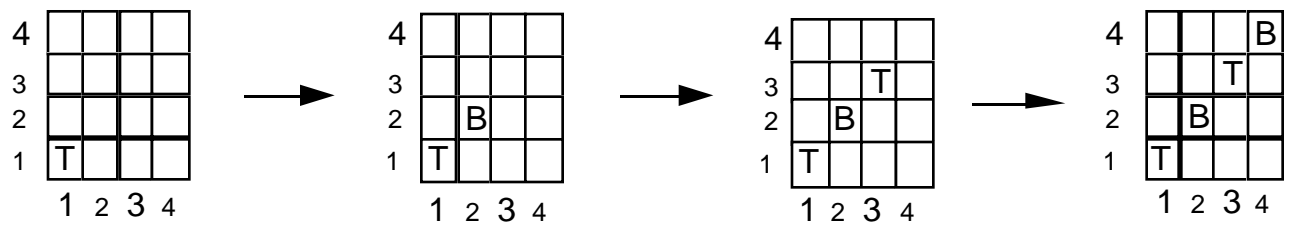
2. Show the weave structure for the four weft picks



3. Use a 4 x 4 grid that indicates the shaft numbers for warp threads and pick numbers for weft threads.

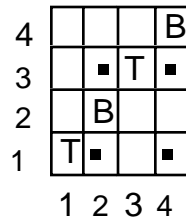


4. Use the symbols T and B to represent which warp threads will be in the top or bottom layers of double weave





5. In double weave the top layer must be raised out of the way in order to weave the bottom layer. Black dots complete the tieup diagram.

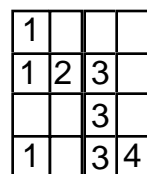


6. You may prefer diagrams with numbers, either as tieups or peg plans.

Tieup



Peg Plan



7. The drawdown or drawup may be made from either the tieup or the peg plan. It is somewhat more direct to do this from the peg plans.

Peg Plan  
for Drawdown

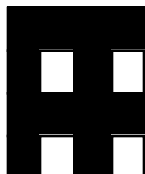


Peg Plan  
for Drawup



8. The completed drawdown and drawup look like these diagrams  
(They are misleading in that all warp and weft threads are shown in one layer rather than in the two layers of double weave.)

Drawdown

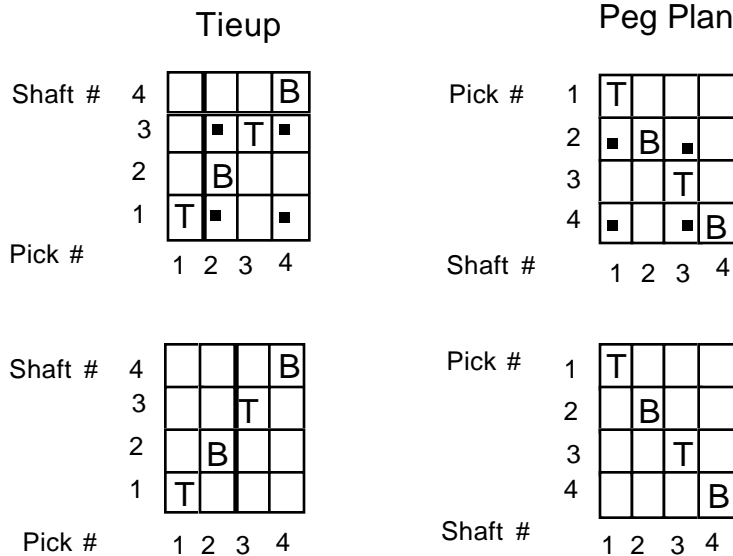


Drawup

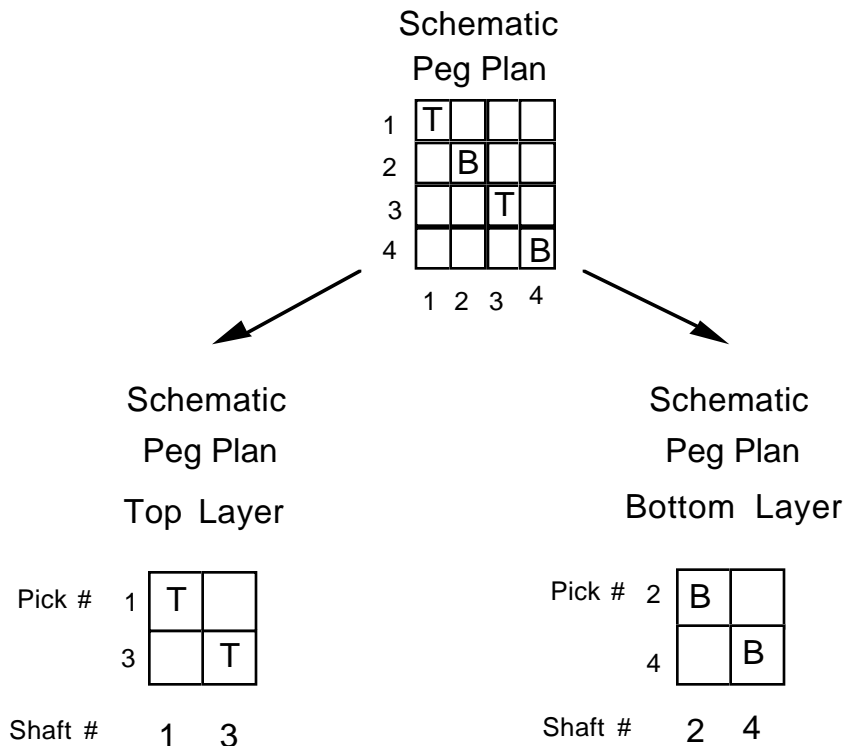


## A Foolproof Method to go from the Tieup or Peg Plan to Drawdowns of the Two Layers of Double Weave

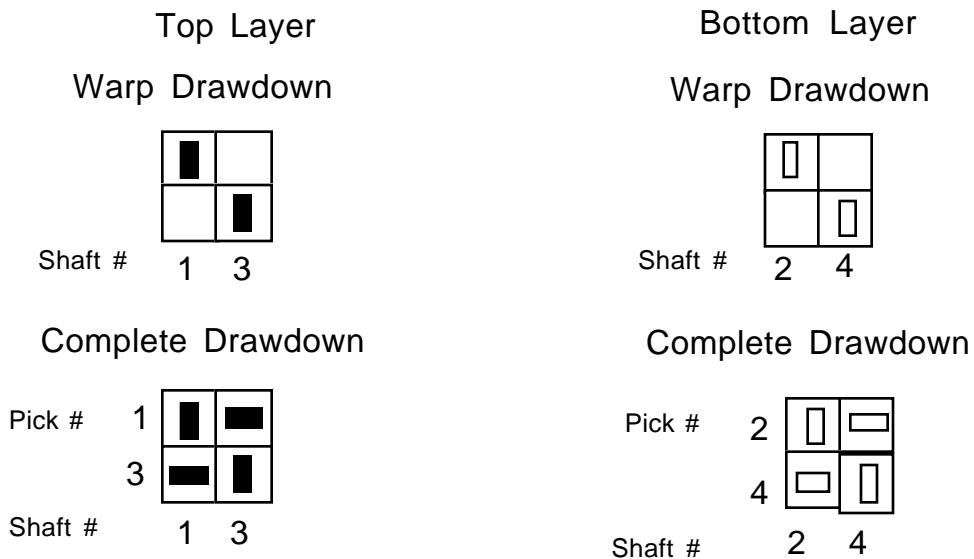
1. Start with the Tieup or Peg Plan in the T, B, Black Dot Form and Erase the Dots



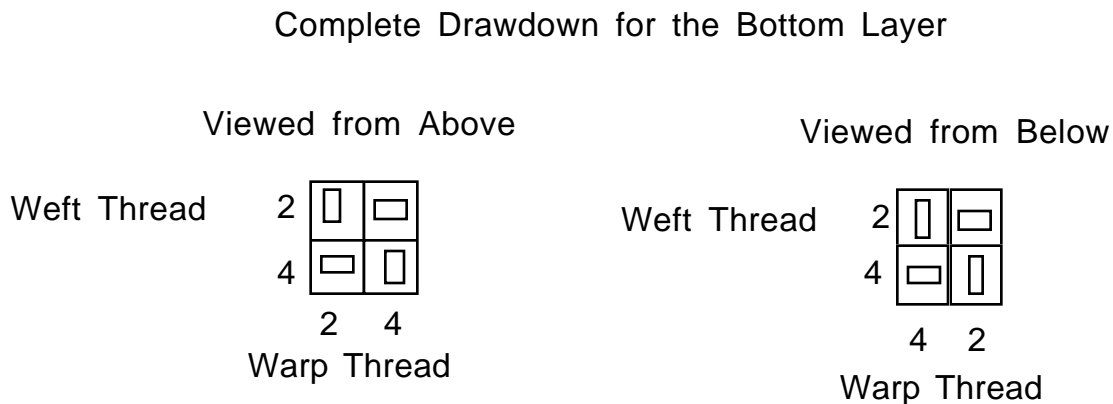
2. Recognition that double weave leads to two cloth layers permits separation of the peg plan into two peg plans, one for the top layer and the other for the bottom layer, both viewed from above



3. The drawdowns are now easy to develop. First the warp threads are shown and the second set of diagrams shows both warp and weft threads.



