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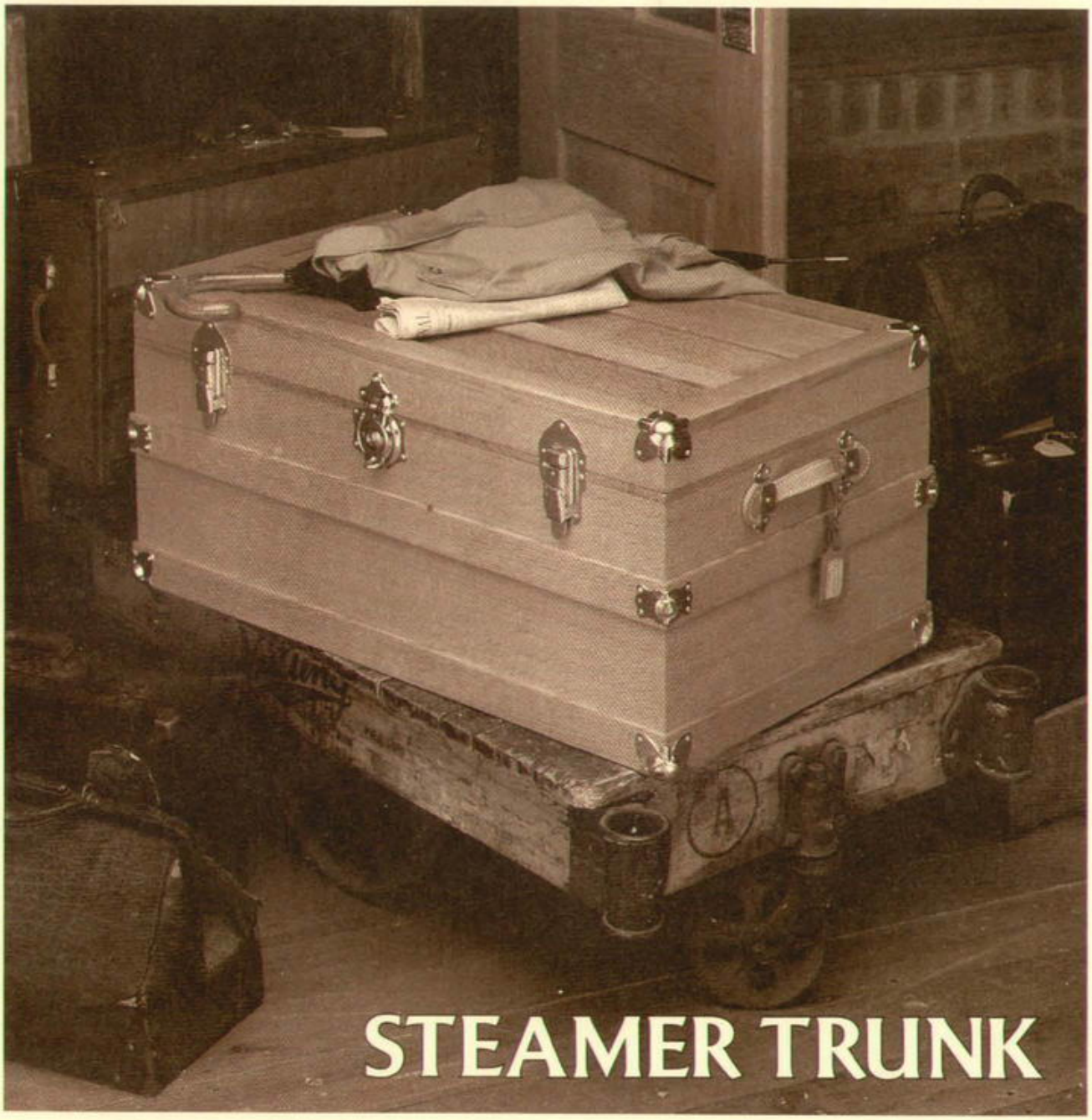

STEAMER TRUNK

No. 73 February, 1991

Woodsmith

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EDITOR'S COLUMN

Sawdust

I was in the shop and had just made a good cut (or so I thought) on the end of some scrap plywood to test the joint I wanted to use on the Steamer Trunk.

As I put the the pieces together, the joint didn't fit the way it was supposed to. Okay, the plywood was a little warped, and that caused some problems with the cut.

But the whole experience forced me to think of a good way to cut bad lumber. That's how the sliding cut-off table was born, see page 14.

This sliding table is by no means a new invention. But with a little brainstorming, we were able to come up with several features that solved some nagging problems.

Since we were cutting miters across wide pieces, one of the first things we added was a hold-down bar with clamps to press the warp out of wide boards. These clamps also help hold long boards securely in place so they don't slide around as they're cut.

The feature I like best is the sliding stop. For years I've struggled with a stop block held to the front fence of the table with a C-clamp. It worked, but was always a hassle to set exactly where I wanted it. And even more of a hassle to make fine adjustments.

The stop we came up with for this new table slides easily along the fence, and locks in place quickly and precisely. If you don't make anything else in this issue, the sliding table (or some version of it) with this stop is worth building.

STEAMER TRUNK. Every few months we compile a list of the most requested projects and try to schedule them for upcoming issues. There was little doubt that a steamer trunk would be quite popular.

One of the first questions we faced was whether to design it with an arched top or a flat top. An arched top would have been the most fun to build. But the flat top won out because of the versatility of the trunk when it was completed. (See the back cover for a photo of the trunk as a coffee table.)

NEW FACES. As new people are added to the staff, it's become a tradition to introduce them in this column. Dirk Ver Steeg and Kurt Schultz have joined us to help with the illustrations in each issue.

It's a real pleasure to work with Dirk and Kurt not only because of their art skills, but also their enthusiasm for woodworking.

We get a lot of compliments about the artwork in *Woodsmith*. As you can imagine, it requires a lot of work.

It all starts by designing and building the projects for an issue. Ted and Ken are primarily responsible for the design, but everyone usually gets their two cents in.

When the design is pretty well set, an editor and illustrator team up to build the project in our shop. As they get into it, there are usually mid-course changes to the design because of snags we hit, or ideas we come up with to make it easier to build.

The illustrator is then in charge of laying out the article — breaking down the project into the major steps, and determining what illustrations are needed to show the construction of the project step-by-step.

Then the art skill comes into play. There are a series of steps that involve rough pencil sketches of each illustration, which are refined to precise pencil drawings, and finally the drawings are inked. It's easy to say in one sentence, but it requires over a thousand hours of work for each issue. (Now you know why we hired Dirk and Kurt.)

PREVIEW OF NEXT ISSUE

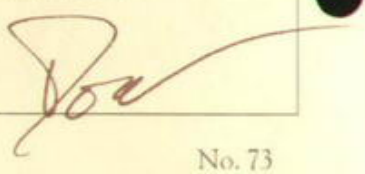
Here's a sneak preview of the projects and techniques that will be featured in the next issue of *Woodsmith*.

OAK FILE CABINET. Recreate a 19th Century file cabinet with oak frames, oak plywood panels, dovetailed drawers, and raised panel drawer fronts.

MODULAR WORKBENCH. You know the old idea of making a desk by putting a top across two file cabinets? Well, you can make a great storage bench the same way. We've designed a modular base unit that can have any combination of drawers, doors, or shelves. Build as many units as you want (with common construction materials), and add a top to make a workbench.

JOINERY: FRAME AND PANEL. Both of the featured projects use solid-wood frames with panels. The key to making the frame is to cut grooves in the stiles (vertical pieces) and the rails (horizontal pieces) to hold the panel. Then these pieces are joined with "stub" tenons that are cut on the end of the rails to fit in the grooves. We will show some easy ways to make this joint.

NEXT ISSUE. The next issue of *Woodsmith* (No. 74) will be mailed during the week of March 25, 1991.



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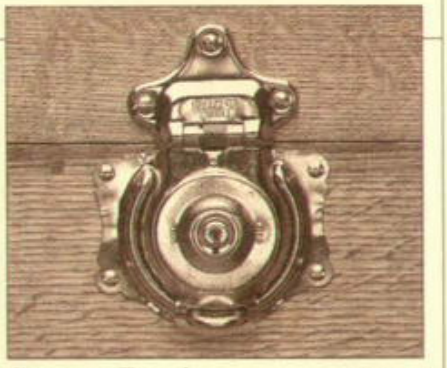
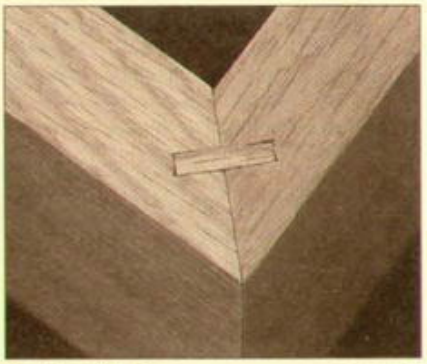
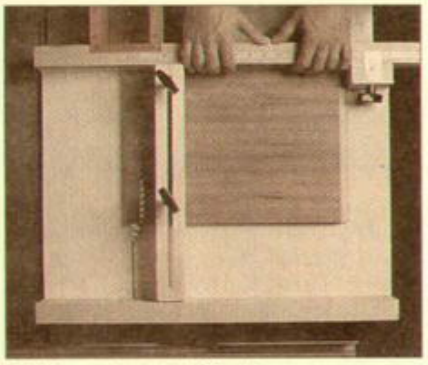


Steamer Trunk *page 6*



Splined Miter *page 12*



Sliding Cut-Off Table *page 14*

Collector's Cabinet *page 20*

Tips & Techniques

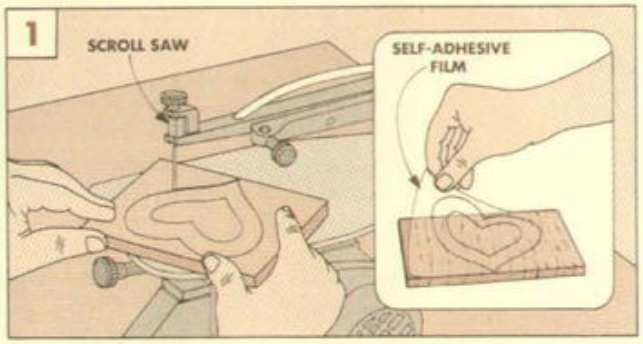
TRANSPARENT PATTERNS

■ Sometimes I want to position a scroll saw pattern so the wood grain matches the shape of the pattern or to avoid a knot. The problem is, I can't see the wood through the pattern. To solve the problem, I photocopy the pattern onto a sheet of clear self-adhesive film, see Fig. 1.

The film is available in art and office supply stores. Two brand names are Letracopy and Raven Reprofilm. I buy them locally for about 70¢ for a 8½" x 11" sheet.

The film makes perfect patterns for cutting on a band saw or scroll saw. But the film's adhesive isn't sticky enough to hold it on wood while cutting on a table saw or drilling.

Malcolm Partridge
Braintree, Massachusetts



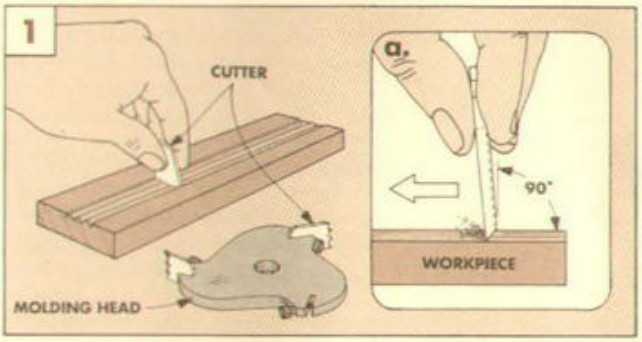
MOLDING CUTTER SCRAPER

■ I used the molding head on my table saw to put a decorative molding on some walnut boards. But after cutting, the areas with the most attractive wood grain also had the roughest surfaces.

I tried sanding, but couldn't follow the beads or get into the tight spots. So I removed one of the cutters from the molding head and tried using it as a scraper, see Fig. 1. It smoothed out the rough spots.

To use a cutter as a scraper, hold it with the bevel away from you. Then press it down on the workpiece and tilt it slightly as you scrape, see Fig. 1a. If the cutter is sharp, you'll get tiny shavings rather than dust.

Barry A. Milton
Indianola, Iowa



RADIAL ARM SAW SHIM

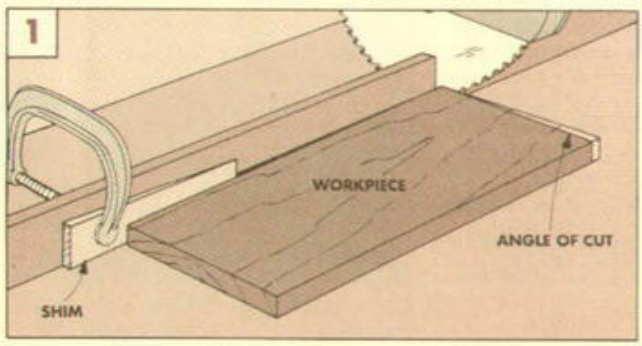
■ A recent project called for a shelf cut to fit into a corner of a room. Since the corner wasn't square, one end of the shelf had to be cut slightly less than 90°.

I cut this on a radial arm saw, see Fig. 1. But I used a shim to change the angle of the cut instead of turning the saw's arm. (I like to keep the saw set at 90°. And it's hard to set my saw at *slightly* less than 90° — it wants to fall back into the 90° position.)

After marking the cut line on one end, set the workpiece on the saw. Then put a shim between the fence and the other end of the workpiece, see Fig. 1.

Next, align the cut line with the blade. (Move the shim to change the angle of cut.) Once aligned, clamp the shim and cut.

Stanley B. Myers
Colorado Springs, Colorado



FORSTNER BIT GUIDE

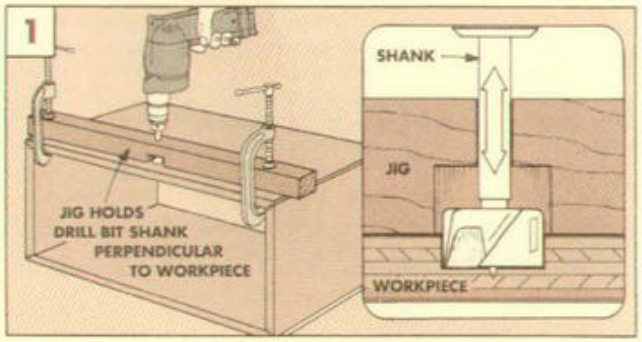
■ Here's a simple jig that holds a Forstner drill bit perpendicular to a workpiece while boring with a portable drill, see Fig. 1. It's just a scrap 2x4 with a hole in it that guides the bit shank.

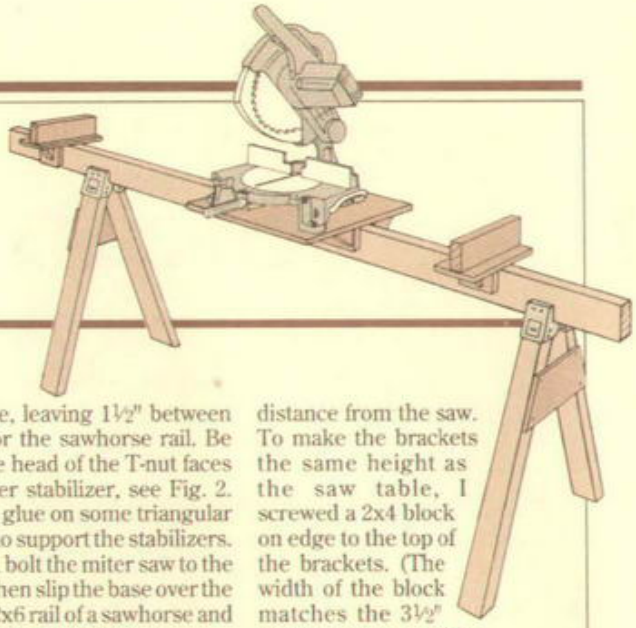
To make the jig, cut a 2x4 long enough to be clamped to the workpiece and then rip it 1½" wide. Next cut a dado across the stock slightly wider than the Forstner bit head.

Now, bore a hole centered in the dado that fits the shank of the bit. And then put the shank through the hole with the head inside the dado.

Next, align the bit over the spot to be drilled and clamp the jig to the workpiece. Finally, chuck the bit in the portable drill and bore the hole.

Art Hanson
Medford, Oregon





MITER SAW STAND

■ When I took my new miter saw out on a job, I found myself using it on the floor. This was uncomfortable and made it hard to make accurate cuts.

To get the saw up off the floor, I built a bracket that fits over a 2x4 or 2x6 rail that's held between standard sawhorse legs, see drawing. Two side brackets hold the workpiece level with the miter saw table.

To make a bracket for your miter saw, first cut a piece of ¾" plywood two inches longer and wider than your saw's table, see Fig. 1. Now mark and bore holes in the base to match the bolt holes in the saw.

Next cut two plywood stabilizers 3½" wide and the same length as the base piece. Then, mark the location for a thumb screw to hold the bracket to the rail. It goes through a T-nut centered in one of the stabilizers. Now, counterbore and drill a hole to accept a 5/16" T-nut, and then install it, see Fig. 2a.

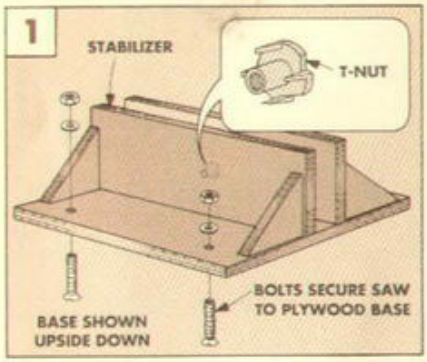
Next, screw the stabilizers to the base, leaving 1½" between them for the sawhorse rail. Be sure the head of the T-nut faces the other stabilizer, see Fig. 2. Finally, glue on some triangular blocks to support the stabilizers.

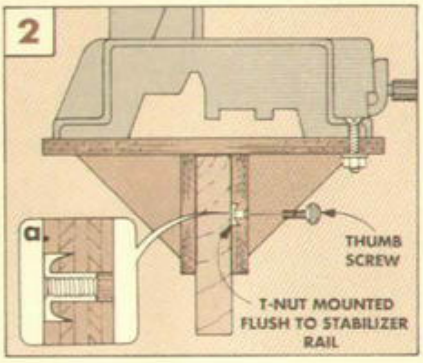
Now, bolt the miter saw to the base. Then slip the base over the 2x4 or 2x6 rail of a sawhorse and tighten the thumb screw.

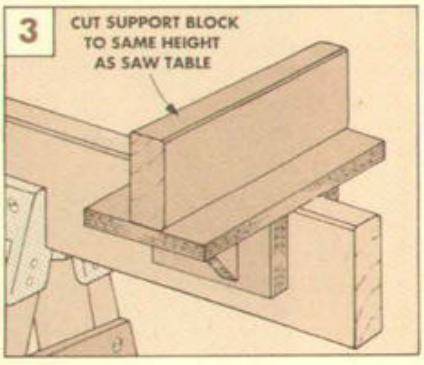
To hold the workpiece level when cutting, I made adjustable plywood support brackets, see Fig. 3. They also fit on the sawhorse rail and can be placed any distance from the saw. To make the brackets the same height as the saw table, I screwed a 2x4 block on edge to the top of the brackets. (The width of the block matches the 3½" height of my saw table.)

Now I can stand and work in comfort with long pieces of molding properly supported.

William Eldridge
Chatham, New Jersey







QUICK TIPS

TAPE SHIM

■ The cuts I was getting on my new table saw weren't always square. I traced the problem to the miter gauge guide bar. There was too much play in the miter gauge slot in my saw table.

To take up the excess space, I used metal foil tape. This very thin flexible tape has adhesive on one side. It's used to seal joints in duct work, but it makes an excellent shim. I put a strip down one side of the guide bar and tested the fit in the table slot. Since it was still just a bit loose, I put a second strip along the other side and the play was gone.

Richard Candy
Cinnaminson, New Jersey

CHUCK KEY HOLDER

■ After wasting lots of time looking for the chuck key for my drill press, I placed a small magnet on top of the drill press. Now, after using the chuck key, I put it on the magnet. So the key is always there the next time it's needed.

There's even room on the magnet to keep a couple Allen wrenches and an extra drill bit.

Jim Johnson
Brunswick, Ohio

PIN MAGNET

■ I like to use steel wool when I'm finishing a project, but it can be very difficult to get the steel wool particles out of corners and holes, even with a shop-vac. To solve this problem, I use a safety pin and a small magnet.

Start by straightening the safety pin. Then, to make it easier to gather the steel wool particles, make a little right angle bend near the point.

Now, hold the other end of the pin against a magnet and put the point in a hole or crevice. The steel wool particles stick to the pin and are easily removed.

Richard Goldman
Great Falls, Virginia

STRIPPING KNIFE

■ Recently I purchased several pieces of second hand furniture and started to strip off the finish using a liquid paint remover and a putty knife. But the sharp edge of the putty knife can gouge the wood. I found that by using a Teflon-coated kitchen spatula, the job was easier and I didn't damage the wood.

Richard Lane
Ada, Oklahoma

SEND IN YOUR TIPS

If you would like to share a tip or idea, just send it to *Woodsmith*, Tips and Techniques, 2200 Grand Ave., Des Moines, Iowa 50312.

We will pay upon publication $15 to $100 (depending on the published length of the tip). Please include an explanation and a sketch or photo (we'll draw a new one).

Steamer Trunk

Place it at the foot of the bed, or add a glass top to use it as a coffee table in the den. Either way, this trunk is a handsome — and lasting — transportable piece of furniture.

I used to spend hours in my grandfather's attic rummaging through his old steamer trunk. It made me curious to think where the stuff had come from and where the trunk had been.

That trunk is now in *my* attic. And if it weren't so beat up and musty-smelling, I'd bring it down and show it off. But instead of trying to renew the antique, I decided to build my own.

