

Basic Cabinetmaking

by Mark Duginske



Introduction to Basic Cabinetmaking
using Pocket-Screw Joinery

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Welcome Woodworkers!

This booklet is designed to provide you with the basic fundamentals needed to create your own custom cabinets for the home, shop or office. Although we've tried to make this booklet as comprehensive as possible, there are some areas that we felt were beyond the scope of this booklet and were skimmed over. Look for more detailed information on cabinetmaking from me in the near future as I finish a cabinetmaking book. In addition, if you have any questions or suggestions regarding the content of this booklet, feel free to contact me at markduginske@gmail.com.

Sincerely,

Mark Duginske

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Introduction to Cabinetmaking

Cabinetmaking Simplified

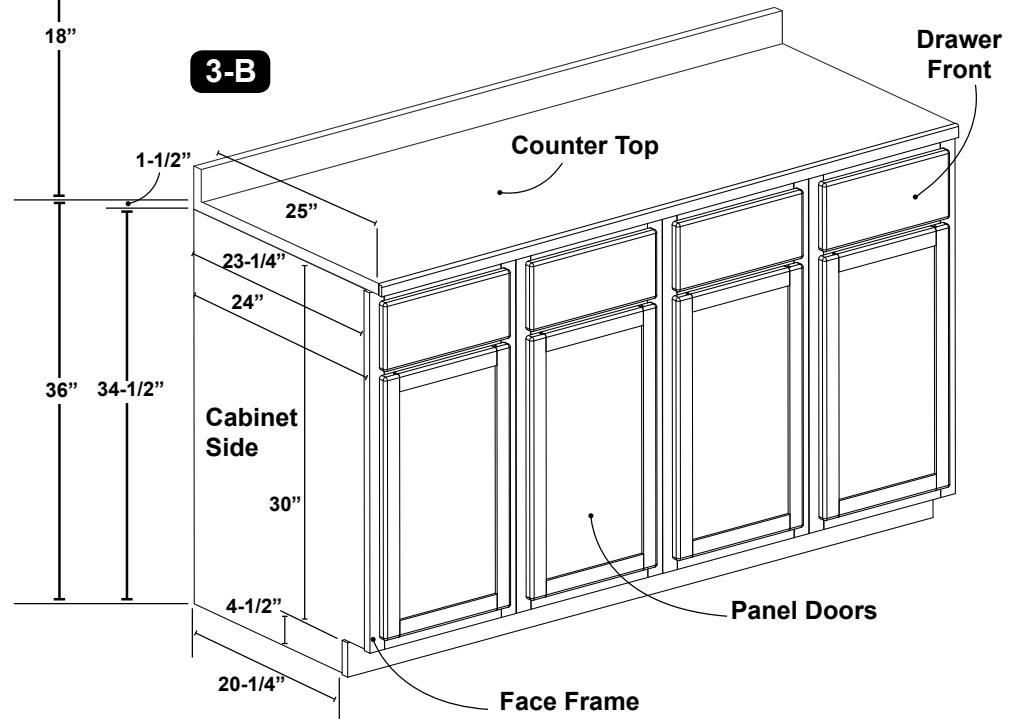
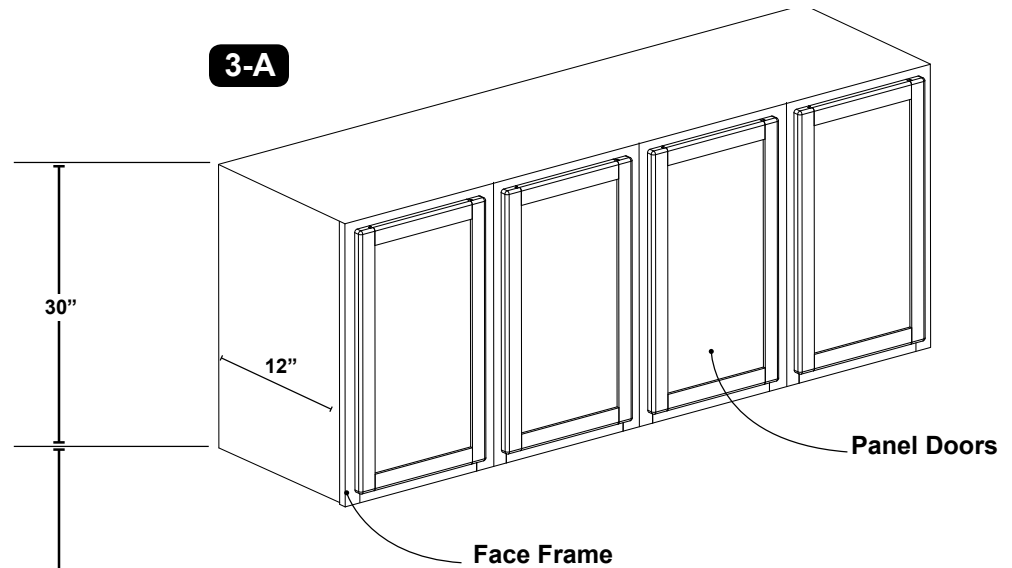
Every year professional and amateur woodworkers build thousands of cabinets. One of the biggest misconceptions about building cabinets is that you need a shop full of expensive machinery to achieve professional results. On the contrary, cabinets are actually quite simple constructions that with a few well-designed tools can be very easy to build.

Kreg Jigs®, invented in the late 1980's have changed the way many woodworkers choose to build.

This booklet is designed to act as a primer to get you started in cabinetmaking. Rather than offering a lot of theory we strive to teach you cabinetmaking by example.

The simple example that we chose to build in this booklet is a 15" wide base cabinet with one drawer and one door. This is a good place to start because it is full sized and yet small enough so one person can build the whole thing without any help. Once you build this cabinet and learn the system you will be able to build an entire kitchen. Using this system you will also be able to build professional looking bookcases, display cabinets, entertainment centers and just about any other type of cabinet that you would like.

WALL CABINETS

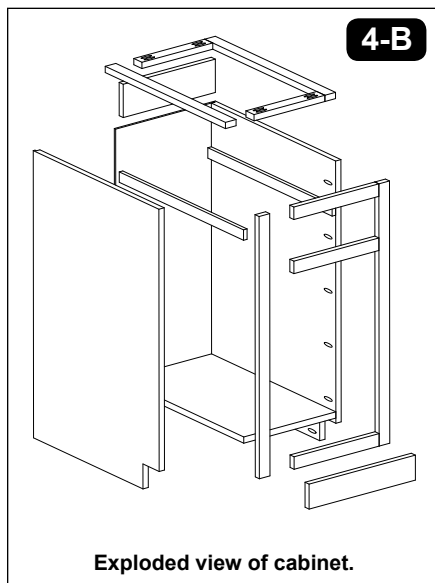
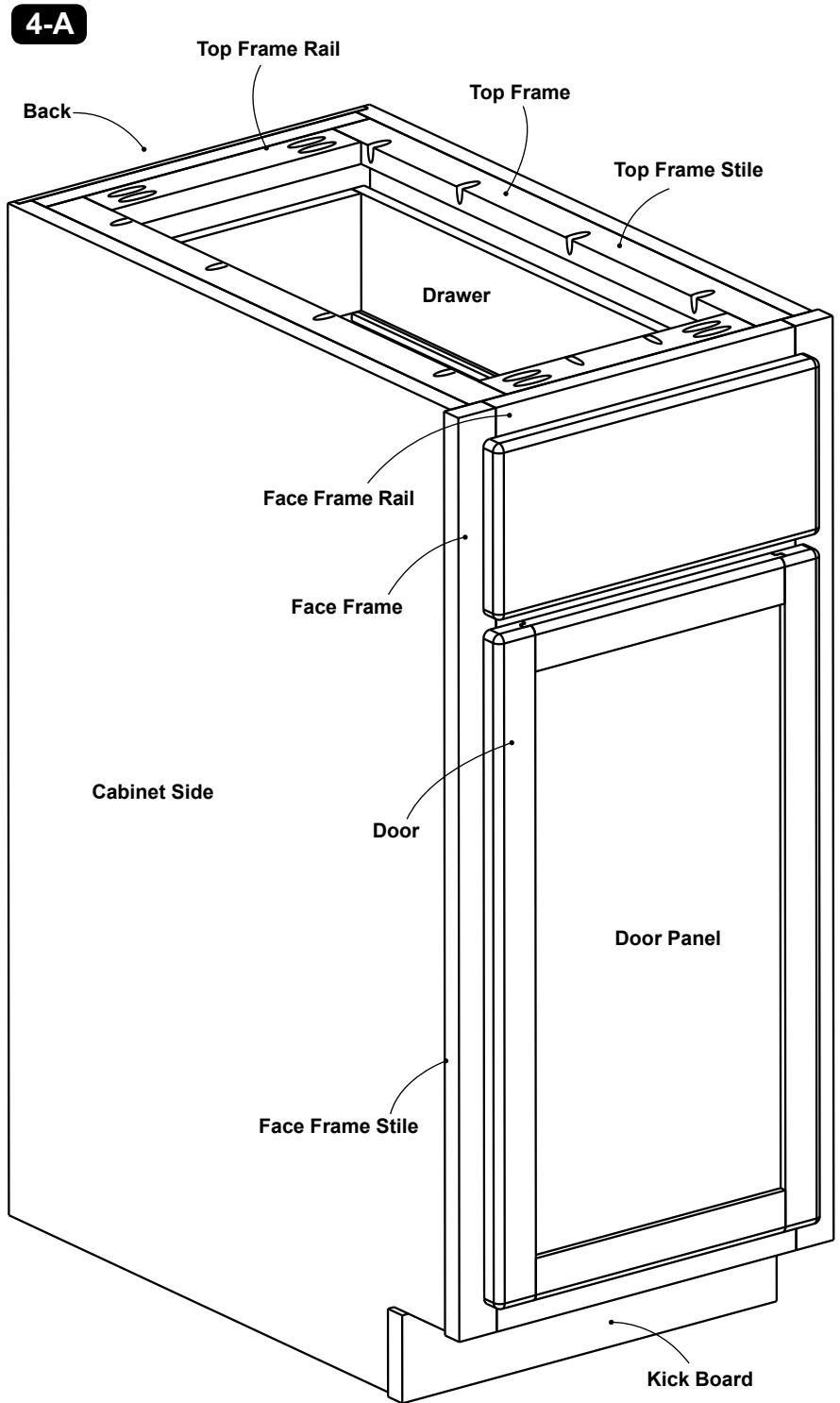


BASE CABINETS

Introduction to Cabinetmaking

Don't expect the first cabinet you build to be perfect. There will be some mistakes and that is to be expected. Try not to be too goal oriented or upset if you make a mistake. That is how you learn. We recommend that before you jump into building an entire kitchen, you should build at least two sample cabinets as you will learn quite a lot from each experience.

You can use your sample cabinets in your shop as a storage place, or a tool stand. The 15" wide sample cabinet detailed in this booklet is an excellent size for use as a stand for a drill press, grinder or sharpening station. Please read through the entire text and study the drawings before starting this project.



Face Frames Explained

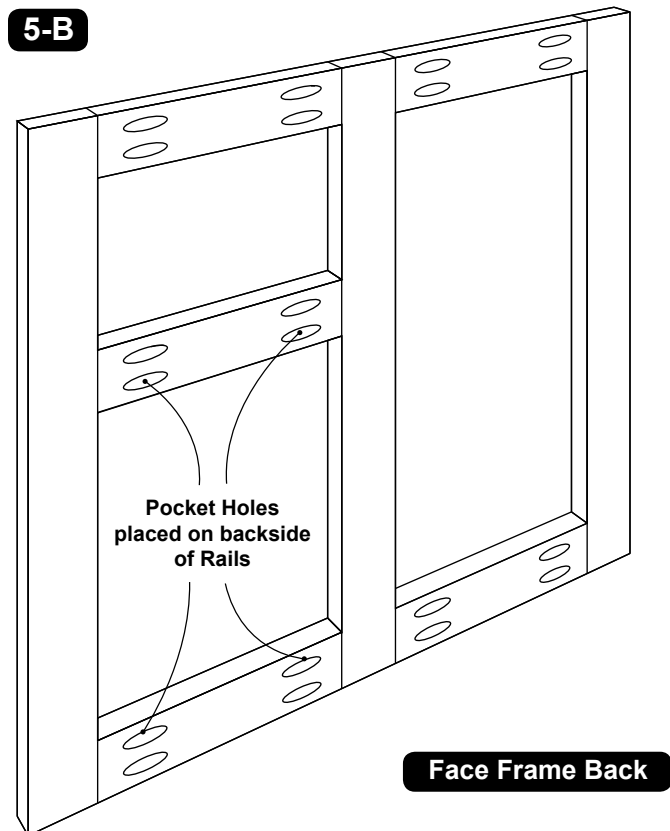
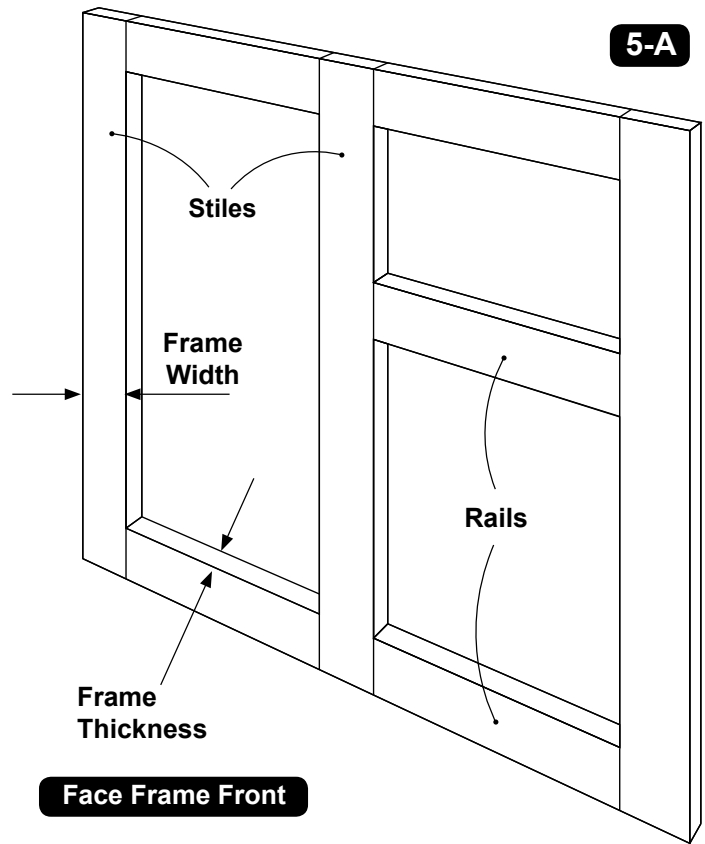
Introduction to Face Frames

Cabinet types are usually divided into two different construction methods: face frame and frameless. The 15" cabinet that we are making in this booklet is the face frame style which means that there is a frame on the front of the cabinet as shown in Fig. 4-A. Using a face frame is the traditional way of making cabinets and case furniture. The frameless cabinet styles are a more recent European development that is sometimes referred to as a Euro cabinet. Frameless cabinets, as the name suggests, don't have a face frame and require relatively expensive equipment to manufacture because there is little room for error. Face frame cabinets, like the one shown in this booklet, are easier for the small shop or the hobbyist to build. The cabinet is essentially a box with a face frame attached to the front of it. The face frame reinforces the box and helps to keep it square. The doors are then mounted to hang from the face frame. Because the face frame supports the box and keeps it square, the back of the cabinet can be made of thinner materials such as 1/4" plywood or another man-made material. The back provides little structural support compared to the face frame which is located on the front of the cabinet.

The face frame is designed to extend past the cabinet carcass 1/4" on each side so when the cabinets are attached to each other, there is a tight fit between the frames. The 1/4" of excess material on each side also allows the cabinet side to be scribed to the wall if it is not straight. The face frame also serves to cover the edge of the materials used to make the box. Single cabinets are often joined together at the face frame to make multiple cabinets as the one shown in Fig. 6-C. Another option is to make multiple cabinet compartments with one face frame.

Dimensions of the Face Frame

The face frame is the widest part of the cabinet. It is 1/2" (1/4" on each side) wider than the cabinet carcass. Because the width of the face frame determines the width of the cabinet, it should be the first measurement determined when designing a cabinet. If the distance between a refrigerator and a stove is 15-1/2", the cabinet should be designed with a 15" wide face frame. That would allow for a little space on each side of the cabinet. Fig. 5-A and 5-B shows the front and the back of the typical face frame. The Pocket Holes are located in the backside of the cabinet and are not visible from the front. The face frame stiles extend from the top of the cabinet to the bottom so end grain is not shown.



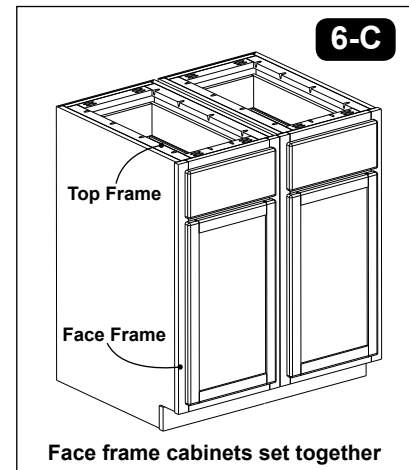
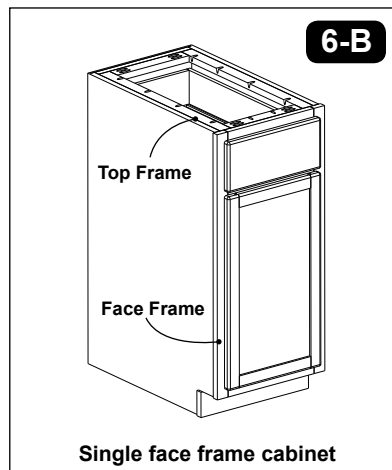
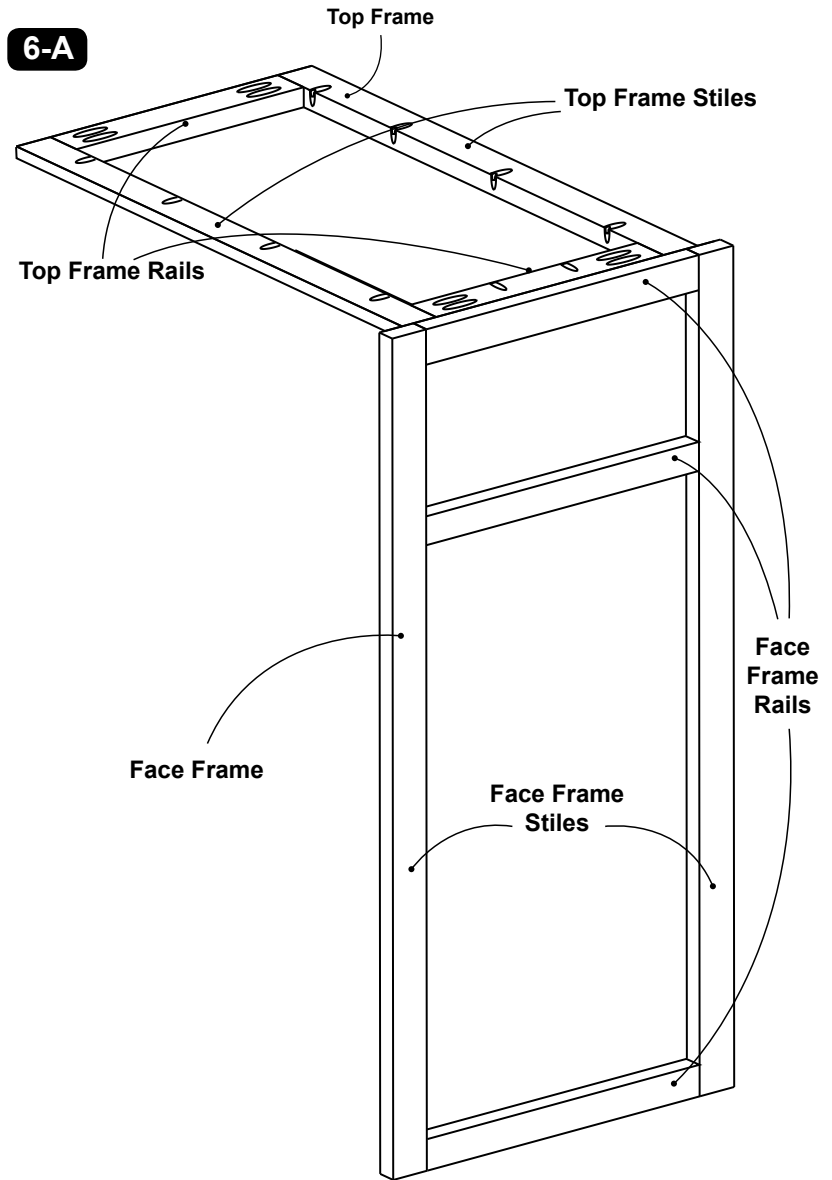
Face Frames Explained

Building a cabinet is essentially a matter of building a box. Most of the joinery used to build the cabinet in this booklet features Kreg Joinery™. Kreg Joinery™ is a relatively new technique in which an angled hole is drilled into one workpiece only and then is joined to the second workpiece using a specialized self-tapping wood screw. Kreg Joinery™ has many advantages compared to other wood joinery techniques for a variety of reasons. Alignment is simplified with Kreg Joinery™ as only one of the workpieces must be drilled prior to assembly. Assembly and clamping time is decreased as you can connect one joint at a time and not need to wait for the glue to dry.

This cabinet design has been simplified so that it can be assembled from the absolute least number of parts. There are only eight parts, including the optional mounting rail. The two identical sides, floor and back are made from manmade panel materials such as plywood, medium density fiberboard or particle board. The face frame and top frame are made from solid stock and are efficiently assembled using Kreg Joinery™. Complicated machining such as the use of dados and rabbets, are avoided. Rather than using individual pieces of wood or triangular corner blocks that are installed individually (which is time consuming and can be misaligned), this cabinet design employs a top frame.

The top frame is made of four pieces that are pocket screwed together. Because it is a one-piece frame it is easily installed. An optional nail rail at the back of the cabinet allows the cabinet to be secured to the wall at the time of installation.

To make sure that the cabinet sides are parallel to each other, the Top Frame and the floor must be **EXACTLY THE SAME WIDTH**. This is accomplished by first joining the frame together, then removing less than a 1/16th of an inch off the edge of the frame by running it through a table-saw. This will then give you the correct tablesaw setting to cut the floor **EXACTLY** identical to the top frame, which will result in perfectly parallel cabinet sides.



