



Hand Weaving Tools

WEAVING TODAY™

A Guide to Using a Warping Board,
Weaving Shuttle, and more

Your Weaving Teacher: Tools of the Trade

by Deborah Chandler

I remember how really disgusted I was when I found out about ball winders. Aside from my tremendous delight that such a wonderful tool existed, I couldn't help but regret the hours and hours I'd spent balling yarn by hand, wrestling with skeins, trying to take a little yarn off a huge cone to give to someone else, all of which I could have done in minutes had I had the right tool. I've probably always been an advocate of using the right tool for a job, and finding out that there is a right tool is the first step. It's not that I'm in a rush to get things done; most of the time I'm really not. It's more a matter of priorities; there are so many things that I want to do, and using tools that offer some degree of efficiency allows me to do more of the things that fascinate me. A ball of yarn made on a ball winder is no more valuable than one made on my fingers; the value is in the time that's saved.

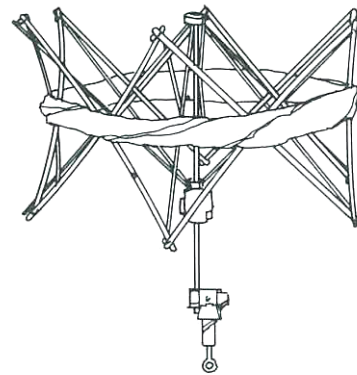
So in an effort to save you some of the aggravation I've experienced, I'll tell you about the wide assortment of tools that are available to weavers. Even if you don't feel the need to have some of them right away, you'll know about your options. What's useful to you will depend on what kind of weaving you are doing, which aspects you enjoy, what kinds of tools appeal to you. No doubt I'll leave some out, and new things come out on a fairly regular basis. If you have a problem and you think there ought to be a tool to solve it, ask your shopkeeper or invent one yourself.

I'll divide the tools into three categories: those for handling yarn, those for measuring warp and warping, and those for weaving.

Yarn-handling Equipment

If you are going to own only one piece of equipment, make it an umbrella swift. A swift or reel (same function, different shape) holds a skein of yarn while you unwind it and keeps it from tangling. Growing up, you probably saw two people are making a ball of yarn, one holding the skin on

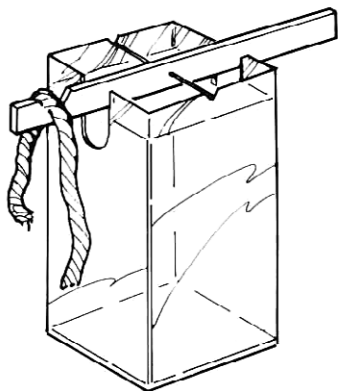
outstretched arms, the other winding the ball. (Or you were one of the people.) Well, the swift replaces the outstretched arms. While less companionable than a person, the swift is much faster. It spins around, letting the yarn feed off as fast as you can wind it. From the swift, the yarn can go directly to a warping board, a bobbin winder, a shuttle, or a ball winder. (Note that it is not necessary to make skeins into balls before going on to the next stage.)



After the swift comes the ball winder, a tool that can make a 4-oz, 200-yard skein of yarn into a ball in two or three minutes. Ball winders come in several sizes, from small to jumbo, and most make balls with flat tops and bottoms, making them easy to stack. The yarn can be pulled from the center, so the ball sits still instead of rolling all over the floor. The center support of the ball winder lifts off so that if you are after a specific amount of yarn, you can weigh the ball before finishing the winding. Since I no longer wind all my yarns into balls (going directly from the swift to the warping board instead), I mainly use my ball winder to take leftover yarn off bobbins, giving me small manageable balls of yarn instead of the many paralyzed bobbins I used to have. (Paralyzed because I said, "Oh, I'll use that someday, so I'll leave it on the bobbin rather than taking the time to wind it off by hand.")

From *Handwoven*, January/February 1985; pp. 23-25.