4. One small problem. The bottom layer should be viewed from below not from a above. The twill line in the threading draft reverses when viewed from below. The drawdown for the bottom layer changes in a very minor way



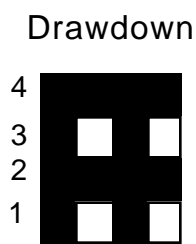
# Drawdowns for Double Weave

13/24

24/13

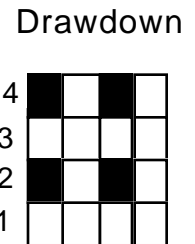
Tieup

4			4
3	3	3	3
2	2		
1	1	1	



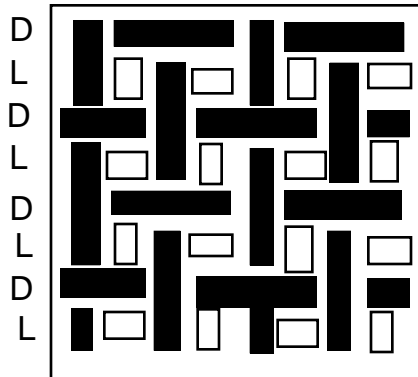
Tieup

4	4	4	4
3		3	
2	2	2	
1	1		

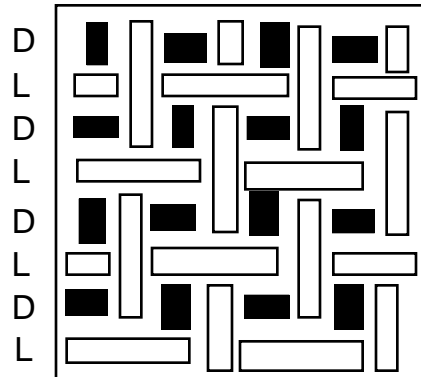


The traditional drawdowns above are not very helpful because they show all the warp and weft threads in one rather than two layers. Looking at weave structures helps in seeing what is happening. The first diagrams show all warp and weft threads. In the second diagrams the threads in the top layer slide over to cover up the threads in the bottom layer.

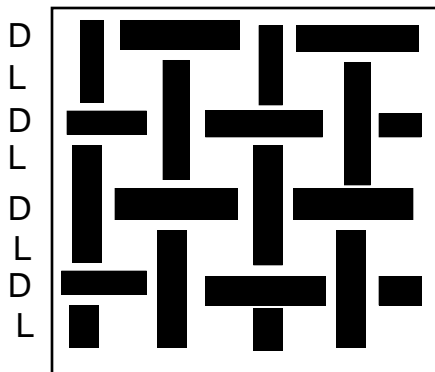
D L D L D L D L



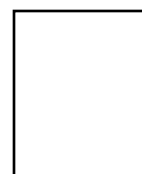
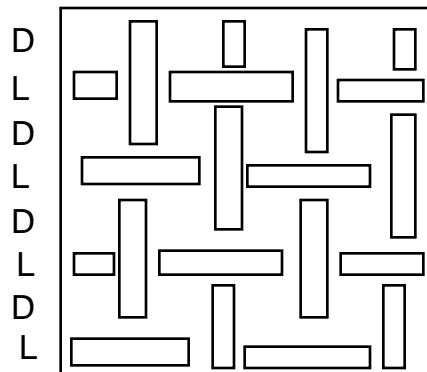
D L D L D L D L



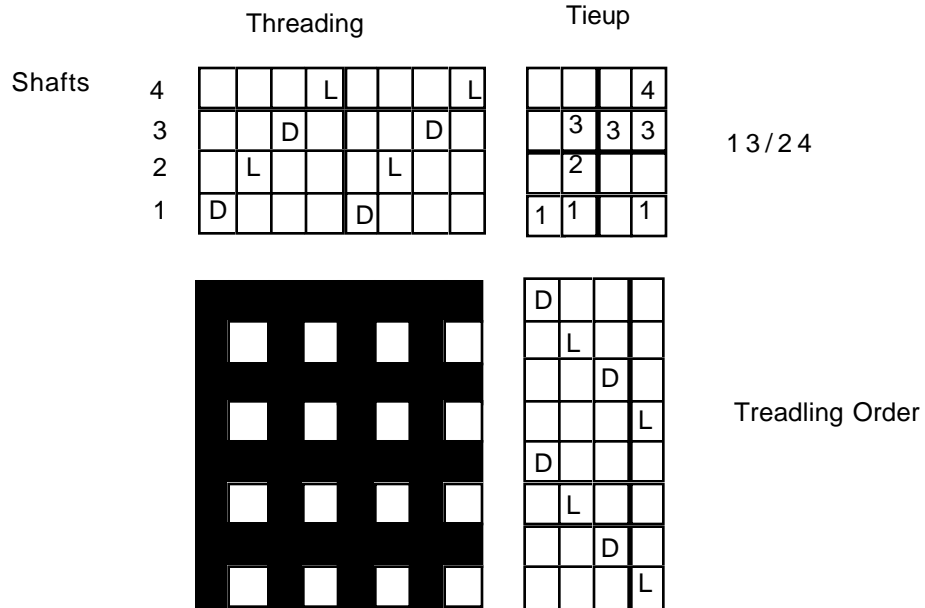
D L D L D L D L



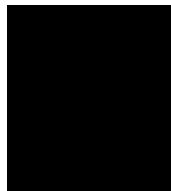
D L D L D L D L



# The Threading, Tieup, Treading Order and Drawdown For the Top Layer of Double Weave

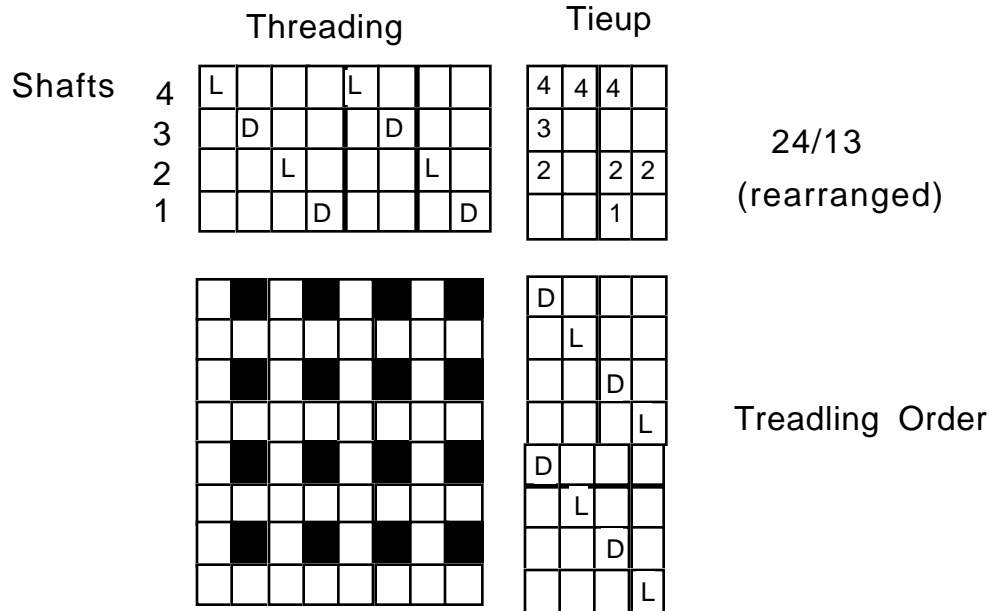


This drawdown should be interpreted to mean that the top layer looks like this.



## What Does the Other Side of Double Weave Look Like?

When looking at the back side of double woven cloth, you must remember two things. The order of the warp threads is now 4321 rather than 1234. The tieup becomes the complement of the tieup for the top layer.



This drawdown should be interpreted to mean that the bottom layer looks like this.



## Color and Weave Effects in Double Weave

"Color and Weave Effects" refer to the changes that can be made in a weaving by rearranging the color sequence in the warp threads or the weft threads or in both the warp and weft threads. The vertical or horizontal lines in a Log Cabin weave is an example of color and weave effects.

Four sets of color orders for the warp and weft threads are discussed in next few pages. The warp color order is indicated across the top of each grid and the weft color order is specified vertically on the side of the grid. The weave structures that are shown correspond to the top layer. Therefore a second set of warp and weft colors are given inside the outlining box and correspond to the threads in the top layer only.

The four sets can be categorized in this manner. In each set there will be four possible patterns as becomes clear when you look at the weave structures.

