

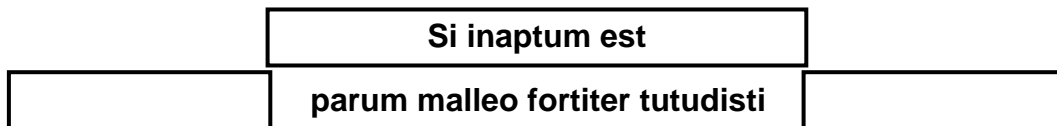
# How to Build a Platform



## An Illustrated Guide

by **Ben Teague**  
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### Amateur Theater Division



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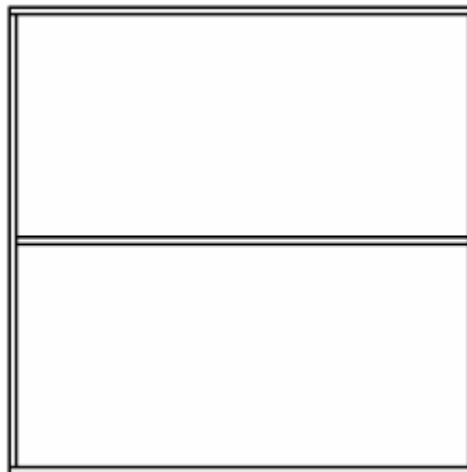
**June, Year 3**

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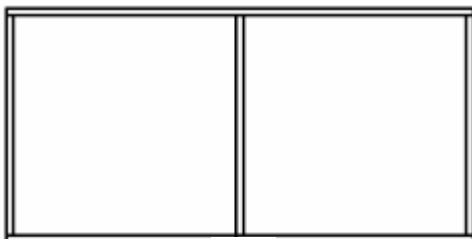
## Building a platform

As in the case of flats, there are a lot of things to keep in mind when creating a standard platform. This paper will take you through the steps of building the platform and affixing legs to make it taller.

The illustration at right shows the frame of a standard 4'x4' platform as viewed from above (only the frame; the top will go on later). The frame comprises two rails 4'0" long (horizontal at top and bottom), two that are not quite so long (vertical at left and right) and one that's the same length but runs horizontally. The pieces are arranged this way so that when we finish we won't have all the screws running the same way.



Town & Gown began using 4x4 as the standard size a few years ago. It had been 4x8, but those big units were killers, and not as versatile as the smaller size either.



At left you see the frame for a half-size platform, 2x4. There's an important difference in that all the screws in this unit *do* run the same way. It can't be helped.

We build these frames from 1x6 lumber and connect the parts with 2" sheetrock screws. The tops are 3/4" (really 23/32") plywood, also attached with 2" screws. The frame pieces must be fairly straight and free of defects that will rob the unit of strength. Because people in the audience don't get a square-on view of the platform, the plywood top does not need to be high-grade material; we commonly use "CDX" grade, which shows knots. From time to time a clever person suggests using Oriented Strand Board for the tops; OSB is about as strong as plywood and a little cheaper. We have not tried it, for two reasons: Plywood, like dimension lumber, heals; that is, screw holes don't turn into craters or disfiguring marks after you draw the screws. OSB is not as forgiving in that respect. And the edge of a piece of plywood—the part the audience *does* see—will stay presentable longer than the crumbly edge of a sheet of OSB. This may all change.

Glue or no glue? There are good reasons for using the glue-and-screw technique when building platforms. In addition to strength, we need quietness in these units. They should not flex and grind when the Talent walks on the top. Glue helps. A thin bead of Elmer's white (or, better, brown) glue in every joint will keep the platform from speaking during the several years it will be in use. The main drawback to glue is that it makes the joints slippery for a crucial 3 minutes during assembly. I'll show you how to clamp the pieces together to control them. Glue also bars disassembly of the platform and reuse of the materials; usually that is not a problem.

**Bill of materials** for a standard 4x4 platform:

1x6 – 8’ “Number 2 or better” lumber (see note below), 2½ sticks  
 Plywood, 3/4” (23/32”) CDX, ½ sheet  
 Glue and glue brush  
 Drywall screws, 2 inch, approx. 3 dozen

**Note on lumber selection.** Pick on these criteria, most important first:

Straight (no warps, bows or twists)  
 No splits  
 No weepers (sap on the wood surface)  
 Few ugly knots  
 No abrupt changes in grain direction (which will soon become splits)

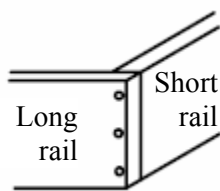
**Tools needed:**

Circular saw (miter saw too, if you have access to one)  
 Protective goggles or spectacles  
 Screw gun with pilot and countersink drill and Philips screwdriver tip  
 Clamps  
 Square  
 Steel measuring tape

**Step 1, always the slowest step:** Cut the frame pieces and top. Set the top aside and lay out the frame members in roughly their final places.

