DESIGN UPDATE 3 -- 8/29/2006

Since our first design we've made many minor changes to key areas of the prayer bench, especially the folding hinge geometry. The *general* design remains the same, though the measurements and the order of assembly have changed. We've changed to pocket-screws and biscuits for almost all applicable joints, and made some measurement changes to allow for dovetail-style assembly and better actuation. The disadvantage of these improvements is that they require additional tooling -- pocket screw and dovetail jigs, and biscuit jointing cutters -- and some require greater woodworking skill and precision. But the results are worth the effort. These changes have resulted in a stronger, more attractive finished piece with greater functionality and long-term durability.

Before beginning, read through this update *and* the original plans. Both are necessary to complete the new design.

If you do not have pocket screw and biscuit joinery tooling, use the new piece sizes and drill locations from this update, but assemble them as directed in the original plans; and instead of pocket/frame screws and biscuits, use #8 wood screws.

NEW BILL OF MATERIALS

Qty	Description	Source
6'	1 x 8" Hardwood	Various
20'	1 x 6" Hardwood (Two 10' boards will suffice if without defect or bad snipe)	Various
2	1/4 20 x 35mm knockdown bolts with shoulders	Woodworker's Supply 812-628
2	1/4 20 x 70mm knockdown bolts with shoulders	Woodworker's Supply 812-529
2	1/4 20 knockdown nuts	Woodworker's Supply 812-620
2	1/4 20 x 13mm Type D hex drive threaded inserts	Woodworker's Supply 812-466
12-22	#7 or #8 1-1/4 inch fine thread pocket/frame screws	Various
4-20	Hole plugs (depending on how many and the type -- standard or pocket -- of holes you want to plug)	Various
2	2" diameter Wood Knobs (part number for oak ->)	Woodworker's Supply 938-692
2	3/8" o.d., 1/4" i.d., 1 to 1-1/2" length bushing	Hardware store
1	22-1/4" x 5-1/2" x 4" foam pad (optional)	Fabric/craft store
1	13" x 30" fabric (optional)	Fabric/craft store
26	Upholstery tacks (optional)	Woodworker's Supply 937-761
3-4	Small right angle brackets and screws less than 3/4" long	Various
8	1/2 to 3/4" diameter adhesive felt pads (optional)	Woodworker's Supply 933-692
2	#20 Biscuits	Various

COMPLETE CHANGE LIST

1. The folding kneeboard subassembly has been widened *slightly*.
2. The joint pins are now reinforced with bushings, do not require any thread cutting, and have an attractive wood knob on the end. The threaded wood knobs can be tightened to keep the kneeboard subassembly up during transport.
3. The joint pin location has moved, simplifying the fabrication of the kneeboard subassembly.

4. All end-grain screws have been discontinued and are replaced with stronger pocket screws. The general order of assembly has changed to take advantage of the pocket screw system. (You can still use standard screwing by following the screw patterns and assembly process in the original plans.)
5. *General* order of assembly for dovetail joinery methods.
6. The kneepad is attached to a floating board rather than affixed directly to the kneeboard subassembly, allowing for easy replacement or repair.
7. Kneeboard subassembly can now be permanently locked in the down position by adding two hidden pocket screws.
8, Biscuits are *strongly* recommended instead of pocket screws in at least two locations to avoid possible board end-splitting.

SAFETY

All of the safety points in the original design instructions apply equally here.

TOOL LIST

The tool list is the same as in the original plans, with the recommended addition of the complete Kreg pocket screw jig set (or similar product), a biscuit cutter and tooling for dovetails if you wish to try your hand at them.

WOOD PREP AND INITIAL CUTS

The preparation and cutting *process* is similar to the original design. Only the lengths vary slightly for some boards. See the new cut list.

The tolerances are *much* tighter on this model. Your cuts must be as square as you can make them. Tune and square your saw before beginning; *do not* trust your saw manufacturer's claim that your saw was squared at the factory! When we checked our new shop table saw we discovered that almost every axis and stop was off by as much as two degrees.

Make sure your blade is sharp.

If you have good sanding equipment it can save a *lot* of time to sand all boards with 150 grit on a drum or belt sander prior to cutting and assembly.

See the cutting diagram. Cut the upright sides and shelf pieces from one 1 x 6 x 10'. Cut the remaining 1 x 6 pieces from the other 1 x 6 x 10'. If your wood is not clear, you may need additional boards. Cut the top and side bases from your 1 x 8.

Perform miter cuts on feet, upright sides and shelf back as in original plans (10.3 degrees).

If your lumber is not 3/4" thick, you will need to adjust the plan measurements accordingly. The hinge geometry in particular is affected if the base cross-brace is anything except 3/4" thick, as are the widths of any horizontal boards.

CUT LIST

Component	Standard Model	Double	Dovetail Mod.
Top	1 x 8 x 26"	+24" (50")	- 1 1/2"
Two Side Bases	1 x 8 x 16"	Same	Same
Two Sides	1 x 6 x 30"	Same	+ 3/4"
Shelf and Shelf Back	1 x 6 x 23"	+24" (47")	Cut to fit, ~23" long
Base Brace	1 x 6 x 24-1/2"	+24" (48 1/2")	Same
Two Feet	1 x 6 x 19-1/4"	Same	+ 3/4"
Kneeboard	1 x 6 x 22-1/4"	+24" (46 1/4")	Same
Kneeboard Support	1 x 6 x 22-3/4"	+24" (46 3/4")	Same

DRILLING, BORING AND ROUTING

Key drill and routing points are different from the original design.

1. Using a 25/64" bit and a drill press, drill *precisely* as shown in the diagram; upright sides, base sides and feet. If these points are not dead on and matching, the kneeler will not fold properly. We drill these pieces simultaneously in our shop to assure that they match.
2. If you want the kneeler to be height-adjustable, route 2" slots downward from the holes on the upright sides only (as in the original plans). Use a 3/8" straight bit and a routing table. Unlike the original design, no routing is necessary in the foot end.
3. ***DESIGN UPDATE:*** Using a 23/32" to 3/4" plunge/mortising router bit, plunge 3/32" to 1/8" into the inside of the upright sides, centered directly over the upper hole. This will countersink the inside knockdown nut, and eliminates a possible scratch in the side of the folding subassembly. If you made the kneeler height-adjustable by routing the slot as directed in step 2, above, this counterbore needs to be extended to cover the entire slot. This adjustment may require shortening your upper knockdown bolt with a hacksaw or using a 30mm one instead of the listed 35mm one.
4. Bore a 3/4 inch deep hole into the wood knobs (assuming yours are about 1 or more inches thick) using a 21/64" bit. A brad point or forstner style bit is best. Twist in the threaded insert. It should be a *very* tight fit. Glue it into place with superglue (or similar).

STANDARD ASSEMBLY

This section describes the assembly process of the standard (non-dovetail) design using pocket screw systems. Assembly is in a slightly different order than in the original design. If you are not using pocket screws, revert to the original instructions for screw location, clamping techniques and general assembly order, but use the revised board dimensions and hinge geometry.

Precise positioning of the pocket screws is generally not necessary. When being drilled into a board face, just make sure that the screw hole is at least an inch away from the edge to avoid splitting and to allow room for a driver. Note that some screws are driven into the board edges rather than the faces; handle these a little more delicately — do not overtighten — to avoid splitting your boards.

Good clamping is critical when using pocket screws. If your boards are not firmly clamped in the proper location and square *prior* to driving a screw, the screw can (and probably will) pull your boards out of place when driven. If this happens, remove the screw, optionally plug the holes (or replace the board entirely), drill a new pocket and do it over.

Piece locations are identical to the original design except for the kneeboard support board. See the diagram for the new location.

Glue is helpful but unnecessary (the strength primarily in the pocket screws).

1. Pre-drill all pieces for pocket screws as shown in the diagram. Some holes are optional. The only pieces that do not require any pre-drilling are the top, base sides and kneeboard support.

1a. *We recommend against using pocket screws to connect the foot to the kneeboard support board as shown in the original diagrams*. In some cases the boards are splitting due to the proximity of the screw to the end of the board. We now use biscuits and glue in this location. Counterbored (and plugged) screws, and inside right-angle braces are two options that could also work.

2. Attach the shelf back to the upright sides using four screws. Plug and trim the visible screw holes now if you wish. You won't be able to get a chisel in position to trim these plugs later in the assembly process.
3. Attach the top to the sides using four screws. The vertical screw from the shelf back to the top is optional -- install it if the top is warped. Plug and trim now if you wish to hide these holes.
4. Attach the shelf base to the upright sides using four screws underneath the board. Sometimes it is useful to add a fifth screw connecting the center of the shelf base to the shelf back if ei-

ther board is warped (or if you anticipate warp in the future).

5. Attach the feet to the kneeboard support with ~~four pocket screws~~ *biscuits and glue*. See the diagram.
6. The base subassembly is completed as in the original design (II.10-11 in the original plans) except that pocket screws are used. The cross brace edge with the screws should be on top for reasons that will be clear later. The face with the screws should face out/front.
7. Insert plugs in remaining screw holes as desired. The only board that *needs* them (aesthetically) is the base cross brace.
8. Trim and sand for finishing.
9. Continue with *finishing*...

DOVETAIL ASSEMBLY

This section describes the assembly process of the dovetail design, also using pocket screw systems. The dovetails force a different assembly order and slightly different lengths for some boards. It is beyond the scope of this guide to teach actual *dovetail* techniques. See your local woodworking store for related manuals, jigs and tools (we use the Leigh dovetail jig).

