

DVD CABINET

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INTRODUCTION

These plans are derived from Michael Dunbar's Colonial Cupboard hand tool project in *Fine Woodworking*, Number 151, October 2001, pages 64-71. The project is scaled up slightly from his plans to accommodate three rows of DVDs and a single row of CDs. The case is a dovetailed box with a mortise and tenon face frame and door. Shelves are set into dados in the sides and the back is formed from tongue and grooved boards.

Throughout the construction details I'll be dropping all sorts of old tool manufacturer names and numbers. One of the cool things about hand tool projects is using tools that may not have seen any action in many, many years. You certainly don't need all of these different tools to complete the project (in his article, Dunbar uses a saw and a chisel to cut the dados, rather than a dado plane) but it never hurts to have just the right tool for the job at hand. Learning to repair, tune, and use an old tool is part of the fun.

CONSTRUCTION DETAILS

The project starts by cutting the case sides, top and bottom to size, squaring the edges and doing some preliminary smoothing of the faces. Since there's still a bunch of joinery to do, you don't want to spend too much time getting things perfect. The final smoothing will come later.

I used an Atkins #54 crosscut saw and a Harvey Peace rip saw for the sawing, a Lie Nielsen low-angle jack to square the end grain sides, and a wooden fore plane for flattening the long edges. A coffin smoother was used to smooth the boards.



dadoing with a wooden plane

The first bit of joinery involves cutting the dados for the shelves. I've done this a variety of ways in the past, but this time I used a wooden dado plane. A straight batten is clamped down to hold the workpiece in place, and to serve as a fence for the dado plane. Dunbar, in his article, uses a backsaw to saw the sides of the dados and cleans out the waste with a chisel. A router plane would be useful to smooth the bottoms of the dados.

Next, rabbets need to be cut along the inside edge of all four cabinet parts to hold the back pieces. I used a wooden moving filletster plane, and cleaned up the rabbets with a Lie Nielsen low-angle rabbeting block plane. A shoulder plane or the same filletster plane set to take a finer cut could also be used to clean up the rabbet. This joint is in the back and won't be visible, so it doesn't need to be perfect.

The case is held together with through dovetail joints. I cut the tails first, in the top and bottom pieces. I no longer have a workbench with a front vise that can hold boards for sawing, so I used a combination of a holdfast, and three wooden handscrew vices to hold the piece upright against the benchtop. The tails were marked and cut with a Lie Nielsen dovetail saw, and most of the waste removed with a coping saw. A bit of work with a chisel cleans up the edges.

I like to clamp the tail piece to the piece that will have the pins using a pair of 90 degree clamps. This way I can get the boards exactly where they will go, held fast while I mark the tails on the top of the side pieces. I use a pencil line, and then saw the mark in half when I'm cutting the pins. The waste between pins is chopped out with a chisel.



rabbeting with a moving filletster plane

At this point, the insides of the case, and the shelves

should be finished because it's difficult to get finish to the edges without piling it up. I used Zissner's clear shellac. It's not de-waxed, so it won't be as resistant to water as de-waxed shellac is, but I had most of a can left over from my living room project^[1].

Now that the case pieces are finished, carefully measure the length and width of the shelves that will fit into the dados. Saw out, square and smooth the shelves, and then test them in their dados to make sure they will fit. You also want to finish the tops and bottoms of the shelves before assembling the case. I used some blue painters tape along the edges to keep from getting shellac onto the areas that will fit into the dado.

Assembling the case is tricky so it's a good idea to test your assembly procedure without glue. Don't fully assemble the dovetails, but be confident they'll fit together when the time comes. I started by putting one side of the case on the bench, putting glue in the dados (not really necessary, but it can't hurt) and putting the shelves into their dados. Then the other side of the case is placed on top of the shelves, and driven down to seat the shelves in their dados on both sides of the case. Finally, I put glue on the dovetails with a small brush, and carefully fit the top and bottom onto the sides.



sawing out the tails

A set of clamps across the sides, clamping against the top and bottom, will keep the dovetails in place until the glue dries. I used cauls to distribute the clamping forces across the joint, with waxed paper between the cauls and the workpiece to keep the cauls from getting glued to the case. This is also the point to measure the diagonals of the front and back of the case and make sure the two diagonals are the same. If the measurements aren't the same, the case isn't square and another set of clamps will need to pull

across the longer diagonal until the measurements match.

