A Game Plan for Big Cabinet Jobs

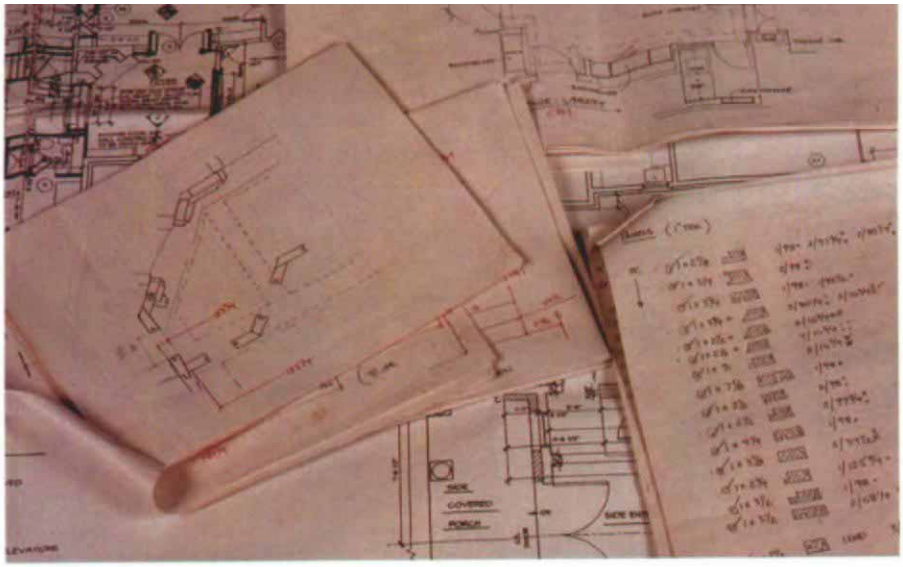
Good shop drawings, the right materials and accurate machine setups are the keys to success

by John W. West

Over the years, I've built close to 20 libraries for residential clients. To me, these rooms of cabinetwork and millwork are interesting for their variety. A library—more than any other room in a house—brings together a lot of different components. Case work, shelving, drawers and pull-outs, frame-and-panel doors, glass doors, paneling, and unique moldings all make up the finished job. Case work may vary from simple bookcases to more elaborate storage units for television and audio equipment. But in the end, they're all just plywood boxes dressed up to look good.

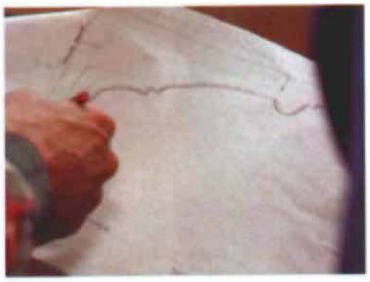
For a large and complicated job like this one (see the photo above), I always measure the room twice, on two separate days, to reduce the chance of making a mistake in laying out and sizing the work. By checking the two sets of measurements against one another, any discrepancy will show up readily and may have to be resolved with a third visit to the job site. I used story poles (scraps of lumber on which all the job-site conditions are marked) for many years because they're almost foolproof. (For more

Photos: William Duckworth



LAYOUT AND DESIGN

Several stages of paperwork—*From an architect's original drawing, the author makes a large-scale version. Next come shop sketches, a parts lists and full-sized details (below).*



on story poles, see *FWW* #105, pp. 66-69.) But lately, I've developed another system that works more efficiently for me.