1. Dovetail and attach the top to the sides. Dovetail and attach the kneeboard support to the feet.
2. Trim the shelf back and base to fit the final span between the sides.
3. Pre-drill the shelf back, shelf base and base crossbrace for pocket screws.
4. Install the shelf back first, then the base. Sometimes it is useful to add a fifth screw connecting the center of the shelf base to the shelf back if either board is warped (or if you anticipate warp in the future). See the diagram for suggested locations.
5. Continue as with step 6, above, then go on to *finishing*...

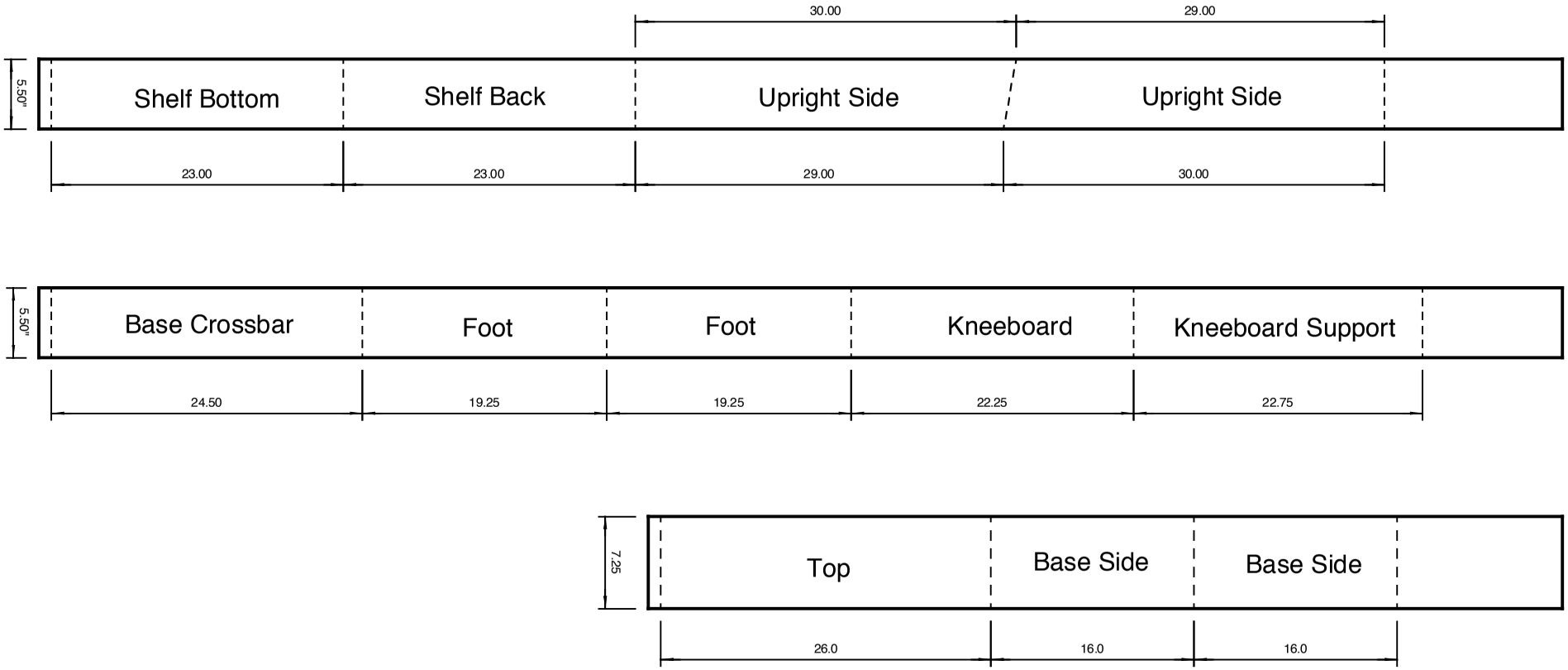
FINISHING

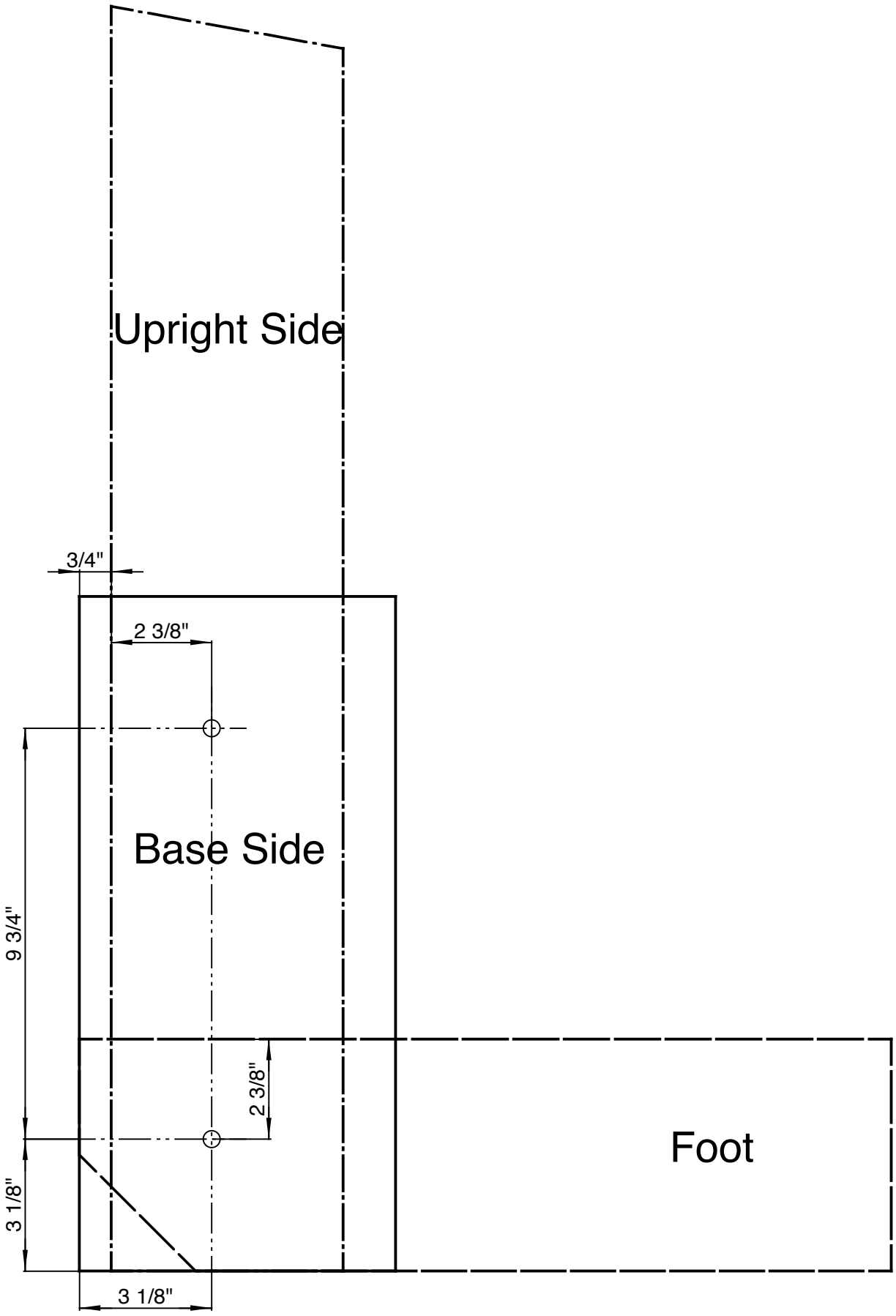
1. "Dry-assemble" all subassemblies and check for proper operation. See the original plans and final assembly changes, below, for details. If anything isn't working properly, it is much easier to address it prior to staining!
2. If everything checks out, finish/stain all pieces as in the original plans and per the application instructions for your finish.
3. Attach the kneepad to the kneeboard using techniques similar to those in the original plans. In the new design the kneepad is attached directly to a kneepad board, rather than to the entire kneeboard subassembly. The finished kneeboard/pad is then attached to the kneeboard subassembly using right angle brackets. This allows for easy removal and replacement of the kneepad if it becomes damaged.

FINAL ASSEMBLY NOTES

Final assembly is similar to the original plans, with these exceptions:

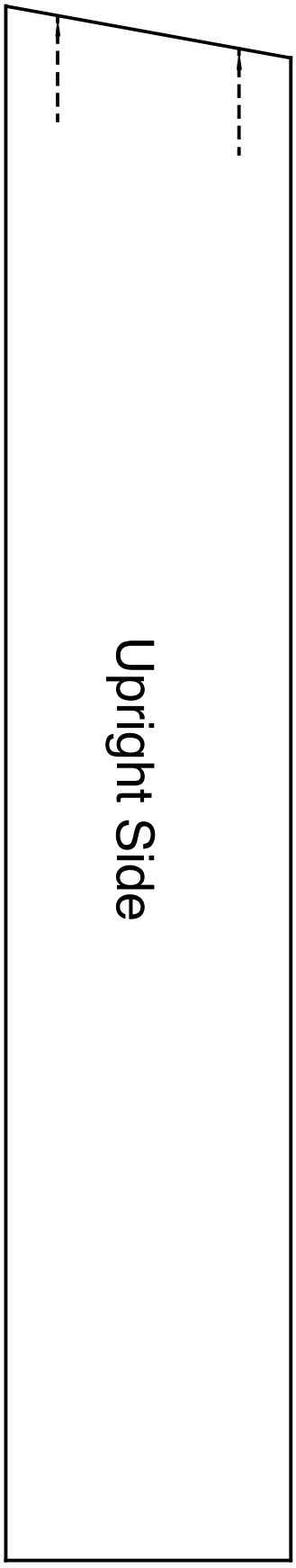
1. No thread cutting is necessary on the main joint pin. Just slide a bushing over the 70mm bolt. Push the bolt from the outside through the side base, upright side and foot end, then twist on the threaded knob. If all was cut and assembled accurately, there will be about 1/16" - 1/8" play between the kneeboard subassembly and the upright sides. You can insert a fender washer into this gap to keep the wood from rubbing together when folding the kneeler.
2. If you want the knee pad fixed in the down position (which helps with overall stability), drive a screw through the optional pocket holes in the 'nose' of the feet and into the base brace. This step will not be possible if the edge pocket screws on the cross brace are on the bottom edge of the cross brace unless you also have filled the hole with a solid wood plug (which might also create a mechanical weakness).