Hardware

Note: We recommend that you acquire your hardware BEFORE BUILDING THE CABINET and follow the manufacturer's instructions completely. For the 15" cabinet with overlay drawers built in this booklet, we recommend that you use 22" drawer slides.

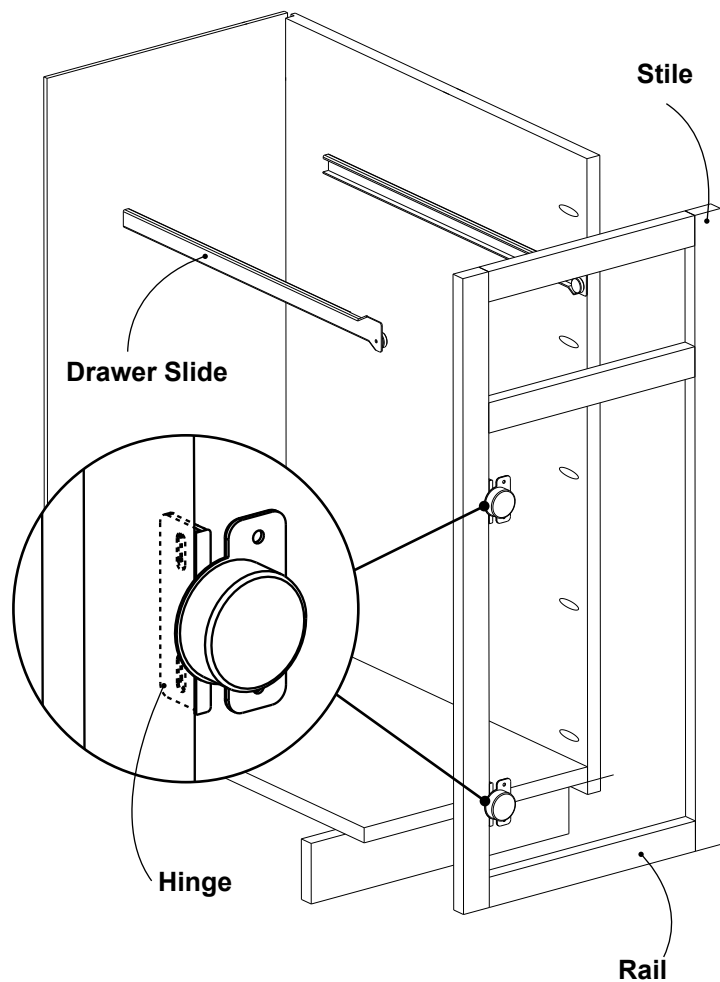
Frameless cabinets are a recent European development that are sometimes referred to as Euro cabinets. The cabinet is essentially a box with no face frame. The sides, floor and solid top are usually made from 3/4" material. The design evolved from new developments in cabinet hardware that allow the doors to be mounted directly to the side of the cabinet rather than the face frame, which is traditionally the way it is done. Along with the door hinge hardware, Europeans also developed hardware for quickly installing the drawers. European hardware has become the standard in the industry and designs have been developed so that the hardware can be used with the traditional face frame. One huge advantage of the hardware is the door hinges are very easily adjusted for alignment with the turn of a screw.

Fig. 7-B shows the drawer slide hardware that we are using in the 15" cabinet. A bottom-mount drawer slide with a roller on the front is secured into the cabinet. The other part of the slide is screwed to the bottom edge of the drawer. This hardware is designed to work with a drawer that is 1" narrower than the opening in the face frame.

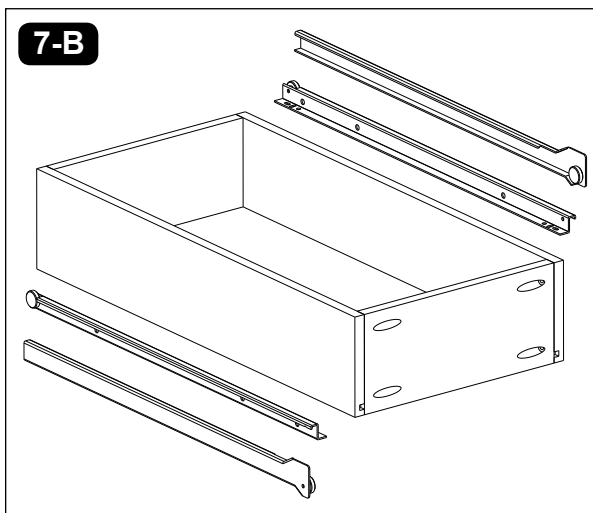
The two door hinges are located in two 35mm holes drilled in the frame of the door. The door hinges are then screwed to the face frame edge. Fig. 7-C shows a drill press setup for locating the hinge cups that uses the Kreg Trak and Stop components.

Study the hardware and make samples of how it will be used before you make the cabinet. It is a good idea to have one or two extra sets of hardware so you can make some sample pieces and keep them.

7-A



7-B



7-C

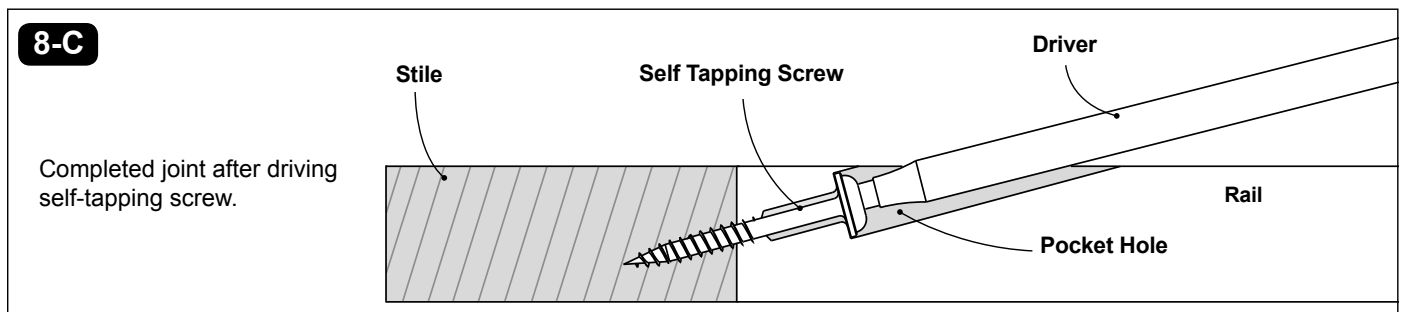
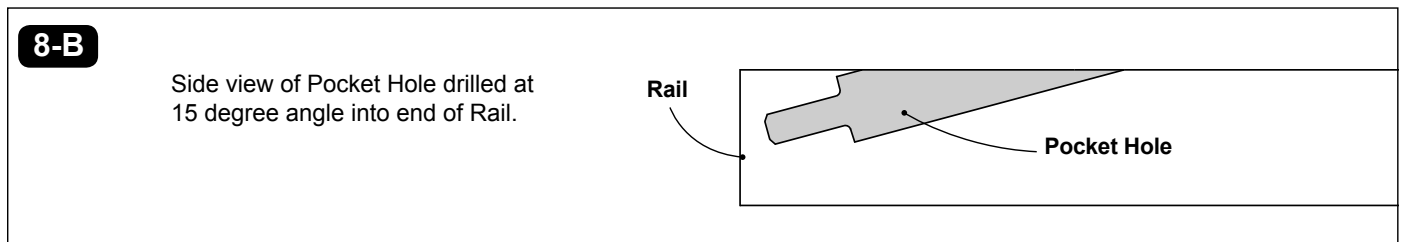
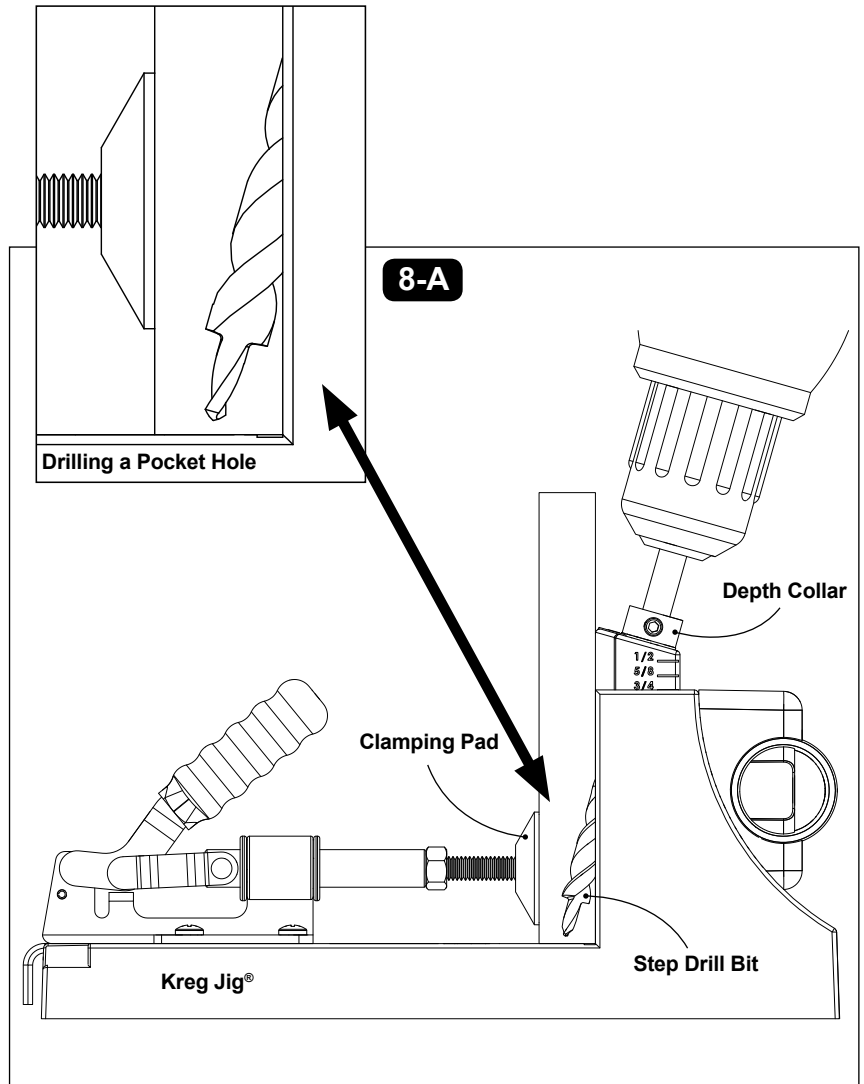


Kreg Joinery™ Fundamentals

Introduction to Kreg Joinery™

Kreg Joinery™ is one of the easiest ways to assemble cabinets and many types of furniture. The joint is easy to make with the proper equipment. The concept is quite simple. One of the boards is secured into a Kreg Jig® and the specialized step drill bit is used to drill an angled hole as shown in Fig. 8-A. A self-tapping screw is then inserted into the Pocket Hole formed by the drill bit and the point of the screw is secured into the mating workpiece, as shown in Fig. 8-C. Although Pocket Hole technology has been used in the furniture making industry for years, two more recent inventions from the 1980's, the Kreg Jig® and the development of the self-tapping wood screw, have made the technology available to all levels of woodworkers.

Kreg Jigs® secure one workpiece in the drilling position, as shown in the photos on page 9. Holes are drilled at a 15 degree angle on the backside of the workpiece using a special step drill bit with a depth collar so that the drill bit does not penetrate the end of the board. There are a number of manual Kreg Jigs® available as well as semi-automatic and fully-automatic machines at a variety of price levels that produce Pocket Holes.

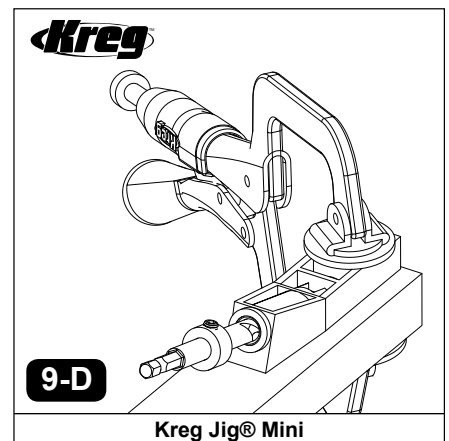
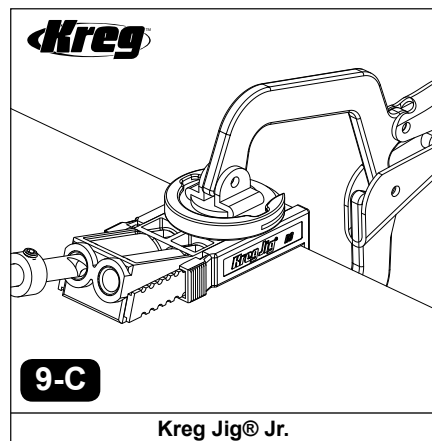
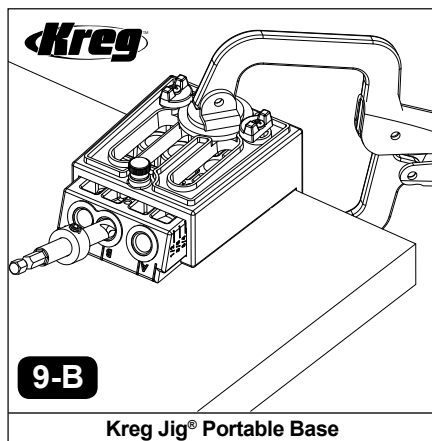
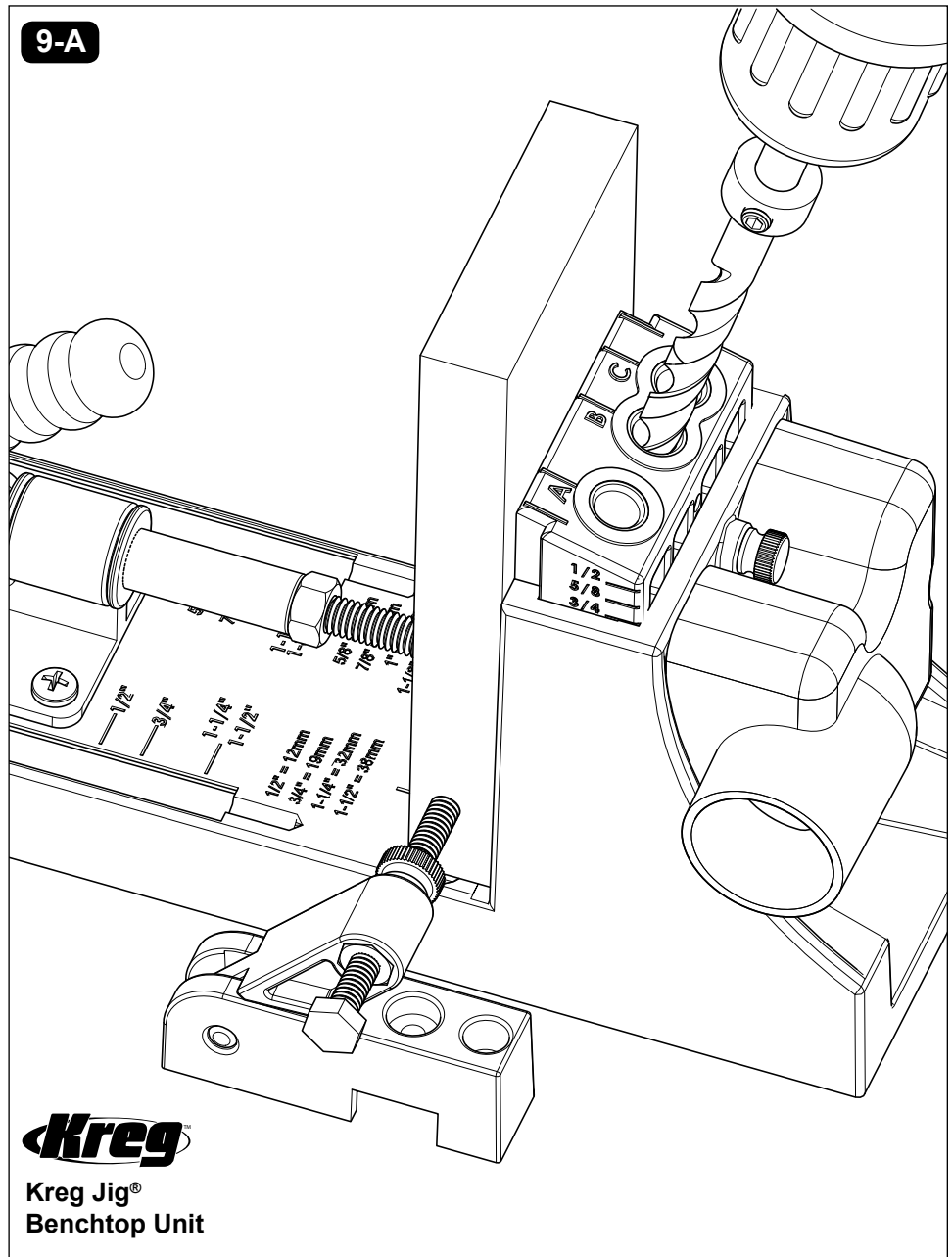


Kreg Joinery™ Fundamentals

Kreg Joinery™ Advantages

Kreg Joinery™ is significantly faster than other wood joining techniques for a number of reasons. The use of a self-tapping screw eliminates the need to pre-drill the mating work piece, which avoids many alignment problems caused by having to layout and drill for aligning fasteners as with dowel, biscuits and mortise and tenon joints. The self-tapping screw serves as an internal clamp that eliminates the need to clamp the joint as the glue dries. This saves the investment in various clamping devices, the time and frustration of clamping, as well as problems associated with pulling the assembly out of square with clamping pressure. You can add additional workpieces to the assembly -- sand, rout and even stain while the glue is still drying. Pocket Hole projects can be completed in hours rather than days.

With Kreg Joinery™, specially designed clamps are used to align the surfaces of the mating boards together while the screws are being driven. Kreg Joinery™ is unique from other joinery methods because there is no need to use multiple clamps for assembly as you assemble one joint at a time. The self-tapping wood screws serve as an internal clamp that instantly bonds the workpieces together, negating the time usually spent waiting for the glue to dry.



Kreg Joinery™ Fundamentals

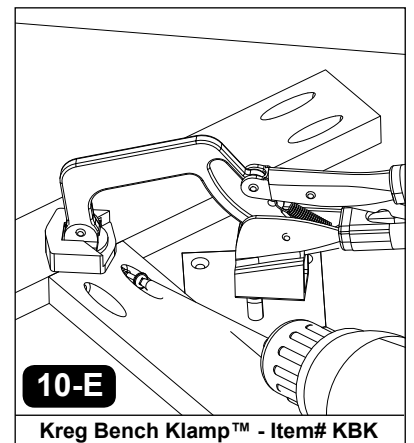
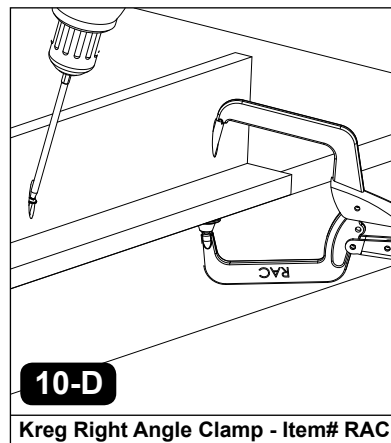
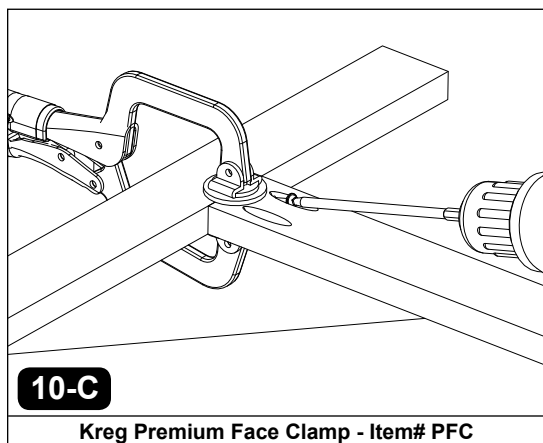
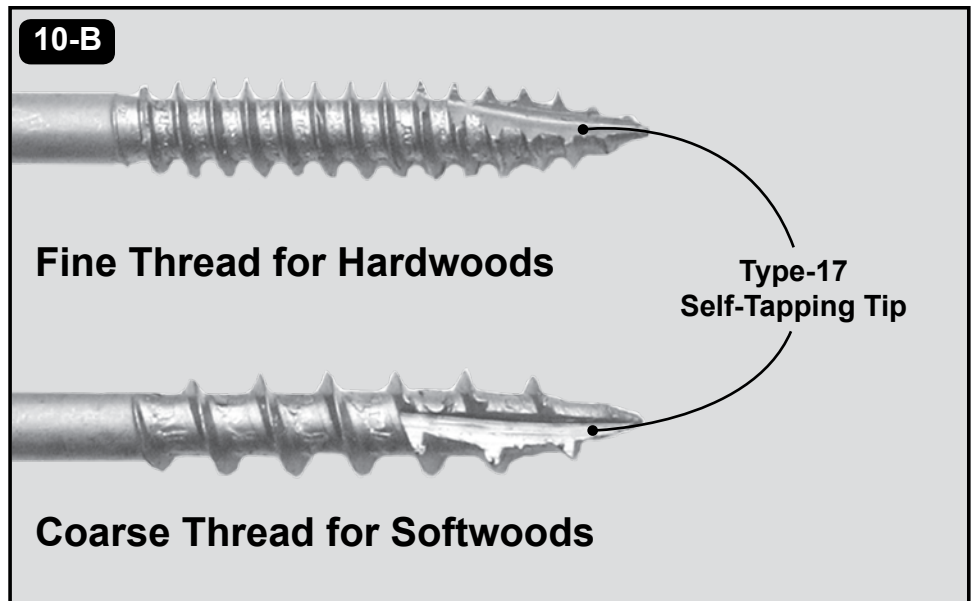
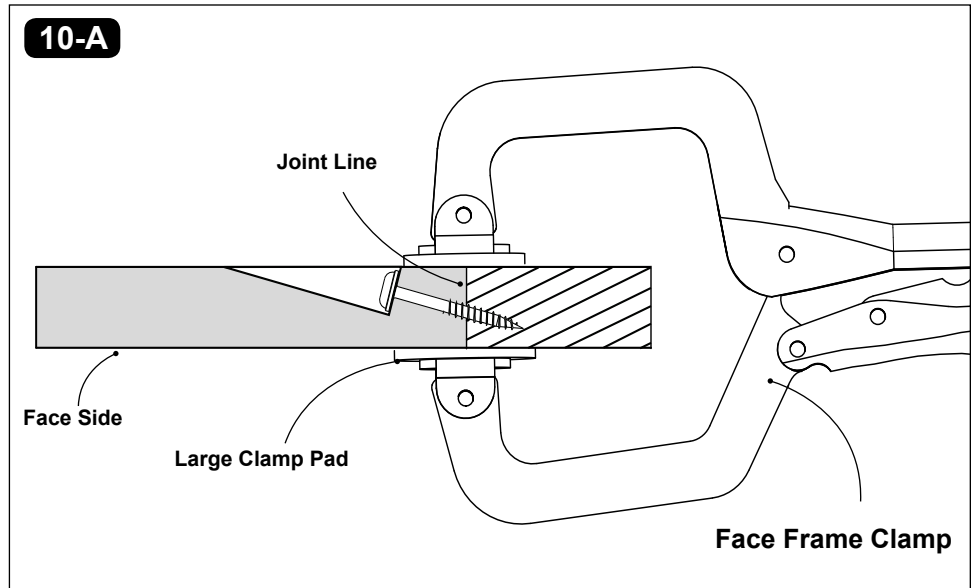
Assembling Pocket Hole Joints

Fig. 10-A shows a completed Pocket Hole Joint and a Face Clamp™ used to hold the workpieces together as the screw is driven into place. Images 10-C, 10-D, and 10-E show three different types of clamping tools that allow Pocket Hole Joints to be quickly assembled.

