

SCHACHT STANDARD FLOOR LOOM™

ASSEMBLY FOR DISASSEMBLED LOOMS

FL3121 FL3322
FL3123 FL3324
FL3125 FL3326
FL3127 FL3328



BEFORE YOU BEGIN

- Read through the directions before starting to assemble your loom.
- You'll find a complete labelled diagram of the Wolf loom in your Maintenance and Warranty manual and at schachtspindle.com.
- The beater is at the front of the loom. The brake is on the right side of loom.
- All wooden parts of the loom have been finely sanded and finished with hand-rubbed Danish oil. If at any time you wish to apply more finish to the loom, use a Danish oil (tung oil and polyurethane mixture) and hand-rub the wood with a soft lint-free cloth. **Be sure to follow the finish manufacturer's instructions.**
- Unpack the loom parts carefully and compare them to the drawings on pages 3 and 4. Do not throw away the carton or any of the packing material until you have checked to see that all of the parts and hardware bags have been included.
- Follow the exact order of assembly. Take care and work slowly. It will be easier to assemble your loom with a helper. Some steps may require two people.
- When you finish assembling the loom, go back over all of the screws and bolts to make sure they are tight. For screws on parts that need to pivot, tighten the screw firmly, then unscrew just enough to allow free movement. It is a good idea to re-tighten all screws on your loom every few months.



Find out more at schachtspindle.com
Schacht Spindle Company 6101 Ben Place Boulder, CO 80301
303.442.3212

© 2021 Schacht Spindle Company, Inc.

TOOLS NEEDED

- #2 Phillips screwdriver
- Slotted (flat) screwdriver
- 7/16" or adjustable wrench
- 1/2" and 9/16" wrenches or 2 adjustable wrenches

HARDWARE

Hardware bags may include parts that are not needed for your loom; there may also be extras included for some parts. Photos and drawings of hardware are not to scale.

- 2X fold knobs (plastic knobs with 1" threaded shafts)
- 2X 1/4" nylon washers
- 8X 1/4-20 x 2-1/2" Phillips truss head machine screws
- 8X 1/4-20 barrel nuts
- 5X 1/2" SAE washers
- 2X 5/16-18 x 2-1/2" carriage bolts
- 8X 1/4" USS washers
- 2X 5/16-18 washer wing nuts
- 2X 5/16-18 lock nuts
- 2X 5/16-18 x 1-3/4" hex bolts
- 12X #12 x 1-1/2" Phillips truss head sheet metal screws
- 2X 1/4-20 lock nuts
- 1X 1/2" cap nut
- 1X 1/2" USS washers

For 8-shaft looms:

- 2X 3/8" x 5-7/8" jack pivot rods
- 2X 1/4-20 x 7" carriage bolts
- 22X 3/8" SAE washers
- 11X 8/32" hex nuts
- 11X rubber O-rings

For 4 Now-4 Later looms:

- 2X 3/8" x 5-7/8" jack pivot rods
- 2X 1/4-20 x 7" carriage bolts
- 6X 3/4" plastic spacers
- 18X 3/8" SAE washers
- 7X 8/32" hex nuts
- 7X rubber O-rings

For high castle looms:

- 12X #8 x 1-1/2" Phillips truss head sheet metal screws
- 2X 1/4" x 1-1/2" hex bolts
- 2X 1/4" USS washers

CORDS BAG

36" maple looms:

- 80X tie-ups
- 14X 33" apron cords

36" cherry looms:

- 80X tie-ups
- 2X 360" apron cords

45" maple looms:

- 96X tie-ups
- 18X 33" apron cords

45" cherry looms:

- 96X tie-ups
- 2X 480" apron cords

ACCESSORIES PACK

- 1000X inserted eye heddles
- 1X brass reed hook
- 1X 11" boat shuttle & 4" bobbin
- 1X warp beam crank handle (shown on page 4)

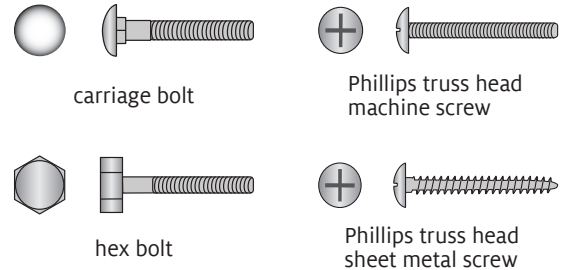
COMMON HARDWARE

These drawings are not to scale and hardware is not shown in every size listed.

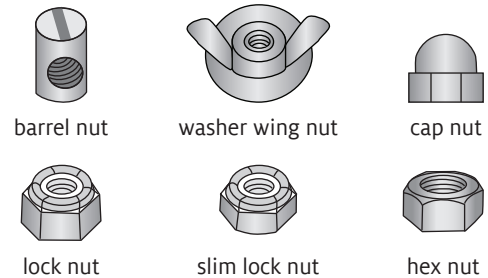
- **Screws and bolts** are sized in inches, measured by **shaft length**. Measure the shafts of screws and bolts with a metal tape measure or the ruler on this page. First identify all the screws and bolts in a hardware bag; then it will be easier to identify any nuts.
- **Nuts** attach to bolts and machine screws. They have to match the bolt or machine screw in **diameter** and **thread size**. Match the numbers at the beginning of the description (for instance, 10-24 or 1/4-20) to the corresponding bolt or machine screw.
- **Washer** sizes refer to the **diameter of the hole**; measure the hole with a metal tape measure or the ruler on this page. Different types of washers, all the same size, are shown here. SAE washers have the smallest outside diameter, fender washers have the largest outside diameter, and USS washers are in the middle.

For more help identifying hardware, see our guide at

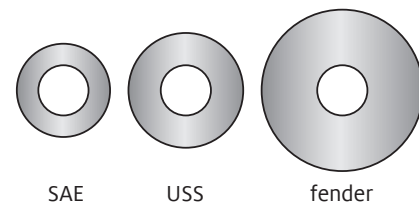
www.schachtspindle.com/pdfs/schacht-hardware-guide.pdf.



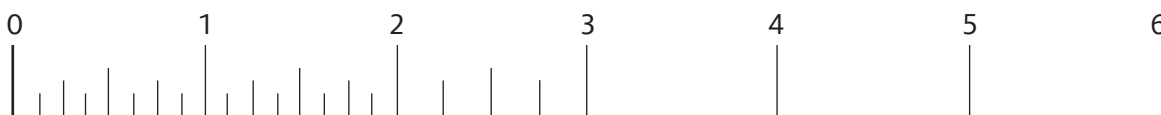
IDENTIFYING SCREWS AND BOLTS



IDENTIFYING NUTS



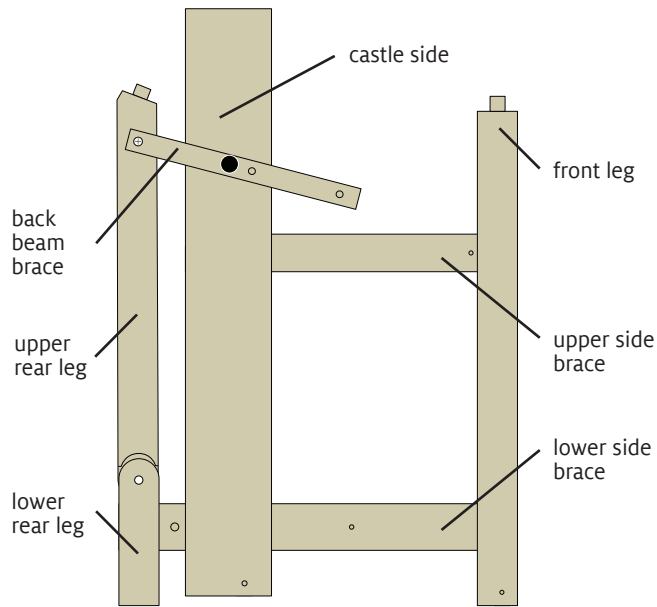
IDENTIFYING WASHERS



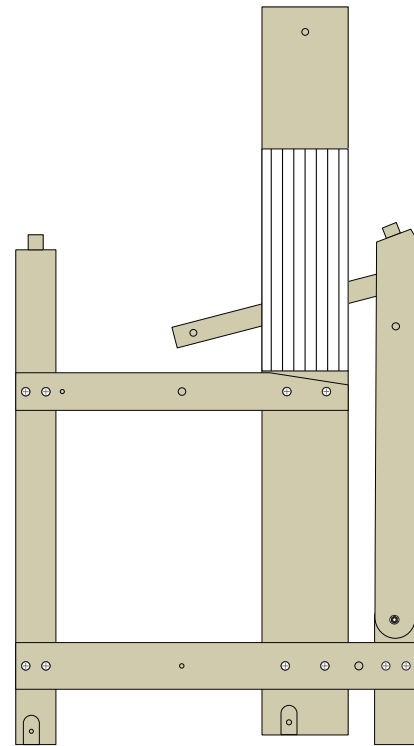
STANDARD FLOOR LOOM PARTS

left loom side: front leg, low/high castle side, upper and lower rear leg, upper and lower side braces, back beam brace
 right loom side: front leg, low/high castle side, upper and lower rear leg, upper and lower side braces, back beam brace, ratchet dog, beater pin and holder, brake, brake release pedal, brake release hold