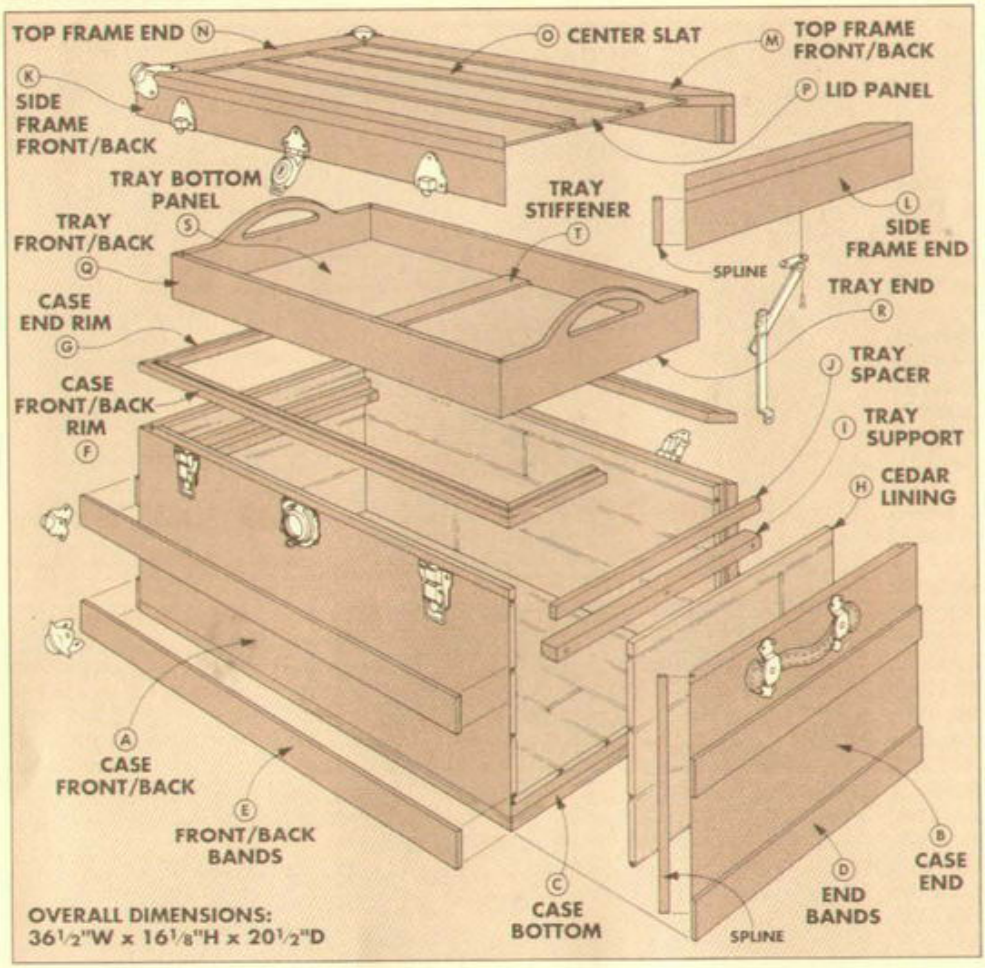
WOOD. Old trunks were built light so they wouldn't be impossible to carry. Since I don't plan on carrying this trunk around much, I used ¾" oak plywood for sturdy construction. But ¼" oak plywood is all that's needed for the lid and tray panels. If it's used as a sweater or blanket chest, you can line the trunk with aromatic cedar to keep the contents smelling fresh.

CONSTRUCTION. To avoid exposing the plywood edges of the trunk case, the sides are joined with a splined miter joint. The lid panels are reinforced with oak slats that are tenoned into frames.

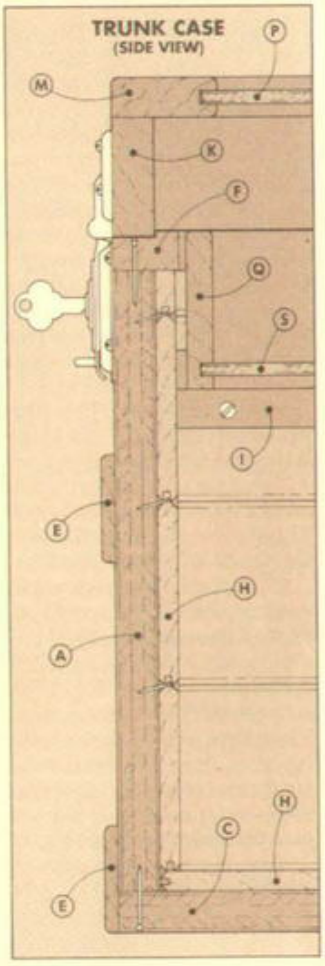
FINISH. A dark-colored stain makes the oak trunk look like an heirloom. But finding just the right shade can be challenging. So after a bit of experimenting, I came up with a mixture of artists' oil and boiled linseed oil that produced a rich, translucent brown — like aged oak.

HARDWARE. In the past, trunks that travelled great distances needed special reinforcement with hardware at the corners and edges. But today, trunks like this have extra hardware mostly for decoration. To make this trunk as authentic as possible, we used brass-plated trunk hardware, see Sources, page 31.

EXPLODED VIEW



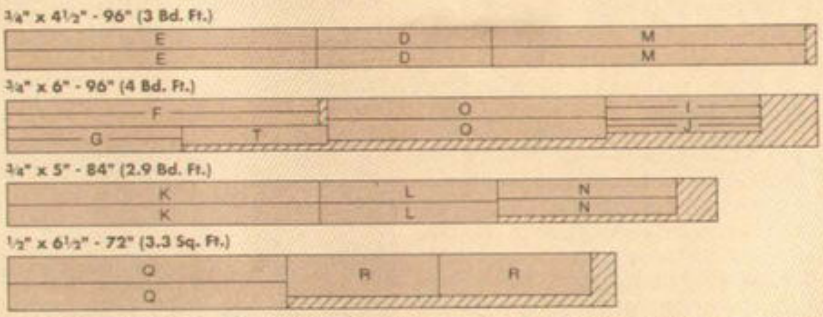
CROSS SECTION



MATERIALS

CASE		
A	Front/Backs (2)	¾ ply - 11¾ x 36
B	Ends (2)	¾ ply - 11¾ x 20
C	Bottom (1)	¾ ply - 20 x 36
D	End Bands (4)	¼ x 2 - 20
E	Fr./Bk.Bands (4)	¼ x 2 - 36½
F	Front/Back Rim (2)	¾ x 1¼ - 36
G	End Rims (2)	¾ x 1¼ - 20
H	Cedar Lining	1 pkg. (@15 s.f.)
I	Tray Supports (2)	¾ x 1 - 18
J	Tray Spacers (2)	½ x ¾ - 18
LID		
K	Side Frame Fr./Bk. (2)	¾ x 2¼ - 36
L	Side Frame Ends (2)	¾ x 2¼ - 20
M	Top Frame Fr./Bk. (2)	¾ x 2 - 36
N	Top Frame Ends (2)	¾ x 2 - 20
O	Center Slats (2)	¾ x 2 - 32½
P	Panels (3)	¼ ply - 4½ x 32½
TRAY		
Q	Front/Backs (2)	½ x 3 - 32½
R	Ends (2)	½ x 5 - 17⅜
S	Bottom Panels (2)	¼ ply - 16⅞ x 15½
T	Stiffener (1)	¾ x 2 - 16⅞

CUTTING DIAGRAM

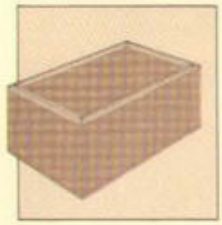


ALSO REQUIRED: One 2' x 8' Piece of ¾" Ply: One-half (4' x 4') Sheet ¼" Ply.
(1) Package of Tongue-and-Groove Cedar Closet Lining (Approx. 15 s.f.)

SUPPLIES

- Case corners, brass plated (8)
- Corner clamps, brass plated (4)
- Stop hinges, brass plated (2)
- Leather handles, russet (2)
- Handle loops with pegs, brass pltd. (4)
- Draw catches, brass plated (2)
- Trunk lock, brass plated (1)
- Lid stays, brass plated (2)
- ¾" brads (1 box)
- (24) 4d finish nails
- (89) #6 x ½" Rh brass woodscrews
- (6) #6 x 1¾" Fh brass woodscrews

TRUNK CASE



The main parts of the trunk case are cut from a 2'-wide by 8'-long piece of ¾" plywood, see cutting diagram, Fig. 1.

CUT PIECES. Begin making the case by cutting a double-wide piece for the **case front** and **back (A)** to a rough size of 24" by 37", see Fig. 1.

Then cut another double-wide piece 24" wide by 21" long for the two **case ends (B)**. Now rip the double-wide pieces to get four pieces 11¾" wide, see Fig. 1.

MITER TO LENGTH. Theses four pieces are joined with splined miter joints, see Fig. 3. (For more on splined miters, see page 12.)

To cut the joint, tilt the blade to 45° and cut a miter (bevel) on one end of all four pieces. Then miter the four pieces to finished lengths of 20" and 36", see Fig. 1.

Shop Note: To make mitering panels more accurate, I use a sliding cut-off table for the table saw, see page 14.

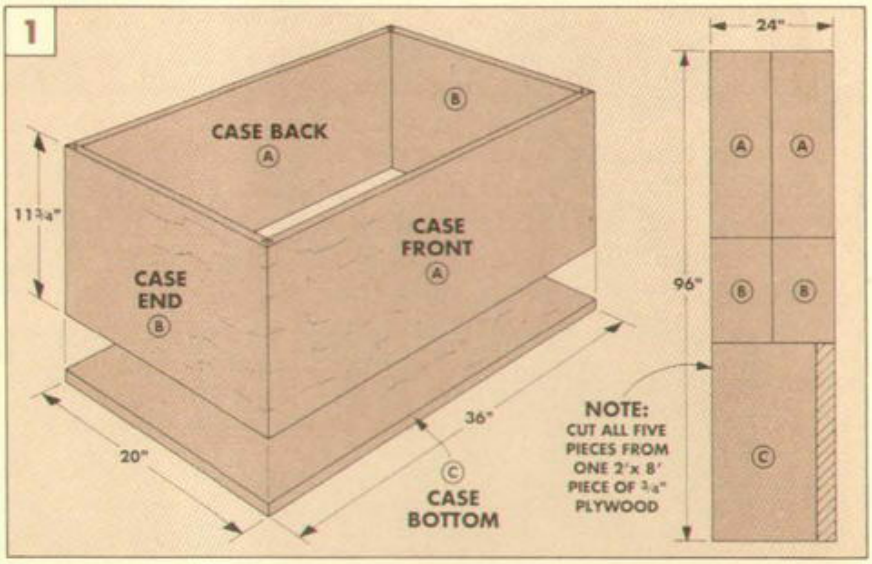
SPLINES. Next, cut a kerf for the splines in each mitered end, see Fig. 3. Then cut 11¾"-long splines of ⅛" Masonite to fit in the kerfs.

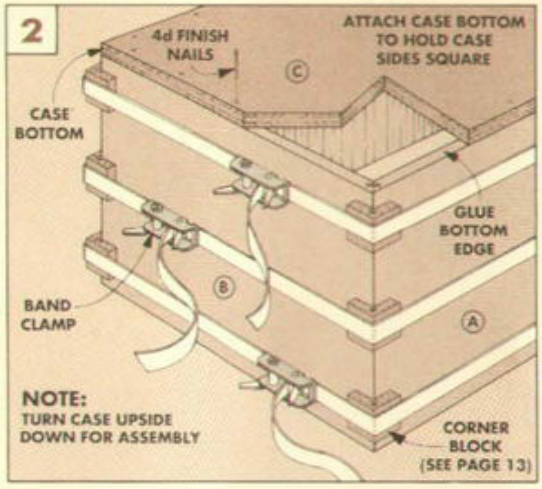
ASSEMBLE CASE. Before gluing the case together, dry-assemble the sides to check for square corners and tight joints, see Fig. 2. When you're satisfied the box is square, cut the **case bottom (C)** to fit, see Fig. 1.

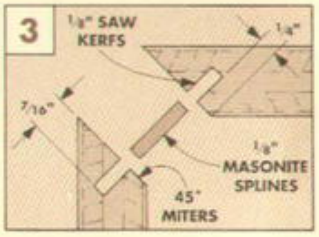
Note: The bottom fits onto — not inside of — the case sides, see Fig. 2. (The exposed plywood edges are covered later with hardwood bands, refer to Fig. 11a.)

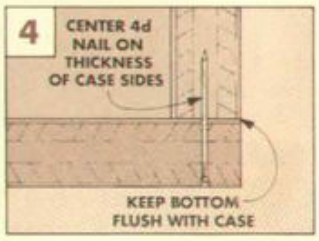
Now glue all four corners with the splines in place, and clamp the case square.

ATTACH BOTTOM. To keep the case square while the glue dries, attach the bottom — glue and nail it with 4d (1½") finish nails, see Fig. 4.









CASE RIM

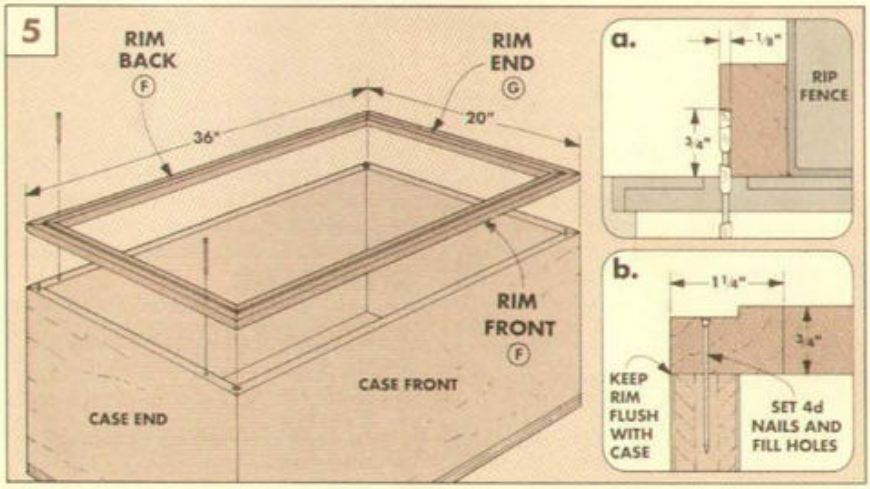
To hide the top edges of the plywood, the trunk case has a solid wood rim, see Fig. 5. The trunk lid fits into a shallow rabbet cut around the upper inside edge of this rim, refer to Fig. 6b, facing page.

RIP AND RABBET. Begin making the case rim by ripping the **rim front, back (F)** and **ends (G)** to a width of 1¼" from ¾" stock.

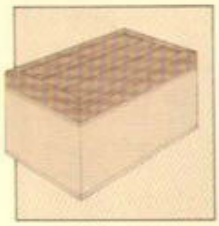
Before cutting the pieces to finished length, I cut the rabbets. To do this, first set the blade ¾" high, see Fig. 5a. Then set the rip fence to cut a ⅛"-deep rabbet on the outside face of each workpiece.

MITERS. When the rabbets have been cut, miter the rim pieces to the same lengths as the case front, back, and ends, see Fig. 5.

ATTACH RIM. Now glue and nail each section of the rim onto the trunk case with the rabbet facing up and out, see Fig. 5b.



TRUNK LID



The lid of the trunk consists of a top frame that fits on a side frame, see Fig. 10.

SIDE FRAME. To make the lid, start by cutting the **side frame (K, L)** pieces from ¾" solid wood to a width of 2¼", see Fig. 6b. Then cut the front/back (K) pieces to a rough length of 37", and the ends (L) to a rough length of 21".

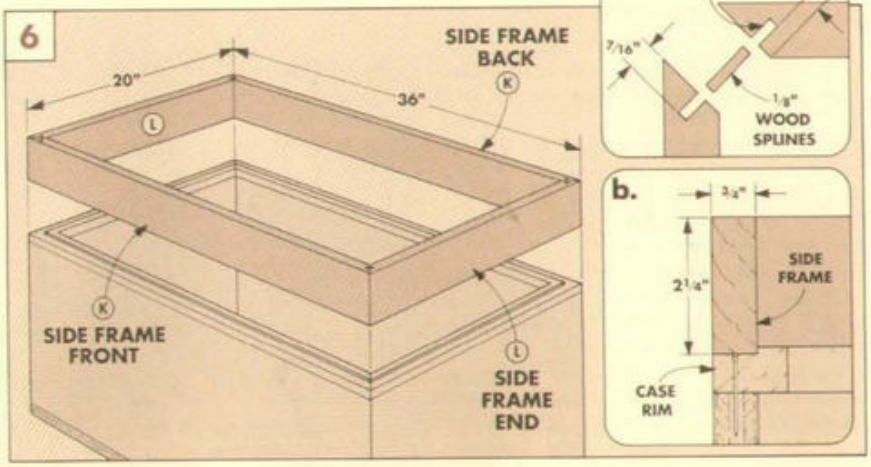
Next miter all four pieces to the same size as the case rim, see Fig. 6. Then cut kerfs for the splines, and assemble the frame like you did the case, see Fig. 6a. (To keep the frame square, I assembled it on top of the case.)

TOP FRAME. The miters on the top frame are a little different than the miters on the rest of the trunk — they're cut across the *face* of the pieces, see Fig. 7. And because the mitered pieces will be glued down to the side frame, they don't need splines.

To make the top frame, first rip the **top frame front/back (M)** and **ends (N)** to a width of 2". Then miter them to length so they fit on top of the side frame pieces.

CENTER SLATS. Next, work on the **center slats (O)**. These slats have ¼"-long stub tenons that fit into grooves on the inside edges of the top frame, see Fig. 9.

To make the slats (O), first cut two pieces of ¾" stock to a width of 2", and ½" *longer* than the inside length of the top frame (to allow for the tenons), see Fig. 7.



GROOVES AND TENONS. Now cut grooves centered on the *inside* edge of each top frame section (M,N), and on *both* edges of the two center slats (O), see Fig. 8. Cut these grooves to width to hold the ¼"-thick plywood you will be using for the lid panels (P).

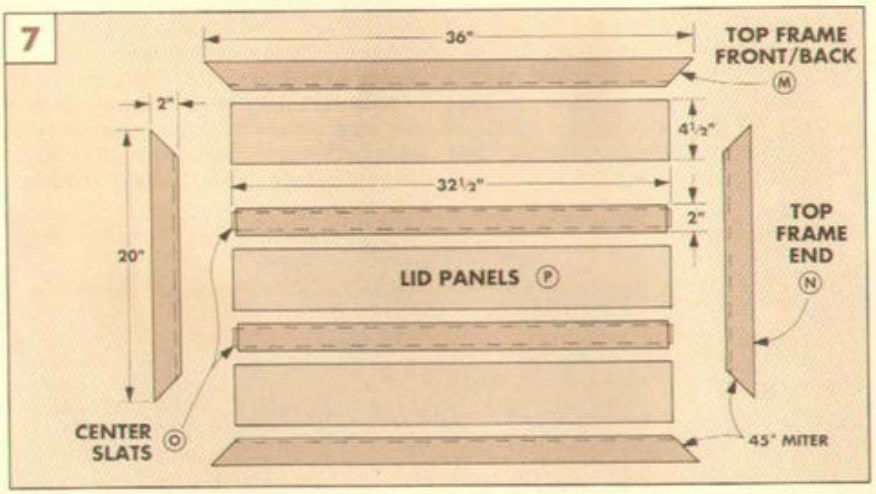
Shop Note: ¼" oak plywood is usually *less* than ¼" thick. Be sure to cut the grooves to the exact thickness of your plywood.

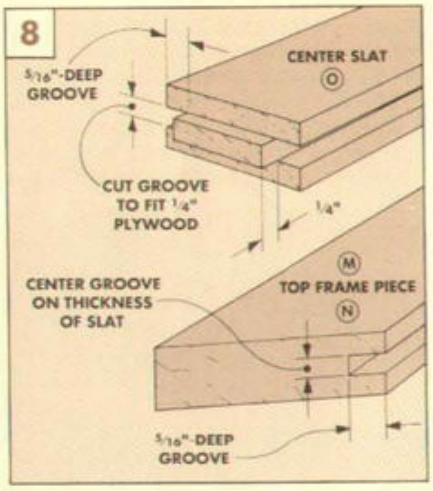
Next cut ¼"-long tenons on the ends of the center slats (O) to fit in the groove, see Fig. 8.

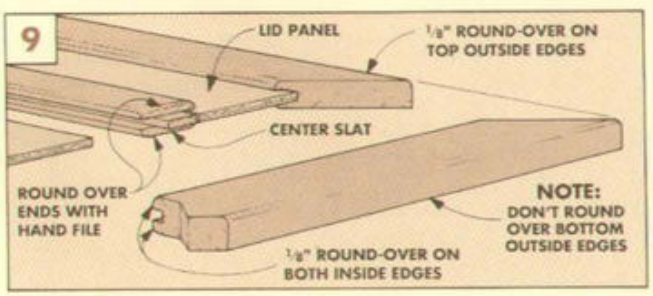
ROUND-OVER. To soften the edges of all the pieces, I routed a ⅛" round-over on three edges of the top frame pieces, see Fig. 9. Then round over all the edges of the center slats, and file over the ends.

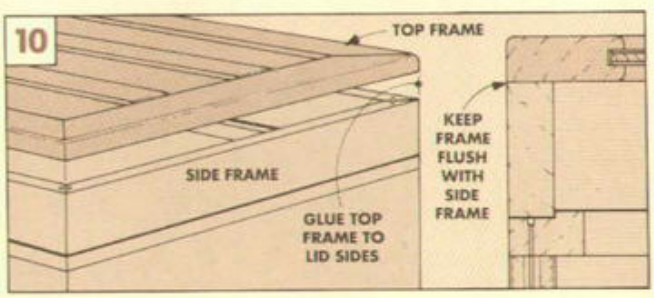
LID PANELS. Determine the width of the **lid panels (P)** by first dry assembling the top frame with the center slats in place. Then rip a piece of ¼" plywood into three equal-width panels (4½" for my lid). After that, cut the panels the same length as the center slats (32½"), see Fig. 7.

ASSEMBLY. With the panels cut, assemble the top frame with glue and clamps. Then glue it onto the side frame, see Fig. 10.









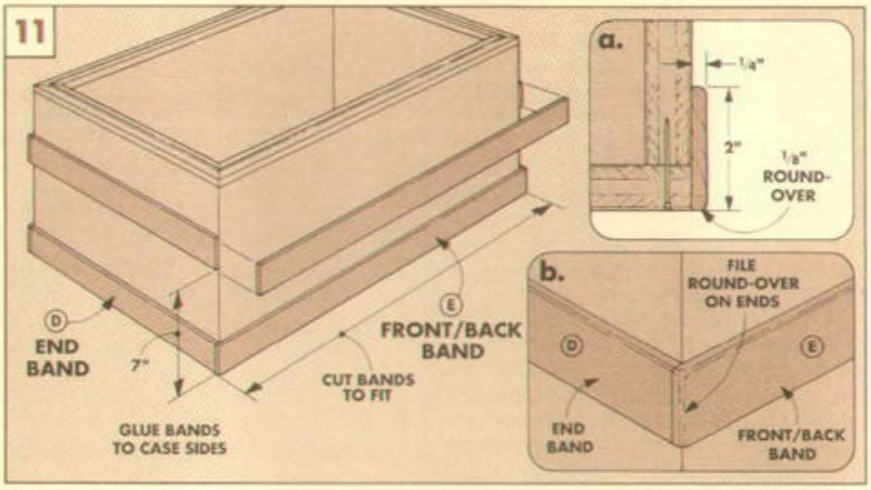
CASE BANDS

To make the trunk look authentic, I added hardwood bands around the case, see Fig. 11. The bands are ¼"-thick stock resawn and planed from ¾" stock, see Fig. 11a.