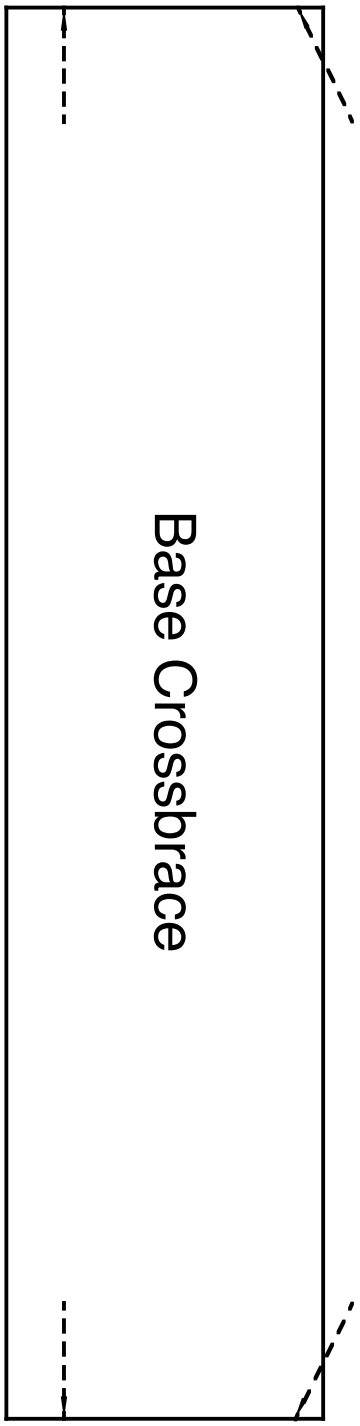

30.00
29.00
5.50"
Shelf Bottom
Shelf Back
Upright Side
Upright Side
23.00
23.00
29.00
30.00
5.50"
Base Crossbar
Foot
Foot
Kneeboard
Kneeboard Support
24.50
19.25
19.25
22.25
22.75
7.25
Top
Base Side
Base Side
26.0
16.0
16.0

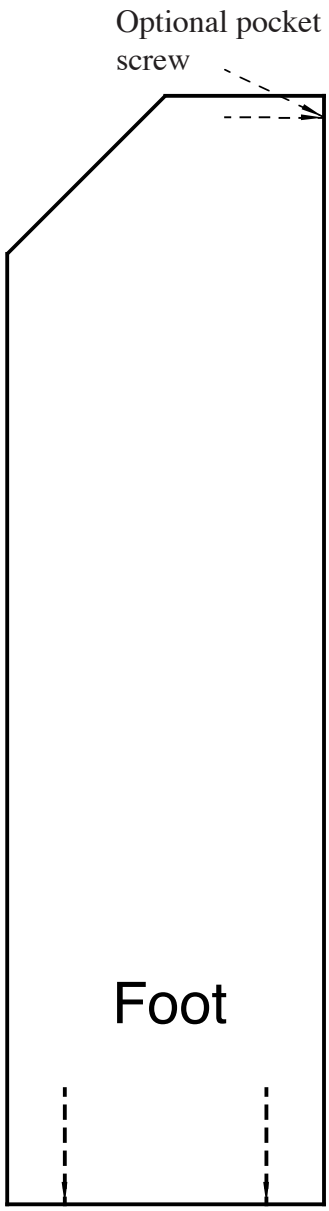

Upright Side
3/4"
2 3/8"
Base Side
9 3/4"
2 3/8"
Foot
3 1/8"
3 1/8"

Screws go into the interior faces of the upright side and the feet. Screws go into the top edge and front/outside face of the base crossbrace.

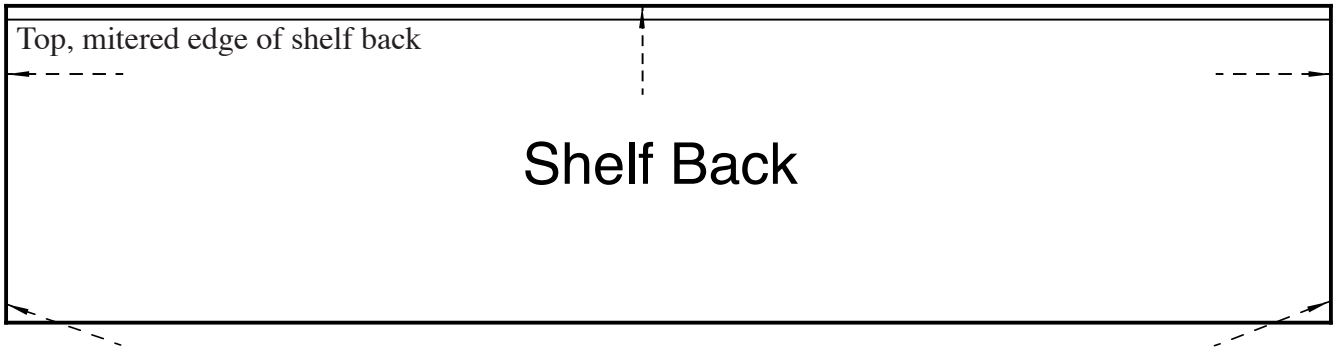
UPDATE: We now recommend biscuits instead of pocket screws in the end of the foot where it attaches to the kneeboard support.



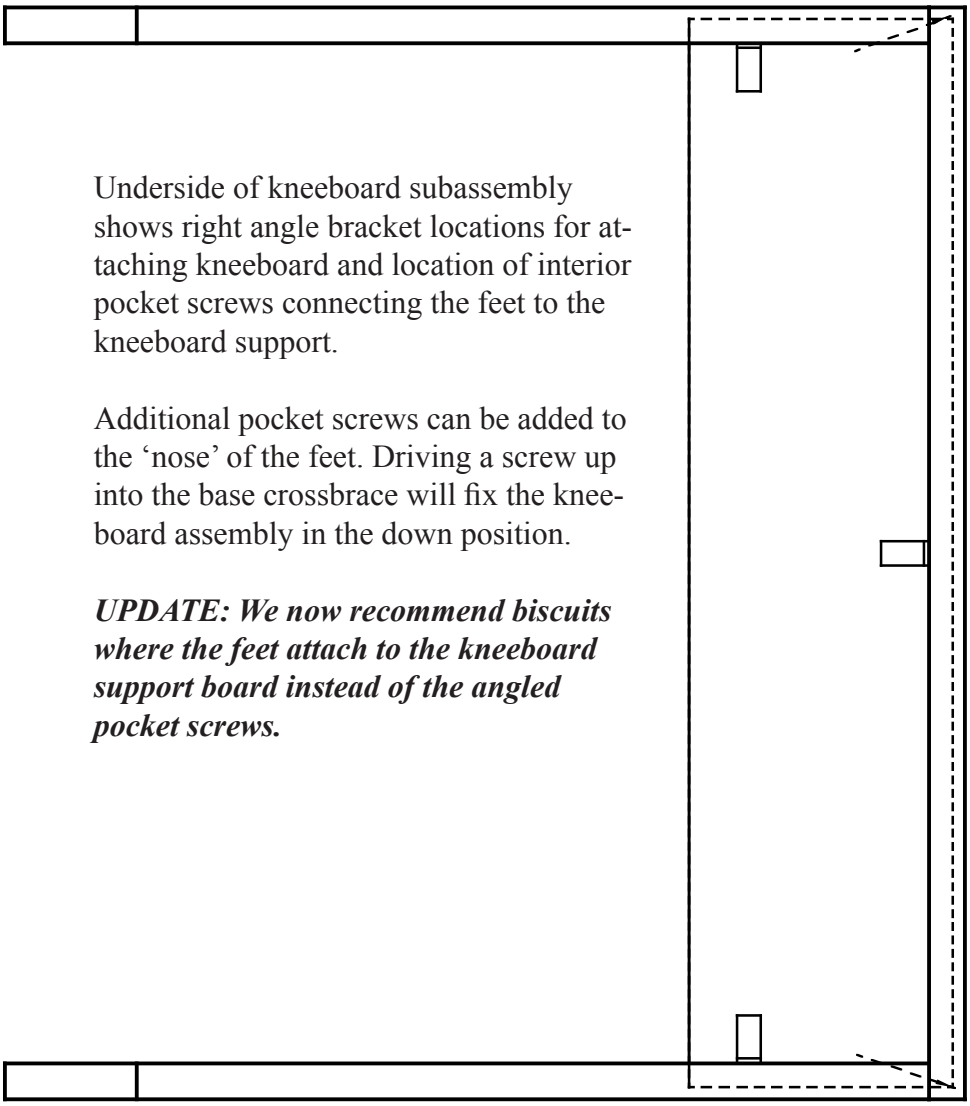




Top edge of shelf back, interior facing you. The vertical screw is optional; add it only if the top is significantly warped and the screw is needed to hold it down. The lower screws are going into the *edge* of the board, not the face.



