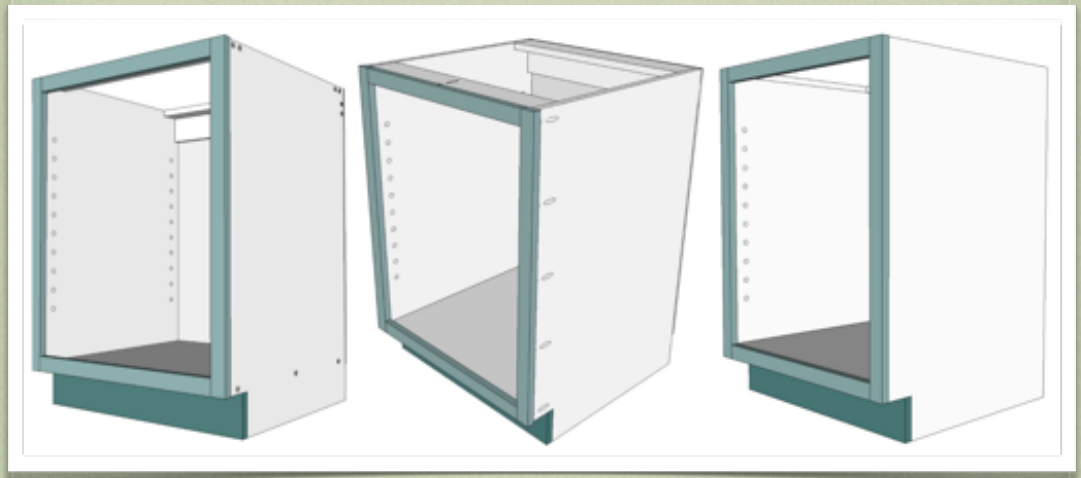
Cabinet Building 101

Basic, Intermediate and Advanced Cabinet Building Instructions

by *Sawdust Girl*™
Sandra Powell



• About SawdustGirl •

Sandra began her DIY journey years ago--back in the sleepy town of Chandler, AZ. After supporting multiple corporate relocations for her husband's career, Sandra realized the tremendous value she brought to each home she lived in by bringing her creative design ideas to fruition through her own effort and skill.

Having remodeled 5 homes on her own, Sandra has cultivated her design sensibilities, honed her DIY and carpentry skills, and become an icon of the "do it ALL yourself" woman.

Sandra's talents have now evolved to coaching new DIY'ers both online and in widely known workshops around the country.

Sandra is pioneering a whole new concept in the world of DIY, through one on one virtual, personal coaching with amazing client results.

Follow Sandra on SawdustGirl.com and check out the awesome projects that have been built by Sawdust Girl clients on TheSawdustDiaries.com

SawdustGirl Cabinet Building 101

Basic, Intermediate and Advanced Cabinet Building Instructions

Safety first.
Always wear eye, ear and lung protection.
... now go make some sawdust!

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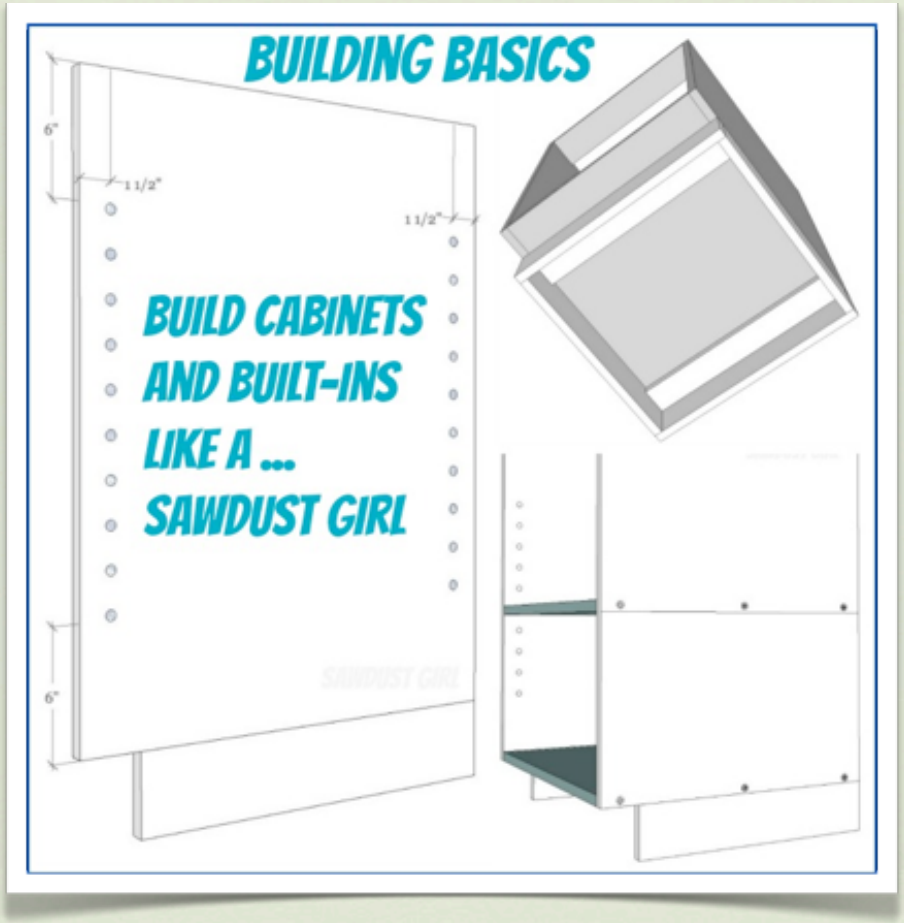
Chapter 1

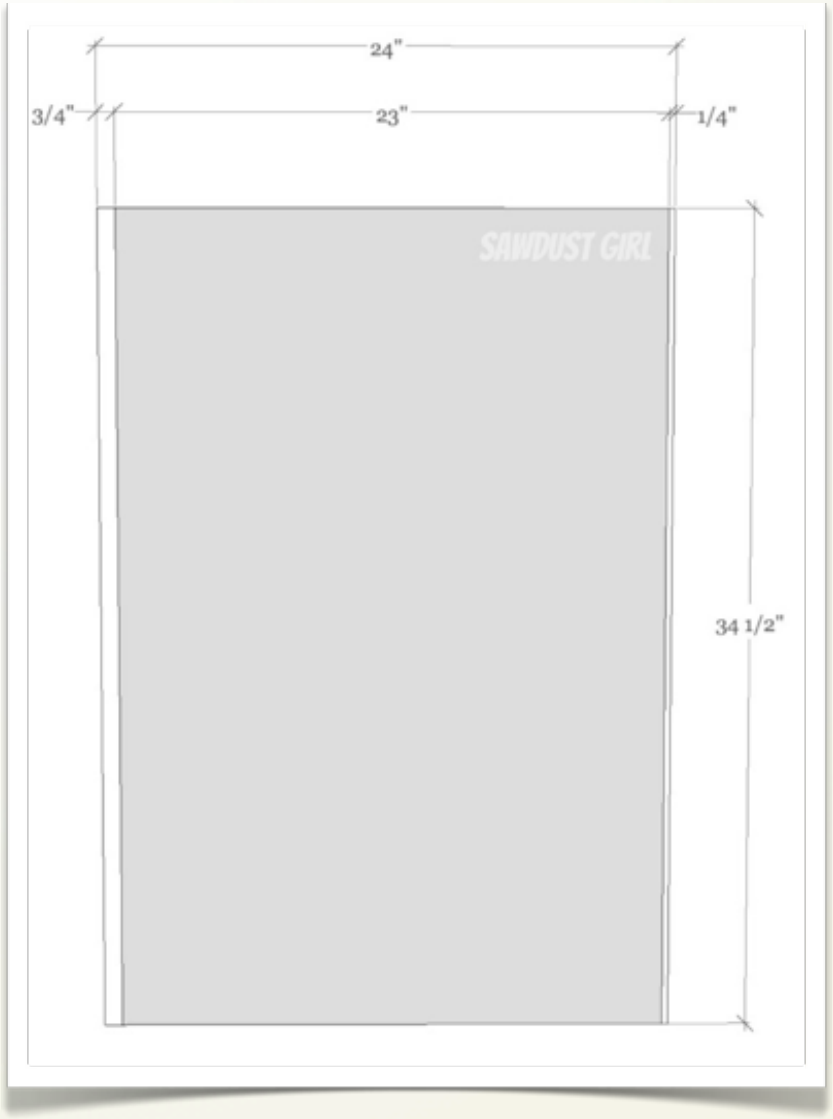
Basic Cabinet Building Techniques



Standard Kitchen Cabinet Dimensions

* Height is generally 34 1/2″. (Standard kitchen countertop height is 36″)
* Depth is generally 24″ including the face frame and back.
* If I'm building a cabinet with butt joints, a face frame and a back attached directly onto the back of the cabinet (not set into dados), I cut my sides and shelves at 23″ deep. That way once the 1/4″ back and the 3/4″ face frame are attached, the cabinet is exactly 24″ deep.
* I almost always build cabinets and built-ins out of 3/4″ plywood (or MDF).
* Face frame width is generally 1 1/2″, thickness is generally 3/4″, these dimensions are the ACTUAL size of a 1×2.

Fig. 1.1. Standard kitchen cabinet dimensions.



Maximum Width of Cabinets and Shelves

The maximum length that a suspended "board" can be before it will start to bow (or bend) varies based on a few variables. The "board" can be a fixed bottom, top or shelf of a cabinet or built-in OR an adjustable shelf.

- the kind of material
- the thickness of the material
- the depth of the board
- if it's supported by a front face
- if it's supported by a back cleat

I'm sure you can Google and find a list of materials, thicknesses and weight load limits if you're interested. It's a lot of info and I don't try to retain all the information. Just what applies to the building that I do.

And this is the information that GENERALLY applies to what I do.

1. I generally build out of 3/4" plywood or MDF. (FYI, there are lots of different types of plywoods)

2. I generally never build a cabinet or built-in wider than 32" and that is with a face frame which provides a little extra strength to the span of the board length.

Although both plywood and MDF will most likely bow eventually at that length if they are loaded down with a ton of books or heavy items, they should hold up under normal use.

