

# PLANS: materials list



Here's a materials list with everything you need to follow the plans. I'll explain in more detail later, but the easel I built will hold a 7' tall painting, has a 4' wide shelf and stands about 7 1/2' tall total.

## Wood:

- (8) 2x4, 8' pine
- (1) 1x2, 8' poplar
- (1) 1x2, 2' pine
- (1) 1/2" hardwood dowel

## Hardware:

- approx. 50 3" all-purpose phillips coarse thread screws
- (1) 3/8" thumb screw (about 1.5" in length should do)
- (4) 3 1/2" door hinges with screws
- (4) lockable wheel casters (2 1/2" diameter)
- (2) 4" long, 1/2" diameter carriage bolts
- (6) 1/2" washers
- (2) 1/2" hex lock nuts (nylon insert)
- (2) 4" long, 3/8" diameter hex bolts
- (2) 3/8" washers
- (2) 3/8" wing nuts
- (1) 3/8" square nut

## Tools:

- smallish crosscut hand saw
- backsaw w/ mitre box
- dovetail saw (optional)
- 1/2" wood chisel
- phillips screwdriver
- adjustable carpenter's square (with bubble level)
- tape measure
- power drill w/ bit set (up to 1/2")
- jigsaw with wood cutting blade
- a table or bench to construct on
- some clamps

Below you'll find the plans to the easel I built, with all the lengths, dimensions, etc. However, as we go along, I'll point out what you need to do to extend this design to suit any size painting.



fig. 1: side angle



fig. 2: front angle

Above are pictures of the finished easel and its supporting measured drawing below. I will stick with this format throughout the site. The diagrams are fairly self-explanatory, but let me explain the few possibly confusing things. In figure 4, notice where it says 'chisel for ctr. support'. If you look at the photo above, you may be able to tell that the center support (1x2x7.5) is actually sitting inside of the bottom horizontal brace, so that its face is flush with the brace. Here's a closeup of the front of the bottom brace:



fig. 3: bottom brace with chiseled center support recess

This is essential so that the adjustable shelf, which isn't attached to that center support in any way, lies flush against it. This way, if you have a painting which is narrower than 3 feet, it can simply lay against the center support. Also notice the spacers in Fig. 5. These are narrower than the center support so that the top clamp can easily slide up and down the center support (more later).

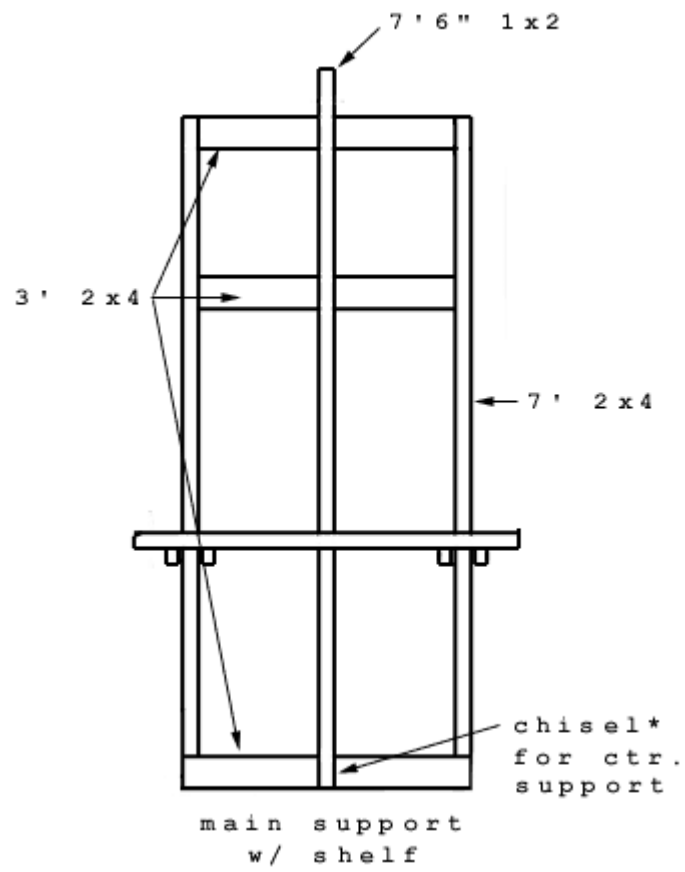


fig. 4: front angle (measurements)