## Cut list:

1x6, 4’0” — cut 2  
 1x6, 3’10½” — cut 3 (adjust the length if your frame lumber is thicker or thinner than ¾”, which it may be)  
 Plywood, 4’0” x 4’0” — cut 1



Take one long rail and one short rail and hold them together temporarily. If the long rail is left-to-right in front of you, the short rail stands behind it and points away from you. Drill pilot holes through both members and countersink them. Don’t omit this step; you may get away with it, but more likely the end of the long rail will split and feather and it will be hard to produce a tight joint. Three holes will be about right. Draw a line (imaginary if you like) ⅜” from the end of the long rail and position the holes quite near the line, and be sure you are drilling the pilot holes straight into both pieces of lumber. Please make sure the tops of the frame members are flush to each other when you lay up the joint.

Now apply a light coat of glue to the end of the short rail, reassemble the joint, square it up, and drive the three screws. You must bring the two pieces of wood into solid contact; an air gap now will mean tearing down and rebuilding the platform later. Wipe off excess glue that oozes from the joint and proceed to the next corner.

The drawing at right shows how to use a pipe clamp to immobilize the slippery joints while you drill the holes and drive the screws.

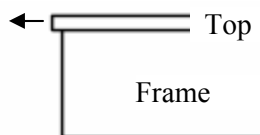
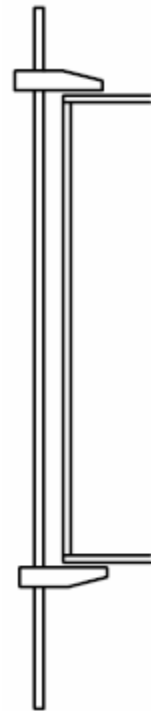
Don't drive yourself crazy trying to keep the frame precisely square in the early going. The top will cover a multitude of sins.

**Steps 2 to 6:** Assemble the other five joints in the same way. The odd rail should be centered inside the frame.

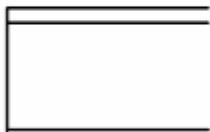
If your lumber is not consistent in width—this does happen sometimes—make a mark to show which way is up. Any discrepancies should go to the bottom of the unit, allowing you to produce a perfectly tight fit between frame and top.

It sounds unbelievable, but people occasionally do put frames together wrong. A simple check of the dimensions will tell you whether you have it right; the unit should measure 4'0" in each direction. Once you screw down a glued joint, you have about 10 minutes to pull it apart and fix it.

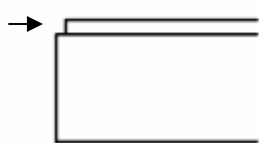
**Step 7:** Lay the plywood top on the frame. Even CDX plywood has a good side; you can often tell because the labels go on the ugly side. Put the good face on top if you can. Be sure your frame is the right way up if it has a top and a bottom.



The illustration at left shows three ways the plywood can fit the frame. In the first drawing the plywood is a little bigger than the frame; we say it is “proud” of the frame. You can't put two plywood-proud units together without warping one of them, and warping makes for extra movement. We don't like that.



The second drawing shows the unlikely situation where the plywood is just the same size as the frame; it's flush to the lumber. This is OK, but not worth any extra effort. In fact. . . .



The third drawing represents the best fit of all, with the plywood just a little shy of the frame. Can't be very much shy, because then it gets hard to attach securely and quietly, but an eighth-inch will not hurt anything and will allow the unit to be joined to others without difficulty.

You may have to trim a sliver off the plywood to keep it from fitting proud.

With the plywood on the frame and fitting flush or shy, draw a line (it can be imaginary)  $\frac{3}{8}$ " from the edge of the frame all the way around the top. On this line you're going to space about four screw holes along each edge, plus three or four on the central rail. Drill pilot holes and countersink, apply a little glue to the top of the frame, lay up, and drive the screws. It's important to have the screws go down flush to the plywood; if they stick up they may hurt somebody. Make sure the plywood is seating tightly on the top of the lumber; an air gap will cause the unit to speak later on. Clamps will help greatly.

**Step 8:** When the glue is dry, paint the underside of the new platform. Any color is OK, but black is best. The purpose of painting the exposed surfaces (edges of the frame too) is to impede the flow of air to the wood if the unit gets exposed to flame.

If you've built this platform as part of the stock renewal program, you now have the privilege of selecting the oldest, grostiest, most dangerous-looking unit from the scene shed and destroying it.

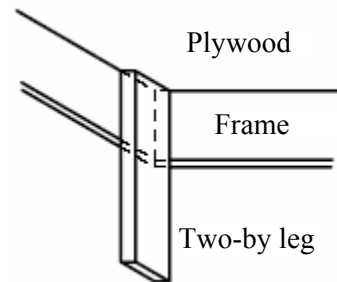
## Making your platform into a level

Of course your platform is already a level, a level approximately 6¼" high. If the set design calls for a different height, you will have to leg up the platform and several of its cousins.