The McMorrans Yarn balance is one of the lesser known and more valuable pieces of equipment available to weavers. It's small, pretty, and relatively inexpensive (about the same as a ball winder or some swifts). If you use mill ends a lot or have other yarn that is no longer labeled, the yarn



balance is essential. It will tell you, in seconds, the yardage (or “meterage”) per pound of almost any yarn. There is a carefully calibrated balance arm on which you lay a piece of yarn. Cut the yarn until the arm balances, measure the piece, multiply by 100, and the answer is your answer. Thus, if the balancing yarn is six inches yarn, the yarn has 600 yards per pound. Could it be any simpler? You still need to know how many ounces or pounds you have, and a scale can tell you that.

Measuring Warp

Anything that will hold firm while you warp a lot of yarn around it can be a warp measuring device. Weavers in many parts of the world use sticks stuck in the ground, and chairs turned upside down will work in a pinch, but there are three types of tools that make measuring a whole lot easier.

Warping pegs are the least expensive, and are simple to make. They are wooden dowels stuck into a small, flat wood base. They come in pairs, one with a single peg, and one with two pegs for making the cross. The bases holding the pegs are clamped to a table or other surface, spaced at a distance that gives the correct warp length. The cross is made at the two-peg end. The only problem with warping pegs is if your warp needs to be longer than the table you are clamping to, you need some means to get a longer distance between pegs.

Warping boards are the most common way of measuring warp. Each manufacturer arranges the top and bottom pegs in a slightly different pattern, which is of no consequence at all; just find the path that works for what you need. Most commercially made warping boards come in 1-yard or 1/2-yard widths, giving us a built-in measurement.

Warping reels or mills cost more, take up more space, and are much faster and physically less strenuous to use than warping boards. The reel turns round and round to add length to the warp instead of the weaver's arm going back and forth across the warping board. For a 3-yard warp, the difference is probably not worth much, but for a 10-yard warp it is. Reels come in different sizes, and in horizontal and vertical models, so look at several before deciding on one to buy. You'll need a little practice to adjust to the new process, but once you have, winding a warp is a “reel” pleasure.

Warping

There are numerous tools for warping: reeds, and raddles, and paddles, and more.

Reeds come with varying spacing, most often ranging from four to fifteen dents per inch. You can also special order anything you want. For the production weaving I've done, the sett is always 7 epi, so after lots of debate I finally ordered a 7-dent reed, and it worked like a charm. You can also order reeds with spacings that change, going from wide to close and back within the same reed.

The other serious consideration about reeds is what they are made of. Most are steel, and that works fine if they will never get wet. If you live near the ocean, it's best to buy stainless steel reeds because they won't rust. They cost a lot more, but a rusty reed may well shred your yarn. If you have been inland and are moving to the coast, there are also spray plastics you can buy that will seal your reed, keeping out the moist salt air.

Rigid heddles also come in varying dent spacings for the slots and holes. The thing to watch for on rigid heddles is how small the eyes (holes) become as the spacing gets closer. Most newer designs have tall, oval eyes to accommodate larger yarns. At higher dents per inch, a round eye can be so small that very few yarns will go through it safely.

Sley hooks, also called reed hooks, are for sleying the reed. Threading hooks (also called heddle hooks) are long and skinny for threading warps through heddle eyes. Some weavers use threading hooks for both sleying and threading, and many do both with only their fingers.

A warping paddle is like a small rigid heddle with a handle. Many threads can go through it at once, so you can measure six or eight warps at one time instead of the one or two that you can hold in your hand. By handling it correctly you can make both the threading cross and a raddle cross for back-to-front warping with a raddle.

A raddle is like a widely spaced reed either with no top or with a top that comes off. When warping back to front, you use the raddle to spread the warp out to its full width for beaming. The warp is laid into the spaces, usually in one or two sections per inch. Some loom manufacturers offer specially designed raddles that have a built-in way to attach to their looms—very handy.

If you frequently use long warps, twenty yards or more, a sectional beam is very helpful. This kind of warp beam has pegs every inch or two, dividing the beam into sections. The warp is wrapped into one section at a time, coming from spools on a spool rack, going through a tension box to maintain even tension, and possibly through a yardage counter to help you keep track of how many yards you are winding on. (There are numerous books that explain sectional warping.)