1. DLDL (warp) vs DLDL (weft)
2. DLDL (warp) vs DDLL (weft)
3. DDLL(warp) vs DLDL (weft)
4. DDLL (warp) vs DDLL (weft)

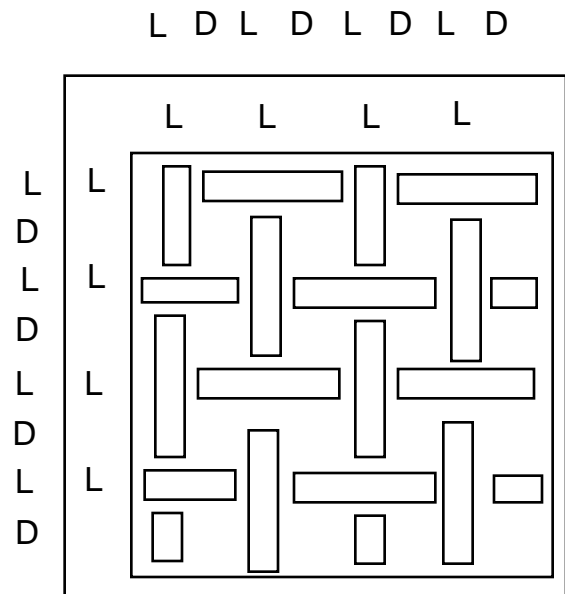
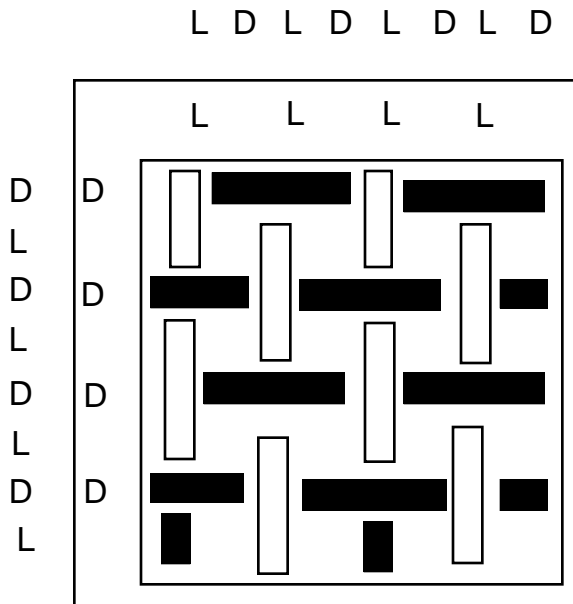
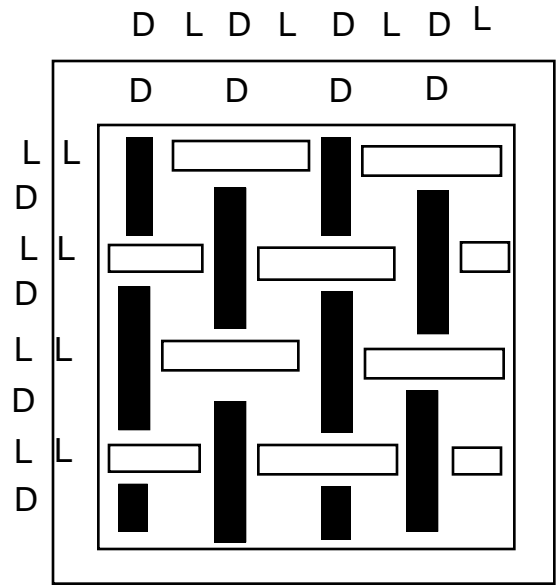
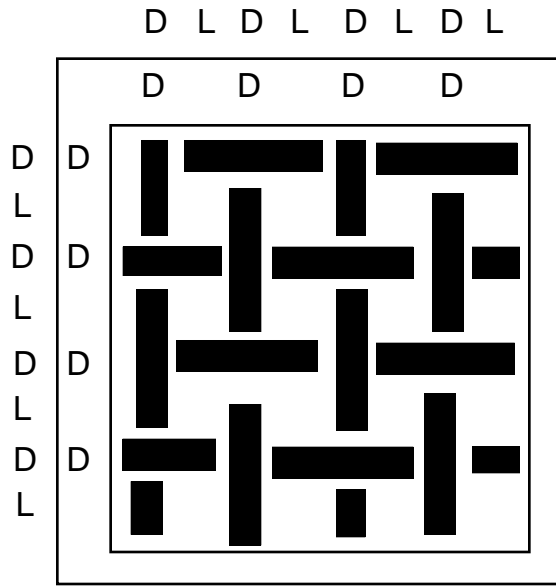
All have the same double weave structure based on the notation 13/24.

Since drawdowns are easier to draw than weave structure diagrams, each example is identified both with a drawdown and with a weave structure.

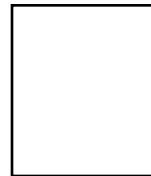
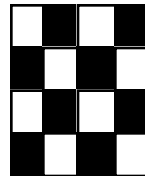
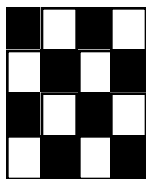
Color and Weave Effects for 13/24 Double Weave

Top Layer Only

DLDL - DLDL Combinations



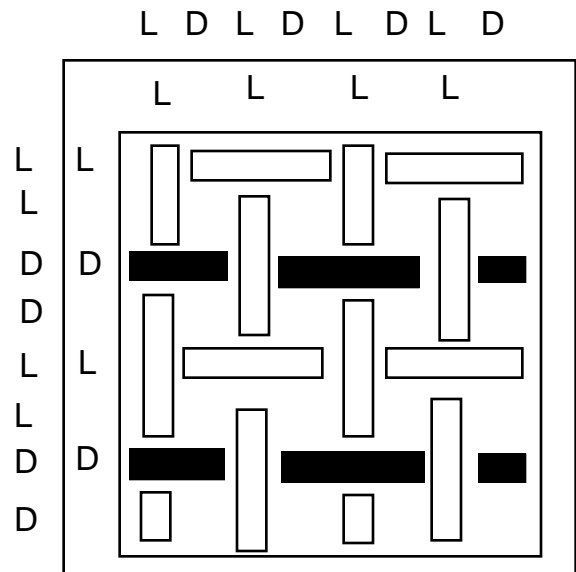
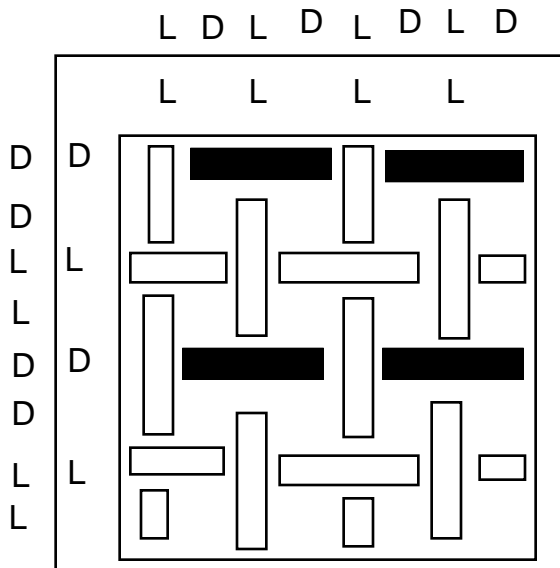
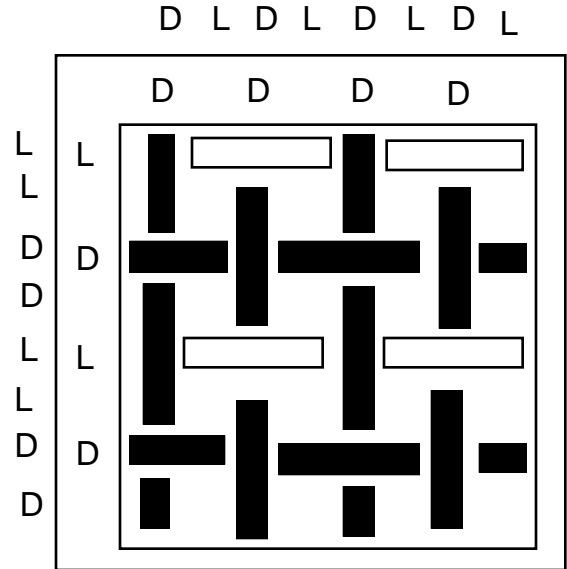
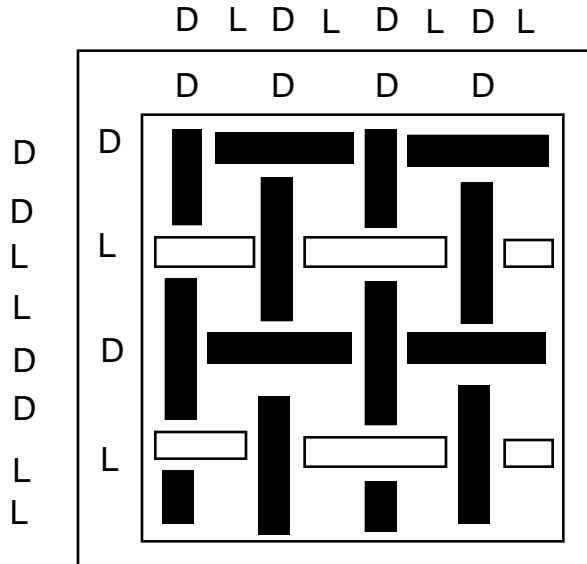
As Drawdowns



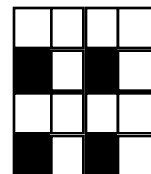
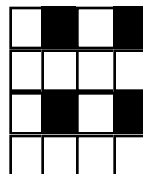
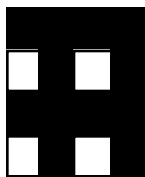