Photo 10-C shows a portable Face Clamp™ in use that requires the joint to be assembled off the edge of the workbench. The Face Clamp™ has a large clamp pad that registers the faces of the mating boards so that they are in the same plane resulting in minimal sanding being required.

Photo 10-D shows a Right Angle Clamp that is used to secure boards at a 90 degree angle. This clamp features a steel dowel pin on one end of the clamp that fits down into the Pocket Hole and a swiveling pad on the other end that reaches around the opposite side of the board to hold the workpieces firmly in place while the screw is driven into an adjacent Pocket Hole.

The Bench Klamp™ shown in Photo 10-E works very similarly to the Face Clamp™ shown in Fig. 10-C, but is designed to be routed into the top of a workbench. This allows you to rotate the frame around the clamp and assemble one joint at a time as it lays perfectly flat on the workbench.



Kreg Joinery™ Applications

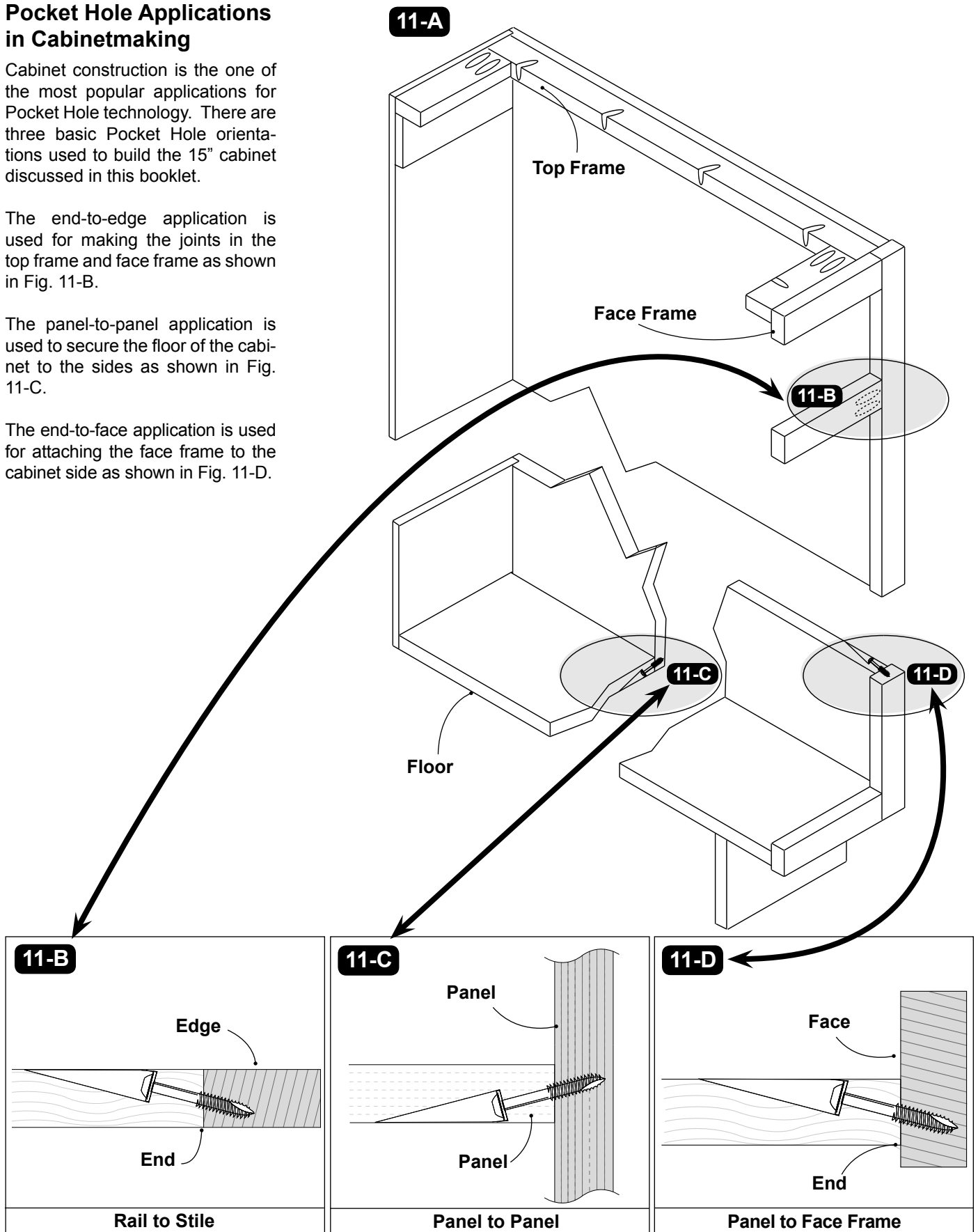
Pocket Hole Applications in Cabinetmaking

Cabinet construction is the one of the most popular applications for Pocket Hole technology. There are three basic Pocket Hole orientations used to build the 15" cabinet discussed in this booklet.

The end-to-edge application is used for making the joints in the top frame and face frame as shown in Fig. 11-B.

The panel-to-panel application is used to secure the floor of the cabinet to the sides as shown in Fig. 11-C.

The end-to-face application is used for attaching the face frame to the cabinet side as shown in Fig. 11-D.



Kreg Joinery™ Applications

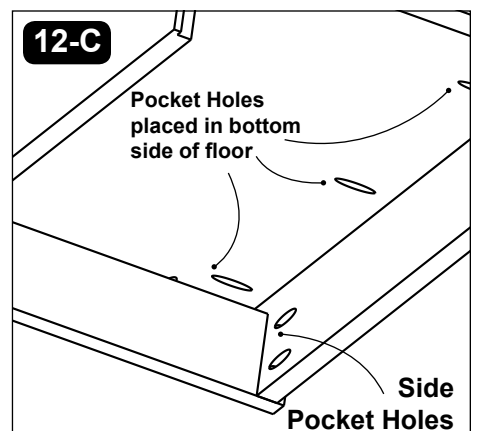
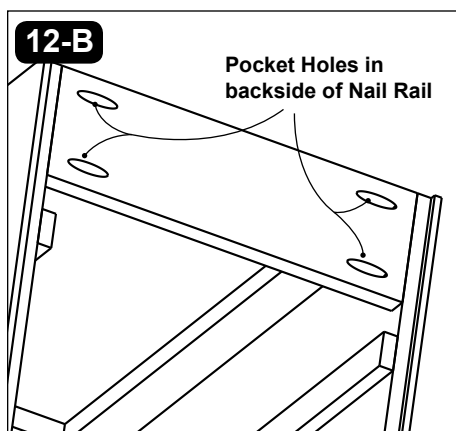
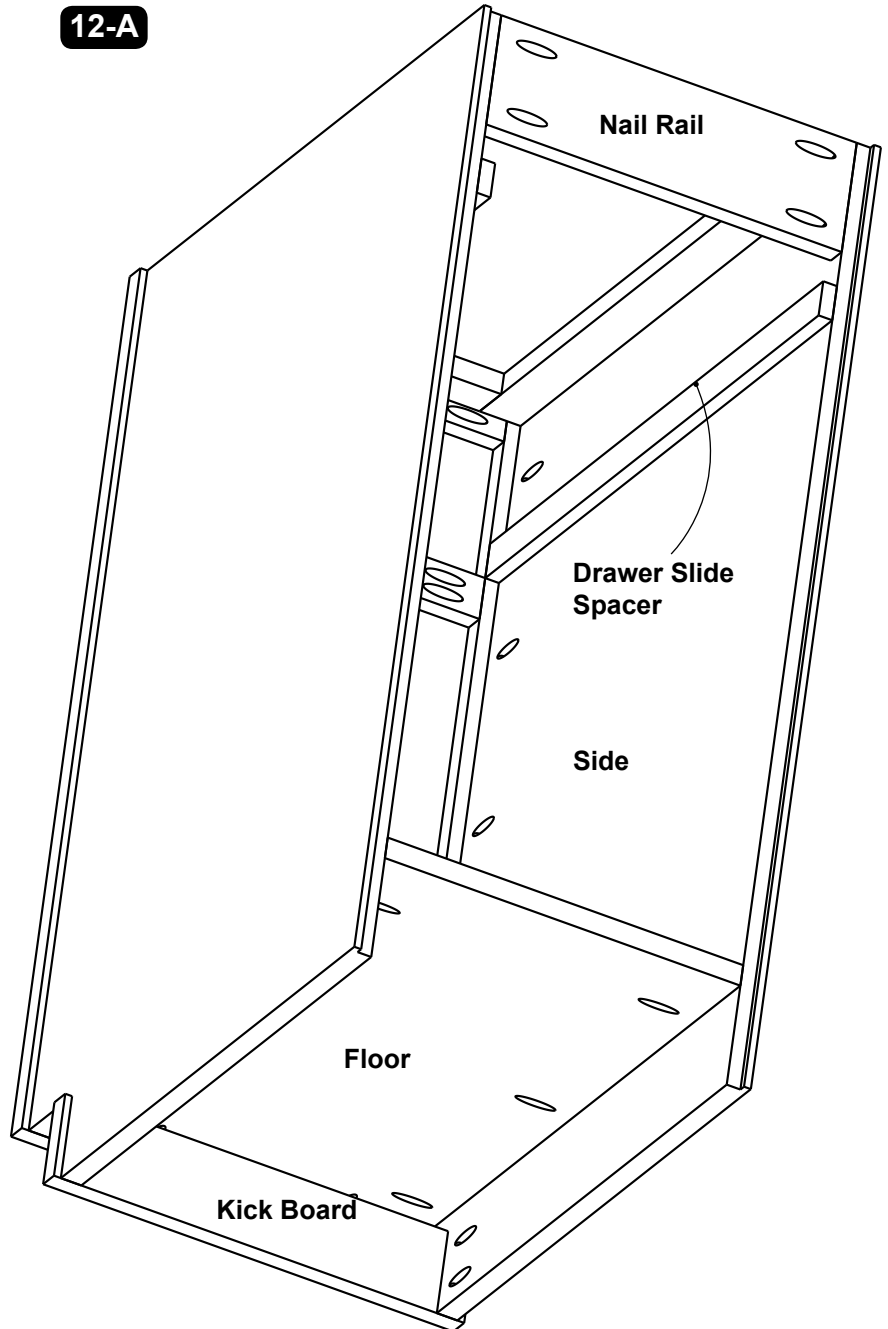
Pocket Holes are normally placed on the backside or underside of a project where they are hidden from view. With a little design ingenuity there are few situations in which a Pocket Hole needs to be visible from the front of the cabinet. The drawings on this page help to illustrate the placement of Pocket Holes on the backside and underside of the 15" cabinet design. Note that Pocket Holes placed on the cabinet sides can usually be hidden against another cabinet side, a wall, or an appliance.

Selecting the Correct Screw

It is important with Kreg Joinery™ to use a self-tapping wood screw. Ordinary drywall or hardware store type screws are not self-tapping and will tend to split the wood. First, choose the correct screw length, which depends on the thickness of the wood, the setting of your Kreg Jig® and the depth at which you drill the Pocket Hole. When joining 3/4" to 3/4" stock, which is what we are doing with our cabinet, a 1-1/4" screw length is standard. I use Kreg Self-tapping Pocket Hole screws which are specially designed for Kreg Joinery™. They feature a type-17 self-tapping auger point that eliminates pre-drilling and a washer head that seats flush in the bottom of the Pocket Hole. These screws have a deep #2 square drive recess, which provides a very positive fit when driving the screw.

It is also important to use a screw thread appropriate for the hardness of the material being joined (see Fig. 10-B). A fine-thread screw is used any time you're driving the screw into a hardwood (i.e., oak, maple, walnut, cherry, hickory, etc).

The coarse thread screw has a larger thread diameter and provides greater holding power when driving a screw into soft material such as plywood, particle board, MDF, melamine, and pine.



Stock Preparation

First Things First

Successful results of any woodworking project depends on the accuracy of stock preparation. Any errors during this step compound as the project progresses. This critical process involves much more than just cutting up the pieces for your project. The initial step in stock preparation is planning. Plans and shop drawings will help you to visualize the finished project.

Make a cutting list, which is a detailed account of the size and number of the parts required. To begin, inspect the wood. Look for flaws, warp, checks, splits or other defects that may prove dangerous. When inspecting the wood, observe grain patterns and color. It is a good practice to buy 25% more material than you need. There is always some waste, but remember that the more material you have, the easier it is to make choices.

Preparing Stock for Your Project

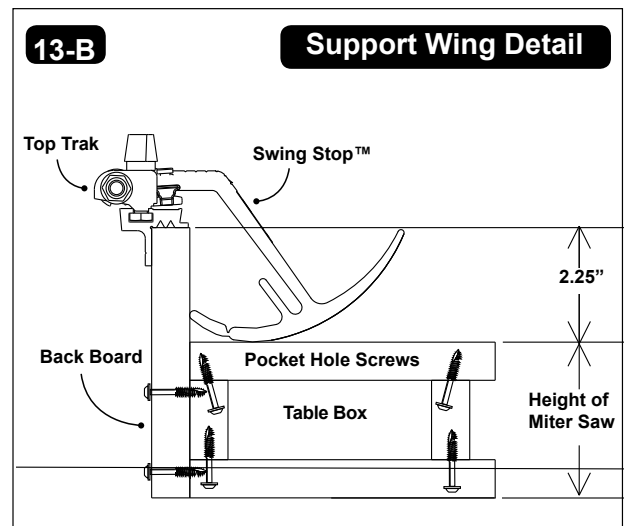
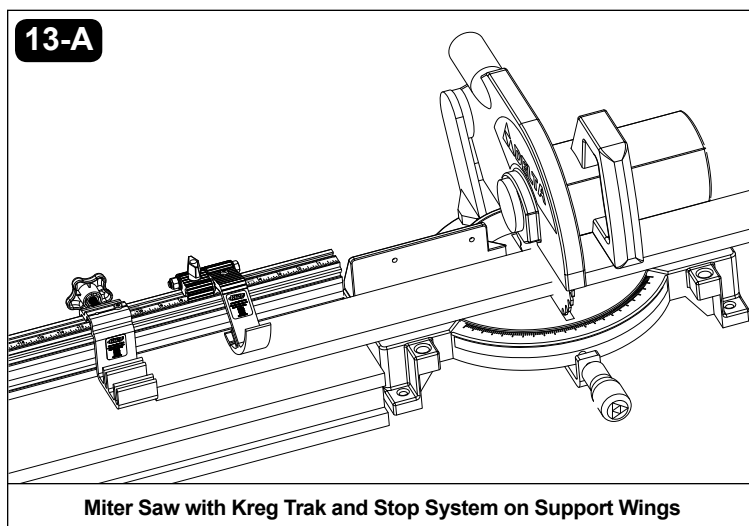
First, check your machine set-ups. Is your jointer fence, table saw, and miter saw square and cutting accurately? Are your jointer and planer knives sharp and adjusted correctly? Secondly, choose your lumber wisely. Lumber is usually available in three forms. The more the wood has been processed the higher the price. Rough lumber has not been processed since it was cut at the sawmill. It has a rough surface and is usually slightly warped. Surfaced lumber has been planed so that both faces of the board are parallel to each other and have a smooth planed surface. This is also known as “surfaced two sides” or “S2S.” “Surfaced four sides” (“S4S”) means that the board has been planed and the edges are square and parallel to each other. Plywood, particleboard and melamine sheets are the most stable materials available to the woodworker. The S4S (surfaced four sides) boards and man-made materials are the most

convenient. The drawback, of course, is that you have to pay a higher price for these finished boards. Many woodworkers with well-equipped shops prefer to surface rough lumber into the S4S material.

“Layout” is the term for the process of selecting and marking the stock required for the cutting lists. The boards are usually sorted by size and color. The widest and the longest boards should be used for drawer fronts. Ideally, the drawers fronts should all be cut from the same board and mounted consecutively with the grain creating a continuous flow. Door panel material should also be chosen with care.

A board that is 4 ft. long is the most manageable to machine. If the finished pieces will be short, leave as long as possible and crosscut them to length last. The key to layout success is to plan ahead so that you can maximize the use of your lumber and your time. Every situation is different and requires a different solution. Jointing and planing may release tension in the board and expose the interior of the board to the environment, which may have a different moisture content. The fresh surfaces may either release or absorb moisture, and the board may distort slightly.

Many experienced woodworkers allow the wood moisture content to equalize by partially processing the wood and then allowing it to stabilize for a couple of weeks in the shop before the final machining. The wood is cut and planed slightly oversize and then stacked with shims between each board. Stacking the boards in this way allows air to circulate between the boards so that they have the same moisture content as the air in the shop. After the boards stabilize, they are jointed and planed again to remove any warp that developed.



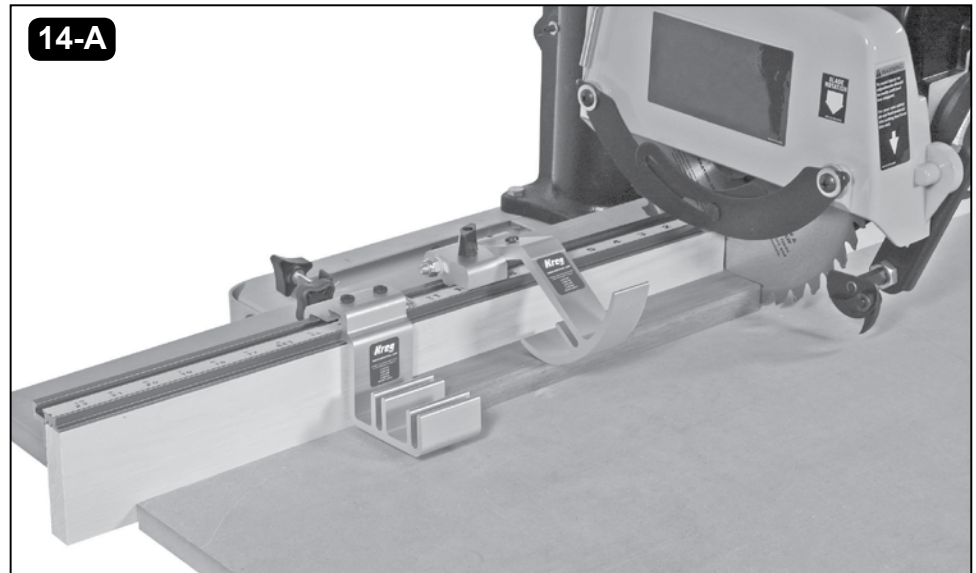
Stock Preparation

Cutting to length

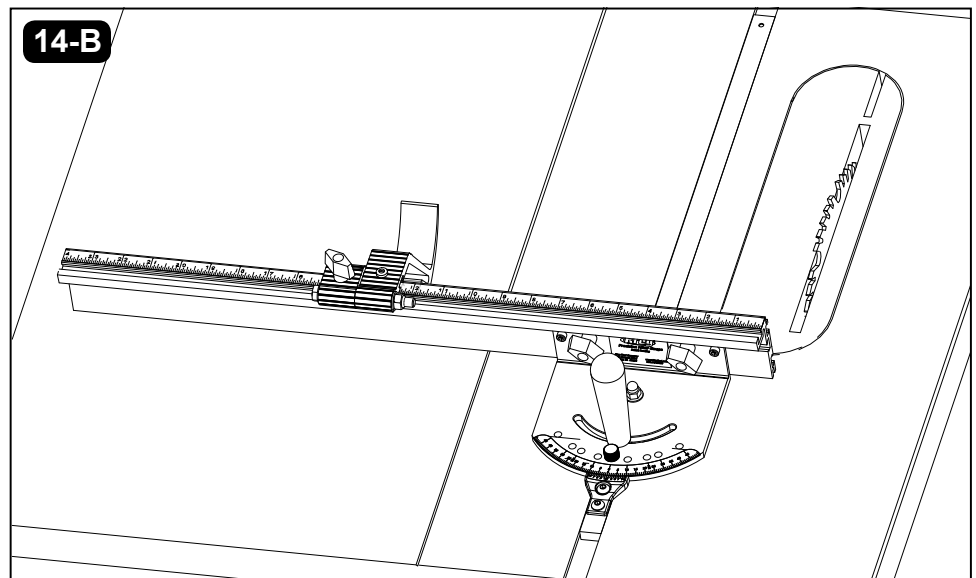
After the boards have been surfaced on all four sides, the last stage is to crosscut the pieces to the desired length. Before you start cutting up your pile of wood, make sure that you have newly sharpened saw blades on your machines. Cutting the two ends square and to the desired length is a two-step process. The initial step is to cut one end square and the second step is to cut the opposite end square and to the required length. I use my tablesaw and the miter gauge to crosscut anything that is less than 20 inches long and the radial-arm saw or miter saw for wood longer than 20 inches. If more than one board is to be cut to the same length, use a stop for accuracy and repeatability. The ideal stop would be there when needed but also allow multiple set-ups. The answer for the small shop is the reasonably priced Kreg Precision Trak and Stop System (Fig. 13-A).

Choose the Right Saw for the Job

Fig. 13-A and 13-B show an easy way to make auxiliary support wings for your miter saw with trak mounted for the stops. Fig. 14-A shows the Kreg stops on the radial arm saw. The miter saw is usually more accurate than a radial arm saw. The Trak and Stops can be mounted on either side of the saw. The curved design of the Swing Stop™ allows a board to bypass the stop by simply sliding the board into the stop, thereby lifting it out of the way. Pieces of multiple lengths can be cut to the precise length without ever touching a stop. For cutting short pieces less than 20 inches long, I use the miter gauge on the tablesaw with the same Kreg Swing Stop™ as shown in Fig. 14-B.