Shuttles and Winders

Shuttles are probably the most important piece of equipment in the weaving process. There are many kinds for many purposes. Stick shuttles are the most basic. They come in different lengths, and it's easiest if your shuttle is the same length as your weaving width. They are inexpensive to buy and easy to make if you have or know someone who has basic woodworking skills. You could even make them out of stiff cardboard in a pinch. (It isn't as pretty as maple or cherry and doesn't last as long, but will do the job).

Boat shuttles are so called because they look like boats (or wooden shoes). They hold bobbins of yarn, and the bobbins feed off automatically as the shuttle passes through the shed. They are faster to use than stick shuttles and give better selvages, allowing you to get into a weaving rhythm that is not really attainable with stick shuttles. Boat shuttles come in several sizes and shapes, all of which work; so choose the one that appeals to you most. They are good for fine- and medium-weight yarns, but inefficient for heavy yarns because you can't get much yarn on the bobbin. Owning a few boat shuttles and a bunch of bobbins will equip you for most of the things you'll weave. Boat

shuttles cost more than stick shuttles, but they are worth the cost. They're wonderful to use and beautiful to look at, and they increase in beauty as they age.

If you use boat shuttles, you will need to wind bobbins (or pirns, which are thin cardboard tubes). You could wind by hand but it takes a long time, you get less yarn on the bobbin, and uneven tension will cause the yarn to feed off the bobbin less smoothly than if you had used a mechanical bobbin winder. There are a number of bobbin winders available. Manual winders cost least and are plenty good for most weavers. If you do a lot of weaving with fine wefts, an electric bobbin winder is worth considering. If you don't want to buy a bobbin winder now, there are lots of alternatives. A number of weavers use handheld electric drills: you just jam the bobbin onto a thick drill bit and pull the trigger. The noise is terrible, but it does the job.

Ski, rag, and rug shuttles are for thick yarn. They hold the yarn directly, like a stick shuttle, but they have a smooth bottom so the shuttle will slide easily through the shed.

Weaving Gadgets

A temple, sometimes called a stretcher, is an adjustable bar with teeth at both ends that are inserted into the weaving at the selvages. The temple adjusts to the width of your weaving, and holds it to that width. Some weavers use temples mostly for rugs, but some weavers use them for everything. If your selvages drive you crazy, or if you have problems with too much draw-in, a temple can help. If you've just started weaving, I advise that you give yourself a little while; hardly anybody has good selvages in the beginning, and some draw-in is normal.

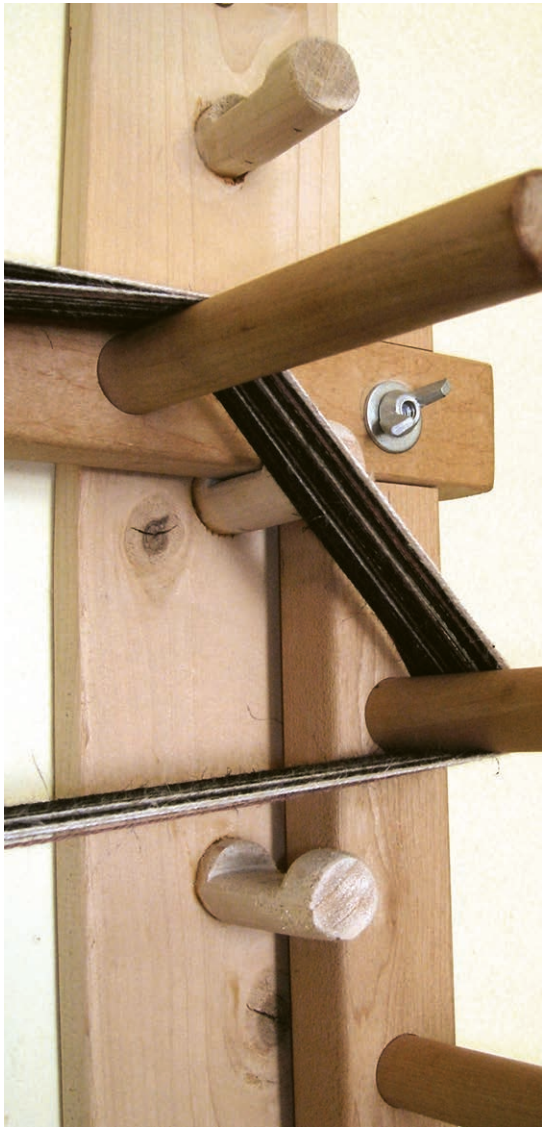
Pickup sticks are flat sticks used for picking up or holding down individual warp threads to alter the pattern. They are like stick shuttles with beveled instead of notched ends. Pickup sticks are especially useful in rigid-heddle weaving, but they can be handy in any weaving.