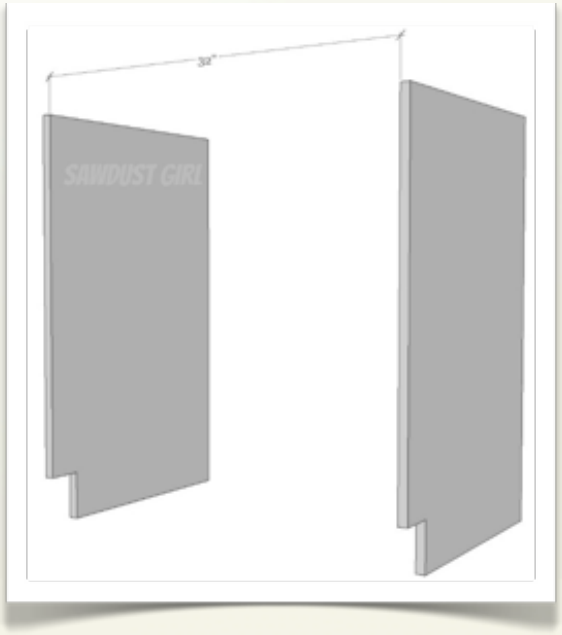


Fig. 1.2. Maximum width of cabinets and shelves.

Toe Kick

I generally always put a toe kick in cabinets that make up “work areas” because it’s nice not to stub your toe. I didn’t put toe kicks in my last island and was constantly kicking it.

Toe kicks can be created in different ways and you can change up the dimensions of your toe kick as well. I generally go 3″ deep and 3″ – 4″ high.

* You can cut the toe kick out of the sides of the cabinets before assembly. I mark it with a square and cut it out with a jigsaw.

* You can build a base for your cabinet that creates your toe kick.

* I build both ways depending on the cut list. If I can get 6 sides per sheet of lumber instead of 4, I’ll build separate bases to save money.

Fig. 1.3. Toe kick dimensions.

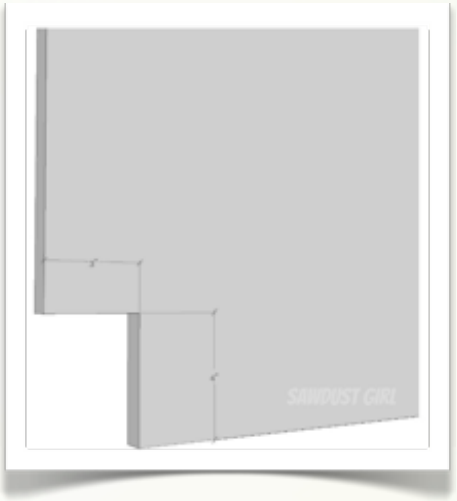
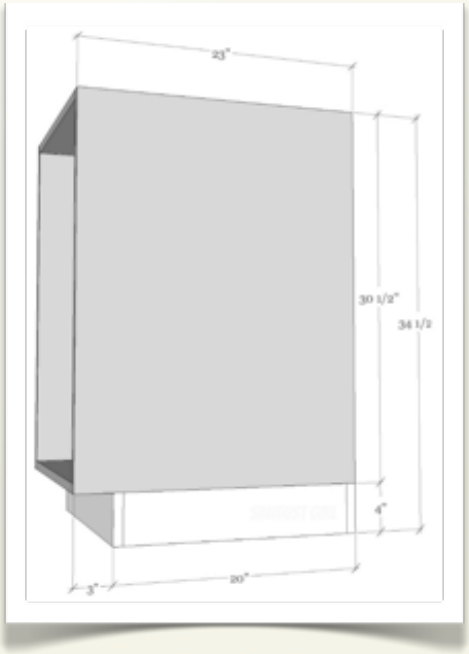


Fig. 1.4. Cabinet set on top of a separate base.



Cabinet Bases

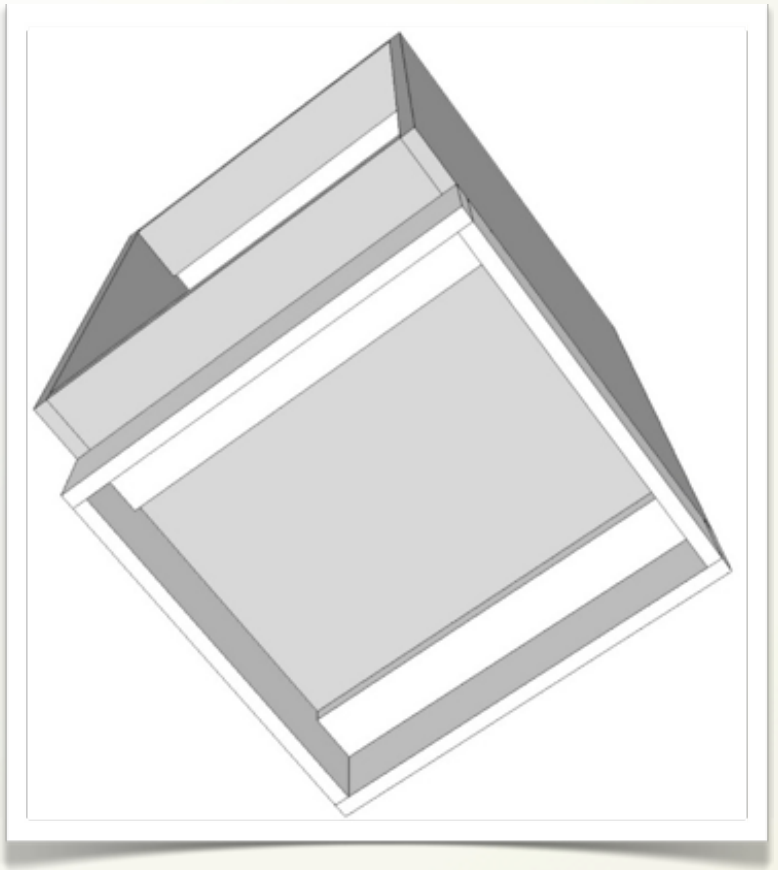
As I said previously, sometimes I build a separate base for a cabinet to achieve the desired height I want while maximizing materials.

* I only do a separate base if the cabinet side is going to be hidden in the end whether it's going to have applied beadboard or its going to have another cabinet nested up against it or some other situation that will hide the sides of the cabinet.

I generally always have scraps of material that I can cut and use for bases and it's pretty easy to attach. I screw two cleats across the width of the base and drive screws up through the base cleat into the bottom of the cabinet bottom.

*Make sure not to drill THROUGH the bottom. When using 3/4" material for the base and the cabinet bottom, I use 1 1/4" screws.

Fig. 1.5. Base cabinet.



Fasteners (Screws and Nails)

* I generally drive wood screws no closer than 1 1/2" from the edge of a piece of wood

* I generally drill pocket holes no closer than 2" from the edge of a piece of wood

* Most general purpose wood screws require you to pre drill (and if you want the head of the screw to sink below the surface of the material you need to countersink too.)

* Self-drilling screws like SPAX screws do all that (almost always without splitting any wood) as you drive them so it's only one step.

Fig. 1.6. Wood screws no closer than 1 1/2" from edge.

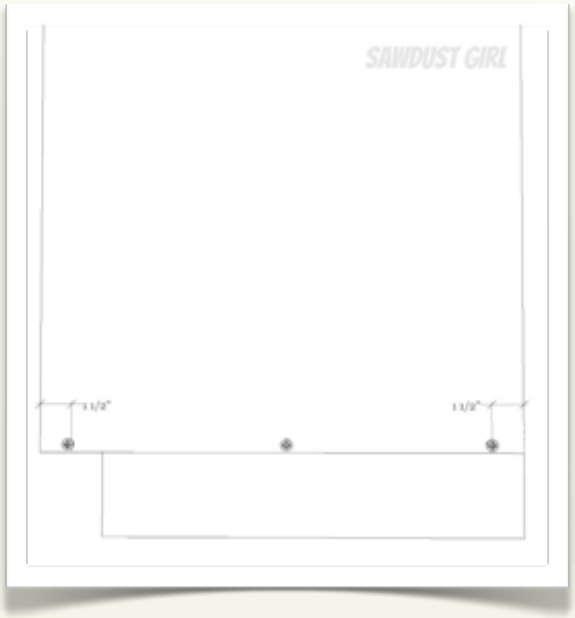
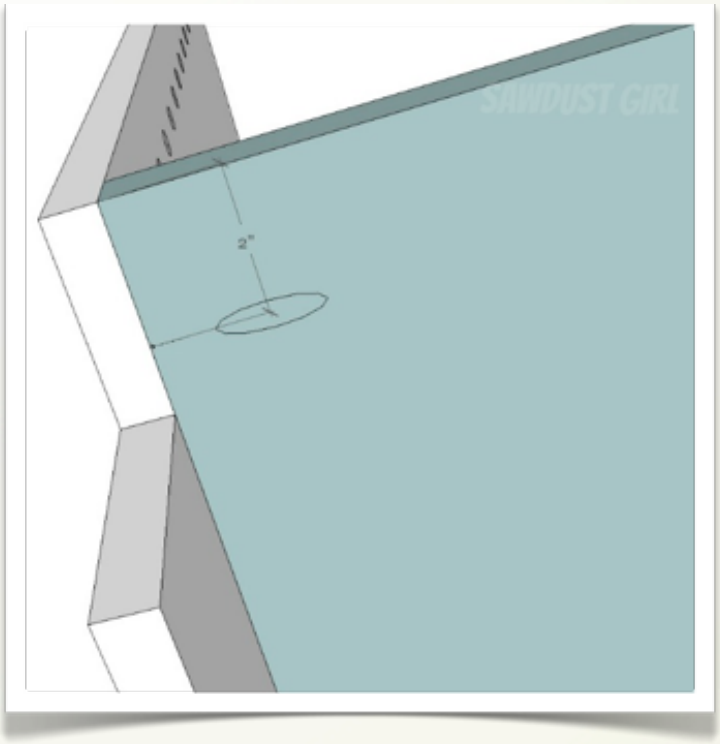


Fig. 1.7. Pocket holes no closer than 2" from edge.



Shelf Pin Holes

You would want to drill shelf pin holes anywhere you want to have adjustable shelves. It's generally easiest to drill these holes before you assemble the cabinet.