Screws go into the bottom face of the shelf bottom.

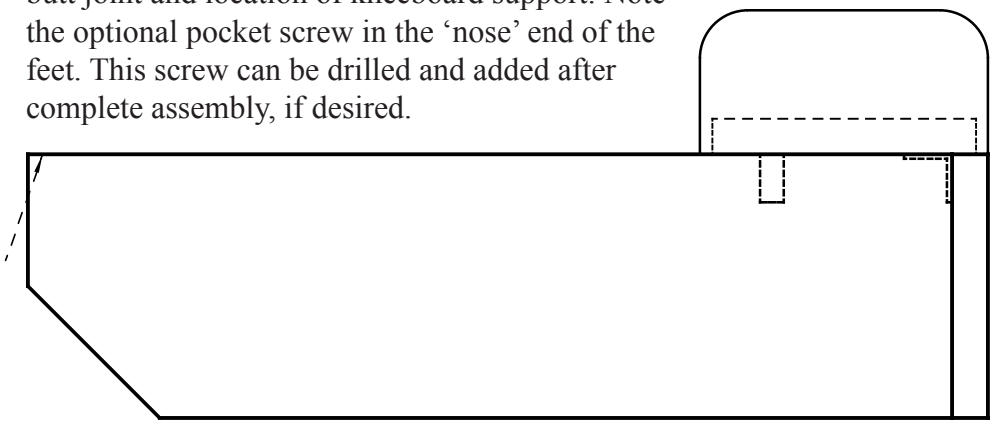


Underside of kneeboard subassembly shows right angle bracket locations for attaching kneeboard and location of interior pocket screws connecting the feet to the kneeboard support.

Additional pocket screws can be added to the ‘nose’ of the feet. Driving a screw up into the base crossbrace will fix the kneeboard assembly in the down position.

UPDATE: We now recommend biscuits where the feet attach to the kneeboard support board instead of the angled pocket screws.

Side view of kneeboard subassembly showing butt joint and location of kneeboard support. Note the optional pocket screw in the ‘nose’ end of the feet. This screw can be drilled and added after complete assembly, if desired.



PERSONAL PRAYER BENCH

COMPLETE ASSEMBLY INSTRUCTIONS

READ THROUGH ALL INSTRUCTIONS PRIOR TO BEGINNING ASSEMBLY. WRITE SERVICE@ROSARYSHOP.COM OR CALL 503-434-5264 IF YOU HAVE QUESTIONS OR COMMENTS.

1 INTRODUCTION

1. To complete your kneeler, you will need the following materials and tools

Material	Standard Model	Double Size	Handicap Accessible
1 x 8	5 - 6'	8'	5 - 6'
1 x 6	20'	30'	10'
5/16" Countersink Plugs	25	30	15
#8 x 1 1/2" Wood screws	25	30+	15
3/4" Adhesive Wool Pads	10	10+	4
1/4-20 x 35mm knockdown bolt	2	2	4
1/4-20 x 70mm knockdown bolt	2	2	0
1/4-20 x 12mm knockdown nut	6	6	4
Kneepad material*	32" x 14"	56" x 14"	0
Kneepad foam*	6" x 23" x 5"	6" x 47" x 5"	0
Upholstery tacks*	25	50+	0
Armrest material*	32" x 14"	56" x 14"	32" x 14"
Armrest foam*	8" x 27" x 2"	8" x 51" x 2"	8" x 27" x 2"
Armrest Uphostery tacks*	27	54+	27

* optional item.

Tools:

Table or Radial Arm saw
Router with 3/8" x 1" long straight bit
Thickness Planer and Jointer (if you purchase rough or S2S lumber)

1/4 - 20 threat tap and die
2 3/16" hex wrenches
Hammer(s)
Portable drill (preferably 2, one for predrilling holes and the other for driving screws)
25/64", 3/8" and #8 countersink drill bits
Personal safety equipment (glasses, earplugs, respirator, etc.)
Worktable or suitable work area
Assorted wood clamps including two right angle clamps and at least one clamp able to span 26". At least two large Jorgensen wood clamps will also be very helpful at one point in the assembly.
Phillips screwdriver or bit for drill
Right angle
Wood chisels or hacksaw blade
Routing/Shaping Table or Trim Router (if you wish to trim the edge of the top)
150 or 220 grit sandpaper
Stain/finish and application tools
Dustmask (capable of filtering down to .3 micron particles)
Threadlock (optional)
Wood glue
Additional 1x6 and 1x8 scrap boards are helpful when attaching the knee and optional arm pads

2. Though we refer to boards as “1x6” and “1x8” they are actually planed and sanded down to smaller dimensions -- 3/4 x 5 1/2 and 3/4 x 7 1/2. “One by eight” is just easier to say than “three quarter by seven and a quarter inches.” If you purchases finish-planed 'S4S' lumber, it will already be these dimensions.
3. *Plan your cuts out in advance*. Careful planning can reduce wood waste and save you some money.
4. Follow the safety instructions for any hand and power tools you use. Wear all appropriate safety equipment, especially eye, ear and lung protection as needed. *The Rosary Shop is not liable for any injury you might experience while or as a consequence of constructing, assembling or using this kneeler. Proceed at your own risk.*
5. Use the right tools for the different parts of assembly. Check the needed tools and materials list before beginning the project. Go slowly and carefully and it will turn out fine. You will find it easier if you have a large, clean well-lit area in which to work. Wood preparation takes approximately 2 hours. Assembly takes another one-to-two once you have all of your tools ready and area prepared.
6. If using a power screw driver or drill to drive your screws, set the clutch so as to avoid stripping out the screw holes. We use Craftsman 15V drills and set the clutches to 11-12. Depending on your drill and wood, you may need a different setting. If a screw strips, back it out and drill another hole for it. You can plug the empty hole later. If a screw head breaks off, place another screw near it (we’ve never had a SPAX screw head break off).
7. There may be points in the assembly where a gentle rap with a hammer will help line things up. If you do this, always place a block against the kneeler and strike the scrap block. Striking the kneeler directly with a steel hammer may dent the wood.
8. We welcome your suggestions for improvement in the design or these plans. Please send such comments to us at *service@rosaryshop.com*. If suggesting a correction, please note the section and paragraph number (e.g. ‘I.7.’).
9. Additional images are available at *http://www.rosaryshop.com/*.

INITIAL BOARD CUTTING AND PREPARATION

PLANE ALL BOARDS AS NEEDED: Finish plane all boards down to final thickness of .75 inches. 1 x 6 should have a width of 5.5". 1 x 8 should have a width of 7.25". If knife marks are visible on the boards and you have a drum sander, it is convenient to run all boards through a drum sander prior to assembly.

CHECK FOR CHECKING: Cut ~1/2" from end of board(s) to test for dry-splitting and to provide uniform board edges for all pieces. If no splitting, proceed to cut board for use. Otherwise, continue cutting until no more fractures. This cut also squares boards and acts as a practice cut during initial saw setup.

CUTTING: Cut the lumber as follows, depending on the model you are making. See the special notes and diagrams for items marked with an asterisk.

Piece	Standard Model	Double Size	Handicap Accessible
1 x 8 x 26" Top	One	One 50"	One
1 x 8 x 16" Side Bases*	Two	Two	Two
1 x 6 x 30" Sides*	Two	Two	Two
1 x 6 x 23" Shelf and Shelf Back*	Two	Two 47"	Two
1 x 6 x 24 1/2" Base Brace	One	One 48.5"	None
1 x 6 x 20" Feet*	Two	Two	None
1 x 6 x 22 1/8" Kneeboard	One	One 46 1/8"	None
1 x 6 x 20 5/8" Kneeboard Support	One (optional)	One 44 5/8"	None

SHELF, and SHELF BACK: Stack two 1x6s and cut both pieces simultaneously so as to get a perfect length match. Rip an optional 10.3 degree miter on one long edge of the shelf back; this is not necessary, but creates a more attractive seam where the shelf mates the kneeler top.

FEET: Again stack two 1x6 boards. The feet can vary slightly in length without problem. Trim corner from feet (45 degree cut, see diagram).

SIDES: Make a 10.3 degree cut on 2 1x6 such that the long edge is 30" and the short edge is 29".

DRILL: Drill sides, bases and feet per diagrams. 25/64" bit is preferred, and will make routing and assembly easier. If you cannot get a 25/64" bit, you can use a 3/8", but this will require *precise* accuracy for all drilling and extra care while routing.