After a half an hour the clamps can be released and the case should be reasonably stable and square. The back and face frame will really hold the case square, but the dovetails should already be holding it together pretty tight.

While the case dries, we can make the back pieces. The back is made up of five tongue and grooved pieces, sized such that when the back is assembled, there will be a slight gap between the boards. The boards will expand and contract with the seasons (or as the wood from the home center dries in your house), so you need to account for these changes by spacing the boards according to how much you expect them to expand (if you're building the project in the winter) or contract (it's summer or the wood wasn't completely dry).

I used a Stanley #45 combination plane to cut the tongue and groove joints in the back pieces. The joint could be simplified by using a ship-lapped joint, which only requires a rabbet on each edge. I dressed up the edges of the tongues and groove by taking a few passes with a Stanley low-angle block plane to form a small chamfer. The image shows me grooving a piece of red oak is from my magazine cabinet project^[2].



grooving with a Stanley #45

Once the tongues are cut, you can lay all the boards out with the tongues under the next board in the series and measure across all the board to determine if they'll fit in the back of the case. It's easy to creep up on the proper width for each board by slowly removing wood from the surfaces that will receive a groove. I used a wooden jack, followed by a fore plane to remove wood until the boards fit into the opening in the back of the case (with a slight gap between boards). If the case sides aren't completely straight (mine are bowed out a bit from the shelves), you

[1] http://www.frontier.iarc.uaf.edu/~cswingle/bio/living_room_2004.php

[2] http://www.frontier.iarc.uaf.edu/~cswingle/woodworking/mag_cab.phtml

can scribe the boards on the ends and plane them down to fit perfectly into the rabbets at the back of the case.

Again, it's much easier to finish the back pieces before they're in the case, so take care of that next. Be careful in re-assembling the pieces because the finish may have enlarged the tongues or reduced the width of the grooves. Don't force them together or you risk breaking part of the groove.

The back pieces are slid together, and then placed into the rabbets in the back of the case. I nailed the two edge pieces into the middle of the sides, and then used a screwdriver to pry the pieces apart until the gaps shown on the inside of the case were similar all the way across. The boards are then nailed to the case, with a single nail in the center of the top and bottom. The boards on the ends should be nailed near the edge so that the board can expand toward the middle of the case. If you look carefully at the image on the right you can see the nails at the bottom of the back pieces.



nails in the bottom of the back

The next step in the project is to make the face frame that will be glued to the front of the case. One advantage of using 1 x 12 lumber for a project only 8 inches wide is that there's wood left over after cutting the case pieces, and this wood is typically pretty close to quarter-sawn. I used these cutoffs for my face frame.

The face frame rails have tenons on the ends that fit into mortises in the stiles. I used tenons about one inch long, $\frac{3}{8}$ of an inch thick, and about $\frac{3}{4}$ of an inch less in width than the rails themselves (meaning they had four shoulders). Tenon cheeks were cut with a Lie Nielsen Independence dovetail saw and removed with a Disston crosscut carcass saw. The mortises were chopped with a modern Robert Sorby mortising chisel.

Once the tenons were about the right size, I used a Lie Nielsen low-angle rabbeting block plane to trim the cheeks of the tenons, and to square up the shoulders for a perfect fit. A shoulder plane is the usual tool for squaring the shoulders, but I've found my rabbeting block plane

does a better job and is easier to handle.

After gluing and clamping the face frame, make sure the inner dimensions are square and clamp across the diagonal if they're not exactly true. We're going to be hanging a door on the inside of this face frame, so getting the inside square is essential. The squareness of the outside of the frame (and the case) doesn't really matter because we can plane the face frame to meet the case sides.