Radial Arm Saw with Kreg Trak and Stop System



Tablesaw with Kreg Precision Miter Gauge

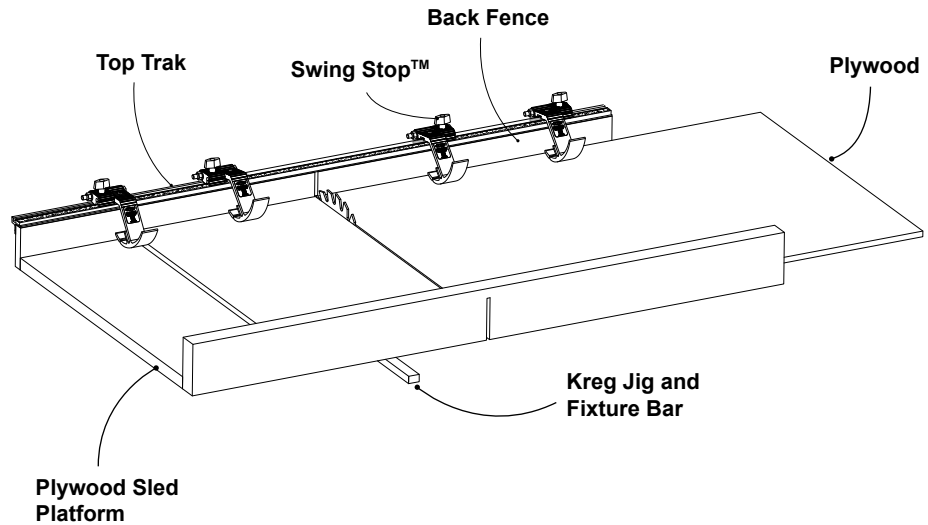
Stock Preparation

Building a Crosscut Sled

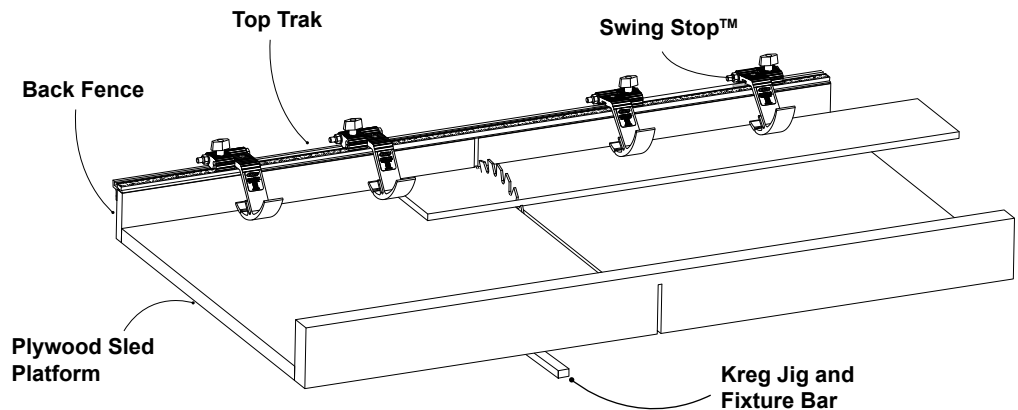
Although the miter saw and the tablesaw miter gauge are great for accurate crosscuts, they are not ideal for cutting sheet materials used in the cabinetmaking process. The Kreg Trak and Stop System can also be used to build jigs and fixtures.

The shop-made crosscut sled shown in Fig. 15-A and 15-B is one of the most useful jigs that you can make for your shop. The plywood platform should be made of high quality material. The back fence supporting the Kreg Top Trak should be 2-1/4" higher than the table. The Kreg Top Trak is screwed on top of the fence board which is secured to the plywood platform with screws. You only need to use one 30" piece of Kreg Jig and Fixture Bar for the bottom of the sled. The sled bottom should be 25" wide so that you can cut a piece of plywood in half as shown in Fig. 15-A.

15-A



15-B



Building a 15" Base Cabinet

15" Cabinet Overview

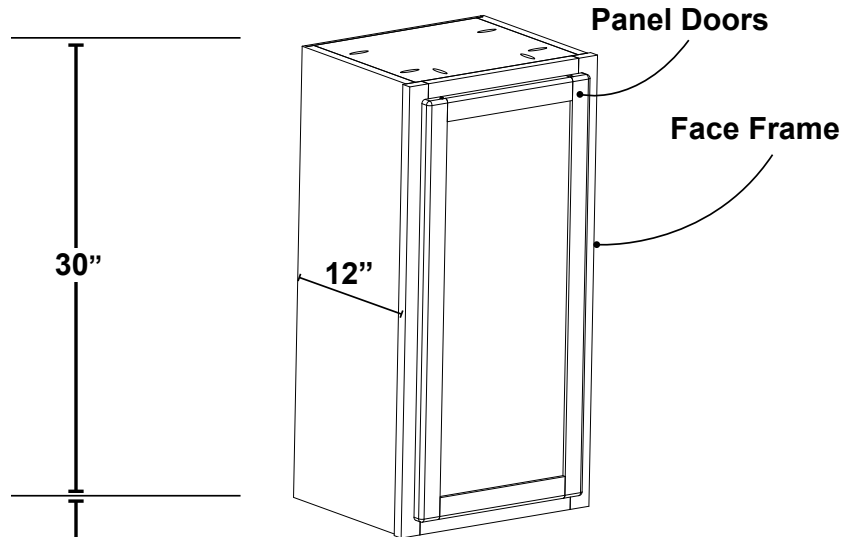
Over the years, a lot has been written about cabinetmaking and the best systems for making kitchen cabinets. Unfortunately, some cabinet designs are not practical for a small shop or use materials that are not readily available to the small shop or individual hobbyist.

When I first started making cabinets, I doweled the face frame which was much faster than the mortise and tenon joint that my father and grandfather used. When I first saw the Kreg Jig® at a woodworking show in Minneapolis, it took about ten seconds for me to figure out that I needed this tool.

This one small device has made more difference than any other tool in my shop. It has helped to make my woodworking a lot faster and easier, the quality of my work has also improved. The cabinet design shown in this booklet has evolved over the years. In this design, I'm using modern technology such as Kreg Joinery™ and European hardware to produce a stronger cabinet in less time.

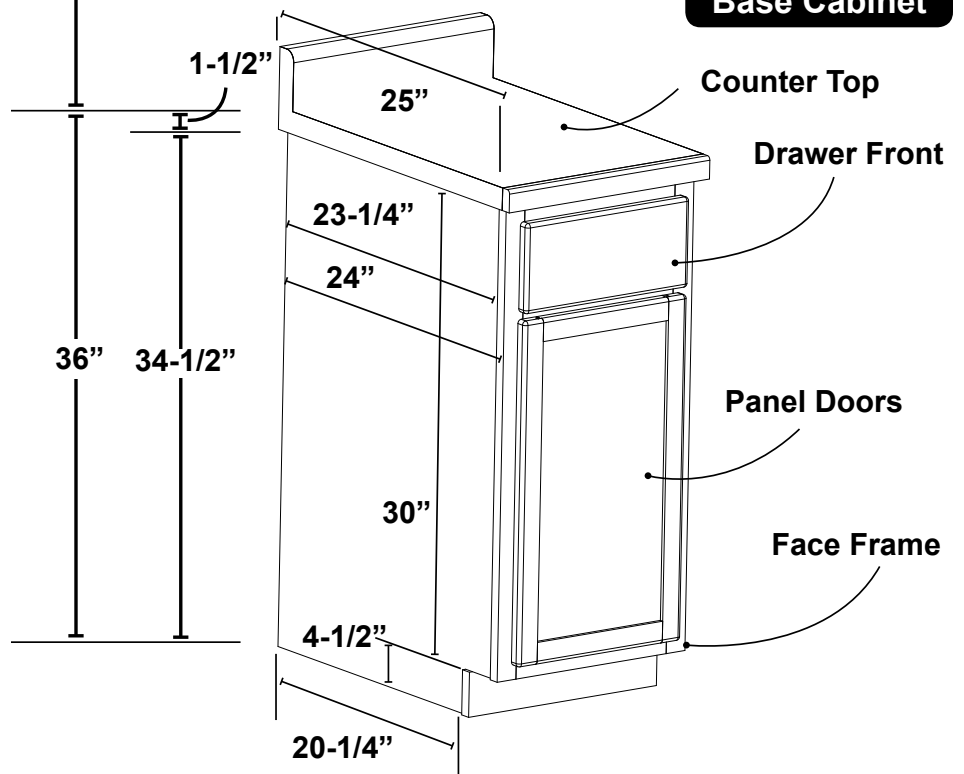
16-A

Wall Cabinet



16-B

Base Cabinet



Building a 15" Base Cabinet

Simple Design - Yet Ready for Production!

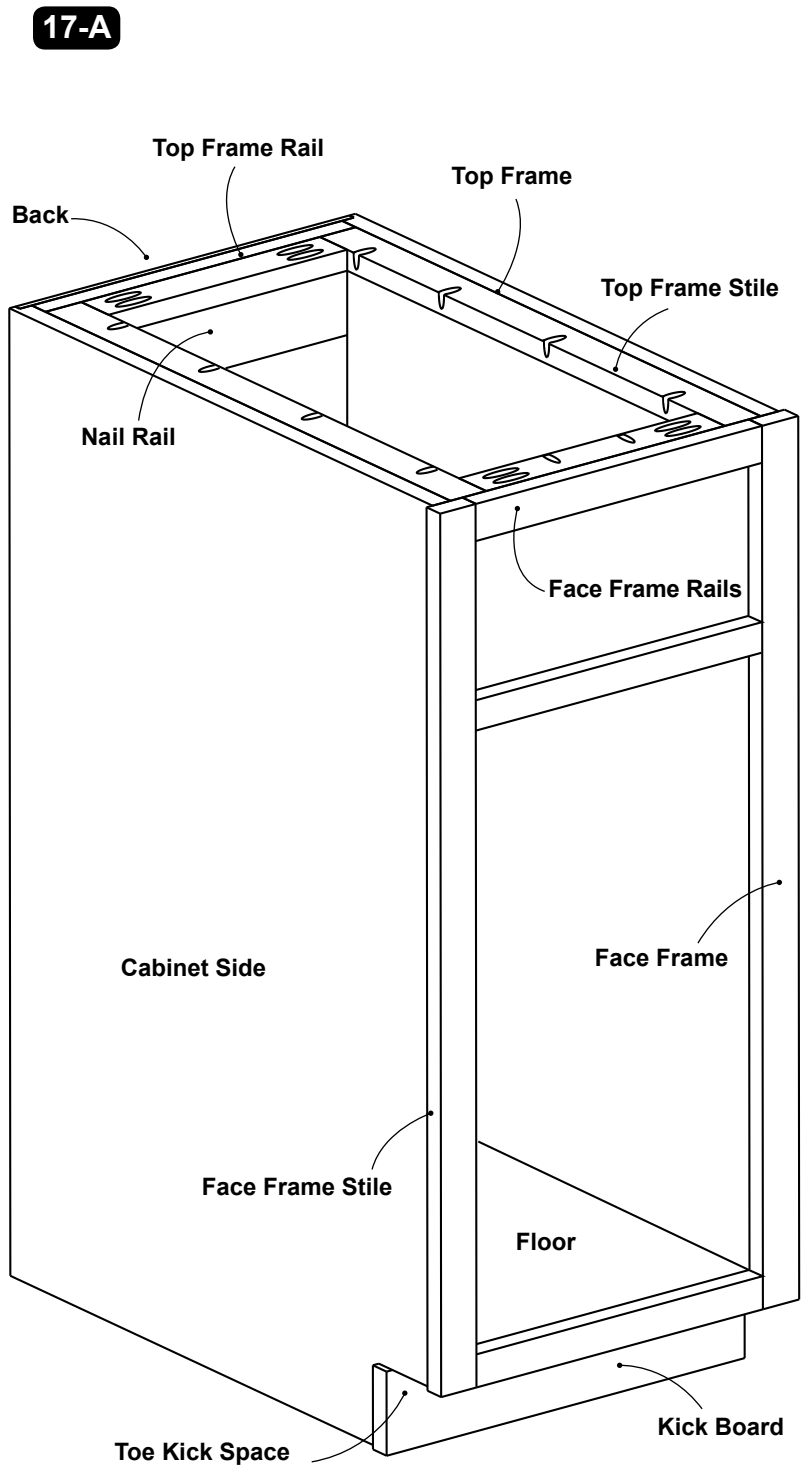
In this cabinet design, I create two simple frames with Kreg Joinery™ that serve as a reference point for the rest of the cabinet. The standard face frame and also a "top frame" which stabilizes the top of the cabinet. It makes the assembly of the cabinet a snap, and I think that it is a better overall product. It is especially easy for one person working alone to assemble.

I've used this design in cabinetmaking classes and now have students, some of whom have never done any woodworking, finish complete cabinets in two days. That includes re-saw and bookmatching the door panel. This booklet is designed to systematically present the information needed to build a high-quality, professional cabinet that can be easily replicated to build an entire kitchen. With that said, let's get started. I'm sure you'll enjoy the simplicity and speed of this construction process.

Placement of the Pocket Holes

Before you start, the placement of Pocket Holes in the side panels is important to plan out in advance. If the side panel is to be exposed to the room, you'll want to position the Pocket Holes on the inside face of the panel and plug them if necessary. If the side panel will be against a house wall or another cabinet, the Pocket Holes should be placed on the outside face, as it won't be visible. If the side panel will be against an appliance and trim will be used to hide the side panel, place the Pocket Holes on the outside face.

The 15" sample cabinet illustrated in this booklet is the face frame style, which means that there is a frame on the front of the cabinet as shown in Fig. 17-A. The cabinet is essentially a box with a face frame attached to the front of it. The frame reinforces the box and keeps it square. The frame is designed to be 1/2" wider than the cabinet so the when the cabinets are attached to each other there is a tight fit between the frames. This cabinet design also has a top frame which keeps the tops of the sides in place and makes the cabinet easier to assemble. The two frames are made from solid stock and are quickly assembled using Kreg Joinery™.



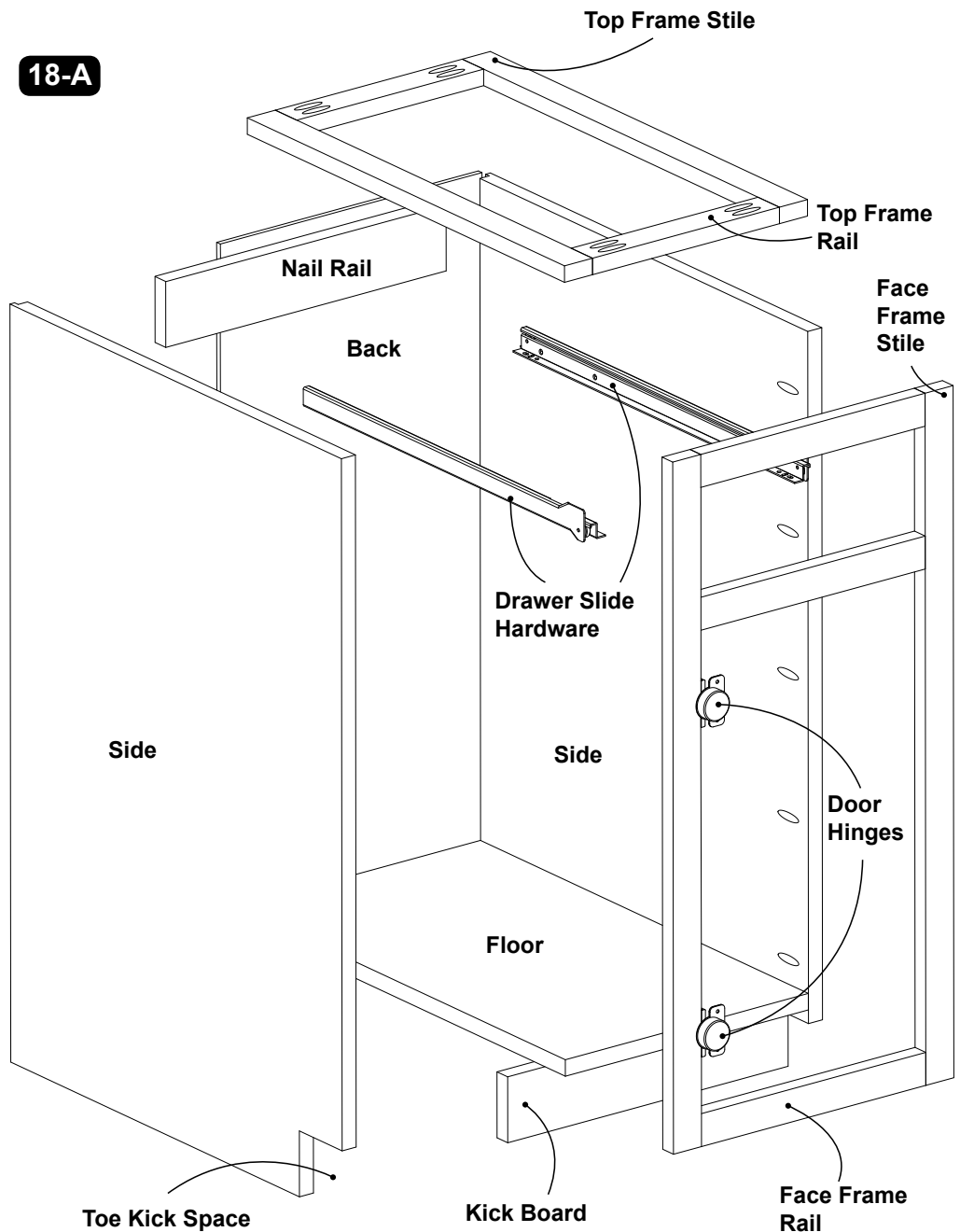
Building a 15" Base Cabinet

Cabinet Parts Overview

Fig. 18-A is an exploded view of the cabinet. The sides are secured to the floor and the top frame before the back and front face frames are attached to the box unit. With this design, complicated machining and the use of dados and rabbets can be avoided. Also avoided with the use of a top frame are filler pieces or angle brackets, which require tedious positioning and installation.

One of the questions to be answered when making a cabinet is how will the countertop be attached to the cabinet? Another often asked question relating to this issue is how do you keep the cabinet sides parallel to each other? In the past, individual corner blocks have been used to square the cabinet top and provide a place for securing the counter to the top of the cabinet. An alternative to the corner blocks is a filler piece called a "stretcher" which is the width of the floor and keeps the sides parallel.

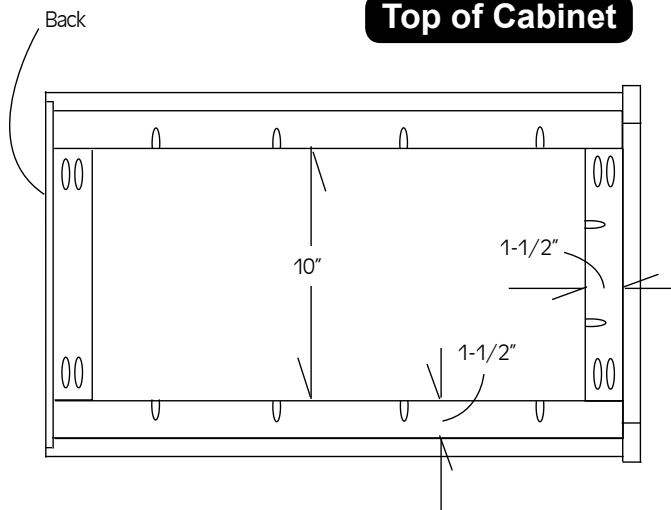
Rather than using triangular corner blocks which are installed individually this cabinet design employs a top frame. The top frame is made of four face frame pieces that are Pocket Screwed together. It provides the spacing function of the stretcher and the squaring function of the triangular blocks. Because it is a one piece frame, it is easily installed when aligned with the top of the cabinet.