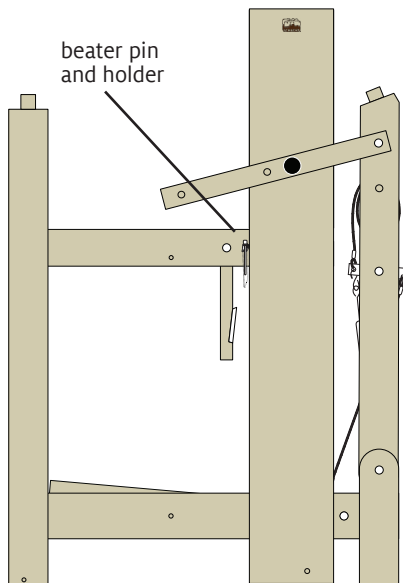
Parts drawings and illustrations for assembly steps show a 36" low castle loom, unless otherwise indicated.



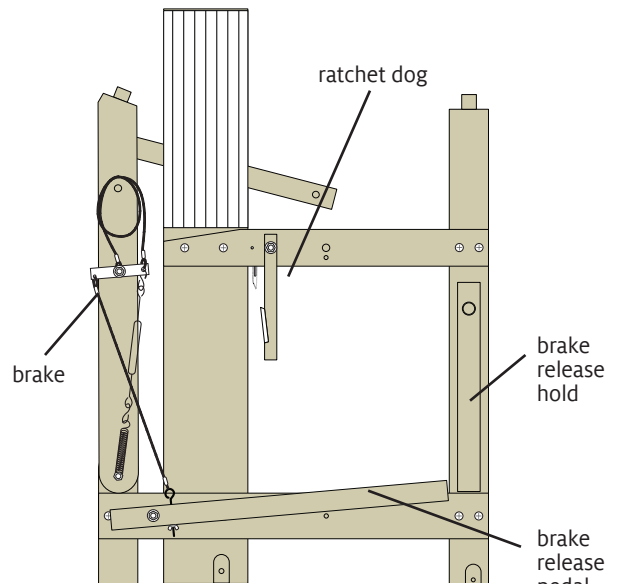
LEFT LOOM SIDE, LOW CASTLE (OUTER SIDE)



LEFT LOOM SIDE, HIGH CASTLE (INNER SIDE)



RIGHT LOOM SIDE, LOW CASTLE (OUTER SIDE)

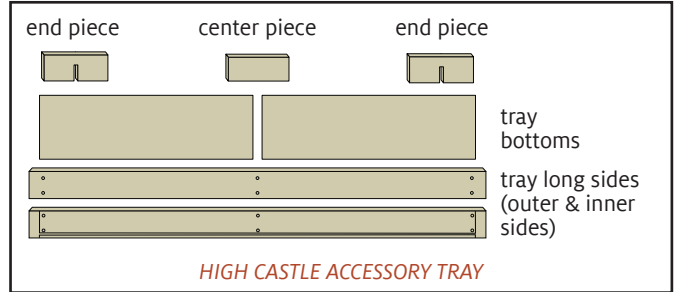


RIGHT LOOM SIDE, LOW CASTLE (INNER SIDE)

STANDARD FLOOR LOOM PARTS (CONTINUED)

- treadle assembly
- treadle stop
- cloth beam
- ratchet advance lever
- front castle cross brace
- left and right beater sides
- beater bottom
- beater top
- front and rear square beams (parts are identical)
- rear castle cross brace
- warp beam
- jack & lamm assemblies—numbered on stickers
 - 8-shaft looms: 2X #1 jack assemblies, 2X #2 jack assemblies, 2X #3 jack assemblies, 2X #4 jack assemblies
 - 4 Now-4 Later looms: 2X #1 jack assemblies, 2X #2 jack assemblies
- shaft frames with heddle bars:
 - 8-shaft looms: 8X shaft frames, 16X heddle bars
 - 4 Now-4 Later looms: 4X shaft frames, 8X heddle bars

- 3X apron bars
- 2X lease sticks (with holes)
- Cherry looms: 2X 1/4" dowels (36" or 45", not shown)
- Low castle looms: upper castle support
- High castle looms: high castle accessory tray
 - 2X tray long sides
 - 2X tray end pieces
 - 1X tray center piece
 - 2X tray bottoms



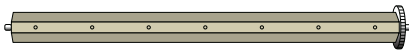
treadle stop



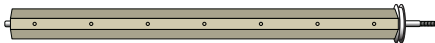
front castle cross brace



rear castle cross brace



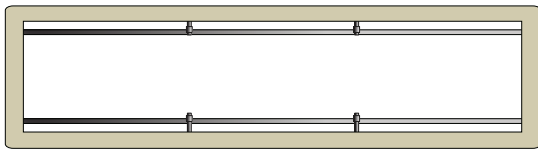
cloth beam



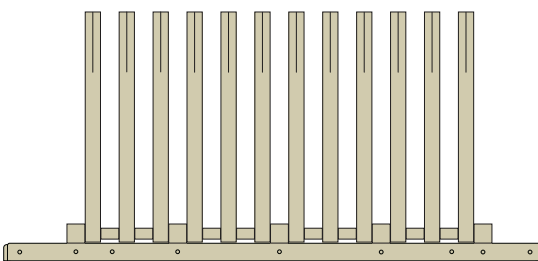
warp beam



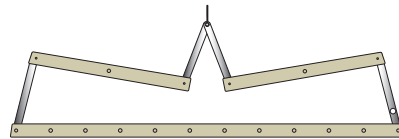
front & rear square beams (seen from the top)



shaft frame with heddle bars & heddle locks, 45" loom



treadle assembly, 45" loom



jack assembly



upper castle support, low castle loom



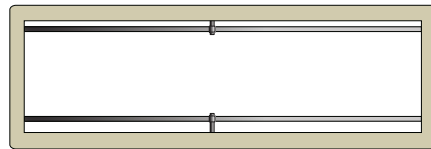
beater top



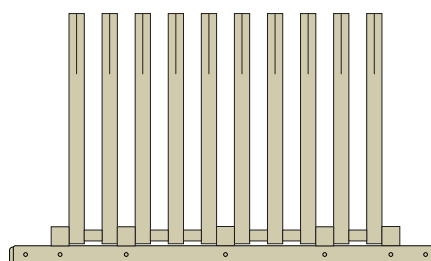
beater bottom



apron bars & lease sticks



shaft frame with heddle bars & heddle locks, 36" loom



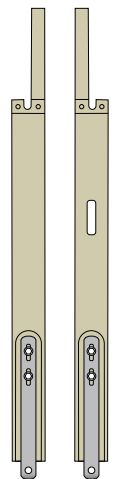
treadle assembly, 36" loom



ratchet advance lever



warp beam crank handle



left & right beater sides (inner sides)

1. Unfold the rear legs.

Parts: left loom side, right loom side

Set a loom side flat on the floor. Remove the fold knob and 1/4" nylon washer holding the back beam brace to the castle side through the middle hole of the brace. Unfold the upper rear leg so that the hole at the front end of the back beam brace lines up with the hole in the castle side (Figure 1). Insert the fold knob through the 1/4" nylon washer, then screw the knob into the castle side. Repeat this step for the remaining loom side.

To fold the back beam, insert fold knobs and washers through the holes in the middle of the back beam braces.