After the glue has dried run a smoothing plane over the show sides of the face frame to smooth the joints and remove any excess glue. A couple passes on the back side will also help the frame fit onto the case. I applied two coats of shellac to the back side, protecting the glue surfaces with blue painters tape. Once the frame is attached, it'd be virtually impossible to get a finish back there.

I don't have enough clamps to really apply even pressure around the entire face frame for glue-up, so I laid the case on it's back and used bricks to hold the face frame onto the case while the glue dried. A dry run of this operation is a good idea because you might find out (as I did) that the front of the case and the face frame may not meet exactly even after the bricks are loaded onto the frame. In my case, this was because two of the shelves were just proud of the case sides, and the face frame couldn't touch the case in those areas. It's better to find this out before the glue is on and you can plane down the shelf fronts until the face frame meets the case sides perfectly, without gaps.



sanding the baseboard curves

While the face frame glue dries, you can work on the baseboard trim. I cut decorative curves in the bottom of each piece using a coping saw. After the material is removed, a rasp or some sandpaper wrapped around a tube of caulk works well to smooth the curves. Slightly back

beveling the cutouts helps keep their profile crisp once the case is assembled.

The baseboards will be glued and nailed to the face frame and sides of the case, but the case will also sit in a shallow rabbet in the baseboards to help provide additional support. I cut a one and a half inch rabbet across all the baseboard pieces using a wooden skew rabbet plane that someone modified by adding a tote on the outboard side. The handle really helps when cutting wide rabbets like this one. The rabbet and shoulder were cleaned up with the rabbet block plane I've mentioned before.

The tops of the baseboard pieces are decorated with a chamfer that extends almost to the top edge of the piece. I marked the width of the chamfer on the top and side of the baseboard pieces with a marking gauge, removed the majority of the waste using a drawknife, and cleaned it up with a coffin smoother.



sawing the baseboard miters

The baseboards are mitered at the corners, and are nailed and glued to the base of the carcass. I used a big Langdon miter box that came with an Atkins miter box saw. The miters were cleaned up with a low angle block plane until they fit perfectly together. Glue is applied to the rabbet and the miters, and the baseboards are glued and nailed to the bottom of the carcass. Because I was using nails to hold while the glue dries, clamps aren't necessary. I also glued and clamped a small block of wood behind the front miter joints to provide stability, and added a short glue block to the back of the side baseboards to keep them square to the case.

The top of the cabinet is a single piece of wood with a bullnose molding on the edges that sits on top of the carcass. Below this is a repeat of the chamfer that's at the top of the baseboard molding. I milled this the same way as I chamfered the edge of the baseboards, except here I sawed off the molding and cleaned up the edge with a block plane. The moldings are pre-drilled and nailed onto the top of the case, hiding the dovetails. The top piece is then glued to the top of the case. You want glue on the top of the case and the front piece of molding, but not on the side moldings. This is a cross-grain situation, and those moldings need to be able to move relative to the case sides and top.

Once the glue dries, all the woodworking is finished except for the door. The edges are broken with a sanding block and the piece is ready for finish.



gluing the top

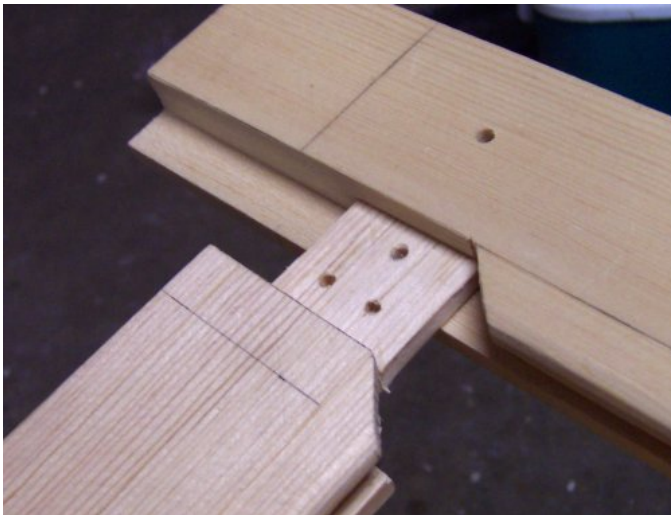
The door begins by cutting the rails and stiles, leaving plenty of extra width in all the parts, and extra length on the stiles. Once the door is completely glued, pinned, and wedged, we will remove the horns from the stiles and plane the edges until the door fits perfectly in the opening.

with exactly the reveal you want.