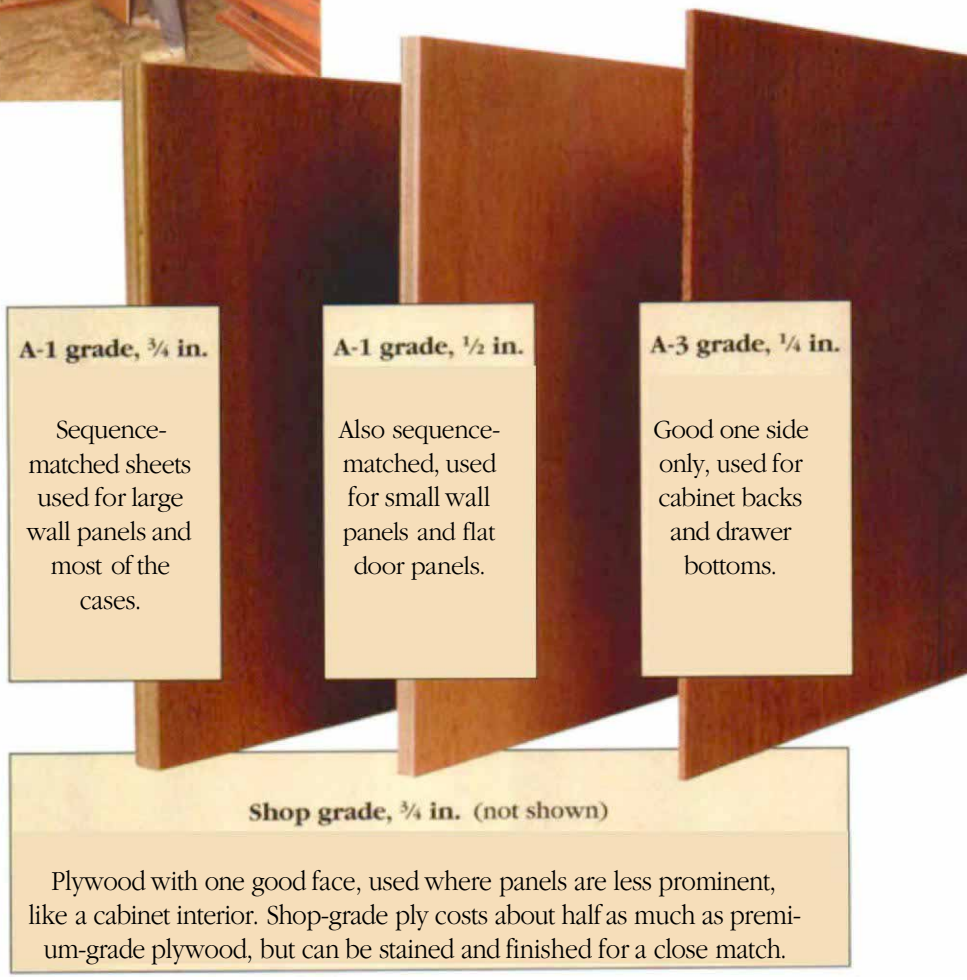
To lay out and design a room like this one, I start with a set of drawings from the architect that have been approved by the clients. The drawings show scaled elevations, or front views, of how they want the room to look. To figure out exactly how cabinets and paneling and moldings will all fit together, I use those drawings to make my own in a larger scale based on the measurements taken at the site. From my first set of drawings, I make another set of free-hand shop sketches where I figure out the joinery details and the actual cut size in overall dimensions of every cabinet, door, wall panel and piece of molding that will make up the job. From those shop sketches, I make cut lists that show every piece of plywood or lumber by finished size—thickness, width and length—and the number of pieces of each. There are still many times when I will draw out some details full-sized, especially when I deal with angles or curves or I want to be sure something is going to look right.

Choosing materials and tuning up equipment

For all open bookcases and wall and door panels, my shop buys the best quality (an A-1 grade), sequence-matched, veneer-core plywood. I stay away from particleboard and fiberboard cores. I'm getting too old to hoist the extra weight. We use ¾-in.-thick material for all the case work parts and large panels, ½ in. for smaller wall panels and flat door panels, and ¼-in. (A-3 grade) plywood for cabinet backs and drawer bottoms (see the photos at right). We make everything else, including drawer cases, from solid lumber. By using se-

MATERIALS

Plywood for panels and case work—*The 18 cases and scores of panels that went into this library required 45 sheets of veneer-core plywood of varying grades and thicknesses.*



FIRST, TUNE UP YOUR TOOLS

To get off on the right foot, make sure tools have sharp knives, and choose a single tape measure for the job.