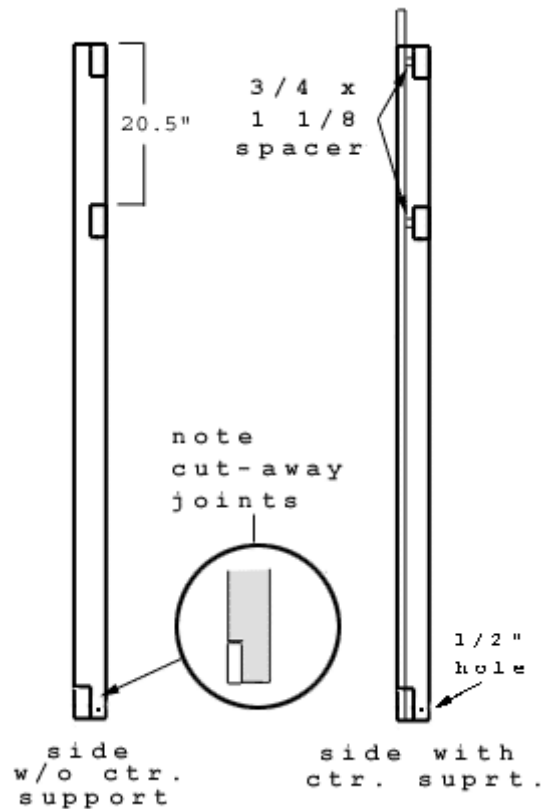


fig. 5: side angle (measurements)

All of the lengths of the pieces for this section of the easel are listed in the drawings above. All pieces are screwed together with No. 8 x 3" screws (as listed in the [materials list](#)). Make sure you drill pilot holes for each screw before you drive it... something like 3/32 should do it. You might want to experiment on a test piece first.

Notice the joints--I've cut out pieces of the vertical supports to hold the horizontal supports in place. The top two supports are attached on the back half of the vertical supports so that the shelf can slide freely up and down the vertical supports. See the close-up drawing in Fig. 5 or look closely at the joints in the easel pictures.

NOTE: This is the piece you want to modify if you want this easel to hold taller paintings. Essentially all you need to hold a taller painting will be a taller center support. Simply change the 7'6" support to whatever height you want. However, if you think you will go \*much\* higher, say 10'+, you might want to consider increasing the length of the whole piece by extending the two outside vertical supports as well.

Below are plans for the simple, yet functional easel base.



fig. 1: side angle



fig. 2: front angle

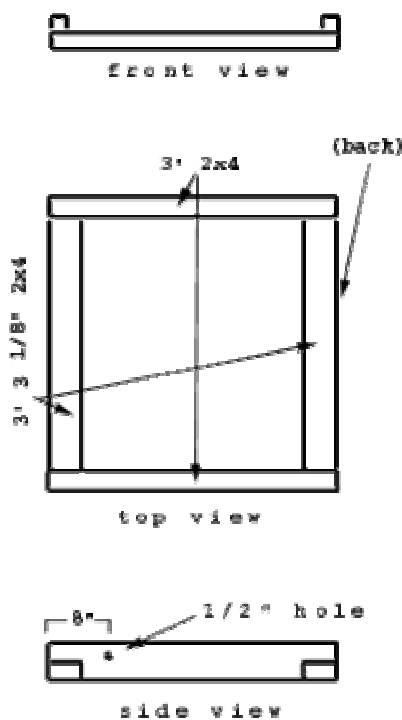


fig. 3: front/top/side angle (measurements)

The base is very simple to build. Its side pieces are 3' each and attached in a tall orientation. Its front and back are 3' 3 1/8" each in a laid-down orientation. The extra length on the front and back is so that the distance between the two side pieces is large enough to accommodate the 3'-wide frame in addition to a bit of wiggle room for a couple washers. Notches are cut into each side piece to accommodate the flat front/back pieces (see side view). One hole is drilled on each side piece, 8 inches back from the front of the base. This hole will accept a 1/2" x 4" hex bolt w/ washers to bolt the main support to the base. By using a bolt here, the main support's angle is adjustable (and secured with the back-side slot setup--more later).

