Panel saws are impressive. They make it easy for one person to cut a plywood sheet. But the high price of a store-bought model has always kept me from adding this tool to my shop. So I decided to build my own version with the features that I like.

**VERTICAL BED.** To prevent twist and warp, I used sturdy, 3/4" birch plywood to create a vertical A-frame bed. And for the support rails, I used a strong Douglas fir for added strength.

**RIPPING.** The Panel Saw can also be used for ripping. Just lock the carriage in place, rotate the saw 90°, and push the workpiece through the blade. To provide additional support when ripping a full sheet of plywood, I added two removable wings to the sides of the saw.

**MOBILE.** Since the Panel Saw is about 10 feet long (with the wings), I attached casters to roll it around. When I'm done cutting, the Panel Saw folds up flat and rolls against the wall for storage.

**DESIGN OPTION.** This plan includes an optional design for adding a router carriage for cutting grooves and dadoes in sheet goods.
I started on the Panel Saw by making the bed. The bed is built in two sections. Each section consists of a triangular piece of plywood with one edge rail and one center rail screwed to the long edges of each bed piece (Fig. 1).

**CUT PIECES.** To make the bed sections, start by cutting two bed pieces (A) from a blank of $\frac{3}{4}$" plywood (Fig. 1). To do this, I first raised the plywood off the floor with some scrap 2x4s. Then I clamped another 2x4 diagonally across the workpiece to act as a straightedge for the saw. Next, cut the center and edge rails (B, C) to length (Fig. 1). Note: The edge rails are cut 6" longer than the center rails (Fig. 1). I used straight-grained 2x8s for both the center and edge rails. I ripped them to a finished width of 3".

**ATTACH RAILS.** With all of the rails cut to size, they are ready to be clamped and screwed to the bed pieces. The edge rails (C) need to extend past the bottom edge of the bed. They will become two of the “feet” for the panel saw (Fig. 1b). To ensure that both feet extend an equal distance on both sides, just position the top inside corner of each edge rail flush with the top of the bed (Fig. 1a). The center rails (B) are left flush with the bottom edge of the bed.

**CONNECT SECTIONS.** After the two sections are complete, they’re connected with a top and bottom rail (D, E) (Fig. 2). I used the remainders of the 2x8s to make the rails, but this time the rails are ripped to a finished width of 2 3/4".

**CUTTING TROUGH.** To prevent the circular saw from cutting into the bed, a space (cutting trough) is left between the two sections (Fig. 2). I used a piece of 6" long scrap 2x4 as the spacer to get both sections into place before screwing the bed pieces to the rails (Fig. 2). Note: This scrap spacer will be used later to position the guide tubes. For added strength, I secured the ends of the edge and center rails to the top and bottom rails with lag bolts (Fig. 2a).

**CASTERS.** Finally, to roll the saw around the shop, I screwed a pair of 2" swivel casters under the bottom rail (Fig. 2b).

**BACK SUPPORT**

Once the bed is complete, the next step is to make the folding back support. In the “down” position, it holds the bed upright.
The back support consists of two main parts: a brace assembly and two plywood base pieces (Fig. 3). To move the Panel Saw, the back support folds up, and the saw can be rolled around on the casters.

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**BRACE ASSEMBLY.** The brace is a simple wood frame (Fig. 4). The braces (F) are 1 1/2"-thick stock cut to a finished length of 48". Complete the frame by screwing a 3/4" plywood top and bottom plate (G) to the braces (Fig. 4).

To secure the brace assembly to the vertical bed, cut slots in the top plate (Fig. 4a). The slots fit over hanger bolts installed in the center rails (Fig. 3a). Tightening a plastic T-knob (or wing nut) locks the bed in place.

**Note:** A counterbore at the end of the slot prevents the knob from sliding as it’s tightened (Figs. 3a and 4a).

**FOOT.** Now all that needs to be done to complete the brace assembly is to screw a plywood foot (H) to the bottom plate (Fig. 4). With the ends of the two edge rails, this foot creates a "tripod" that stabilizes the Panel Saw.

**BASE.** The last step is to build the base. The base is just two triangular-shaped pieces of plywood that keep the Panel Saw from racking (Fig. 5).

The base pieces (I) are hinged to the bed and braces (Fig. 5). Start by screwing the brace assembly to the base pieces. But to allow the back support to easily fold up, I left 1/4" clearance between the base pieces and the center rails.