Color and Weave Effects for 13/24 Double Weave  
Top Layer Only

DLDL - DDLL Combinations



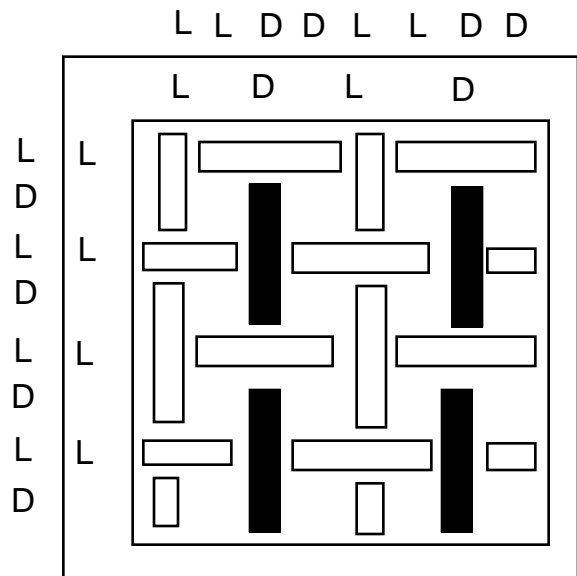
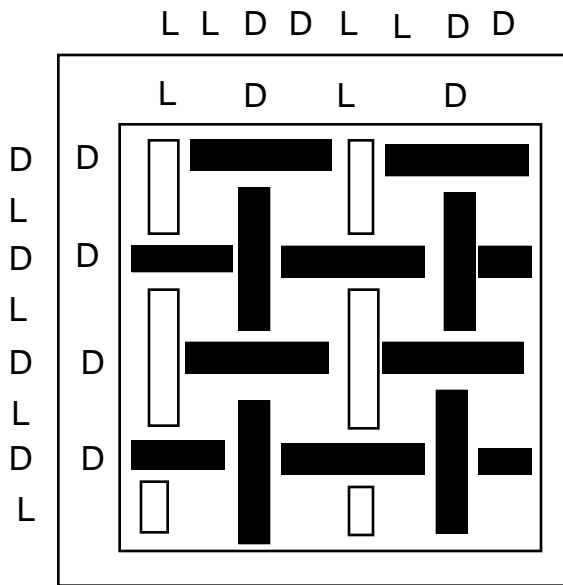
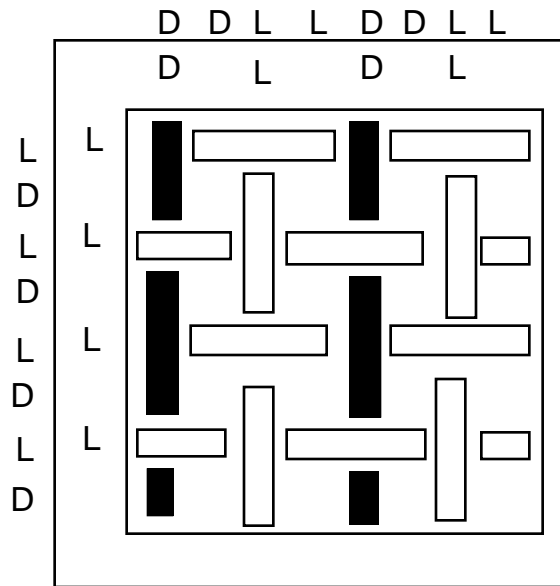
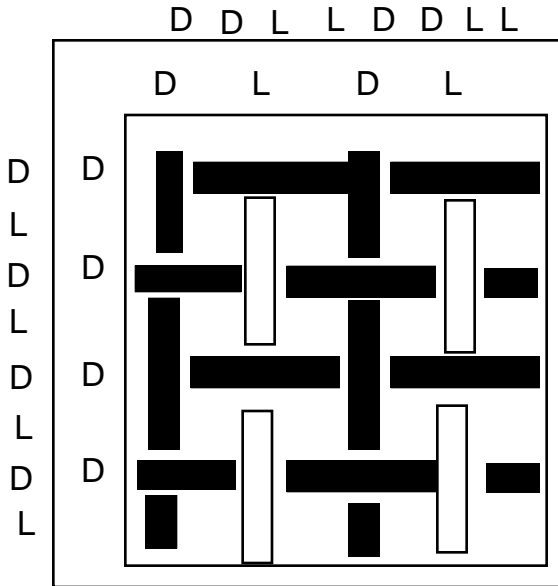
As Drawdowns



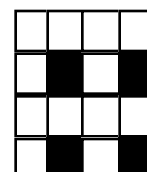
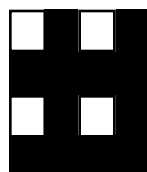
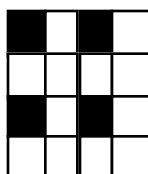
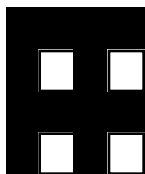
Color and Weave Effects for 13/24Double Weave

Top Layer Only

DDLL - DLDL Combinations



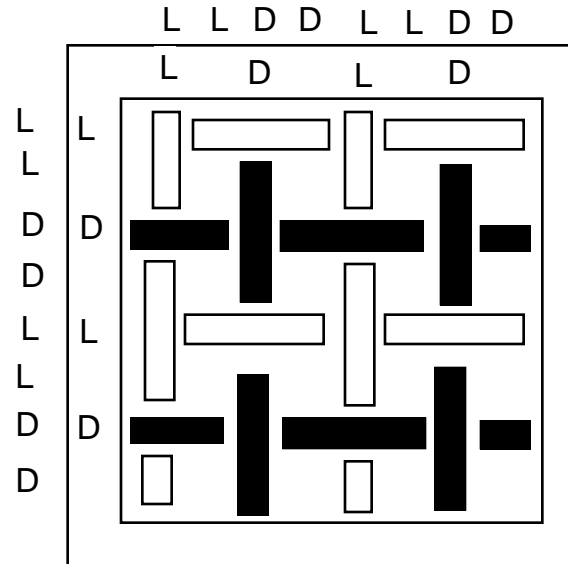
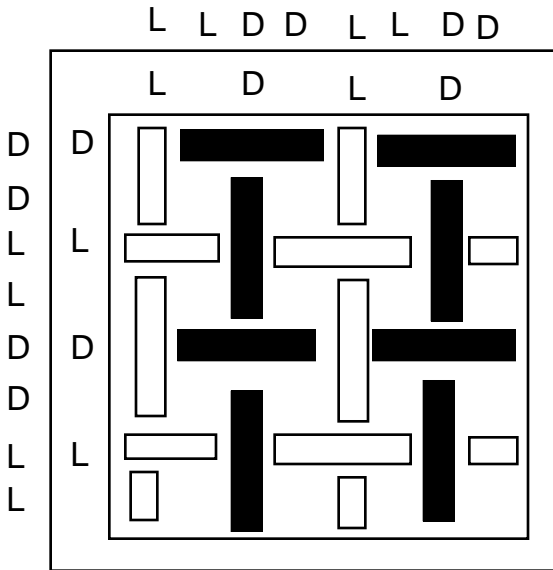
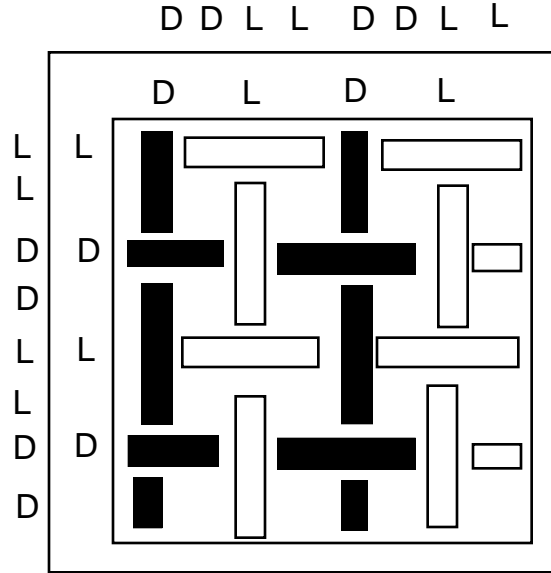
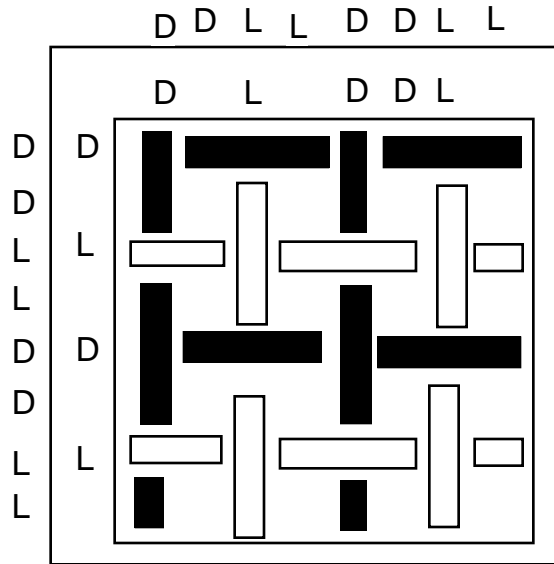
As Drawdowns



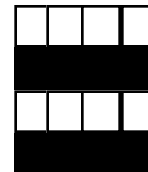
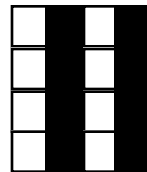
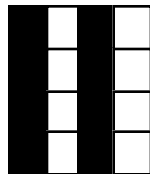
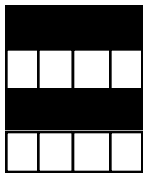
# Color and Weave Effects for 13/24 Double Weave

