

INTERCHANGEABLE

# Night Light



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Light up the night with four interchangeable patterns featuring enchanting scenes that are sure to please your child. All it takes to build it is a scroll saw, a small light bulb, and a weekend in the shop.



**S**ome projects get their charm from the wood that's missing. This night light is one of those projects. It's just a box with the sides, top, and bottom made from solid wood. What makes it interesting is the interchangeable front panel that screens the light shining from a small bulb inside.

I designed this night light with four of these scroll-sawn hardwood panels. Then, depending on your mood or the season, you can slide one in front of the light, and store the others in a compartment in the back of the box.

**PANEL DESIGNS.** I've included four examples for the panels in my night

light. Each has a magical quality that will look nice in a child's bedroom or sitting on a hallway table or stand. (You can find the patterns in the Designer's Notebook on page 5.) If you're artistic, it would be easy to come up with hundreds of different ideas for your own panels. Turn to page 9 for a full-size template to design a panel yourself.

**WOOD.** I used cherry for all the parts of the night light. The color and warmth of cherry enhance the glow cast by the light. And because cherry is close-grained, it cuts well on a scroll saw.

**SUPPLIES.** The light fixture is a Christmas-tree-size (4-watt) bulb that

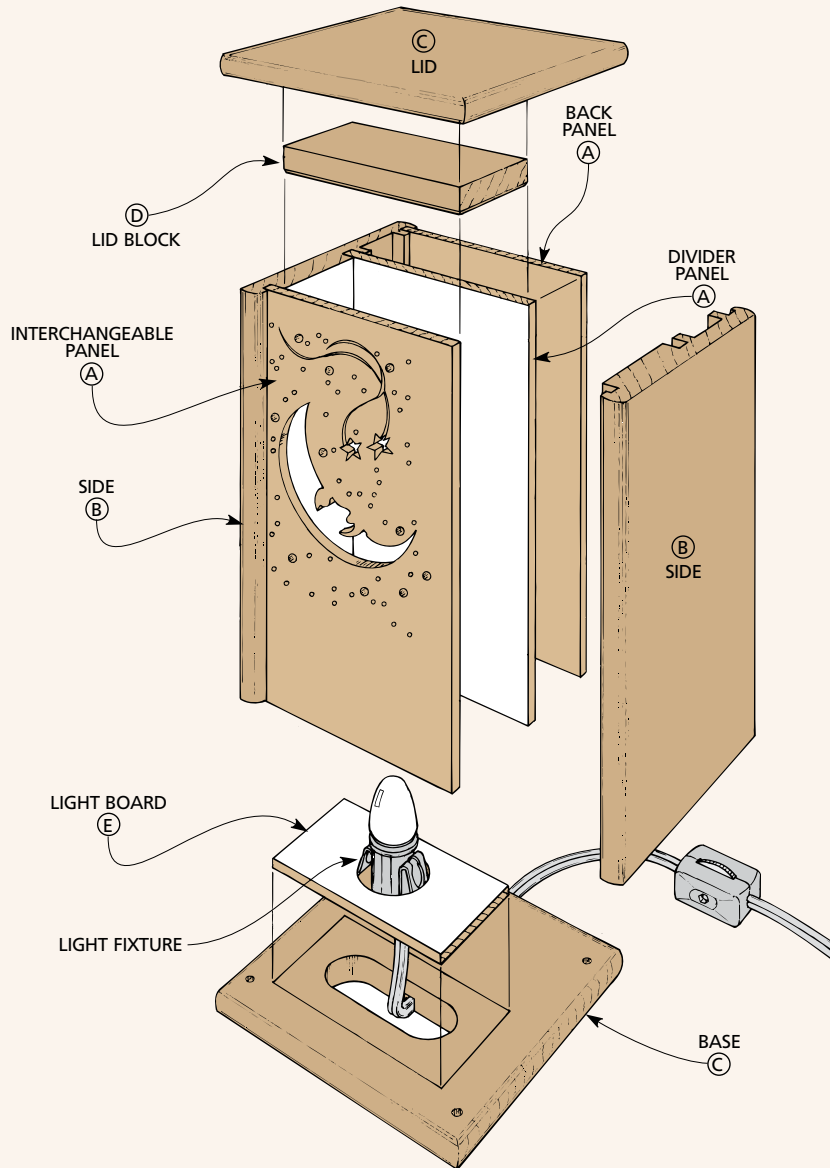
clips tightly into the base of the box. This light bulb fixture, along with a full-size drawing of each of the four patterns