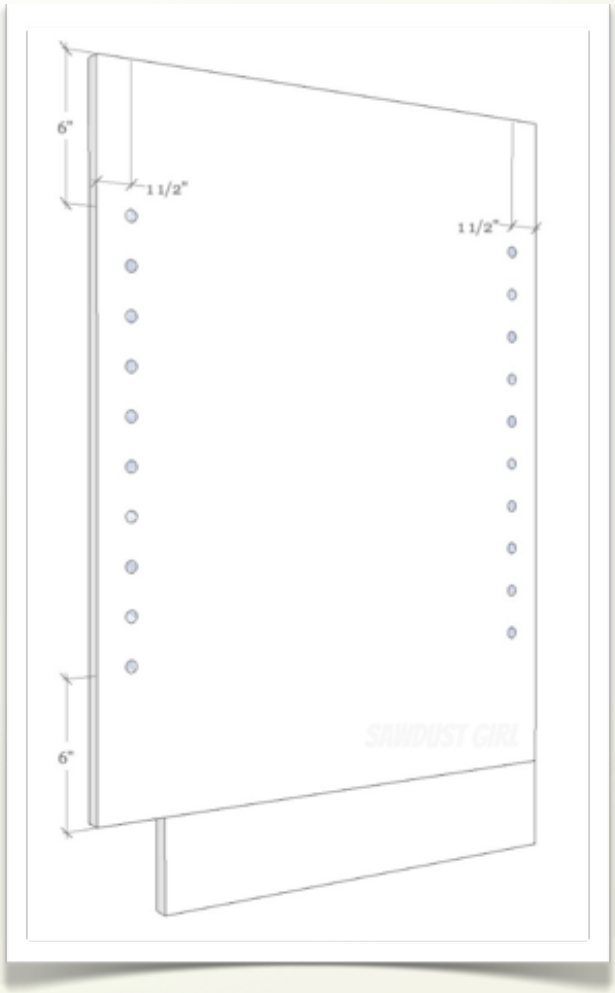
* There is no need to drill holes all the way up or down your cabinet sides.

* 6-8" from the top of the cabinet and the above the placement of the bottom shelf is sufficient.

* 1 1/2 – 2" in from each end is a good place for the holes to line up.

* Make sure you drill the holes in exactly the same placement on both sides of the cabinet so your shelves don't rock.

Fig. 1.8. Shelf pin holes.



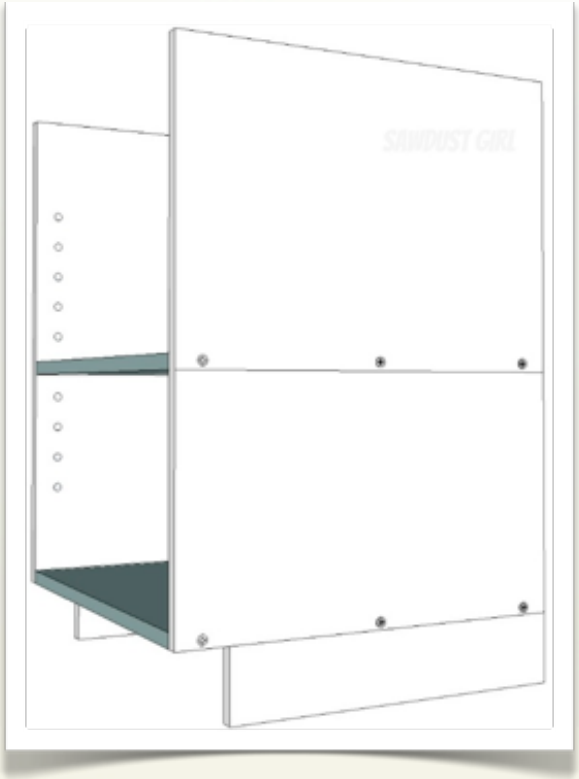
Marking your Material

* I like to draw a line (with a pencil) ON BOTH SIDES of the sides of a cabinet to mark the BOTTOM of a fixed shelf. (You can mark the top or bottom — your choice — just choose one and stick to it so you don't ever mix it up).

* That way I know exactly where to line up the shelf on one side and exactly where to drive my fasteners on the other side.

* Then I don't accidentally "miss" when shooting a nail or driving a screw and have to pull it out and try again after having made a boo-boo in my beautiful new cabinet.

Fig. 1.9. Marking your material.

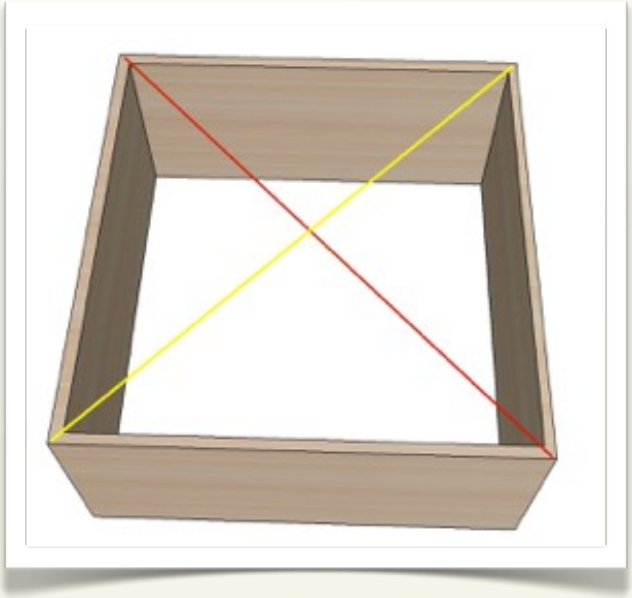


Squaring up

* It's important to square up your cabinet before you put your back on. Once the back is attached, it will keep the cabinet from "racking" (where the cabinet can be pushed into more of a parallelogram than a rectangle). The back will hold the cabinet either in or out of square so make sure it is as perfect as you can get it before you attach the back!

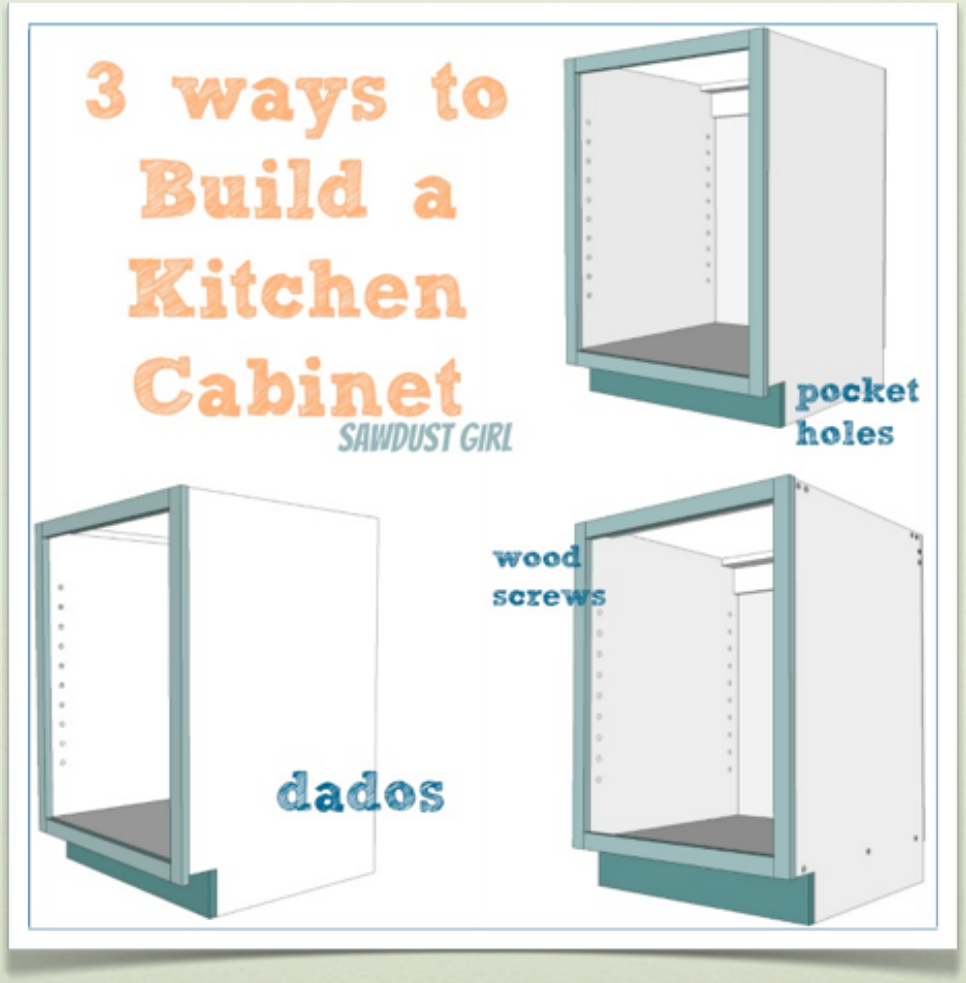
* To check for square, simply measure the opposite corners of the cabinet. Top left to bottom right and then top right to bottom left. It doesn't matter what the measurement is, just so long as it is exactly (or as close to exactly) the same. I'll take a "give me" on 1/16" (sometimes hugging 1/8") but no more.

Fig. 1.10. Checking for square.



Chapter 2

Basic, Intermediate and Advanced Cabinet Building Instructions



Introduction to Basic, Intermediate and Advanced Cabinet Building Instructions

There are many different ways to build cabinets because there are so many different ways to join wood. You can use different methods for building and attaching the face frame as well as the cabinet carcass. With modern advancements in tools and products it's possible to build strong joints and great looking pieces with quick and simple methods. I like to keep things as simple, easy and fast as possible. Every project is different and some situations call for creativity in order to "Make it work." Sometimes I can build fast and easy and other times I have to spend more time on a specialized project because the situation calls for it.

The three basic construction methods I will cover here are: (1) butt joints and wood screws, (2) butt joints and pocket hole screws, and (3) dados (day-doe). To help you decide which method is best for your project, I've created three different plans for the same 24" kitchen cabinet using all three of these. In highlighting each method, I hope to illustrate when and why I might use one method over another. Sometimes experience and available tools dictate what method you use but that doesn't mean you can't create a beautiful project! You just have to take the extra steps to ensure that your END RESULT looks awesome. This just means you need to plan ahead and figure out which parts of your cabinet are going to be visible after all is said and done, then pick the method that works for you.