Building a 15" Base Cabinet

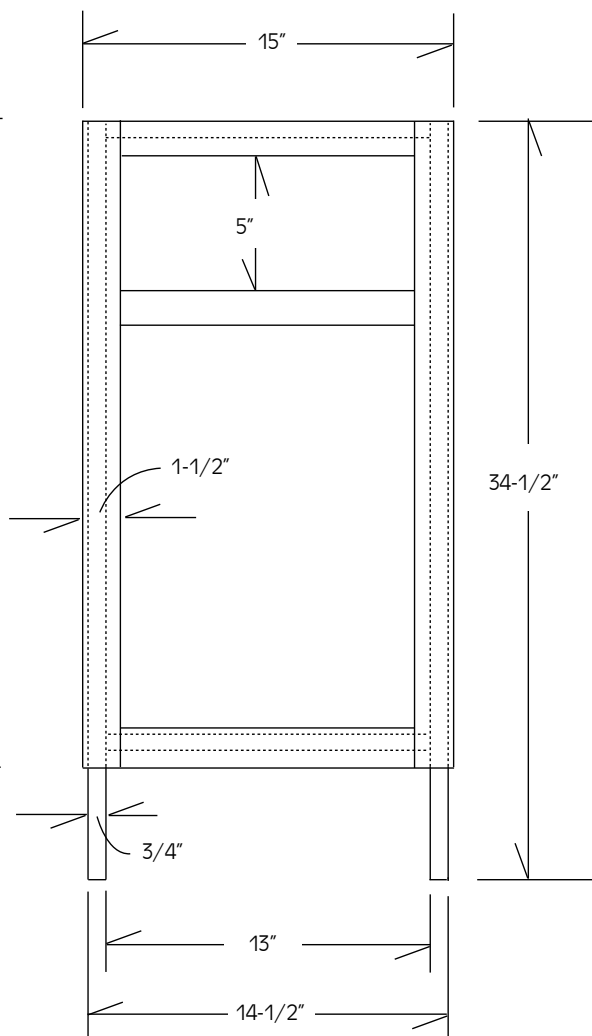
19-A

Top of Cabinet



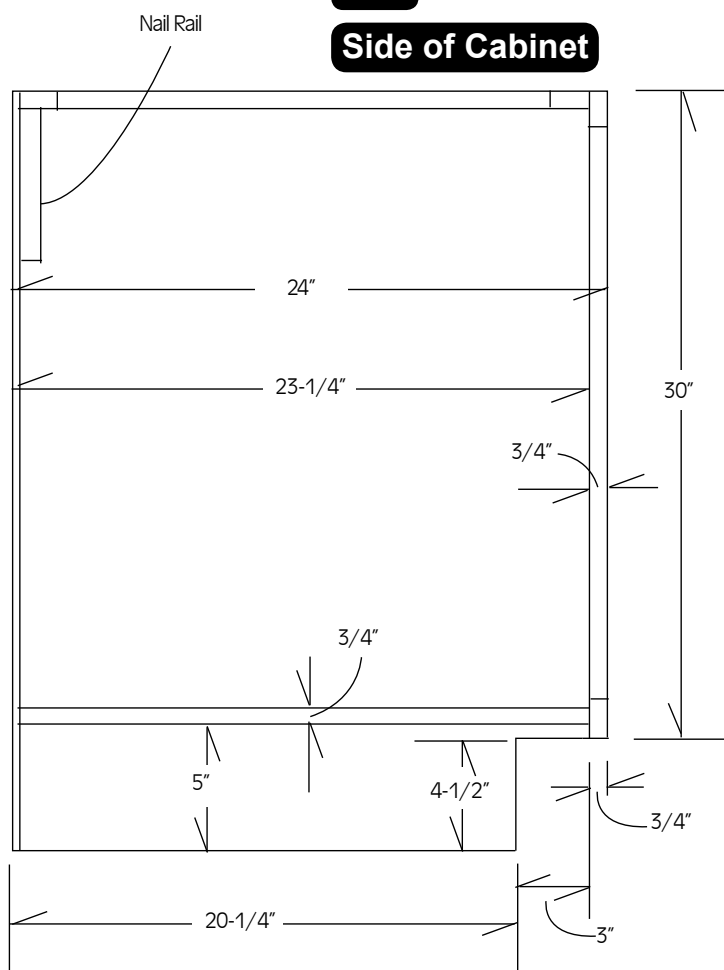
19-C

Front of Cabinet



19-B

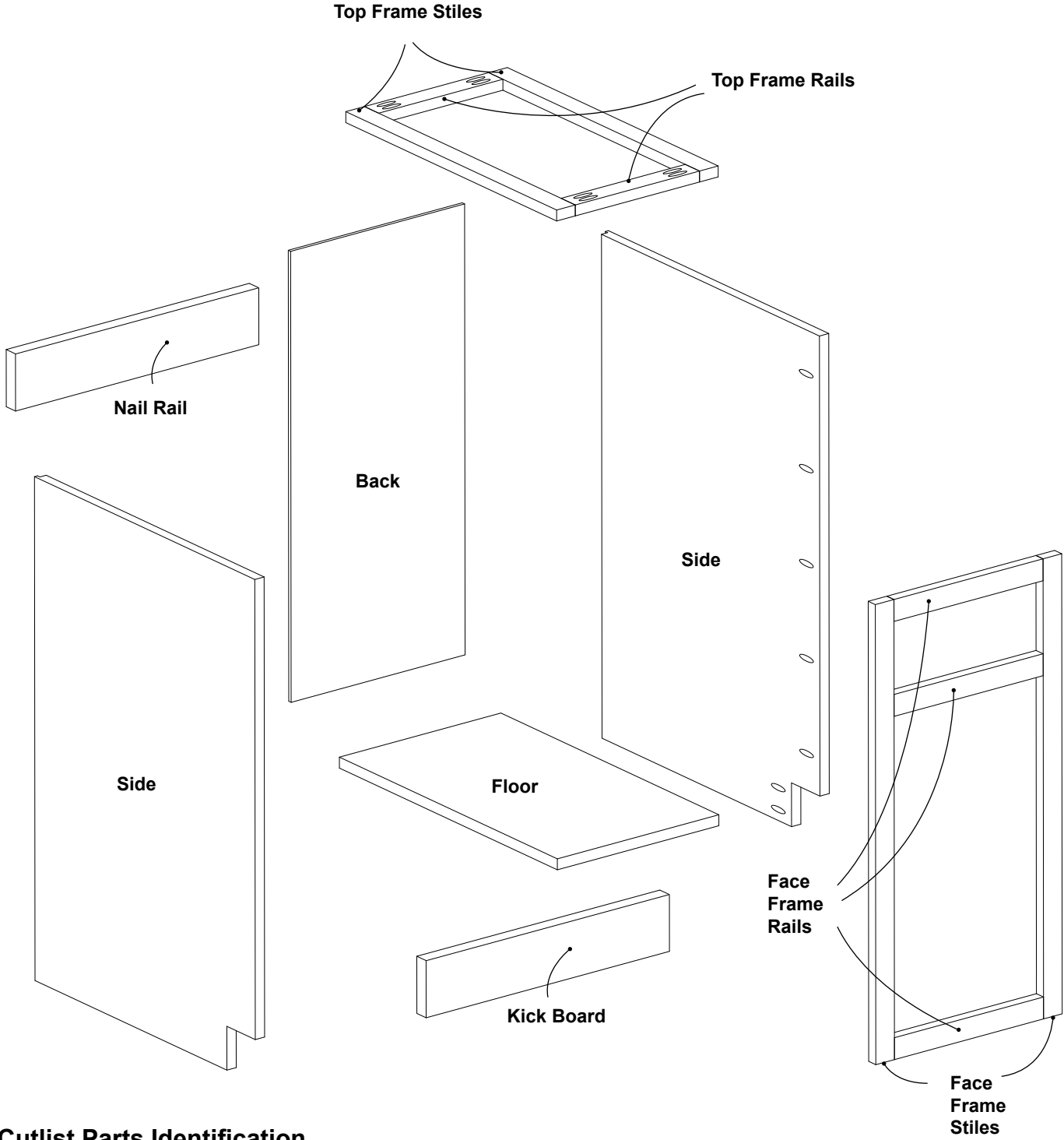
Side of Cabinet



Building a 15" Base Cabinet

20-A

Cutlist Diagram



Cutlist Parts Identification

The parts identified on this page correspond with the cutlist on the following page. Please reference dimensions from the list to size parts correctly prior to assembly.

Building a 15" Base Cabinet

Standard parts are always the same regardless of the width of the cabinet. These items can be made at one time and stockpiled for ease of processing when building a set of cabinets.

Standard Parts Cut List for 15" Wall Cabinet:

Part Name	Qty.	Thickness	Width	Length	Note:
Side	2	3/4"	23-1/4"	34-1/2"	Note: There is a cut out for the kick board that is 4-1/2" high and 3" wide. There is also an optional rabbet in the side panel that is 1/4" deep and 3/8" wide to accept the back panel.
Top frame stile	2	3/4"	1-1/2"	23"	
Face frame stile	2	3/4"	1-1/2"	30"	
Door frame stile	2	3/4"	2"	21-1/2"	
Drawer sides	2	1/2"	4"	21-1/2"	

Non-standard parts change in size (width or length) depending on the width of the cabinet (15", 18", 21", etc.). These parts include the floor, face frame rails, top frame rails, back, door frame rails, drawer rails, drawer fronts, nail rail, and kick board. The rule listed to the right of each component makes it very easy to re-calculate the dimensions for various sized cabinets.

Non-Standard Parts Cut List for 15" Base Cabinet:

Part Name	Qty.	Thickness	Width	Length	Rule:
Floor	1	3/4"	13"	23"	Width of cabinet (15") minus 2"
Top frame rail	2	3/4"	1-1/2"	10"	Width of cabinet (15") minus 5"
Face frame rail	3	3/4"	1-1/2"	12"	Width of cabinet (15") minus 3"
Back panel	1	1/4"	13-1/2"	29-1/2"	Width of cabinet (15") minus 1-1/2"
Door frame rail	2	3/4"	2"	9" Plus	The door frame rail is 9" for the 15" cabinet plus the length of the stub tenon or the length of the tenon on the cope and stick joint. The door panel should be sized AFTER the door frame is completed.
Drawer front rail	2	1/2"	4"	10"	Width of cabinet (15") minus 5" Note: The drawer bottom panel should be sized AFTER the drawer box is completed.
Drawer back rail	2	1/2"	3-1/4"	10"	Width of cabinet (15") minus 5" Note: The drawer bottom panel should be sized AFTER the drawer box is completed.
Drawer front	1	3/4"	6"	13"	Drawer front to be same width as door.
Nail rail	1	3/4"	5"	13"	Width of cabinet (15") minus 2"
Kick board	1	3/4"	4"	14-1/2"	Width of cabinet (15") minus 1/2".

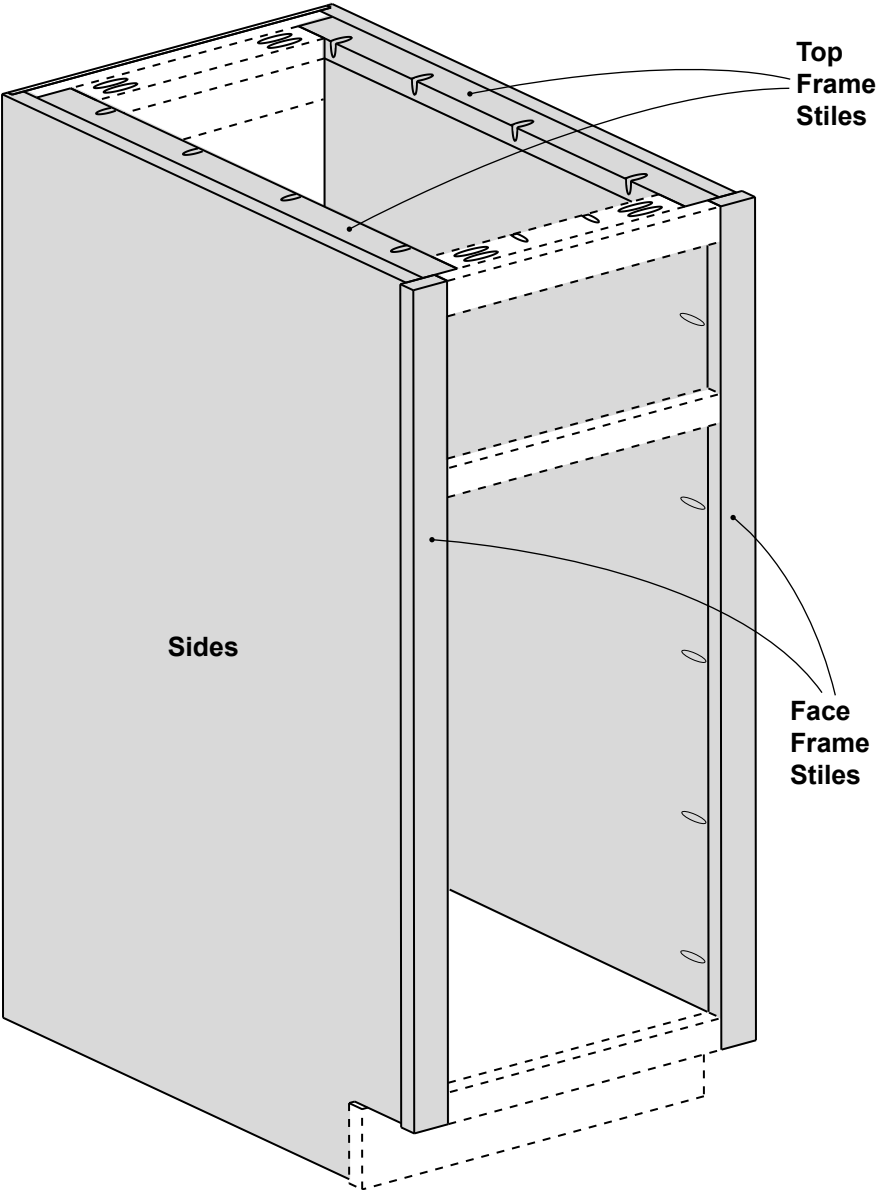
Building a 15" Base Cabinet

About Standard Parts

Standard parts shown shaded gray in Fig. 22-A are always the same size because they do not change with different cabinet widths (ie. 15", 18", 21"). Because these parts are not custom pieces, they can be made in quantity and "stockpiled". The sides, face frame stiles and top frame stiles are standard parts and are always the same no matter what the width of the cabinet may be.

 Standard Parts

22-A Standard Parts



Building a 15" Base Cabinet

Non-Standard Parts

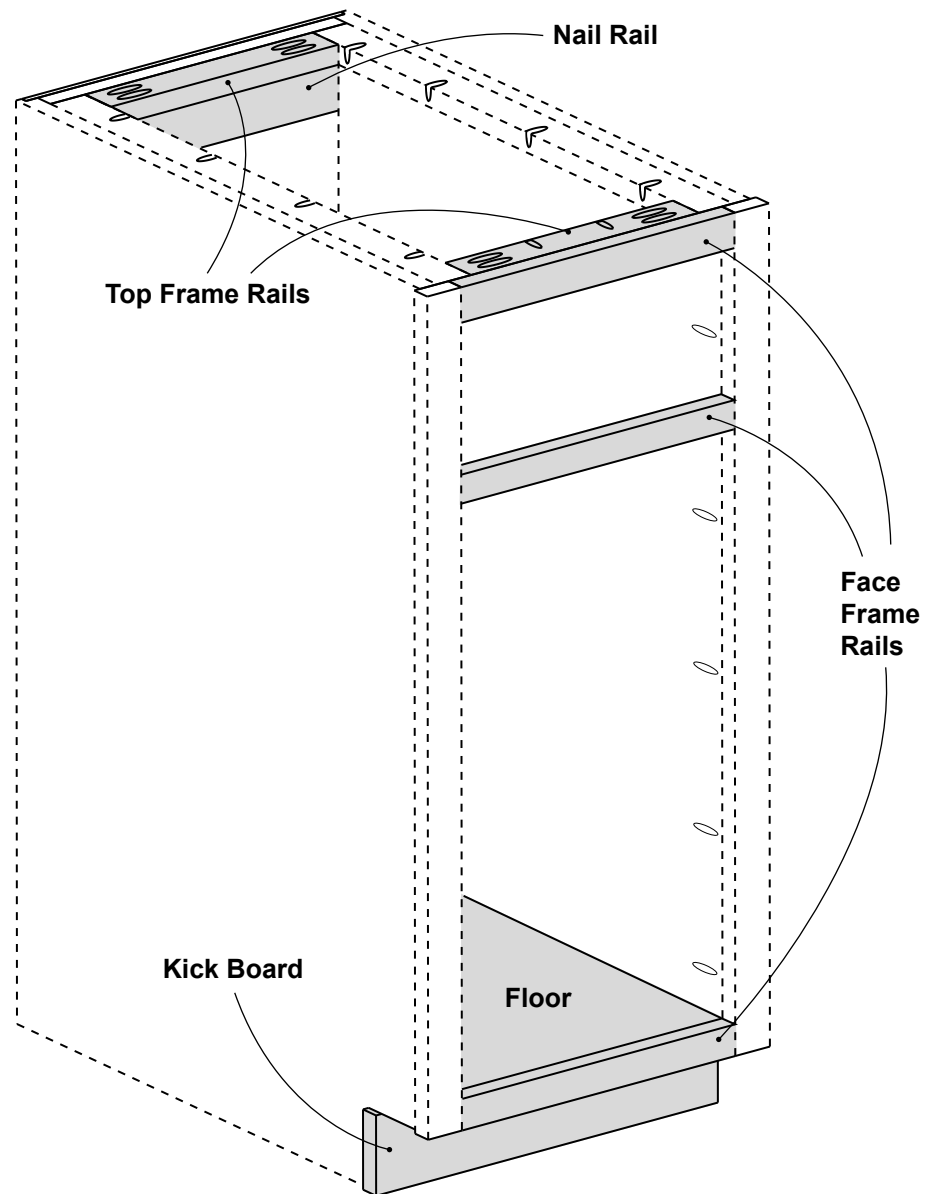
Nonstandard parts, which are shown shaded gray in Fig. 23-A, are the parts that determine the width of the cabinet. They are different lengths depending on the cabinet sizes. The bottom, back, kickboard, nail rail, and frame rails change in size as the cabinet changes in size.

To make sure that the cabinet sides are parallel to each other the top frame and the floor must be **EXACTLY THE SAME WIDTH**. This is accomplished by using the same tablesaw rip fence setting to cut a hair off the width of the top frame and then cut the floor to the same width.

 Non-Standard Parts

23-A

Non-Standard Parts



Building a 15" Base Cabinet

GENERAL CABINET BUILDING SUGGESTIONS

Building cabinets efficiently can best be accomplished by following the simple steps below.

Step 1: Make one complete cabinet at a time (with the exception of the countertop). We recommend beginning with a base cabinet that doesn't span a corner because these are the simplest. These types of cabinets are the focus of this booklet.

Step 2: Once all the cases are made, drawers and doors can be made and finished.

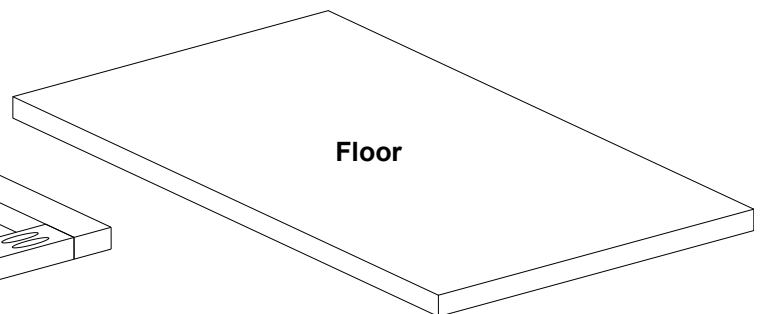
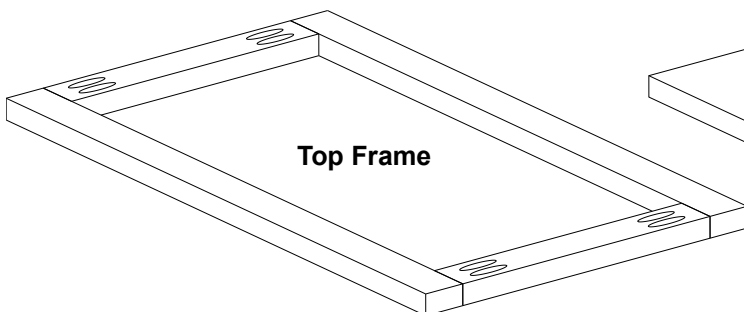
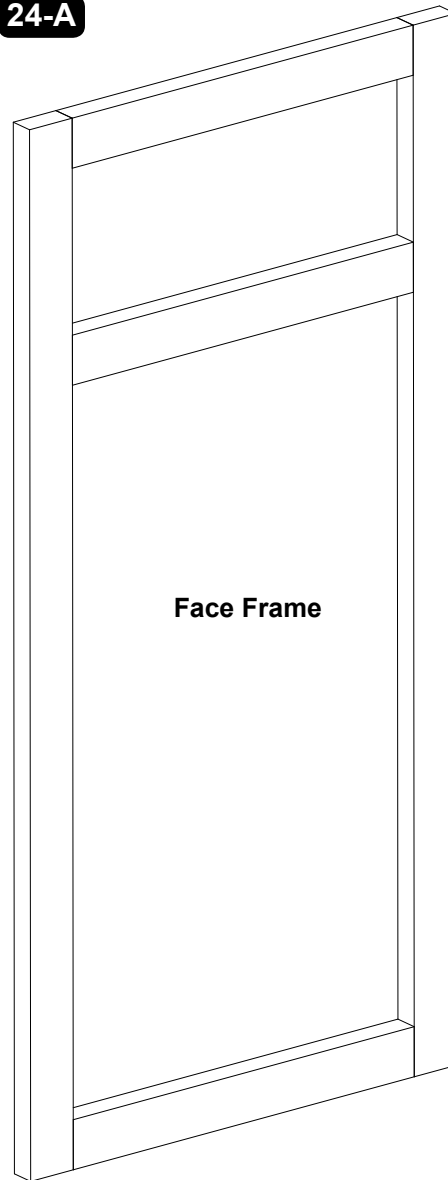
Step 3: Door and drawer hardware should be installed.

Step 4: Attach backs.

Step 5: Install cabinets.

Step 6: Countertops constructed and installed. Important! It will be easier to install your wall cabinets if you haven't installed the base cabinets.

24-A



Top Frame and Floor are ripped to the exact same width on the tablesaw to achieve perfectly parallel cabinet sides.

Assembly

The actual assembly of the cabinet is a step that is easily taken for granted. However, as with other steps in the cabinetmaking process, attention to detail will reward you with professional results.

First, Assemble the Frames

Step 1: Bore two Pocket Holes in the end of each rail.

Step 2: Assemble the face frame and top frame one joint at a time using a Face Clamp™ to align the workpieces.

I use the following screws from Kreg: a #7, fine thread 1-1/4" (#SML-F125) for hardwoods, and a #8, coarse thread, 1-1/4" screw with a washer head (SML-C125) for softwoods and man-made materials.

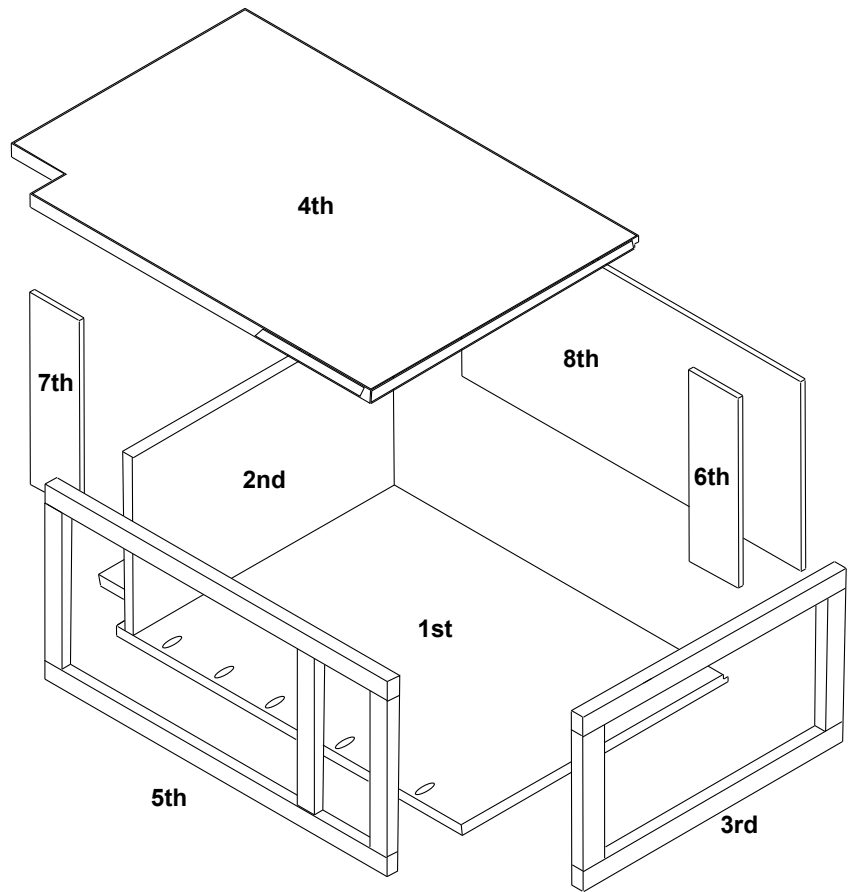
Second, Drill Pocket Holes in Side Panels and Floor

(Note: First mark the inside and outside of each side panel for reference.)