Top Layer Only

DDLL - DDLL Combinations



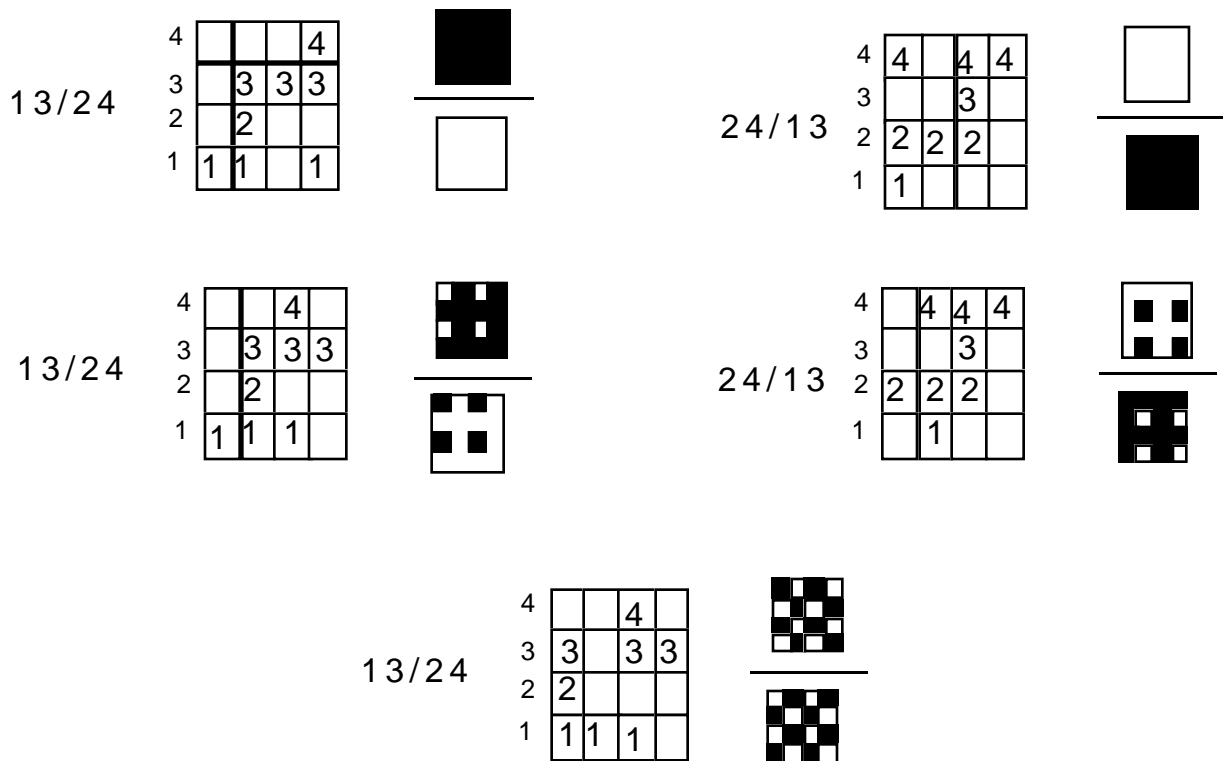
As Drawdowns



## Color and Weave Effects with DLDL Color Order in Both Warp and Weft

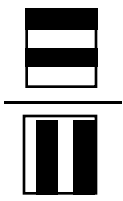
There is one problem with the discussion of the last four pages. The order in which the eft shiuttles are used changes, sometimes DLDL, other times LLDD. This is all right if there is only one block in the weaving. But suppose there are 2 or 3 or 4 blocks of double weave in the design and you want to change the color and weave effect in one of the blocks without change the other blocks. A different approach is needed.

The color order for the warp is determined once you warp the loom. The weft color order must also stay the same so that the weaving in multiple blocks can be controlled. The order within a tieup however can be changed block by block and this permits control of color and weave effects for the top and the bottom layers and from block to block. My kind of problem and I have discussed the general problem in my book "More Loom Controlled Double Weave". There are 144 possibilities and a few examples are shown now. The appearance of the top and the bottm layers are shown as drawdowns.



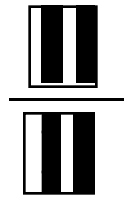
23/14

4			4
3	3	3	3
2	2		2
1	1		



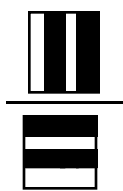
23/14

4		4	
3	3	3	3
2	2	2	
1	1		



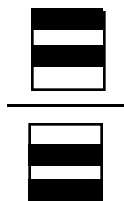
23/14

4		4	
3	3	3	3
2	2	2	
1	1		

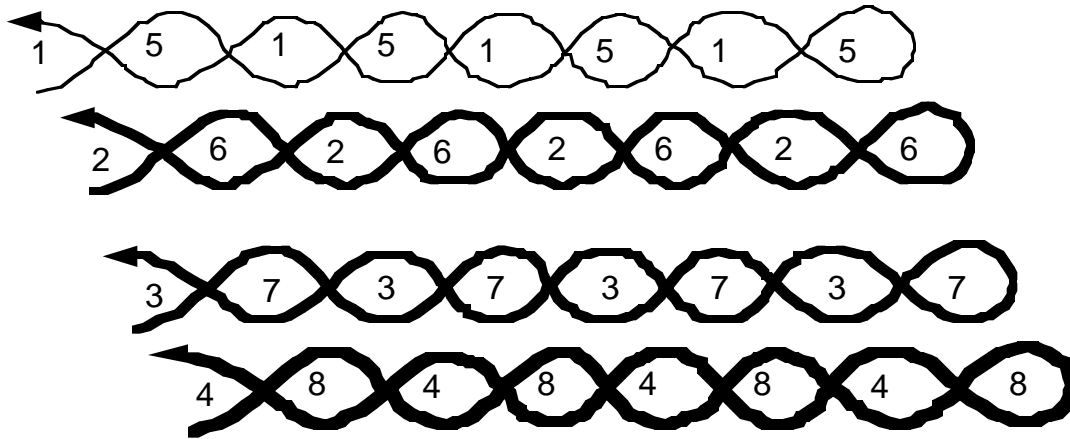


23/14

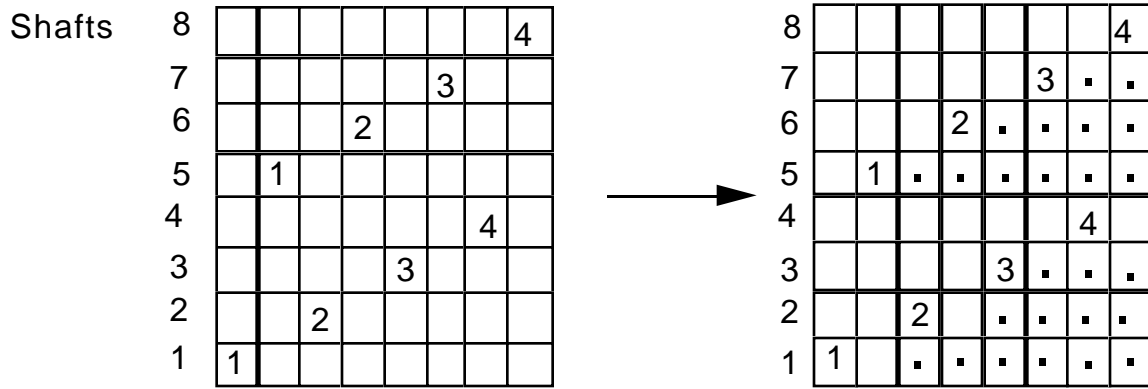
4	4		
3	3	3	3
2	2	2	2
1			1



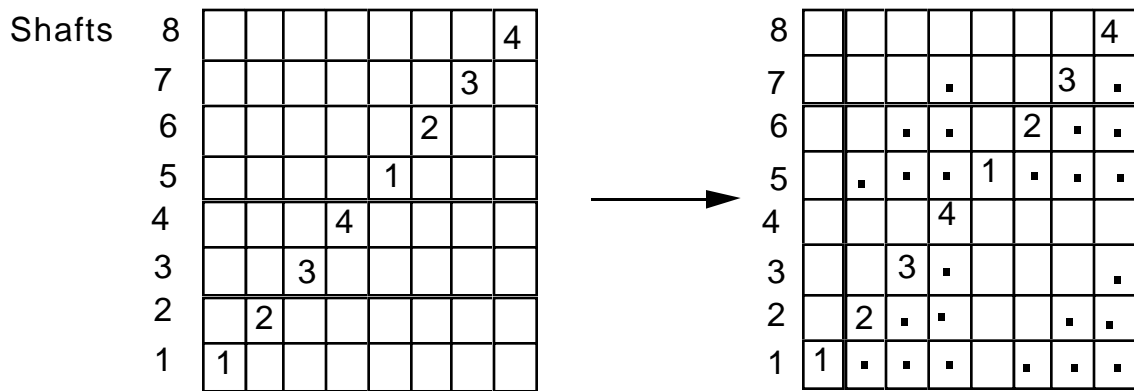
# Four Layer Weave Structure and Tieups for an 8 Shaft Loom