Not much more to it than that for the base. The locking casters will attach to the bottom of this piece, but I put those on last. Not sure if that made the most sense, but I didn't want the thing rolling around while I was trying to put it together. For the casters, I used 2 1/2" tall locking casters and some wood screws to screw them directly into the base on each corner. You need to make sure they are close enough to the corners so that you can get at the locks with your feet. In hindsight, larger casters might have been a better choice.

The rear supports allow you to tilt the angle of the main support to a comfortable position. By loosening the two wing nuts, you can adjust the angle from 90 degrees (straight up) to 45 degrees back, to even a little forward (i.e. 90+)--good for pastels..



The rear supports look more complicated in the diagrams than they really are. Each support basically consists of two 2x4's, one slotted and one with a bolt that slides in the slot. By tightening the wing nut on the bolt, you can set the adjustment where you want.

fig. 1: rear supports

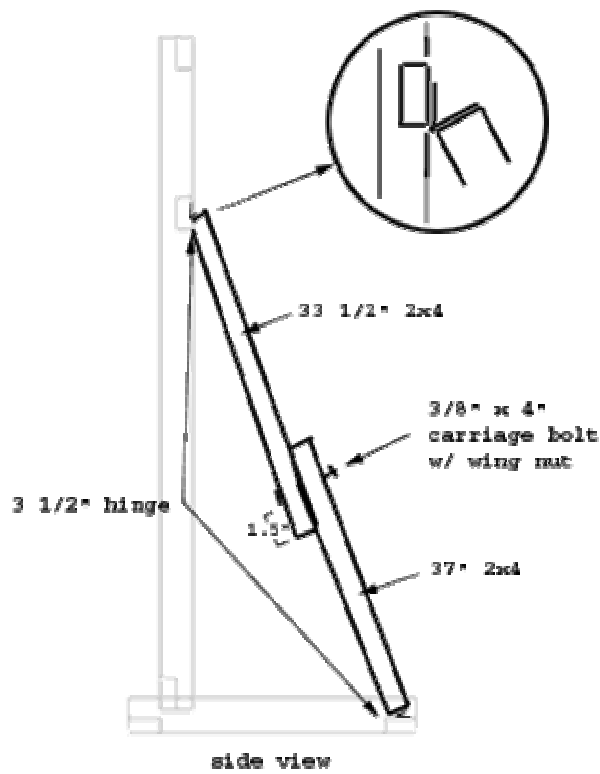


fig. 2: side view of rear supports (measurements)

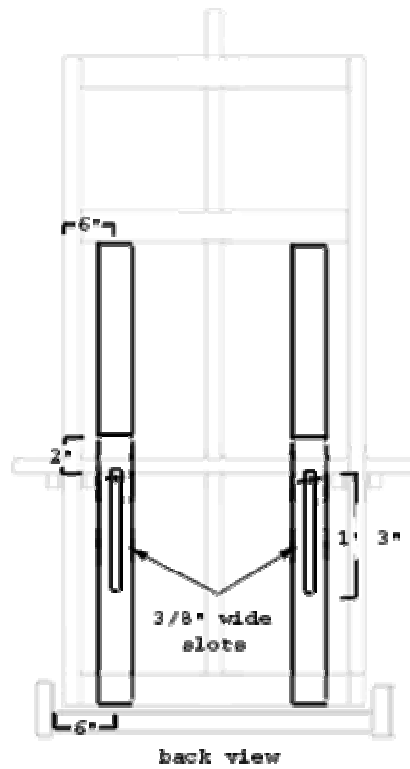


fig. 3: rear view of rear supports (measurements)