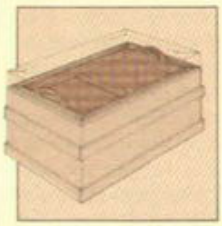
CUT TO SIZE. To make the case bands, cut four 2"-wide **end bands (D)** the same length as the end of the case (20"). Then cut four 2"-wide **front/back case bands (E)** ½" *longer* than the trunk case (36½"). (They overlap the end bands, see Fig. 11b.)

ROUND OVER. After cutting the bands to length, rout the *outside* edges of each band with a ⅛" round-over bit. (Not the *inside* edges, nor the *ends* of the end bands.)

GLUE TO CASE. Now glue and clamp the bands to the trunk case, starting with the end bands, see Fig. 11b. To make clamping the upper set of bands easier, I made clamp extension blocks, see page 18.



TRUNK TRAY



With the case bands attached, work can begin on the inside tray. The tray consists of a hardwood frame with splined miter corners, and a hardwood "stiffener" that separates two plywood panels, see Fig. 12.

TRAY FRAME. I began making the tray frame by first ripping the **tray front/backs (Q)** to a finished width of 3" from ½"-thick stock. Since the **tray ends (R)** have handles, rip them 2" wider (5" wide).

As for length, miter the front/backs (Q) so they're 1" shorter than the inside length of the trunk *rim*. (This allows room for the lid stay hardware.) Then miter the ends (R) ⅛" less than the inside width of the trunk rim.

Next, cut kerfs into each mitered end, and make splines to fit the kerfs, see Fig. 12a.

SHAPE HANDLES. To make the handles, first lay out the profile of the handle on each tray end (R), see Fig. 13. Next, using a sabre saw or a band saw, cut around the outside of the handle. Then bore two ½" holes and complete the inside with a sabre saw.

When both handles have been shaped, round over the top edges and the inside of the cut-outs with a ⅛" round-over bit.

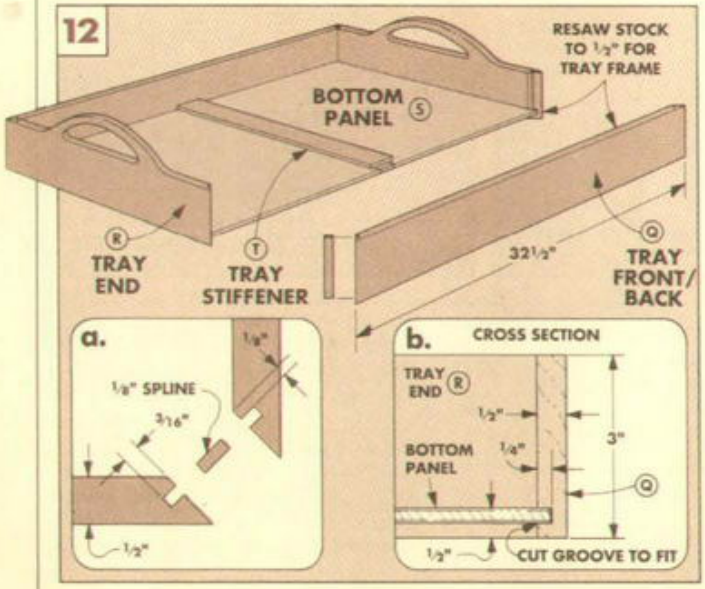
STIFFENER. Make the **tray stiffener (T)** by cutting a piece of ¾" stock to a width of 2". Then cut it ½" longer than the inside width of the tray frame, see Fig. 14. (This allows for a tenon on each end.)

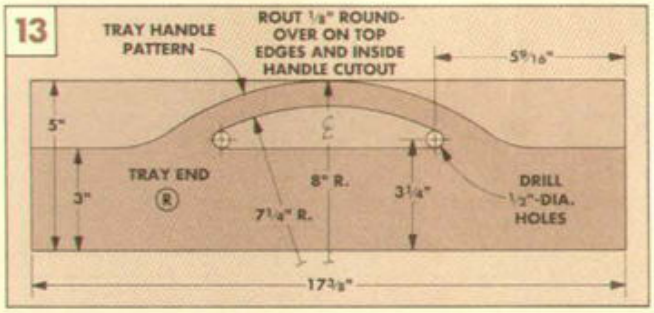
PANEL GROOVES. The plywood tray panels fit into grooves in the stiffener and the tray frame. Cut these grooves along the bottom edge of each frame piece, see Fig. 12b, and on both sides of the stiffener, see Fig. 14.

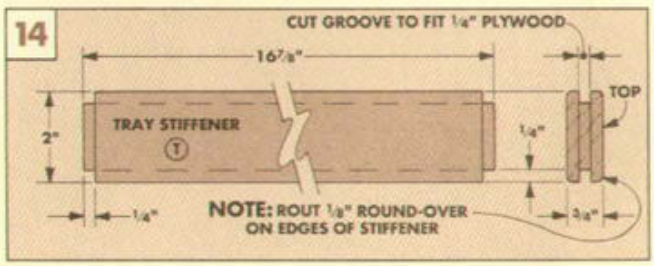
TENONS. Now cut ¼"-long stub tenons on both ends of the tray stiffener (T), see Fig. 14. (Cut these to thickness so they fit in the panel grooves.) Then round over the top and bottom edges of the tray stiffener, see Fig. 14.

BOTTOM PANELS. With the tenons cut on the stiffener, cut equal-size **bottom panels (S)** from ¼" plywood. Cut the panels to size so they fit in the grooves of the tray.

ASSEMBLE THE TRAY. With all the tray parts cut, I glued the tray together with the splines, panels, and stiffener in place. Then clamp the unit square until the glue dries.







TRUNK LINING & TRAY SUPPORTS

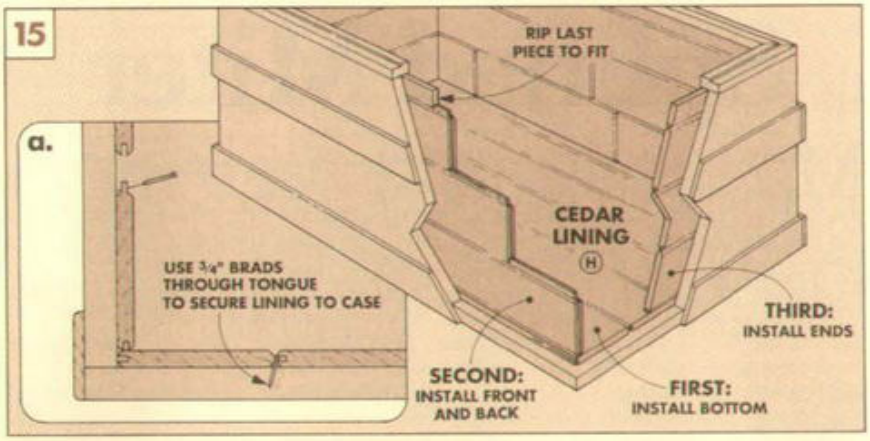
I lined the trunk with 3/8"-thick tongue-and-groove aromatic cedar closet lining (but it could be left unlined). The inside of the trunk has about 13 square feet of area to be lined. (I didn't line the lid.) The package of lining I used contained about 15 square feet of cedar, see Sources, page 31.

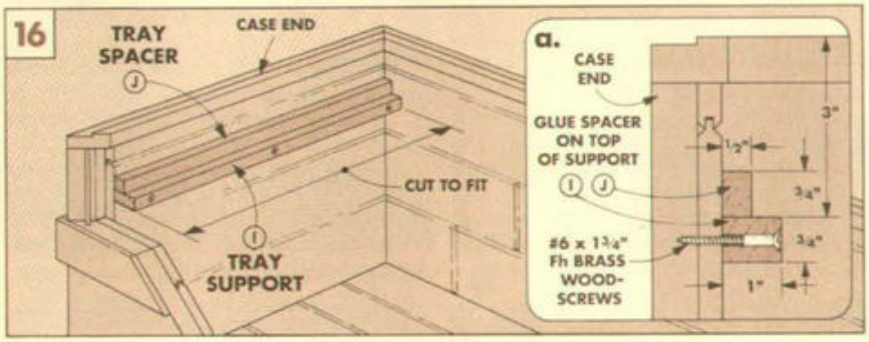
INSTALLATION TIPS. There are a couple tricks that can help you install the **lining (H)**. The first trick is the sequence: nail lining to the bottom of the trunk first; line the front and back of the case next. Then, finish off by lining the ends, see Fig. 15.

Second, to get the most out of one package of cedar, use the short cut-off pieces. For the nicest-looking effect, stagger the cut-offs between full-length pieces, see Fig. 15.

TRAY SUPPORT. After the lining is nailed in place, rip two **tray supports (I)** to a width of 1" from 3/4"-thick stock. (If you don't line the trunk, cut the supports 3/8" wider.) Then cut the supports to length so they fit tightly across the ends, see Fig. 16. Now screw each support in place with 1 3/4" Fh brass woodscrews, see Fig. 16a.

SPACER. To allow clearance for the lid stay hardware, and to center the tray left-to-right, I added two **tray spacers (J)**, refer to Fig. 16. Cut the 3/4"-thick spacers to a width of 1/2", and to the same length as the tray supports. Then glue them in place, see Fig. 16a.





FINISH & HARDWARE

I applied finish to the trunk before attaching the hardware. Note: Don't finish the cedar lining or you'll mask its aroma.

FINISH. To get the look of an "aged oak" trunk, I mixed a custom stain. To do this, start with a pint of boiled linseed oil, then add 1 1/2 tbsp. of burnt umber artists' oil color from an art supply store. (The two oils need a *thorough* mixing for the oil color to dissolve.)

After applying the stain, I wiped on two coats of General Finishes' Royal Finish (satin), see Sources, page 31.

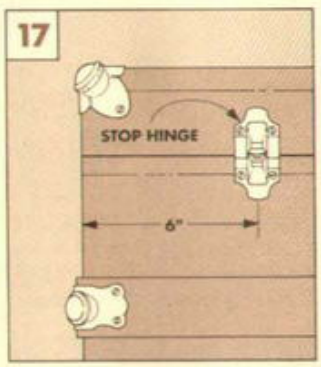
HARDWARE. When the finish has completely dried, begin installing the hardware. Note: All the hardware is attached using #6 x 1/2" Rh brass woodscrews.

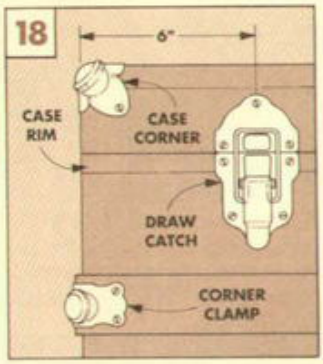
The lid is attached with two stop hinges, see Fig. 17. On the front of the case, draw catches pull the lid tightly closed, see Fig. 18. Install the two-piece lock in the same manner as the draw catches, see Fig. 19.

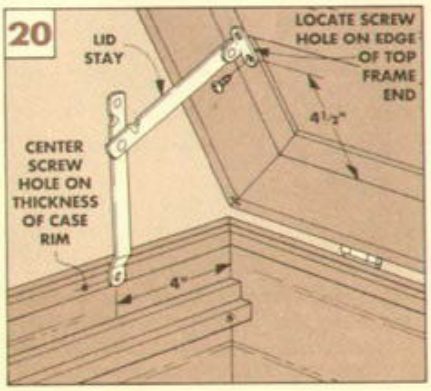
A pair of lid stays inside the trunk prevents the lid from opening too far. Screw one end of each stay to the inside of the case rim, and the other end to the top frame, see Fig. 20.

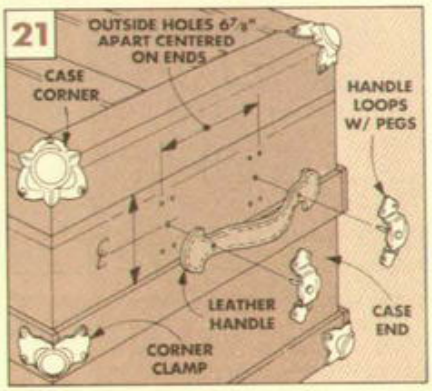
Attach the leather handles to the ends of the trunk using two handle loops, see Fig. 21.

Finally, to to give the trunk the traditional look, I screwed on case corners and corner clamps, see Fig. 21.

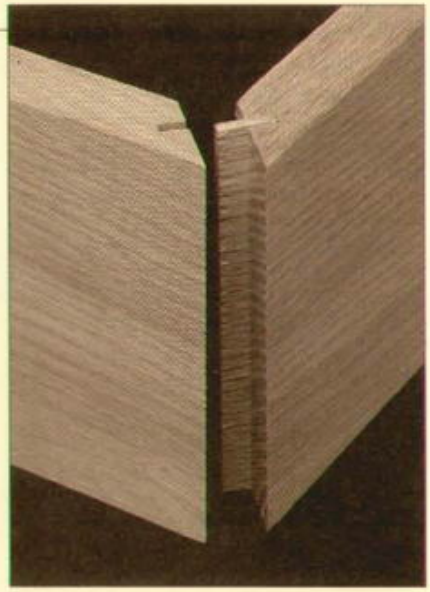








Splined Miter



Miter joints are great for hiding end grain, especially when working with plywood. For example, when building a box, you can hide the ends of the plywood by using miter joints at the four corners. (See the Steamer Trunk shown on page 6.)

Miter joints look like they're easy to cut and join together. Unfortunately, looks can be deceiving — especially when you're working with wide pieces.

CUTTING. The challenge is when you have to cut a perfect 45° bevel on the end of a wide workpiece. (This was needed for the Steamer Trunk.) The trick here is to make a cut that's 90° to the adjacent edge over its entire length, refer to Step 3.

SPLINE. Cutting the miter is only half the problem. The other half is assembling it. I've found the best way to get the miter aligned during clamping is to use splines.

A spline is a thin piece of wood that runs *across* the joint. It fits into kerfs cut in both sides of the joint, refer to photo at right.

There are a couple advantages to adding a spline to a miter joint. First, since miters tend to slip out of alignment as you clamp them together, the spline locks the joint while the clamps are tightened.

Second, the spline strengthens the joint by providing more glue surface.

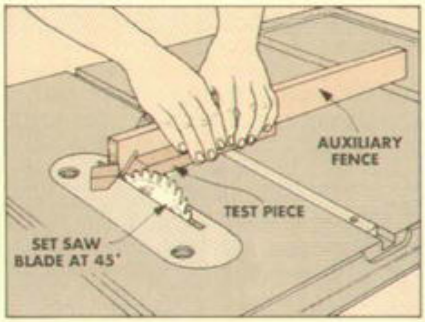
PREPARATIONS. There are some steps to take before cutting a splined miter joint.

To help support the workpiece over its entire length, and to have a surface to clamp a stop block to, I screw an auxiliary fence to my miter gauge, refer to Step 1. (Or, you could use a sliding cut-off table, see page 14.)

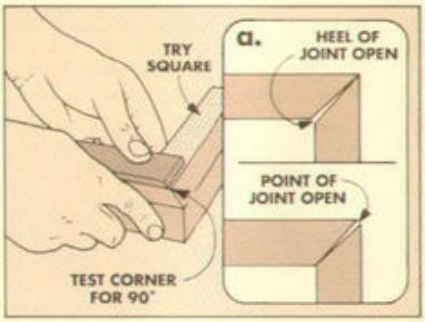
STOP BLOCK. Next, cut a stop block from a piece of scrap, and miter one end of the block at the same angle as the miter on the workpiece, see Step 4.

ROUGH LENGTH. Before cutting a miter on large workpieces, I've found it's a good idea to rough-cut all pieces so they're only about 1" longer than needed. This gives you enough length to work with, but reduces the workpiece to a manageable size.

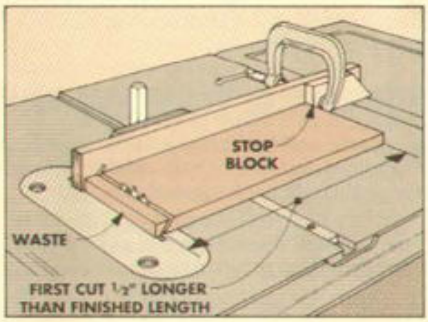
TEST CUTS. Before making any finish cuts, it's a good idea to check the angle of your blade with some test cuts. Cut two pieces of scrap (see Step 1), and check the angle with a try square, see Step 2. If the joint is open at the heel (see Step 2a), raise the angle of the



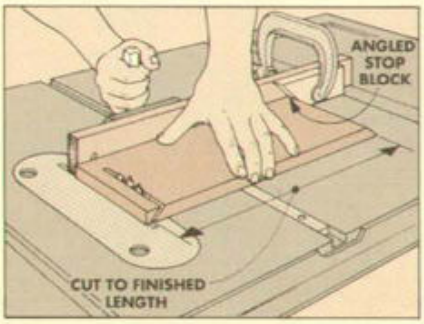
1 *Start with a test cut. Screw an auxiliary fence to the miter gauge and tilt the saw blade to 45°. Then make test cuts on the end of two pieces of scrap.*



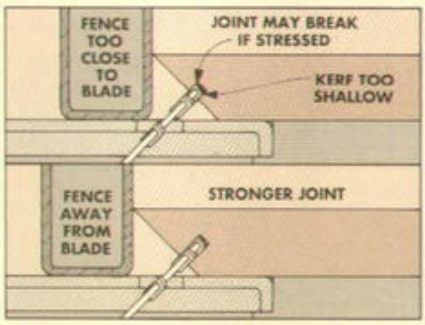
2 *To check the angle of the test cut, hold the pieces together around a try square. If heel is open, raise angle of blade from table. If point is open, lower the angle.*



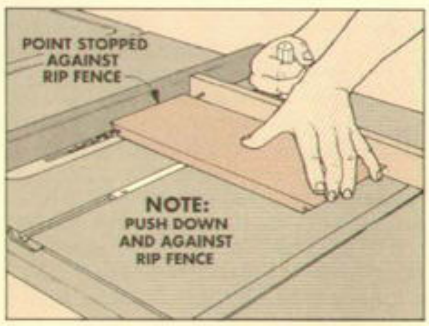
3 *After blade is set to cut exactly 45°, clamp a stop block to auxiliary fence so blade will cut 1/2" longer than finished length. Then trim one end off workpiece.*



4 *Turn workpiece end-for-end and reset stop block to finished length. (Note angled stop block, see text.) Then trim off workpiece to finished length.*



5 *To cut kerf for spline, lower the blade until it sticks above table about half the thickness of wood. Then position fence to act as a stop. Cut kerf near the heel.*



6 *Make cut in test piece to check position and depth of kerf. Then cut kerf in all of the miters with the workpiece tight against the miter gauge and rip fence.*

blade (up from the table). If the joint is open at the point, lower the angle of the blade (down toward the table).

CUT PIECES. After the saw is set up, cut miters on *one end* of *all* the workpieces first, see Step 3. Use the auxiliary fence and stop block to hold the pieces in place.

To cut the other end, mark the final length you want on the edge of one piece. Then align this mark with the blade. Now adjust the mitered end of the stop block at the end of the workpiece, see Step 4. (I always use a stop block rather than aligning to pencil marks to ensure the pieces are exactly the same length.)

KERFS. After all of the miters are cut, the blade can be retracted (lowered but at the same angle) to cut kerfs for the splines. I use a carbide-tipped sawblade to cut ⅛"-wide kerfs. Later, I cut the splines to fit.

When cutting the kerfs for the splines, use the rip fence as a stop for the mitered end of the workpiece, see Step 6. (Since you're not cutting through the piece, it's okay to use the rip fence and the miter gauge together.)

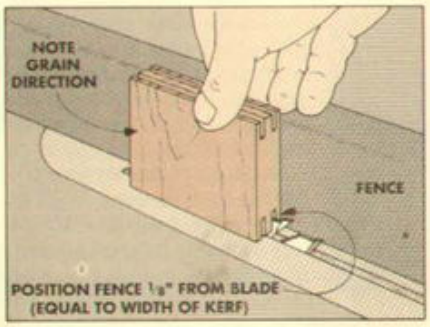
You want to position the fence so the kerf is cut near the "heel" of the miter, see Step 5. In this position, the kerf can be deeper and thus the spline can be longer for more glue surface. (For a tip on protecting the point of the miter, see Shop Notes, page 19.)

After the rip fence is positioned, cut a kerf in each miter, see Step 6.

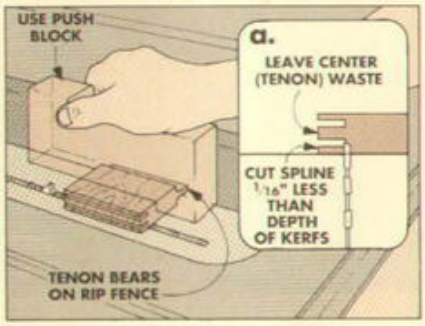
MAKING SPLINES. After the kerfs are cut, splines are cut to fit into the kerfs. If you cut the splines from a piece of solid wood, it has to be cut so the grain runs *perpendicular* to the joint line, see Steps 7 and 8.

To ensure the spline won't prevent the joint from closing, cut the spline so it's 1/16" less than the depth of both kerfs, see Fig. 9a.

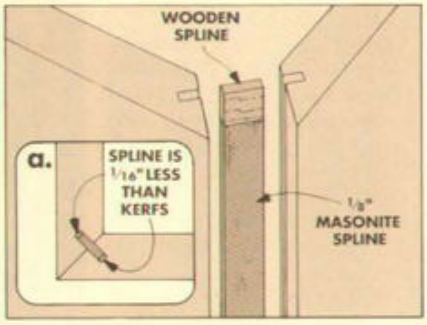
If the workpieces are wide, I use ⅛" Masonite for the splines. If the ends will be exposed, they can be capped with solid-wood splines, refer to Step 9.



7 *To cut splines, first make four cuts in the edges of a wide piece of ¾" stock. Set distance from the blade to the rip fence to equal width of kerf in the miter cut.*



8 *Lower the blade until it's just high enough to cut off a spline. Now trim a spline off the waste side of the workpiece. Then cut splines off other three edges.*



9 *⅛" Masonite can be used to make splines on wide joints. Cut the Masonite shorter than the length of the miter and fill in ends with wooden splines.*

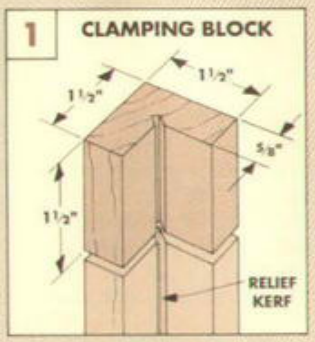
CLAMPING SPLINED MITER JOINTS

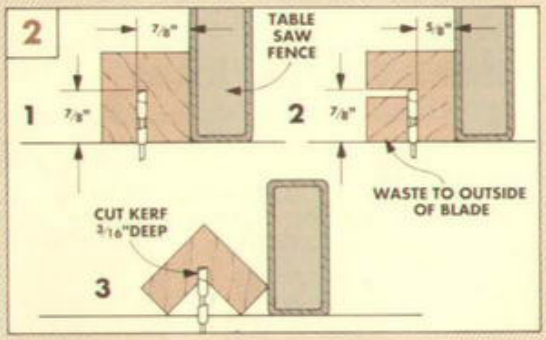
When I'm assembling a box with splined miters, I use band clamps to clamp all four corners at the same time. A band clamp puts uniform pressure on all four joints, and directs the pressure toward the center of the project. This way there isn't a tendency for the miters to slide out of position.