Butt Joints and Wood Screws

Building cabinets with butt joints and wood screws drilled in directly through the sides is the fastest way to build a cabinet carcass and requires no special tools. You will need a drill/driver to drive in your screws and that's it! I build a LOT of cabinets and built-ins this way. I use wood glue and good fasteners. I have found this method to be just fine for most of my projects, especially when the sides will be hidden. Once the face frame is on and everything is finished, no one can tell what type of joint method you used. Unless you take a sledge hammer to your cabinet, your cabinet should hold up.

The main drawback of the butt joints and wood screws method is that the fasteners will be visible on the sides of the cabinets. However, this need not be an issue if you plan ahead. You can hide the fasteners in two easy ways:

1. Countersink your screws so you can fill them with wood filler or putty and they will be hidden once painted.

2. Cover the sides of your cabinet. I often cover my cabinets with 1/4" beadboard or plywood. (I adjust my face frame to account for this.)

On the other hand, it won't matter if the screws are visible if the sides of your cabinets will not be visible. For example, when attaching cabinets together to fill a wall to wall space, the sides will not be visible.

Bottom line regarding the butt joints and wood screws method to join wood:

Pros: Fastest and simplest method. No special tools required.
Cons: Fasteners and back panel are visible from the side

Butt Joints and Pocket Hole Screws

The second cabinet construction method utilizes butt joints and pocket hole screws. Pocket hole screws are actually a very easy method to join wood. This methods does require you to have a special jig to drill the holes. I often use pocket hole screws to attach my face frames to cabinets.

Bottom line regarding the butt joints and pocket hole screws method to join wood:

Pros: Very easy method and fasteners are not visible from the sides.

Cons: Back panel is still visible from the sides. It takes a little time to drill all the pocket holes. Requires a pocket hole jig.

Dados

The third construction method I use is one that requires cutting dados. A dado is essentially a rectangular groove cut into a board so that another piece can fit into it. Cutting dados that allow the back panel, cabinet bottom and fixed shelves to recess into the cabinet sides is definitely a little more time consuming and a trickier method, but it pays off aesthetically. Dados require specialized tools like a router or a table saw and a little more time and patience when compared to the first two methods I described.

Bottom line regarding dados to join wood:

Pros: Very clean look. No visible fasteners on back panel.

Cons: Cutting the dados requires precision and special tools such as a table saw or a router. Cutting dados to join wood is probably not a beginner's project.

How to Build a Cabinet

with a Toe Kick Using Wood Screws

Materials

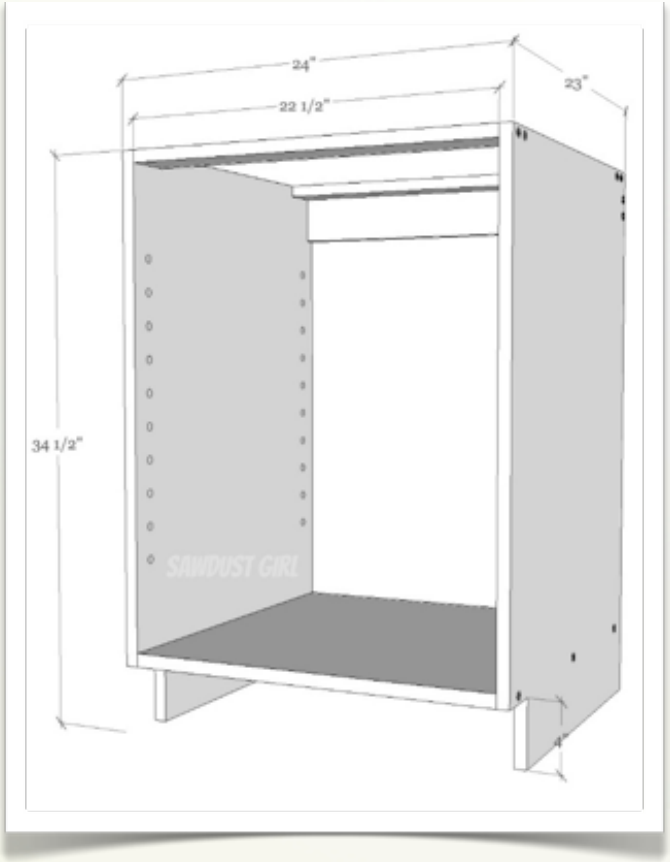
* 3/4″ plywood for sides, bottom and shelves
* 1/4″ plywood for back
* wood glue
* clamps
* wood screws

As I previously explained, the fastest and easiest method to join wood is with butt joints and wood screws. Wood glue and screws will provide strong joints and you can build the cabinets quickly and securely. However, it is important to note that the screws will be visible unless you cover the sides with a thin panel (e.g., beadboard). However, if the sides of the cabinet will be butted up to another cabinet or the wall they won't ever been visible.

Here I demonstrate a standard 34 1/2″ Kitchen Cabinet that is 24″ wide. **You can modify this plan to build cabinets of different widths.** Refer to Chapter 1 on Cabinet Building Basics for additional information, tips and techniques.

The final dimensions of this cabinet after the back and face frame are attached will be 24.″ However, the sides, bottom and shelves are 23″ deep. The height is 34 1/2.″ And the toe kick is 3″ deep by 4″ tall, cut out of the sides with a jigsaw. The cabinet material is 3/4″ thick.

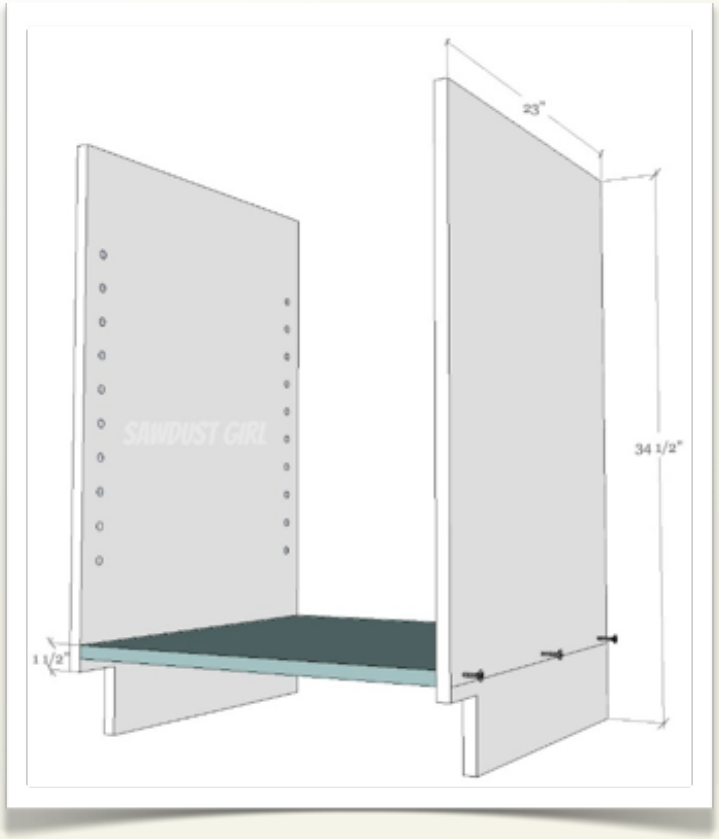
Fig. 2.1. Standard 34 1/2" kitchen cabinet that is 24" wide.



Step 1: Attach bottom to sides

* Use wood glue and 1 3/4" wood screws.
* Pay close attention to the location of the "bottom." It will be flush with the face frame once that is installed.

Fig. 2.2. Bottom attached to sides.

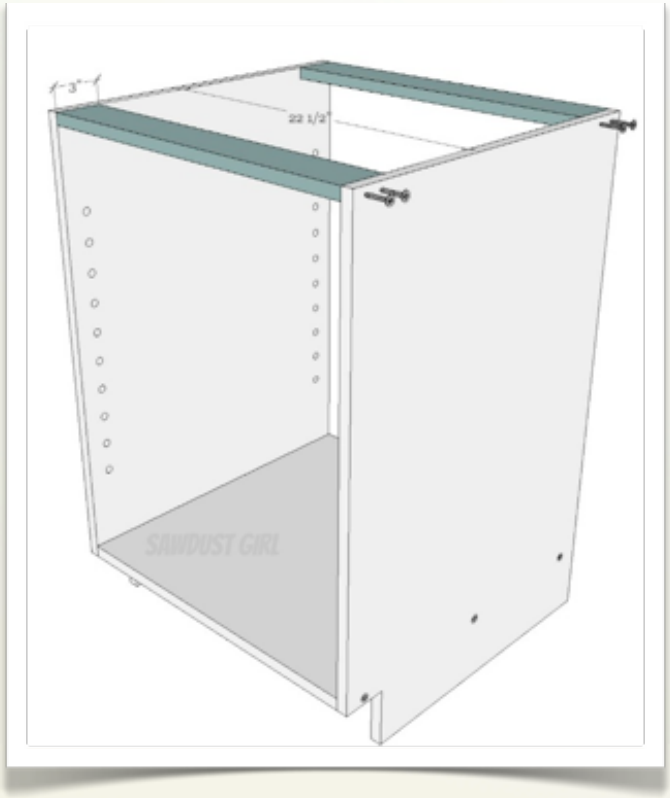


Step 2: Attach top cleats

You can use a full top if your project calls for it. If you are covering the cabinet with a countertop there is no need to use the extra material.

* Use wood glue and 1 3/4" wood screws.

Fig. 2.3. Top cleats attached.



Step 3: Attach back cleat

This is what you will use to secure the cabinet to the wall after everything is leveled. (Drive 3" cabinet screws through this cleat into the studs.)

* Cleat is 3/4" thick plywood

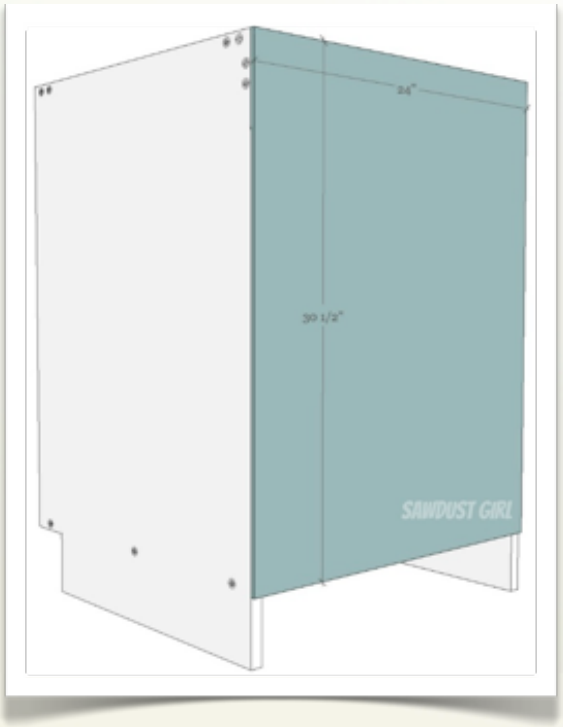
* Use wood glue and 1 3/4" wood screws.

