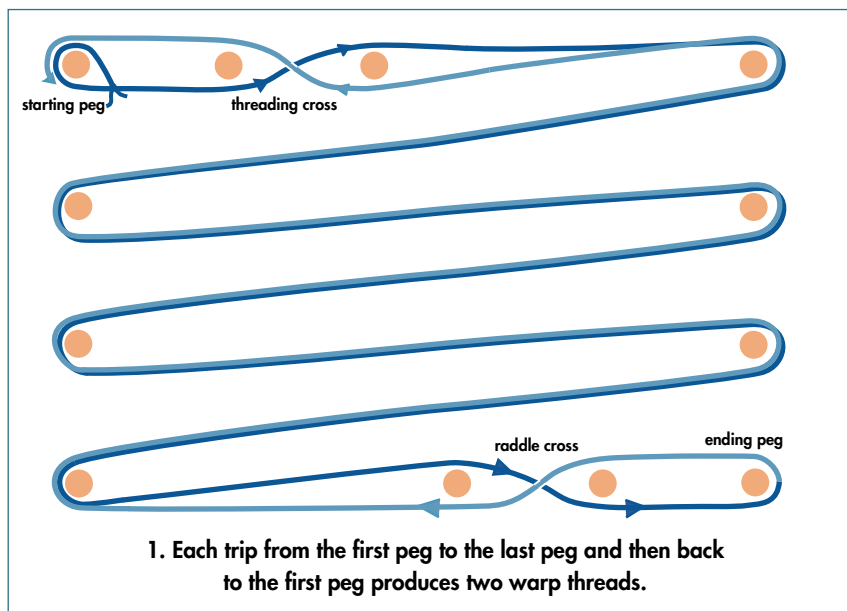


# WARPING STEPS BACK TO FRONT WITH TWO CROSSES

Use this method with very fine, sticky, or highly twisted warp yarns. Because the threads are separated by only the raddle pegs as they are wound on the warp beam (no lease sticks are used during beaming), this warping method is the least stressful for warp fibers. Although the warp threads do not go on the beam in their exact threaded order, warp tension during weaving is sufficient to separate and align the threads. For smooth yarns, you can use either front-to-back warping or back-to-front warping in which beaming is done with lease sticks in the threading cross.



## 1 Make a guide string

Measure a guide string the desired length of the warp plus about 6" for tying the ends of the string to pegs. Tie one end to the starting peg and make a path on the warping board that accommodates the full length of the string with the other end tied to a second peg. The first and last pegs should be in positions on the board that allow a cross at both ends of the warp.

## 2 Wind the warp

Wind the warp following the guide string with a threading cross at the starting end and a raddle cross at the opposite end; see Figure 1. Group the number of threads in the raddle cross that are to be placed in each raddle space. For this method, it is important to use a raddle with small ( $\frac{1}{4}$ – $\frac{1}{2}$ " ) spaces—the smaller the spaces in the raddle are, the more evenly the warp will wind onto the warp beam.

### CHOICES

a. Wind one end at a time for warps with lots of colors. At color changes, tie the new end to the old end at the first or last peg.

b. Wind two ends together for solid-color warps, warps with few color changes, or warps with two alternating colors. Keep a finger between the two threads as you wind to prevent them from twisting around each other.

### TIPS

- Wind with even but loose tension—the threads should be just tight enough to prevent them from drooping.
- Do not overlap threads on the pegs.
- If the total number of threads or their thickness makes them too crowded on the pegs (covering more than half of each peg when pushed toward the board), wind the warp in two or more equal chains.

## 3 Count the threads

Count the threads at the raddle cross. Usually each group in the raddle cross will have the same number of threads. Multiply that number by the number of groups to determine the total number of warp threads.

## 4 Secure the warp chain

Tie the four arms of both crosses as in Figure 2, page 2. (You can instead

pass a single thread through the two openings of each cross and tie the ends in a loop. It's harder to find the cross later with this tie than it is with four ties, but it is easier to untie.)