Tieup 1



Tieup 2



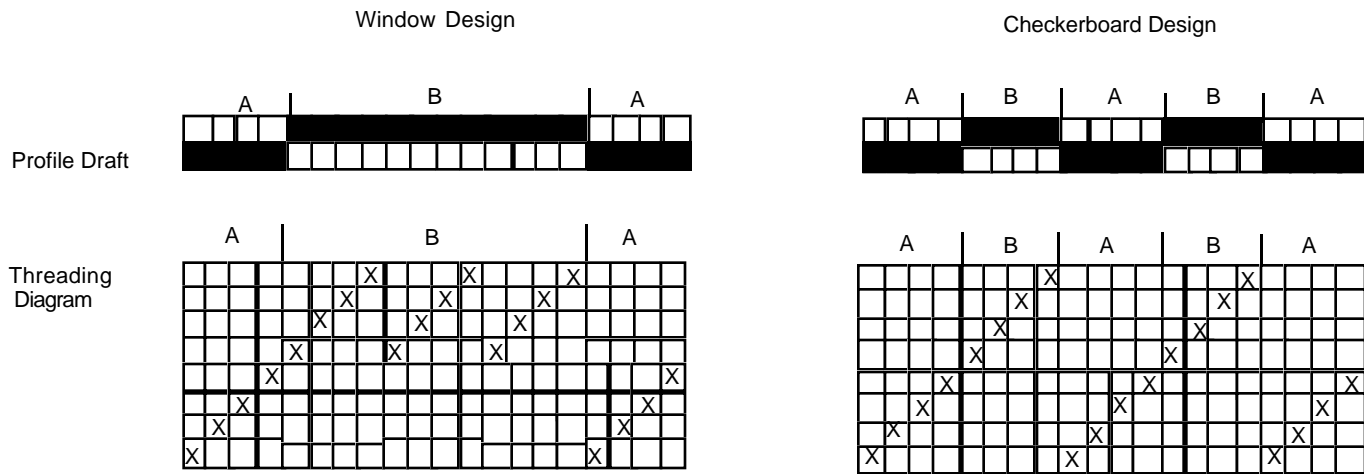
## Units and Blocks in Double Weave

When a weaver graduates from a 4 shaft loom to 8 or more shafts, the concepts of units, blocks, and profile draft prove to be very helpful shortcuts in planning designs.

A warp unit is the minimum number of warp threads that will lead to the desired weave structure. That minimum number for double weave is four warp threads, with two warp threads in the top layer and the other two warp threads in the bottom layer. Because of this a 4 shaft loom provides only one weaving unit on shafts 1-4. An 8 shaft loom provides two kinds of weaving units, one on shafts 1-4 and the other on shafts 5-8. Additional shafts provide more units, always in multiples of 4 shafts.

A warp block can be made of as many warp units as the weaver desires. Blocks are usually designated as block A on shafts 1-4, block B on shafts 5-8 and so on. It is important to realize that block A may weave in the same or different fashion from block B.

In a profile draft, a warp unit is indicated by a filled in square. The warp block then consists of the appropriate number of unit squares. The designs for the two important 8 shaft double weave designs called “windows” or “checkerboards” appear like this as profile drafts. The warp units labeled A are on shafts 1-4 and the warp units labeled B are on shafts 5-8.



(The threading diagrams have been scaled down by x 4 from the profile drafts)

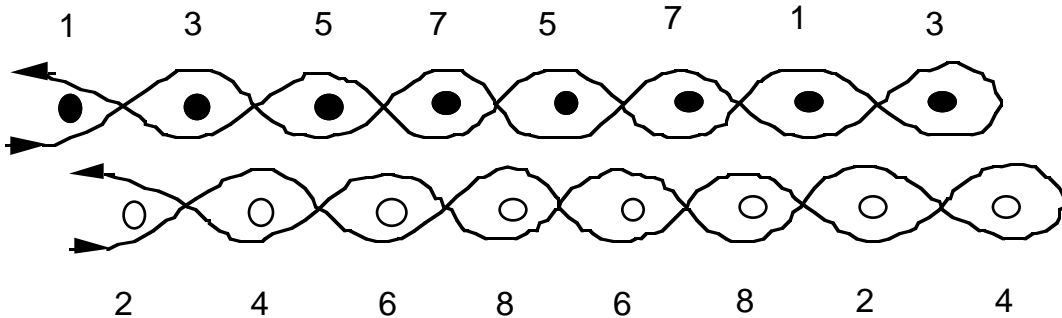


\*There can be 4 or 8 blocks of double weave with an 8 shaft loom. There are only 2 blocks in traditional double weave and the other blocks are in integrated double weave.

# 8 Shaft Double Weave

Blocks		A			B			B			A			
Shafts	8						L				L			
	7					D				D				
	6				L				L					
	5				D				D					
	4			L									L	
	3		D									D		
	2	L										L		
	1	D										D		

The tieups for blocks A and B have the same form so even though there are 8 shafts available, this example behaves as though a 4 shaft loom is used. The two wefts are in the top and bottom layers of the double weave across the entire warp.



Tieup	Shaft	8			8	57/68
	7		7	7	7	
	6		6			
	5	5	5	5		
	4				4	13/24
	3		3	3	3	
	2		2			
	1	1	1	1		

Peg Plan	Shaft	1	2	3	4	5	6	7	8
	1					5			
	1	2	3			5	6	7	
			3					7	
	1		3	4		5		7	8

13/24    57/68

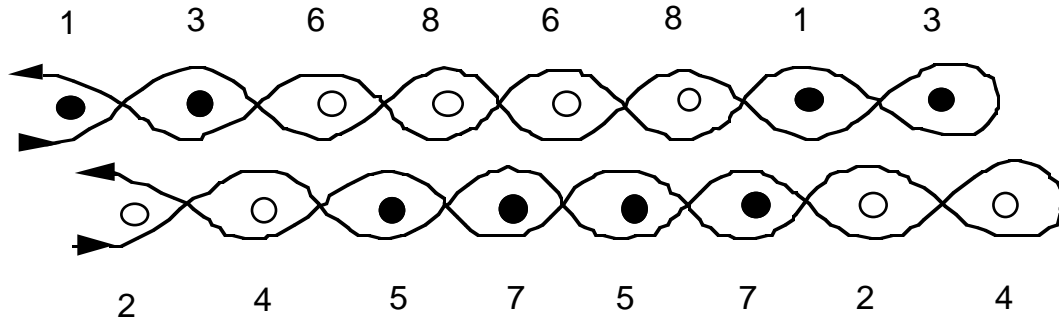


## 8 Shaft Double Weave

Blocks	A	B	B	A					
Shafts									
8				L			L		
7				D			D		
6			L			L			
5			D			D			
4		L						L	
3		D						D	
2	L							L	
1	D							D	

Variation Number 1

The tieups for blocks A and B have different forms. Block A has dark threads in the top layer and light threads in the bottom layer while block B has light in the top layer and dark in the bottom layer. The two wefts weave in the top or the bottom layers across the entire warp.



Tieup

Shaft

8		8	8	8	68/57
7				7	
6	6	6		6	
5		5			
4				4	13/24
3		3	3	3	
2		2			
1	1	1		1	

Peg Plan

Shaft

	1	2	3	4	5	6	7	8
1					6			
1	2	3			5	6		8
		3			6			8
1		3	4		6	7	8	

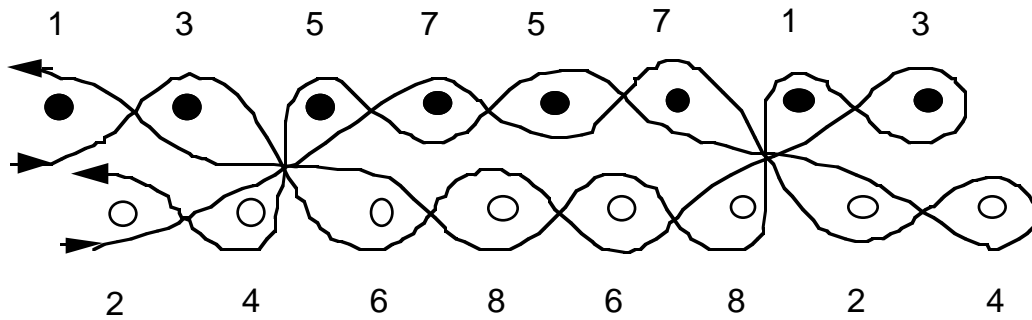
13/24      68/57

# 8 Shaft Double Weave

Blocks		A		B		B		A	
Shafts	8				L			L	
	7			D			D		
	6		L			L			
	5		D			D			
	4		L					L	
	3		D					D	
	2	L						L	
	1	D						D	

## Variation Number 2

The tieups for blocks A and B have different forms. The wefts now move between the top and the bottom layers across the warp.



