

Unlimited Cabinet Door Making Possibilities with Freud's Premier Adjustable Cabinet Door Set

Congratulations on your purchase of Freud's world class Premier Adjustable Cabinet Bit Set. Freud's mission is to design and manufacture the highest quality, most technically advanced cutting tools available. This set contains everything you need to create a variety of beautiful cabinet doors or any other doormaking project you have in mind. Freud develops and manufactures different carbide blends for each cutting application, so you can be sure that the high quality bit you're using was designed specifically for creating flawless raised panel doors in plywood, hardwood and softwood.

This revolutionary set combines Freud's unique patented Premier Adjustable Rail and Stile Router Bit System with a patented four cutter Quadra-Cut™ Raised Panel Bit. The Premier Adjustable Rail and Stile Bit system enables you to build any style of cabinet door in a range of door thicknesses and sizes! The Quadra-Cut™ Raised Panel Bit has two small wings that cut downward and two large wings that shear upward for an extremely smooth cut in hardwoods, softwoods, and even plywood. These extremely easy-to-use solutions give you unlimited creative freedom, and solve the long-standing challenges and limitations of frame and panel door construction.

Introduction to Door Construction

This unique Premier Adjustable Cabinet Door Set with patented solutions allows woodworkers to build any style of cabinet door in a range of door thicknesses and sizes!

Build a remarkable variety of different styles and sizes of cabinet doors, including:

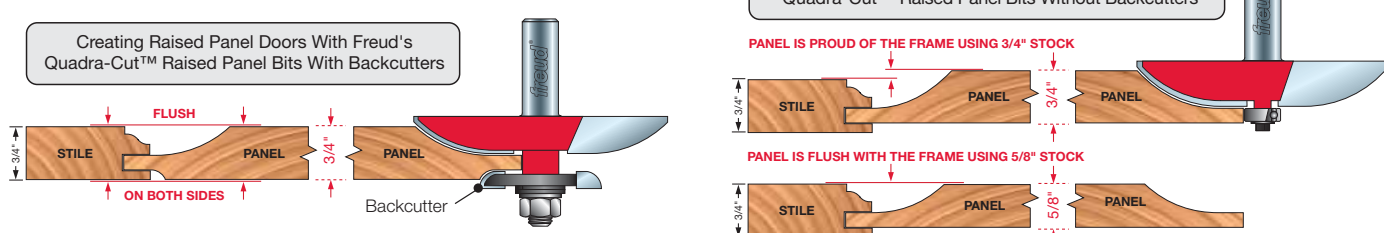
- Rail and Stile doors with "stubby" tenons
- Rail and Stile doors with **extended** tenons for added strength
- Rail and Stile doors with panels of **undersized plywood**
- Double Sided Rail and Stile doors with decorative **profiles on both sides** (requires optional cutters)
- **Glass Panel doors** (requires optional cutters)
- Doors with **thicknesses from 5/8" to 1-1/4"**

Introduction to Cabinet Door Construction

Cabinet doors may consist of a number of elements. Here are some common terms that will be used throughout these instructions:

- Stiles:** The vertical frame components of the door.
- Rails:** The horizontal frame components of the door.
- Tenon:** An extended piece of wood on the end of a rail that fits into a pocket, or "mortise" in the stile.
- Mortise:** A pocket cut in a stile that matches the tenon on the end of a rail.
- Panel:** The center portion of a door, which is contained within the frame of rails & stiles. Panels may be solid wood (normally a "raised" panel), plywood or glass.
- Glass trim:** The wooden molding which holds glass in the door frame.

Freud produces Quadra-Cut™ Raised Panel Bits (panel cutters) with and without backcutters. Quadra-Cut™ Raised Panel Bits with backcutters are typically used to create doors with panels that are flush with the frame on both sides when using 3/4" stock. Quadra-Cut™ Raised Panel Bits without backcutters are typically used to create doors with panels that sit proud of the frame when using 3/4" stock. Freud also produces Quadra-Cut™ Raised Panel Bits for 5/8" stock for producing panels that are flush with the front of the frame.