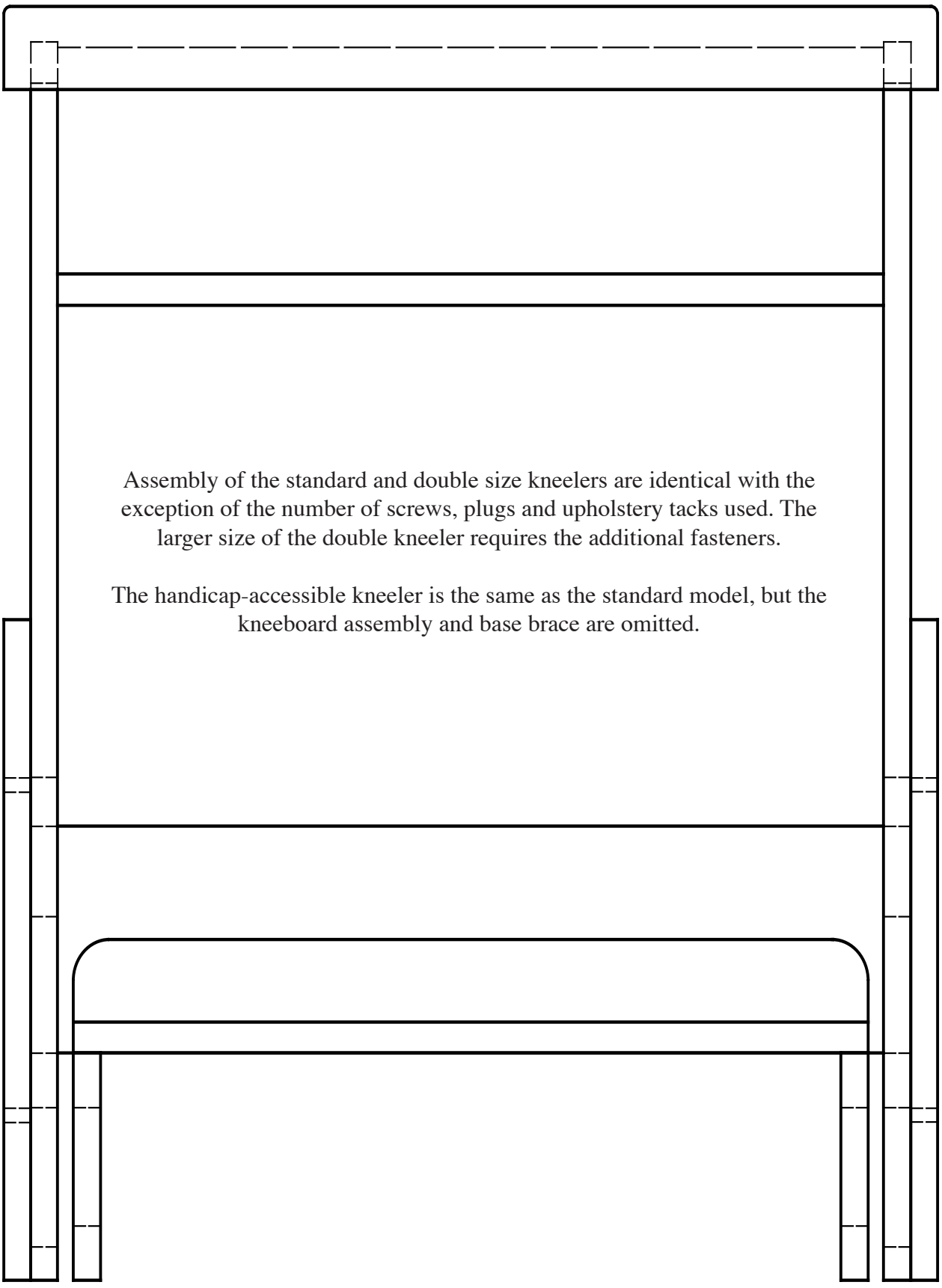
ROUTE: Mark paths and route slots in sides and feet per diagram. Use 3/8" straight bit. If you drilled with a 3/8" bit, your router will likely bind on startup; if the motor is not strong enough, this can damage your router. It can also grab the board, not only damaging the board, but causing serious risk of injury to the tool operator.

HARDWARE PREPARATION (STANDARD AND DOUBLE SIZE ONLY)

Cut threads back on the entire 70mm knockdown bolt. Completely tap two of the knockdown nuts.

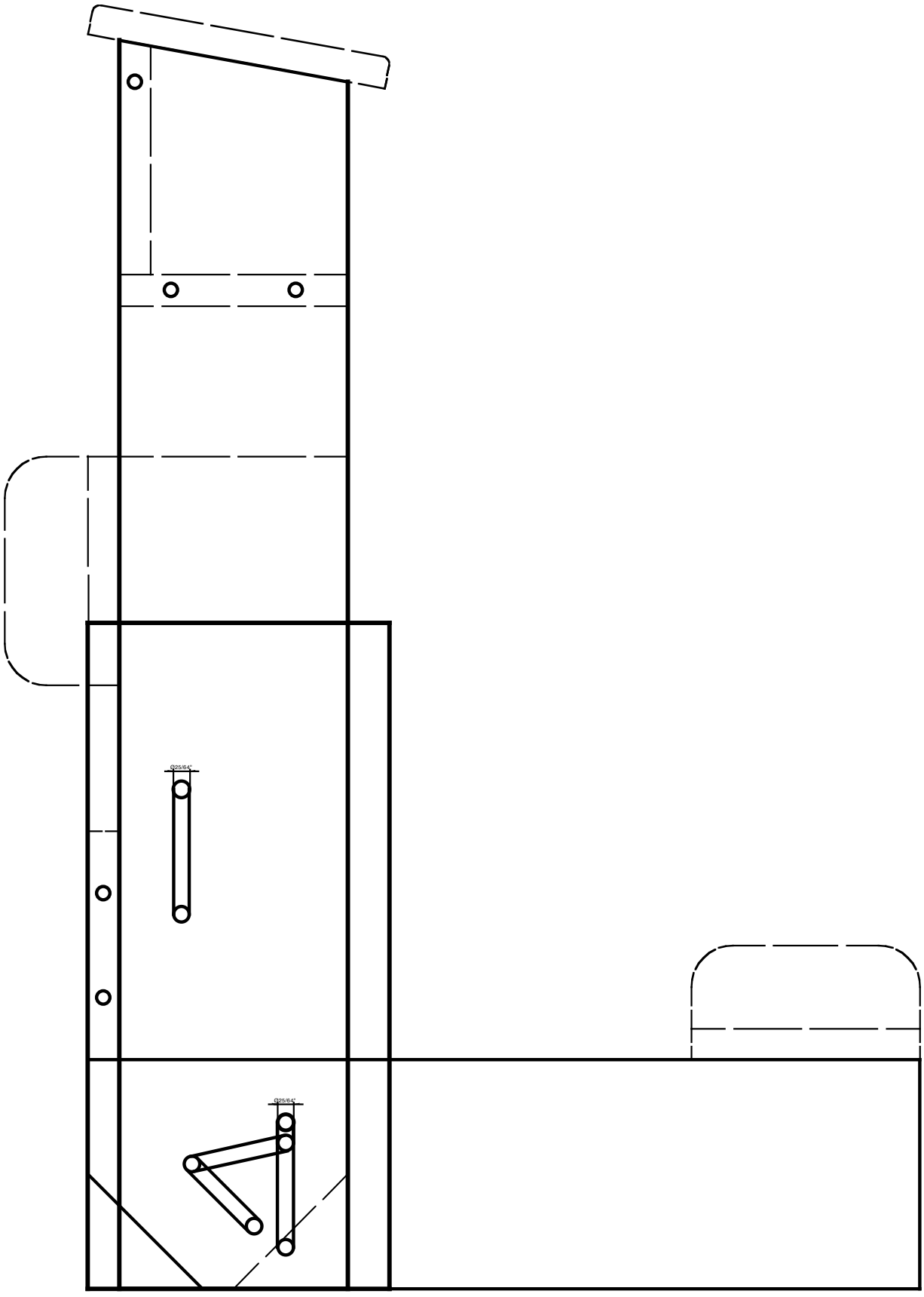
DIAGRAMS

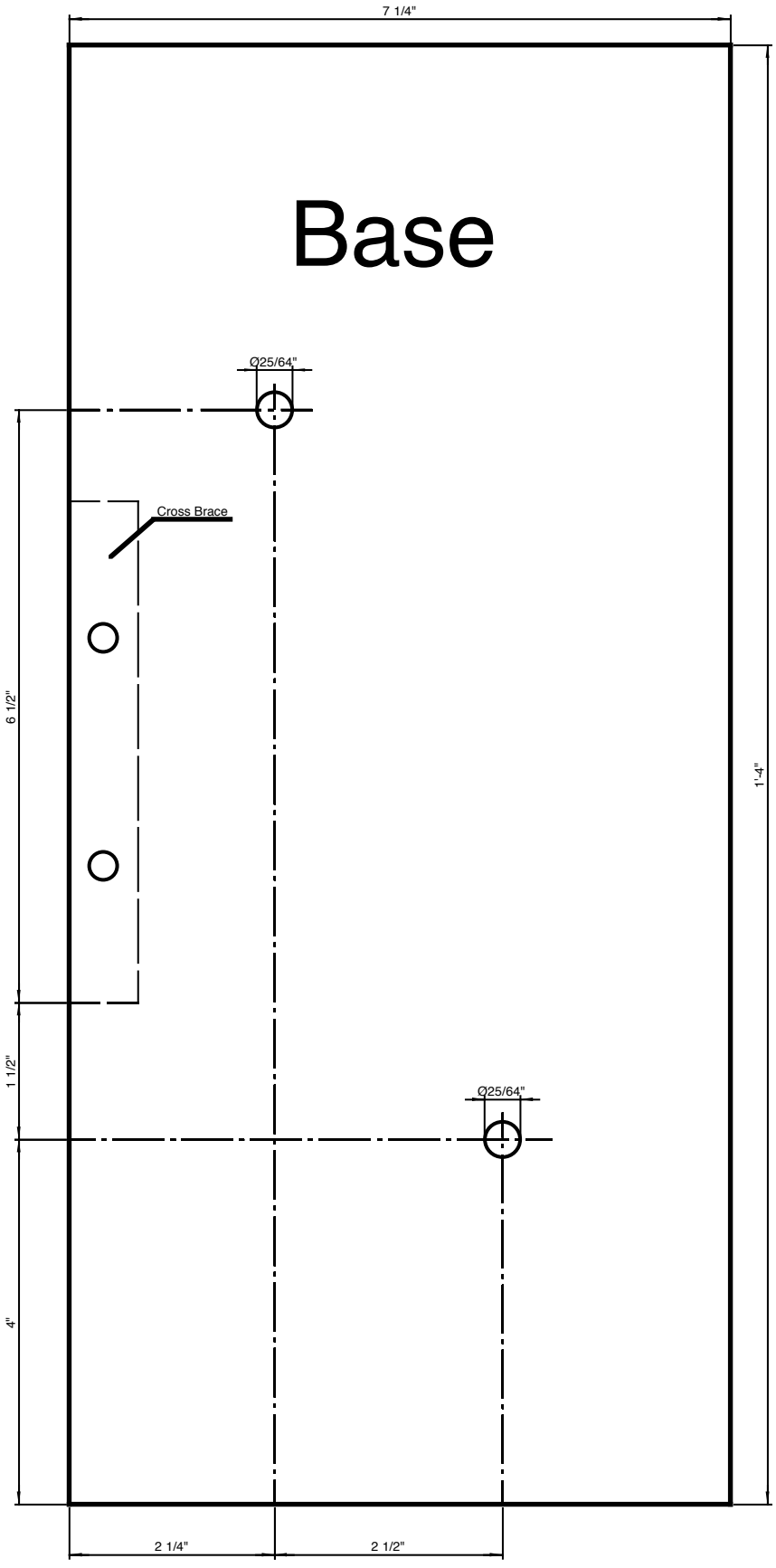
Following are diagrams of the completed kneeler, base, lower half of a side, and the routed area of a foot (other pieces are not diagrammed with measurements because they are simple pieces). The diagrams show the exact measurements required for proper functioning of the kneeler. *If the holes are not drilled and routed precisely, the kneeler might not assemble and function properly.*