Cut two 33 1/2" 2x4's and two 37" 2x4's. 1.5" from the end of the 33" 2x4's, drill a 3/8" hole in the center. This hole will hold a 4" long, 3/8" diam. carriage bolt. The carriage bolt has a square bit under the head so that it digs into the wood. This enables you to tighten the wing nut w/o having to hold onto the other end of the bolt. Kind of like embedding the bolt into the wood. On the other end of each of these pieces, attach one side of a 3 1/2" wide hinge. This hinge will eventually get attached to the appropriate brace on the main support.



fig. 4: rear support detail (front)



fig. 5: rear support detail (rear)

In the 37" 2x4 you will need to cut a 1' 3" long slot which is 3/8" wide. This is the slot that the carriage bolt will slide through when you adjust the angle. I cut this slot using a jigsaw (also called a scroll saw). First, mark the beginning and end of the slot. Using a 3/8" drill bit, drill a hole at the beginning and end of the slot. This will give you a starting and ending point from which to insert the jigsaw blade. Draw an outline of the slot between each hole so you have a guide and saw out the slot. I found this a bit tough (hadn't used a jigsaw before), but as long as you don't go way outside the lines, you can always fix it up. Once you've drilled out the slot, take a 3/8" bolt and slide it through the length of it to make sure you have sufficient width along the entire length. (Those with routers already know how easy this will be for them).

Steve Baird from Australia sent in the great suggestion of clamping down another board to act as a guide for the jigsaw to ride against. He says "simply measure the distance between the blade and the edge of the base on the saw to calculate the position to clamp the guide. Don't forget to allow for the width of the saw blade. If the rear support is not wide enough then clamp another piece of timber next to it to support your guide."

Attach another hinge to the bottom of this piece, in the same manner you did to the top piece. Leave the assembly until we've completed a few more steps.

The adjustable shelf is just that; it allows you to change the height at which the painting is supported; both to allow accommodate large supports, as well as to provide a comfortable painting height for sitting and standing.



fig. 1: shelf front angle

Admittedly, the shelf design is a potential weak spot in my design. It doesn't slide up and down as easily as I would like. Once you get the hang of it, it works. This is really the part that could benefit from some higher-end tools. If you look at easels in stores, you'll see the shelf design either utilizes wood cuts that you can't do by hand or specialized metal components. I will say one thing for my shelf, though--its is VERY sturdy. I figure with huge paintings, I also won't be raising and lowering all the time either. If someone has an improvement on this design that can be made with (or without) fancier tools, I'd be happy to include it here.



Others who have built this easel have tried various modifications of this shelf design. One person used joist hangers to support the shelf. Another put a slot in the main support and tightened the shelf into place, like I do with the rear supports. See the [gallery](#) for more on these modifications.

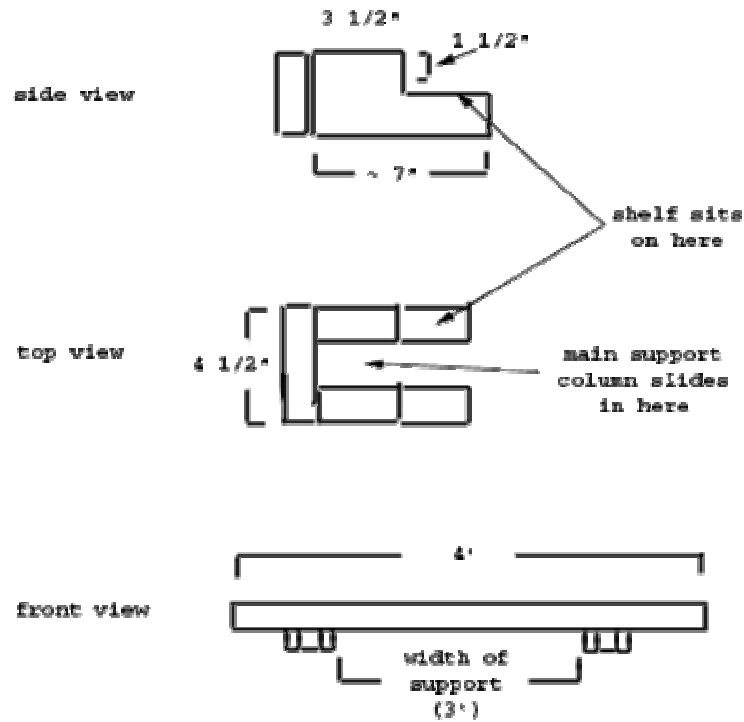


fig 2: shelf diagram (measurements)

