Anniversary Chair

The first in a new furniture line designed to commemorate 100 years of POPULAR MECHANICS.

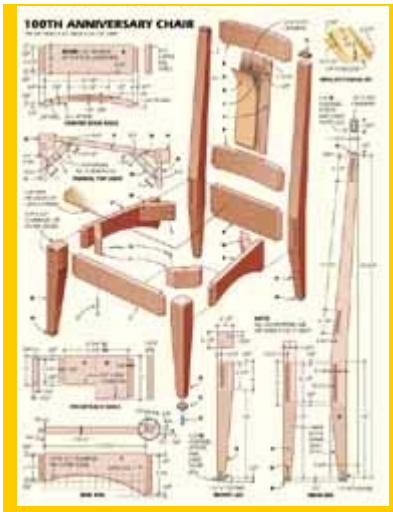
No woodworker of 100 years ago could have guessed what lay in store--what amazing new tools and materials waited in the wings. Who could have known that compact, powerful electric motors would come to dominate every basement workshop activity? And that manufactured panels and lumber, new adhesives and plastics would literally change the shape of our homes, the things we make for them and the way we build it all?

No one could have known--but there was one sure way to keep up. With each issue, POPULAR MECHANICS brought the latest in technology, tools, products and projects into homes and workplaces across the country. It was here, in these pages, that woodworkers just like you pored over plans and instructions for building everything from bookcases to speedboats. For millions, POPULAR MECHANICS took the mystery out of making, and empowered whole generations, giving them confidence to "do it themselves." Now, with 100 years under our belt, it's time to celebrate. And what better way than with a set of matching furniture projects specifically designed for the occasion.

The first in our series is this elegant side chair, and it sets the tone for each succeeding furniture project throughout the year. With bows to both the Arts & Crafts and Art Nouveau styles, we've created a contemporary design theme that's compatible with any decor. We've chosen mahogany as the primary wood. But instead of the typical dark stain that many are familiar with, we opted for a natural oil finish that gently darkens with use, turning a golden, reddish brown.

In addition to the mahogany, we used two exotic woods to create tasteful decorative accents: wenge, a heavy, dense, dark wood, and pomele sapele veneer, a mahogany-like wood with a heavily quilted grain figure. Both of these materials are available through mail-order suppliers. One such supplier is A&M Wood Specialty Inc., 358 Eagle St. N., Box 32040, Cambridge, Ontario, Canada N3H 5M2; 800-265-2759; www.amwoodinc.com.

We had an upholsterer provide the slip seat for our chair. This is the place where you can add a personal touch by selecting a fabric that blends with your home's interior design scheme.



MATERIALS LIST--CHAIR		
Key	No.	Size and description (use)
A	2	1-3/4 x 3-3/4 x 43-3/4" mahogany (rear leg)
B	2	2-1/8 x 2-1/8 x 16" mahogany (front leg)
C	1	13/16 x 4 x 17-1/4" mahogany (front rail)
D	1	13/16 x 6 x 13-5/8" mahogany (rear rail)
E	2	1-3/4 x 4 x 13-5/8" mahogany (back rail)
F	2	13/16 x 6 x 15-1/2" mahogany (side rail)
G*	2	1/2 x 1-1/16 x 1-3/4" wenge (leg cap)
H*	4	1/2 x 1-1/16 x 1-1/16" wenge (foot)
I	1	3/8 x 5-1/2 x 17-5/8" mahogany (splat)
J*	1	3/8 x 4 x 15" wenge (panel)
K*	1	4 x 15" pomele sapele (panel veneer)
L	2	1 x 3 x 5-1/8" maple (corner block)
M	2	1 x 3 x 5-9/16" maple (corner block)
N	20	1-1/2" No. 8 fh woodscrew
O	4	3" No. 10 fh woodscrew
Misc.: Glue; wax paper; 120-, 220- and 320-grit sandpaper; 4/0 steel wool; Waterlox Original Sealer/Finish (Waterlox Coatings Corp., 9808 Meech Ave., Cleveland, OH 44105); slip seat provided by upholsterer.		
* Finished dimension. Cut oversize and trim after assembly.		

Start With The Legs
Begin by making a full-size template for the side profile of the rear legs from a piece of 1/4-in.-thick hardboard or plywood. Use the template to lay out the legs on 1-3/4-in. stock, and cut to the waste side of the lines with a band saw (Photo 1). Do not make the top and bottom cuts at this time--it's more accurate to make these cuts after final leg shaping.