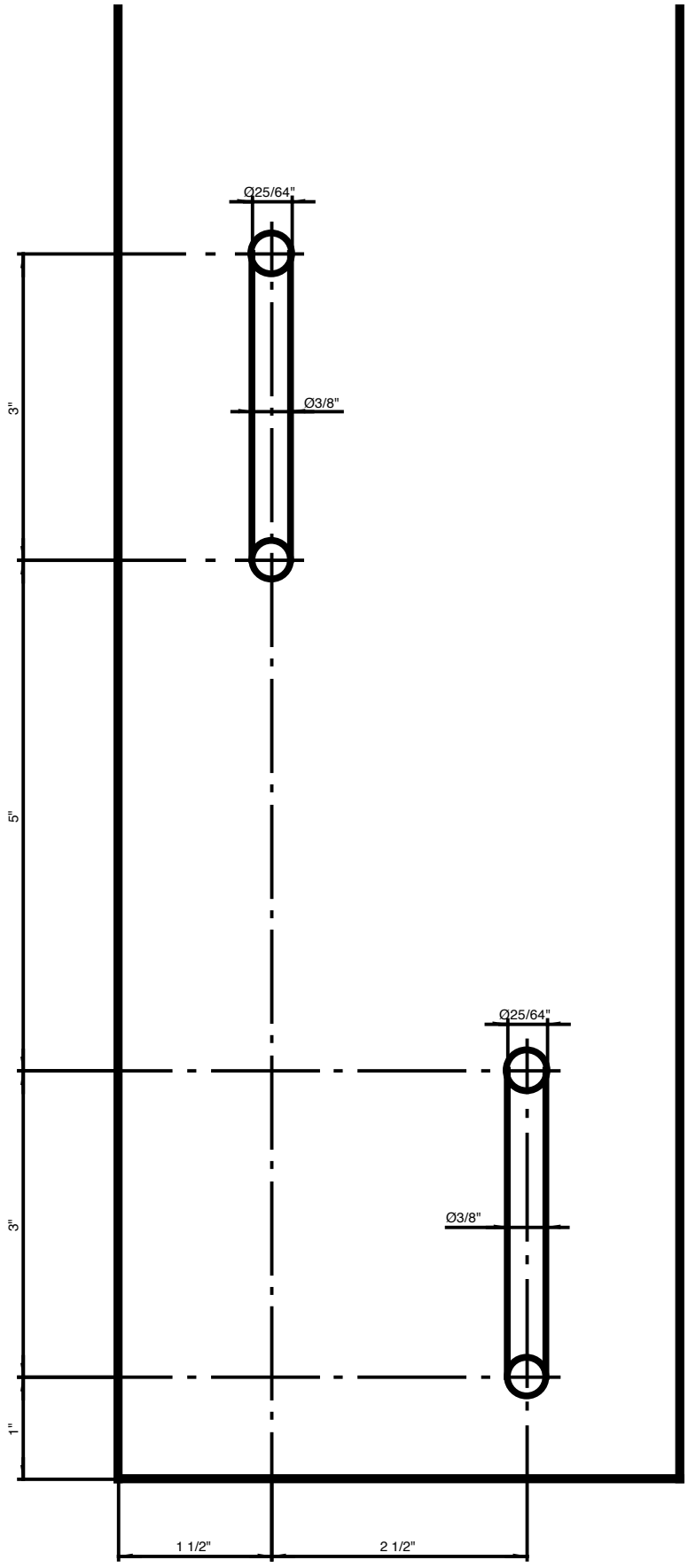
Assembly of the standard and double size kneelers are identical with the exception of the number of screws, plugs and upholstery tacks used. The larger size of the double kneeler requires the additional fasteners.

The handicap-accessible kneeler is the same as the standard model, but the kneeboard assembly and base brace are omitted.


Ø25/64"
Ø25/64"

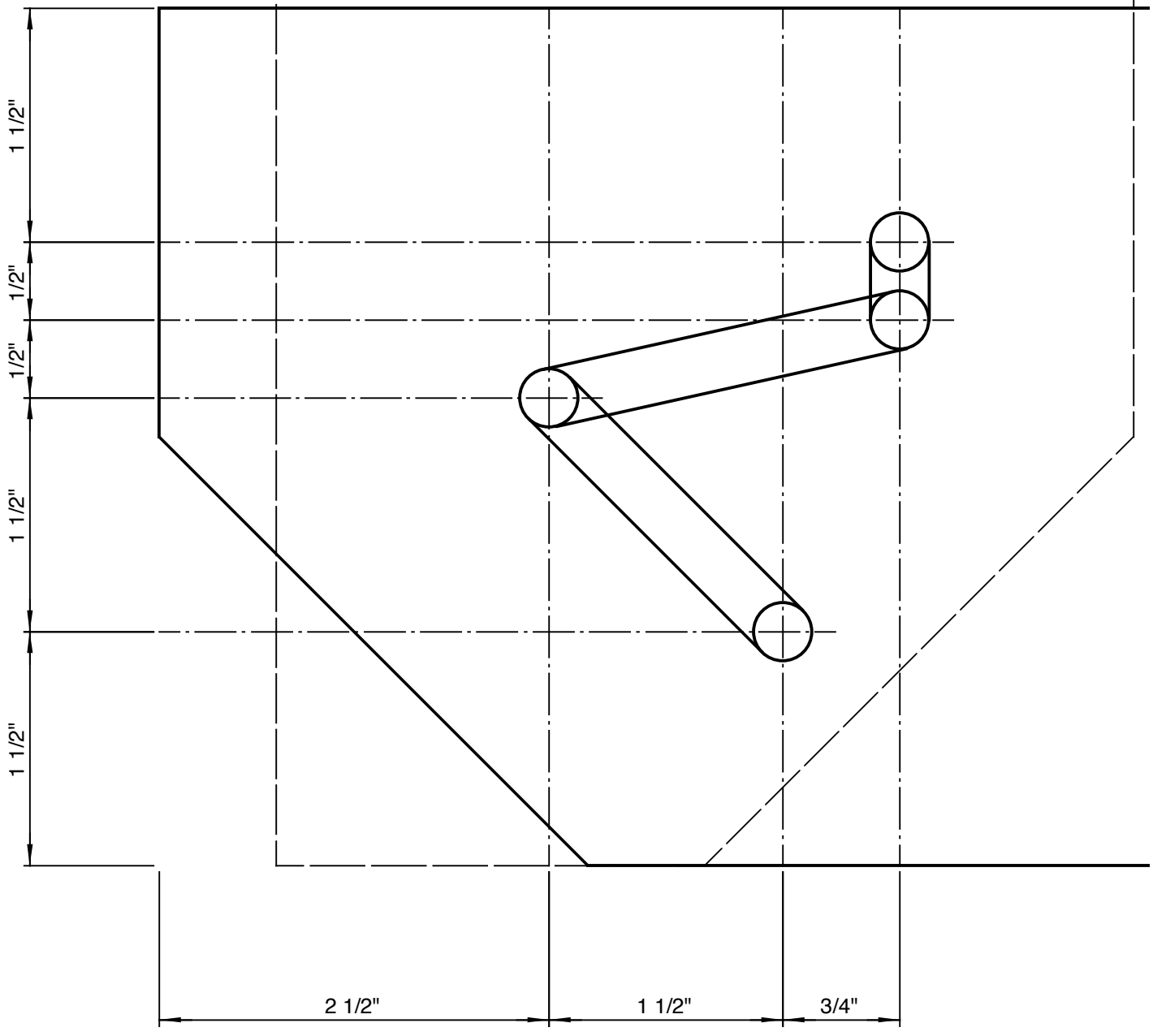

7 1/4"
Base
Ø25/64"
Cross Brace
6 1/2"
1 1/2"
Ø25/64"
4"
1'-4"
2 1/4"
2 1/2"

SIDE
(LOWER
HALF)



CLOSE-UP OF FOOT END SHOWING CRITICAL POINTS FOR ROUTING PATH. THE BEGINNING AND END POINTS OF THE ROUTED PATH MUST BE EXACT AND MATCH THE CORRESPONDING POINTS ON THE SIDE AND BASE.