**Note:** To keep everything straight, screw the hinges to the bases first. Attach the back support with screws to the bed.

**TURNBUTTON.** Finally, screw a turnbutton (J) to each center rail to secure the back support in the “up” position (Fig. 3).
The heart of this Panel Saw is the carriage assembly. This versatile assembly provides an easy way to mount the saw. Plus, it allows you to easily rotate the saw for accurate crosscutting or ripping. The carriage assembly is built from three main parts: an insert attached to the base of the circular saw, a sliding carriage to hold the insert, and a pair of metal guide tubes that the carriage slides on.

**INSERT.** The base of the circular saw is attached to an insert (K) made of ¼" hardboard that fits into a recessed opening in the carriage (Fig. 6).

**MOUNTING HOLES.** The saw is then mounted to the hardboard insert with ¼" threaded knobs and T-nuts. This means you’ll first have to drill three holes in the saw base (Fig. 7).

After drilling the holes, center the saw base on the insert, and transfer the location of the holes and the blade opening onto the insert. Now you can drill the holes and cut the slot in the insert.

**ADJUSTMENT.** Next, to provide a way to adjust the saw, enlarge the two holes at the end of the insert (Fig. 7a). The single hole at the other end of the insert will be used later as a “pivot point” to help position the saw blade.
Just as its name implies, the carriage “carries” the saw up and down the guide tubes on the Panel Saw. Depending on whether you’re ripping or crosscutting a panel, the insert fits into one of the two recessed openings. To make the carriage (L), start by gluing together two pieces of 1/4” hardboard (Figs. 6 and 6b).

Creating the recessed openings is a simple two-step process. First, a 1/4”-deep recess is routed in the carriage to match the shape of the insert (Fig. 6c). Then a lip is created by removing the waste with a jigsaw (or coping saw) (Fig. 6d).

The trick to making the recess is to use the insert as a template and rout the recess with a pattern bit. First, center the insert on the carriage (Fig. 8). Then, to guide the router, tape strips around the edges of the insert with carpet tape.

**ROUT RECESS.** Now you can remove the insert and rout one recess (Fig. 6c). Then repeat the process, and rout a second recess 90° to the first (Fig. 6b).

**LIP.** To complete the openings and form the lip for the insert, remove the waste with a jigsaw (Fig. 6d).

**HARDWARE.** All that’s left is to drill holes and install hardware onto the carriage. To help the carriage slide smoothly without a lot of “play,” I slipped nylon spacers over the four U-bolts. Just slide them over the bolts like you would when lacing beads on a necklace.

**Note:** You may need to cut one of the spacers in half to completely cover the U-bolt and surround the tube (Fig. 6a).

Finally, to reduce the friction between the guide tubes and the carriage, I added nail-on plastic furniture glides between the ends of each U-bolt.

**GUIDE TUBES.**

The next step in assembling the carriage is to use conduit straps to attach the carriage guide tubes to the top and bottom rails. (The tubes are just 6-foot long pieces of 11/2” “thin wall” electrical conduit.)

**INSTALL TUBES.** Now the top and bottom ends of the guide tubes can be secured with the straps and lag bolts (Fig. 9). But first, slot the holes in the “ears” of the conduit straps (see the Shop Tip at left). Next, place a square U-bolt and a locking knob on the carriage. This U-bolt is used to lock the carriage in place (see the Technique on page 97).

**ATTACH INSERT.** Finally, attach the insert to the carriage with knobs and T-nuts (Fig. 10a). The knobs tighten against fender washers, holding the insert in place.
**MATERIAL REST**

The Panel Saw is designed with a material rest to support sheet goods during a cut. Why not just use the bottom rail as a rest? Because the carriage would “bottom out” on the rail before the saw could cut all the way through a workpiece.

The material rest (M) is made of two 1⅛-thick blanks (one for each half of the bed) (Fig. 11). A number of deep dadoes create openings in the rest that allow sawdust to fall through.

**SHOP TIP**

**Eased Edges**

To allow workpieces to slide easily on the material rest, rout or file a chamfer on the top edges of each opening and the edge of the bed next to the cutting trough.

**CHAMFER EDGES.** To prevent sheet goods from “catching” on the material rest, the top edge of each opening is chamfered (see Shop Tip on this page). I also chamfered the edges of the bed next to the cutting trough.