I've seen many other tools that grew out of a weaver's own particular need and a desire to share the solution with others. If some aspect of weaving feels irritating to you, ask the other weavers you know how they deal with it. Very likely they can show you how to get that stone out of your shoe, usually in totally surprising ways. The fun of discovery . . . isn't that one of the real joys of weaving?



Warping Board Ergonomics

by Karen Piegorsch



Detail of a notched peg wall-mount system.

From a purely physical perspective, using a warping board doesn't top the list of ergonomic issues for most weavers. Viewed holistically, though, winding a warp is a complex task.

There's the mental activity of counting, the need to apply even tension while winding non-overlapping threads, muscle tension induced by anxiety to avoid problems at the loom, and repetitive motion. Add personal concerns (e.g., shoulder injury or fibromyalgia), and there's ample motivation to apply these basic ergonomic principles:

Fit the environment to yourself

Select a board whose proportions match your arm span, vary the board height according to how your body feels each day, and have adequate lighting without glare.

Find your personal compromise between eyesight and movement needs

For a starting point, have the cross at eye-level, then adjust board height to accommodate your movement pattern. Consider changing eyeglasses if there's a mismatch between your focal distance and comfortable arm reach.

Use gross movements with large muscles wherever possible

Position your feet to create an open base, and shift your body weight side to side to minimize shoulder reaching.


Use balanced, non-extreme postures

Let your knees be unlocked. Keep your head upright over your shoulders, elbows near the body, and hands moving between shoulder and waist height. Use both hands in symmetrical rhythm.

Use minimal effort

Monitor your breathing, be deliberate about ambient sound, trust yourself, and enjoy the process.

Respond to changes from project to project

Readjust the board position if your body rhythm changes with different warp lengths or yarn characteristics. 

From *Handwoven*, Sept/Oct 2008; p. 12.



In studios where warp preparation is infrequent and wall space at a premium, a portable stand can provide a practical way to have height adjustability. Tapestry artist Lyn Hart of Tucson, Arizona (www.desertsongstudio.com), uses the Spriggs tripod stand. It's available from Hill Creek Fiber Studio.



Using notched pegs, fiber artists Ann Keuper (near right) and Julie Hul (far right) created a height-adjustable wall mount to accommodate weavers who work and study at their studio (www.desertweaving.com) in Tucson, Arizona. Because winding a warp is a dynamic activity with wide arm movement, it's not surprising that most people stand. For those who sit, a stool that tilts from its base to move with the body can reduce reaching and straining.

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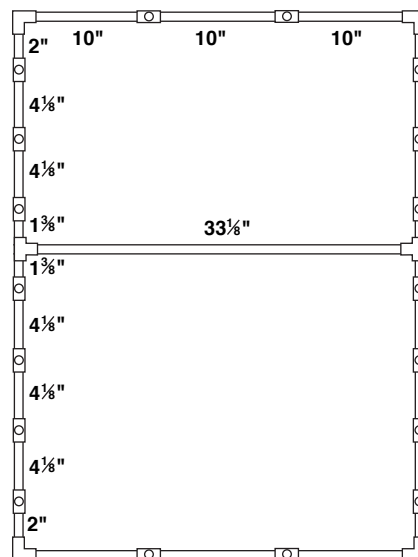
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Make Your Own Warping Board

by Kelly Wetzel



PHOTOGRAPHS BY KELLY WETZEL




This warping board does not allow a peg in the corners. Use the first peg on the upper left as the start peg and place the cross between the two center pegs on the top. In this configuration, maximum warp length is about thirteen yards. For longer warps, add sections of PVC pipe!

Here's an easy-to-make warping board! The materials are inexpensive, you need very few tools, it can be taken apart easily for storage, and it can grow or shrink with the length of your warp. It's a perfect solution for weavers who don't have much space, who are budget conscious, or who travel to teach.