Fig. 2.4. Back cleat attached.

Step 4: Attach back

* 1/4” plywood, masonite or beadboard
* Square up your cabinet first
* Use 3/4”-1 1/2” staples or small screws to secure back to cabinet.

Fig. 2.5. Back attached.



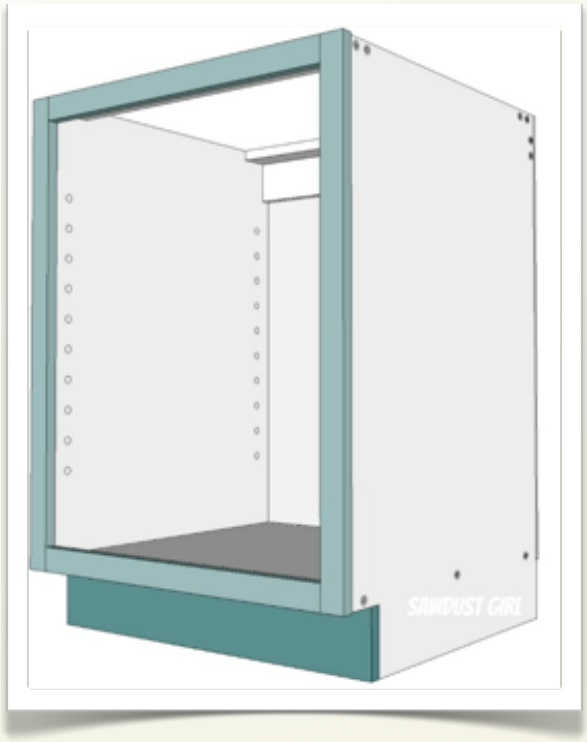
Step 5: Build and Attach Faceframe

Chapter 3 will cover how to build and attach a faceframe

Step 6: Nail a “kick plate” onto the recessed toe kick.

* I find it’s easiest to paint the kick plate before installing
* Use brad nails to nail in place

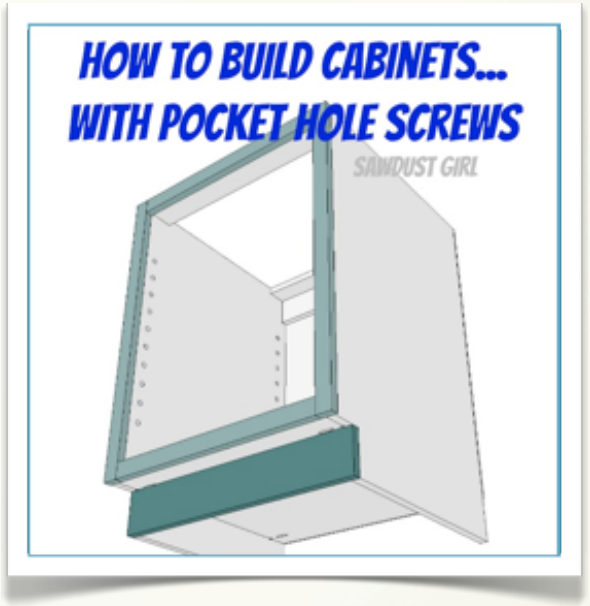
Fig. 2.6. Face frame and kick plate attached.



If the cabinet sides will not be visible after installation, this quick and easy method rocks! If the sides will be visible, you can still use this method. You will need to fill the screw holes or cover the cabinet sides with a panel of 1/4" beadboard, smooth hardboard or plywood (or other material). You just need to make sure to plan for that when you build your face frame.

That is the fastest and simplest method for building a basic cabinet. If the cabinet sides will not be visible after installation this way rocks. If you will see the sides you can still use this method if you cover the cabinet sides with a panel of 1/4" beadboard, smooth hardboard or plywood or something else. Just make sure to plan for that when you build your face frame.

How to Build a Cabinet With Pocket Hole Screws



* 3/4" plywood for sides, bottom and shelves
* 1/4" plywood for back
* wood glue
* clamps
* pocket jig and pocket hole hole screws

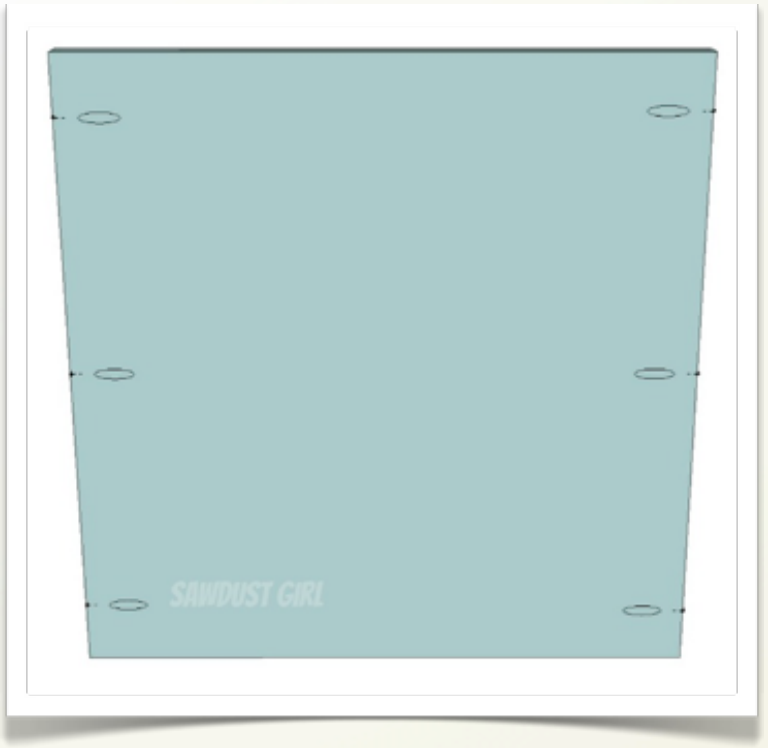
* Pocket holes allow you to attach your cabinet bottom, fixed shelves and cleats without having fasteners visible on the cabinet sides. You will, however, still see the cabinet back from the side. Here I show you a different way to build the same 34 1/2″ tall cabinet that is 24″ wide. You can modify this plan to build cabinets of different widths. Refer to Chapter 1 on Cabinet Building Basics for additional information, tips and techniques.

The final dimensions of this cabinet after the back and face frame are attached will be 24″ but the sides, bottom and shelves will be 23″ deep. The height is 34 1/2″ tall. The toe kick is 3″ deep by 4″ tall and cut out of the sides with a jigsaw. The cabinet material is 3/4″ thick.

Step 1: Drill pocket holes

* Use a pocket hole Jig to drill pocket holes into the cabinet bottom.

Fig. 2.7. Pocket holes drilled.

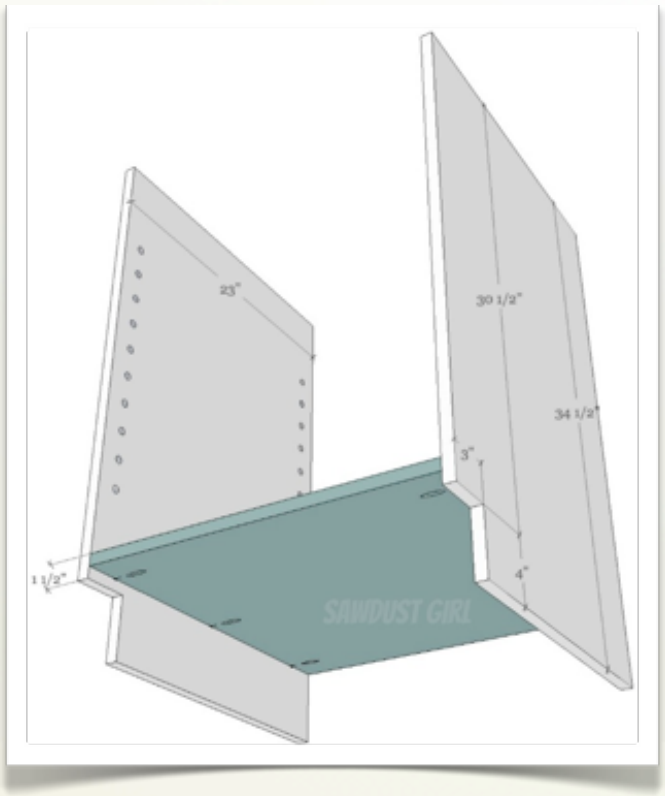


Step 2: Attach bottom to sides

* Use wood glue and 1 1/4″ pocket hole screws.

* Pay close attention to the location of the “bottom.” It will be flush with the bottom rail in the face frame once that is installed

Fig. 2.8. Bottom attached to sides.

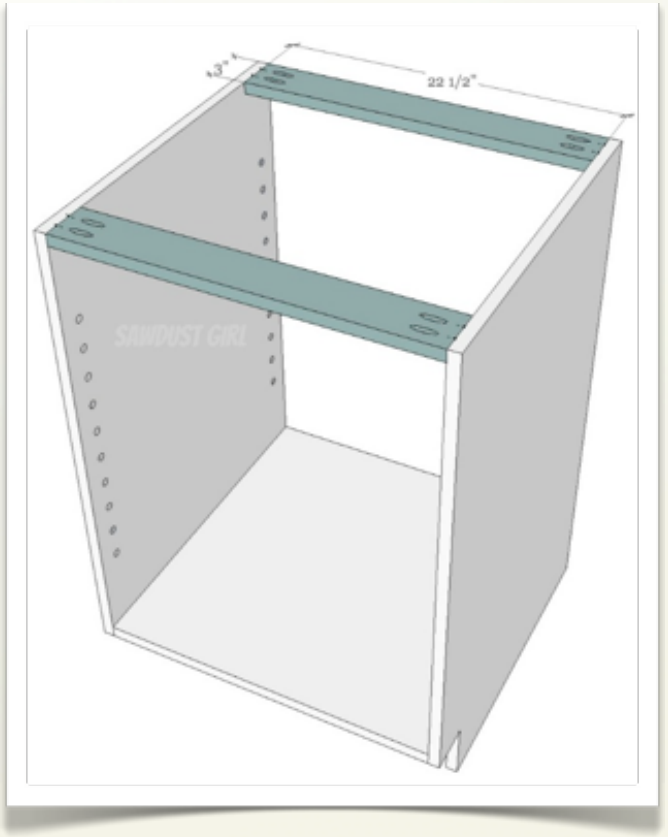


Step 3: Attach top cleats

You can use a full top if your project calls for it. If you are covering the cabinet with a countertop there is no need to use the extra material.