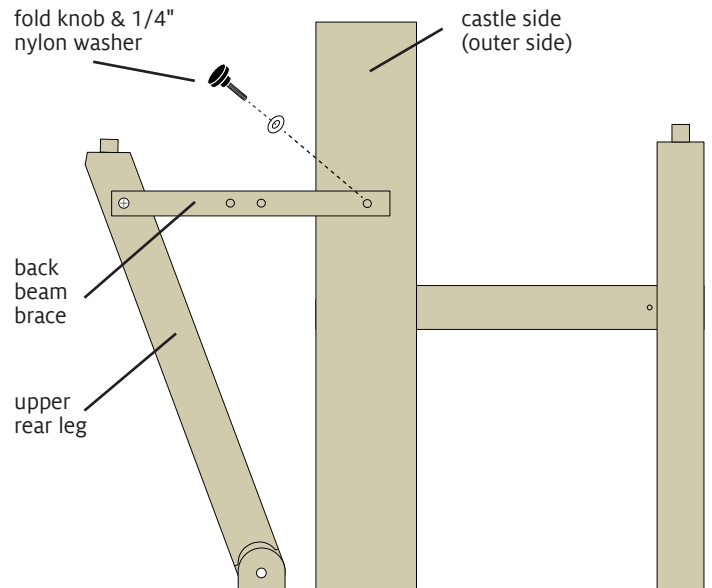


FIGURE 1: UNFOLD THE REAR LEGS

2. Install the treadle assembly.

Parts: treadle assembly

Hardware: 2X 1/4-20 barrel nuts, 2X 1/4-20 x 2-1/2"

Phillips truss head machine screws

You will need a helper for this step. Stand the loom sides up with their inner sides facing each other. Set the treadle assembly between the sides, with the grooves in the treadles toward the floor. (If you can see the grooves, the treadle assembly is upside down.)

Fit the ends of the treadle support into the slots in the bottom of the front legs (Figure 2). Insert a 1/4-20 barrel nut into one end of the treadle support and hold it in place with a slotted screwdriver. Insert a 1/4-20 x 2-1/2" Phillips truss head machine screw through the front leg from its outer side and screw it into the barrel nut. Repeat on the other end of the treadle support.

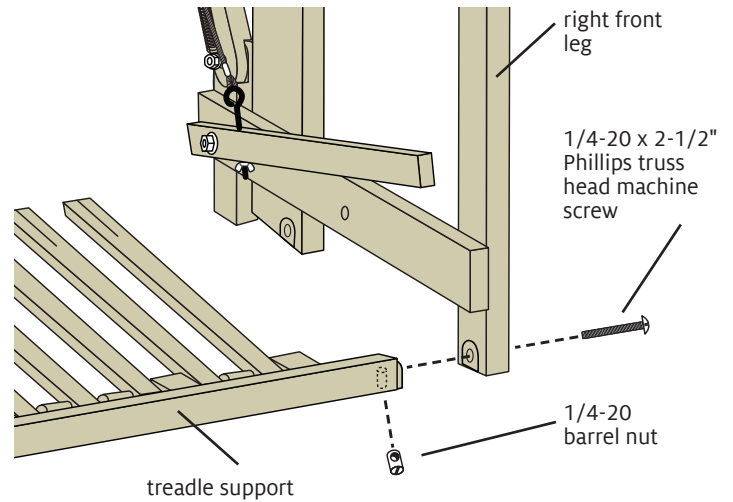


FIGURE 2: INSTALL THE TREADLE ASSEMBLY

3. Attach the treadle stop.

Parts: treadle stop

Hardware: 2X 1/4-20 barrel nuts, 2X 1/4-20 x 2-1/2"

Phillips truss head machine screws

You will need a helper for this step. Fit the ends of the treadle stop into the slots in the bottom of the castle sides (Figure 3). Insert a 1/4-20 barrel nut into one end of the treadle stop and hold it in place with a flat screwdriver. Insert a 1/4-20 x 2-1/2" Phillips truss head machine screw through the castle side from its outer side and screw it into the barrel nut. Repeat on the other end of the treadle stop.

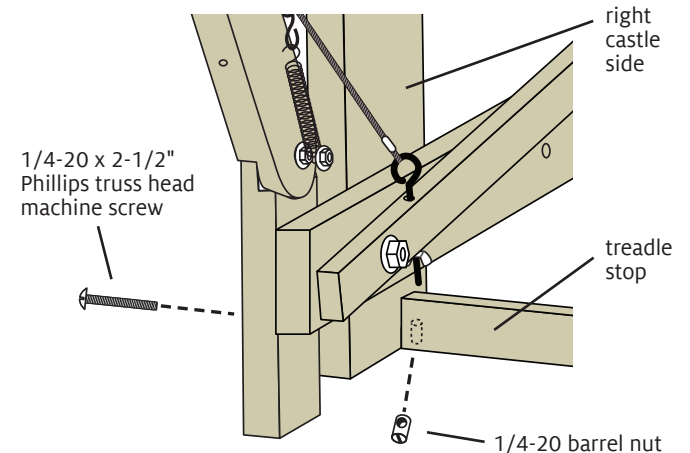


FIGURE 3: ATTACH THE TREADLE STOP

4. Install the cloth beam and ratchet advance lever.

Parts: cloth beam, ratchet advance lever

Hardware: 3X 1/2" SAE washers

On the right axle of the cloth beam, next to the ratchet gear, place a 1/2" SAE washer, the ratchet advance lever (oriented as shown in Figure 4A), and a second 1/2" SAE washer. Insert the cloth beam in the upper side brace of the right loom side, below the ratchet dog (Figure 4A). Make sure the ratchet dog is positioned as shown in Figure 4A.

Place a 1/2" SAE washer on the left axle of the cloth beam and insert the axle into the left loom side (Figure 4B). You will have to spread apart the loom sides slightly to complete this step.

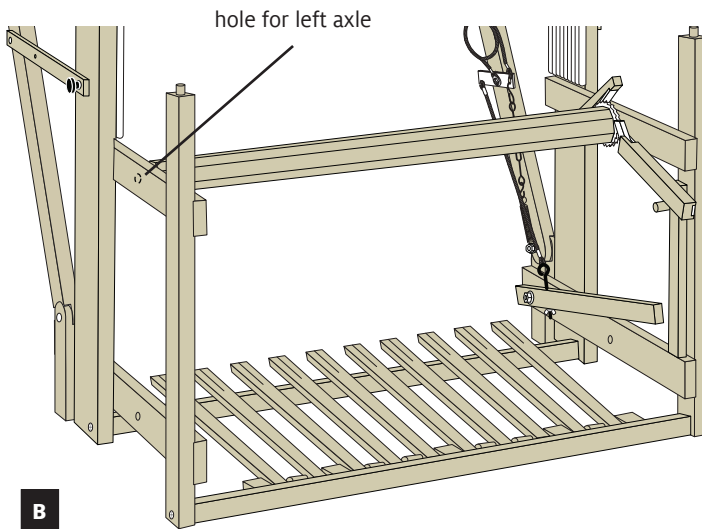
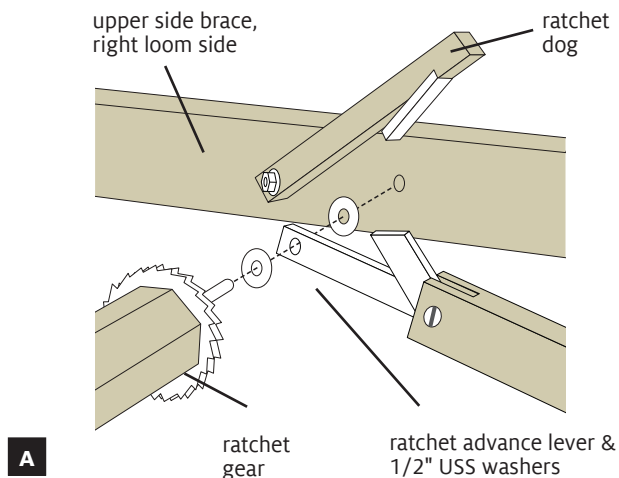


FIGURE 4: INSTALL THE CLOTH BEAM

5. Attach the front castle cross brace.

Parts: front castle cross brace

Hardware: 4X #12 x 1-1/2" Phillips truss head sheet metal screws

Orient the front castle cross brace with the logo right side up and square holes at the top, as shown in Figure 5. Attach the brace to the front edges of the castle sides, just below the upper side braces, with two #12 x 1-1/2" Phillips truss head sheet metal screws at each end.