Once the side panels are cut to size, you will need to rout a rabbet into the back inside edge of the panels. This rabbet will later accept the back panel. If the side panel is designed to support shelving, you will also need to bore holes for shelf pins at this time, or use adjustable shelving tracks. If adjustable shelving isn't important, you can simply place Pocket Holes on the underside of the shelves and screw the shelves directly into the side panel.

The next step is to bore the Pocket Holes along the front edge of each side panel. Make sure your depth collar is set correctly. If the side panel is exposed to the room you'll want to position the Pocket Holes on the inside face of the side panel and plug them if necessary. If the side panel will be against a house wall or another cabinet, the Pocket Holes should be placed on the outside face, as the outside face won't be visible. If the side panel will be against an appliance and trim will be used to hide the side panel, place the Pocket Holes on the outside face. Choose which side to place the Pocket Holes, given your situation, and bore Pocket Holes every 6" to 8" along the front edge of the side panel. Use a Right Angle Clamp (as shown in Fig. 10-D) to hold the panels in place as you drive the screws into the face frame.

25-A



Assembly Overview

First, assemble face frame and top frame.

1. Position first side panel on bench.
2. Join floor to one side panel.
3. Join top frame to side panel.
4. Add opposite side panel.
5. Add face frame to front of cabinet.
6. Join nail rail to side panels.
7. Secure kick board to side panels
8. Nail back panel into position.

Assembly

ASSEMBLE THE FLOOR

Place the Pocket Holes along the front edge and sides on the underside of the floor. Make sure your depth collar is set correctly.

Assembly – Step by Step Overview

We recommend that you make a floor spacer jig to help secure the floor to the side using Pocket Hole screws. The spacer is simply a piece of 5" wide scrap with a 1-1/2" piece of wood screwed to the edge of it as shown in Fig. 26-A. Once built, this spacer will allow you to accurately position the floor into your cabinet time after time.

Step 1: Using the shop made floor spacer jig, secure the floor to one side panel using Pocket Hole screws as shown in Fig. 26-C.

Step 2: Next, secure the top frame to the top edge of the side panel.

Step 3: Flip the cabinet over and secure the floor and the top frame to the opposite side panel.

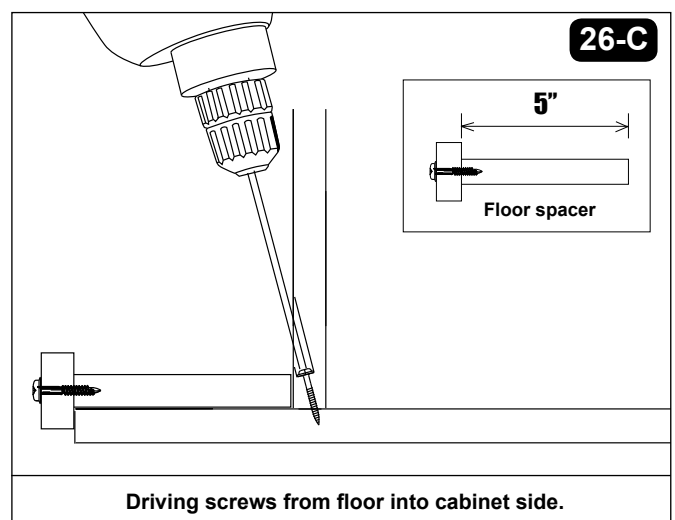
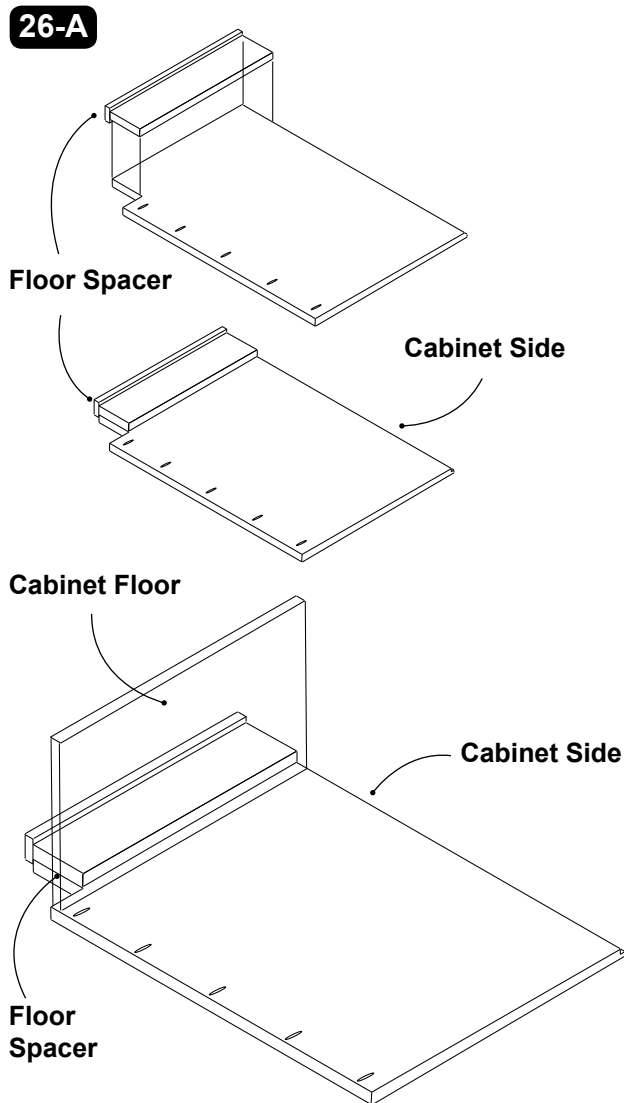
Step 4: Secure the face frame to the front of the cabinet making sure to leave a 1/4" reveal on each edge.

Step 5: Screw the toe kick board to the floor and sides of the cabinet.

Step 6: Door and drawer hardware should be installed at this time. If you are going to use a wood spacer to correctly position the drawer hardware, fit and install the filler strip now. This is covered in detail in the drawer section of this booklet.

Step 7: Screw the nail rail to the sides of the cabinet.

Step 8: Fit the back but leave it unattached for now until the hardware and drawers are fitted.



Countertops

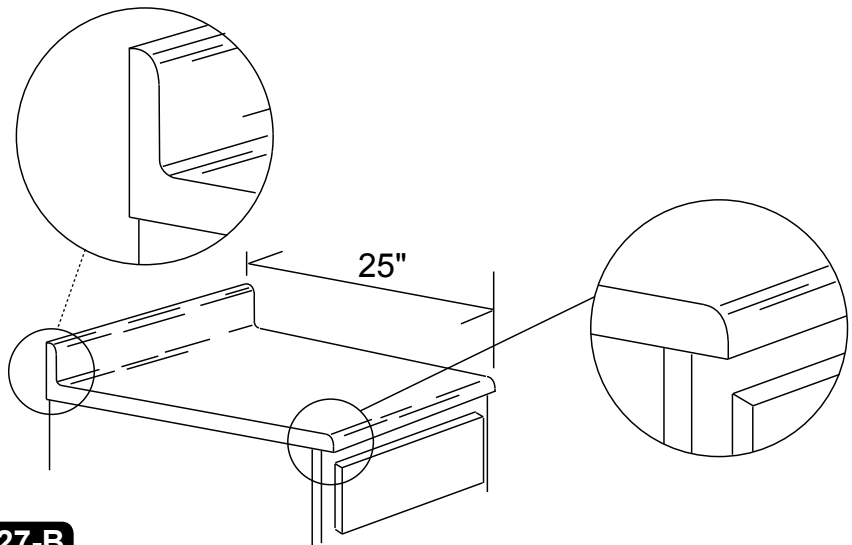
Countertop Basics

The last big task for making the cabinet base is to decide on the design and material for the countertop. There are many options in addition to the standard plastic laminate top including man-made solid surface materials such as fire slate and Corian. Other materials, such as tile and stone, have also gained popularity. After you decide on the material, research the thickness in which it is available in. Some materials, such as Corian, are only available in 1/2" and the height of the cabinet may have to be elongated to reach the finish height of 36", which is the standard height for stoves, etc.

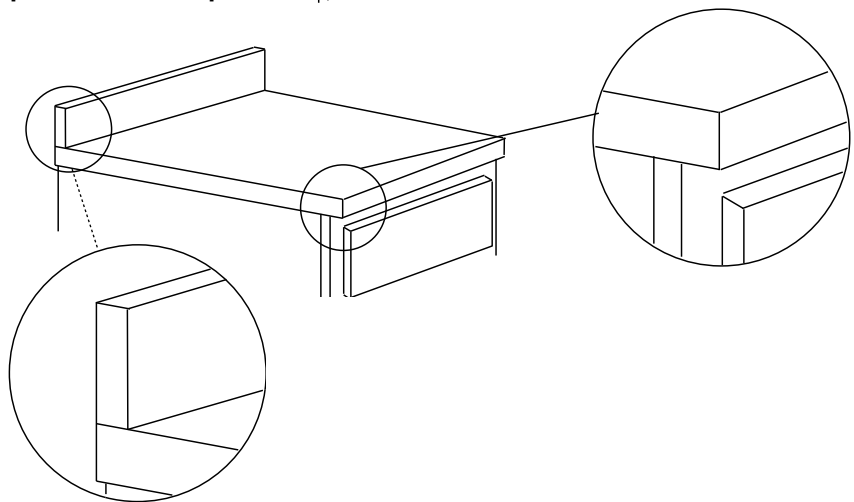
The most popular countertop is the post-formed plastic laminate shown in Figure 27-A. It is available in a large variety of patterns and colors and is relatively inexpensive. It can be ordered in any length up to 12' long and pieces can easily be connected end to end to form any length. It is characterized by three curves, which are the top of the backsplash, the union of the top and the backsplash and the front edge as shown in Fig 27-A. Making the three curves requires very expensive commercial equipment and is beyond the scope of the small shop or hobbyist. It is easily ordered with the end caps already installed from a local dealer or home center either in standard lengths or custom lengths. It usually takes about two weeks for delivery.

Another option for the hobbyist or the small shop is the choice of making plastic laminate countertops without the post-formed edge. The shop-made countertop would have square edges, like the cabinet shown in Fig. 27-B. This countertop is similar to the post-formed version in that the top is made from a 3/4" substrate such as particle board or MDF. The side is designed to look as if it is 1-1/2" thick which is accomplished by adding 3/4" by 3/4" rim boards to the bottom outside edge of the substrate as shown in Fig. 27-C. The rim board should be glued and screwed to the substrate with 1" pocket hole screws. If you secure the rim board material so that it is proud of the substrate by 1/8", it is easily trimmed to be flush with the top by using a flush trimming router bit. Using contact cement, attach the plastic laminate to the sides before laminating the top. After the top and sides are done secure the laminated backsplash to the top with Pocket Hole screws.

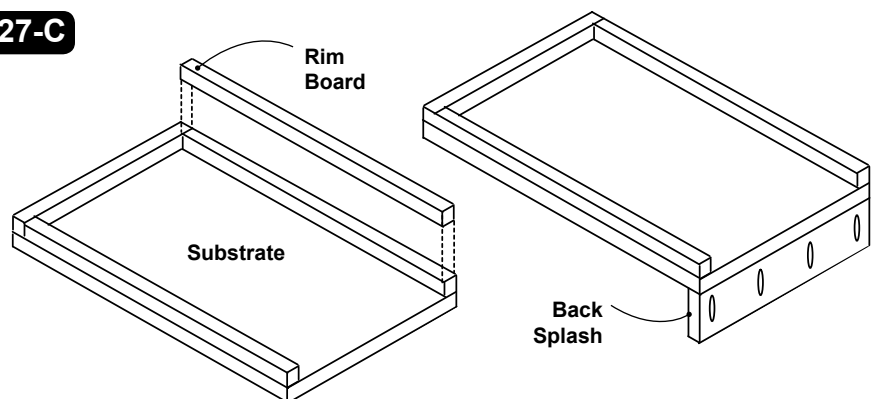
27-A
Standard Countertop



27-B
Square Countertop



27-C

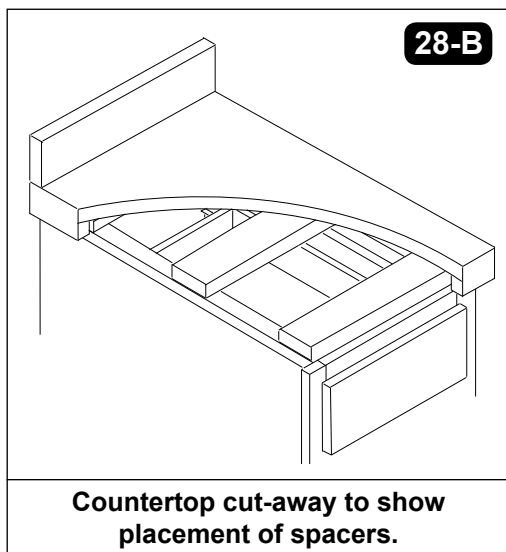
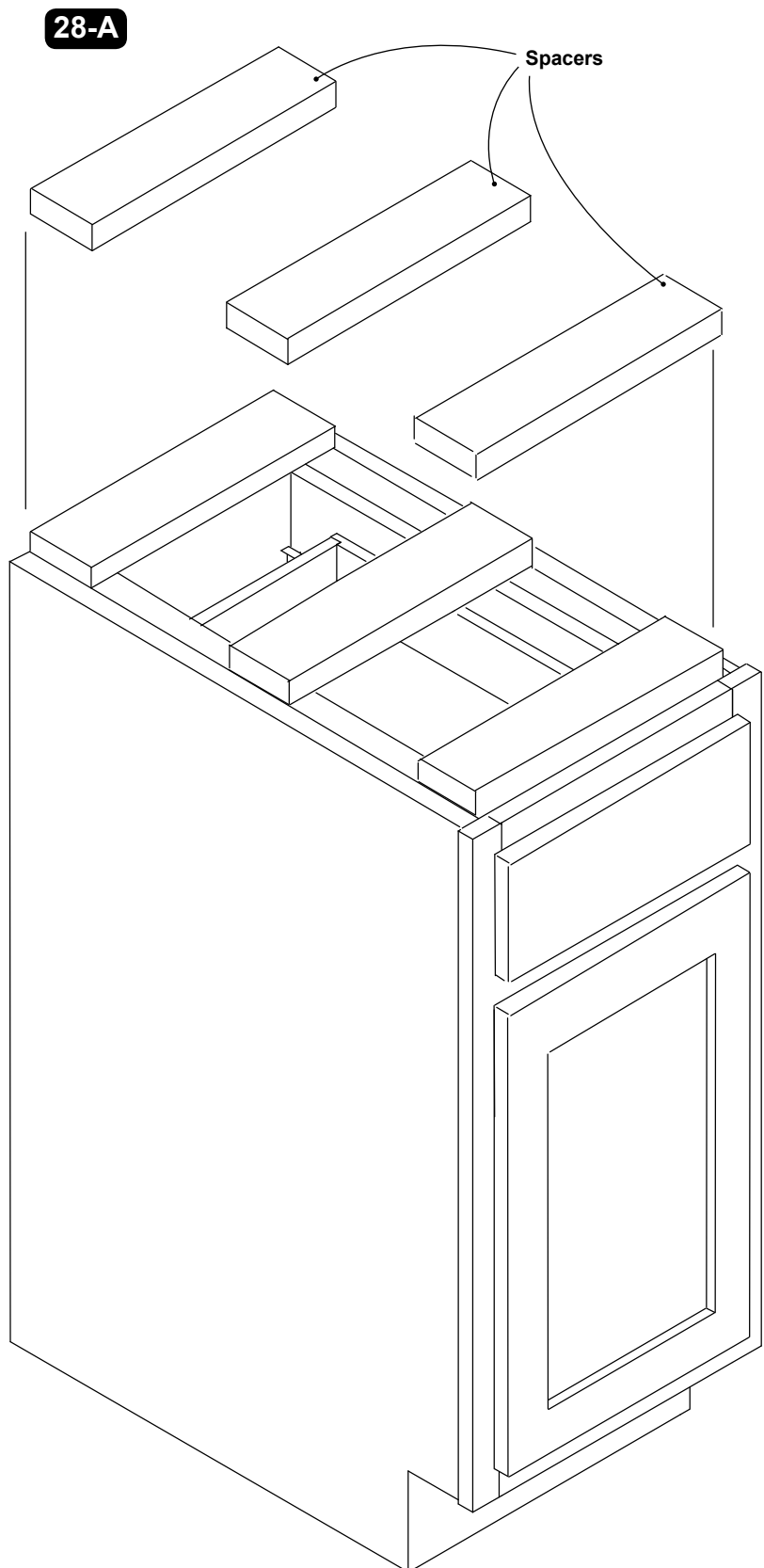


Countertops

Laminated tops, both post-formed and shop made, should be 25" from front to back which allows the cabinet to have a 1" overhang on the front of the cabinet. There are three options for determining the width of the counter top. Islands and counters that are freestanding (don't touch another cabinet or appliance) should have a 1" overhang on each side to match the front of the cabinet. An island with an eating space is an exception because the counter top should extend past the cabinet for sitting space.

If the cabinet is placed between appliances, such as a stove and a refrigerator, the countertop should extend 1/4" past the edge of the face frame on each side of the cabinet. That means that the countertop for the 15" cabinet would be 15-1/2" wide. The third option is to make a countertop with a 1/4" overhang on one side which contacts an appliance and a 1" overhang on the opposite side which is open to the room.

There are various mechanisms for securing the countertop to the cabinet. One option for securing plastic laminated counter tops is to use spacers attached to the top of the top frame with screws as shown in Fig. 28-A and 28-B. The spacer is 3" wide and the width of the top frame which is 13" for the sample 15" cabinet. The spacers fit in the 14" space between the rim boards. Holes in the spacers allow 1" screws to be used to secure the countertop to the cabinet.



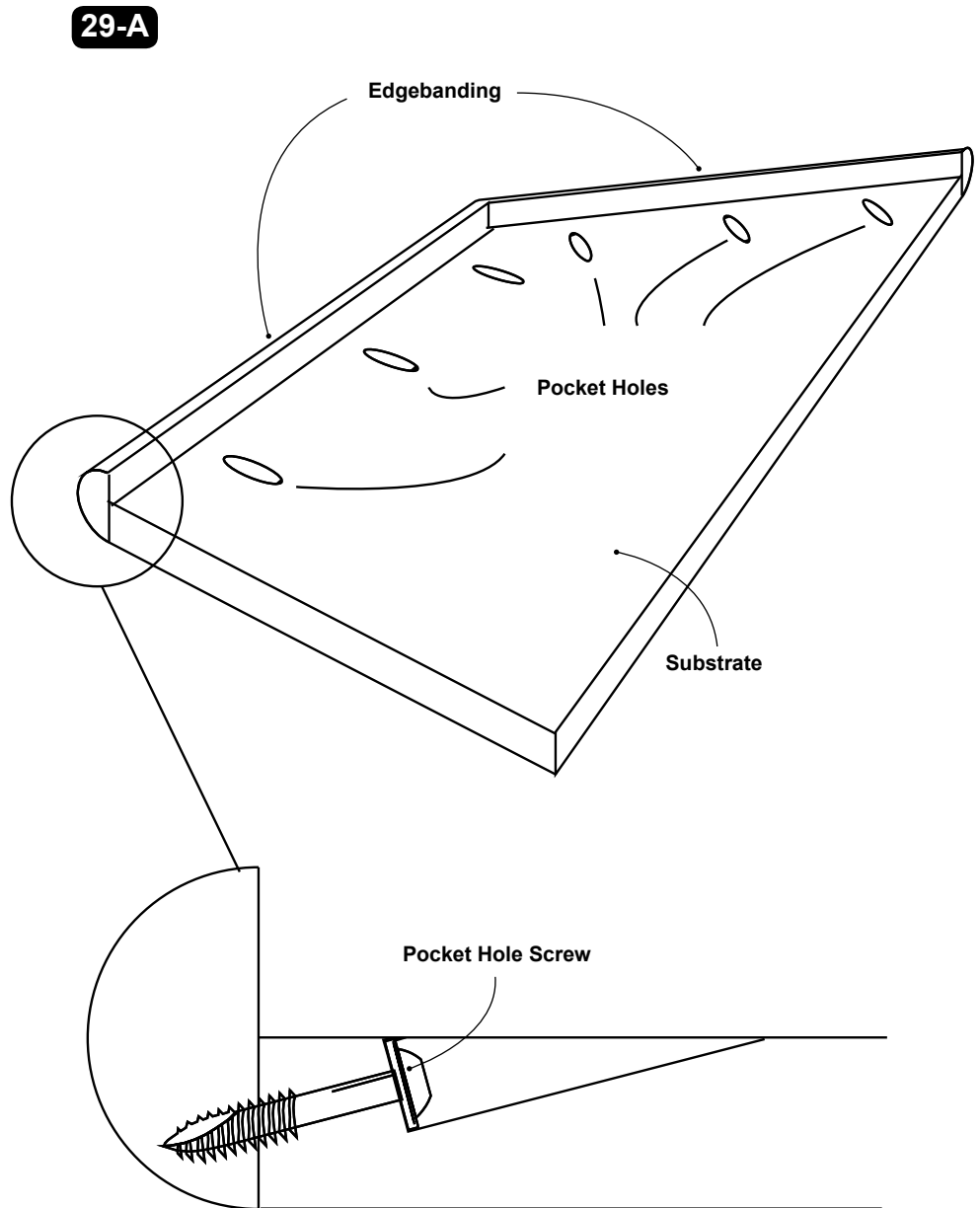
Countertops

Edgebanding

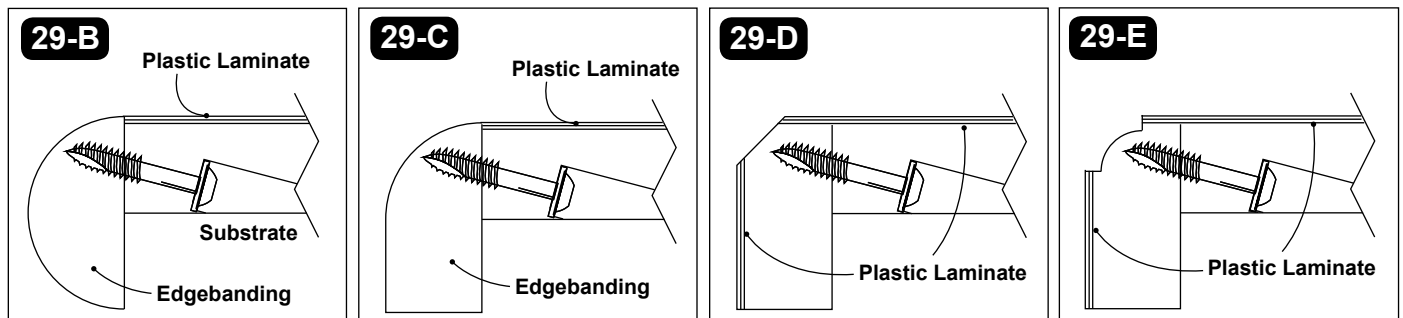
Another option for making a countertop is called edgebanding. As the name implies, material (usually decorative hardwood) is secured to the edge of the countertop.