If the warp threads are very slippery or springy, tie choke ties along the length of the warp as necessary (a cord wrapped around the warp and secured with a square knot; see Photo 4, page 3).

## 5 Chain the warp

Cut the loop of warp threads at the starting peg and chain the warp from the warping board beginning at the starting peg: Make a loop of the threads and pull another loop through the first loop with one hand; see Photo 3, page 3. Pull a loop through the new loop with the other hand. Continue, pulling loops hand over hand until you reach the raddle cross. Remove the chain from the warping board without cutting the loop of threads at the last peg.

## 6 Spread the warp in the raddle

Attach the raddle to the back beam. Place lease sticks in the raddle cross

and a sturdy rod in the uncut loops at the end of the warp. Secure the lease sticks between the back beam and the castle (the structure of your loom will determine the best way to do this; the lease sticks should be side by side and parallel to the back beam). Attach the rod to the apron rod of the warp beam, sliding the warp to one side (it will rest on one end of the raddle). With the heddles pushed to the sides and the reed removed, drape the rest of the warp chain through the castle, over the front beam, and down to the floor in front of the loom. With a piece of cord, tie the warp chain to the front beam to keep it in place while you spread the warp in the raddle. Using the raddle cross, place each warp group in one space of the raddle, centered for the weaving width required by your project. Secure the warp in the raddle by stretching rubber bands across the pegs. Remove the lease sticks and untie the cord holding the warp to the breast beam.

## VARIATION

- You can sley the raddle at a table instead of at the loom (place lease sticks in the raddle cross, a rod in the end loops, and a heavy book on the warp chain to provide tension). When the warp is secured in the raddle, remove the lease sticks, take the warp and the raddle to the loom, and tie the rod with the warp loops to the warp beam apron rod as above.

## 7 Beam the warp

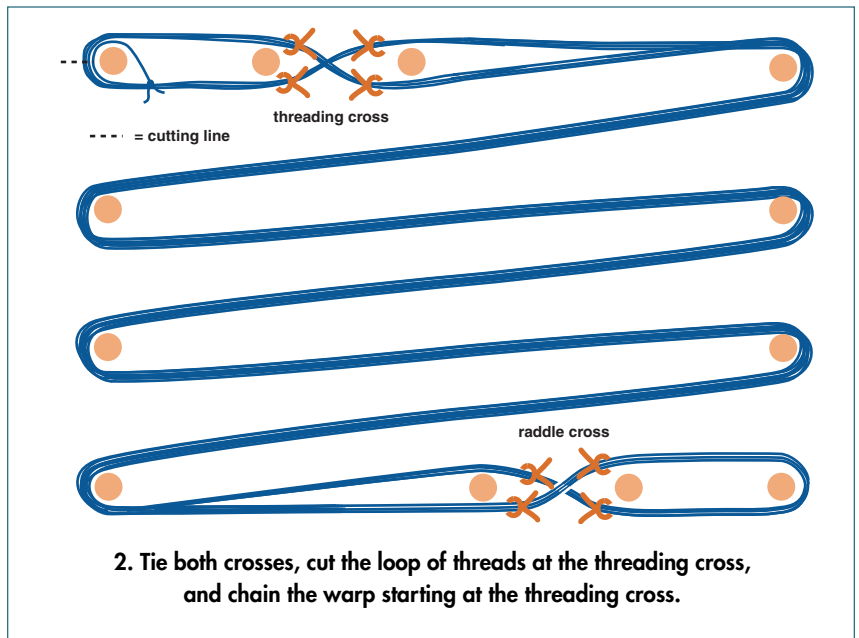
At the front of the loom, divide the warp chain into sections: Run your finger between the two halves of the warp from the breast beam to the chain resting on the floor. Then divide the halves into halves until the whole warp is divided into sections of about 2" each. Pull firmly on each section to straighten and align the threads. Never handle or comb individual threads.