One tape, start to finish

Tape measures aren't all the same. Using one tape, what the author calls a master tape, ensures accuracy in cutting cabinet parts. For quick identification, the author scratches a symbol into the tape's case (like the triangle on this one), so it won't be confused with any other tape.

Change and set planer knives

After installing a sharp set of knives, the author sets them with a gauge. The process is fast, and knives are accurate to within a few thousandths of an inch.

Calibrate tablesaw rip fence

Using a scrap piece of plywood, the author checks the rip fence setting against the master tape. The tablesaw should be checked again with each blade change.

Jointer

New jointer knives are set flush to the outfeed table. Table surfaces are cleaned and waxed and checked for alignment. Depth-of-cut gauge is reset if necessary.

Shaper knives

The author grinds his own shaper knives for all of the molding that must go into a job. He sharpens previously made knives and sets them aside for quick access.

quenced-matched panels, we get the same color and grain patterns throughout the room. For cases that are sunken into a closet alcove or hidden by doors, we use a lesser shop-grade plywood (costing about half as much as the A-1 panels) because the cases are not seen, and you can still get a similar color once they are stained and finished.

Before we start a project like this, we perform a major tune-up on all the equipment (see the photos above). The time spent on tune-up is critical because one thing we do that's different from many cabinet shops is cut all the plywood and mill all the lumber for a given job before assembling any cabinets. That means shelves and door stiles and drawer parts are all machined and cut to size before case work or paneling goes together. The machining has to be accurate.

We change knives on the jointer and the planer and reset the thickness gauges to be accurate within a tolerance of less than 1/100 in. We also install freshly sharpened blades on the saws. All the machines are calibrated to agree with one designated tape measure we'll use throughout the job.

When we cut plywood sheet stock, we always cut off the factory edges, usually taking at least an inch from all sides. We may not cut as much off the long edges,

FACTORY FRESH DOESN'T MEAN IT'S SQUARE

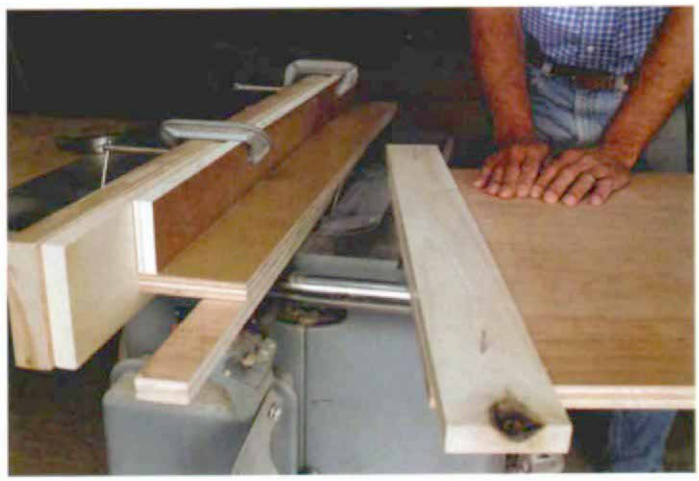
You cannot trust that any sheet of plywood from the factory will have square corners, and you cannot make square cabinets with out-of-square parts.

Before I owned a panel saw, I worked in a shop where we used a jig over a regular cabinet saw fence, like the one shown below, for squaring up sheet goods. By tacking an additional straightedge to one edge of the plywood (left) and running it under the jig (right), we were able—simply and fairly quickly—to square up sheets of plywood.