Use a plane to smooth the sawn surfaces and refine the shape of the rear legs. Be sure to keep the planed surfaces square to the leg sides (Photo 2). With the shaping done, use a table saw and miter gauge to trim the top and bottom of each leg. Then, rip stock for the front legs to 2-1/8 in. square and crosscut these pieces to 16 in. long.

Lay out all the mortise locations on the legs.To make this job more accurate, clamp two legs side by side and mark them together. Then, use an edge guide and a spiral up-cutting bit to rout the mortises (Photo 3). Make each mortise in two or three passes to avoid breaking the bit or overloading the router, and finish by chopping the ends square with a sharp chisel. Lay out the tapers on the front chair legs, use your band saw to cut the legs to shape, and plane the surfaces smooth.

Rip a blank of wenge to 1-1/8 x 1-13/16 in. and cut it about 8 in. long. Use a sharp chisel to trim a 1/4-in. bevel around one end (Photo 4), and then cut a 1/2-in.-thick piece from the beveled end to produce a leg cap. Repeat the process for the remaining leg cap. Apply glue to a cap and top end of a leg, position the cap (Photo 5) and clamp it in place. When the glue dries, sand the cap edges flush and adjust the chamfer as required. Then, cut a wenge foot for each leg. Bore and countersink a pilot hole in each foot and fasten them to the legs with screws and glue. Sand the feet flush, and slightly soften the bottom edges so they won't chip.

Use a band saw to cut the rear leg shapes. Keep the saw kerf on the waste side of the layout line while cutting.

Smooth the cut surfaces with a hand plane. Be sure to keep the planed surface square to the adjacent faces.

Rout the leg mortises with a spiral up-cutting bit. Another leg helps support the router while making these cuts.

Use a chisel to cut a 1/4-in. bevel at the top end of a wenge blank. Then, cut a leg cap from the blank.

Apply glue, place the cap on the end of the leg, and clamp. Sand the cap flush and adjust the chamfer as necessary.

Making The Rails

Cut 13/16-in.-thick stock to size for the lower chair rails and use 1-3/4-in. blanks for the curved back rails. Install a dado blade in the table saw and use your miter gauge to cut the tenons on the front and back bottom rails (Photo 6). Readjust the blade height and hold the work on edge to cut the tenon shoulders. When cutting the thicker back-rail tenons, note that the depth of cut is different on the front and back faces.

Use a dado blade to cut the rail tenon faces. Turn the stock on edge and readjust blade to cut tenon shoulders.

Mark the locations of the mortises in the edges of the curved rails, and rout the mortises before you cut the rails to shape. Square the mortises with a chisel.

Use your band saw to cut the inside curve of the rails (Photo 7). Then, clamp each piece to your bench and use a spokeshave to smooth the cut

faces (Photo 8). Return to the band saw to cut the outer curved faces, and smooth with a spokeshave or plane.

To cut the angled side-rail tenons, first construct a jig for the table saw as shown in the Angled-Tenon Jig detail in the drawing. Build a ramp to support the rails at the 9° tenon angle, and screw the ramp to a 1/4-in. plywood base. Attach a solid wood back to the base behind the ramp and clamp the jig to the table saw miter gauge. Install a dado blade and cut one side of each joint with the ramp sloping down to the blade (Photo 9). Reverse the ramp to cut the other side of each tenon. Because the angle will raise the rail end high above the table, use a normal 10-in. blade and repeated cuts to finish each tenon.

Lay out the curved shape on the side rails and cut to the lines. Smooth the edges with a spokeshave and use a dovetail saw to cut the shoulders at the top and bottom of each tenon (Photo 10).

Install a chamfer bit in your router, and bevel the bottom outside edges of the rails as shown in the drawing.

After cutting the curved-rail tenons and splat mortises, cut the inner curve on the back rails with a band saw.

Use a spokeshave to remove saw marks on the inside face of the curved rails. Then, cut the outside face and smooth.

Build a ramp to support the side rails when cutting the angled tenons. Reverse the ramp for the opposite tenon faces.

Clamp a side rail in your vise and use a dovetail saw to cut the shoulders at the top and bottom ends of each tenon.

The Veneered Panel

Cut the back splat to size and check that it fits snugly in the back-rail mortises. Use your band saw to resaw a blank of wenge just slightly thicker than 3/8 in. for the decorative panel core. Then plane the sawn surface smooth and to finished thickness. Leave the blank at least 1 in. oversize both in width and length.