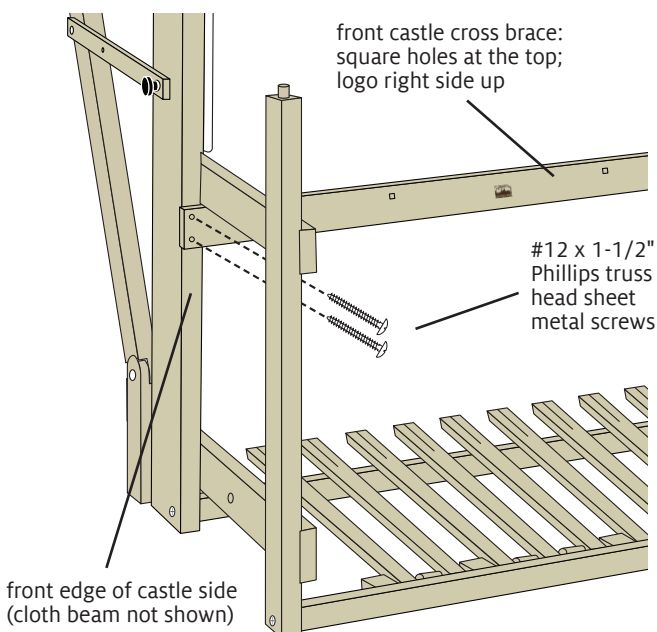


FIGURE 5: ATTACH THE FRONT CASTLE CROSS BRACE

6. Assemble the beater.

Parts: left and right beater sides, beater bottom, beater top
 Hardware: 4X 1/4-20 barrel nuts, 4X 1/4-20 x 2-1/2"
 Phillips truss head machine screws, 2X 5/16-18 x 2-1/2"
 carriage bolts, 2X 1/4" USS washers, 2X 5/16-18 washer
 wing nuts

Attach the beater sides to the beater bottom: Orient the left and right beater sides with their fronts facing forward, as shown in Figure 6. Set the beater bottom between the sides with the groove facing up and the wider side (the shuttle race) at the front. Insert two 1/4-20 barrel nuts into the holes at one end of the beater bottom. Insert 1/4-20 x 2-1/2" Phillips truss head machine screws through the holes of a beater side and tighten them firmly into the barrel nut. Repeat for the other end of the beater bottom.

Attach the beater top to the sides: If you wish, you can put the reed in the beater at this point. Place the beater top with its longer edge in front of the beater sides, so that the holes in the top line up with the slots in the sides (Figure 6). From the back of the beater top, insert a 5/16-18 x 2-1/2" carriage bolt through each hole. Secure each carriage bolt with a 1/4" USS washer and a 5/16-18 washer wing nut.

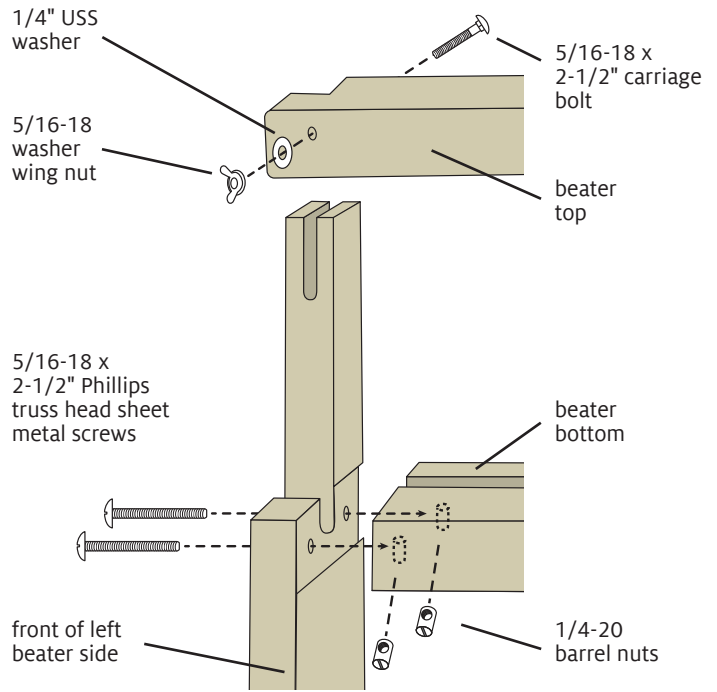


FIGURE 6: ASSEMBLE THE BEATER

7. Install the beater.

Hardware: 2X 5/16-18 x 1-3/4" hex bolts, 6X 1/4" USS washers, 2X 5/16-18 lock nuts

Orient the beater with its front side facing forward. Set it in front of the castle sides with the beater sides and beater supports outside of each lower side brace, as shown in Figure 7A.

Insert a 5/16-18 x 1-3/4" hex bolt through a 1/4" USS washer, then through the beater support, then through a second 1/4" USS washer, then through the outer side of the lower side brace. From the inner side of the lower side brace, add another 1/4" USS washer to the hex bolt and secure with a 5/16-18 lock nut (Figure 7B). Tighten the lock nut all the way, then loosen one-half to one full turn to allow the beater to move freely. Repeat this step for the other beater support.

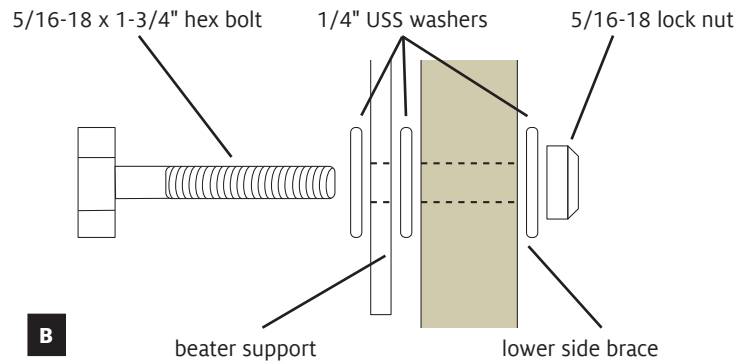
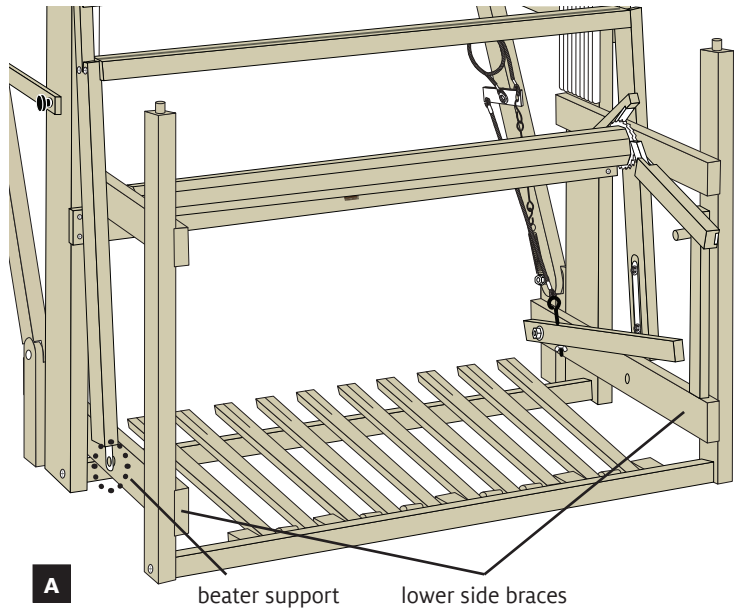


FIGURE 7: INSTALL THE BEATER

8. Install the front square beam.

Parts: square beam

Set one of the square beams on the pegs of the front legs, with its rounded edge facing forward and the squared edge facing the back of the loom (Figure 8).