The 3/4" substrate should be cut to size so that it overhangs the cabinet front and sides (but not the back) by the appropriate amount. Remember to add the width of the edgebanding. Bore pocket holes 6" to 8" apart along all countertop edges that will be exposed to the edgebanding as shown in Figure 29-A. Remember to pay close attention to the depth of the pocket hole. Keep in mind that the trim will be routed so the screw must fit the profiled edgebanding.

There are two options for attaching an edgebanded piece to the substrate counter top. Figure 29-C shows the option of applying the plastic laminate to the top of the substrate before applying the edgebanding. Figures 29-D and 29-E show the option of applying the plastic laminate to the top of the substrate and to the front of the edgebanding before routing the edge. This last option is one of the ways that commercially available counter tops are made. As with any other techniques, it is a good idea to make some countertop samples to get the hang of it before starting a big project.



Be sure to use 1" screws for edgebanding!



Making the Drawer

The drawer is essentially an open box. Cabinet drawers are usually made with two parts: a drawer box and a drawer front, which is made of the same wood type used to make the face frame. Making a separate front allows the box to be installed and then the front attached so that it is centered on the opening or aligned with the door. Fig. 30-A shows the drawer construction with a dado on the front and sides. The drawer bottom slides in from the back after the box is constructed. Fig. 31-A, 31-B and 31-C shows the drawer dimensions in detail for the 15" cabinet.

The drawer is constructed using Kreg Joinery™ on the front and the back of the drawer. The Pocket Holes at the front of the drawer are later covered by the drawer front. Fig. 30-A shows the hardware that we are using in this 15" cabinet. A track with a roller on the front is secured to the cabinet. Another track with a roller on the back is screwed to the bottom edge of the drawer. This hardware is designed to work with a drawer that is 1" narrower than the opening in the face frame. We've chosen this type of drawer slide because it offers excellent performance, is economical, and are simple to install. Many manufacturers make bottom mount slides that install in a similar manner.

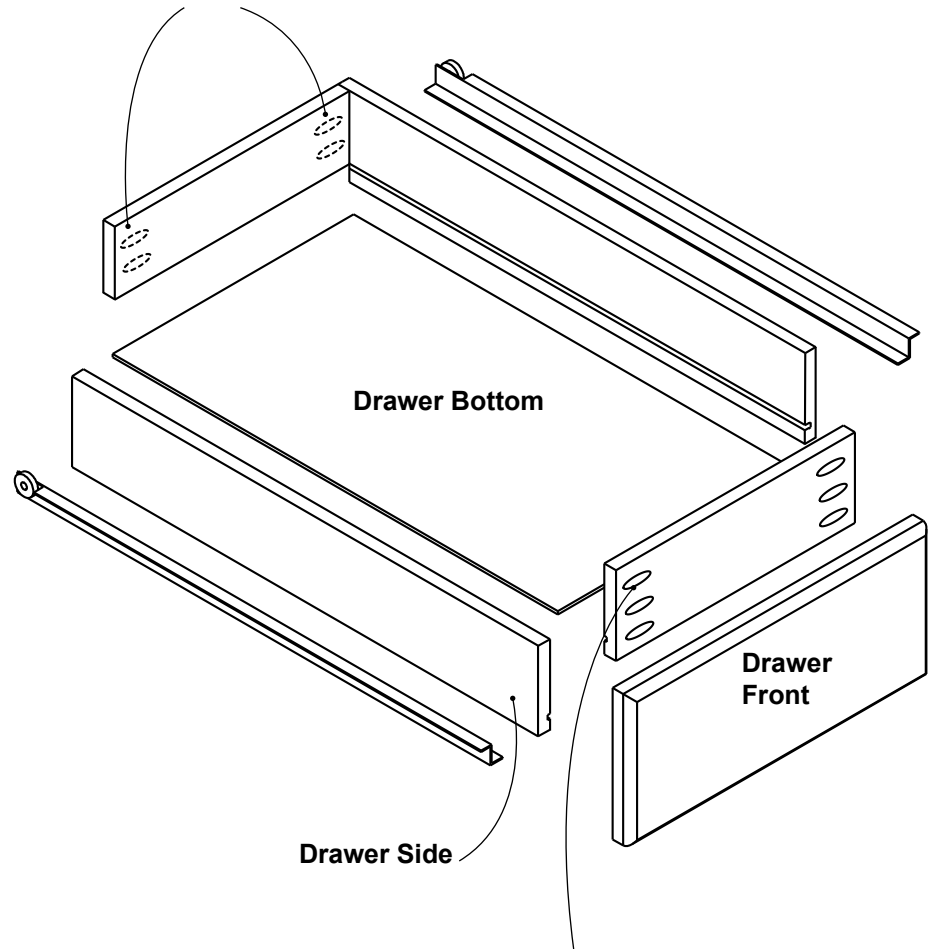
The traditional wood used for making drawers is ash, other hardwoods can also be used. Another option is 1/2" or 3/4" Baltic Birch or Appleply plywood.

If you are using the bottom mount drawer slides, get the slides and read the instructions. You may want to build a sample drawer to work out the details if you have not used this kind of hardware before.

The drawer size is determined by the kind of hardware you use. Make the drawer boxes 1" narrower and 1" shorter than the drawer opening in the face frame. For example, if your face frame opening is 5" tall by 24" wide, the outside dimensions of the drawer box should be 4" tall by 23" wide.

30-A

Pocket Holes placed on backside of Drawer Rail.



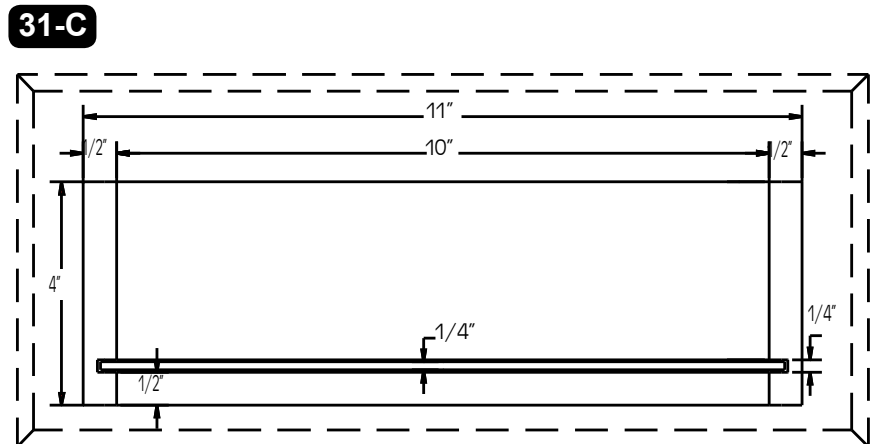
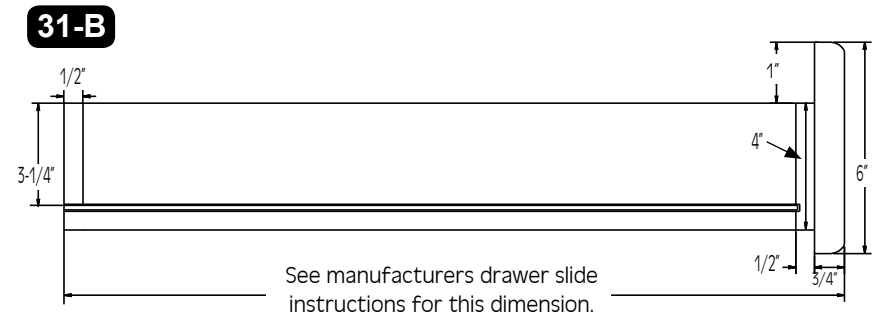
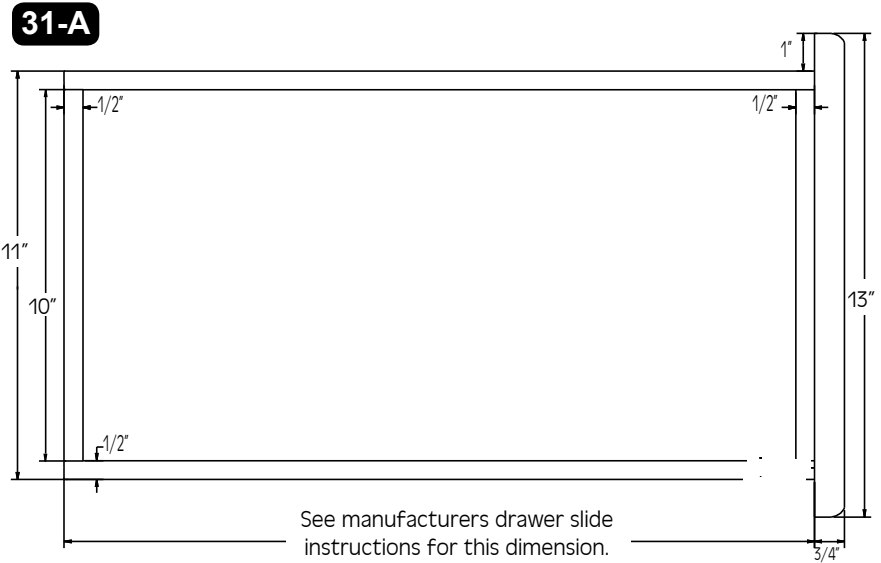
Pocket Holes placed on the front side of drawer rail will be covered by the drawer front.

Making the Drawer

The length of the drawer slide you choose will vary depending on if you build your cabinets with inset or overlay drawer fronts. We recommend that you acquire your hardware BEFORE BUILDING THE CABINET and follow the manufacturers instructions completely.

Metal drawer slides are very popular because they work well, add a professional touch and are economical. Side mount drawer slides are made of two parts. The part mounted to the cabinet is called the cabinet track. It is U shaped with a flattened end to which a wheel is attached. The cabinet tracks have to be accurately positioned in the cabinet. Without a mounting tool, the job is tedious because of all the measuring and marking.

The Kreg Mounting Tool shown on page 32, is used to easily mount the drawer slide to the cabinet side. It eliminates the need for measuring and marking because it uses the intersection of the stile and rail as a reference point so that each cabinet track is mounted accurately. This new design employs magnets to hold the cabinet track in place.



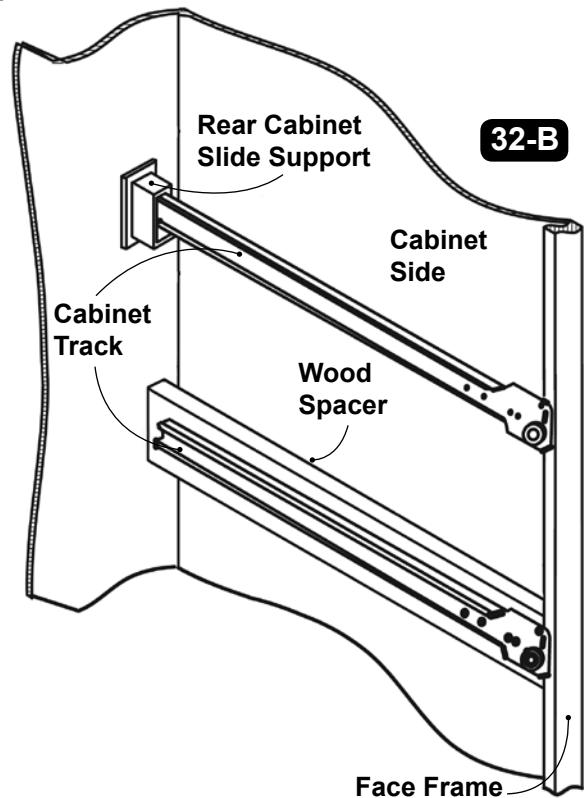
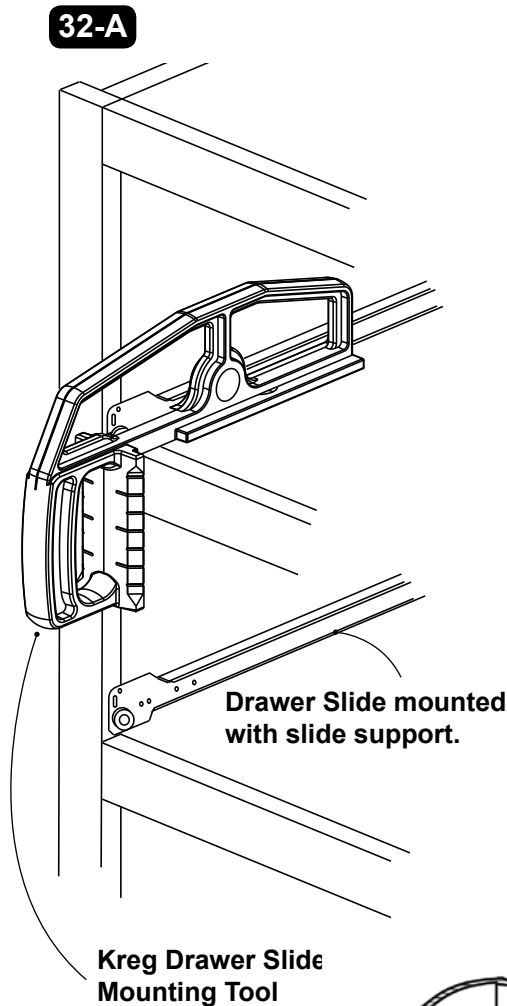
Making the Drawer

Installing the Drawer Slides

The design of the Kreg Drawer Slide Mounting Tool allows most types of metallic slides to be installed with ease. This product features a magnet on each side of the tool so it can be used for mounting the track to the cabinet on each side of the drawer. The end with the wheel should be positioned toward the Mounting Tool. Make sure that the cabinet track is secured to the mounting tool with the slide parallel to the bottom of the mounting tool as shown in Fig. 32-A.

A Face Clamp™ can then be used to hold the mounting tool in place while the screws are driven into the cabinet side. The cabinet track typically has an oblong hole. Use this hole for securing the track to the side of the cabinet. Putting the screw in the middle of the oblong hole allows for a slight adjustment later.

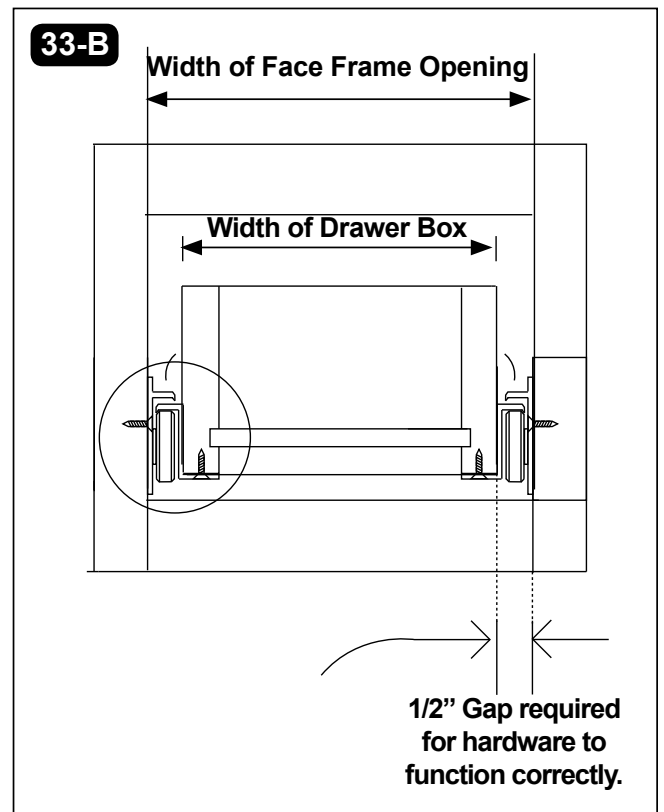
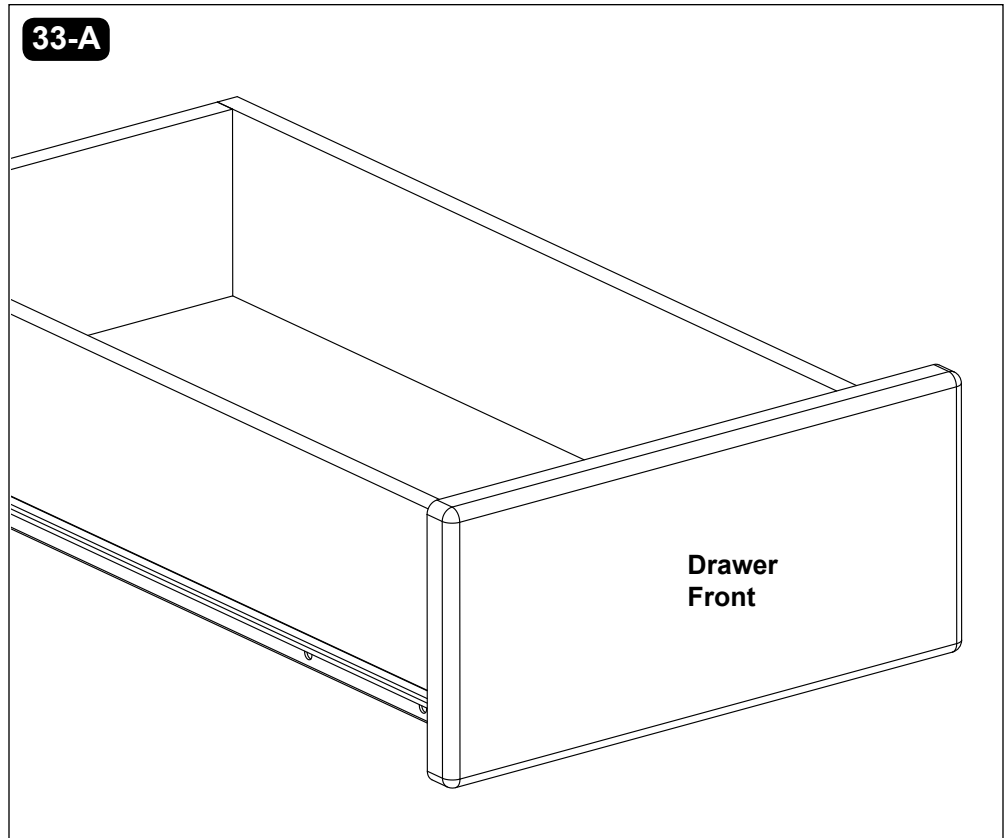
When there is a space between the edge of the stile and the cabinet side, a mechanism is needed to support the cabinet track. One option is to use a commercially available plastic rear cabinet track support, as shown in Fig. 32-B, that mounts to the rear of the cabinet. Another option is to use a wood spacer as shown in Fig. 32-B. The spacer is the width of the distance between the edge of the face frame and the side of the cabinet. Make and mount the drawer fronts after you have hung and adjusted the doors. That way, you can align the drawer fronts with the doors.



Making the Drawer

After the doors are made, installed and aligned, the next task is to attach the drawer fronts. Carefully measure the width of the door and cut the drawer face to that width. Make a spacer that will rest on top of the door. With the drawer box in the cabinet, place the drawer front on top of the spacer. Roll the drawer box out and use a couple of clamps to secure the drawer front to the drawer box. Drive a screw from inside the box through the drawer box and into the drawer front.

We like to use the SPS-F1 (1") or SPS-F125 (1-1/4") screws because the self-tapping tips eliminate pre-drilling. Keep in mind that if you've used a 1/2" material for the drawer box and 3/4" material for the drawer front, a 1-1/4" screw is too long.



Making the Door

Cabinet doors are made in many different styles. Most cabinet doors are made with the frame and panel design because it is a good way of making a wide door without the expansion and contraction problems of solid wood. The style of the door determines the hardware design that can be used to mount it. If the door fits inside the face frame, it is called an "inset" door and requires the appropriate hardware. Furniture often is made with inset doors. Cabinets are usually made with overlay doors which are wider than the face frame opening. The first consideration should be whether you want overlay or inset style doors.

If you choose overlay doors, the next decision is how much overlay you want. Traditional cabinets typically use a 1/2" overlay, meaning the door covers a 1/2" of the face frame on all sides. Usually the overlay door is one inch wider and one inch longer than the face frame opening. The 15" sample cabinet door opening in the face frame is 20-1/2" by 12". The door will be made to be 21-1/2" by 13". The amount of overlay is determined by the hinge design. There are many choices in hardware and the details of the choices available are beyond the scope of this booklet. Magazines, books, catalogs, home centers and home shows are good sources of information.

There are many considerations when choosing hardware. Concealed hinges provide a more contemporary look and are typically used with solid, composite laminate or flat panel doors in either an overlay or inset style. All things being equal, overlay doors are easier to make and install because, with inset doors, the openings and the doors must be perfectly square.

Concealed European style cup hinges typically mount into a 35mm (diameter) hole bored 1/2" deep into the door, requiring a 35mm forstner bit used in a drill press. If you don't have a drill press, there are some jigs available through catalogs, which make a portable drill work like a drill press.

For the 15" sample cabinet that we are making in this booklet, we are using an overlay door that is one inch longer and one inch wider than the face frame opening. We are using two European style cup hinges for the door which are placed in 35mm holes in the door frames. The standard for mounting door hardware is to mount the centerline of the hinge 3" in from the top and bottom of the door. If the hinge provides a 1/2" overlay, then the centerline of the hinge should be mounted to the face frame 2-1/2" below where the stile meets the rail.