Begin winding the warp on the warp beam. If threads tangle at the raddle, go to the front and pull firmly on each section. When the warp en-

circles the warp beam, begin inserting heavy paper at least 2" wider or warping sticks 2" longer than warp width to separate the layers. Continue, winding a turn and then tightening each section at the front of the loom until the threading cross arrives behind the shafts. Maintain the divisions between the sections and vary the order in which you pull to tighten: from the center out, from right to left, from left to right.

## TIPS

- The warp should go onto the beam at exactly its width in the raddle. It will tend to spread out at the edges, causing less density there. Tie two very heavy cords or place two C-clamps around the back beam on each side of the warp. Push them against the warp to make it about ¼" narrower on each side than its width in the raddle. The warp will then go onto the warp beam at the correct width and even density.
- The warp must be wound very tightly so that the threads cannot change their tension in relation to each other throughout the weaving. After each full turn of the beam, pull on each of the 2" sections very firmly (wrap the section a couple of times around a smooth stick and pull on the stick to save the skin on your hands).



- To clear any tangles, pick up a section of warp near the floor in one hand, pull to apply tension, and then strum the threads with the other hand without allowing them to move in the hand that is holding them.

## 8 Thread the loom

Count the number of heddles required on each shaft by your draft and make sure you have enough. Divide any extra heddles on each shaft so an equal number is placed on each side of the threaded warp. Insert lease sticks in the threading cross, secure them behind the shafts in a convenient position for threading (see Tips below), and remove the cross ties. Sitting at the front of the loom, thread the heddles from right to left if you are right-handed, from left to right if you are left-handed, or from the center to each side.

## TIP

- If the breast beam and back beam of your loom are about the same height and the length of your lease sticks is close to the width of your loom, here is one way to secure them: Tie two cords on each side of the warp from breast beam to back beam. With the lease sticks parallel to the back beam and resting on the cords, on one side

lower one cord and raise the other to make an opening in which to place the end of one lease stick, then reverse the positions of the cords to make an opening for the end of the other lease stick. Repeat with the cords on the other side, securing the other ends of both lease sticks in the same way.

- It is easier to see the warp threads as you thread if the lease sticks are positioned at a slight angle, with the lease stick closest to you below the lease stick beyond it. If you used cords as described above, place cones of yarn or other objects on the back beam under the cords to raise them at the back.


## 9 Sley the reed

Measure from the center of the reed to each side a distance half the warp width (to center the warp in the reed) and sley the reed following your draft.

## 10 Tie onto the front apron rod

Starting in the center, take two small ( $\frac{1}{4}$ " ) groups of warp threads, pass them over and around the front apron rod as in Figure 5, and tie the first half of a square knot on top. Continue tying groups, working from the center out, alternating sides. When you've tied half knots for all of the groups, tie the second half of each square knot.

### TIP

- Very important! Do not make these knots tight. If you do, each succeeding knot, aided by the tension of the others, will be tighter than the previous one. Instead, holding the tails from the first half of the square knot, one tail in each hand, take the two tails toward the reed to eliminate slack, bring them down to snug the knot against the rod (think "snug," not "tight"), and tie the second half of the knot. Notice how this feels, and make each knot feel the same way. This will make the tension even on all threads without further adjustment. 



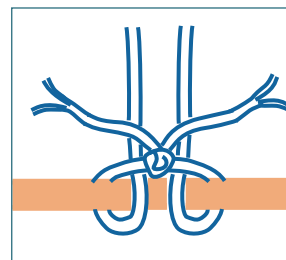
3. To chain a warp, make a loop and pull another loop through it. Pull the next loop through with the other hand and continue.



4. To tie a square knot, wrap the right yarn around the left yarn; then wrap the left yarn around the right yarn.



5. To tie the warp onto the front apron rod, pass two warp groups over the rod and tie the first half of a square knot. After all groups are tied, tie the second half of each square knot snug, not tight.



### 6. The parts of the loom