The simplest way to cut veneer is with a veneer saw. This is a small saw with fine teeth that are beveled on only one side. Hold the flat side of the saw against a straightedge guide while you make several passes to cut through the veneer (Photo 11). Apply light pressure so you don't tear the veneer at the edges. Cut your veneer to the exact size of the wenge blank.

Use a veneer saw, guided by a straight piece of wood, to cut the veneer. Finish the cut in several light passes.

Use a foam roller to spread glue on the wenge panel. The glue must cover the surface, but shouldn't pool.

Use a foam roller to apply glue to the wenge blank (Photo 12). For this small veneered panel, use regular yellow glue--for a larger panel, slower-setting glue is recommended. Cover the entire surface with glue, but don't spread so much that it pools. Place the veneer on the glued face aligning its edges with those of the wenge. Place a sheet of wax paper over the veneer, then sandwich the blank between cauls of 3/4-in. plywood. Apply clamps, working from the center toward the ends (Photo 13). Allow the glue to set for a few hours before removing the clamps. Let the panel dry overnight.

Trim the veneered panel to size and bevel the edges with a router. Sand the back splat and

panel to 220 grit and lightly mark the position of the panel on the splat with a pencil. Apply a light coat of glue on the mating surfaces, then position the panel and clamp it to the splat.

Starting at the center, apply clamps along the panel. A modest amount of glue will squeeze out along the edges.

Assembly

Sand all the parts, finishing with 220-grit sandpaper, and join the splat to the curved rails (Photo 14). You don't need glue at these joints since the splat is held captive between the rails. If the joints are excessively loose, though, use a drop of glue in each mortise to keep the splat from rattling. Wrap the ends of the rails with masking tape where they join the legs to keep glue from drying on the wood surface (Photo 15).

Begin assembly by joining the splat to the back rails. You don't need to use glue unless the joints are loose.

Spread glue on the back-rail tenons and leg mortises. Join the rails to the legs and add clamps to pull the joints tight (Photo 16). Then, join the front rail to the legs.

Complete the base by joining the front and back leg subassemblies to the side rails. Stand the chair on a flat table so you can be sure that all the legs rest evenly (Photo 17).

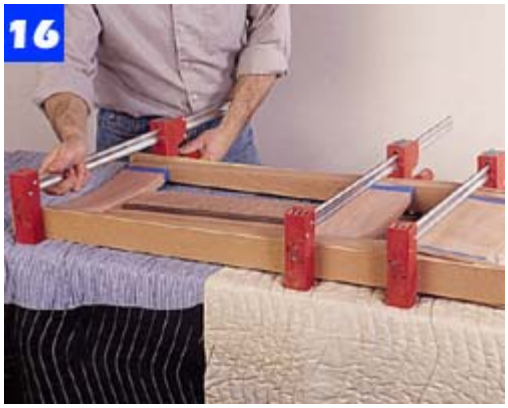
Make the 1-in.-thick corner blocks, bore and countersink pilot holes for mounting them, and bore holes for attaching the seat. Then, screw the blocks to the chair rails.

Protect the sanded parts from glue squeeze-out during assembly by applying masking tape at the rail ends.