Tools Required

Materials Required

In addition to your Freud router bits, you will need the following tools and supplies to build your door unit:

- Variable speed router, 2-1/4 HP minimum. Check your router manual for maximum allowable bit diameter.
- Router table with fence and miter gauge. For best results, use featherboards and push blocks to control work pieces when possible. We also strongly recommend that a shop vacuum or dust collector be used with the router table.
- Table saw for ripping stiles, rails and other door parts.
- For long tenon door construction: Mortising machine, Drill Press with mortising attachment, or Drill Press with brad point bits.
- Various common woodworking hand tools including hammer, chisels, rule, straight edge, square, coping saw.
- Clamps with the capacity to secure all door joints.
- A sturdy, level work table or saw horses for door assembly

Safety Tips

WARNING: Failure to obey these warnings could lead to serious bodily injury or death:

- Use router bits with a router only
- Carbide is a very hard and brittle material. Slight shocks can damage the carbide. Before each use, check that the bit is sharp and free from damage. DO NOT use the bit if it is dull, broken, cracked or if any damage is noticed or suspected
- Before each use, make sure that at least 80% of the router bit shank is inserted into the collet. The end of the bit shank should be at least 1/8" from the bottom of the collet.
- Before each use, ensure that the collet has been tightened and that the work piece is secure.
- Read and obey all warnings and instructions contained in the router's owner's manual, and for any accessory that is used. If you do not have the correct owner's manual, obtain one from the manufacturer before using the router bit.
- Always wear eye protection or a full face shield complying with current ANSI Standard Z87.1
- Always wear hearing protection.
- Keep body, clothing and hair clear of spinning bit. Do not wear loose hanging clothing or jewelry.
- Use a router table and fence wherever possible. Be sure all guards are in place.
- Bits over 1-1/2" in diameter must only be used with the router mounted in the table.
- Use multiple passes when removing large quantities of material.
- Never use bit on router that will exceed maximum recommended RPM of bit.
- If you have any questions regarding your router bits, please call Freud Customer Service at 800-472-7307. In Canada call 800-263-7016.
- Make sure that you are well rested before working with power equipment.
- Do not use power equipment if you have consumed any drugs or alcohol. If you are taking prescription medication, check with your physician to ensure it is safe for you to operate power equipment.
- Always turn off and unplug the router before removing and installing router bits or making adjustments to the router or router accessory.
- Keep these instructions in a safe place for future reference.

Getting Started: Planning and Preparation

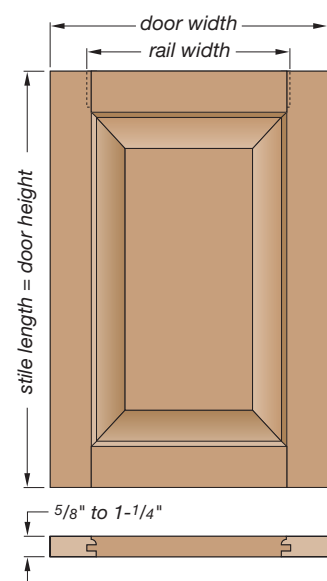
Plan the project carefully before purchasing materials. Refer to the reference below for formulas to calculate the widths and lengths of your stiles, rails, and panel inserts.

Be sure to obtain enough stock to build all doors, plus extra stock for making test cuts. This will make it easier to match the grain and color of the material for a more attractive finish, and milling all stock to thickness at the same time avoids inconsistencies that can affect the quality of your joints. Choose stock with care. Lumber for door construction should be straight, and free from defects such as knots, splits and checks.

Calculating Sizes of Door Parts

Stock thickness: Your Premier Adjustable Stile and Rail bit set is suitable for stock from 5/8" to 1-1/4" thick. To mill double sided or glass panel doors, please contact your Freud Distributor to purchase the optional cutter set to match your profile.

Stile and Rails for common cabinet doors are normally 2" to 2-1/2" wide, depending on your preference and application. Your Freud bits can easily be used to mill stiles and rails of any width.



Rail lengths: are determined based on the width of the stiles and the length of the tenon you plan to use. The rail length should be equal to: the width of the door, minus the width of two stiles, plus the length of the two stub tenons. A single stub tenon measures 10.3mm (13/32") long, two tenons would be 20.6mm (13/16") long, so the formula is:

$$\text{Door Width} - (\text{Stile Width} \times 2) + 13/16" = \text{Rail length}$$

Note: For doors with extended tenons, add twice the length of the desired tenon.

Stile lengths: Should be equal to the finished height of the door.

Panel Size: Allow for expansion for wood panels as humidity changes. Panels will expand more across their width (across the grain) than they will along their length (with the grain). Calculate Panel sizes as follows: **Panel width** is equal to the total door width, minus both stile widths, plus the two stub tenon groove depths (13/16"), minus 1/8" for expansion. **Panel length** is equal to the total door height, minus both rail widths, plus the two stub tenon groove depths, minus 1/16" for expansion.

Below is a sample calculation for a single panel door at 12" wide by 18" high using 3/4" stock:

Note: This calculation is just for example purposes only. You may make a door in a variety of sizes.