The materials in this warping board cost just a few dollars. To make the board, all you have to be able to do is cut some pieces of plastic pipe and use glue!

Assemble the frame following the diagram above. Then lay the frame flat on the ground. Insert the 5" PVC pieces into each of the open holes of the upright T connectors so that the pieces

are perpendicular to the frame. Tap the pieces into the holes with a mallet or hammer to be sure they are fully inserted.

Stand the board—first on one end and then on the other—and run a bead of Superglue around the rims of the T connectors where they connect to the 4 1/8" pieces. This will prevent the connectors from turning in from the tension of the yarn. Do not Superglue the corners, so you can add pegs to the warping board later for longer warps. Don't glue the top and bottom T connectors, either, so you can later increase the width of the warping board by substituting longer PVC pieces between the two top and bottom pegs, another way to make longer warps. 

Supplies

- Three 10 ft lengths of 1/2" PVC pipe
- 20 T-shaped PVC connectors (all socket openings, no screw-in connectors)
- 4 corner-shaped PVC connectors
- PVC cutter/hacksaw
- Mallet or hammer
- Measuring tape
- Superglue (Bondini)

PVC lengths needed

Measure and cut the PVC pipe:

- Ten 4 1/8" pieces
- Four 2" pieces
- Eighteen 5" pieces
- Six 10" pieces
- Four 1 3/8" pieces
- One 33 1/8" piece

Are You Using the Wrong Shuttle?

by Madelyn van der Hoogt

Shuttles are wonderful tools. They come in beautiful woods and finishes, they are not expensive (compared to looms!), they don't take up much space (you can never have too many!), and they make weaving a joy—especially if you are using the best shuttle for the task.



Stick shuttles and belt shuttles

Stick shuttles come in all sizes and shapes. Usually they have forked ends so that you can wind the yarn around the center, as in the shuttle above, or in a figure-eight sort of motion that takes the yarn to both sides. Stick shuttles with one beveled edge (like the one shown here) are also called belt shuttles. The beveled edge is used to press in the weft, particularly with looms that don't have beaters, such as inkle looms. Stick shuttles are useful for very narrow weaving or for weft yarns too thick to be wound on bobbins. A disadvantage to stick shuttles is that you can't "throw" them through the shed. Also, after each pick, you must manually unwind the yarn needed for the next pick.

Ski shuttles

Ski shuttles look like skis! And like skis, their shape is designed for fast movement. The yarn (often a very thick yarn or cut rag strips) is wound around the top of the shuttle so that the yarn does not touch the warp as the shuttle flies through the shed. Ski shuttles are ideal for rug weaving, especially with looms that make sheds big enough to accommodate them. They can be "thrown" through the shed like a boat shuttle. Their only disadvantage is that the yarn must be unwound before each pick.




Boat shuttles

Boat shuttles, not surprisingly, are shaped like boats. They are open in the center to hold a bobbin. The bobbin rotates on a rod, allowing the yarn to unwind as the shuttle goes through the shed. Boat shuttles can be "thrown" through the shed with little manipulation to achieve smooth selvages (the tug on the yarn as the bobbin rotates pulls the weft against the selvedge thread). Bobbins must be wound firmly and evenly, however, so that the yarn unwinds smoothly during weaving. A poorly wound bobbin can yank the weft too firmly and draw in the edge threads. Boat shuttles come in different sizes and weights. For wide warps, you need larger and heavier boat shuttles than for narrow warps.



End-feed shuttles

End-feed shuttles are shaped like boat shuttles but are equipped with pirns instead of bobbins. A pirn is wider at the base than at the point, and the weft yarn is wound around it in sections, from the base end to the top. As you weave, the yarn is pulled off first from the top end of the pirn, then lower and lower, and finally from the base. No tension is applied to the yarn by the pirn. Instead, the yarn passes through a tensioner at one end of the shuttle. The tensioner can be adjusted to apply the desired amount of pull against the selvages. End-feed shuttles are generally used with relatively fine yarns, and it takes a bit of practice to learn how to wind a pirn successfully. 

TIP. To wind a bobbin for a boat shuttle, start with a very smooth base, covering the bobbin from one end to the other. Make each subsequent layer smooth and very tight.