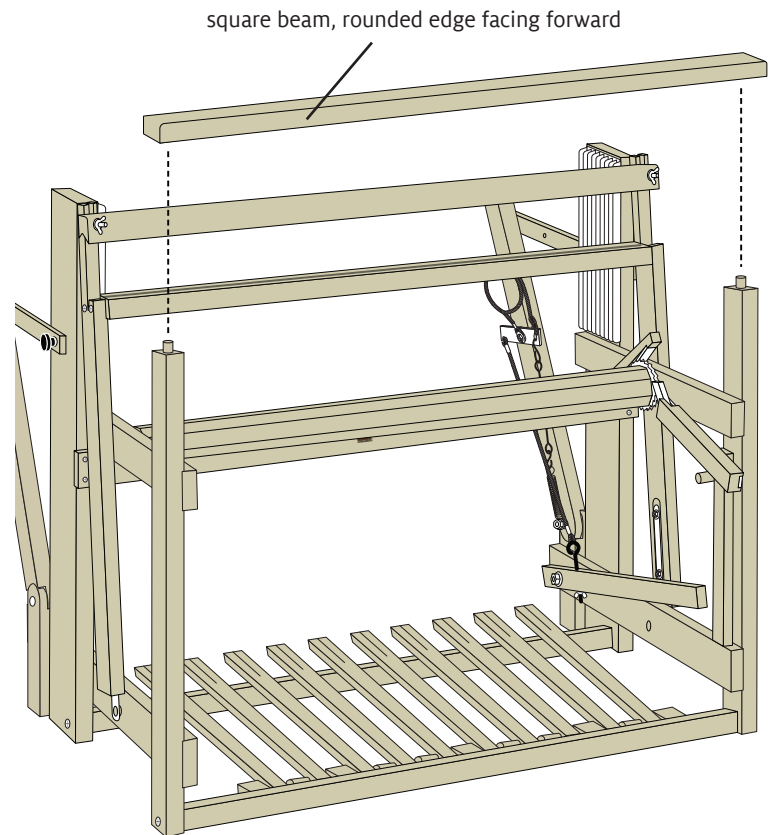


FIGURE 8: INSTALL THE FRONT SQUARE BEAM

9. Install the jack assemblies.

Use the parts and hardware listed below for your loom. Each jack assembly has a sticker marked with a number from 1 to 4.

8-shaft looms: 2X 3/8" x 5-7/8" jack pivot rods, 22X 3/8" SAE washers, 2X #1 jack assemblies, 2X #2 jack assemblies, 2X #3 jack assemblies, 2X #4 jack assemblies

4 Now-4 Later looms: 2X 3/8" x 5-7/8" jack pivot rods, 18X 3/8" SAE washers, 6X 3/4" nylon spacers, 2X #1 jack assemblies, 2X #2 jack assemblies

All looms: Insert the 3/8" x 5-7/8" jack pivot rods into the larger holes of the front castle cross brace, pointing towards the rear of the loom. Place two 3/8" SAE washers on each of the jack pivot rods (Figure 9A).

8-Shaft looms: Place a #1 jack assembly on the rods, followed by a washer on each rod (Figure 9B). Place the second #1 jack assembly on the rods, followed by a washer on each rod. Continue in the following order: a #2 jack assembly, a washer on each rod, another #2 jack assembly, a washer on each rod, a #3 jack assembly, a washer on each rod, the second #3 jack assembly, a washer on each rod, a #4 jack assembly, a washer on each rod, and the second #4 jack assembly. Finish by placing two more washers on each rod.

4 Now-4 Later looms: Place a #1 jack assembly on the rods, followed by a washer on each rod (Figure 9B). Place the second #1 jack assembly on the rods, followed by a washer on each rod. Continue in the following order: a #2 jack assembly, a washer on each rod, another #2 jack assembly, a washer on each rod. Place three 3/4" nylon spacers on each rod. Finish by adding one or two washers on each of the rods as needed to fill any remaining space on the jack pivot rods.

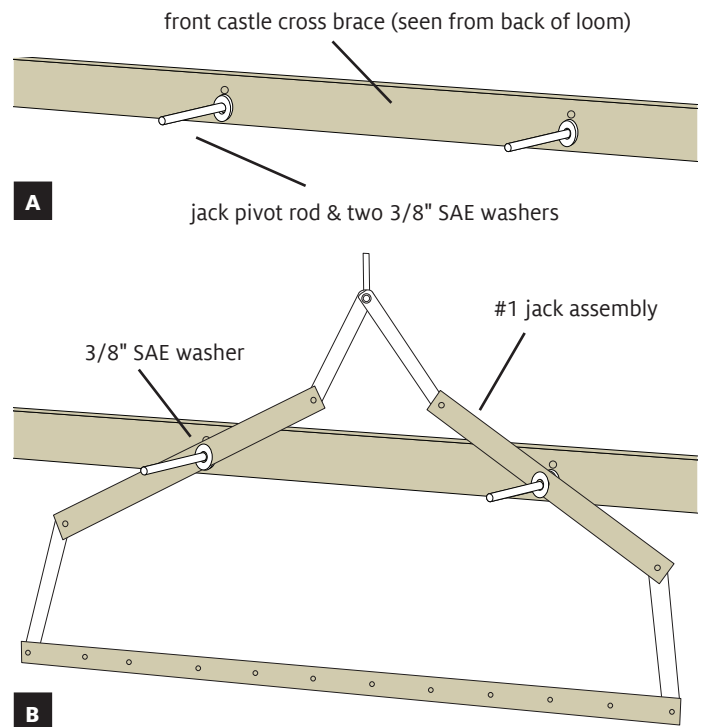


FIGURE 9: INSTALL THE JACK ASSEMBLIES

10. Attach the rear castle cross brace.

Parts: rear castle cross brace

Hardware: 4X #12 x 1-1/2" Phillips truss head sheet metal screws

Place the rear castle cross brace behind the jacks so that the jack pivot rods fit into their holes, which do not go all the way through the brace (Figure 10). Attach the brace to the backs of the castle sides, just below the upper side braces, with two #12 x 1-1/2" Phillips truss head sheet metal screws at each end.

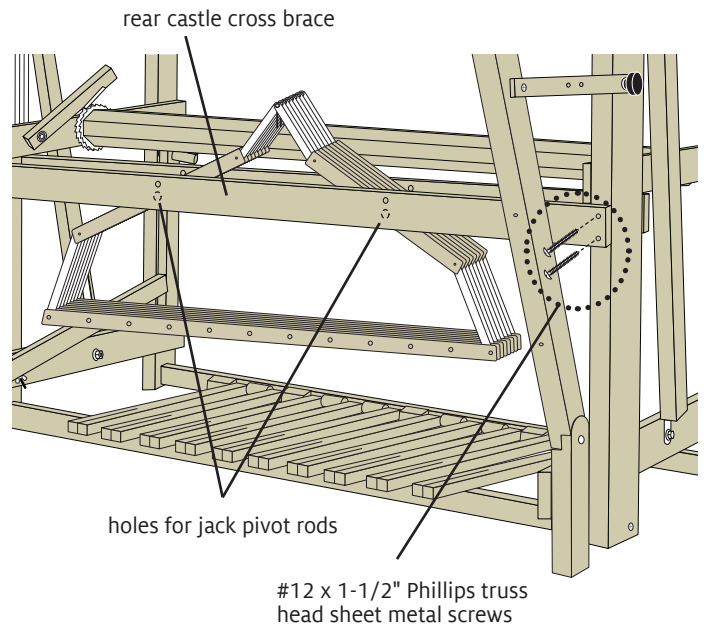


FIGURE 10: ATTACH THE REAR CASTLE CROSS BRACE

11. Install carriage bolts on the castle cross braces.

Hardware: 2X 1/4-20 x 7" carriage bolts, 2X 1/4" USS washers, 2X 1/4-20 lock nuts

Push the jacks down in the center. From the front of the loom, insert the 1/4-20 x 7" carriage bolts through the square holes in the front castle cross brace, over the jacks, and all the way through the holes in the rear castle cross braces (Figure 11).

From the front of the loom, turn the carriage bolts until their square parts fit into the square holes in the front castle cross brace. At the rear castle cross brace, place a 1/4" USS washer on each bolt and secure with a 1/4-20 lock nut. Tighten the lock nut all the way so that the carriage bolt fully engages in the hole. Then loosen the lock nut slightly so that the washer remains loose.