(2) Rails Cut to:
3/4" x 2" x 8-13/16"

(2) Stiles Cut to:
3/4" x 2" x 18"

(1) Panel Cut to:
3/4" x 8-11/16" x 14-3/4"

Calculating the Rail Length for a 12"x18" Door Example:
The length of your rails is equal to: the width of your door minus the width of two stiles, plus the length of the two stub tenons (13/32" x 2 = 13/16").
This example: 12" - 4" + 13/16" = 8-13/16"

Calculating the Stile Length for a 12"x18" Door Example:
The length of your stiles is always equal to the height of your door.
This example: = 18"

Calculating the Panel Size for a 12"x18" Door Example:
Length: The length of your panel is the height of your door minus the width of both rails, plus 13/16" for top and bottom rail groove depths minus 1/16" for expansion.
This example: 18" - 4" + 13/16" - 1/16" = 14-3/4"
Width: The width of your panel is the width of your door minus the width of both stiles, plus 13/16" for left and right stile groove depths, minus 1/8" for expansion.
This example: 12" - 4" + 13/16" - 1/8" = 8-11/16"

*Material is removed to allow for expansion and contraction, which occurs mainly across the grain of the wood.

**Note: Different species of wood expand and contract differently. To be completely accurate and be sure you remove exactly the right amount, you may want to understand more about the specific wood you are using. There are many wood shrinkage calculators on the internet.*

Mill and Cut Your Door Parts

- Read and follow all safety instructions that came with these router bits, as well as your planer, saw and all other tools.
- Mill all stock to final thickness. If you do not have a thickness planer, many lumber dealers and millwork shops will plane stock for a fee.
- Rip all stock to finished width. See recommended widths in the previous section. Be sure all edges are perfectly square, and that all surfaces are straight and flat. Freud's LM75 and LM74 series ripping blades are excellent choices for this stock.
- Cut all parts to length, using the formulas in the previous section. Freud's LU74 and LU85 series Ultimate Cut-Off blades is an excellent choice to ensure a perfect end cut on rail and stile parts.

Routing the Rails & Stiles

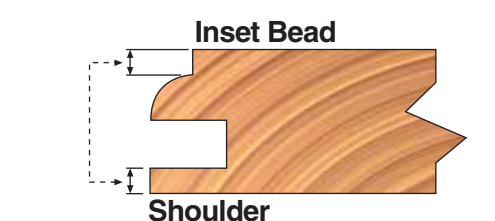
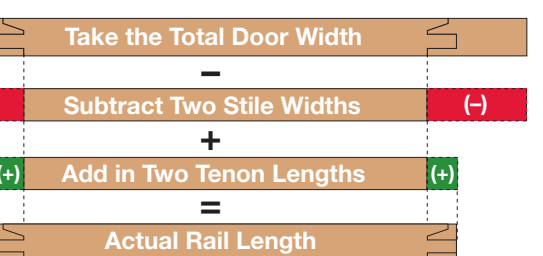
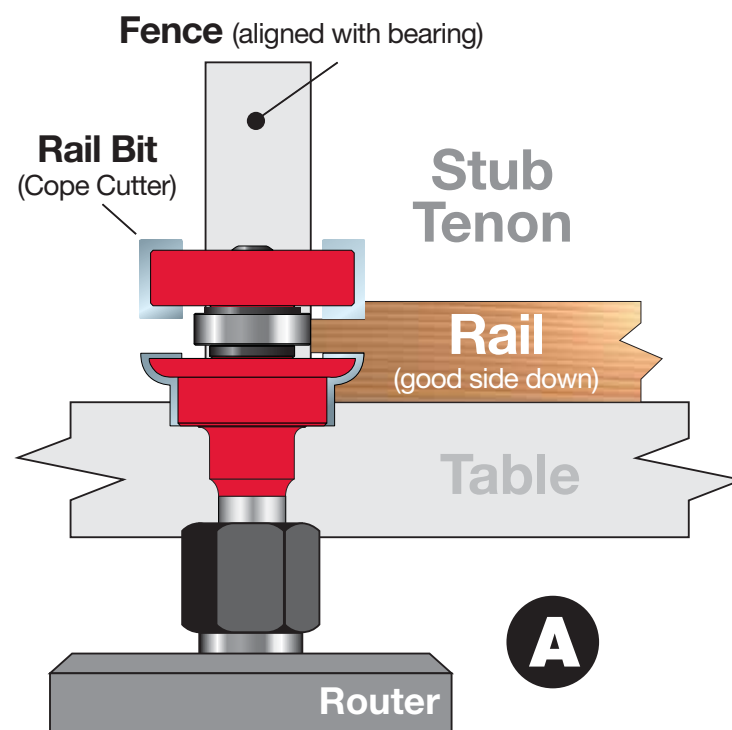
Doors with (Standard) Stub Tenons.