* Use wood glue and 1 1/4″ pocket hole screws.

Fig. 2.9. Top cleats attached.

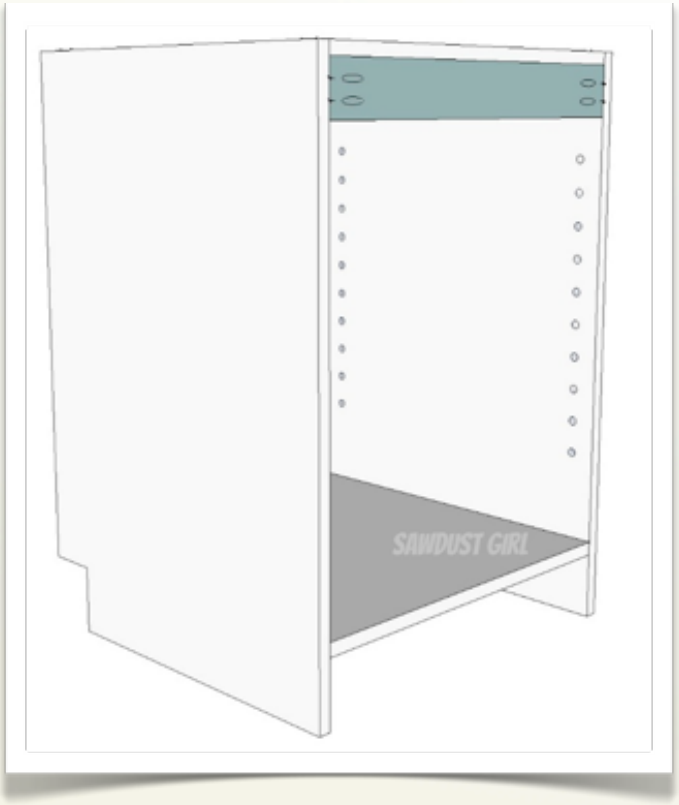


Step 4: Attach back cleat

This is what you will use to secure the cabinet to the wall after everything is leveled. (Drive 3" cabinet screws through this cleat into the studs.)

* Use wood glue and 1 1/4" pocket hole screws.

Fig. 2.10. Back cleat attached.



Alternate Step 3 and 4:

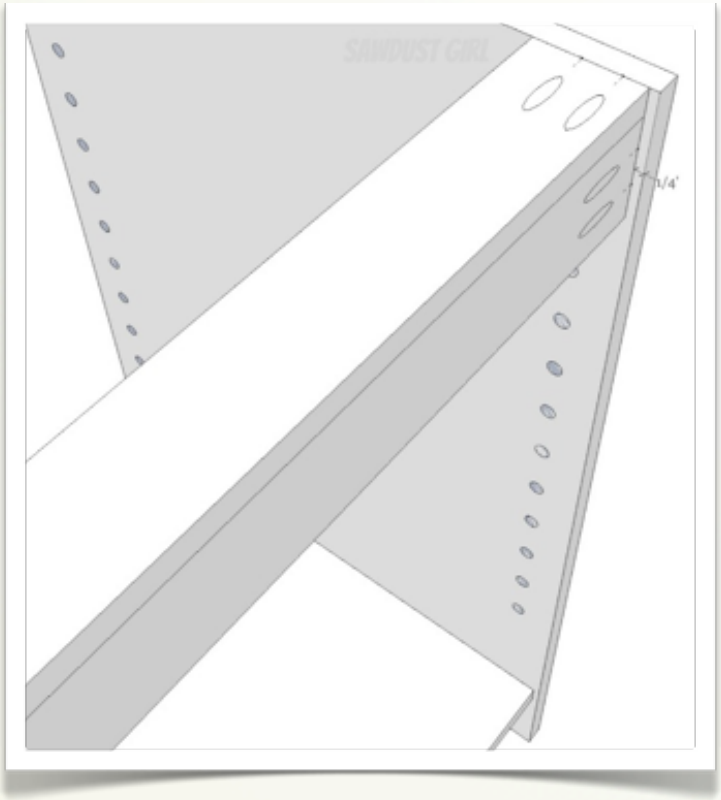
Attach top and back cleats

* If you do not want the back panel to be visible from the sides, you could set the two back cleats 1/4" in from the cabinet back leaving room for the back panel to recess.

* If you do this, I would also shorten the cabinet bottom by 1/4" so the back panel can recess in front of that.

* I don't do this because I want the back to be stapled all the way around on the back so it keeps the cabinet in square. I don't think it would do as good a job at this if it's just attached on the top and bottom and resting against both sides. (However, it IS an option if you don't have the tools to cut a dado. Sometimes you have to choose the best of your available options.)

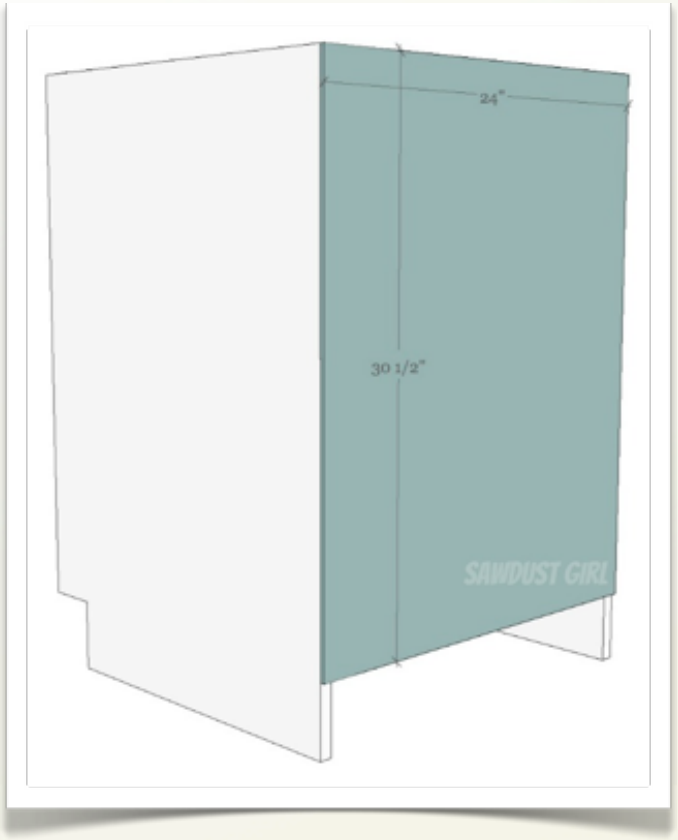
Fig. 2.11. Alternate steps 3 and 4.



Step 5: Attach back

* Square up your cabinet first
* Use 3/4”-1 1/2” staples or small screws.

Fig. 2.12. Back attached.



Step 6: Build and Attach Face Frame

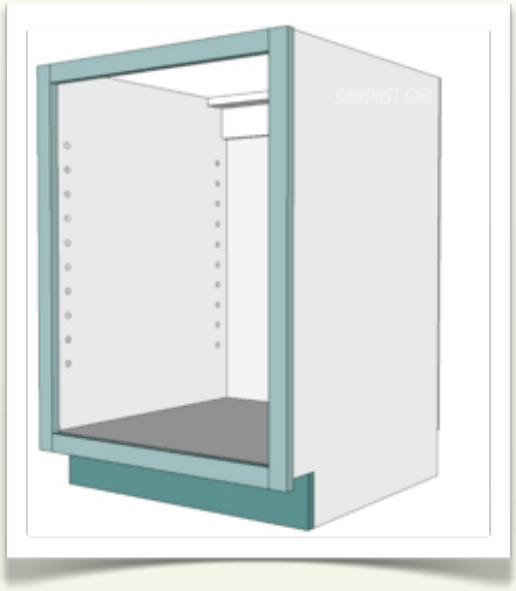
*See Chapter 3 for details on building and attaching the Face Frame.

Step 7: Nail a "kick plate" onto the recessed toe kick.

* I find it's easiest to paint the kick plate before installing

That's how easy it is to use a pocket hole jig to build a cabinet so your fasteners are not visible on the sides of your cabinets.

Fig. 2.13. Kick plate and Face frame attached.



How to Build a Cabinet with Dado Joints

The third method for building a basic cabinet requires more tools than first two methods I've described. This method, which requires you to cut dado joints, gives you strong joints and perhaps the cleanest look. It's definitely a more advanced method so if this is your first cabinet building experience, I recommend using the wood screws or pocket hole screws methods

Fig. 2.14. A dado and a rabbet.

Technically, we're using Dado and Rabbet joints. The difference is only WHERE in the wood you route (or cut) your groove — I'm just referring to ALL grooves in this post "Dados." You can cut a "through dados" with a table saw but you really need a plunge router and guides to do the "stop dado"- safely.

Materials

* 3/4" plywood for sides, bottom and shelves
* 1/4" plywood for back
* wood glue
* clamps

Step 1: Cut your dados

* Use a plunge router and guides to ensure your dados are straight.
* Use the correct sized bits for the material thickness. The material should fit snugly inside the dado.

Fig. 2.15. Dados for bottom shelf.