The first step is to chop the through mortises in the door stiles. The best way to keep through mortises centered and square is to chop from both sides, meeting in the middle of the workpiece. Mark the width of the mortise with a mortising gauge on both edges, being sure that you're keeping the face of the gauge on the same side of the stile. I chopped the mortises with a Robert Sorby mortising chisel, but you could also drill out the majority of the waste (some people use a doweling jig to keep the drill straight and centered) and then pare the sides flat.

All the pieces have a $\frac{1}{4}$ " wide, $\frac{1}{2}$ " deep groove cut along the inner sides for the panel to float. I used the same Stanley combination plane for this task. The groove should be the same thickness and in the same position on the stiles as the mortises you chopped.

The front side of the rails and stiles is decorated with a very shallow rabbet that is the same width as the groove, and then a rounded inner edge that meets the panel. I used a Lie Nielsen rabbet block plane to cut the shallow rabbet and formed the rounded edge with a Stanley low angle block plane.



door mortise and tenon

Once the edge details and mortises are complete, cut the tenons on the ends of the rails. If you look carefully at the photograph showing the door mortise and tenon joint, you can see how the tenon and mortise will fit together. The back side of the tenon cheek is cut to the width of the door opening, but the front cheek is mitered to the end of the decoration on the stiles. The front lip of the groove is removed and mitered above the mortise on the stiles. This is a complicated step, so be sure you understand how the pieces fit together before making any cuts.

Carefully clean the mortises and shave the tenon cheeks until the tenons fit smoothly into the mortises. You want a tight fit, but not so tight that you have to struggle to get them in and out. All of the joint lines on the front and back should come together without gaps, and at the same time, the joint should be square. Carefully remove material until you reach this.

The tenons will be pinned, and also wedged from the end of the through mortises. In the image of the door mortise and tenon you can see the hole in the center of both pieces. The two holes closer to the rails are relief holes that terminate sawcuts that the wedges will go into. You can see a better image of the saw kerfs and relief holes in the last image on my magazine cabinet project^[1] page.

I drilled the peg holes through the mortises without the tenons inserted, then clamped the frame together and marked the position of the holes on the tenon. Then I removed the tenons, and drilled the center hole just a hair offset from the mark, toward the shoulder of the tenon. This slight adjustment will result in the peg pulling the mortise and tenon joint tight. But be careful here – if the hole is too far offset, driving in the peg may split out the center of the tenon.

Now that we've gotten the door frame built, it's time to mill the panel that will float in the door frame. I used some $\frac{1}{2}$ " aspen I had left over from another project. The door is quite wide, so you'll probably need to edge joint two pieces together to form a large panel. Once the panel has dried, you need to mill whatever decoration you wish. The groove in the rails and stiles is $\frac{1}{4}$ " wide and the panel is $\frac{1}{2}$ ", so you will need to remove some material so the edge of the panel will fit into the grooves. I milled a bevel on all four sides of the panel.

To mill the bevel, start by marking the edge of the middle section where the bevel ends. I used a Lee Valley round gauge for this. For my panel, I started bevelling the panel at this point, but if I was to do it again, the next step would be to saw a shallow kerf along the lines just marked with the gauge. Then use a rabbet plane to lower the outer sections of the panel slightly, along those lines. At this point you'll have a rectangular panel, with a slightly raised rectangle in the center. This creates a nice sharp detail for your eye to catch on when you're looking at the panel and also provides a small shoulder to keep the rabbet plane in line when milling the bevel.