Your Freud Premier Adjustable Rail and Stile bits come factory-assembled to produce perfectly fit stub tenon joints right out of the box. This is the most common type of cabinet door. It is fast and easy to produce, and gives a beautiful finished appearance.

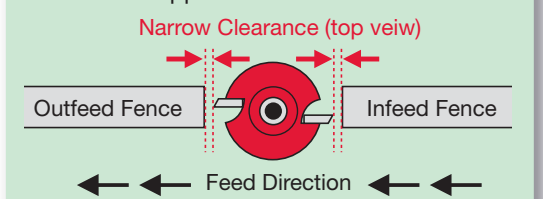
Routing Rail Ends:

- Install the rail bit into the router collet.
- Set the bit height and make a test cut as follows:

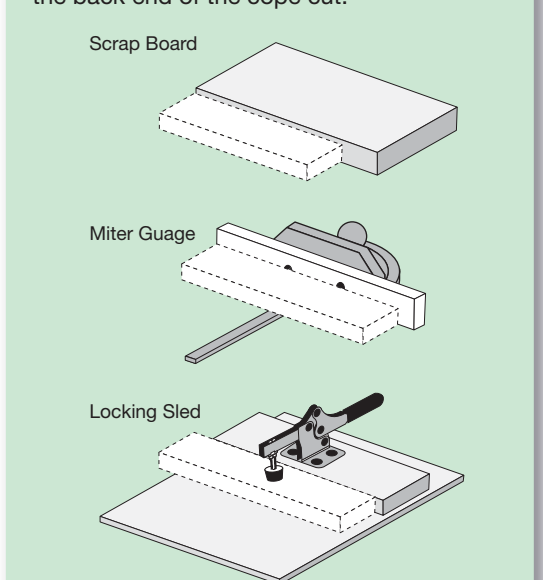
- Set the bit height to produce the desired profile. A common rule is to have the inset "bead" on the face of the stile the same thickness as the "shoulder" on the back of the stile, but this can vary depending on stock thickness and the appearance you desire. In 3/4" thick material, the inset bead should be approximately 1/8" deep.
- Use a straight edge to align the router table infeed and outfeed fences with the bearing on the bit.
- Be sure that the fence is parallel to the miter gauge track.
- Make a test cut across the end of a test piece of stock by using a miter gauge to feed the stock perpendicularly across the cutter (A).



Tip 1: Make the opening between the infeed and outfeed fence as narrow as possible (without touching the cutter) to provide maximum support.



Tip 2: Use a backer board, miter gauge, or a sled jig to reduce the chance for blow-out at the back end of the cope cut.



For downloadable plan of the above Locking Coping Sled please visit: www.freudtools.com

Routing edges of stiles and rails:

- With the router unplugged, install the stile bit in the router (B). The stile bit is the tallest of the two bits in your set, with one profile cutter and two slot cutters.
- Use a straight edge to align the router table infeed and outfeed fences with the bearing on the bit.
- With the router unplugged, use one of the completed rail (cope) cuts on the end of your rails as a guide to set the cutter height (B).
- Plug the router in and carefully make a test cut in scrap material to check your set up. Use push blocks to control narrow stiles (C).
- Test the fit of your stile sample to the rail ends you routed in the previous step. If you need to adjust the height of the bit, unplug the router, adjust the bit, and make another test cut. Once the height matches perfectly, rout one edge of all stiles and rails.

Tip 1: Use consistent pressure and feed rate when making the stick cuts. This ensures a consistent and straight groove along the edge of each rail and stile.

Tip 2: When making the stile (stick) cuts, use feather boards to hold the material safely on the table and use push sticks for safety.