When I'm getting ready to make the plywood cuts for a job at hand, I look through the sheets for the important pieces, the ones that will be most prominent. I rough cut those pieces first, a little bigger than the final size, to make them more manageable. I also make any necessary repetitive cuts of similarly sized pieces, like base cabinet sides. It's better to crosscut first and rip last, so I cut all those oversized pieces to the finished length first. To guarantee that you get square corners on all your plywood pieces, always place a freshly cut edge against the fence with each new cut, until all four sides have been trimmed off. *—J.W.*

***1. Clamp the jig to the saw fence** with the outside of the sawblade flush with the edge of the jig. Tack a straightedge onto the workpiece to a square line marked in pencil.*

***2. Run the workpiece through the saw,** keeping even pressure on the straightedge against the jig.*

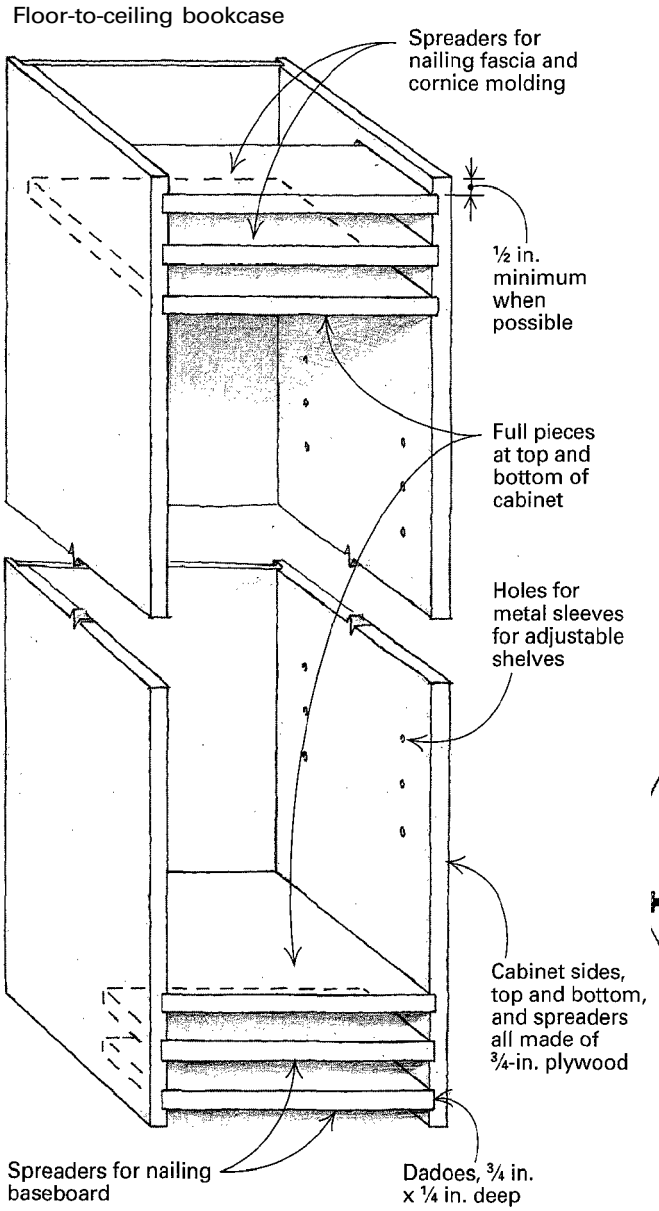


***3. Leave plenty of space between blade and saw fence** to prevent the off cut from binding.*

but we always remove at least an inch from the ends because they are sanded over and thinner than the center of the panel. The sanding machines at plywood factories often leave a pronounced bevel on the ends (sometimes even sanding through the face veneer). Also, edges are often torn up from handling, and you cannot count on the corners being square. Unless you have a panel saw, you may have to spend some extra effort making a jig to guarantee square corners when you cut up the plywood (see the box above). It's worth the time.