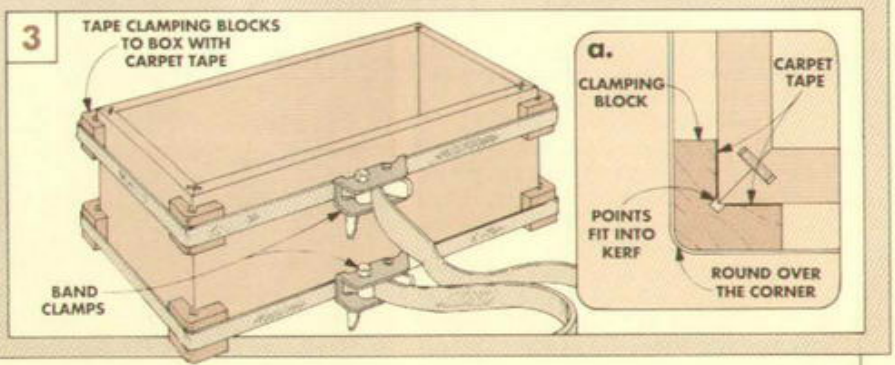
CLAMPING BLOCK. The only problem with band clamps is that they tend to round over the corners of the miter joint as the clamps are tightened. To prevent this, I use clamping blocks, see Fig. 1.

To make the clamping blocks, cut a large rabbet from one corner of a piece of 2x2 stock, see Steps 1 and 2 in Fig. 2. Then cut a relief kerf on the inside corner of the rabbet, see Step 3 in Fig. 2. This kerf allows space for glue squeeze-out, and protects the points of the miters when clamping, see Fig. 3a. Finally, cut 1½"-long blocks off the 2x2.

CARPET TAPE. You need at least three hands to hold the clamping blocks in place while tightening the band clamps. Since I only have two, I stick a piece of double-sided carpet tape in the rabbet of the blocks to hold them in position over the corners before positioning the band clamps, see Fig. 3a.







Sliding Cut-Off Table

Cross-cutting wide boards or plywood panels with a miter gauge on a table saw can be unsafe as well as awkward. It's usually a balancing act — trying to hold the workpiece steady against the miter gauge while pushing it through the cut. And the result of all this maneuvering is a less-than-perfect cut.

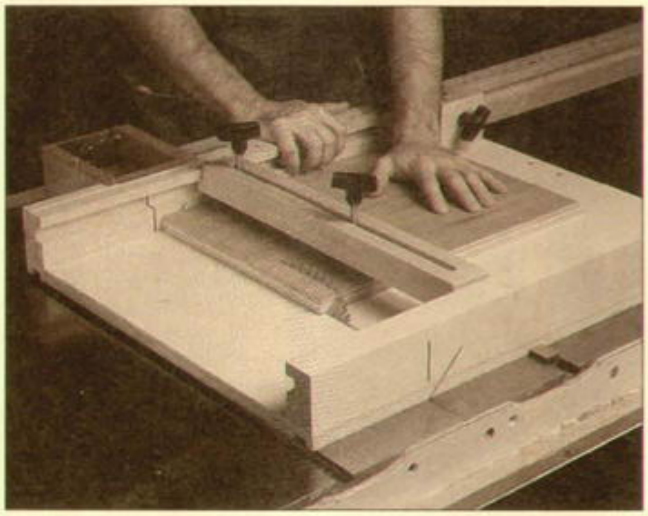
One solution to this problem is a sliding cut-off table. The sliding table acts as a giant miter gauge to give extra support to wide boards and panels while cross-cutting them to length.

Okay, you've seen sliding tables (sometimes called sleds) like this before. What makes this one different?

Well, it starts out like most cut-off tables — a plywood platform with a runner on the bottom that fits in the miter gauge slot of your saw. Then a fence is added to produce perfect 90° cross-cuts.

On some versions, a support rail is added (on the edge opposite the fence) to help stabilize the platform and hold it together.

The version shown here adds three features not usually found on cut-off tables. These features improve accuracy and safety.



HOLD-DOWN. The first thing I added is a removable hold-down bar that fits between the sliding table fence and support rail, see photo. When positioned over a workpiece, two machine bolts in the hold-down bar keep the workpiece flat and secure, refer to Fig. 18. With this addition, you get accurate cross-cuts on wide boards and panels — particularly on workpieces that are slightly warped or cupped.

STOP BLOCK. Since I often use a sliding table to cut off several pieces to exactly the same length, I added an adjustable stop block. (Even if you don't want to build this table, this stop block is worth looking at.)

SAFETY. For safety, I added a Plexiglas blade guard that covers the blade after it passes through the fence. And, to prevent the blade from cutting through the guard, I screwed a safety stop onto the bottom of the cut-off table.

WOOD AND HARDWARE. This sliding table is easy to build out of common materials. I made the base with ¾"-thick plywood (¼ sheet), and all the other parts with ¾"-thick maple (six board feet). The table is designed so that all the hardware can be purchased from most hardware stores, or as a kit from *Woodsmith Project Supplies*, see Sources, page 31.

Shop Note: For the best cut when using this cut-off table, the saw blade and rip fence of your table saw should be adjusted so they're parallel with the miter gauge slot. To make these adjustments, see the owner's manual for your saw, or *Woodsmith* No. 51.

RUNNER AND BASE

Since table saws vary in size, this cut-off table is designed so you can customize it to fit your saw's dimensions.

RUNNER. Start building the cut-off table by cutting a ½"-thick hardwood **runner (A)** to width so it slides smoothly in your table saw's miter gauge slot. Then cut the runner to a finished length of 21". (You can also order a piece of phenolic plastic to make the runner, see Sources, page 31.)

BASE. The plywood base for the cut-off table consists of two pieces: a **table (B)** that supports the workpiece, and a **table leaf (C)** that supports the waste. The table and leaf are cut from a single piece of plywood.

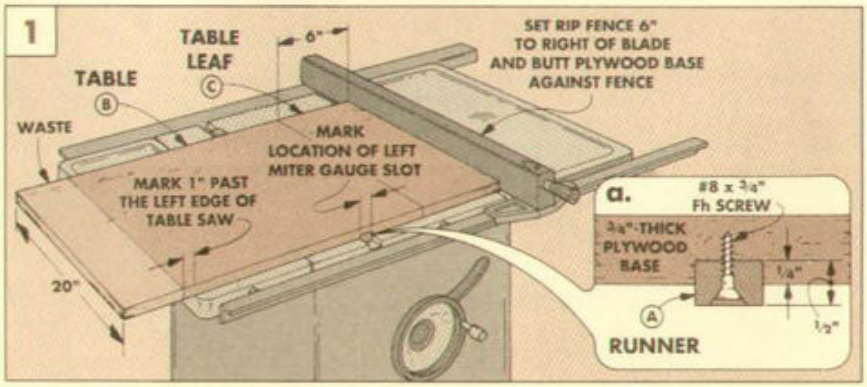
To determine the length of this piece, I positioned the rip fence 6" to the right of the blade and then lowered the saw blade, see Fig. 1. (The 6" area to the right of the saw blade is for the table leaf.)

Next, butt a piece of ¾"-thick plywood (I started with a 2'x4' sheet) against the fence. Now make a mark on the plywood 1" past the *left* edge of the table saw, see Fig. 1. (This 1" overhang is for a safety stop.) Also mark reference lines on the front edge of the plywood for a dado that will align with the left miter gauge slot. This dado is for the runner (A).

Now, cut the plywood base to length (1" past the saw's edge), and to a width of 20".

RUNNER DADO. To cut the dado for the runner, position the rip fence so the reference lines on the front edge of the plywood base are over the blade. Then, cut a ¼"-deep dado in the base by making a series of passes until the runner fits tightly in the dado.

Next, glue and screw the runner in the dado, see Fig. 1a. (The runner is 1" longer than the table so it's easy to align the runner and slot when setting the table on the saw.)



FENCE, RAIL, AND LEAF

After the runner is screwed to the base, the next step is to make a fence and support rail.

FENCE. Begin work on the **fence (D)** by cutting two pieces of ¾"-thick stock 3" wide and 46" long. Then, glue-up the pieces to make a 1½"-thick blank, see Fig. 2. When the glue dries, cut the blank to a finished width (height) of 2½" and length of 45".

SUPPORT RAIL. The blank for the shorter **support rail (E)** is made the same way. To determine its rough length, add the length of the plywood base plus 4" extra for a stop block (that's cut off later), see Fig. 2.

CUT GROOVE AND RABBET. Next, cut a ¾"-wide groove in each blank to mount the hold-down, see Fig. 2a. Then, cut a ⅞"-wide rabbet on the *top* of the fence (D) to accept a self-adhesive measuring tape, see Fig. 2b.

CUT STOP BLOCK. Now trim a 3" piece off the support rail (E) for the stop block (G) and set it aside, see Fig. 2. (The stop block is completed later.) Once the stop block is cut off the support rail, trim the rail to the same length as the plywood base, see Fig. 3.

MOUNT FENCE AND RAIL. To mount the fence and rail to the plywood base, position the fence (D) flush with the front of the base and the right edge, see Fig. 3. Then, screw the fence to the base, positioning the screws 9" from the right edge of the base and 3" from the left edge. (Note: *Don't* glue the fence in place. You may want to adjust it later if the table isn't cutting exactly 90°.) Next, screw the support rail (E) to the plywood base so it's flush with the back and sides, see Fig. 3.

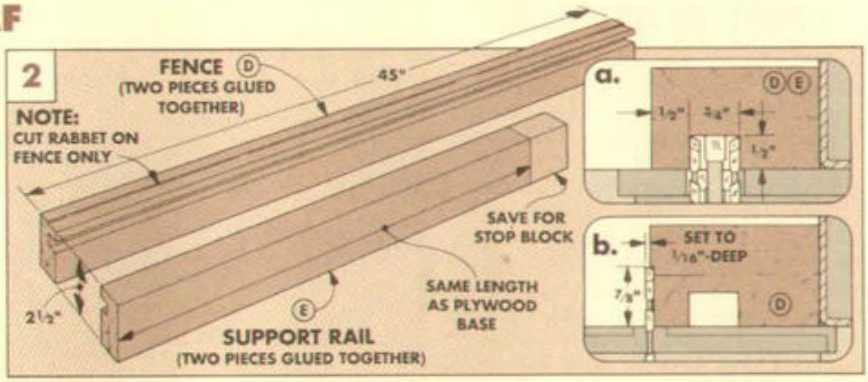
LEAF. Since I wanted to use the cut-off table for cutting bevels, next I cut the table leaf (C) off the table (B) at a 45° angle, see Fig. 4. (Note: If your saw blade tilts to the right, you'll only have to cut the leaf off at 90°, see Talking Shop, page 28.)

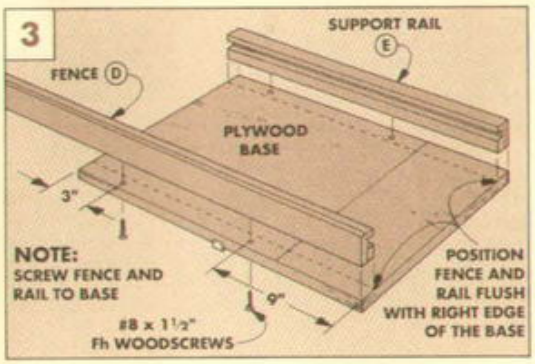
If your blade tilts to the left, set the blade at 45°, fit the runner in the miter gauge slot, and cut the leaf from the table — *don't* make a 90° cut yet. (Safety Note: Keep your hands well away from the blade when cutting.)

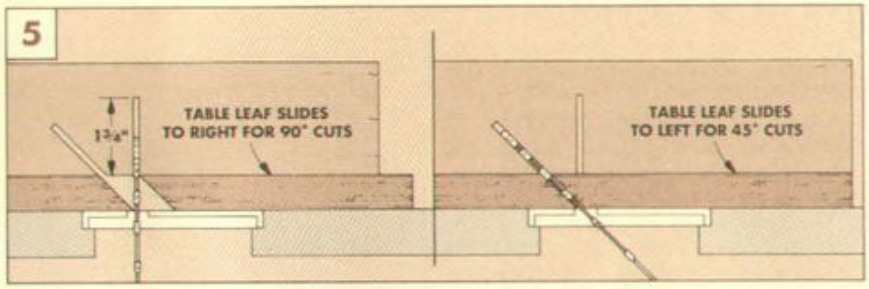
The leaf is adjustable — it opens to make 90° cuts and closes up for bevel cuts, see Fig. 5. To make it adjustable, cut a ¾"-wide groove at the end of each leaf, see Fig. 6a. Then, drill ¼" holes centered on the groove, and cut a slot between the holes, see Fig. 6.

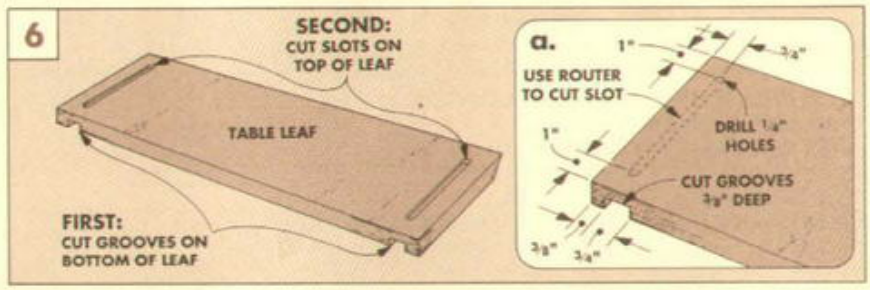
ATTACH TABLE LEAF. Now the leaf can be screwed to the fence and rail with panhead screws and washers. To do this, turn the sliding table over and drill pilot holes in the fence and support rail, see Fig. 7.

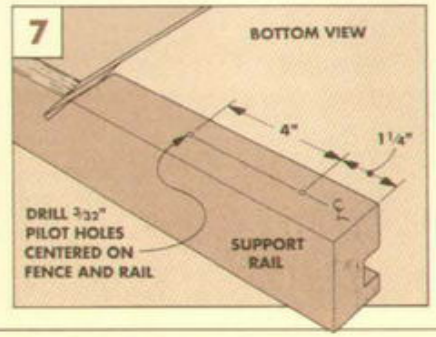
Now screw the leaf to the fence and rail, see Fig. 8. Next, slide the table leaf to create a ¾"-wide opening, and turn the cut-off table over so it sits in position on the saw. Then, make a 90° cut with the blade set 1¾" above the cut-off table, see Fig. 5. (Again, keep your hands away from the blade as it comes through the fence.)

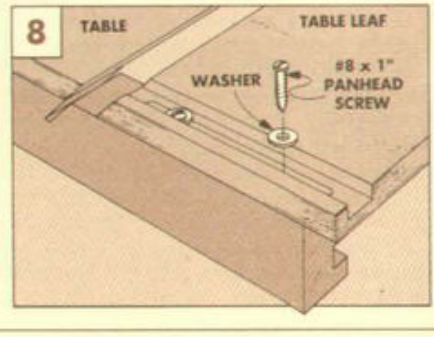












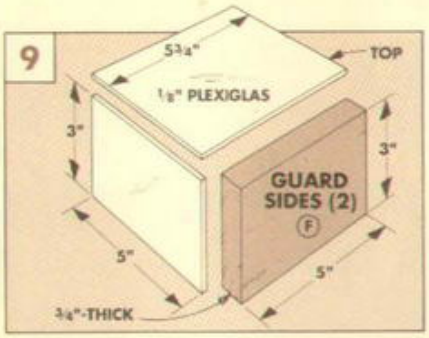
SAFETY FEATURES

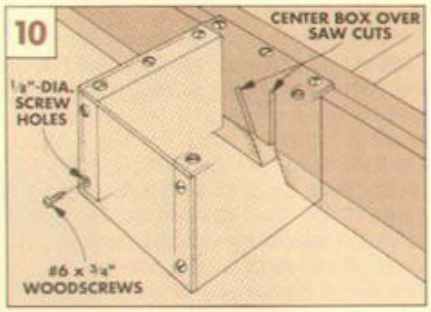
After the base is made, two safety features are added. A guard covers the blade as it passes through the fence. And a safety stop keeps the blade from cutting into the guard.

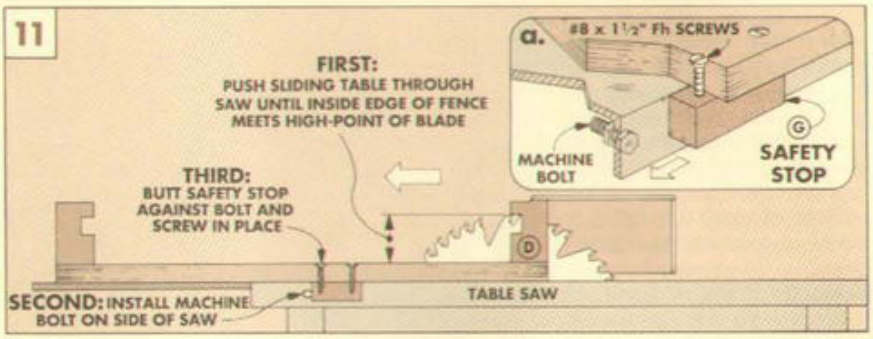
MAKE GUARD. Start by cutting two **guard sides (F)** from ¾"-thick stock, 3" wide and 5" long, see Fig. 9. To cover the top and back of the guard, I used transparent Plexiglas. (Seeing the blade is a reminder to keep your hands away from the guard when cutting.) Center the guard over the cuts in the fence and screw it in place, see Fig. 10.

SAFETY STOP. After the guard is attached, make a 1" x 3" **safety stop block (G)** from ¾"-thick stock to screw to the bottom of the cut-off table. To position the stop block, raise the blade to 2½", turn the power on, and push the table into the blade stopping when the inside edge of the fence (D) meets the high-point of the blade, see Fig. 11.

Then, turn off the saw and install a machine bolt on the left edge of your table saw, see Fig. 11a. (Note: If your saw doesn't have holes in the table edge, you'll have to drill a hole for the bolt.) Now, butt the stop block against the bolt and screw it in place.







HOLD-DOWN

The hold-down is a simple clamp system that fits into the grooves in the fence and support rail, refer to Fig. 18.

To use the hold-down, a workpiece is placed on the cut-off table and the hold-down is positioned over it. Then, to hold the workpiece flat, I used a pair of machine bolts.

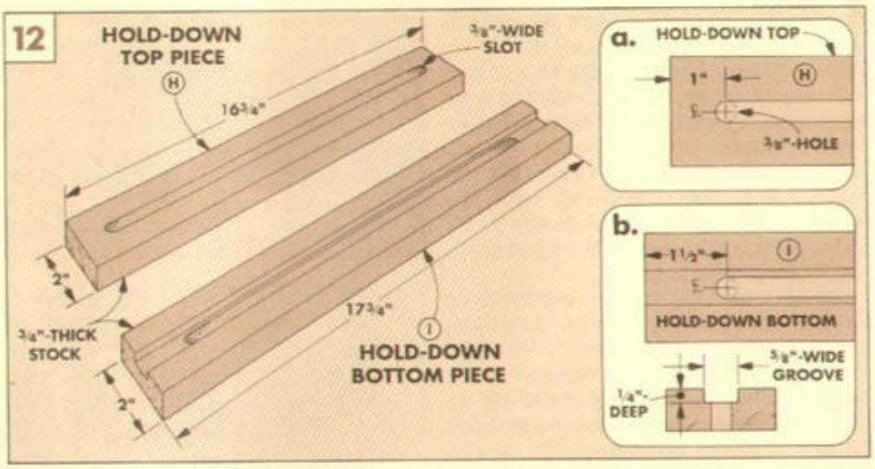
The bolts thread into square nuts that are "captured" in a groove in the bottom of the hold-down, refer to Fig. 13a. This allows the head of the bolt to be screwed down tightly against the workpiece. To accommodate different size panels, I made the bolts adjustable by cutting a slot in the hold-down.

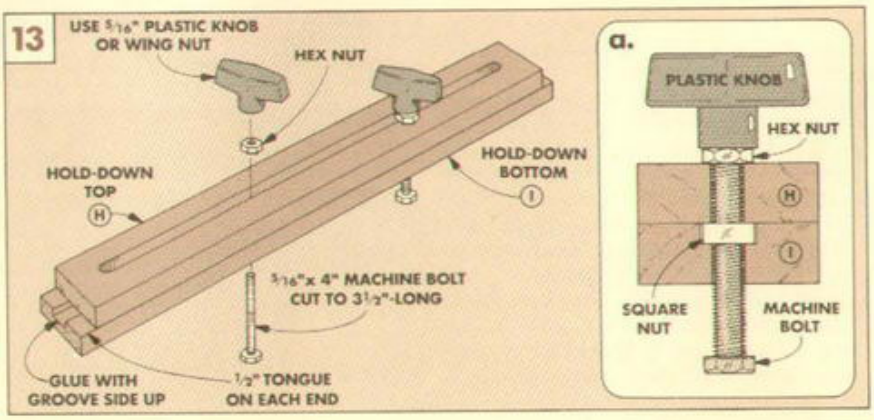
CUT TOP AND BOTTOM. To make the hold-down, start by ripping ¾"-thick stock to a width of 2". Then, cut a **top piece (H)** to a finished length of 16¾" and a **bottom piece (I)** to 17¾", see Fig. 12.

CUT GROOVE. Next, to capture the square nuts in the bottom piece, cut a ⅝"-wide groove, ¼"-deep down the center of the bottom piece (I), see Fig. 12b.

CUT SLOTS. To make the slots for the bolts, drill ⅜" holes in the top and bottom piece, see Figs. 12a and 12b. Now, rout a slot between the holes (see Shop Notes, page 19).

ASSEMBLE HOLD-DOWN. Finally, glue the top (H) centered on the bottom (I) so there's a ½"-long tongue on each end, see Fig. 13. Then, slide two ⅝" square nuts into the groove in the bottom piece and thread ⅝" x 3½" machine bolts into the nuts. Now, to tighten down the bolts, add ⅝" hex nuts and knobs (or wing nuts), see Fig. 13a.





STOP BLOCK & TAPE

The last part to add to the cut-off table is a stop block. I made a **stop block (J)** that runs in the same groove in the fence that holds the hold-down, refer to Fig. 18.

The secret to making this stop work is a runner that fits in that groove. There's a machine screw that's inserted in a hole in the runner, refer to Fig. 16. As a knob on the end of the screw is tightened, the tapered head of the screw causes the sides of the runner to expand within the groove. This creates pressure and locks the stop in place, see Fig. 16a.

STOP BLOCK RUNNER. Begin by cutting a **stop block runner (K)** from ¾"-thick stock, 1" wide and 3" long, see Fig. 14. Next, to mount the machine screw, drill a 5/16" countersunk hole centered on the runner. Now cut a ¾"-deep expansion slot in the runner. Finally, glue the runner into the groove in the stop block, see Fig. 15.

