

# SWATCH PAGE

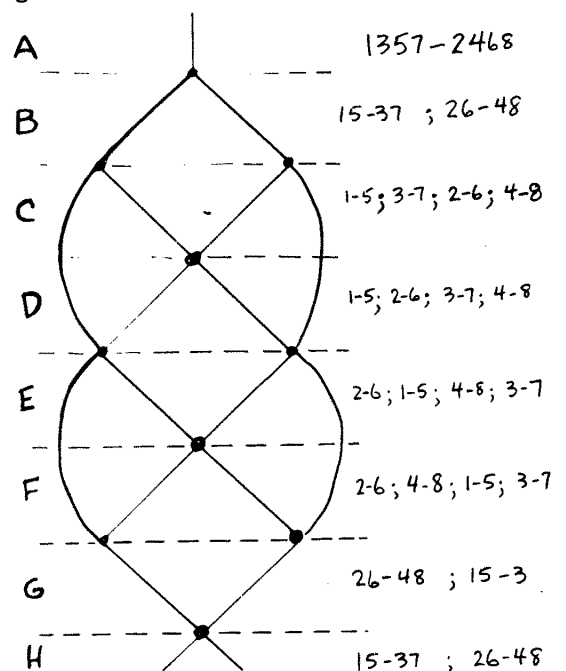
## DOUBLE WEAVES WITH 4, 6, and 8 HARNESSSES

In the first articles in this series on double weave, I have discussed some of the things that can be done in 4-harness double weaves (Jack type loom). Now let's move on to more harnesses. The possibilities begin to multiply and I will cover only some of them.

- 6 harnesses**      3 fabric layers, each in tabby weave  
 2 fabric layers, each in 3-harness pattern weaves  
 triple width fabric in tabby weave  
 pickup, one background color, two pattern colors
- 8 harnesses**      4 fabric layers, each in tabby weave  
 2 fabric layers, each in 4-harness pattern weaves  
 quadruple width fabric in tabby weave  
 pickup, one background color, three pattern colors  
 block patterns (I call this double-double weave)

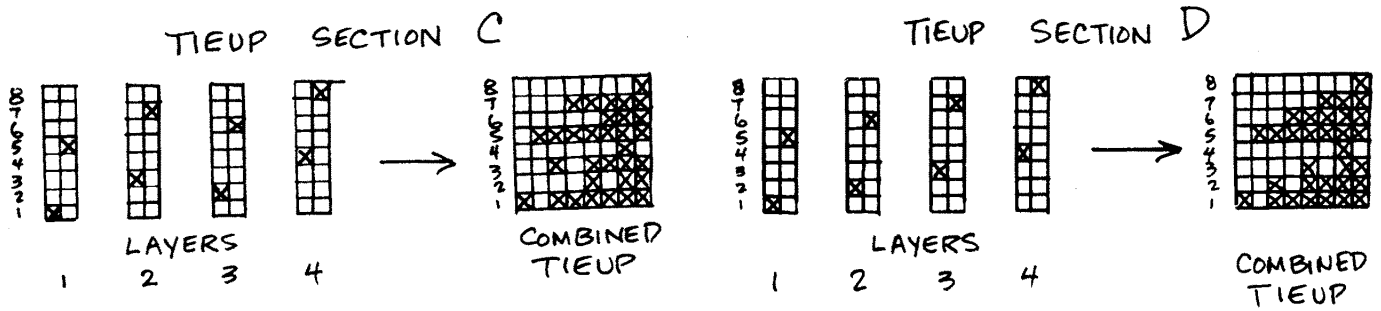
With more than four harnesses it becomes fairly easy to stitch the two layers together and I will discuss some ways to do this in the next article. Also with more harnesses, there are many more ways to blend colors of the warp in each layer. You may recall that with four different colors in the warp in 4-harness double weave, there are six different color pairs that one can choose for the top layer warp. With 8 colors and 8 harnesses, there are 70 color combinations possible in two layer weaving (4 warps used in each layer). And for four layers weaving with 8 colors and 8 harnesses there are 28 color combinations (2 warps used in each layer).\*

In this article I want to discuss two topics. The first deals with multilayer weaving and the second with patterns in double weaves. Although I will refer specifically to 8-harness weaving, the principles can be applied to any number of harnesses. Let me analyze the weave structure and the tieups for one of Kay Sekimachi's beautiful wall hangings in monofilament nylon (see pp.258-260 in *"Beyond Craft: The Art Fabric"*). The weave seems to be tabby throughout and the accompanying sketch shows what happens. One layer splits into two layers; the two layers split into four layers which cross each other several times before becoming two layers again. In