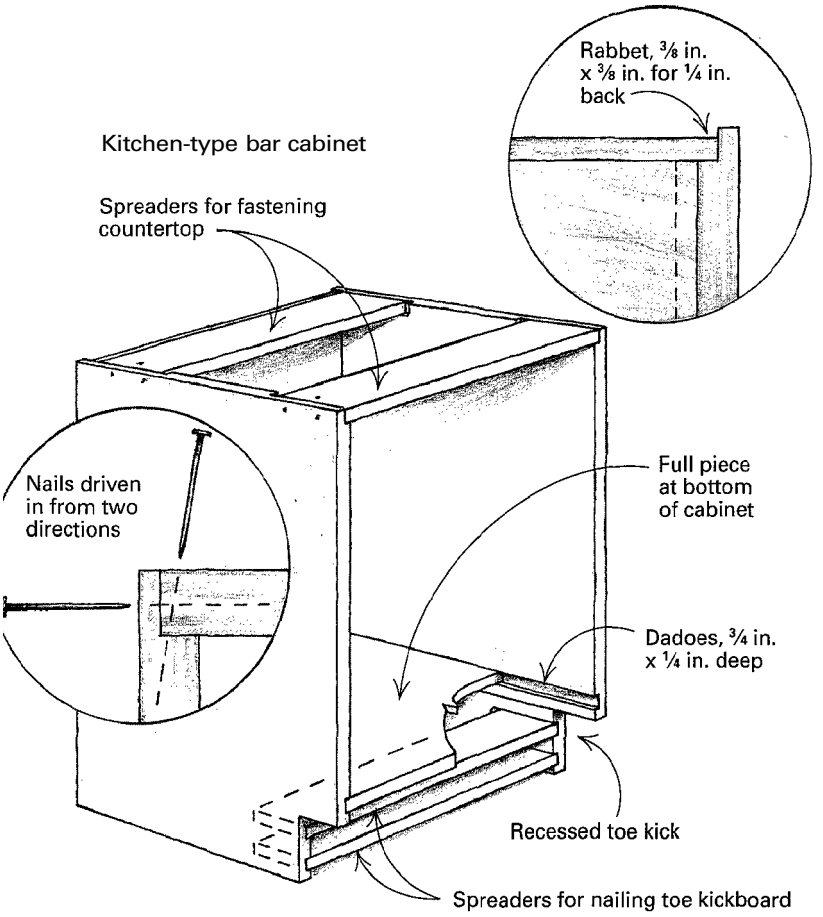
Build for the outside dimension of the box

With the cases we build, all the horizontal pieces are let into the verticals by the full thickness of the material, usually ¾ in., in either rabbet or dado joints (see the drawing on p. 86). One important chore that rabbets and dadoes do is to locate things. And your biggest enemy in making boxes is the assembly time. The machining and preparation of all the parts is worth the extra time it takes when you get to assembly. Jobs will go together better, faster, easier, squarer and truer. Anything that you can do that helps you to index or locate parts for assembly, the better off you are, espe-



SIMPLE PLYWOOD BOXES

Cabinets for this library were built to store books, audio and video equipment, a large television and glassware for a wet bar. Although some of the details (doors and face frames) and all of the sizes varied, the cases were all made using the same basic construction methods for ¾-in. plywood parts.



daily if you are working alone.

If there's a place where we need additional support or a means of keeping a box straight, we put in additional pieces we call spreaders (see the drawing above). The tops of base cabinets serve as spreaders and also provide a way of fastening a counter from underneath. If there is a fascia piece, which serves as a background for cornice molding, above the solid top of an an open bookcase, then we'll put spreaders across the top.

For cases like a kitchen cabinet, where you have a recessed toe kick, we notch out the sides of the cabinet and add a spreader or two as a nailing surface for the toe kickboard. In cabinets where there is a baseboard across the bottom of the cabinet, we may add one or two spreaders to stiffen the bottom of the cabinet and to act as nailers for the baseboard. All spreaders, no matter where they are, are always let into a dado the same depth as the cabinet top and bottom or a fixed shelf.