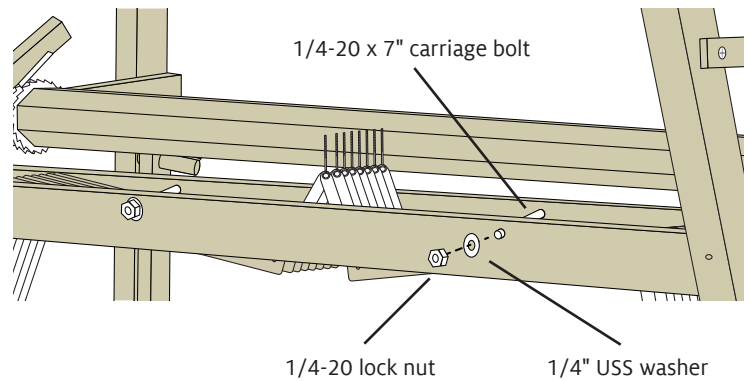


FIGURE 11: INSTALL CARRIAGE BOLTS

12. Install heddles on the shafts.

Use the parts and hardware listed below for your loom.
8-shaft looms: 8X shaft frames, 16X heddle bars, 1000X inserted eye heddles

4 Now-4 Later looms: 4X shaft frames, 8X heddle bars, 1000X inserted eye heddles

Lay a shaft frame on a flat surface. Push up on the slide lock on the heddle bar hook and pull the heddle bar out of the hook (Figure 12A). Release the slide lock. Flex the heddle bars enough to remove one end from the slot in the side of the frame. Remove the other end from the frame (Figure 12B).

Keep the heddles loosely tied until the heddle bars are installed in the shaft frame. Be sure to keep the heddles oriented in the same direction for easier threading. Lay the heddle bars next to the heddles. Carefully slide a group of heddles onto the heddle bars (Figure 12C).

Replace the heddle bars in the shaft frame. Insert one end of each heddle bar in the slot in the frame. Flex the heddle bar and insert the other end into its slot. Divide the heddles approximately in half and push them to either end of the heddle bar. Push up on the slide lock and place the heddle bar back on the hooks (Figure 12D).

Repeat this step for the other shafts. For 4 Now-4 Later looms, you can install all the heddles on shafts or set them aside them to install with the 4 Later kit.

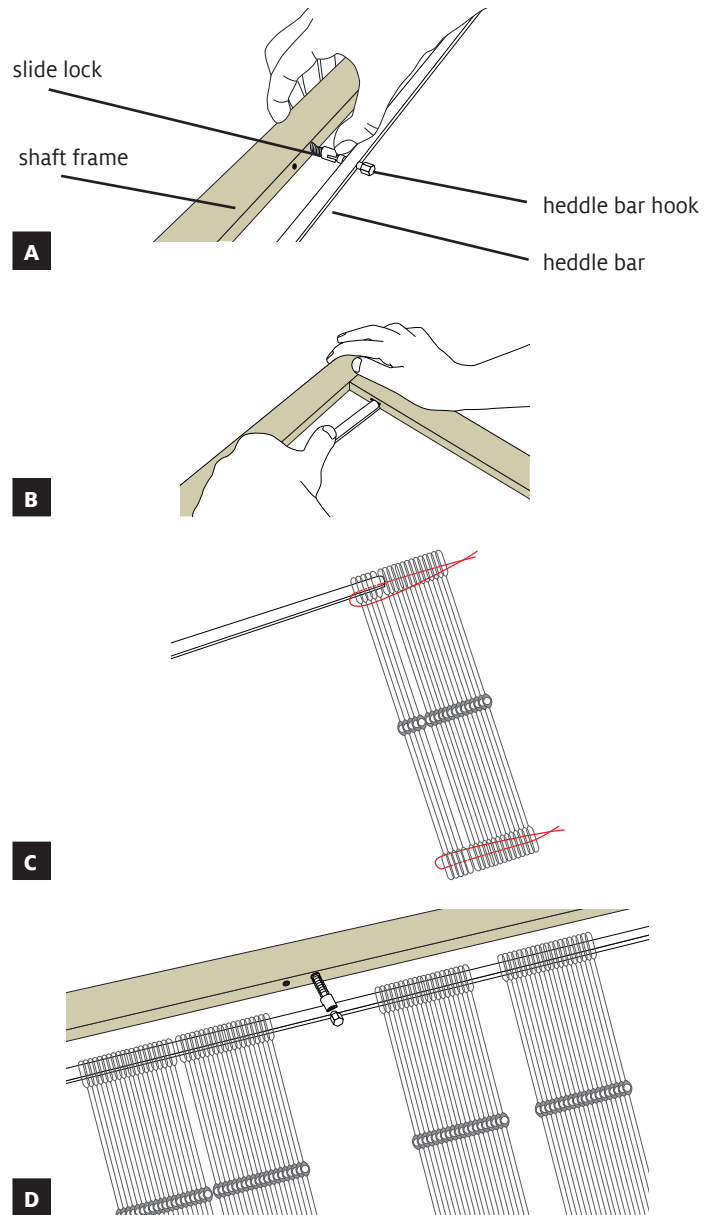


FIGURE 12: INSTALL HEDDLES

13. Install the shafts.

Hardware:

8-shaft looms: 11X 8/32" hex nuts, 11X rubber O-rings

4 Now-4 Later looms: 7X 8/32" hex nuts, 7X rubber O-rings

Working from the rear of the loom, slide a shaft frame into the frontmost channel in the castle sides. Insert the jack pin into the hole in the center of the bottom of the frame (Figure 13). Secure the jack pin with an 8/32" hex nut, then push a rubber O-ring on top of each hex nut.

Install the remaining shaft frames into channels, working backwards from the front of the loom. The heddle bar hooks in each shaft frame are slightly off-center. The hooks should all line up when the shafts are installed in the loom—if they do not, remove any misaligned shaft frames, turn them around, and reinstall.

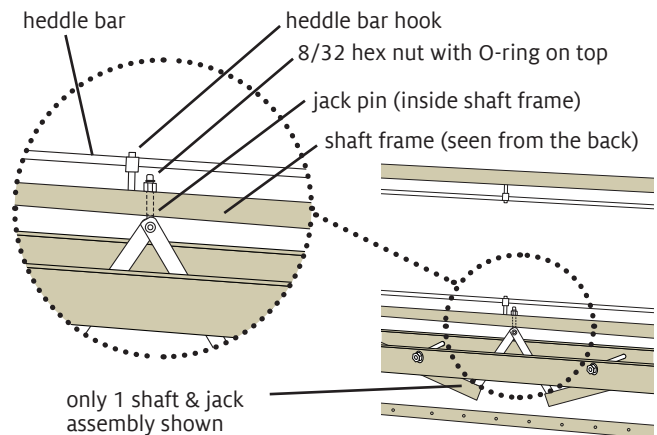


FIGURE 13: INSTALL THE SHAFTS

14. Attach the upper castle support (low castle looms only).

Parts: upper castle support

Hardware: 4X #12 x 1-1/2" Phillips truss head sheet metal screws

Orient the upper castle support so the logo faces right side up (Figure 14). Using two #12 x 1-1/2" Phillips truss head sheet metal screws at each end, attach the support to the top of the castle sides.

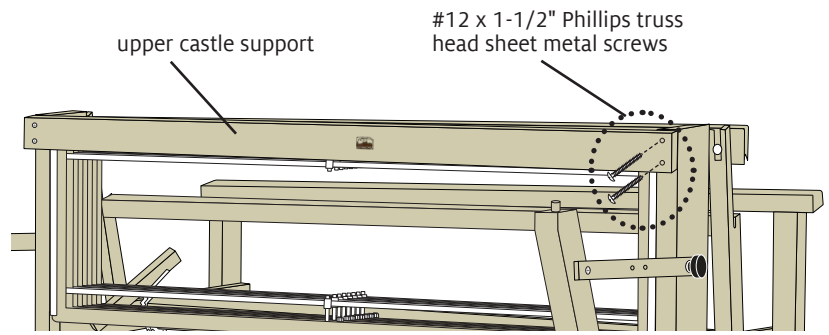


FIGURE 14: ATTACH THE UPPER CASTLE SUPPORT (LOW CASTLE LOOMS)

15. Assemble the high castle accessory tray (high castle looms only).

Parts: 2X tray long sides, 2X tray end pieces, 1X tray center piece, 2X tray bottoms

Hardware: 12X #8 x 1-1/2" Phillips truss head sheet metal screws

Orient one tray long side with the grooved inner side showing and the groove at the bottom. Place the end pieces in position with their slots at the bottom, as shown in Figure 15A. Using six #8 x 1-1/2" Phillips truss head sheet metal screws, attach the two end pieces and the center piece to the tray long side.

Slide the tray bottoms into the groove of the long side, pushing them as close as possible to the center piece—there will be a small gap between the bottoms and each end piece (Figure 15B).

Fit the remaining long side, with its grooved inner side facing inward and the groove at the bottom, on the other side of the tray bottoms. Attach the long side to the end pieces and center piece with six #8 x 1-1/2" Phillips truss head sheet metal screws (Figure 15C).