Demystify Mystery Yarns with an Easy to Make Yarn Balance

by Christina Hammel

So you have boxes of mystery yarn that came with the loom you just bought for a bargain price. And you've long been amassing unknown cones from guild auctions, yarn trades, and the occasional garage sale. How to use them? Many projects in *Handwoven* (and ideas of your own) call for using a variety of specific yarns you don't have. Or, a project calls for a certain yarn in green, but you have an unknown green yarn—can you substitute? If only you knew the yards per pound of the yarn on your mystery cone! If you did, you'd also be able to figure out how many yards there are.

Weavers have long been lucky to have available the McMorran yarn balance to determine the yards per pound of an unknown yarn. To use the balance, you fold a piece of yarn over the triangular cutout with equal yarn length on both sides (see Photo a on page 12; for fine yarns note that the balance must be at the edge of a table or counter so the length of yarn can hang freely). Then you trim the ends until the balance becomes horizontal (Photo b). Next, you measure the length of the trimmed strand in inches and multiply by 100. The result is the number of yards in one pound (8" or 800 yards per pound for our yarn; see Photo e).

The equation that is the basis for how the balance works looks like this (if you are not fascinated by math, skip to "Making your own balance"):

$$\frac{1}{3,600} \times 3,600 = 1$$

1/3,600 represents the weight (in pounds) of the triangle that is missing from the balance. It also represents the weight of the yarn that is responsible for bringing the arm into balance. The yarn's length (in inches) equals the amount found in 1/3,600th of a pound.

When that yarn's length is multiplied by 3,600, the result is the number of inches in one pound of that yarn. The inches per pound are then divided by 36 to find the yards per pound. For an 8" strand, for example, 8" × 3,600 divided by 36 (inches per yd) = 8 × 100 or 800 yards per pound. Users are therefore instructed simply to multiply the yarn's length by 100 to find the yards per pound.

Making your own balance

The bamboo skewer (or wooden dowel) balance works on the same principle as the McMorran Balance with only a slight difference. Start with a #12 Extra Thick Bamboo Skewer sold in grocery stores (trim off the pointed ends, leaving it about 11" long) or use hardwood dowels, 3/16" in diameter by 12" long, sold in craft stores.

Fold a 12" piece of yarn (such as 5/2 pearl cotton) in half and tie the ends in an overhand knot. At the looped end, form a lark's head knot and slip it around the bamboo skewer; see Photo c. Position the lark's head knot at the center so that the bamboo skewer rests in a horizontal position when you hold onto the knotted end. Glue lark's head in place.

Now, instead of removing a triangular piece equaling 1/3,600th of a pound at one end of the skewer, add a piece of yarn that weighs 1/3,600th of a pound (the control yarn). To determine the amount of a control yarn to add, multiply the yards per pound of that yarn by 36 to get the number of inches

$$\frac{1}{3,600} \times 75,600 = 21"$$

per pound and then divide by 3,600: for 5/2 cotton at 2,100 yards per pound, for example, there are 75,600"/pound, so a piece measuring 21" should be used:

You can use 5/2 cotton or determine the appropriate length for another yarn.

From *Handwoven*, May/June 2007; pp. 78-79.

Using the skewer balance

To determine the yards per pound of an unknown yarn using the bamboo skewer balance, start by taping a pencil or another skewer onto a flat surface such as a table or a countertop with at least half of the pencil extending out from the surface so the balance can move freely (Photo d).

Slide the loop of yarn at the center of the balance over the pencil. Fold the control yarn in half and form a lark's head knot at the center. Slip this knot around the bamboo skewer and position about 1" from one of the ends. At the same distance from the other end, attach a long piece of the unknown yarn. (You can use a lark's head to secure this yarn, too, to prevent the yarn from sliding off the end of the skewer.) Trim off the ends of the unknown yarn until the balance comes to rest in a horizontal position as in Photo d. Pull the trimmed yarn off the end of the skewer, measure its length in inches as before (Photo e), and multiply this number by 100. The answer is the number of yards per pound.