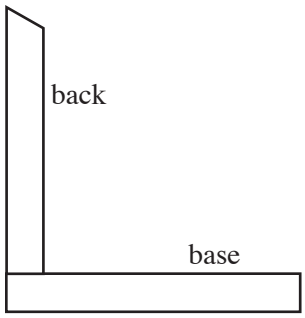
DRILL ONE OF THE HOLES 25/64 AND USE IT AS A STARTING POINT TO ROUTE THE REMAINING PATH WITH A 3/8" STRAIGHT ROUTER BIT.



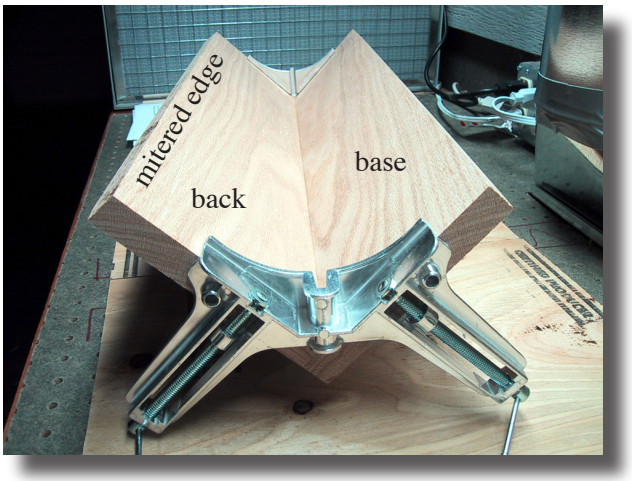
11 SUBASSEMBLIES

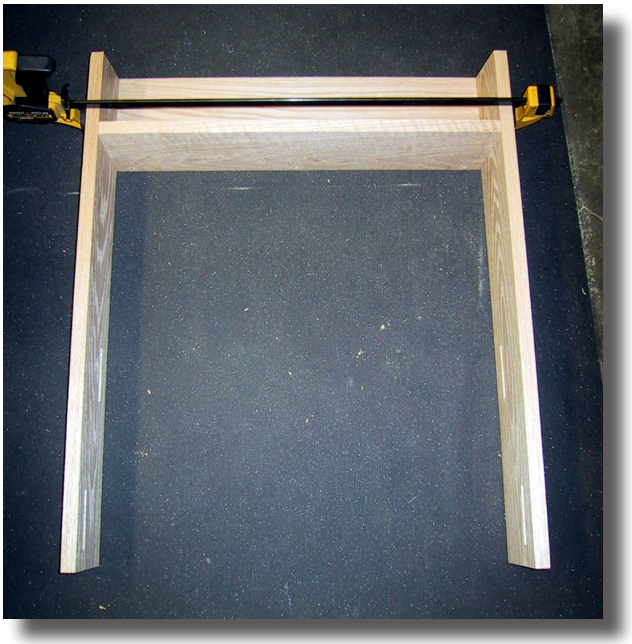
NOTE: These images are of the standard model kneeler. The double-size and handicap-accessible kneelers will require assemby adjustments noted in the text.

1. Clamp shelf to shelf back using 90 degree edge clamps. They are both the same dimensions. The shelf back has a 10 degree miter on one edge to match the angle of the kneeler arm rest.
2. Confirm that they are at a right angle to each other, that the shelf back is resting on the back edge of the shelf base, and that the back edge is flush. If necessary, use the scrap block and bar clamp to correct for any warp in the wood. If you have a mitered shelf back (to match the angle of the top), the miter should angle down towards the shelf base.

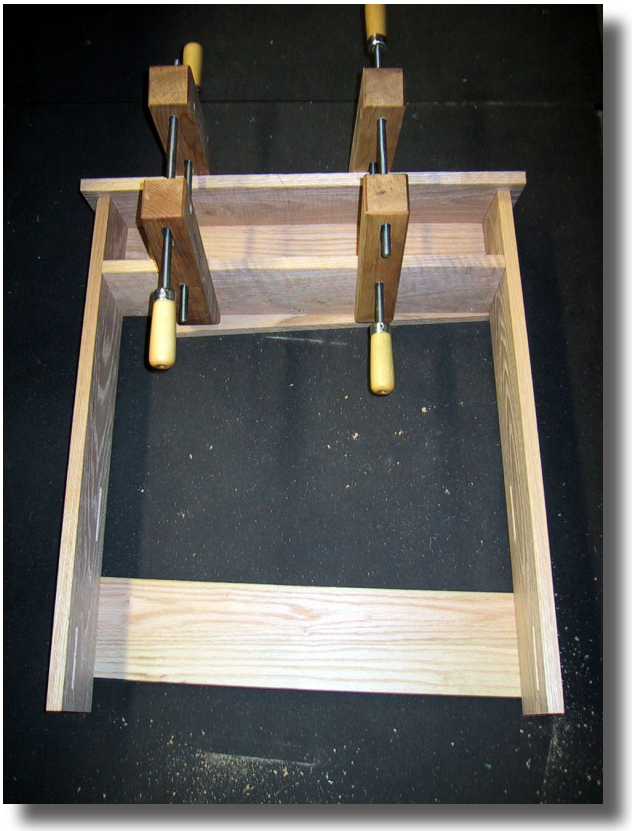


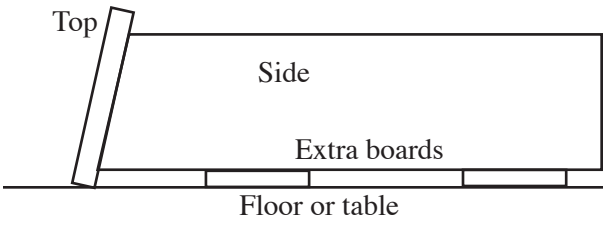
3. Using the #8 countersink bit and #8 x 1 1/2 screws, drill and screw the shelf base to the shelf back near the center and about one inch from each edge. In this diagram we have used additional clamps due to a slight warp in the wood. The double-size kneeler requires additional screws.
4. Lay the shelf on its back on a large flat surface. A floor or large table work well. Place the sides on each side of the shelf and clamp using a large bar clamp. Make sure that the mitered top of the shelf back is flush with the mitered tops of the sides, and that the shelf's back is flush with the long edge of the sides. If the shelf back protrudes above the top of the sides, then the kneeler top will not attach correctly. See the next illustration for another view.



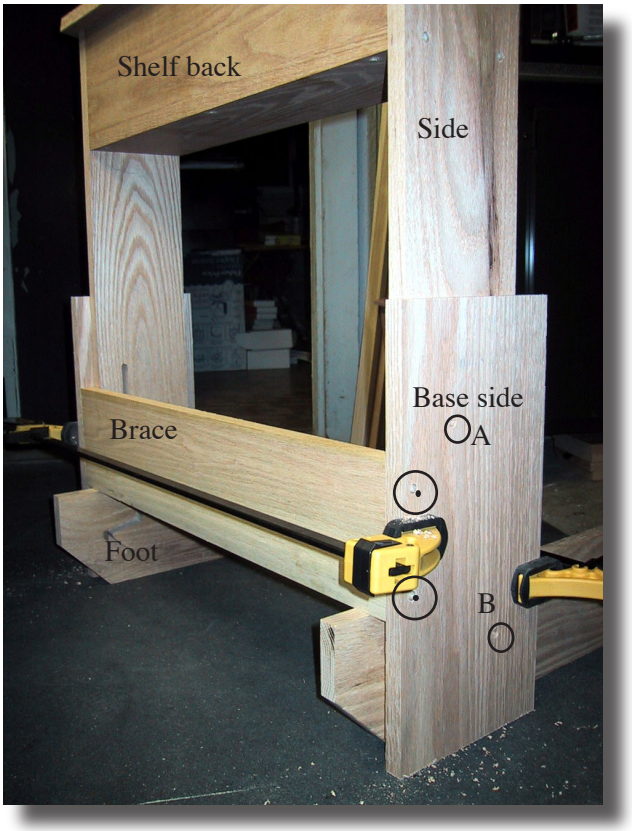


5. Drill and screw each side (three screws on each side). In this image we used a second large clamp to get a better hold and removed our original clamp prior to drilling.
6. If you wish to add any decorative edging to the top using a trim router, this is a good time to do it. You can, however, perform such trimming at almost any point prior to the final sanding.
7. Place two boards under the assembly so that it is level and supported at .75 inches off of the table or floor. It doesn't matter which boards you use as long as they support the assembly and keep it level. Clamp the top to the shelf so that it is resting on the table and centered side to side. We use adjustable jaw Jorgensen clamps, but other clamps will do as long as they are carefully placed.