The shelf is made up of two identical U-shaped pieces which attach to the shelf itself. The shelf is a simple 4' 2x4. Each U piece wraps around the vertical outer pieces of the main support (see figure 3). The best way to measure up this piece is to lay the pieces up against your actual support and mark the pieces so they fit just right. However, my measurements should be close and give you a starting point. The idea is to make the center gap \*just\* the width of the main support piece, so that the U piece can slide firmly up and down the support.

The order to build this is to build each U-shaped piece first. Then, once you have those done, put them in place on the main support, lay the shelf on and try it out while holding the shelf and U-pieces together with your hand. If it's satisfactory, put a couple screws in each shelf while its actually in place (at his point, you have no other way to actually get the shelf on the thing).



fig 3: shelf support detail (rear)



fig 4: shelf (up)

The final piece of the shelf system is the shelf support rods. Each side of the shelf is locked into place by placing a 1/2" diameter dowel rod into a pre-drilled hole along the main support (see Fig. 4). The holes are drilled in the face of the main support and each hole is 2" apart, and centered horizontally. The holes are 1/2" in diameter. Drill them up as high as you want the shelf to go. This does hold the shelf very sturdily in place.

I borrowed a tool called a 'dowel-cutting jig' to drill the holes accurately. The jig is basically a clamp with a guide in it. You set the guide where you want (in this case, so that the center of the hole is in the center of the support), clamp it into place, and drill away. This helped me keep each hole nicely lined up. You could do this w/o, but if you can borrow one of these things, it makes it easier. They cost about \$30 (too much for one use), but my dad had one in his basement he hadn't used in 30 years that worked perfectly (and the pricetag on the box was \$6!).

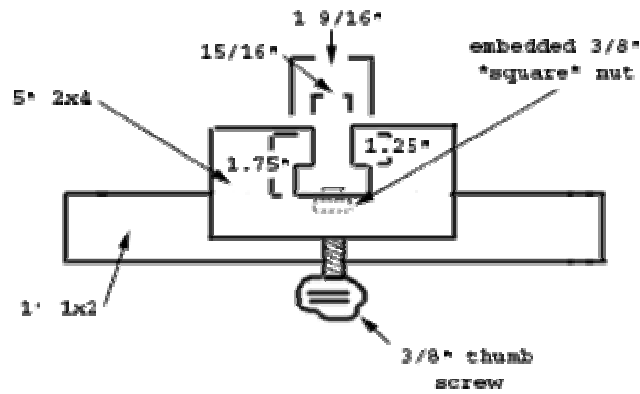
Finally, cut a couple pieces of 1/2" dowel and slip them into place.

The top clamp allows you to clamp down a canvas once it's on the shelf. This keeps it from flopping around or falling forward. The way I did it, the clamp is a bit tricky to make, but not too bad. One could easily substitute multiple pieces instead of cutting out the 'T' shape like I did (as Pat B. --see the [gallery](#)).



fig. 1: clamp (front)

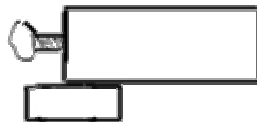
The clamp is made from two pieces; a 5" 2x4 and a 1' 1x2. The 2x4 has a "T" shape cut out of the back of it (see Fig. 2). The top of the T slides down the center support, and thus is just a bit larger than the 1x2. The skinny part of the T is about 1" wide, just a bit wider than the spacers that sit between the center support and the horizontal braces on the main structure.