Other applications

Once you know the yards per pound of the unknown yarn, you can figure out the yarn's size (3/2 cotton, 8/2 wool, etc.). You'll need some additional information: yarn type, yards to the unit, and the number of plies. What is meant by "yards to the unit"? Every type of yarn (cotton, wool, linen, etc.) has a unit of measurement per pound. Cotton yarn is measured according to the number of 840-yard hanks that weigh one pound (see the Yards to the Unit chart).

For example, a singles No. 1 cotton yarn (1/1 cotton; the top number is the size and the bottom number is the ply) has 840 yards per pound. 10/2 cotton is ten times finer so it has ten times the yards per pound (840 × 10), but since it is 2-ply, it reaches one pound twice as quickly (divide 8,400 by 2 = 4,200 yd/lb).

If you have an unknown 2-ply cotton yarn that you have determined with the balance is 1,250 yd/lb, use this formula to determine its size:


$$\text{yd/lb} = \frac{\text{size} \times \text{yd to the unit}}{\text{ply}}$$

or

$$\text{size} = \frac{\text{yd/lb} \times \text{ply}}{\text{yd to the unit}} \quad \text{size} = \frac{1,250 \times 2}{840}$$

size = 2.97 or 3/2 cotton

Resources

- Davison, Marguerite Porter. *A Handweaver's Pattern Book*. Swarthmore, Pennsylvania: Marguerite P. Davison, 1977, p. ix.
- Grandor Industries (McMorran Balance), 1613 Baccharis Ave., Carlsbad, CA 92009, (760) 929-8581, egdjackson@webtv.net.
- Griswold, Alice. *Weaving Solutions: Shortcuts, Tips and Ideas for the Handweaver*. Milan: A & G Publications, 2000.
- Ligon, Linda, and Marilyn Murphy, eds. *The Weaver's Companion*. Loveland, Colorado: Interweave Press, 2001.
- Osterkamp, Peggy. "Table of Base Counts of Threads." *Winding a Warp and Using a Paddle. New Guide to Weaving Number 1*. Sausalito, California: Lease Sticks Press, 2005. pp. 113–114. 

Yarns to the Unit

Cotton, Tencel, rayon	840
Spun silk (English system)	840
Spun silk (French system)	496.5 ¹
Wool (worsted)	560
Wool (woolen, Philadelphia system)	300 ²
Wool (woolen, American system)	1,600
Linen (hemp, jute, and ramie)	300 ³

¹ I reached this number by converting 1,000 meters in one kilogram to yards in one pound.

² Davison's *A Handweaver's Pattern Book* lists 300. Elizabeth's Fiber & Yarn Store gives 256.

³ also from Elizabeth's Fiber & Yarn Store.

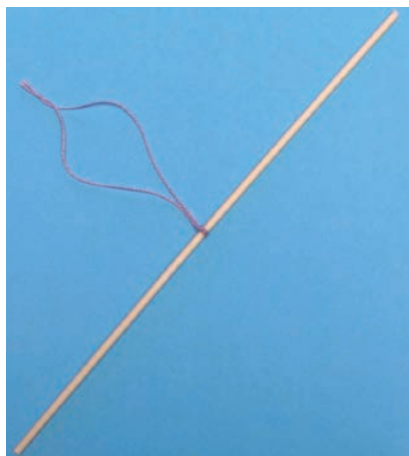
Yarn Balance At-A-Glance



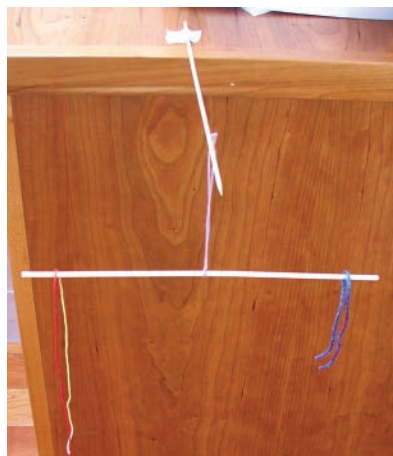
a. Place a strand of the unknown yarn in the triangle of the balance (let the yarn hang off the edge of table or counter).



b. Trim off small pieces of the yarn until the balance swings to become horizontal.



c. Attach a cord to the center of the skewer with a lark's head knot.



d. Place the control yarn on one side, the unknown on the other; trim until balanced.



e. Measure the trimmed yarn.