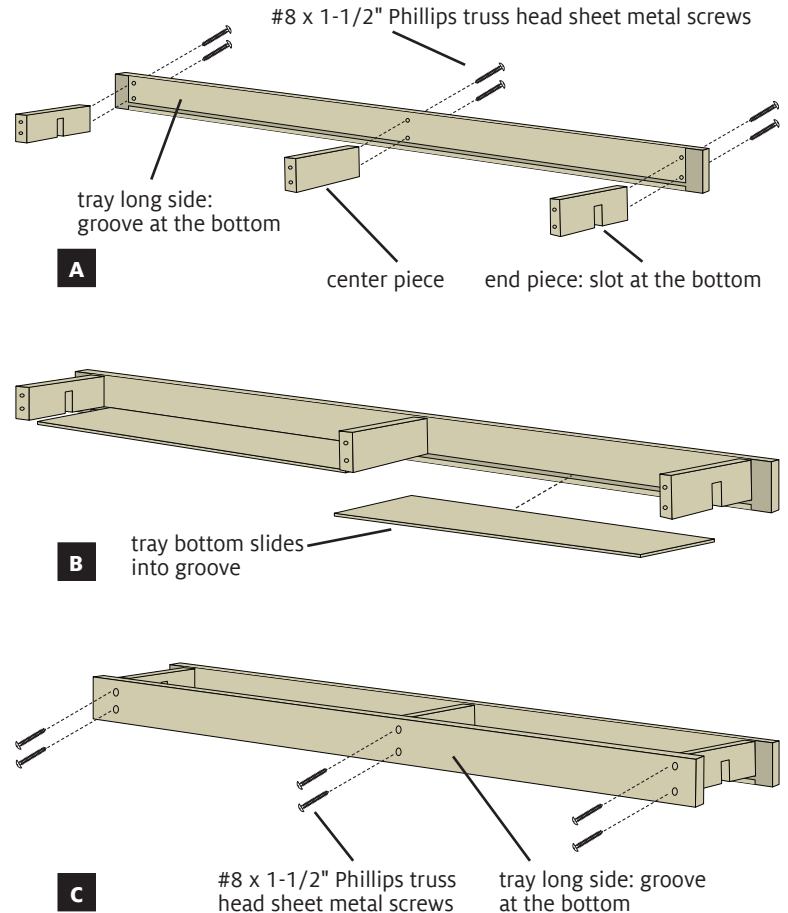


FIGURE 15: ASSEMBLE THE HIGH CASTLE ACCESSORY TRAY (HIGH CASTLE LOOMS)

16. Install the high castle accessory tray (high castle looms only).

Hardware: 2X 1/4" x 1-1/2" hex bolts, 2X 1/4" USS washers

Insert a 1/4" x 1-1/2" hex bolt through a 1/4" USS washer, then screw the hex bolt into the threaded hole at the top of the castle side on its inner side (Figure 16A). Tighten the hex bolt just enough to hold it in the hole. Repeat with the remaining hex bolt, washer, and castle side.

Lower the high castle accessory tray into position between the castle sides and washers, with slots in the end pieces fitting over the hex bolts (Figure 16B). Tighten the hex bolts securely.

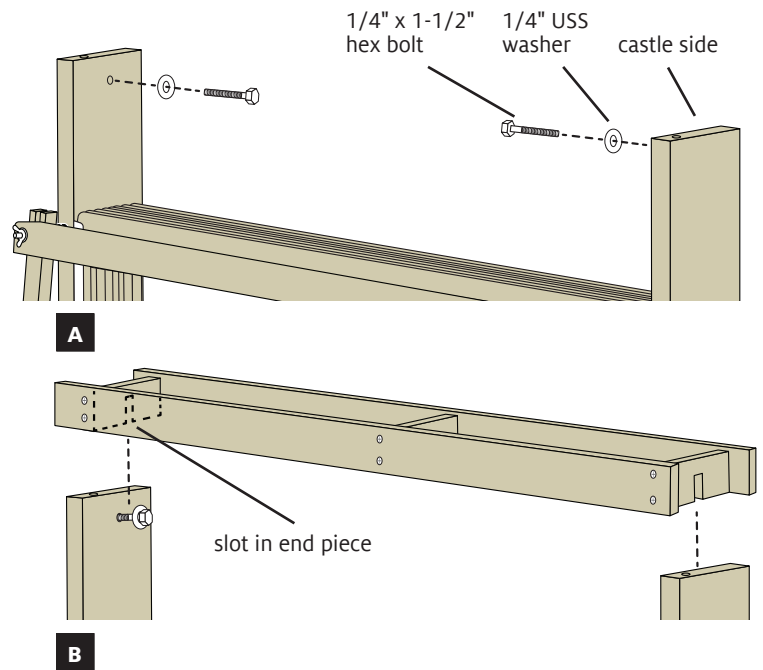


FIGURE 16: INSTALL THE HIGH CASTLE ACCESSORY TRAY (HIGH CASTLE LOOMS)

17. Install the warp beam.

Parts: warp beam

Hardware: 2X 1/2" SAE washers

Place a 1/2" SAE washer on each end of the warp beam. Slip the threaded rod (next to the brake hub) through the hole in the upper right rear leg as far as it will go, moving the brake cable out of the way. Fit the short rod in the other end of the warp beam into the hole in the upper left rear leg—this hole does not go all the way through the leg (Figure 17). You will have to spread the right and left legs apart to accomplish this.

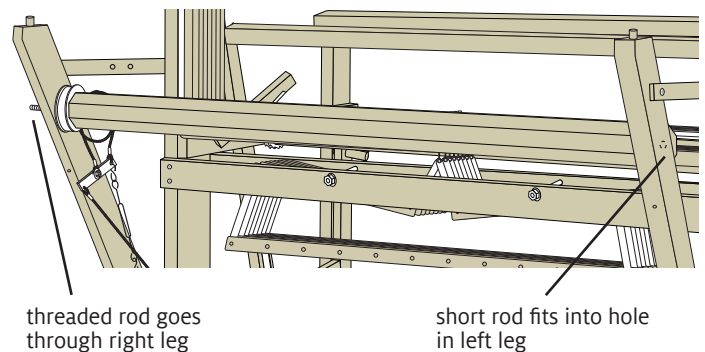


FIGURE 17: INSTALL THE WARP BEAM

18. Install the warp beam crank handle.

Hardware: 1X warp beam crank handle, 1X 1/2" USS washer, 1X 1/2" cap nut

On the threaded rod of the warp beam (going through the upper right rear leg), place a 1/2" USS washer and the warp beam crank handle, with the wooden handle facing out. Secure with the 1/2" cap nut (Figure 18).

When you're weaving, the crank should be pushed off of the cap nut. To engage the crank for turning the warp beam, pull the hexagonal hole in the crank onto the cap nut.

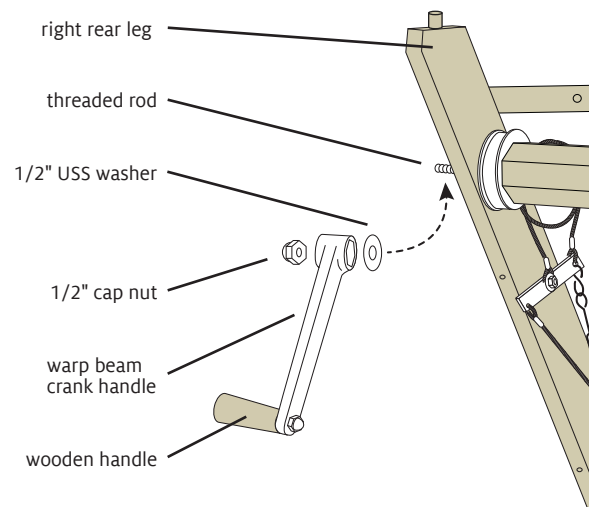


FIGURE 18: INSTALL THE WARP BEAM CRANK HANDLE

19. Install the brake cable.

Locate the brake bar below the warp beam. Remove the lock nut, washer, and brake cable from the bolt holding the brake bar in place. Uncoil the brake cable.

Hold the loose end of the brake cable and wrap it over and around the brake hub three times. Start next to the loom leg and wrap towards the loom center, making sure not to overlap the cable (Figure 19). Press the brake release pedal and replace the cable, washer, and lock nut on the bolt. Make sure that the brake bar can pivot freely—if it does not, slightly loosen the lock nut.