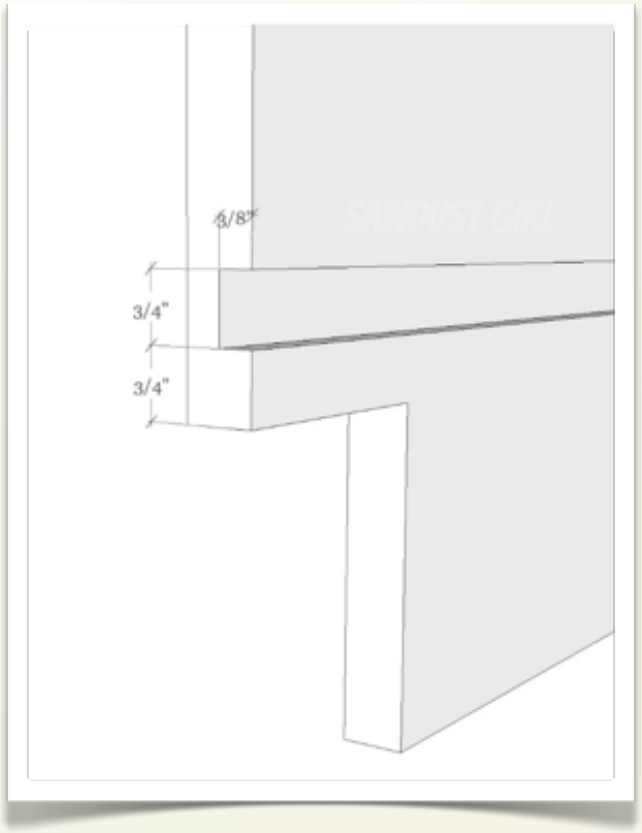


Fig. 2.16. Dado for back panel.

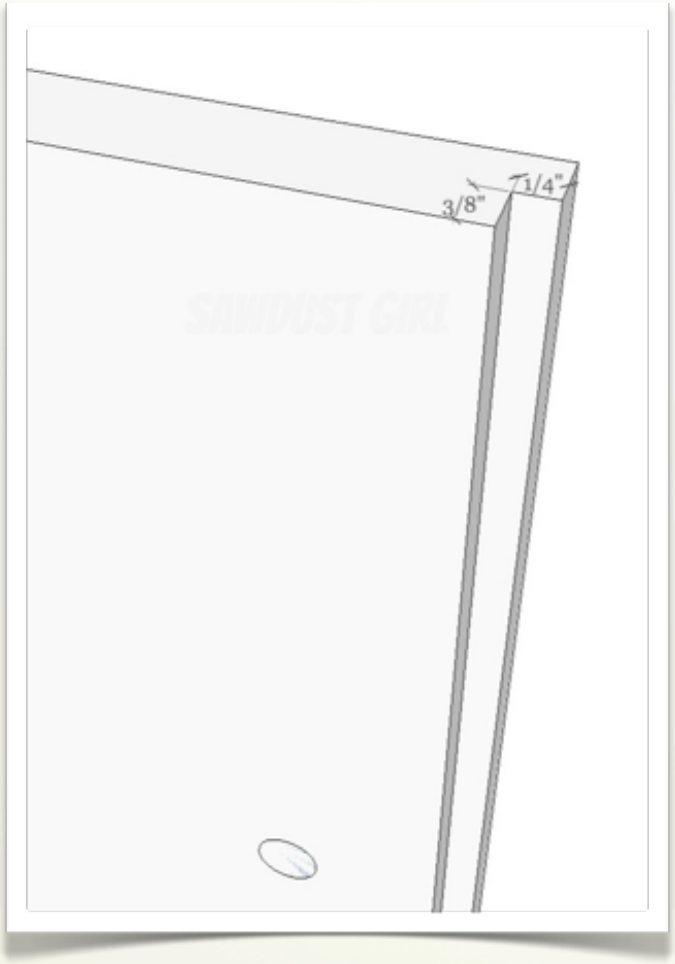
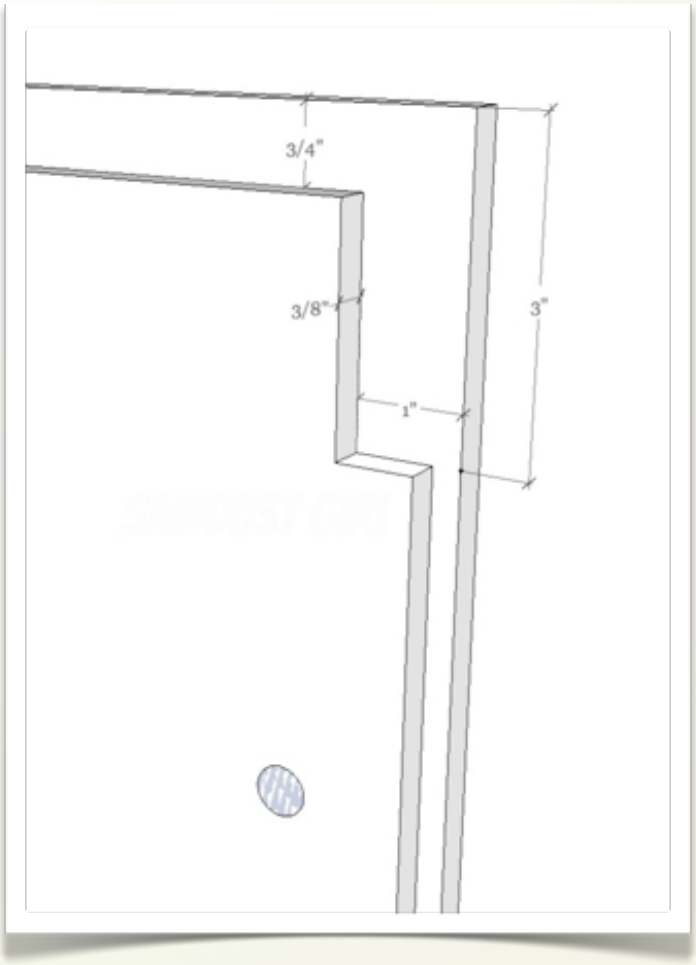


Fig. 2.17. Dados for back and top cleats.

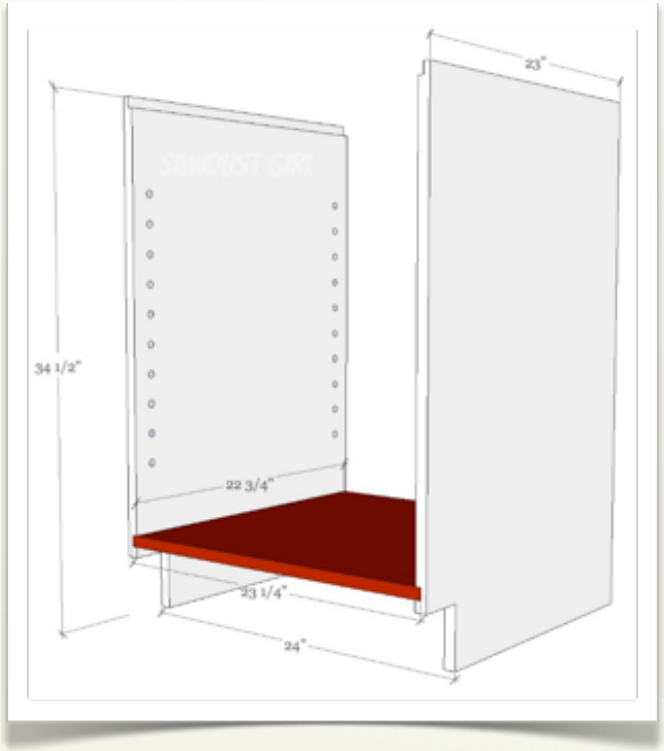


Step 2: Attach bottom

* Apply wood glue to dados for the cabinet bottom making sure to coat all three sides of the cutout.

* Insert cabinet bottom into dados and use clamps (pipe clamps are what I generally use) to hold securely until glue dries.

Fig. 2.18. Bottom attached.

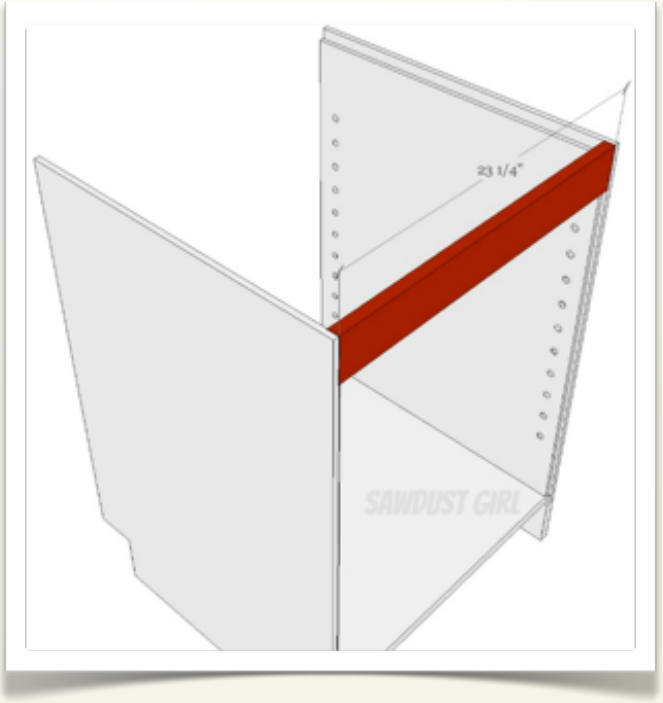


Step 3: Attach Back Cleat

* Use wood glue and clamps to secure the back cleat in place while glue dries

* Make sure the cleat is pushed forward into the dado as far as it will go so there is 1/4" of space left for the back panel.

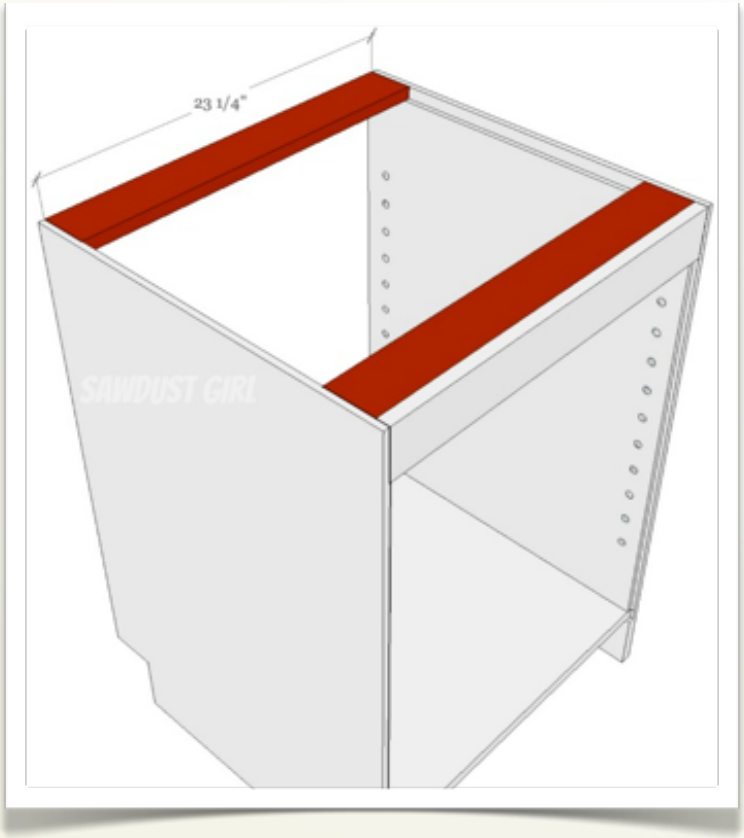
Fig. 2.19. Back cleat attached.