INDICATOR. If you add a self-adhesive measuring tape to the fence, you can use an indicator on the stop to very accurately position the stop for cutting pieces to length.

Cut the indicator from ⅛"-thick Plexiglas, see Fig. 15. Then scribe a "hairline" centered on the indicator, and darken the line with a felt-tip pen.

To keep the indicator from twisting, cut a ⅛"-thick strip and glue it to the top edge of the block, see Fig. 15.

Now, to mount the indicator drill a ¼"-dia. hole in its center. (This is an oversized hole for adjustments.) Also drill a 5/32" pilot hole in the stop for a No. 6 roundhead screw, see Fig. 16. Now, screw down the indicator.

ASSEMBLY. To mount the machine screw in the stop block, use the hole in the runner as a guide to drill a 5/16" hole through the stop block, see Fig. 16. Then, insert a 5/16" x 2½" machine screw through the hole.

To keep the screw from turning as it's tightened, I glued a brad into the screw slot with epoxy, see Fig. 16. Then mount a washer and a plastic knob (or wing nut).

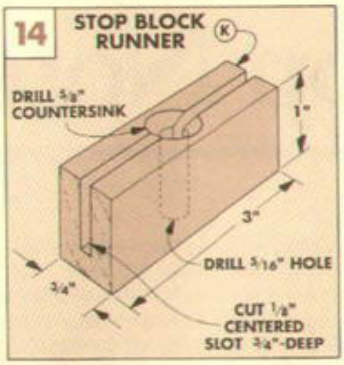
It's also a good idea to sand a chamfer on the block as a sawdust relief, see Fig. 15.

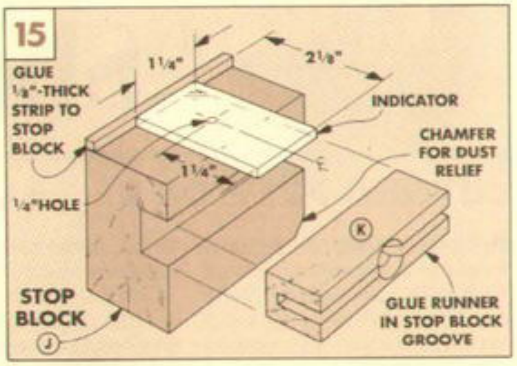
MEASURING TAPE. The next step is to attach a right-to-left reading tape. To do this, butt the stop block against the saw blade, see Fig. 17. With the stop locked in position, peel back a couple inches of paper backing from the zero end of the measuring tape.

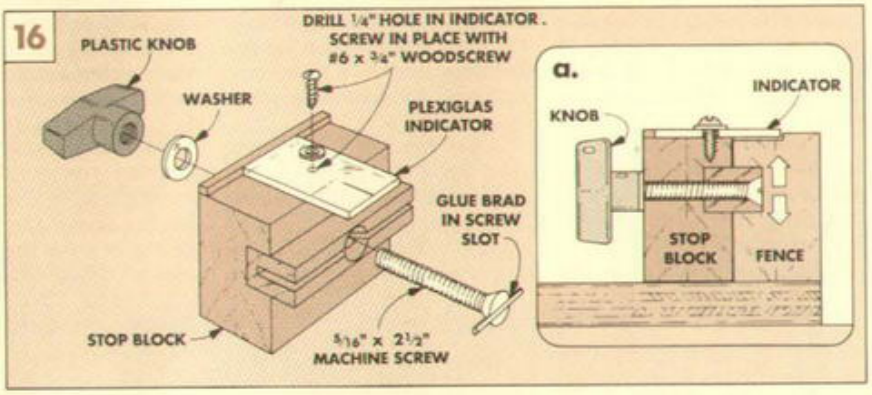
Then slide the tape under the indicator and position the "zero" mark under the hairline, see Fig. 17a. Remove the rest of the backing and press the tape onto the fence. (You'll have to cut the tape to length.)

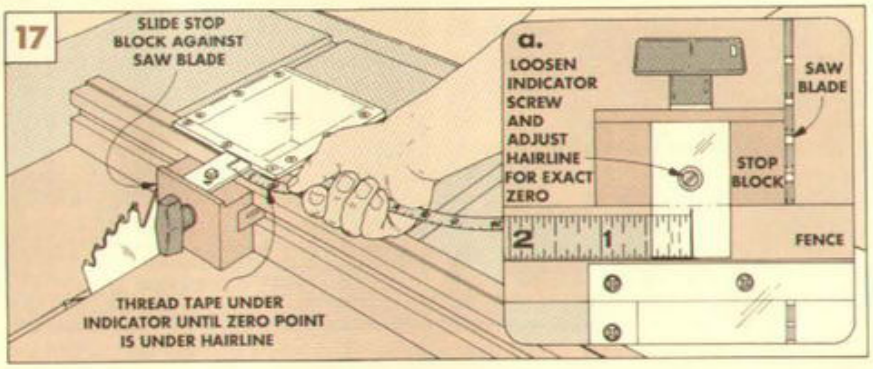
FINE TUNE. If the hairline doesn't read *exactly* zero, loosen the screw and slide the indicator until the hairline is zeroed. (This is why you need a ¼" hole in the indicator.)

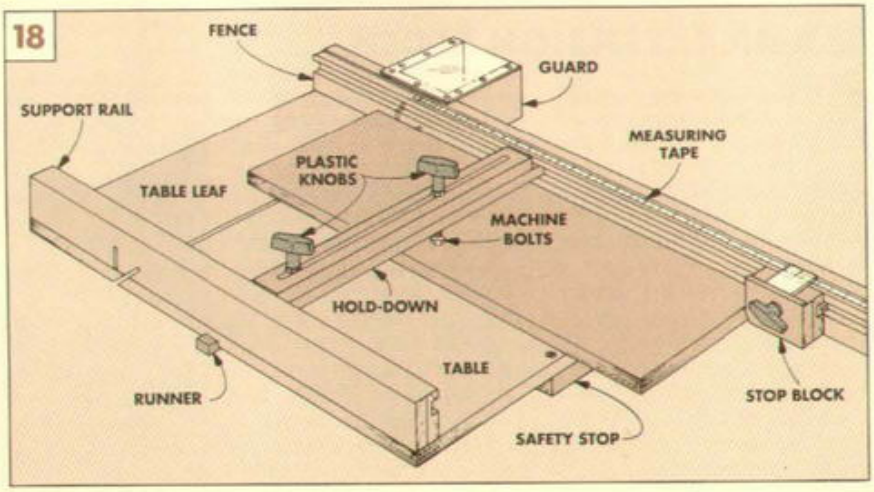
If you use a different blade (such as a thin kerf blade), re-adjust the indicator so the hairline gives an accurate "zero" reading.











Shop Notes

CUTTING PLYWOOD

■ When cross-cutting a plywood panel, the bottom layer of veneer often splinters out along the cut line. But there are some steps you can take to prevent it.

PLYWOOD BLADE. Perhaps the easiest way to avoid splintering is to use a blade that's made just for cutting plywood. For more on that, see Talking Shop on page 29.

COMBINATION BLADE. There are a few tricks you can use to get a clean cut with a combination blade. First, if the blade is crusted with sawdust or pitch, clean it before cutting the plywood. Sometimes, however, even a clean combination blade will splinter the veneer.

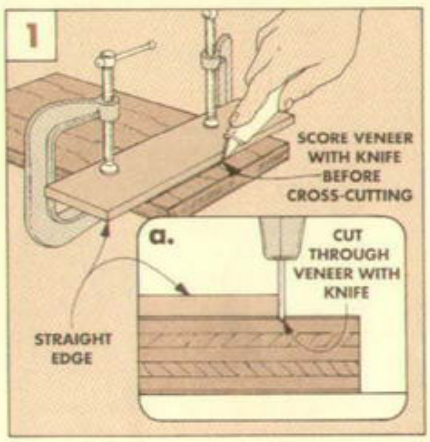
There are two reasons for this. One is that a combination blade has fewer teeth than a plywood blade, so it doesn't cut as cleanly. The other reason is that the cutting edge of the teeth may be pushing the veneer down rather than slicing it off.

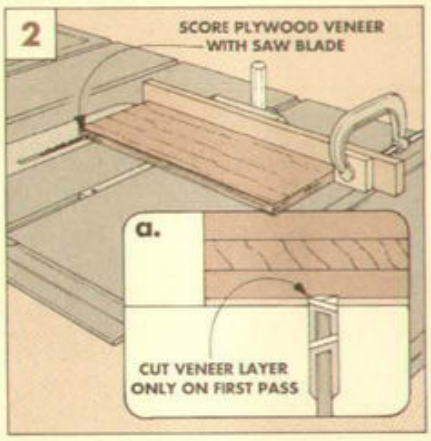
BLADE HEIGHT. One way to avoid this is to change the cutting angle of the teeth by raising or lowering the blade. If your panel is splintering on the bottom, lower the blade. If it's splintering on the top of the plywood, raise the blade.

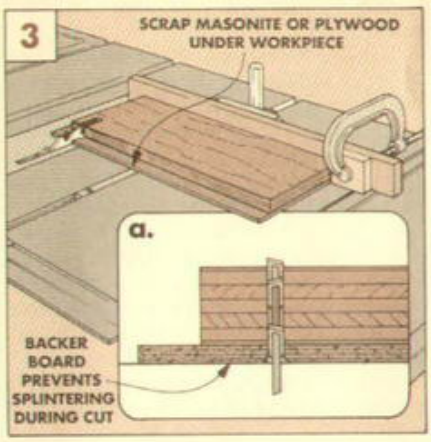
SCORING THE EDGE. The most common way to get a clean cut is to score the panel along the cut line before making the cut, see Fig. 1. To do this, cut through the veneer layer with a utility or other sharp knife. While this method works, it's sometimes difficult to line up the saw blade with the scored line.

SCORING ON THE SAW. An easier way to score the panel is to use the saw blade itself. The trick is to make the cut in two passes. On the first pass, set the blade just high enough to cut through the veneer, see Fig. 2a. Then raise the blade and finish the cut on the second pass. (To keep the workpiece aligned with the blade during both cuts, clamp an extension fence with a stop block to your miter gauge, see Fig. 2.)

BACKER BOARD. Another way to keep the veneer from splintering is to use a backer board, see Fig. 3. This is a piece of plywood or Masonite that's placed below the workpiece when making the cut. This way the veneer layer is supported and can be cut cleanly.







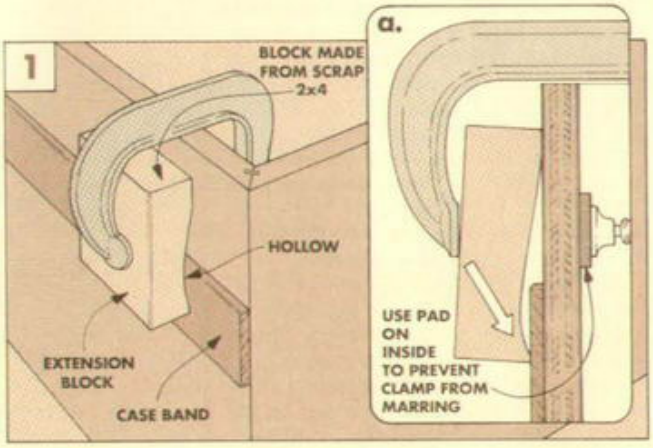
CLAMP EXTENSION BLOCK

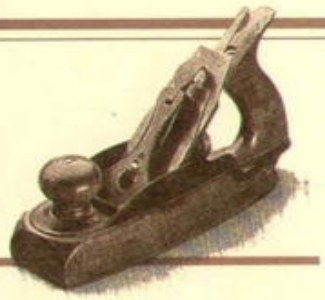
■ Gluing the case bands on the Steamer Trunk seemed simple enough until I realized that I didn't have any deep throat clamps to extend over the top edge of the trunk and hold the bands in place. To solve this problem, I made a number of blocks that extend the clamp's pressure beyond the length of the jaws, see Fig. 1.

CREATING A HOLLOW. The block works because of a hollow cut out of one face. It allows the clamp pressure to be centered on the piece being glued.

To make a clamp extension block for the trunk, cut a scrap piece of 2x4 to 5" long. Next, draw a shallow radius on one long edge, see Fig. 1a. Now cut it out on the band saw, creating a hollow on the face of the block.

USING THE BLOCK. To use the extension block, hold the case band under the block with the hollowed side of the block toward the trunk, see Fig. 1. Now clamp the extension block to the trunk side. And be sure to use a pad inside the trunk so the clamp won't mar the plywood.





MITER BLOCK

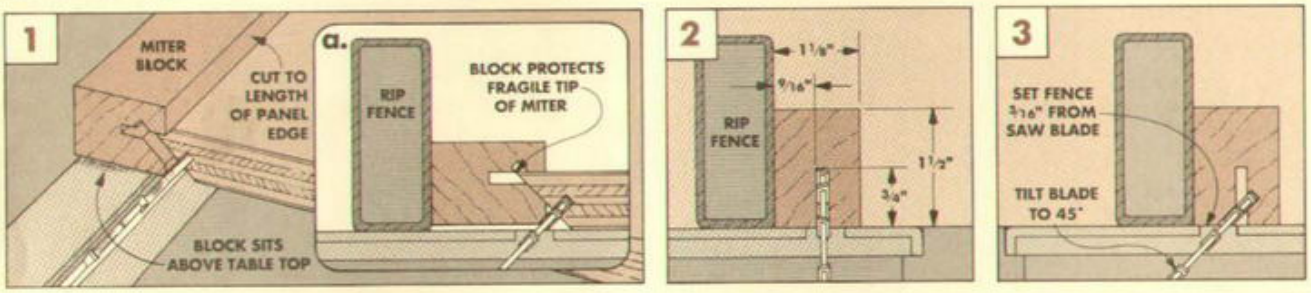
■ Here's an easy way to protect the fragile edge on the mitered end of a panel that has to run against a fence. This happens when cutting a kerf for a spline, such as on the splined miter joints on the Steamer Trunk and Collector's Cabinet in this issue. The solution is to use a long block with an angled slot cut in it that matches the angle on the miter, see Fig. 1. The sharp edge of the miter fits in the slot so the wood fibers won't get crushed.

MAKING THE BLOCK. To make a block for use with ¾"-thick plywood, begin by ripping a 2x4 to 1⅛" wide and cut it to length to match the mitered edge. Then, to cut the slot, set the rip fence 9/16" from the blade and cut a ¾"-deep slot on the narrow edge of the block, see Fig. 2.

Next, tilt the blade to 45° and reset the rip fence 3/16" from the blade. Then run the block across the blade with the same face against the fence, see Fig. 3.

CUTTING A SPLINE KERF. To cut kerfs for a splined miter joint, fit the sharp edge of the mitered panel into the slot, see Fig. 1. Then, put the block against the fence and set the blade to cut the kerf for the spline, see Fig. 1a.

Next, cut the kerf with the block riding along the fence. You'll also cut another corner off the block as you cut – that's okay, the block can still be used again.



CREATING SLOTS

■ To make the hold-down on the Sliding Cut-Off Table, I needed a piece of wood with a ⅜"-wide slot centered down its length. Here are three ways to create a slot using either a router, a table saw, or a band saw.

ROUTER TABLE. To rout a ⅜" slot on a router table, for example, start by laying out the length of the slot on the workpiece, see Fig. 1. Now, bore a ⅜" starter hole at the left end of the slot layout. Then bore a ⅜" stop hole at the other end.

Next, mount a ⅜" straight router bit into the router table. Then, to align the fence, drop the starter hole (the one on the left) over the router bit (with the power off). Pull the fence up snug to the workpiece.

ROUTING THE SLOT. When the fence is in position, remove the workpiece and set the router bit about ¼" high. Then turn on the router and carefully plunge the starter hole in the workpiece down over the bit, see Fig. 1. Now, slide the workpiece *to the left*, stopping the cut when the router bit enters the stop hole.

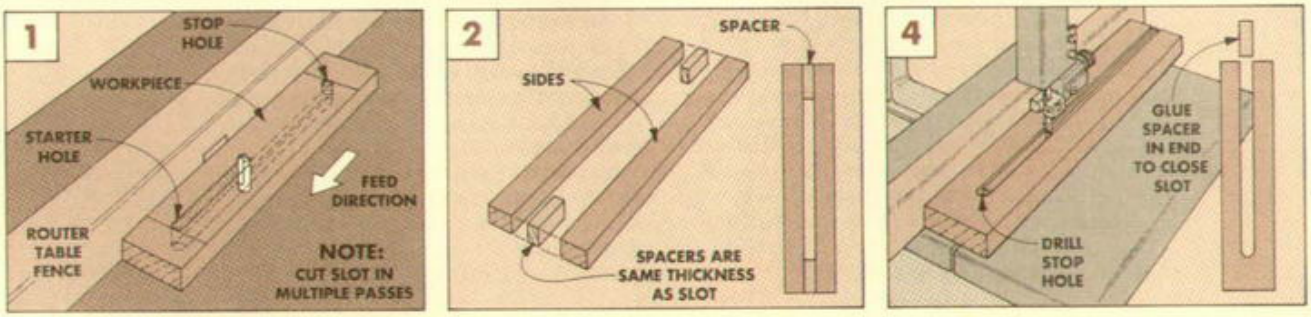
Next, carefully remove the workpiece and then raise the bit higher and make another pass. Continue this process until you have cut through the top and completed the slot.

TABLE SAW SLOT. You can also create a slot using a table saw, see Fig. 2. To do this, start by ripping two side pieces. Their total width should equal the finished width of the slotted piece minus the width of the slot.

Now make two spacers the same thickness as the slot. Then, to create a slot, glue the spacers between the side pieces, one at each end.

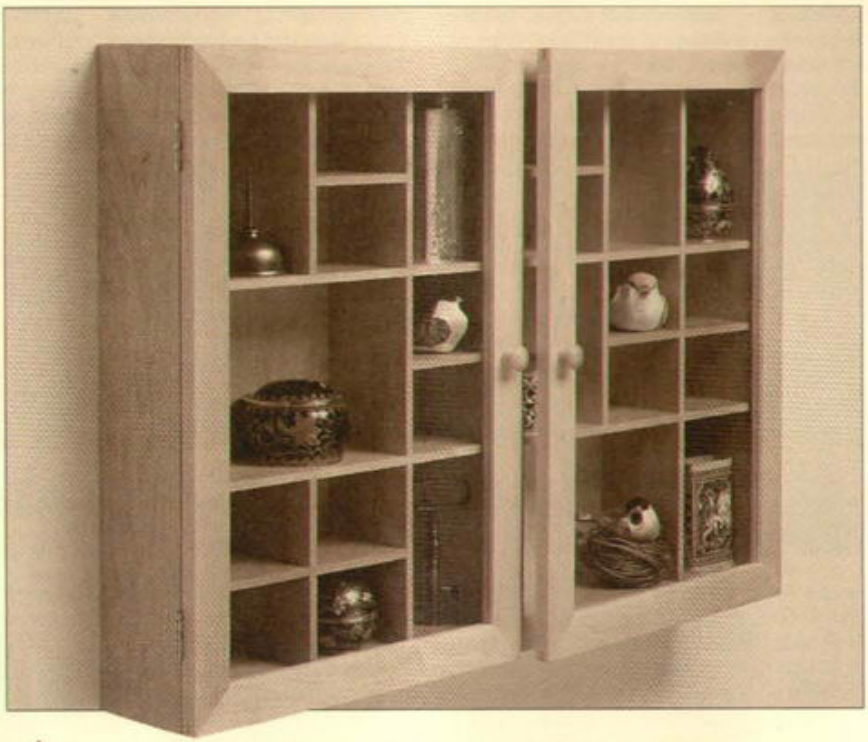
BAND SAW SLOT. To make a slotted piece on a band saw, first lay out the slot on the workpiece. Then bore a hole the same diameter as the width of the slot at one end of the layout.

Now extend the lines for the sides of the slot all the way to the opposite end of the workpiece. Next, cut those two lines on the band saw. Then, to close the slot, make a spacer the same width as the slot and glue it into the open end, see Fig. 3.



Collector's Cabinet

This hard maple cabinet is built with two different types of miter joints — an end miter and a face miter. Then splines are added to align and strengthen the joints.



Almost everyone I know has a collection of something — figurines, small toys, or items that simply bring back fond memories. So I decided to make a special cabinet to hold a few of these items.

This cabinet is made of three components: the case, the dividers, and the doors.

THE CASE. There's nothing complicated about building the case — it's basically a shallow box with mitered corners. To help align these corners and make them stronger, I cut kerfs in the ends and joined them together with hardwood splines.

To mount the case to the wall, I used a hidden hanging system. This two-part system is made up of a hanger strip, that's glued to the back of the cabinet and a cleat that's screwed to the wall. These pieces interlock to hold the case securely to the wall and are completely hidden, see Cross Section in the Exploded View on page 26.

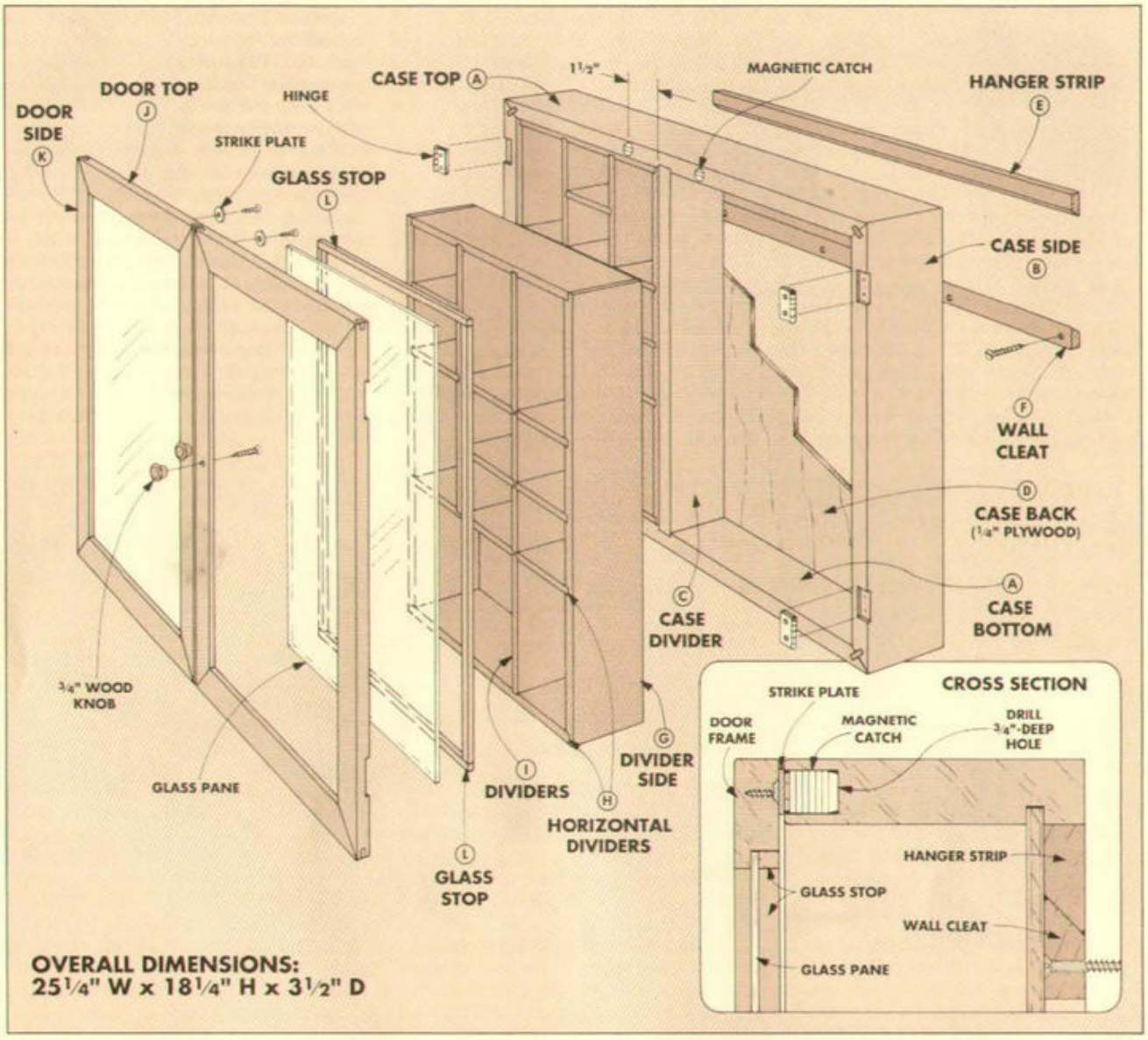
THE DIVIDERS. The second part of the cabinet, the dividers, is the most challenging. The problem is collections change over time, and require different divider locations.