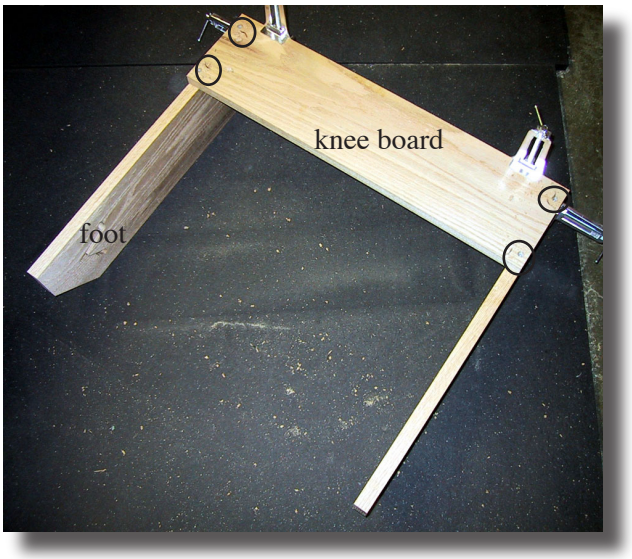
8. Check top placement. It should be centered on top and in full contact with mitered edges of sides. Then drill and screw top to sides (4 screws). Additional screws are recommended along the front edge of the top.
9. Double-check upright subassembly. If anything is amiss, correct it before proceeding.
10. Stand it up, place the feet inside of the side boards so that they extend through the front by at least .75 inches. Rest the base brace on top of the extending portion of the feet and against the sides' front edges. Line up the base sides. Clamp the base sides to the brace. Make sure that all seams are flush and that the bases are square. In this image, we used a second clamp to keep the base sides from spreading. NOTE: The base brace and kneeboard assembly are omitted on the handicap-accessible kneeler.
11. IMPORTANT: Prior to drilling, make sure that you can look into the base side holes labeled 'A' in the image and see clear through the kneeler assembly (the upright sides) and out the other base side holes. If you cannot, then the base side(s) needs to be flipped and/or rotated 180 degrees. You will also be able to see clear through hole 'B' if the folding feet are perfectly aligned. In this image, the feet are extending about 1 1/2" beyond the brace being attached. This is fine for the purpose of attaching the brace at the correct location, but we cannot see through hole 'B'. Were we to scoot the feet back so that their ends were flush with the front face of the base, we would be able to see through hole 'B'.
12. Drill and screw the brace to the base sides (2 screws on each end).
13. Double-check the base subassembly. Make any necessary corrections or adjustments before proceeding.

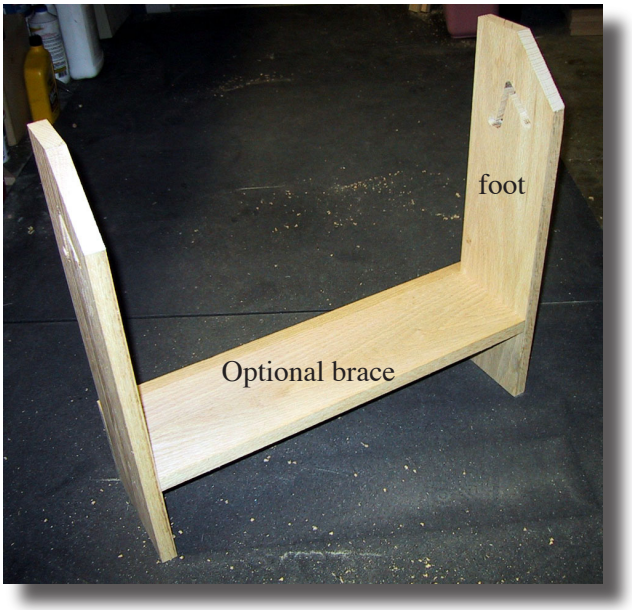


14. Clamp knee board to feet using the right angle clamps. Make sure all is square and flush on the edges. Drill and screw (4). The knee board assembly is omitted for the handicap-accessible bench. Additional screws are recommended if making the double-size kneeler.
15. If comparing to its placement in the kneeler, there SHOULD be some space — about 3/8" — between the feet and the upright sides. This allows for hardware installation and folding of the feet.
16. If you wish to install the optional kneeboard brace, do so anywhere underneath the kneeboard, itself. In this case, we placed it flush with the front edge of the kneeboard. This brace requires 3+ screws to install. At least one screw should go through each foot and the knee board into the brace.
17. Double check all subassemblies.
18. Plug holes using the wood plugs, a small amount of wood glue, a scrap block of wood and a hammer. Gently tap the plugs into place. Not all plugs and countersink bits are created equal. If you find that these plugs are too small, larger ones can usually be found at your local hardware store. You can even make your own with the right bit (we do for our assembled kneelers, but a good #8 plug bit is hard to come by). If the plugs are too large, you can either sand the small end to get them to fit, or you can purchase smaller ones. If you are installing a kneepad or armpad, there is no need to go through the trouble of installing plugs at those locations. If you need to remove a plug (before the glue has dried), this is easily done by drilling a small pilot hole in the plug, screwing in a wood screw and pulling with pliers.

III. FINISHING

1. Trim the plugs using a sharp wood chisel, taped hacksaw blade or a simple sanding block. Be careful not to damage the surrounding wood.
2. Fill any dents or scars in the wood using a suitable wood filler that will accept the stain you plan to use. We use Famowood filler.



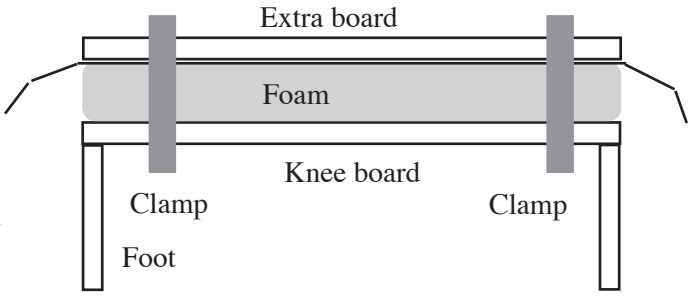


3. Sand 150/220, removing rough or sharp edges, glue, pencil marks, burrs, planer marks, saw burns, scratches, etc. It cannot be overstated how important it is to be thorough at this point. Any imperfections left on (or added to) the wood during finish sanding will be amplified when the finish is applied. You should be able to run your hands over the entire kneeler without feeling any rough spots, seams or plugs. Be sure to remove all glue from around the plugs, as it will show under most finishes if left on the wood. A good random orbital sander is a time saver. Some areas like the inside of the shelf will need to be sanded by

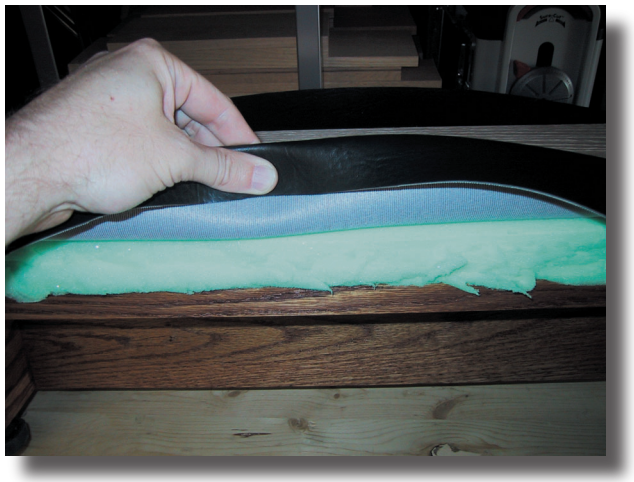
hand because a power sander will not fit into them.

4. Wipe the entire surface with a tack cloth to remove residue and dust.
5. Stain all subassemblies per the directions provided with your finish. We have had very good results using Watco Danish Oil finishes, but many others will work well.

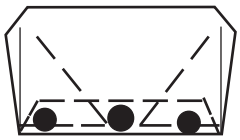
IV. KNEE PAD



1. Center the foam and kneepad fabric on the kneeboard. Place a scrap board on top and evenly clamp down, making a 'foam sandwich.' Pre-compress the foam against the board to about half of its original thickness.
2. Check to make sure that it is evenly compressed and that the fabric has remained centered. You should be able to pull the upholstery down and tuck it up under itself at least 1/2 inch. If the foam is sticking out at any point, shove it back in so that it does not interfere with tacking the vinyl.
3. Beginning in the middle of a long side, gently pull the fabric against the edge of the knee board, folding excess fabric inside and back against the foam. The folded edge of the vinyl should be even with the bottom edge of the kneeboard. Hammer an upholstery tack. This is easiest with a small tack hammer.
4. Do the same at each corner. Then place a tack evenly between each corner tack and the center tack. Now place a tack between all tacks. You will end up with nine tacks down one side. Repeat on the opposite side.
5. 25 tacks are provided. 24 are needed to place three in each end and nine down the long sides. If you need or desire additional tacks, they are available at most fabric and craft supply stores.
6. Fold the ends in like wrapping the end of a Christmas present. First fold in the sides. Tuck the end straight down and up between the folded in sides and the foam.
7. If you have a padded arm rest, just follow the same procedure.



More knee pad assembly photos...



End view of upholstered knee board. Dotted lines indicate hidden folds under the upholstery.

V. FINAL ASSEMBLY

1. Slide the upright assembly into the base assembly. Insert the 35mm knockdown bolt and nut using the provided allen wrenches.
2. Slide the kneeboard into its down position. From the inside screw the 70mm bolt through the routed V slot, through a the tapped shoulder nut, through the side board slot, the base, and into another nut. If making the handicap-accessible version, use a 35mm bolt and nut instead of the 70mm.
3. Using a hex wrench, turn the outside nut while holding the threaded nut with your other hand until the threaded nut is pulled down tight against the side board. (If you ever need to adjust the height of the kneeler, place it flat on its front, loosen these respective nuts and bolts, slide it to the desired height, and re-tighten as above.)
4. Attach felt pads per the diagram.