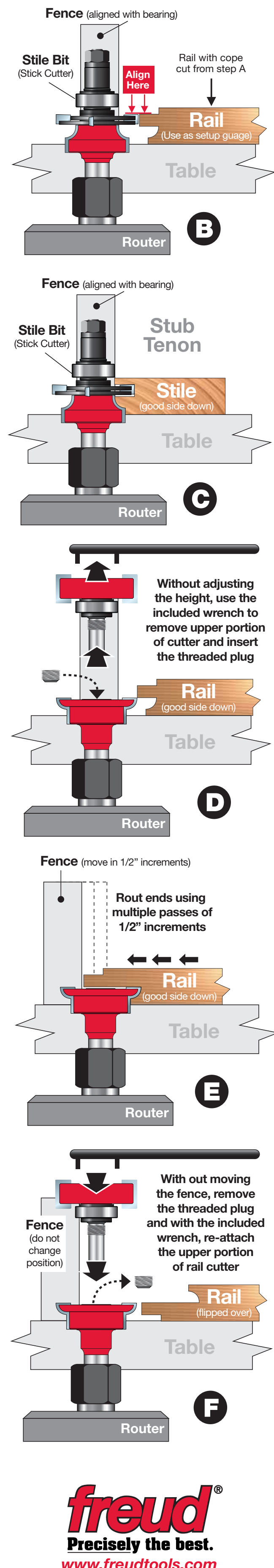
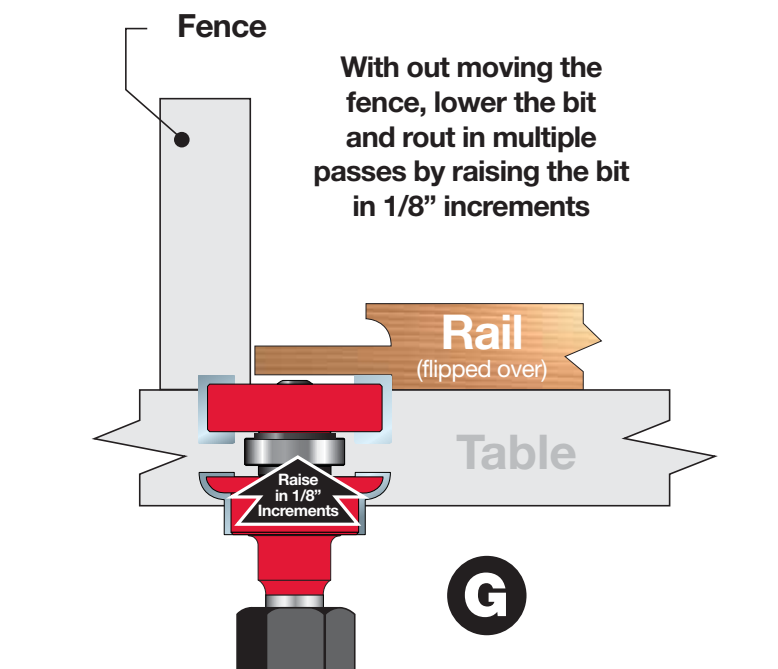
Routing rail ends with extended tenons:

For stronger joints in your cabinet doors, your Freud set offers a unique capability to mill tenons of unlimited length. This capability is especially important for large or heavy doors, and doors that will be subjected to excessive use and stress:

- First, calculate the length of your tenons. As a general rule, plan on your long tenons being as long as half the width of your stiles. For example, if your stile width is 2-1/2", then a 1-1/4" long tenon will be a good choice.
- Be sure that the fence is parallel to the miter gauge track, then rout across each rail end using the same procedure described for routing the stub tenons (A). For this first cut, leave the rail bit fully assembled with the bearing and upper cutter in place. This will produce a stub tenon.

Now, unplug the router. Using the supplied spanner wrench, turn the bit counterclockwise and remove the upper portion of the cutter as shown (D). Use the router spindle lock or your router wrench to prevent the bit from turning. DO NOT change the height of the bit!

- Insert the threaded plug supplied with your set into the threaded hole in the rail bit. Tighten securely with a 3/16" or 5mm Allen wrench (not supplied).
- Second pass: Long tenons should be routed in multiple passes (E). Move the fence back 1/2" from the position used for the first pass. Use a miter gauge, and with the good or "face" side of the rails facing down; make the rail end cut on one side of each end of all rail parts that are to have long tenons. ROUT ONLY the face side of the rail!
- Move the fence back in increments of not more than 1/2" and repeat the procedure described for the second pass. Continue this process until the tenon reaches the desired length on the face side.
- Unplug the router, remove the threaded plug and carefully thread the spindle containing the bearing and upper cutter back into the rail bit. Tighten with the spanner wrench (F). DO NOT change the position of the fence!
- Lower the router and bit (G). Turn your rail face up, and use the stub tenon you routed to adjust the bit height. The top of the cutter should be lower than the underside of the stub tenon for the first pass. **Important Note:** The first pass to remove stock from the back of the tenon should be made with the bit raised no more than 1/8" above the table. If more stock must be removed to finish the tenon (this may be the case if your rails are more than 3/4" thick), make these cuts in multiple passes, raising the bit no more than 1/8" per cut. On the final pass, the top of the rail bit should precisely match the underside of the stub tenon. This will create a long tenon and profile that will perfectly match the stile profile. **Note:** For an alternative method for step G, please see the enclosed video.



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