To solve the problem, the dividers are not glued in place, but are held by a "friction fit" in shallow dadoes. This allows the pieces to be removed and then dadoed if you wish to add more dividers. Or insert new pieces without dadoes if you want fewer dividers.

THE DOORS. The third part of this cabinet is the doors. Here again I used splines to align and strengthen the mitered corners. However, the technique for cutting the kerfs to accept the splines is slightly different, refer to the Box on page 23.

MATERIALS. To keep the items from getting lost in the shadows, I wanted a light background. So I built this cabinet and dividers out of hard maple and the back panel out of ¼" maple plywood.

EXPLODED VIEW



OVERALL DIMENSIONS:
25¼" W x 18¼" H x 3½" D

MATERIALS

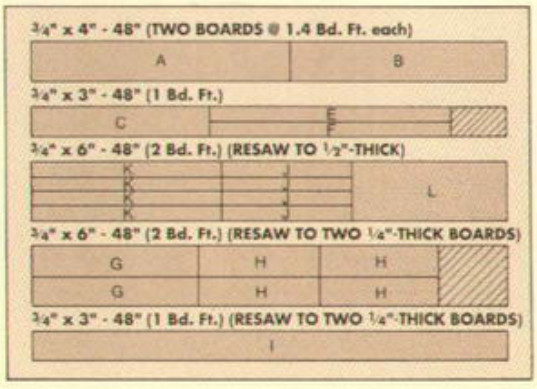
WOOD PARTS

A	Case Top/Bottom (2)	¾ x 3½ - 25¼
B	Case Sides (2)	¾ x 3½ - 18¼
C	Case Divider (1)	¾ x 2¾ - 17⅛
D	Case Back (1)	¼ ply - 17⅛ x 24⅛
E	Hanger Strip (1)	½ x 1¼ - 23¾
F	Wall Cleat (1)	½ x 1¼ - 23¾
G	Divider Sides (4)	¼ x 2¾ - 16¾
H	Horiz. Dividers (8)	¾ x 2¾ - 11⅛
I	Dividers	¼ x 2¾ - 80 rgh.
J	Door Top/Bottom (4)	½ x 1¼ - 12⅝
K	Door Sides (4)	½ x 1¼ - 18¼
L	Glass Stops (8)	3/16 x 5/16 - 16¼ rgh.

SUPPLIES

- 8.8 Board ft. of ¾" maple.
- (1) Quarter sheet of ¼"-thick maple plywood.
- (4) Butt hinges, 1⅛"-wide x 1¼"-high.
- (2) Wooden knobs, ¾"-dia.
- (2) Magnetic catches with metal strike plates.
- (2) Pieces of glass.
- General Finishes System: ½ Pint of Sealacell ½ Pint of Royal Finish (satin)

CUTTING DIAGRAM



THE CASE

The dimensions of this cabinet are based on the divider layout shown in Fig. 4. In fact, to make this project fit this divider layout, you want to make sure the *inside* dimensions of each half of the finished case are exactly 11½" wide by 16¾" high. If you change these dimensions, you will have to change the divider layout also.

TOP, BOTTOM, AND SIDES. I started by cutting the **top/bottom (A)** from ¾" stock to a rough length of 27". Then cut the **sides (B)** to a rough length of 20". Now rip all four pieces to a width of 3½", see Fig. 1.

Next, the ends of these pieces are mitered to length and joined together with hardwood splines. To miter the pieces to length, tilt your table saw blade to 45° and miter one end off all four pieces. Then miter the other end of the top and bottom pieces (A) to a finished length of 25¼" (long point to long point). And miter the sides to 18¼", see Fig. 1.

SPLINED MITER. Once the pieces are cut to length, I cut kerfs in the mitered ends to hold hardwood splines, see Fig. 1a. Then I cut the splines to fit the kerfs. (For more information on making this splined miter joint, see the article on page 12.)

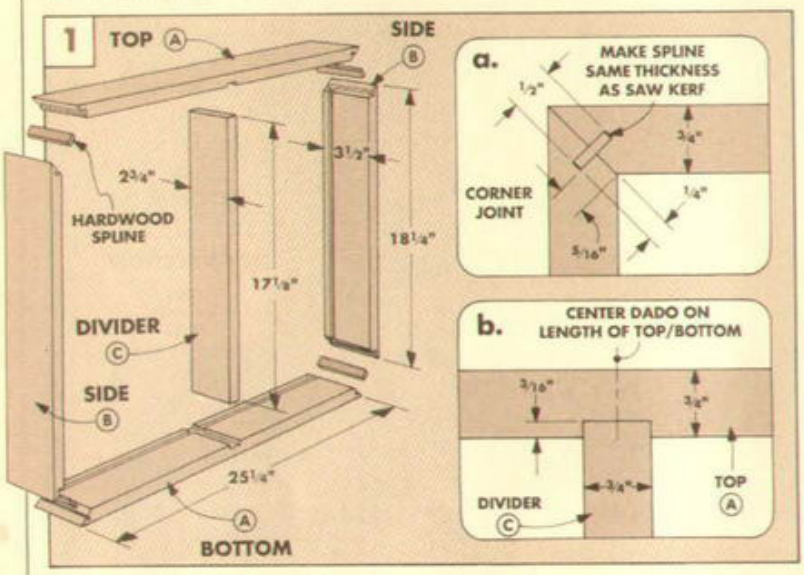
GROOVE FOR THE BACK. Next, a groove is cut in the top, bottom and side pieces for the plywood back. The front edge of this groove is located ¾" in from the back edge of all four pieces, see Fig. 2a. The extra space at the back is needed to conceal the special hanging system that is used to hold the cabinet on the wall, refer to the box below.

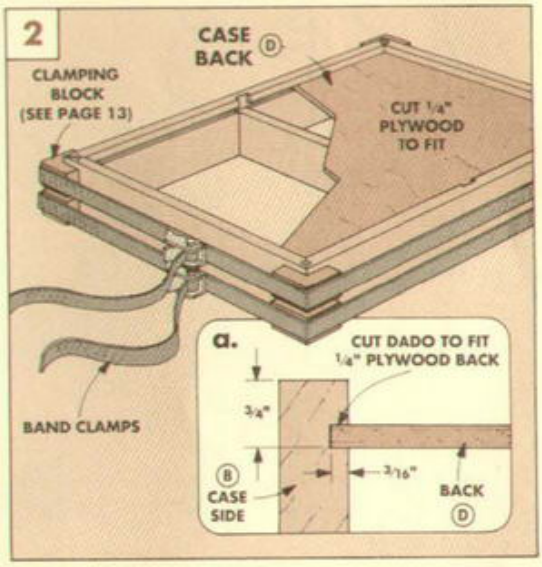
DIVIDER. The next step is to cut the dadoes to hold the ¾"-thick case divider (C), see Fig. 1b. These 3/16"-deep dadoes are centered on the length of the top/bottom pieces (A) and are the same width as the thickness of the divider (¾").

With the dadoes completed, the case **divider (C)** can be cut to a finished width of 2¾". To determine the exact length of the divider, dry-assemble the case and cut the divider to fit between the dadoes (17⅛").

ASSEMBLY. After the grooves and dadoes are cut in the pieces, I cut a piece of ¼" plywood to fit. Then glue up the case, holding the pieces with band clamps, see Fig. 2.

Note: To protect the edges of the case and provide even clamping pressure, I made some small clamping blocks from some pieces of 2x2 stock. For more information, see page 13.





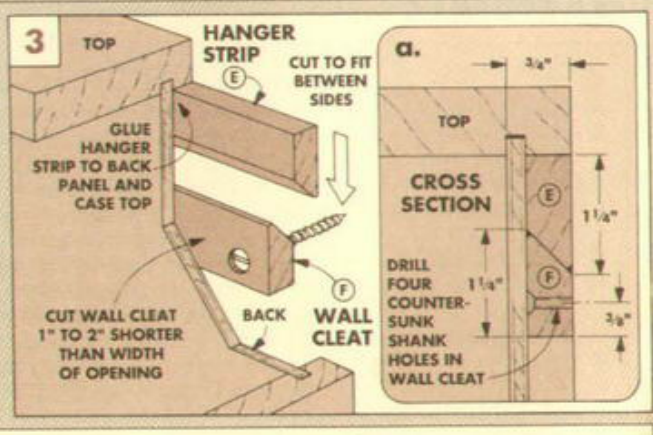
HANGING SYSTEM

One of the most aggravating things about a cabinet like this is how to hang it. It's difficult to get it level and locate mounting holes so they're not visible. To make things easier (and more secure), I like to use this hanging system that's integrated into the design of the cabinet.

INTERLOCKING STRIPS. The system consists of two interlocking strips that are concealed behind the cabinet, see Fig. 3. The **hanger strip (E)** is glued to the back of the cabinet, and the **wall cleat (F)** is screwed to the wall.

CUT THE PIECES. To make the ½"-thick strips, tilt the table saw blade to 45°. Then bevel-rip two 24"-long pieces, 1¼"-wide (to the long point), see Fig. 3a. Trim one strip to fit between the sides in the back of the cabinet and glue it in place, see Fig. 3.

To allow for some side-to-side adjustment, I cut the remaining strip 1" or 2" shorter than the one glued to the cabinet. Then, to hang the cabinet, simply screw this strip to the wall and set the cabinet over the strip so the pieces interlock, see Fig. 3a.



DIVIDER UNITS

Once the case is completed, the next thing to make is the divider units — one for each side of the case. The divider pieces in each unit are removable so they can be taken out and re-cut as your collection changes.

THICKNESS STOCK. The key to making these dividers removable is to cut the pieces to thickness so they fit a ¼"-wide dado. The dividers should fit snugly, but not overly tight. (You want to push them in, not pound them in.) To get the correct fit, I cut a ¼" dado in a test piece. Then I resawed and planed 2¾"-wide stock until it fit the test dado.

SIDE PIECES. To make the two divider units, cut four **divider sides (G)** to fit the height of the case openings, see Fig. 5. (In my case these pieces are 16¾" long.) Then cut a 1/16"-deep rabbet on the ends of these side pieces, see Fig. 5a.

HORIZONTAL DIVIDERS. Now you have to decide where you want the dividers to be located. I used the two layouts shown in Fig. 4 for the divider units in the left and right sides of the case.

My layout starts out by positioning two 1/16"-deep dadoes on the divider sides (G) to create three equally-spaced horizontal sections, refer to Fig. 5.

After the side pieces are dadoed, place them in the case. Then cut the **horizontal dividers (H)** to fit between them. (Each horizontal piece is 11⅛" long, see Fig. 4.)

Note: If you want to display large items you may not want to divide the case any farther, see Details on page 32.

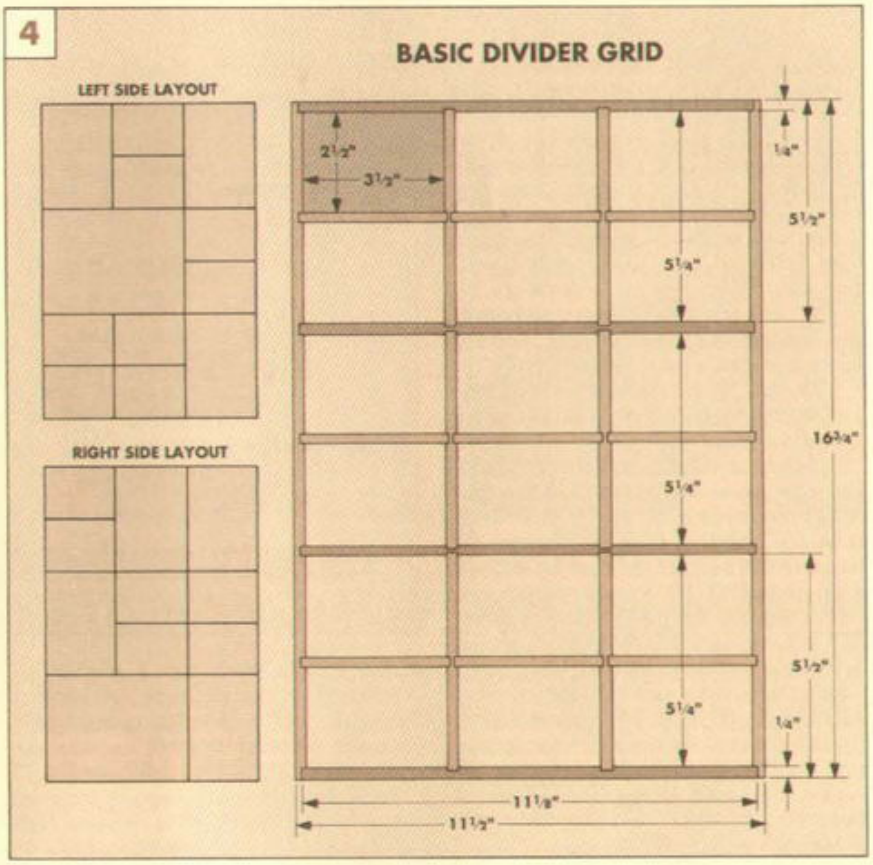
LAYOUT GAUGE. However, if you do want to divide it into smaller sections, you'll need to locate the dadoes for the rest of the dividers. To do this, I made a layout gauge from a piece of scrap wood, refer to Fig. 6.

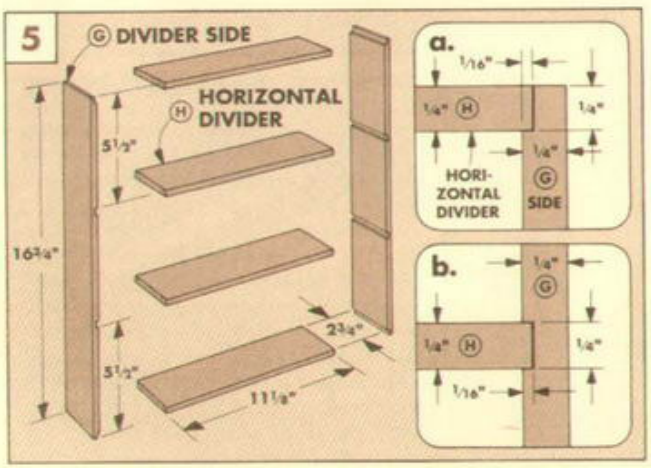
The size of the gauge is determined by dividing the main horizontal sections into six equal-sized compartments (2½" high by 3½" long), refer to the Basic Divider Grid in Fig. 4. The gauge can be used to locate the dadoes for any combination of **dividers (I)**.

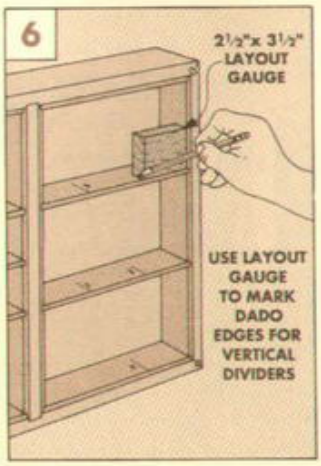
MORE DIVIDERS. To locate the dadoes for the vertical dividers, place the gauge tight against one of the divider sides, see Fig. 6. Mark the location of the dado on the top and bottom of that section. Now remove the marked pieces and cut 1/16"-deep dadoes in them. Then cut the vertical dividers to fit and push them in place.

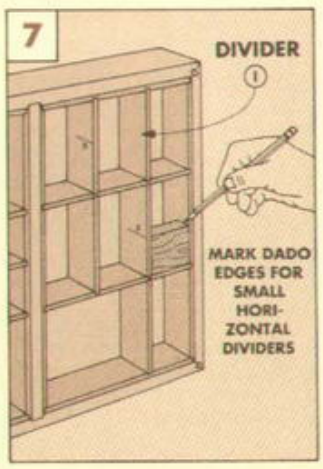
Next, smaller horizontal dividers can be installed. Here again I used the gauge to determine the dado locations, see Fig. 7.

As you're working, remember that you *don't* have to cut dadoes in every location shown in the Basic Divider Grid in Fig. 4. I created different sizes and shapes of "cubby holes" by leaving out some dividers, as shown in the two layouts in Fig. 4.

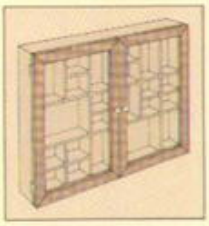








DOORS



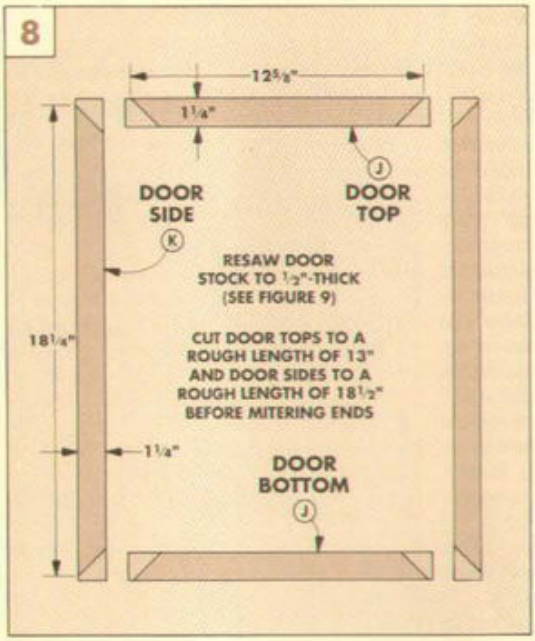
With the case and dividers complete, work can begin on the doors. These doors are assembled like picture frames with a spline at each corner for added strength.

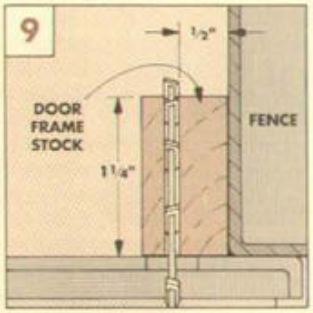
CUTTING THE STOCK. To make the doors, start by resawing ½"-thick stock for the 1¼"-wide top, bottom, and side pieces, see Fig. 9. Then trim the four **top and bottom pieces (J)** to a rough length of 13". And trim the **sides (K)** to a rough length of 18½".

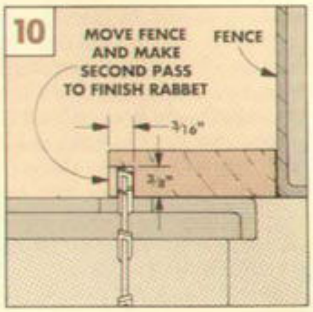
To form a lip for the glass to rest in, cut a 3/16"-wide rabbet, ⅜" deep on the inside face of each of the eight pieces, see Fig. 10.

MITER TO LENGTH. Next, the top, bottom, and side pieces are mitered across their faces to finished length, see Fig. 8. To determine the length of the tops/bottoms (J), measure the width of the case (25¼") and divide in half (12⅝"). Now cut the pieces to this dimension (long point to long point). The sides (K) are cut to the same dimension as the height of the case (18¼"), see Fig. 8.

KERF THE ENDS. Once the door pieces are cut to length, the next step is to cut a kerf in the mitered ends for the hardwood splines, see Fig. 11. Each kerf is ¼"-deep and centered on the thickness of the door pieces. For more information on cutting these kerfs and the splines, see the Box on page 25.



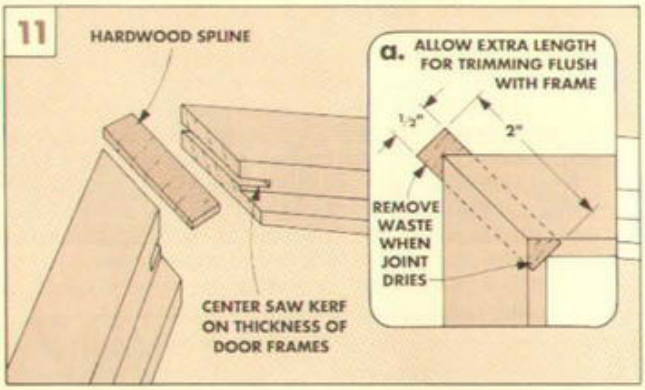


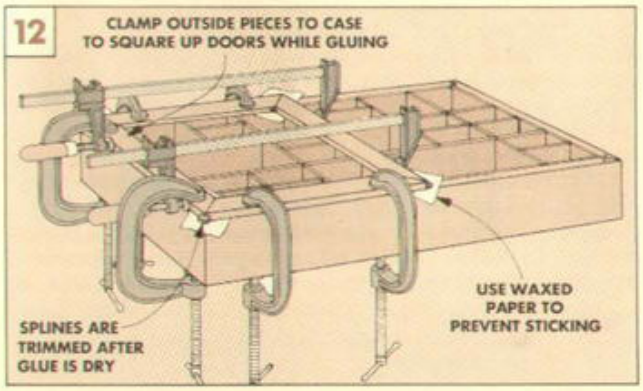


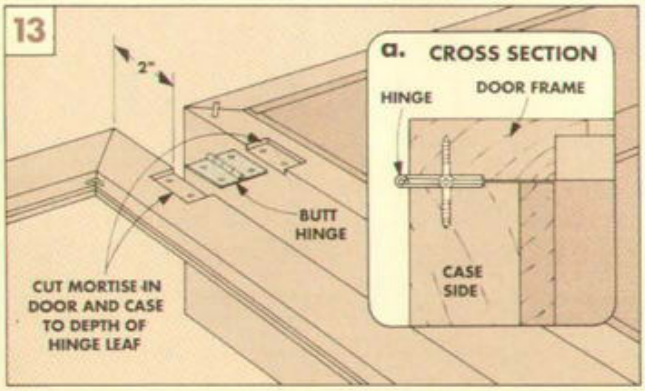
ASSEMBLY. After the miters and splines are cut, the doors are ready to be assembled. To make sure the doors fit the case correctly, I used the case as a guide, see Fig. 12.