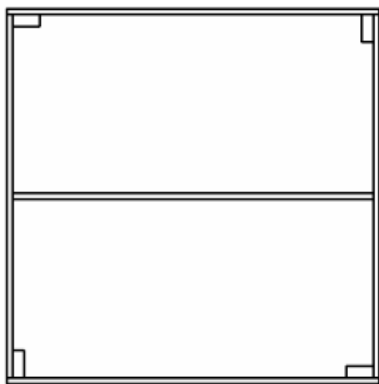
### Two-by legs



Most Town & Gown levels are based on legs made of 2x4 or 2x6. The system is simple and *nearly* foolproof, but it has some drawbacks too.

In brief, you cut a piece of two-by to support every corner of every platform, stick them underneath, and lock the whole affair together when all the pieces are standing. The length of a two-by leg is ¾" less than the height of the level. To understand the drawing at right, imagine you are under the platform looking up at one corner. The plywood top bears directly on the leg. The platform and leg are held together by 2 inch drywall screws driven from the outside (so they aren't shown here). For best results in terms of rigidity, drive three screws into the broad face of the leg (forming a triangle, not a straight line) and one or two into the narrow edge.



Here's a bit of techie jargon: "Wikki-wikki" is the quality of a platform that doesn't have a good rigid system of legs and braces. Aside from drastic measures like concrete counterweights, there are four ways to cure wikki-wikki: (1) solid attachment of legs to platforms, (2) best leg geometry, (3) bracing and (4) unitizing of the whole set. I'll come to bracing and unitizing in a moment, and I already told you how much steel to put into the unit; the picture at left illustrates what I mean about geometry. We're looking at the legged platform from directly beneath it. Notice how the two-by legs sort of walk around the unit? The weak direction of one lines up with the strong direction of the next one.

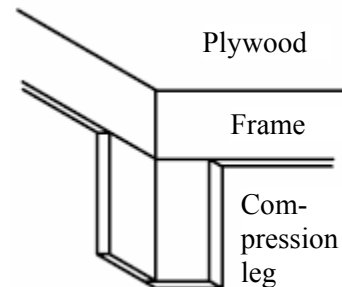


A squatty level or one made up by joining platforms into a big raft may not need bracing at all. A taller level or one that consists of a single platform wants diagonal braces connecting the legs (especially if dancing is in prospect). The braces should make a pattern like , not like . You can use light lumber, even 1x2; whenever you can, let a brace run across three legs instead of just two.

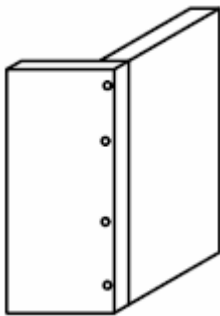
Locking the level together is the same no matter what kind of legs you have used. You stand the legged platforms up next to one another and attach the frame of each one to all the frames around it. You can use carriage bolts or even heavy capscrews, but C-clamps are just as good for most purposes.

### Compression legs

You should consider another system of legging when your levels are tall or narrow, when they have to bear unusual loads (dancing), or when you have special requirements for facing. The compression leg (also called Lofton leg, after its inventor) provides gentler, more stable support to the platform and never has to be braced. The tradeoff is that it is a hell of a lot more trouble to build and install than the two-by leg.

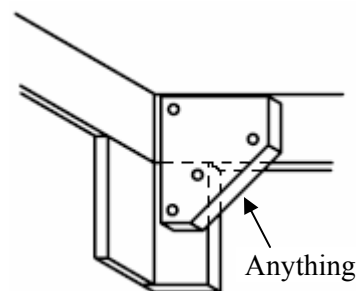


In the drawing at right, we're again under the platform looking up at a corner. You can see that the compression leg has an L-shaped cross section and that the frame, not the top, bears on it.



You begin by cutting 1x6 to the proper length and gluing-and-screwing the L-shaped legs together as shown at left. Make sure the length and the fit-up are accurate. Clamps will be a big help.

If you could simply stand these up and drop the platform on them, it would be a beautiful world, but of course that construction won't inspire confidence on the part of the Talent. The legs have to be fastened to the platform too. The next illustration shows how, in the familiar inside corner view. A piece of "anything" (plywood cut to order, scrap, anything) serves to fish one side of the leg to one side of the frame. Of course, you do the same thing with the other side of the leg. Use bolts for the attachment as shown, though I've seen it done with drywall screws. The farther apart the bolts are, the better. When you finish, you'll be astonished at what rough treatment your level can stand up to.



Compression legs for the utmost in safety and stability are tapered from about 6" wide at the floor to 12-18" wide where the platform rests. The size of the fish plate is larger accordingly. But for heights up to 5'0" I don't have any hesitation using 1x6 and carefully attaching the legs with scrap 1x6 and drywall screws.

If your platforms are nearly worn out or not soundly built, choose compression legs. I have seen two-by legs rip the frame off a very ancient platform.

Tradition dictates that you get to be the first to dance on a level that you build.