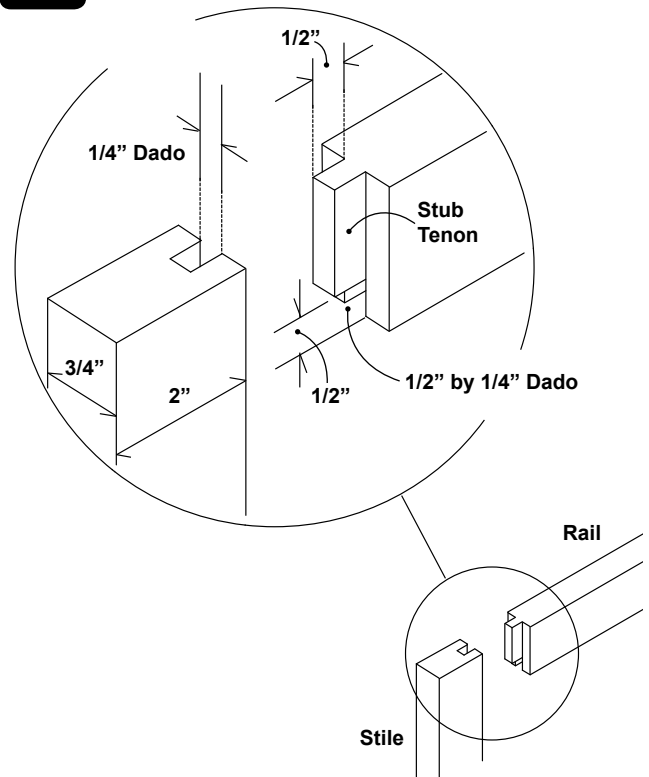
A huge advantage of the European style cup hinge is the adjustability factor. These hinges have screws that allow the door to be adjusted up or down or in and out which allows for squaring, leveling and alignment with the other doors in a set of cabinets.

After deciding on the door design and what kind of hinges you will use, you are ready to make the door. The door that we are making for the 15" cabinet is a simple panel door. The frame is made of the top and bottom rail (horizontal members)

and the side stiles (vertical members). The side stiles run the length of the door and cover the end grain of the horizontal rails. There are two options for making the door frames, which are shown in Fig. 34-A and 34-B on page 34. The easiest option is the stub tenon, which is made with standard woodworking equipment such as a dado blade or a slot cutter router bit. The door stiles and rails are 2" inches wide by 3/4" of an inch thick. A 1/2" deep dado that is 1/4" wide is made on the inside of both the rail and the stile pieces. The dado on the inside of the door is the space in which the door panel is located. The stub tenon, which is 1/2" by 1/4", is the same size as the dado and is glued in the dado after the door panel is fitted to the door frame. The stub tenon has a number of advantages. It is fairly easy to make and doesn't require the purchase of special equipment such as a matching set of router or shaper cutters. The simple design compliments just about any style of décor and is especially at home with the very popular Arts and Crafts designs. If you use the stub tenon, remember to add the 1" measurement (1/2" on each side) to the door rail. The rail for the 13" wide door should be 10" long.

Stub Tenon Door

34-A



Making the Door

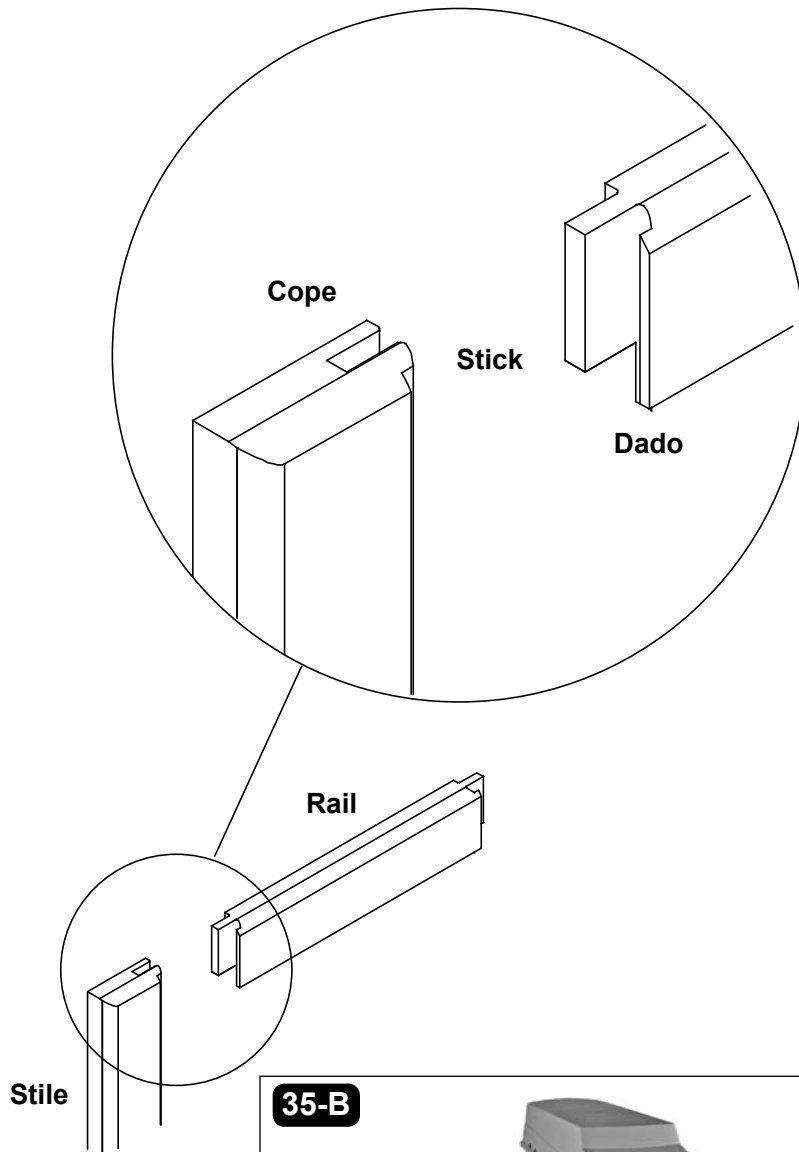
Cope and Stick Doors

A more complicated door design is the rail and stile shown in Fig. 35-A. An interlocking joint called the cope and stick joint is produced by either using router table cutters or shaper cutters. This joint requires making a series of cuts with two different cutters and precisely adjusting the set-up for a perfect fit. For the beginning woodworker, this task can be intimidating due to the complex nature of the required fit. However, cope and stick doors of professional quality are easily produced once you have mastered the techniques.

Cope and stick doors require a learning curve which requires study and practice. Like many woodworking joints, they are easily produced once you have the correct set-up and develop the technique. If you decide to use the cope and stick joint, practice making the joint and carefully measure the rail length for the 13" wide sample cabinet door. After the door is complete, drill the holes for mounting the European style cup hinges. The 2 door hinges are located in two 35mm holes drilled 1/2" deep in the door stile. The door hinges are screwed to the face frame edge. Drill the 35mm holes 3" from the end of the cabinet. Use a drill press with two stops, as shown in photo 35-B.

Cope and Stick Door

35-A



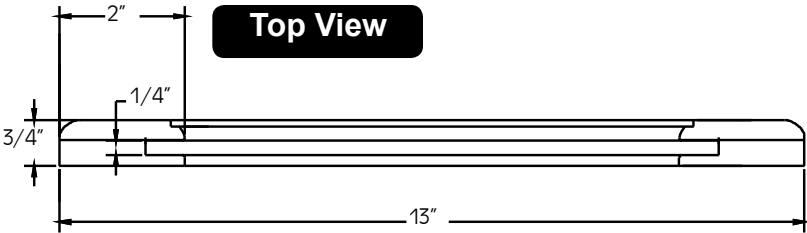
35-B



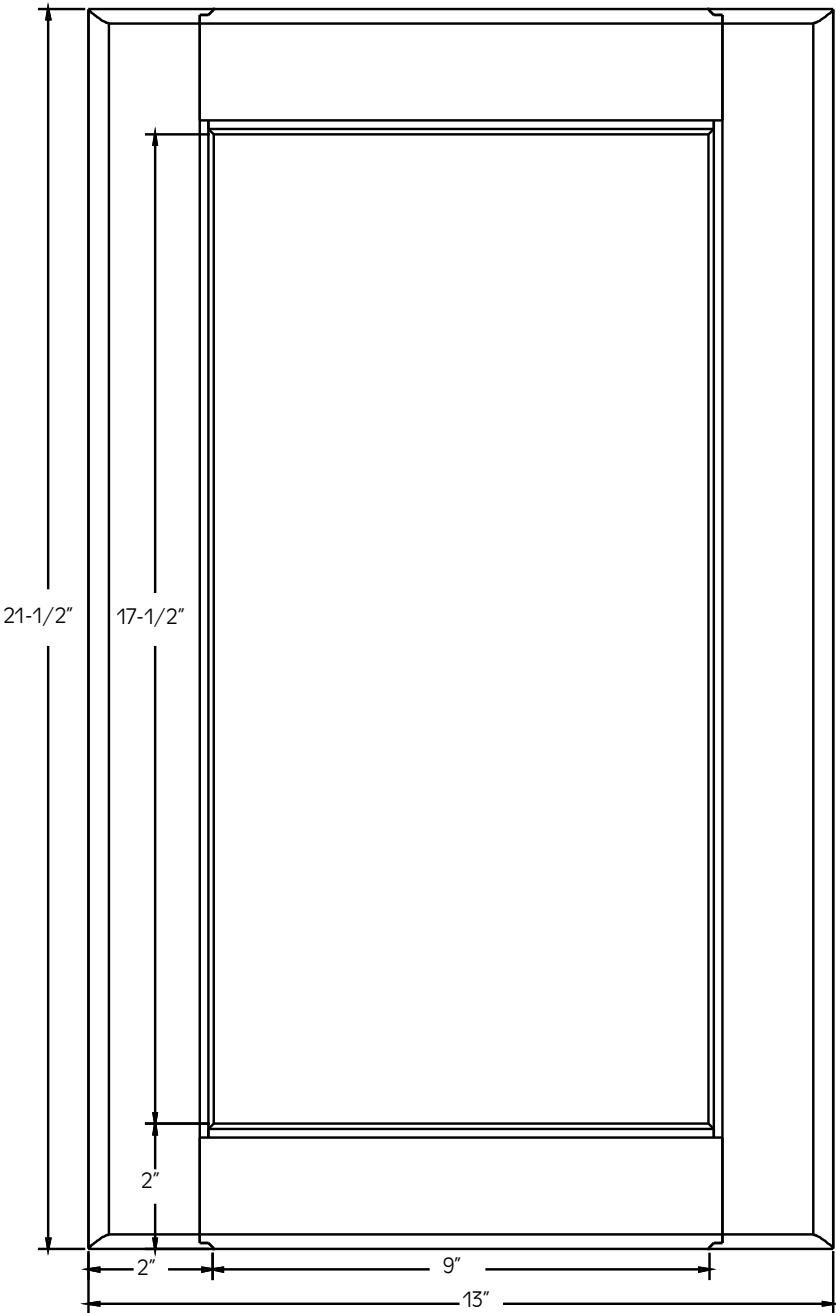
Drilling 35mm holes in door stile for hinge cups.

Making the Door

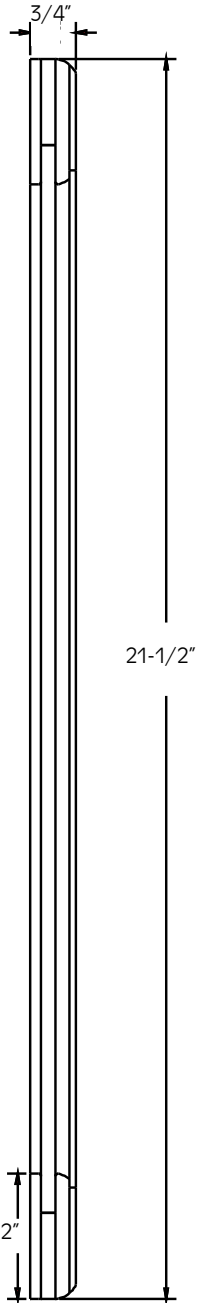
Cope and Stick Door Dimensions



Front View



Side View



Wall Cabinets

Building a 15" Wall Cabinet

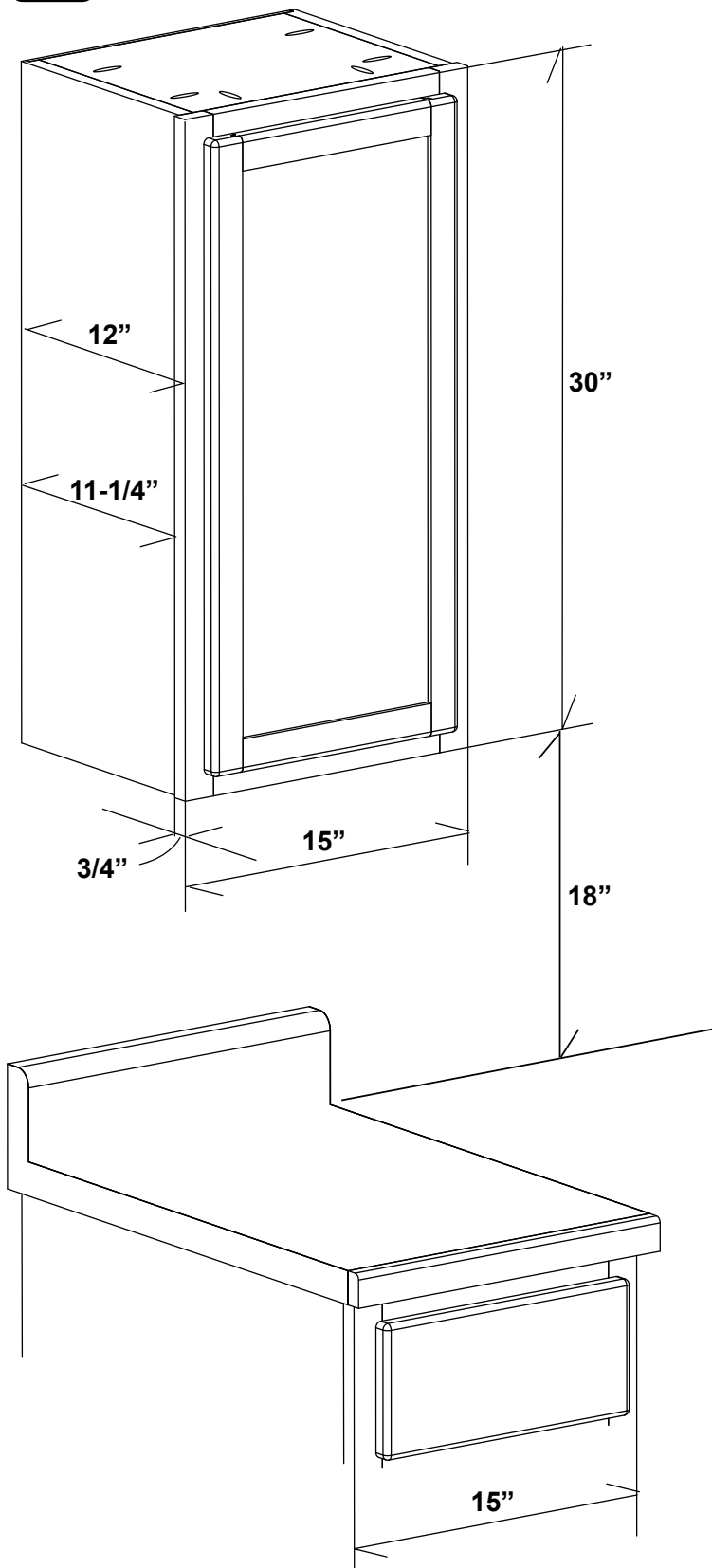
Wall cabinets mount on the wall above the base cabinets and are usually the same width as the base cabinet, as shown in Fig. 37-A. The depth of the cabinet is usually 12". When the wall cabinet is located above an appliance, such as a 30" wide stove the cabinet should be 30" wide. The standard height wall cabinet is 30" high and is designed to be used with a room soffit, which is box in the top corner of the ceiling and wall junction that is the same material as the wall. The soffit is usually a framed box that is secured to the corner of the room where the wall and ceiling meet. It is often covered with the wall material that is used in the rest of the room, which is usually drywall. The finished dimension (frame plus drywall thickness) of the soffit is usually 12" height and 14" wide.

Thus, the finished soffit extends past the top of the wall cabinet 2" which gives it a pleasing professional look.

Depending on the height of the ceiling and the size of the soffit, the distance between the wall cabinet and the countertop is usually 16 to 20".

In recent years, kitchens are frequently designed without soffits and, in some cases, the cabinet goes all the way up to the ceiling. A kitchen may have wall cabinets of varying heights to accommodate appliances such as stove hoods or wall mounted microwaves. To accommodate different kitchen designs (soffit or no soffit), appliance sizes, wall height variations, etc, commercially made wall cabinets are available in heights ranging from 9" to 48" in 3" increments. Obviously, the huge advantage of a custom made cabinet is that it can be designed and made for a specific space.

37-A



Wall Cabinets

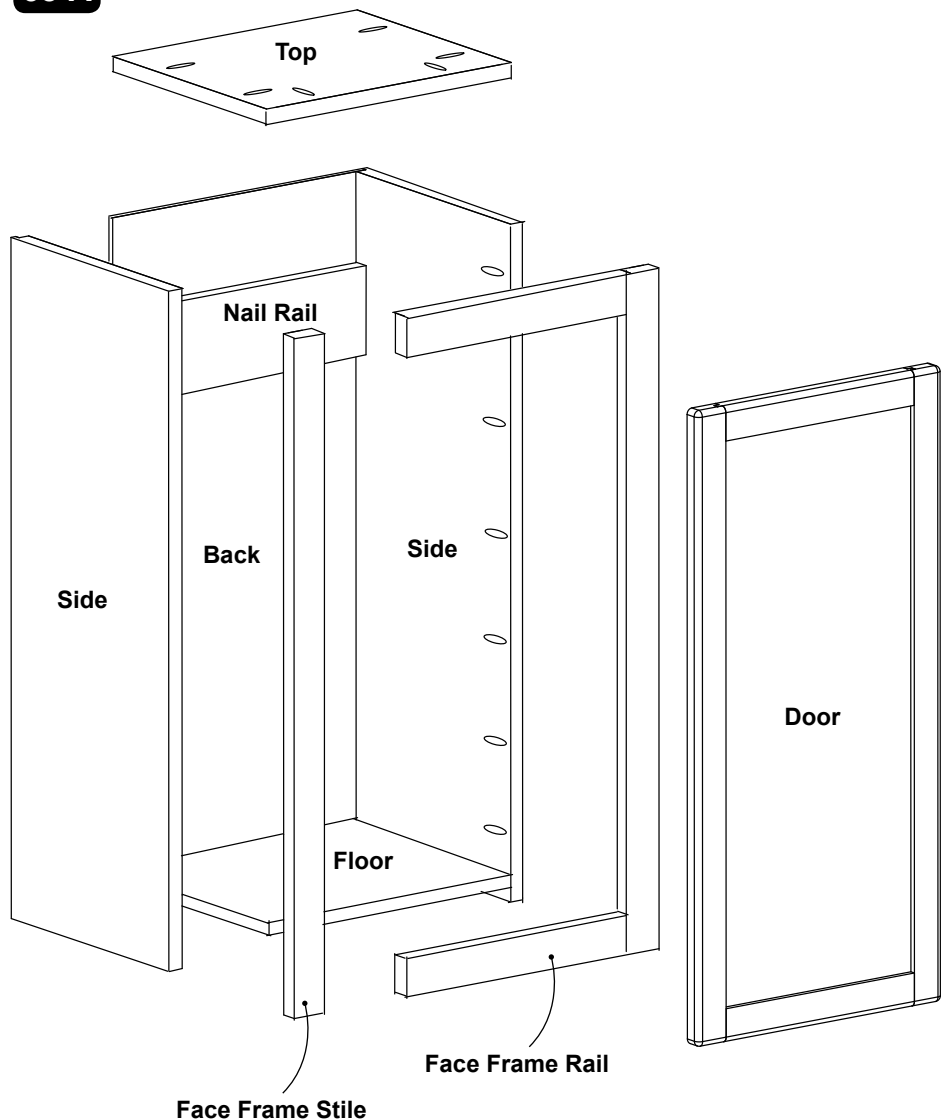
Most wall cabinets are designed with mechanisms for shelf height adjustment. The standard is the use of multiple holes with shelf supports on which the shelf rest. Another option is the use of a front and back track with adjustable shelf supports. Get the adjustable shelf hardware before planning and building the cabinet.

Compared to the base cabinet, the wall cabinet is a lot easier to build. It is smaller and has less pieces, plus it doesn't have a drawer. The face frame is a simple rectangle made of the standard 1-1/2" by 3/4" material. After the parts are cut to size using the wall cabinet cut list, assemble the parts in a similar manner as the bottom cabinet as described in the "assembly" section of this booklet. Make a spacer for measuring the distance between the floor and the bottom edge of the face frame. A 3/4" spacer will secure the floor flush with the top edge of the face frame rail. Another option is to use a 5/8" spacer so that the bottom is 1/8" lower than the top edge of the face frame.

The Pocket Holes on the top should be located on the front and sides of the top. They should be oriented so that the pocket holes are exposed on the top of the cabinet so, when you open the cabinet door, you don't see any Pocket Holes. For most wall cabinets, the Pocket Holes should be oriented on the bottom of the cabinet so when you open the door Pocket Holes are not visible. The one exception to having the holes on the bottom of the cabinet, is the wall cabinet above the sink where the bottom of the cabinet is visible. Plugs can be used to cover pocket holes in situations where they may be visible.

As with the bottom cabinet, orient the Pocket Hole screws so they are not visible from the outside of the cabinet.

38-A



15" Wall Cabinet Cut List:

Part Name	Qty.	Thickness	Width	Length
Side	2	3/4"	11-1/4"	30"
Face frame rail	2	3/4"	1-1/2"	12"
Face frame stile	2	3/4"	1-1/2"	30"
Floor	1	3/4"	13"	11"
Top	1	3/4"	13"	11"
Back	1	1/4"	13-1/2"	29-1/2"
Nail Rail	1	3/4"	13"	4"

About the Author

About the Author

The information in this booklet was kindly provided to Kreg by Mark Duginske. Mark is a fourth generation woodworker from central Wisconsin. He makes his living as a woodworker, designer, writer, and inventor. He was formerly a contributing editor to Fine Woodworking Magazine and currently writes for a number of magazines. His work has appeared in Fine Woodworking, Fine Homebuilding, The Design Book, Americana, Chicago Magazine, Architectural Digest, Architectural Record, Woodsmith, Wood Shop News and Wood News.



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