We cut a ⅜-in. by ⅜-in. rabbet to affix the ¼-in. back to the cabinet. When cabinets go against a wall with bulges in it, that extra ⅛ in. of space usually provides enough clearance so that the cabinets will go flat to the wall.

We use an overhead router to cut all our plywood joints because it's easier to control the overall dimension of cases. Overhead routing leaves a consistent thickness of material in plywood parts because the router bit is fixed in space above the work surface as the plywood is run underneath it. Routing with a hand router is the opposite: The depth of cut remains the same, but the final width of the case work will vary with different thicknesses in the plywood. You can make an overhead router from scraps of plywood, it's not that hard. Or you can simply measure the thickness of each piece of plywood and adjust the depth of the router cut accordingly, but the job will take more time that way.

We cut a full rabbet, about ¼ in. deep, depending on the actual thickness of the plywood, for all the top and bottom pieces. We also cut matching dadoes for any fixed shelves. We developed this system for two reasons: strength and accuracy. I'm convinced that having the horizontal pieces sitting on a rabbeted or dadoed ledge at full-thickness makes a stronger joint. And by using the overhead router with the cutting depth set to leave exactly ½ in. of material after the cut is made, we can always trust that the overall outside dimension of

Drawings: Christopher Clapp

the cabinet will be accurate. It doesn't matter that the ¾-in.- plywood we ordered actually came from the factory anywhere from 11/16 in. to. 25/32 in. thick, as it sometimes does. By building to the outside dimensions of boxes, we can control the overall length of a string of connected boxes. We have put together strings of six or seven large cases and have been off less than 1/16 in. for spans of more than 20 ft.

Pre-finish case work before assembly

Except for the occasional odd box, we usually apply finishes before putting the cases together. The finishing process goes faster and we get better results, without any overspray buildup in the corners. With the cabinets for this library, we applied a pigment-based oil stain, sealed and sanded that, then topcoated all the cabinet parts with two coats of nitrocellulose lacquer. (We usually don't bother to apply masking tape to the joints, unless the glue joint is an important structural factor. That would be the case with a cabinet that will be hung on a wall and loaded with a lot of weight.) On-site, once all the cabinets are installed, we finish up with a coat of Butcher's wax.

When we put boxes together, we most often use glue and nails, through-nailed from the side of all the rabbets and dadoes and toenailed on an angle from the top and bottom of the rabbets (see the drawing at left). The nails mechanically reinforce the glue joint and keep the pieces from pulling apart under the stress of handling when cabinets are delivered and installed.

I'm partial to coated nails. We use 5-penny resin-coated box nails. The diameter is only a little larger than a 4-penny, but the length is almost that of a 6-penny nail. The nails penetrate deeply, and the shank does not split the plywood. Coated nails hold better than any gun-driven nail of the same length, and I can always stop hammering when a nail starts to come out the other side of the cabinet piece. It doesn't take much longer to put the boxes together this way, and it's worth it.

With some case work, especially if there are many parts that have to go together at the same time, we use screws instead of nails and glue. An example would be a case with a lot of drawers that has dust board dividers between each drawer. For that, we use No. 6 trim-head screws with a square-head drive. When spreaders are spaced every 6 in. or so along the full height of the cabinet, there will be plenty of fasteners and glue isn't really necessary.

In most cases, if your plywood pieces and their edges have all been cut square, then the box goes together square. (That's another reason why I like a full-width rabbet; it gives you a full surface on the bottom of the rabbet as a square surface to draw the two pieces together.) When we finish assembling a box, we check it for square. If there's any problem, and there rarely is one, we true it up with clamps before the glue sets in the joints. □

Installing the case work—*Job-site conditions usually require shims to make cases level and plumb (above). The result is a beautiful library and plenty of sawdust back at the shop (right).*

John West operates Cope and Mould Millwork, Inc., in Danbury, Conn.