top view



front view



side view

fig 2: top clamp diagram (measurements)

To cut the slot out of the 2x4, I cut a  $1 \frac{9}{16}$ " cut all the way back 1.75". Then, I used a my jigsaw to rough-cut the larger portion and finished it off with a chisel (see Fig. 3). Not easy and takes some to get it to fit, but it works. Then, in the center of the back of the cut, you need to chisel out a square hole \*just\* big enough for a square  $\frac{3}{8}$ " nut. This nut is what the thumb-screw screws into. It's square so that when you turn the screw it doesn't also turn the nut (the square nut stays firm in its square hole). Finally, drill a  $\frac{3}{8}$ " hole directly into the center front, through to the newly-cut opening.

To finish it off, glue the 1x2 to the bottom of the 2x4 as shown, screw the thumbscrew into place and you're set for the clamp.

Note that it's really best to measure against your exact pieces here, instead of following my directions. Hold the 2x4 up against the center support and draw around it. Do the same with one of the spacers behind the center support (or measure if you can't get to it). My measurements should work for you, but you'll get a better fit if you measure against the actual pieces. This piece works best if it really \*just\* fits. That way, you can raise the clamp and don't have to tighten the screw just to keep it up for a minute while you raise the shelf, etc.

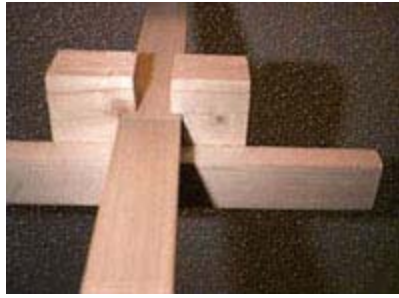


fig 3: clamp cutout detail (rear)

As an aside, I should say that my first clamp finally broke one day. While wood glue will fix it up just fine, the point at which it broke is in the middle where I had cut out the most wood. For this reason, I highly suggest trying the multiple piece design illustrated so well by Pat B. in her photos in the [gallery](#).

You now have all the pieces and can put the whole thing together!



fig. 1: side angle



fig. 2: front angle

If you want wheels, now is the easiest time to add them. Turn the base over and lay it on the floor. Get your casters, line them up on the edges of each corner and screw them in.

Now you need to screw the main support into the base. You'll want the easel against a wall, or actually, a doorway works well, so you can get behind the easel easily. This way the main support has something to rest on. Take your 4" x 1/2" bolt and stick it into the hole so it just pokes through the other side of the base. Then get one of your washers and hang it on the bolt so that it obscures the bolt. Then you can slide the main support into place. Wiggle around a bit and you should be able to get the bolt all the way through the main support. On the other end, place another washer, and then a 'locking' hex nut. The locking nut 'locks' because it has a bit of nylon on the outer end, which gives it some good anti-slip once it's on (you can still remove it if you need to). Lock-tight or other similar products would work here as well. Follow the same procedure for the other bolt on the other side.

Now you want to add the rear supports. If you followed the directions previously, you have hinges screwed to the supports already. Now you need to screw the other end of the hinge into the appropriate place on the base for the 37" pieces, and the second horizontal piece on the main support. Look back at the diagrams in '[rear supports](#)' if you don't remember (the placement of the hinges is presented there in fig. 3). Once you have the hinges screwed in, you can put the carriage bolt of each top piece into the slotted bottoms pieces--add a washer and your wing nut.

If you didn't actually screw on the shelf before, now's the time to do it. Place the U-shaped pieces around the vertical pieces on the main support. Place the shelf into place--measure each side to make sure you have it centered, and put a couple screws on each side to screw the shelf onto the U-shaped pieces.

If you haven't already, go ahead and slide the clamp onto the center support...

**CONGRATULATIONS!!!!**

You should now have a fully-functional, massive, heavy-duty easel to provide a lifetime of painting support. All for less than \$100 in materials. If you are so inclined you could even stain and varnish it at this point. I didn't bother since it's going to (already is, actually) get covered in paint anyway.