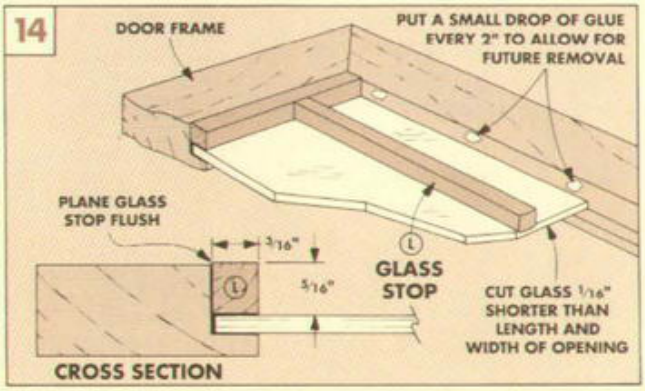
To glue up the doors, start by clamping one of the side pieces (K) to the case. Align the side edge of the piece flush with the side of the case and position the rabbeted edge down. Note: To prevent the doors from sticking to the case, I put waxed paper under the mitered corners, see Fig. 12.

INSERT SPLINES. Next, put glue on two splines and push them into the kerfed ends









DOORS CONTINUED

of the side piece. The splines are longer than the kerf and should stick out beyond the joint and into the rabbet, see Fig. 11a. These splines will be trimmed flush later.

Now, glue the top and bottom pieces (J) to the side piece (K). Then, insert the splines and glue and clamp the remaining side piece (K) in place, see Fig. 12. After the glue is dry, remove the clamps and repeat the procedure to make the other door.

TRIM SPLINES. When both doors are glued up, the splines are trimmed flush with the outside of the door and the rabbet, refer to Step 6 in Box at right.

HINGE MORTISES. The next step is to attach the doors. To do this, I mortised four 1¼"-long brass butt hinges into the case and doors, see Fig. 13.

Start by scribing the mortises with a sharp knife, 2" in from the top and bottom of the case. Then transfer the mortise locations to the inside of the doors. Now rout or chisel out the mortises to the depth of the hinge leaf, and screw the hinges in place, see Fig. 13a.

INSTALL GLASS. To complete the doors you just have to install the glass and glue in the glass stops. To determine the size of glass, measure the rabbeted opening of each door. To allow for clearance, subtract 1/16" from the length and width and cut the glass.

GLASS STOPS. Once the glass is cut, the **glass stops (L)** can be made. These stops are hardwood strips that are glued to the rabbeted edge of the doors, see Fig. 14.

Shop Note: It's tricky to get the stops flush with the inside face of the doors. To solve this problem, I made the stops so they're slightly "proud" when they're installed, see Fig. 14. (In my case this means the stops are 5/16" thick.) Then I planed them down flush.

One more thing about the stops, when you glue them in just put a small drop of glue every 2", see Fig. 14. This way they'll be easier to remove if you ever have to replace the glass.

WOODEN KNOBS. To finish off the cabinet, I added a couple of wooden knobs to open the doors. And a couple of magnetic catches to hold the doors closed.

To mount the ¾" knobs, drill a 3/16" hole, centered on the height and width of the inside piece, refer to the Exploded View on page 21. Then attach the knobs.

FINISHING. Once all of the dividers are installed the next step is to finish the cabinet. To do this, I removed the dividers and applied General Finishes Two-Step finish to all of the dividers and the cabinet.

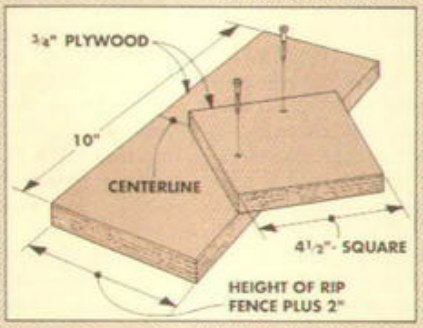
Finally, to install the catches, drill two 9/16" holes in the top edge of the case. These 5/8"-deep holes are located 1½" on either side of the case divider. Once the holes are drilled, epoxy the magnetic catches in place. Then screw the metal strike plates to the inside of the doors, see the Exploded View on page 21.

FACE MITER WITH SPLINE

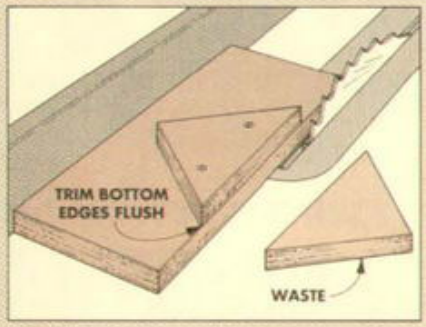
When making the doors for the Collector's Cabinet, I used a spline in the mitered corners for added strength. To do this, matching kerfs are cut in the mitered ends of the door pieces.

These kerfs are cut by running the mitered ends over the table saw blade. The problem is, it's difficult to hold the piece securely while doing this. To solve the problem, I made a simple plywood jig to support the pieces while cutting kerfs in the ends.

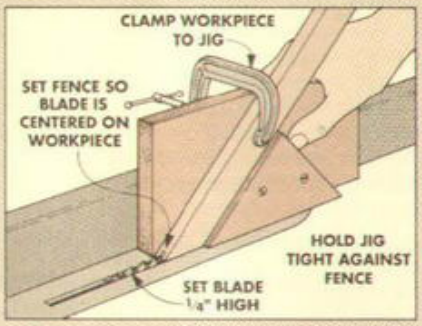
Once the kerfs are cut, splines are cut to fit the kerfs. Here I used a two-step technique, see Step 5. This way the grain direction of the spline is perpendicular to the joint line for greater strength.



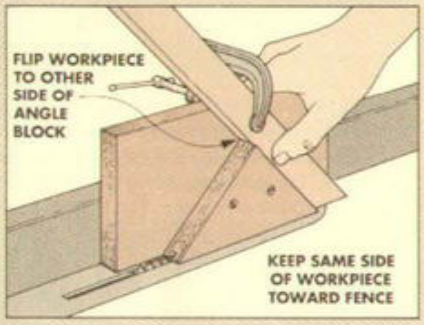
1 *Cut a piece of ¾" plywood for the jig 10" long and to the height of your rip fence plus 2". Next, center a square piece diagonally on the jig and screw it down.*



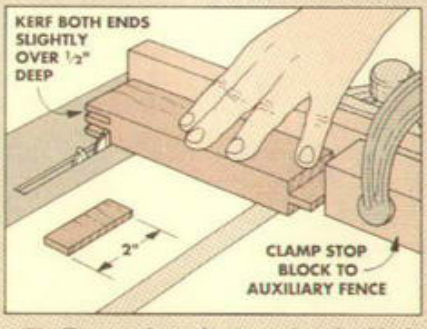
2 *Raise the saw blade and set the rip fence on the table saw so the angled piece will be trimmed flush with the bottom edge of the jig.*



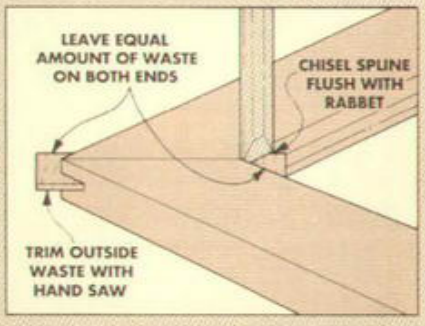
3 *Clamp workpiece to the jig and set the blade to cut a ¼"-deep. Holding the jig tight against the fence, adjust the fence so the blade is centered on the workpiece.*



4 *To kerf the other end, flip the piece over and clamp it to the other side of the angled support block. Keep the same face of the workpiece against the jig.*



5 *To cut the splines, raise the blade over ½" high and kerf both ends of a block. Then lower the blade and trim off the splines using a miter gauge and stop block.*



6 *Glue splines in place, so equal amounts stick out either side. Trim off the outside end with a handsaw. Use a chisel to trim the inside flush with the rabbet.*

Router Tips

The first time I used a hand-held router, I cut a simple round-over on the edge of a frame. Before making the cut, a number of questions came to mind. Which direction do I feed the router? And how fast or slow should I move the router along the edge?

After making the cut, it was apparent that there was more to routing than just pushing it in the right direction.

The more I used the router, the more I realized I had to learn. For example, how do you stop wood from chipping out along the edge of a workpiece or from splintering at the corners?

And how do you set-up a router and fence to accurately position dadoes and grooves?

As I was routing the edge of a workpiece, I found it difficult to balance the router base without having it tip. So I had to come up with a way of stabilizing the router when routing an edge.

The solution to most of these problems depends on learning how to team up with the router — so you're working with it, not against it.

FEED DIRECTION AND RATE

■ Every time I pick up a router, it seems I have to pause to figure out the proper direction of feed — that is, which direction to move the router.

FEED DIRECTION. It's easy to get confused because direction of feed is often used to describe the direction the *workpiece* is fed into the machine (such as on a jointer or router table).

However, with a portable hand-held router, the *machine* is fed into the workpiece.

The rule is: When routing an outside edge, move the router counterclockwise, see Fig. 1. When routing an inside edge, move the router clockwise.

Unfortunately, the rule is easy to get reversed. So you may want to make a copy of Fig. 1 and keep it tacked up over your bench for future reference.

But even if you do feed the router the wrong direction, you will know right away. Instead of feeling some resistance to the cut, the router will feel like it's being pulled down the board. (This is called "backrouting", more on this later, refer to Fig. 4.)

USING FENCES. Feed direction is also important when a fence or straightedge is used to guide a router. You want the rotation of the bit to pull the router tight into the fence.

Here I think of the fence as the table top, see Fig. 2. The router is guided as though you will be going counterclockwise around the fence (even if you're only routing along one edge).

BACKROUTING. There's one occasion when you might want to break these rules. To prevent chip-out when using a hand-held router, I often backrout.

As the name implies, backrouting is guiding the router backwards — opposite to what's described above. To understand why this prevents chip-out, you have to look at the router bit as it leaves the workpiece.

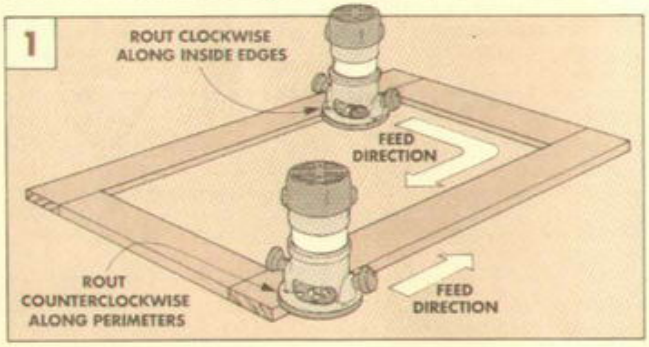
As the bit leaves the wood during normal routing operations, it can cause the edge to splinter out, see Fig. 3. The bit causes chips to be pushed ahead of the cutter since the edge isn't supported. When backrouting, chips can't be pushed ahead of the cutter as it leaves the workpiece — they've already been removed, see Fig. 4.

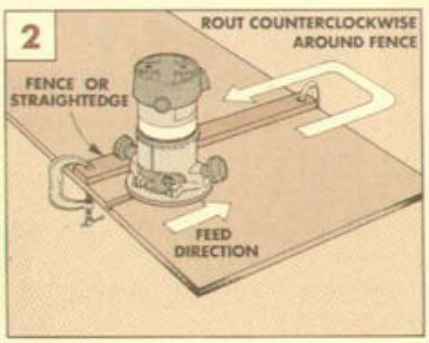
If it's so great, why don't you backrout all the time? The problem with backrouting is the router bit won't pull itself into the wood — it will tend to bounce along the edge and be difficult to control. So whenever backrouting, take light passes, keep a firm grip on the router, and then take a finish cut in the normal direction to clean up the edge.

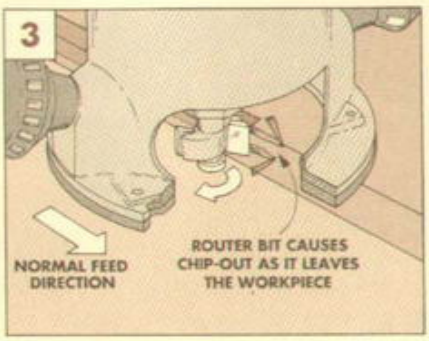
Safety Note: *Don't* backrout on a router table — only with a hand-held router.

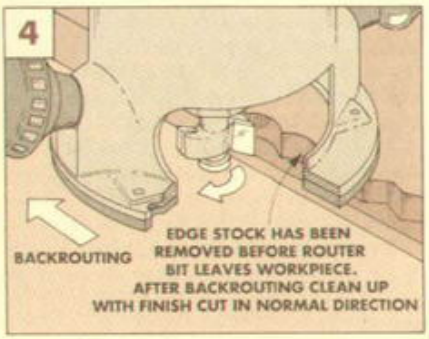
FEED RATE. After identifying feed direction, the next step is to determine feed rate. Ideally, move the router smoothly without excessive pressure.

I use the sound of the router as a guide for feed rate. If I hear a high pitched whine I know I'm feeding it too slow. And if it starts to labor, I'm feeding it too fast. (Since most routers rotate at 23,000 RPM, it's pretty hard to feed a router too fast — unless you're making a deep cut or using a large bit.)





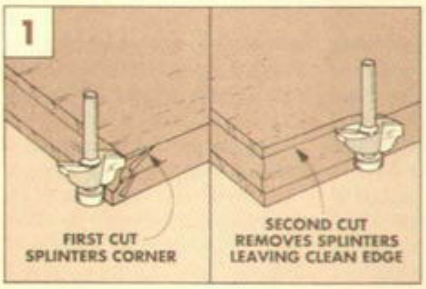




PREVENTING SPLINTERING

■ One of the most frustrating problems when routing is splintering. Splintering occurs at the *end* of a pass when routing end grain, see Fig. 1. As the router bit leaves the wood, it splinters the fibers on the edge of the board since these aren't supported by any more wood.

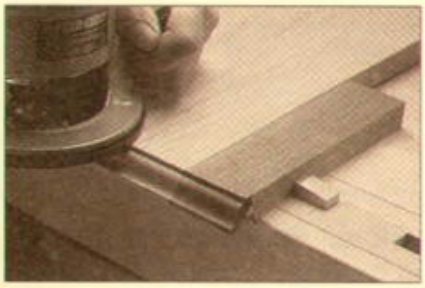
Splintering doesn't occur at the beginning of a pass because the wood being removed is supported by the end grain that's ahead of the router bit.



ENDS FIRST. One way to get around the splintering problem is to rout the end grain first. You'll still get splintering as you rout the end grain — but as you rout the remaining sides (which are cut with the grain), you'll remove the corners that have splintered out, see Fig. 1, right drawing.

To ensure a minimum of splintering when routing the end grain, *don't* set the router bit for a full depth cut — instead, take a series of shallow passes, finishing up with a very light final pass.

SUPPORT SCRAP. Another way to prevent splintering on end grain is to temporarily clamp a scrap of wood to the side of the workpiece so it's flush with the end as shown in the photo above.

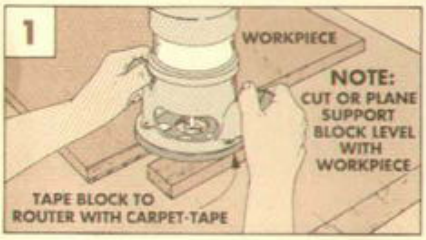


The scrap provides support to the wood fibers at the corners of the workpiece. When the end grain is routed, the scrap will splinter instead of the workpiece.

After routing the ends, the scrap can be removed and discarded, leaving an unsplintered edge on the workpiece.

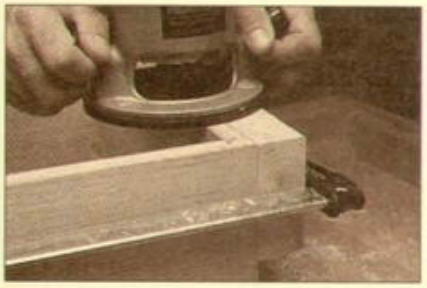
STABILIZING ROUTER CUTS

■ It's often difficult to guide a router along the edge or face of a workpiece without tipping the router and causing an angled cut. To prevent this, I add extra support under the router base.



SUPPORT BLOCK. One method to prevent the router base from tipping is to carpet-tape a scrap block directly to the base of the router. The scrap will act as an outrigger and supports the router base during the cut.

To make a support block, cut or plane a piece of scrap stock to match the thickness of your workpiece. Then, use a piece of double-sided tape to temporarily fasten it to the base of the router.



EDGE ROUTING. Another method to prevent the router from tipping and producing an angled cut, is to clamp one or more scraps of wood along the workpiece edge, see photo. A typical use for this is when rabbeting the back of a cabinet or bookcase for a recessed panel.

ROUTING DADOES AND GROOVES

■ Another routing challenge is routing dadoes and grooves that are 90° to an edge.

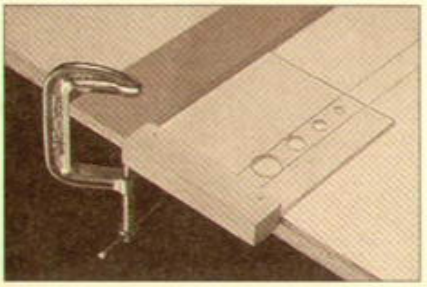
USING A FENCE. The best way to rout a dado or any other cross-grained cut is to use a fence. The tricky part to using a fence is positioning the fence so the router will cut where you want it.

ALIGNMENT GAUGE. To solve the positioning problem, I use a shop-made alignment gauge. The gauge is a piece of Plexiglas with a series of holes drilled along the same centerpoint.

The gauge is used by placing a matching hole over a dado marked on the workpiece. Positioning a fence to cut the dado is then automatic — just butt the fence against the gauge and clamp it in place. Then remove the gauge and rout the dado.

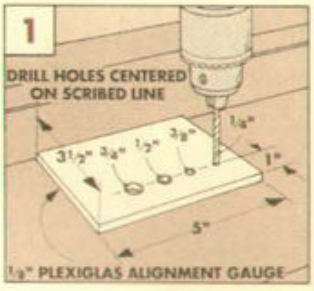
MAKE GAUGE. To make the alignment gauge, start by cutting a piece of ⅛" clear Plexiglas 3½"-wide and 5"-long. Then scribe a line along the length, 1" in from one side.

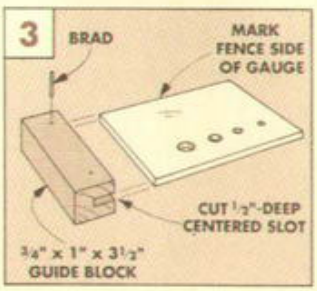
Next, drill a set of holes centered on the scribed line for the router bits you'll use with the gauge. (I drilled ¼", ⅜", ½", and ¾" holes for the straight router bits I use most for cutting dadoes and grooves.)



TRIM GAUGE. The next step is to trim the width of the gauge to match the distance between the bit and the router base. To do this, insert a straight bit in the router, and set the alignment gauge over the bit in the corresponding hole, see Fig. 2. Then, mark the edge of the router base on the Plexiglas and trim the gauge to the scribed line.

GUIDE BLOCK. The Plexiglas fits into a guide block that positions the gauge square with the workpiece, see Fig. 3. To make the block, cut a ½"-deep slot centered on a piece of scrap, see Fig. 3. Then, insert the gauge in the slot and secure it with brads.





Talking Shop

SAW BLADE TILT

■ A question came up when building the Cut-Off table in this issue — why do some table saw makers tilt their blades to the right, and others to the left?

TILT RIGHT. To answer the question, I called Delta International, one of the leading makers of table saws, and asked them to explain why the blades on their saw's tilt to the right.

They gave me two reasons. First, they said that's the way the saw was originally designed. Second, they said that most people use the miter gauge in the left slot when making crosscuts. And if the blade tilts to the right — it tilts away from the operator's fingers. (Note: You can get similiar results by using the right miter gauge slot if your blade tilts to the left.)

RIPPING BEVELS. One problem I've had with blades that tilt to the right occurs when ripping bevels — there's always a possibility of pinching the workpiece between the fence and the blade. And on narrow pieces there's not as much room to get a push stick between the blade and the fence.

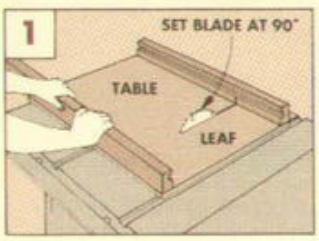
One solution to this problem is to move the rip fence to the left of the blade. But there are two potential problems with this.

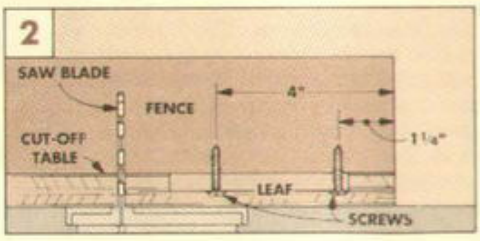
First, rip fences on most table saws have limited movement to the left of the blade. Second, I'm right-handed, so it's awkward for me to push a workpiece through the saw if the fence is to the left.

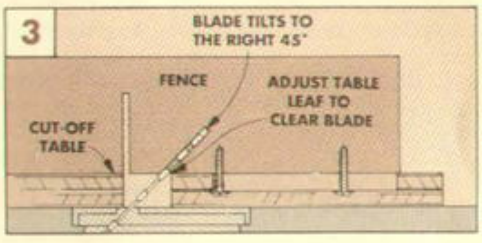
CUT-OFF TABLE. The Cut-Off Table shown on page 14 was designed for a table saw where the saw blade tilts to the left, see Fig. 1. What if your blade tilts to the right? Does that change the way the Cut-Off Table is built?

Yes, and it's even easier to build if your blade tilts to the right. Instead of making a 45° cut and a 90° cut between the table and leaf — you make a single 90° cut, see Fig. 2.

Then, to adjust the leaf, pull it open to cut miters and close it when making 90° cuts (just the opposite of the Cut-Off Table for right-tilting blades), see Fig. 3.







PLUNGE ROUTERS ON THE ROUTER TABLE

■ *I'm having trouble adjusting the depth of cut on my plunge router when it's mounted on the router table. Is there an easy solution to the problem?*

Paul Irving
Crystal, Minnesota

Most plunge routers weren't originally designed for router tables. They're spring-loaded which provides a constant pressure that pushes the router away from the base. When holding the router in your hands, this force can be countered by pushing down on the router and locking it in place.