**LIP.** Before attaching the material rest to the bed piece, glue a ¼” hardboard lip (N) flush with the ends of the material rest. This will help to “track” workpieces along the material rest (Fig. 11).

**NOTE:** Cut the lip shorter than the rest to allow clearance for the carriage.

**ATTACH REST.** The last step is to clamp and screw the material rest to the bed (Fig. 11a). The key here is to position the pieces so the top edges are level and are 90° to the cutting trough.
To provide extra support when ripping, I built two “wings.” Each wing consists of an extension support (O) and an extension back (P) (Fig. 12).

The support is ripped to width from a 48”-long piece of plywood to fit between the material rest and the bottom rail.

Next, I cut the extension back to match the diagonal edges of the vertical bed, and screwed the pieces together (Fig. 12a). To make the wings removable for storage, I drilled two holes for threaded knobs, T-nuts, and washers in each of the extension supports.

MATERIAL REST. Finally, build a material rest extension from 1 1/2” stock (Q) and a hardboard lip extension (R) for each wing (Fig. 12).

PULLEY SYSTEM

All that’s left to complete the Panel Saw is to add a pulley system and counterweight. The idea here is for the carriage to return easily to the top of the guide tubes when you finish a cut.

The pulley system consists of three parts: a pulley base plate (S), a pulley support (T), and a couple of 1 1/2” wheels used for sliding glass doors (Fig. 13).

The base plate and pulley support are both made from 3/4” plywood (Fig. 13). After drilling holes and bolting the wheels to the pulley support, the two pieces can then be screwed together to form an upside-down T-shape (Fig. 13a).

Note: Locate the pulley support so the pulleys (not the support) are centered on the length of the base plate.

The final step in completing the pulley system is to screw the base plate to the top rail so the pulleys are centered on the width of the cutting trough.

COUNTERWEIGHT

With the pulley system in place, the last step is to add a counterweight. The secret is to make the counterweight roughly equal to the combined weight of your circular saw and carriage. (In my case, this was sixteen pounds.)

This lets you control the saw as it cuts a panel. And it allows the saw to travel easily back to the top of the tubes.

LEAD SHOT. To make the counterweight, I filled a length of 3” PVC pipe with lead shot (Fig. 15). But concrete, sand, or any other weight will work fine, just as long as it clears the back support. To hold the shot in the pipe, I cut a 3/4” hardwood pipe cap (U) to fit snugly inside the end of the pipe (Fig. 15b).

WIRE CABLE. After the counterweight was done, I ran a 7-foot length of wire cable over the pulleys to connect the pipe to the carriage. Each end of the cable has a loop made with a crimp-on clip.

An S-hook in one loop hooks into an eye bolt that is installed on the carriage (Fig. 14). (I cut off the exposed, threaded end of the eye bolt for clearance.) The other end slips over a bolt which passes through the top of the pipe (Fig. 15a).

Note: To keep the loop from slipping to one side of the bolt, I filed a small notch in the middle of the bolt (Fig. 15a).
Taking a few minutes to tune up the Panel Saw is the secret to making perfect cuts. The idea is to adjust the guide tubes 90° to the material rest.

First, you need to clamp a block of scrap to the carriage (Step 1). Next, place a sheet of plywood (with a “factory” square corner) on the material rest so one edge extends into the cutting trough. Now slide the carriage along the guides, checking carefully for gaps.

If there are gaps, you’ll need to adjust the guide tubes (Step 2). This is done easily by first loosening the conduit straps. Then place a 6”-long scrap block between them to keep them parallel.

Next you’ll check the saw blade for alignment. This is simple. Just mark a tooth on the blade’s back side, then rotate the saw blade forward until the same tooth aligns with the plywood edge again (Step 3). If there is a gap between the plywood edge and the marked tooth, the saw requires further adjustment.

To make this adjustment, loosen the threaded knobs on each side of the insert and pivot the saw. Test the adjustment by rotating the blade and watching the marked tooth again (Step 4). Repeat until the marked tooth aligns with the plywood edge. Just be sure to tighten the knobs once the saw is aligned.

1. First, clamp a short scrap block to the carriage to align the guide tubes. (This is the same scrap block you used earlier.) Then push a sheet of plywood against the edge of the block, and slide the carriage up and down to check for a gap.

2. Then, to adjust the guide tubes, first loosen the top or bottom conduit straps. Then tap the tubes into position. The slots in the conduit straps make this easy. Cut a block to fit between the tubes to keep them parallel while they’re adjusted.