Tieup

Shaft

8			8		
7	7		7	7	
6	6				
5	5	5	5		
4				4	
3		3	3	3	
2		2			
1	1	1	1		

57/68

13/24

Peg Plan

Shaft

	1	2	3	4	5	6	7	8
	1				5	6	7	
	1	2	3		5			
			3		5		7	8
	1		3	4			7	

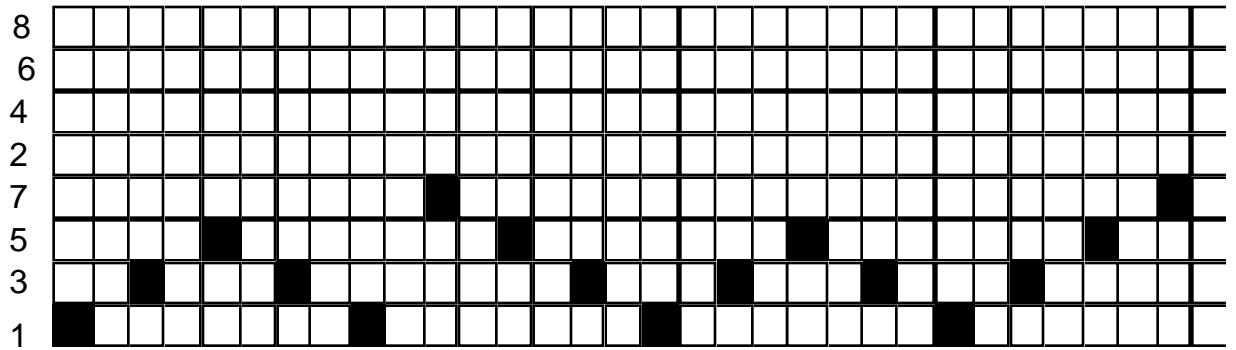
13/24    57/68



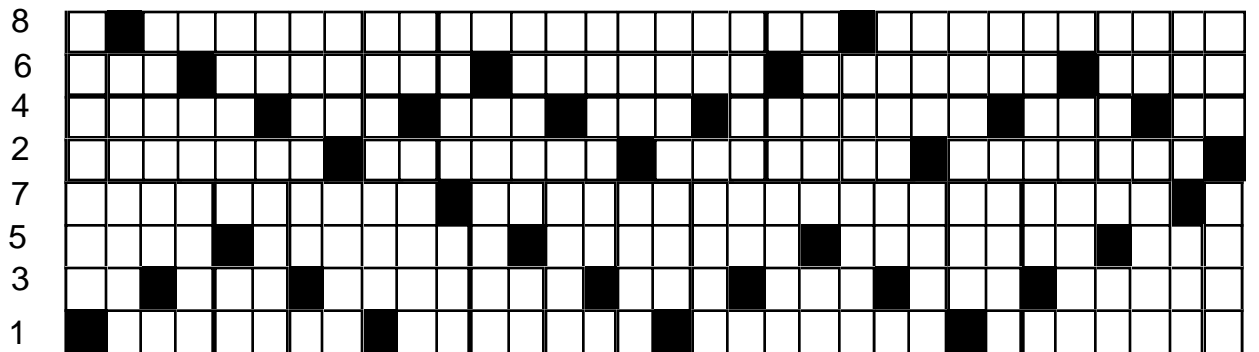
Kathryn Wertenberger's two methods\* for drafting double width double we  
 Top layer drafted on shafts 1357; bottom layer drafted on shafts 2468

Method I

- A. Draft the top layer of the cloth on the bottom rows of the threading draft in alternate columns.

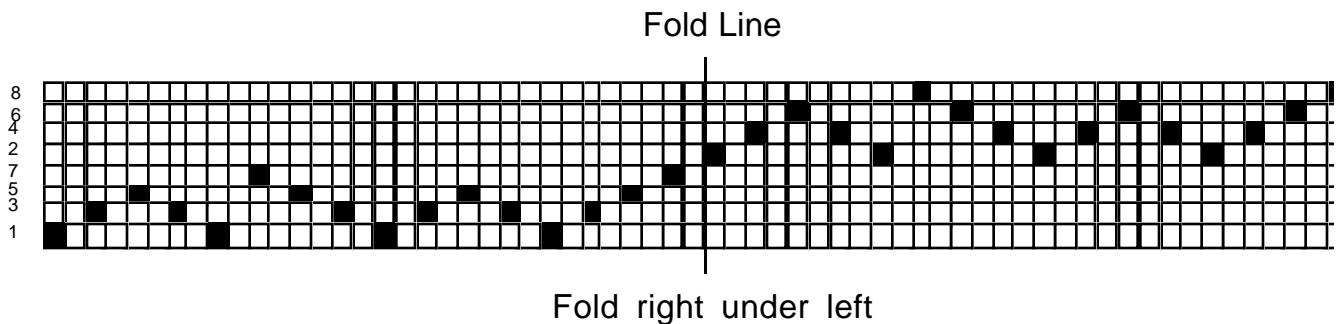


- B. Draft the bottom layer of the cloth on the upper rows of the threading draft in reverse order, using the empty columns.



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II. An alternate method. Write the entire draft for double width cloth on translucent paper filling in the top and bottom layers in alternate columns. Fold the paper over to obtain the complete draft



## Some Thoughts on Color and Design in Double Weave

One of the mysteries and delights of double weave is the way in which warp and weft threads may be made to disappear abruptly only to reappear at a later point in the weaving. Of course they don't disappear. Instead they move from the top layer of weaving to the bottom layer. As one becomes familiar with double weave, the number of choices for color and for design expand. In essence there are two warps which can be interchanged from the top layer to the bottom and back again. At the same time there are two wefts that can be in the top or the bottom layer and even move from top to bottom and back again in the same weft shot if your loom has 8 or more shafts.

A few of many design and color choices are discussed here. It is a challenge indeed to balance the many possibilities in order to achieve a well designed fabric.

### A. Two Color Warps for 4 Shaft Looms

The planning of any weaving starts with the warp threading.

	Threading I								Threading II							
Shafts	4				B				B	4			B			B
	3			A				A		3		B			B	
	2		B				B			2	A			A		
	1	A				A				1	A			A		

These threadings differ only slightly but indicate two ways that you might choose to warp your loom. The letters A,B,C... will be used rather than DLDL to suggest that a wide range of colors could be used in the warp. A special aspect of double weave is that the weaver can choose any of the six warp pairs to be in the top layer (and the complementary pair will be in the bottom layer). Here is a chart to show those six choices and what this means for threading I and for threading II.

Warp Pair Top/Bottom	Threading I	Threading II
12/34	AB/AB	AA/BB
13/24	AA/BB	AB/AB
14/23	AB/BA	AB/AB
23/14	BA/AB	AB/AB
24/13	BB/AA	AB/AB
34/12	AB/AB	BB/AA

When the weft threads are limited to the two colors A and B, the color of the two layers of double weave can be predicted as shown in the next chart.

Warp	+	Weft	=	Woven Fabric
AA		AA		100 A
AA		AB		75 A 25 B
AA		BB		50 A 50 B
AB		AA		75 A 25 B
AB		BB		25 A 75 B
AB		AB		50 A 50 B (Horiz Log Cabin)
AB		BA		50 A 50 B (Vert Log Cabin)
BB		AA		50 A 50 B
BB		AB		25 A 75 B
BB		BB		100 B

When you change from one warp color pair to another, the two cloth layers of double weave are locked together into a single fabric. The basic design for 4 shaft double weave is a series

of horizontal bands which can be the same or varying in width. When a weft color such as C is used rather than A or B, the color possibilities multiply rapidly.

Some additional threadings for 4 shaft looms include these.

Shafts	4				B				B				A				A
	3			A				A					B				B
	2		B					B					A				A
	1	A					A						B				B

Reversal of the threading from ABAB to BABA means that the two halves of each layer could be different in appearance. For example with weft color A, the left half could be all A while the right half could be half A, half B. Or with weft colors AB, the left half could be vertical log cabin lines while the right half could be horizontal log cabin lines. With a weft color such as C, the left half could be a color blend of A and C while the right half could be a color blend of B and C. Choices, many choices.

Shafts	4				B				B				C				B				B
	3			A				A					A				A				A
	2		B					B					C				B				B
	1	A					A						A				A				A

Notice the introduction of a third color in the warp. This gives rise to weaving a stripe or a plaid in one of the layers of double weave with a solid color warp for the other side.

Shafts	4				B				B				D				B				B
	3			A				A					C				A				A
	2		B					B					D				B				B
	1	A					A						C				A				A

This threading can be used for a stripe or a plaid design for each layer of double weave. The two sides could have the same or different widths for the stripes. This becomes possible by combining features of the last two threadings.

## B. Four Color Warps for 4 Shaft Looms

The first threading that will be discussed is this one.

Shafts	4			D			D
	3		C			C	
	2	B			B		
	1	A		A			

As was true for the two color examples, there are six warp color pairs that can be chosen for the top layer of 4 shaft double weave. Now however the six pairs are different from each other. Here is a chart that shows what the choices can be.

Warp Pair Top/Bottom	Warp Pair Top/Bottom
1 2 / 3 4	AB / CD
1 3 / 2 4	AC / BD
1 4 / 2 3	AD / BC
2 3 / 1 4	BC / AD
2 4 / 1 3	BD / AC
3 4 / 1 2	CD / AB

You may not want to use all six color combinations in the same weaving. Or perhaps some of the warp color pairs may not be as attractive as the others. Wind sample warps. Wind each of the six color pairs and see if you like the results. This is important because once the warp is on the loom, that's what you have to work with.

Two more threadings that use four colors in the warp are given without further discussion. Ideas presented in these two sections suggest the wide number of possibilities in double weave both in color and in design. A challenge indeed.