Once you've gotten the shoulder cut and the edges rabbetted slightly, use the same rabbet plane to start milling the bevel. Always do the cross grain edges first because

[1] http://www.frontier.iarc.uaf.edu/~cswingle/woodworking/mag_cab.phtml

any tearout at the ends of the panel can be repaired while milling the long grain (and easier to plane) edges. Simply work the bevel down until the panel fits all the way into the groove for the rails, and then the stiles. When you're finished raising the panel you should have a nice rectangular section in the center of the panel with a slight shoulder that leads to four even bevels reaching their thinnest thickness at the edge. There should be a straight line from the panel corners to the corners of the middle rectangular section.

Now that all the parts of the door are milled, finish the door panel with whatever finish you're using. For my panel I used a coat of boiled linseed oil to bring out the features in my aspen and to yellow it slightly to match the pine, and then sealed the panel with several coats of shellac.

For assembly, gather all the parts: the panel, door rails and stiles, eight thin wedges and four pegs. Put glue on the tenons, and insert two of them into the mortises on one of the stiles. Slip the panel in place and attach the other stile to the rails. Next, clamp across the rails to hold the joint tightly together. Measure across the diagonals, and if the door isn't perfectly square, clamp across the longer of the two diagonals until it is square. Put a bit of glue on the pegs and drive them through, from the front of the door toward the back. Then glue the wedges and drive them into the saw kerfs. Make sure you get both wedges into their kerfs before driving them home, and try to drive them evenly until the tenon is tight in the mortise. After the glue dries, remove the clamps, and trim off the pegs, wedges and the horns on the door stiles. Carefully plane down the edges of the door until it fits perfectly in the face frame opening with an even gap all the way around.

Now finish the remainder of the door. I used blue painter's tape on the panel to keep shellac off the panel while I was finishing the door frame. While the panel is being finished, you can turn the knob for the door. I made mine from a scrap of birch firewood, turned on my spring pole lathe^[1].

To hang the door, I used antique brass H-hinges made by Ball and Ball Hardware Reproductions^[2]. Since these hinges are on the outside of the face frame and door, I found it's easiest to wedge the door in place with the wedges holding the door in exactly the right position, and then slowly attach the hinges. If the drill bit wanders on a particular hole and the screw won't be in the right place, simply leave that screw a bit loose and try again with a different hole on the same side of the hinge. Once

you've gotten two screws correctly positioned on each side of the hinge, you can tighten these screws and screw in the others. The door pull is attached with a screw running through the door stile. I countersunk the hole on the back of the door to make the screw less obvious. You could plug and finish over the hole, if you wanted to.



finished cabinet

As I mentioned, I finished the project with Zissner's canned, clear shellac. If you're not familiar with shellac or have heard that it's not a very durable finish, don't believe it. Although I didn't use it on this project, dewaxed shellac from flakes is very resistant to water and other common household liquids short of hard alcohol. And it dissolves into itself even after it's dry, so it's very easy to repair if it does get damaged. Finally, because the carrier is alcohol, it dries within a few minutes and there are no nasty fumes. A nice thick finish can be done in as

^[1] http://www.frontier.iarc.uaf.edu/~cswingle/woodworking/spring_pole_lathe.php

^[2] <http://www.ballandball-us.com>

little as two days.

For this project I brushed on three to four coats of a two pound mixture of shellac (I cut the Zissner's with one part denatured alcohol and two parts shellac) over the course of a few hours, let the shellac dry for 24 hours, and then lightly sanded with 320 grit sandpaper. If the sandpaper picks up shellac, a light misting of water and a drop of dishwashing detergent will keep the shellac off the sandpaper. After sanding, I repeated the process, applying another four coats over several hours and then sanding. The last coat is carefully brushed over the surface. After the shellac dries for another 24 hours, I waxed all the surfaces with paste wax.

All told, this project took me six weeks to complete, and according to my shop log, I spent approximately 50 hours building it.

PLANS

I do have plans available for this project. Jump to my plans page^[1], or download the PDF plans (124 KB)^[2] directly.

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^[1] <http://www.frontier.iarc.uaf.edu/~cswingle/woodworking/plans.phtml>

^[2] http://www.frontier.iarc.uaf.edu/~cswingle/woodworking/images/dvd_cabinet_plans.pdf