Step 4: Attach Top Cleats

* Use wood glue and clamps to secure top cleats in place while glue dries.

Fig. 2.20. Top cleats attached.

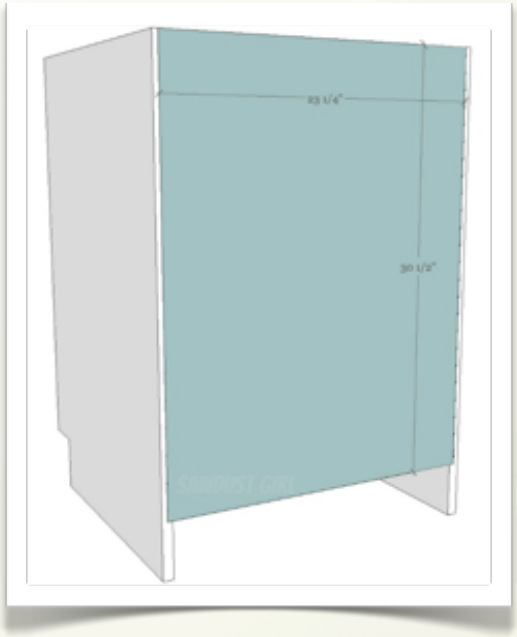


Step 5: Attach Back

* Square up

* Lay back panel into the recess and secure with staples or nails

Fig. 2.21. Back attached.



Step 6: Build and Attach Faceframe

* *See Chapter 3 for details on building and attaching the Face Frame.

Chapter 3

How to Build and Attach a Cabinet Face Frame

How to Build and Attach a Cabinet Face Frame

In this section, I will discuss how to build and attach the face frame, which is the next step to building a cabinet. There are several methods I use to ATTACH the face frame but I generally always BUILD the face frame with pocket hole screws.

I generally always build my face frames out of 1×2 poplar if I know I'm going to be painting the piece. If staining your piece, you want to match your face frame wood as closely as possible to your carcass lumber.

- I use wood glue and my pocket hole jig set for 3/4" material and use 1 1/4" coarse thread pocket hole screws. EASY! Make sure you use clamps to hold the pieces in place as you drive your screws.

*The important thing to know about using pocket hole screws when working with wood is you want to DRILL the holes INTO the END GRAIN and DRIVE the screw into the CROSS GRAIN. It will hold better and be less likely to split.

End grain = grain runs in the direction of the pocket hole you are drilling.

Cross grain = screws drives in perpendicular to - or across the grain.

Fig. 3.1. End and cross grains.

Attaching the Face Frame

There are several ways to ATTACH the face frame. I describe each one below:

Glue and Nails

If I'm painting my face frames I don't mind using filler to hide nail holes and it's quick and easy to use only glue and nails to attach a face frame. I'm suggest using finish nailers NO bigger than 16 gauge and I really prefer 18 gauge.

Wood glue is VERY strong and it's a suitable method for attaching the face frame to the carcass. It is not the strongest joint, so if possible I like to shore it up with fasteners of one sort or another. However, in some situations, I don't want visible pocket holes (and I don't want to plug, trim, sand and patch a bunch of pocket holes either) on built-in pieces where the face frame is huge. In this case it would be impossible to build as a unit and then install with biscuits, so this is how I do it.

Pocket hole screws on the outside of cabinet

- Wood glue
- pocket hole screws

If your cabinet sides are not visible and you used the wood screw or pocket hole method to build your cabinet, you can use pocket hole screws to attach your face frame. It's fast and secure. Apply some wood glue and drive your screws into the wood.

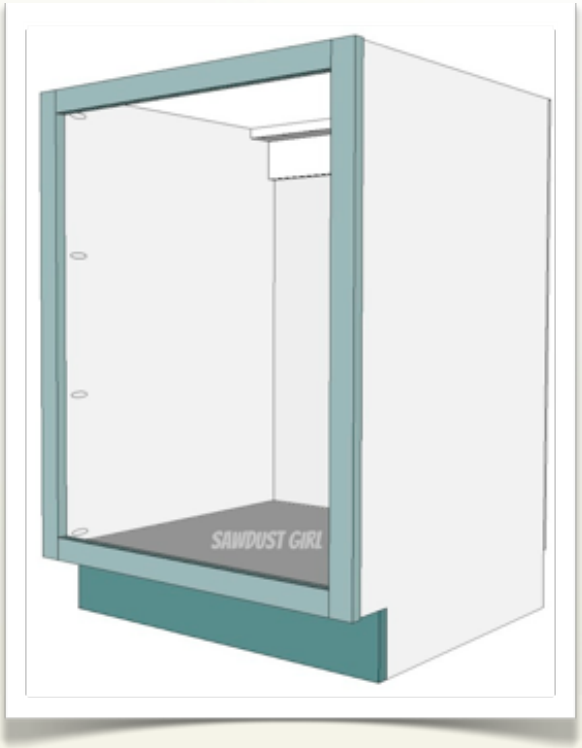
Fig. 3.2. Pocket holes on outside of cabinet.

Pocket hole screws on the inside of cabinet

- Wood glue
- pocket hole screws

If your cabinet sides will be visible and you took the extra time and effort to hide your fasteners, you most likely don't want a bunch of pocket holes drilled in the side of your cabinet. Using pocket hole screws on the inside of the cabinet is great if you are putting drawers in your cabinet because the pocket holes will not be seen at all.

Fig. 3.3. Pocket holes on inside of cabinet.

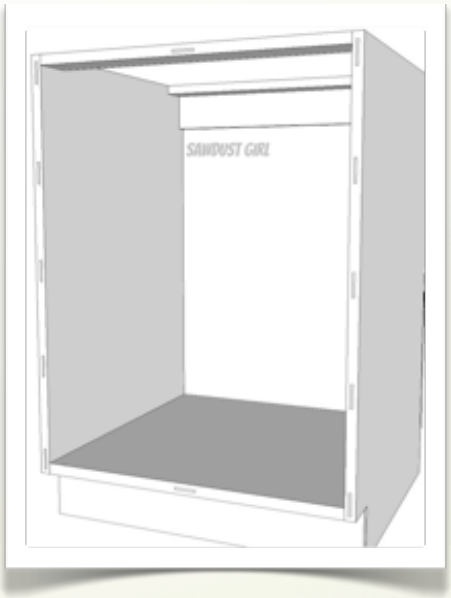


Invisible joinery with biscuits

- Wood glue
- biscuits

Using a biscuit joiner will secure the faceframe to the carcass without any visible fasteners at all.

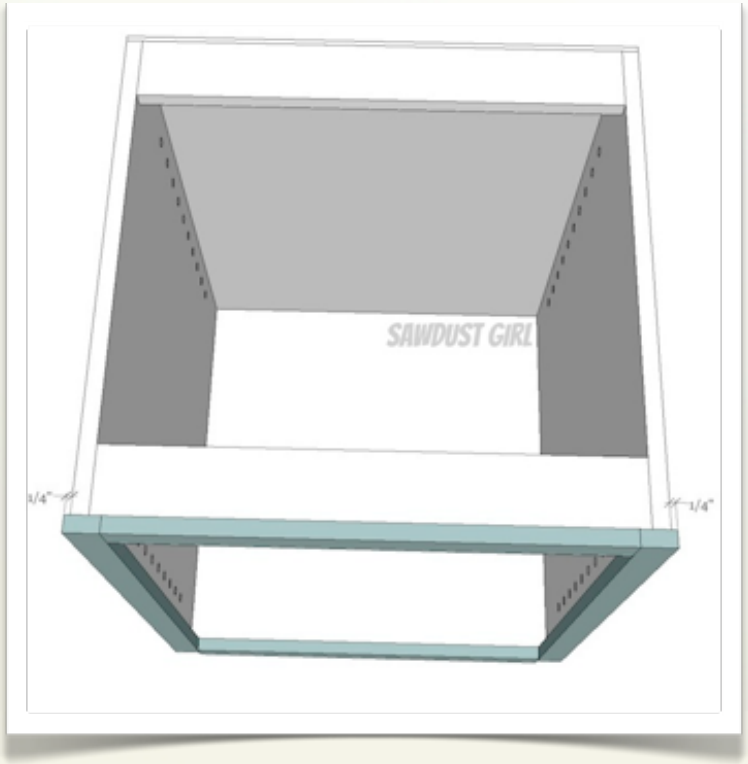
Figs. 3.4 & 3.5. Invisible biscuit attachment.



Hiding fasteners with false side panel

I generally go with pocket holes or nails on the outside of the cabinet (I use wood glue in all methods) and if I'm going to see the sides of a cabinet I size my face frame 1/2" wider so I have an extra 1/4" hanging over each side that will hide my false panel after I attach it, which I usually do with caulk or adhesive so there are no nail holes.

Fig. 3.6. Side panel face frame attachment.



Conclusion

Regardless of which method you decide to take to build your cabinets, be patient with yourself and the experience. There are always moments of frustration with every project, no matter how skilled and experienced the builder. It is just the nature of the work.

Expect hiccups, bumps and hurdles -- that way, when they come (and they inevitably will), you won't want to throw the project out the window. When problems arise, take the time to figure out how best to move forward. Ending up with a finished project that looks awesome doesn't mean that you didn't run into any issues or make any mistakes along the way. It just means you took the time to fix the mistakes and figure out how to work around the issues.

The sign of an good cabinet maker is not "never making a mistake," it is "how you fix mistakes when they happen."

Now all that's left is for you to get some lumber, cut it and build something amazing! Giddy-up!