Finishing

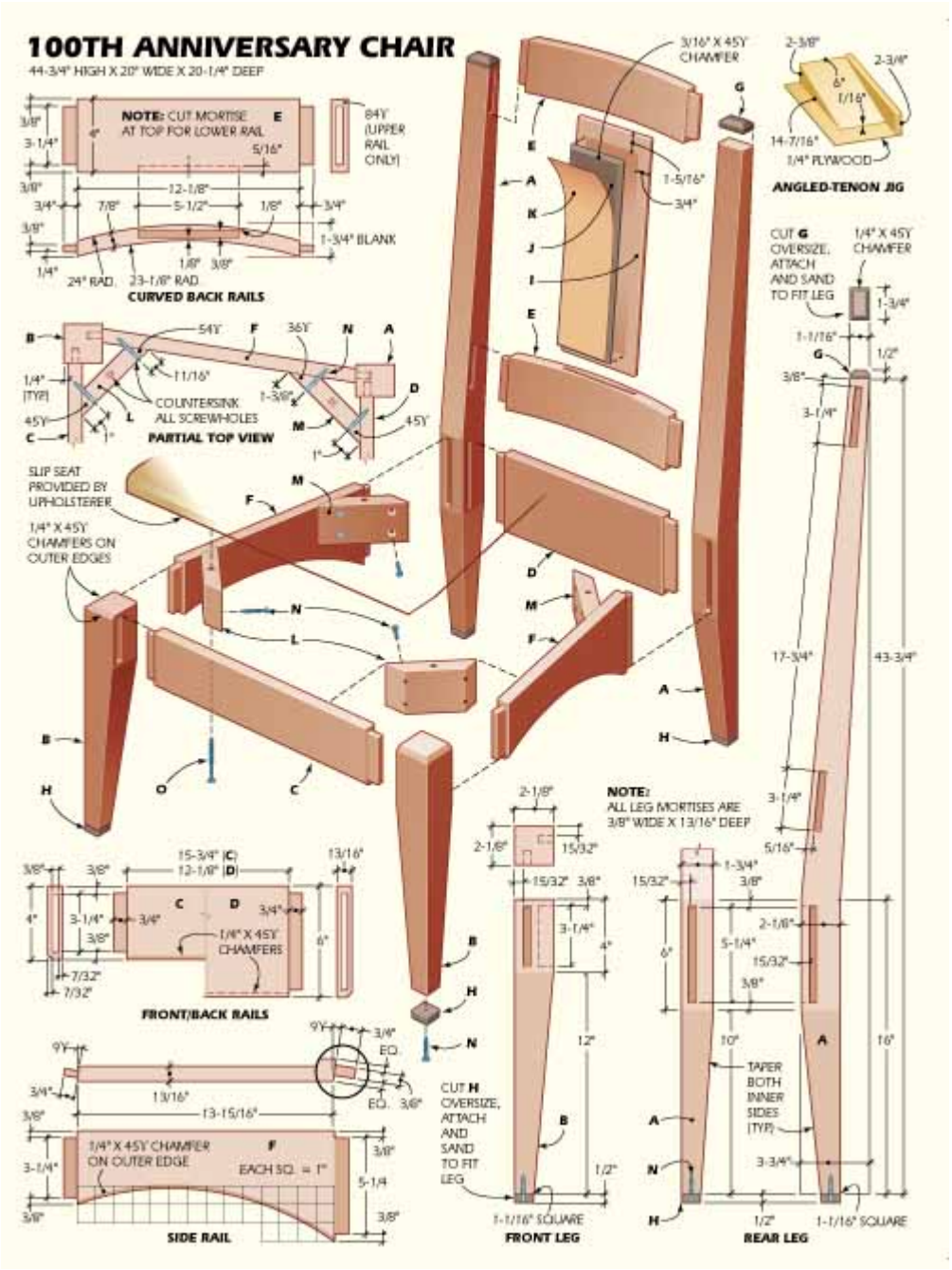
We used Waterlox Original Sealer/Finish for our chair. Apply it with a brush or rag and let it soak in for about 30 minutes. Use a lintfree rag to wipe off the excess and let it dry overnight. Lightly scuff the surface with 320-grit sandpaper and dust off before applying a second coat using the same technique. After overnight drying, apply the third and final coat. Rub the dried finish with 4/0 steel

wool to give it a soft, satin shine.



After applying glue to the mortise-and-tenon joints, clamp the rear legs to the rails to pull the joints tight.

Join the front and rear subassemblies to the side rails. Stand the chair on a flat table and check that all legs rest evenly.


100TH ANNIVERSARY CHAIR
44-3/4" HIGH X 20" WIDE X 20-1/4" DEEP
NOTE: CUT MORTISE AT TOP FOR LOWER RAIL
84° (UPPER RAIL ONLY)
1-3/4" BLANK
24° RAD.
23-1/8" RAD.
CURVED BACK RAILS
54°
36°
11/16"
COUNTERSINK ALL SCREWHOLES
PARTIAL TOP VIEW
SLIP SEAT PROVIDED BY UPHOLSTERER
1/4" X 45° CHAMFERS ON OUTER EDGES
15-3/4" (C)
12-1/8" (D)
1/4" X 45° CHAMFERS
FRONT/BACK RAILS
13-15/16"
1/4" X 45° CHAMFER ON OUTER EDGE
EACH SQ. = 1"
SIDE RAIL
3/16" X 45° CHAMFER
1-5/16"
CUT H OVERSIZE, ATTACH AND SAND TO FIT LEG
1-1/16" SQUARE
FRONT LEG
ANGLED-TENON JIG
1/4" PLYWOOD
CUT G OVERSIZE, ATTACH AND SAND TO FIT LEG
1/4" X 45° CHAMFER
NOTE: ALL LEG MORTISES ARE 3/8" WIDE X 13/16" DEEP
TAPER BOTH INNER SIDES (TYP.)
REAR LEG