3. The next step is to check the alignment of the saw blade. This is a rather simple process. Just mark a tooth on the blade’s back side. Then rotate the blade forward until the marked tooth aligns with the plywood edge again.

4. If the distance between the marked tooth and the plywood edge varies, the saw needs to be adjusted. First you need to loosen the knobs that hold the saw to the insert. Then pivot the saw to align the blade.
TECHNIQUE . . . Using the Panel Saw

The Panel Saw is not only capable of crosscutting, it’s great at ripping large sheet goods as well. To do this, the carriage needs to be locked in place, then the workpiece is pushed through the blade (see photo at right). Setting up the saw for ripping from crosscutting only requires a few simple steps.

First, mount the saw in the carriage so the blade is perpendicular to the guide tubes (refer to Fig. 2).

Note: For a straight cut, it’s important that the blade is perfectly aligned. If you’re unsure of the alignment of the carriage, guide tubes, or saw blade, see the Setup article on the previous page.

Then slide the carriage to the desired position and lock it in place. (You should be able to line the cut up by positioning the plywood next to the saw blade.) Then, just tighten the T-knob against the strap on the square U-bolt (Fig. 1).

Some older circular saws aren’t equipped with lock switches. If your saw doesn’t have a lock switch, just use a spring clamp to hold down the trigger switch during a cut (Fig. 2).

STORAGE

Even though the Panel Saw is a large shop-built tool, I designed it so it’s easy to move and store. To do this, the back support can be folded up flat into the back of the bed when you’re finished cutting (see photo at right).

When it’s folded up, the saw lifts off the rear foot and the two edge rails and rests on the casters (Fig. 1). Then you can roll the saw to another place in the shop, push it out to the driveway, or store it flat against a wall and out of the way.

The turnbuttons on the center rails make it easy to lock the back support in an upright position for storage. Just twist them to lock the support in place.

You will need to push the panel through, so use the saw’s lock switch. If there’s no lock, place a clamp on the trigger switch.

Once you have the saw in position, it needs to be locked into place. This is done by tightening the T-knob on the U-bolt.
Add a base for a router and you can rout grooves and dadoses exactly where you want in either sheet goods or large glued-up panels. A bracket locks tight to the guide tube for stopped cuts.

CONSTRUCTION NOTES:

- The router base consists of a hardboard insert with a pair of cleats that allow the base to be locked into the carriage (L). Hardwood spacers position the router and the insert in the carriage so the bit can reach the workpiece.
- To build it, start by cutting the router insert (V) from 1/4" hardboard. It’s sized to fit down through the inside edge of the rabbet in the carriage base (Fig. 1).
- Next, drill a centered hole in the insert for the router bit. Use the manufacturer’s base to lay out and add countersunk shank holes for mounting the router.
- Now cut the insert cleats (W) to size from 1/4" hardboard. The cleats become the lip that fits into the recess in the carriage (L). (Be sure to sand a small radius on the corners of the cleats so they fit snug in the carriage base.)
- To complete the base, cut a pair of 3/4"-thick hardwood spacers (X). Then the cleat and insert are glued and screwed to the spacers (Figs. 1a and 1b).
- So that I could rout stopped grooves and dadoses, I also made an adjustable stop. The stop is just a couple of hardwood brackets (Y) with openings that fit around the 1 1/2"-dia. guide tube (Fig. 2). These shank holes are for the carriage bolts used to clamp the brackets around the guide tube.
- Finally, rip the blank in half lengthwise and cut the brackets to finished length.

Note: To create a tight grip, the gap that’s cut away by the blade kerf leaves a half-circle that will be slightly smaller than the outside of the guide tube.

MATERIALS LIST

NEW PARTS

<table>
<thead>
<tr>
<th>V Router Insert (1)</th>
<th>1/4 hdbd. - 7 x 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>W Insert Cleats (2)</td>
<td>1/4 hdbd. - 2 3/8 x 7 1/4</td>
</tr>
<tr>
<td>X Insert Spacers (2)</td>
<td>3/4 x 1 1/2 - 7</td>
</tr>
<tr>
<td>Y Stop Brackets (2)</td>
<td>3/4 x 1 - 3</td>
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</tbody>
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HARDWARE SUPPLIES

(8) No. 8 x 3/4" Fh woodscrews
(2) 3/16" x 2 1/2" carriage bolts
(2) 3/16" I.D. star knobs w/ washers