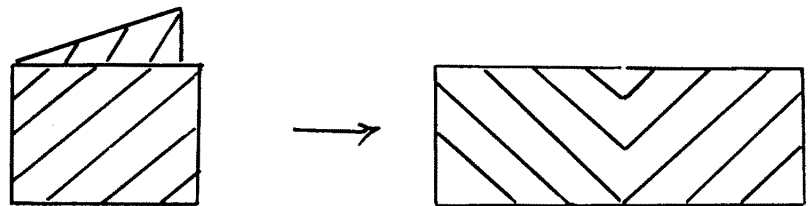
one of the hangings, the warp is used as weft to create triangular finishes at the bottom. In the sketch I have labelled each section A, B, C, etc. and indicated which harnesses have been used against each other for the tabby weave. So the notation 15-37; 26-48 means two layers of weaving with harnesses 15 and 37 weaving tabby in the top layer and harnesses 26 and 48 weaving tabby in the bottom layer.

As an example of what must be done to weave four layers, let's look at sections C and D and see what the tieups have to be. (You are going to need four shuttles to weave four separate layers and you have to be willing to change tieups to interchange the layers.) The important thing to remember in any multiple layer weaving is that each layer must be raised up out of the way as the succeeding layers are woven. The tieups for section C are given in expanded form and then combine in one diagram at the right. In weaving section D, the second and third layers are interchanged and this means that the tieups must accomplish this. Once again the tieups are given in expanded and combined form.



How about some variations? Tubes within tubes? There might be some tension problems to cope with unless you are lucky enough to have two warp beams. If any reader has tried this, I'd be interested in learning how it turned out.

Let's turn now to some of the problems that can arise in double weaves with pattern weaving in each layer. Suppose you want to weave double width fabric with 4-harness twill or overshot patterns in each layer. Obviously eight harnesses are needed. There are several things that you have to keep in mind. The first is that the pattern in the lower layer will be reversed when you open up the double width fabric after it comes off the loom. This is true because the top side of the lower layer becomes the bottom of the fabric. The next two diagrams illustrate what this means for a twill pattern. The twill pattern goes up to the left for half of the fabric and up to the right for the other half.



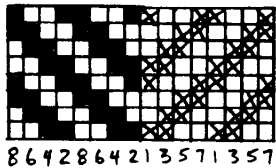
DOUBLE WIDTH FABRIC  
Twill PATTERN

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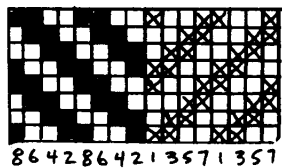
\* For those of you who have forgotten your high school algebra, the formula is:  

$$\# \text{ combinations} = \frac{N!}{(N-R)! R!}$$
 where  $N = \# \text{ harnesses}$  and  $R = \# \text{ warps used / layer}$

More difficult is what happens at the closed selvage. Suppose we want the twill illustrated above. The threading will be straight draw twill on harnesses 1-8, double sett in the reed. The top layer will be woven with harnesses 1-3-5-7 and the lower layer with harnesses 2-4-6-8. The treadling for the top layer will be 13-35-57-71 and for the lower layer it will be 24-46-68-82 plus 1357 of course to raise the top layer as the lower layer is woven). But what happens at the closed selvage when you open the fabric? This is shown here with X's for the top layer and filled squares for the lower layer. The join is clearly wrong. But it is easy to correct with a slight change in the treadle sequence for the lower layer to 82-24-46-68. The weave at the closed selvage now looks like this, a correct weave pattern. The tieup is shown with the treadle sequence for the correct weave.

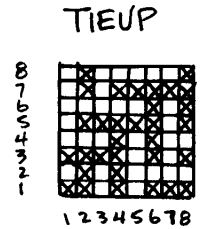


INCORRECT



CORRECT

TWILL PATTERN AT CLOSED SELVAGE (DOUBLE WIDTH WEAVE)



TREADLE SEQUENCE

13 - (82) - 35 - (24) - 57 - (46) - 71 - (68)  
 1 2 3 4 5 6 7 8

I find the easiest way to figure this out is to fold a piece of graph paper and draft the top layer with warp ends 1357 going to the right. Turn the graph paper over and draft the lower layer with warp ends 2468 going to the left. Then open up the graph paper and see if the pattern is correct at the closed selvage (represented by the crease in the graph paper). If incorrect, change the treadle sequence to give the correct pattern. The same can be done if you want to weave a tube with pattern weave. There will be two joined selvages and two places to check for the correct pattern join.

I'll let you work out how to do this with overshot patterns rather than twills!