Adjust the friction action by rotating the turnbuckle to tighten or loosen it. The brake is set properly when you stand at the rear of the loom and cannot turn the warp beam away from you with both hands. If the warp beam turns, tighten the turnbuckle. When you hold the brake release pedal down, the warp beam should turn freely in either direction.

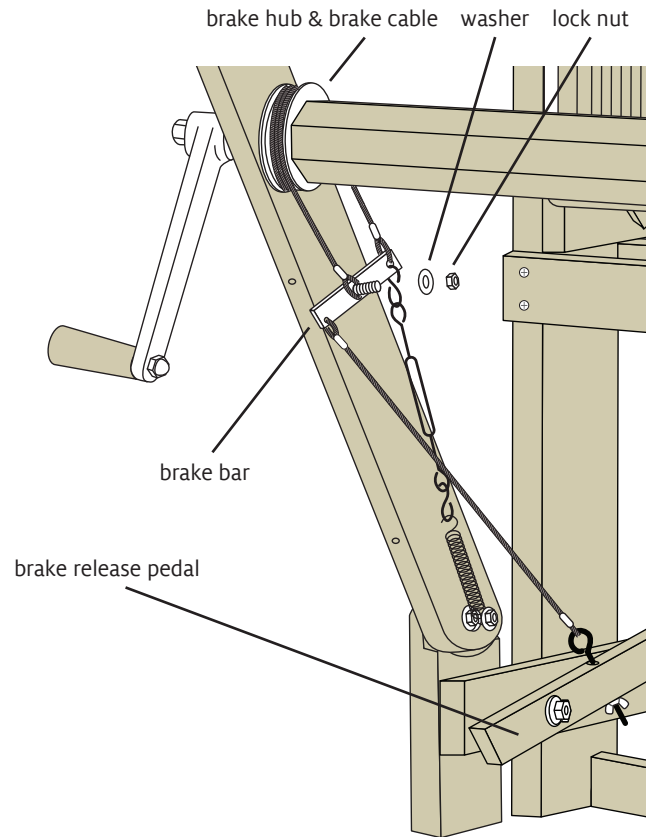


FIGURE 19: INSTALL THE BRAKE CABLE

20. Install the rear square beam.

Parts: square beam

Set one of the square beams on the pegs of the upper rear legs, with its rounded edge facing back and the squared edge facing the front of the loom (Figure 20).

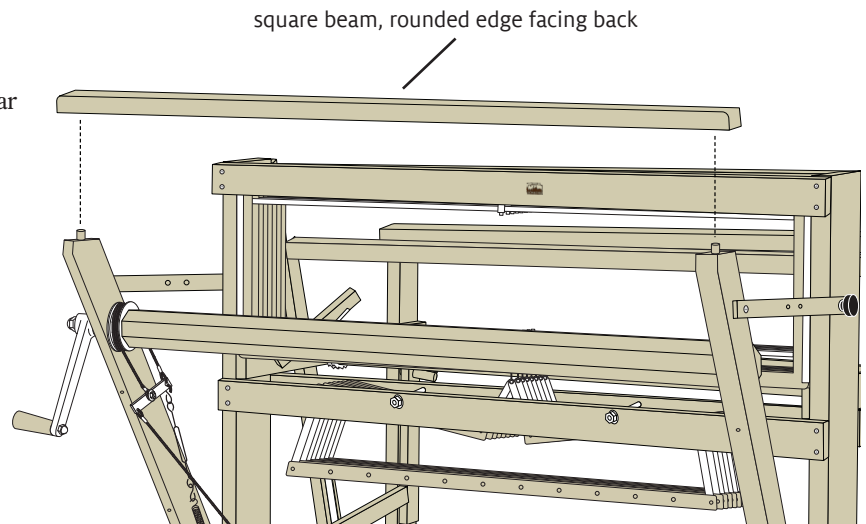


FIGURE 20: INSTALL THE BACK SQUARE BEAM

21. Install the apron bars.

Parts: 2X apron bars

Cords Bag: apron cords for your loom, listed on page 2

For cherry looms: see the special instructions for attaching the apron bars.

For maple looms: Attach the apron cords to the cloth and warp beams. There is one apron cord for each hole in the beams. Insert an end of a cord through a hole in the beam and pull the cord through. Then insert the other end through the second hole in the end of the cord that you just put through the beam. Pull firmly on the cord to tighten (Figure 21A). Repeat across the cloth beam and the warp beam.

Attach the apron cords to an apron bar: take a pinch of the cord about 4" from the end (Figure 21B). Insert the pinched cord through the second hole at the end of the cord. Pull on the pinched cord until a new loop forms that is large enough for the apron bar to slip through (Figure 21C). Slide the apron bar through the loop (Figure 21D) and pull tight. Repeat until all cords are attached to the apron bar. Attach the other apron bar to its beam in the same way.

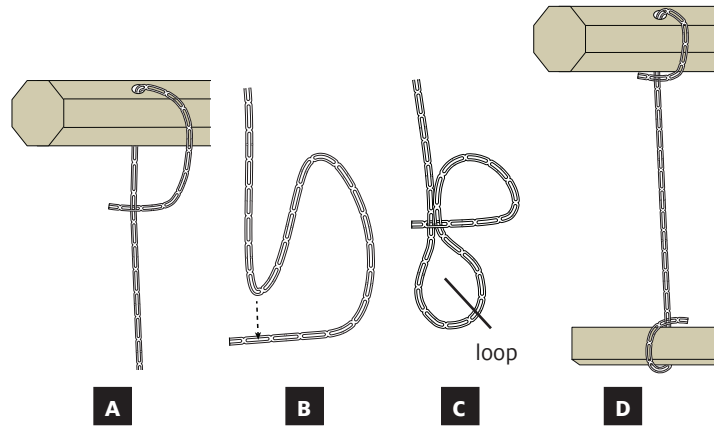


FIGURE 21: INSTALL APRON BARS

22. Install the tie-ups.

Cords Bag: 80X tie-ups for 36" loom, 96X tie-ups for 45" loom

Loop one end of each tie-up through a hole in the lamm (Figure 22). For 45" looms, there is one tie-up for every lamm hole, including the hollow pins at each end of the lamm. For 36" looms, use only the ten middle holes of each lamm.

Tie shafts to a treadle by slipping a tie-up cord into the slot in a treadle (Figure 22). Work from the front lamm to the rear lamm for each treadle.

After you have completed your tie-up, check each treadle by pushing it all the way to the floor and releasing it, making sure that the button of each tie-up cord rests up against the treadle and that each cord hangs straight down to the treadle. There is a long groove on the underside of each treadle end to prevent the tie-ups from slipping off. ■

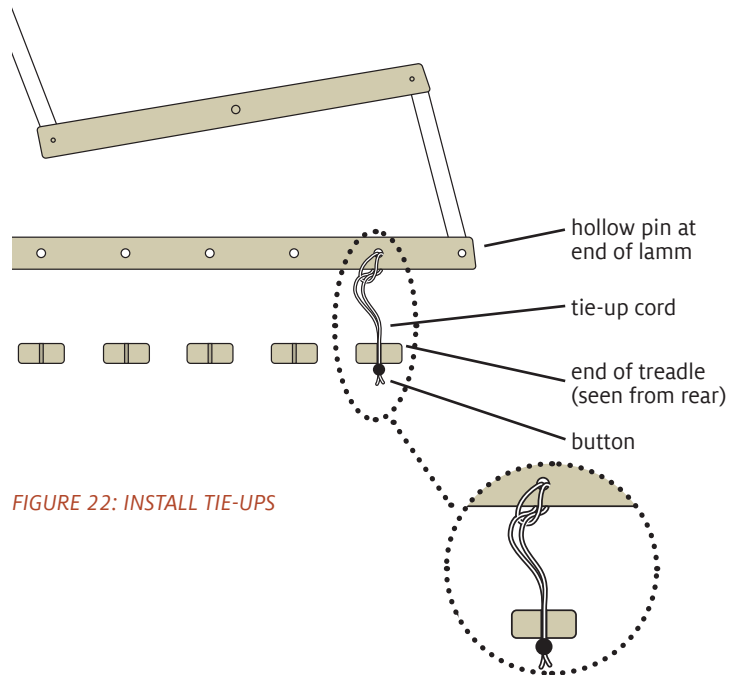


FIGURE 22: INSTALL TIE-UPS