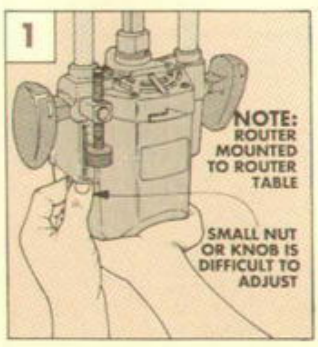
ROUTER TABLE. However, this can cause a problem when it's mounted in a router table. Because it's inverted there isn't an easy way to push a plunge router *up* against the bottom of the table. Instead I use the height adjustment to raise and lower the router when it's in a router table.

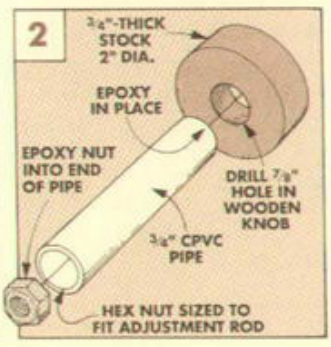
HEIGHT ADJUSTMENT KNOBS. The height adjustment on some routers is made by turning a large knob that extends beyond the router motor. However, some routers have only a small hexagon or knurled nut(s) which is difficult to grab and turn, see Fig. 1.

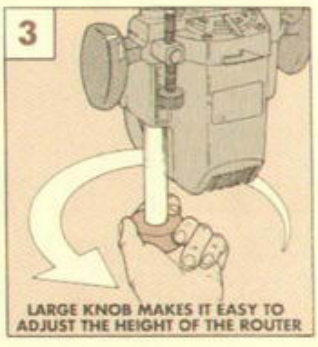
The solution to this problem is to replace the small nut with a large extension knob. Several woodworking catalogs offer these extension knobs for about $20. (One catalog is Woodhaven, call 800–344–6657.) Or you can make your own.

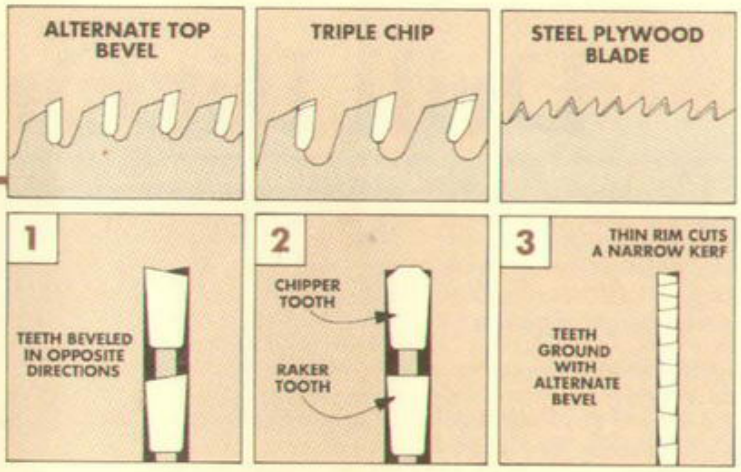
SHOP-MADE KNOB. I made a knob by cutting a 2"-dia. circle from a piece of ¾"-thick stock, see Fig. 2. Then, to connect the knob to the router, I epoxied a short length of ¾"-inside diameter CPVC pipe into a ⅞" hole drilled in the wooden knob. Cut the CPVC pipe long enough to clear the top of your router motor, see Fig. 3.

To secure the pipe to the threaded rod on my router, I bought a hex nut to fit the rod (mine needed a metric nut) and epoxied it inside the pipe. (Depending on the size of the nut, you may have to grind the points on the nut for it to fit in the pipe.)









PLYWOOD BLADES

■ *I plan on making several plywood projects in the near future and I'm wondering if I should invest in a special plywood blade, or will my carbide-tipped combination blade cut clean enough?*

Howard Kirkpatrick
O'Fallon, Missouri

A combination blade is really a jack-of-all-trades, designed to rip *and* cross-cut solid wood. To do this, there have to be a few trade-offs. First, a 10" carbide-tipped combination blade usually has between 40 and 60 teeth. This is enough teeth to do an adequate job of cross-cutting in solid wood. But not so many teeth that the blade will clog up with sawdust when ripping.

SPLINTERING. The problem with using a combination blade for cutting plywood is there aren't enough teeth to keep the bottom edge of the plywood from splintering. The more teeth a blade has, the less material each tooth has to remove. So the general rule of thumb is — the greater the number of teeth, the smoother the cut.

PLYWOOD BLADES. Since a plywood blade isn't meant to make ripping cuts in solid wood, there's less need for chip clearance. So a plywood blade can have a lot more teeth. A 10" carbide-tipped plywood blade can have 80 or more teeth.

TOOTH PATTERN. Another reason some blades give such clean cuts, is the pattern of the teeth. Many blades specified for cutting plywood have a tooth pattern called alternate top bevel, or ATB. This refers to the way the teeth are ground: the top of every tooth is beveled to one side of the blade or the other, see Fig. 1. On these blades each tooth makes a clean, shearing cut.

TRIPLE CHIP. Another tooth pattern that works for cutting plywood is a triple chip pattern, see Fig. 2. A triple chip tooth blade uses two different teeth, a chipper and a raker.

The chipper tooth has a flat top with the corners ground off. This tooth scores the edges and cuts a small channel down the center of the kerf. Then a flat top raker tooth follows the chipper and cleans up the cut.

SCORING CUTS. To find out why a triple chip blade produces such a clean cut in plywood, I called Jim Brewer, Research Manager for Freud saw blades. Jim said "By scoring the plywood with the chipper teeth, the surface tension on the plywood veneer is relieved."

There's only one problem with using carbide plywood blades — the price. Typically the price for a 10" alternate top bevel or triple chip blade with 80 teeth is between $60 and $100. That's a lot of money to spend if you only use the blade occasionally. Luckily, there's one other option — a standard steel plywood blade.

STEEL BLADES. I went to the local Sears store and bought a 10" plywood blade (Sears catalog number 9GT 32159). The blade I purchased has 200 teeth and is a "thin rim" design, see Fig. 3. This means the outside edge of the blade is thinner than the body of the blade. So you get a kerf narrower than ⅛", and a depth of cut that's limited to 1¼".

A CLEAN CUT. The results were surprising — the Sears steel blade produced just as clean a cut as the carbide triple chip. And the best part is the price, only $15.99.

So why would you want to buy a carbide-tipped plywood blade? The answer is — durability. A carbide blade stays sharp at least 10 times longer than a steel one.

A steel plywood blade is going to get dull quicker and will need to be re-sharpened. (Especially when cutting through layers of glue in plywood.) And the more you use the blade the more often you'll need to sharpen it. This can get costly if you take your blades to a sharpening service.

CONCLUSION. If you plan on working with a lot of plywood or you want a blade that is going to stay sharp for a long time, I'd spend the extra money for a carbide blade, such as the triple chip. But if you only cut plywood occasionally and don't want to spend $60 to $100, try the Sears plywood blade. As long as you keep the blade clean and sharp it will work fine.

One final thing. If you only need to make a few cuts, there are a couple of tricks to get clean cuts in plywood with a combination blade. For more information, see Shop Notes on page 18.

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION
(Required by 39 U.S.C. 3685)

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B. Paid and/or requested circulation:		
1. Sales through dealers, street vendors and counter sales	4,899	4,933
2. Mail subscriptions (paid and/or requested)	287,766	277,245
C. Total paid and/or requested circulation	292,665	282,178
D. Free distribution by mail, carrier or other means, samples, complimentary, and other free copies	0	0
E. Total distribution	292,665	282,178
F. Copies not distributed		
1. Office use, left over, unaccounted, spoiled after printing	12,680	32,822
2. Returns from news agents	222	0
G. Total	305,567	315,000

11. I certify that the statements made by me above are correct and complete.
(signed) Donald B. Peschke, Publisher/Editor

Drill Bit Organizers

The response to the drill bit organizer contest (announced in *Woodsmith* No. 71), was really interesting. We've learned a lot about what makes a good organizer. It has to do more than just organize. It should also allow easy access to the drill bits, so you can quickly find the one you want. And it should keep the bits clean and out of the way when not in use. It can also tell you if one's missing because you'll see the empty spot on the shelf or rack.

FIRST PLACE

Our favorite entry combined all these features, and mobility, too. Bob Brown of Great Falls, Montana built a wall-mounted cabinet for his drill bits, see Fig. 1.

SAVES SPACE. The bits are held in solid wood shelves, but they aren't fixed in position — the shelves swing out, see Fig. 1. This saves space since you don't need clearance above the bits to lift them out of the shelf. This arrangement also allows access to the back of the shelves, so you can put two or three rows of bits on each shelf and still find the one you want.

LIFT OUT SHELVES. The neat thing about these shelves is that they lift off the 5/8" pivot dowel that holds them in the cabinet. The shelves are 3½" wide and almost 2" thick, so they're not likely to get knocked over and have the bits spill out.

ARESERVATION. I had only one reservation about this design: what if the wood shelves swell up with changes in the humidity and the holes close up around the bits? I've had that happen and couldn't pull the bits out.

Bob got around the problem by purchasing a plastic drill bit stand. Then he mortised an opening with a router in a shelf to fit the stand, see Fig. 1.

Another solution is to drill oversized shank holes in the shelf stock. Then, to hold the bits tight, drill holes that match the drill bits in a piece of Plexiglas or Masonite and screw it to the top of the shelf, see Fig. 1a.

SECOND PLACE

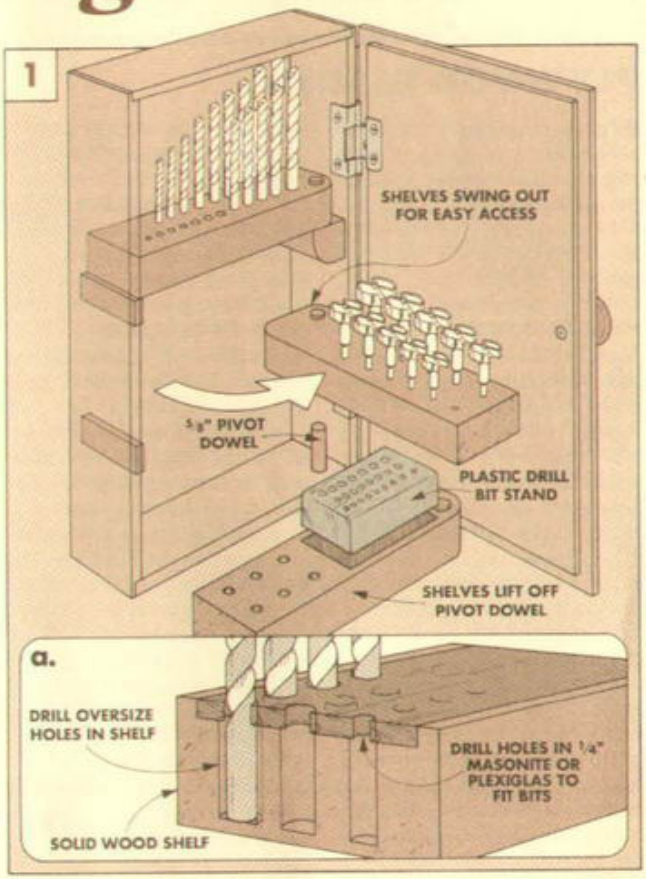
Our next favorite idea was found in two entries that arrived the same day — from Paul McMillan, Sr., of Fayetteville, North Carolina and Donna Feight of Altoona, Iowa.

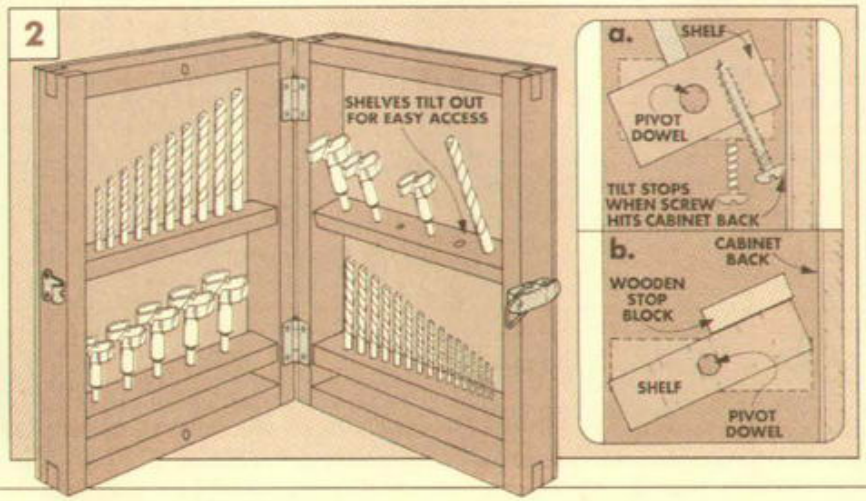
TILT OUT SHELVES. Their idea is a space-saving wall cabinet with shelves that tilt out (but don't lift out) to allow easy access to the bits, see Fig. 2.

ADJUSTABLE TILT ANGLE. As Paul's shelves tilt forward, a screw extending out of the bottom of the shelves acts as a stop so the shelves won't tilt over, see Fig. 2a. And by adjusting the screw in or out, he can change the tilt angle of the shelf.

STOP BLOCK. Donna's cabinet is deeper and has two or three rows of bits on each shelf. She used a wooden block glued to the inside of the cabinet as a shelf stop, see Fig. 2b.

Thanks to all of you who sent in your ideas. In the April issue we'll have the winners of the clamp organizer contest.





$100 CONTEST

SAWHORSES

From the sturdy carpenter's sawhorse to the lighter cabinetmaker's sawhorse, they all solve at least one problem: getting the work up off the floor. If you have a special sawhorse or a modification, we'd like to see it.

We'll publish up to three of the best sawhorse designs in the June 1991 issue of *Woodsmith* (No. 75). Winners will receive $100 and a *Woodsmith* Master Try Square. Duplicate or similar plans will be considered in the order received. Send your sawhorse plans (postmarked no later than February 25, 1991) to Shop Tips Contest, *Woodsmith*, 2200 Grand Ave., Des Moines, Iowa 50312.

Sources

STEAMER TRUNK

Woodsmith Project Supplies is offering a hardware kit for the Steamer Trunk shown on page 6. The kit includes all of the brass-plated hardware, leather handles, and brass screws to mount the hardware, see photo.

Trunk Hardware

773-100 Steamer Trunk Hardware Kit.....$49.95

- (8) Case Corners
- (4) L-Shaped Corner Clamps
- (2) Hinges
- (2) Leather Handles
- (4) Handle Loops With Pegs
- (2) Large Draw Catches
- (1) Trunk Lock With Key
- (2) Lid Stays, Left Hand And Right Hand
- No. 6 x ½" Rh Brass Screws For Mounting The Hardware

The following items are *not* included in the kit. They're available at most local hardware stores or lumberyards:

- Plywood, wood, and finish (see Finish section below)
- (24) 4d (1½") Finish nails
- (6) No. 6 x 1¾" Fh woodscrews
- Mink oil or Neatsfoot oil for the leather handles (optional).
- Cedar lining and ¾" brads to attach the lining. We found tongue and groove cedar closet lining sold by the box at most of the local lumberyards and home centers. The thickness varied from ¼" to ⅜". Most boxes have a minimum of 15 square feet (about 13 square feet are needed). Locally, the price of a box was $15 to $20.

FINISH

I mixed up a stain to give the Trunk an aged appearance from 1½ tablespoons of burnt umber artists' oil and one pint of boiled linseed oil. Since both of these are thick, it takes a lot of stirring.

The mixture was thick, but easy to apply and very uniform. Since it's so thick, it won't soak in too quickly and leave a blotchy appearance.

Burnt umber artists' oil can be purchased from art supply stores or **Woodsmith Project Supplies**:

Burnt Umber Artists' Oil

773-150 Burnt Umber Artists' Oil, 1.25 fl. oz. $3.95

After the stain dried, I applied a coat of General Finishes' Sealacell Tung Oil Sealer, and then two coats of General Finishes' Satin Royal Finish Top Coat (an oil and urethane mixture).

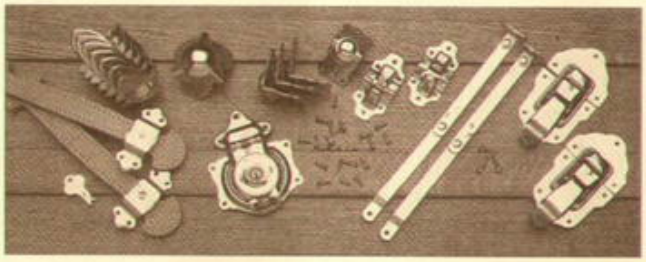
Note: If you line the trunk with cedar, *don't* apply any finish to the cedar. It masks the aroma.

Woodsmith Project Supplies is offering a General Finishes' Two-Step Kit.

General Finishes

761-500 General Finishes' Two-Step System..... $11.95

- (1 pint) Sealacell
- (1 pint) Royal Finish (satin)



SLIDING CUT-OFF TABLE

Woodsmith Project Supplies is offering a hardware kit for the table saw Sliding Cut-Off Table shown on page 14.

Sliding Cut-Off Table

773-200 Sliding Cut-Off Table Hardware Kit..... $27.95

- (1) Phenolic Plastic Runner, ½" x 1" x 21" (Needs to be cut to fit *your* table saw's miter gauge slot, see below.)
- (1) ½" x 6 ft. Self-Adhesive Right to Left Measuring Tape
- (1) 5" x 9" Piece Of ⅛"-Thick Orange Plexiglas (This will have to be cut into two pieces to make the safety guard.)
- (1) ⅛" x 1¼" x 2⅛" Clear Plexiglas Hairline Indicator. (Hairline is etched and inked.)
- (1) No. 6 x ¾" Rh Screw, Washer
- (1) 5/16" x 2½" Fh Machine Screw And Washer
- (3) Plastic Knobs With Metal Inserts Threaded For 5/16" Bolt
- (2) 5/16" x 3½" Hexhead Machine Bolts, Square Nuts, And Hex Nuts For Hold-Down

The following items are *not* included in the kit. They're available at most local hardware stores or lumberyards:

- Wood and plywood
- (4) No. 8 x 1" Panhead screws and washers
- (8) No. 8 x 1½" Fh woodscrews
- (4) No. 8 x ¾" Fh woodscrews
- (13) No. 6 x ¾" Fh woodscrews
- (1) Bolt and Nut. Acts as a stop for the safety block. This bolt fits in a hole drilled in the edge of *your* saw table, see page 16. So the size may vary.

PHENOLIC RUNNER

A piece of ½"-thick phenolic plastic to make a runner is included with the Cut-Off Table Kit explained above. But we're offering this plastic strip separately as well. You can use it for making runners for any jig that will fit in a miter gauge slot.

Plastic has one definite advantage over hardwood for runners — it won't expand and contract with changes in humidity. It will slide smoothly without slop under any condition.

And phenolic is a very strong and durable plastic. It's often used for router bases.

Most miter gauge slots are *about* ¾" wide. But since they aren't all exactly the same size, we're selling the phenolic in a 1"-wide strip. Then you can cut it to fit in *your* miter gauge slot.

Shop Note: Since phenolic is so hard, we recommend using a carbide-tipped saw blade to cut it. Also, the dust created when working phenolic is very fine, so we recommend using a face mask. (This stuff also smells terrible when it's cut.)

Phenolic Runner

773-210 Phenolic Plastic Runner, ½" x 1" x 21".....$4.95

COLLECTOR'S CABINET

Woodsmith Project Supplies is offering a hardware kit for the Collector's Cabinet shown on page 20. Note: Wood, glass, finish and hanging screws are *not* included. We finished our cabinet with General Finishes' Two-Step finish, see above.

Collector's Cabinet Hardware

773-300 Collector's Cabinet Hardware Package.....$8.95

- (2) ¾" Birch Knobs, Screws
- (4) Brass Butt Hinges, 1 1/16" open width x 1¼" long
- (2) Magnetic Catches With Strike Plates

ORDER INFORMATION

BY MAIL

To order by mail, use the form enclosed with a current issue. The order form includes information on handling and shipping charges and sales tax. Send your mail order to:

Woodsmith Project Supplies
P.O. Box 10350
Des Moines, IA 50306

BY PHONE

For fastest service use our Toll Free order line. Open Monday through Friday, 8:00 AM to 5:00 PM Central Time.

Before calling, have your VISA, Master Card, or Discover Card ready.

1-800-444-7002

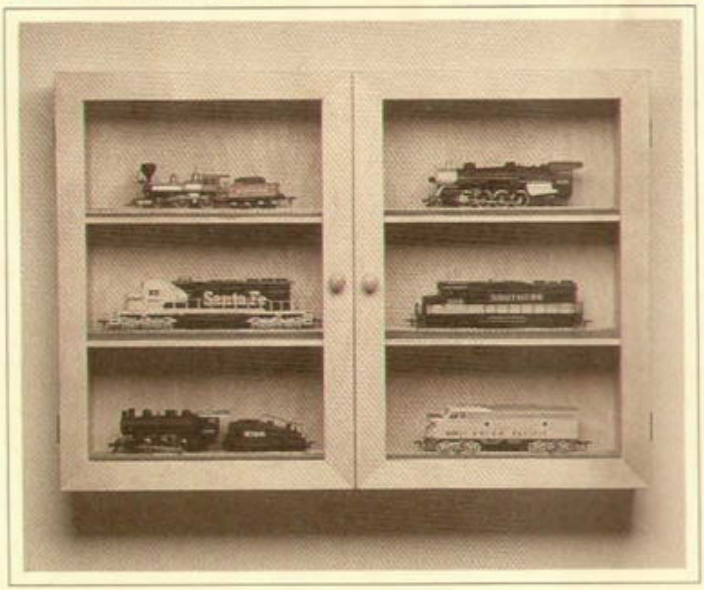
Note: Prices subject to change after April, 1991.

Final Details

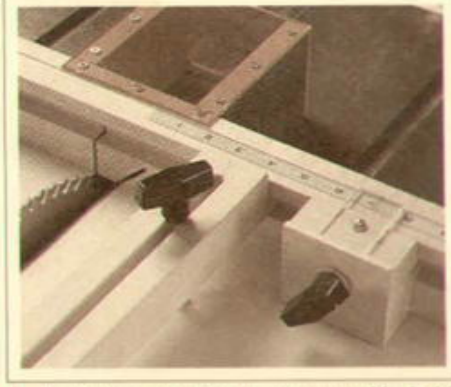
Steamer Trunk

Cedar lining makes this Trunk a great place to store seasonal clothing. And the brass-plated hardware adds a touch of authenticity. You can also add a glass top to create a coffee table.

Collector's Cabinet



Sliding Cut-Off Table



▲ *A sliding stop block, a removable hold-down, and a safety guard are a few of the features that make this Cut-Off Table unique.*

◀ *No matter what you're diplaying, it will look great behind the doors of this solid maple Collector's Cabinet.*