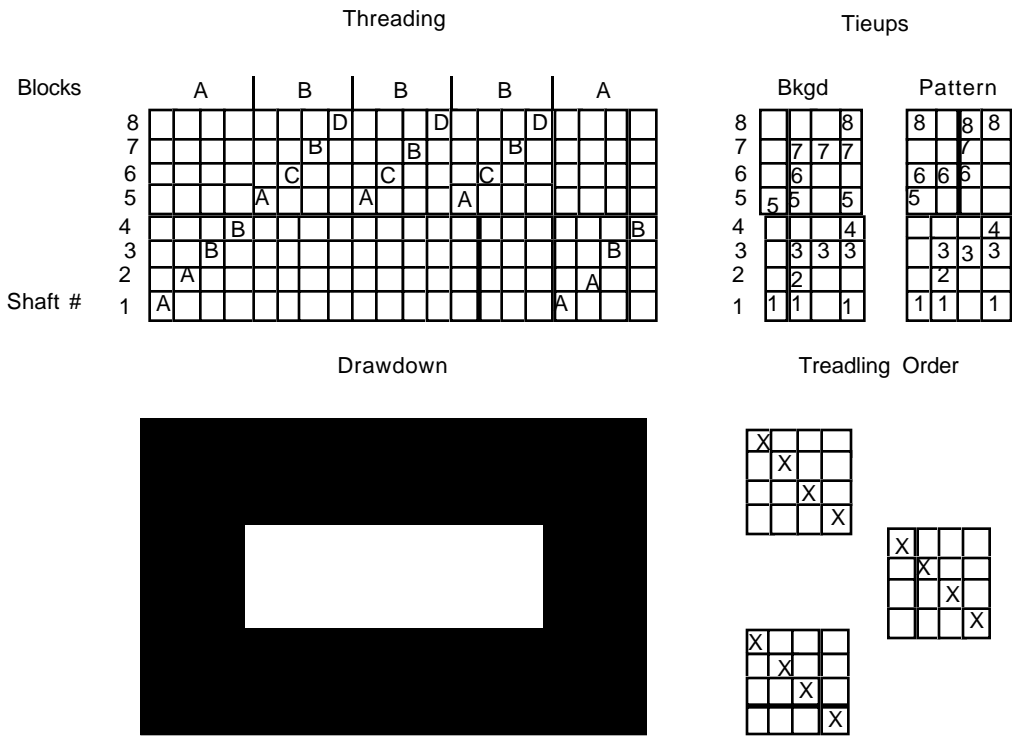
Shafts	4			B			B			D			D			C			C
	3			A			A			C			C			A			A
	2		B				B			D			D			C			C
	1	A				A			C			C			A			A	

Shafts	4			D			D			B			B			A			D
	3			C			C			C			C			B			B
	2		B				B			A			A			D			D
	1	A				A			D			D			C			C	

C. Designs for 8 Shaft Looms. Two Block Designs.

With an 8 shaft loom, two blocks become available for designs because 4 shafts are required for weaving one block of double weave. There are two principal designs for 8 shaft looms presented here. One I think of as the “windows” design and the other as the “checkerboard” design. Here are the threadings and the tieups to weave each type of design. Remember of course that the windows can be wide or narrow; short or tall. Similarly the checkerboard can be regular or irregular in either the warp or the weft direction.

1. The Windows Design. Threading, Tieup, Treading and Drawdown.

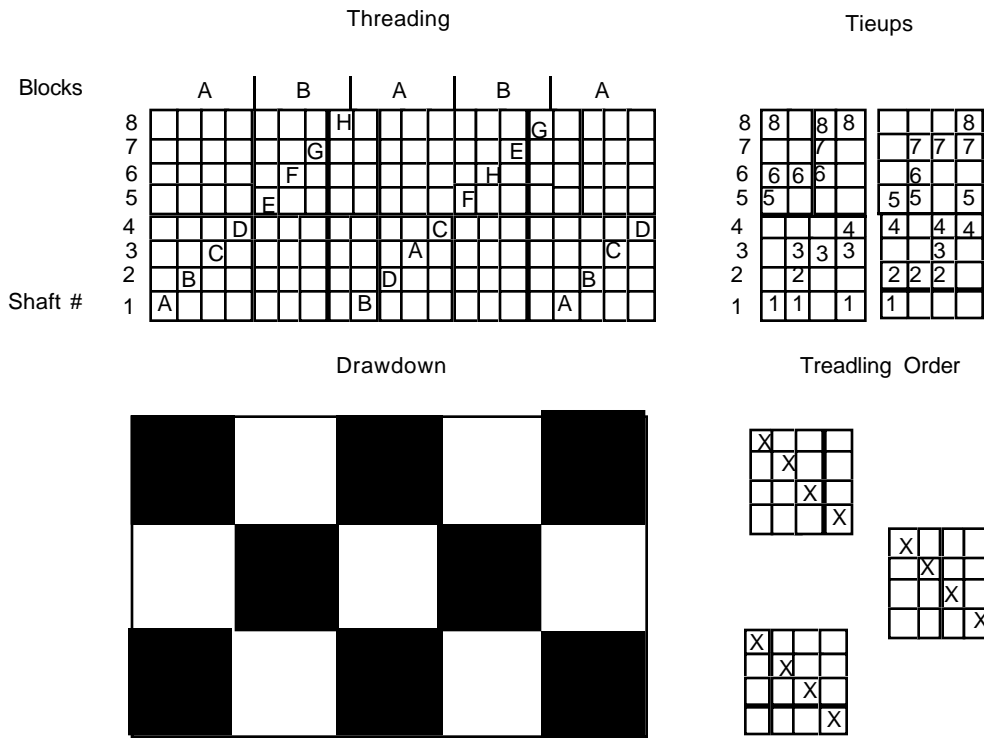


Notice that the threading for this design requires the same color warp threads be used on shafts 1 and 3 and shafts 5 and 7 in order to weave the background across the warp. The threads on shafts 6 and 8 may be different to create a contrast in warp color for the window portion of the design. (In this example the tieups correspond to the choices of 13/24 and 57/68 for the background and 13/24 and 68/57 for the window pattern. Also the threads on shafts 2 and 4 do not have to be the same as the threads on shafts 1 and 3. For reasons of simplicity, they are the same in this example.)

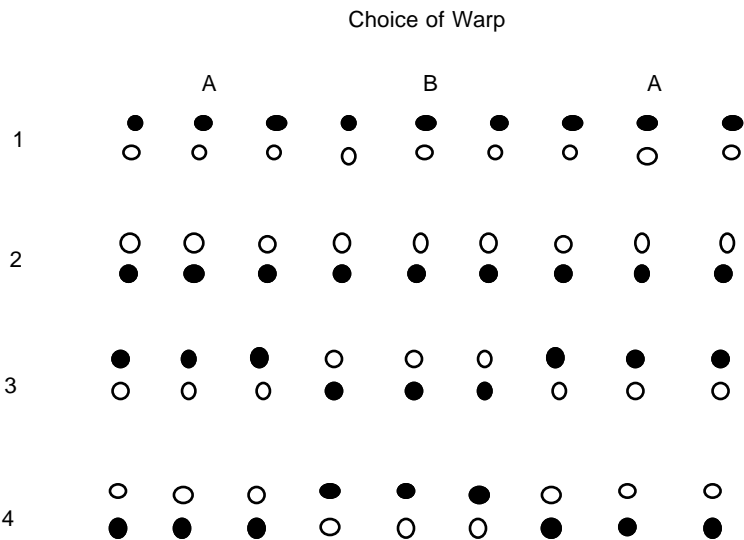
I have often combined units of this basic design to have 3, 5 or 7 windows in a horizontal array across the warp. In some instances the background area continues the two colors A and B throughout the warp. In others each window area is on a separate background color such as (AA BA BB) or (AA BA BB CB CC AC AA). Remember that any of the six warp color pairs can be used in the window area giving a wide range of color possibilities. I usually find it advisable to use a single color for the weft in the background area throughout the weaving to provide the unity of a border. The range for the weft color in the pattern or window regions is much greater and can be changed throughout the weaving.

## 2. The Checkerboard Design. Threading, Tieup, Treading, and Drawdown.

The other basic design for 8 shaft double weave is the checkerboard. This is a more challenging design because the choices of colors in the warp and weft are greater in number. To achieve an overall sense of unity and balance with an exciting color scheme is not easy.

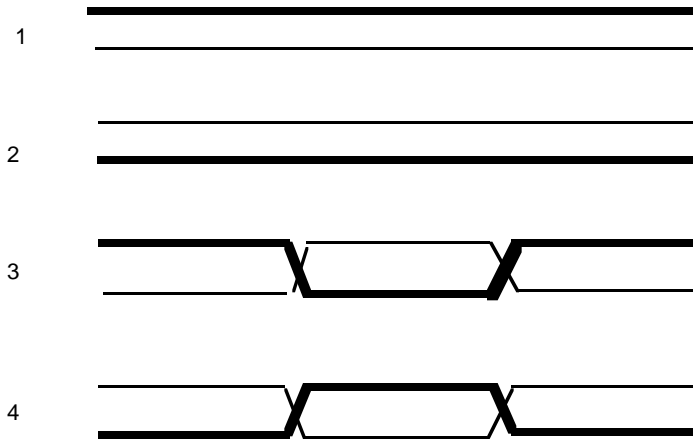


Suppose we stay with D and L for the two colors in this weaving. It is easy to see that the warp blocks A and B can be either D or L in the top layer (and L or D in the bottom layer). The next diagram shows the four choices for the behavior of the warp. The warp threads in blocks A and block B could be all dark in the top layer, all light in the top layer, or the two ways with dark for one block and light for the other block.



There are four choices about the paths the weft threads follow. They can be in the top layer, the bottom layer, or go from one layer to the other. Here are the choices.

### Choice of Weft Behavior



4 x 4 means 16 different final designs!

When colors A,B,C.... are used in a checkerboard design, the problems multiply. Now each square will be surrounded by other colored squares. The way in which neighboring colors can influence each other is well known so the development of a large checkerboard design where many different colors are used in the warp and the weft tests any weaver's ability. I strongly recommend that you examine carefully the 8 shaft weavings of Richard Landis which can be seen in the two books by Ruth Constantine and Jack Lenore Larsen "Beyond Craft: the Art Fabric" and "The Art Fabric: Mainstream". Also the double weaves of Annie Albers are a source of inspiration.