**THIN STOCK.** Except for the sides, each piece in this project is made from wood that's  $\frac{1}{2}$ " thick or less. Finished stock this thin can be found, but it may cost a bit more. A good alternative is to resaw the stock from thicker boards. (For more on this, go to the Technique on page 8.)

**SCROLL SAWING.** And to learn the secret to making the most of your scroll saw projects, I suggest you check out the Technique article on starting on page 6.

## EXPLODED VIEW

OVERALL DIMENSIONS:  
6W x 9H X 5¼D



### MATERIALS LIST

#### WOOD

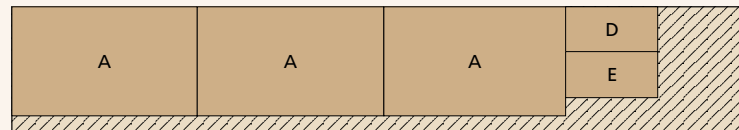
A	Panels (6)	¼ x 4¾ - 8
B	Sides (2)	¾ x 4¾ - 8
C	Base/Lid (2)	½ x 5¼ - 6
D	Lid Block (1)	½ x 2 - 4
E	Light Board (1)	⅛ x 2 - 4

#### HARDWARE SUPPLIES

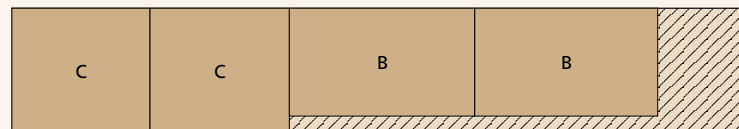
- (4) #6 x 1" Fh woodscrews
- (1) Felt cloth (6" x 6")
- (1) Night light socket switch w/ cord
- (1) 4-watt frosted bulb

### CUTTING DIAGRAM

¾ x 5½ - 36 (Two Boards @ 1.2 Bd. Ft. Each)



¾ x 5½ - 36 (1.2 Bd. Ft.)



## RESAWN PANELS

Start building the night light by cutting the six panel blanks (A) — four for the interchangeable panels, plus one divider panel, and one back panel. The night light box is built around these.

**PANEL BLANK.** To make these six  $\frac{1}{4}$ "-thick panels, first cut a piece of  $\frac{3}{4}$ "-thick stock to final width ( $4\frac{3}{4}$ ") and rough length (26") (Fig. 1).

**RESAW PANELS.** Then resaw this into two panels that are each slightly thicker than  $\frac{1}{4}$ ". I used the table saw and made two passes with a sharp blade (Fig. 1). (For more on this procedure, see the Technique article on page 8.) You could also use a band saw or thickness planer to reduce the stock to  $\frac{1}{4}$ ".

Now, sand or plane the saw marks from all the panels so they're all  $\frac{1}{4}$ " thick. Then cross-cut both blanks to produce six 8"-long panels (Fig. 2).

**Note:** You could use plywood, but the plies will show on the finished panels.

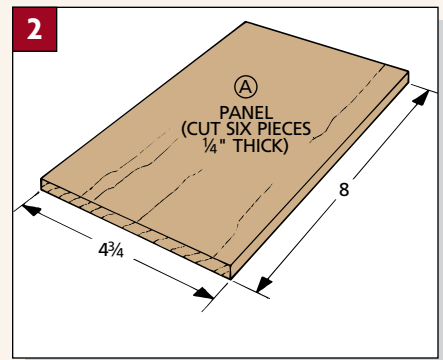
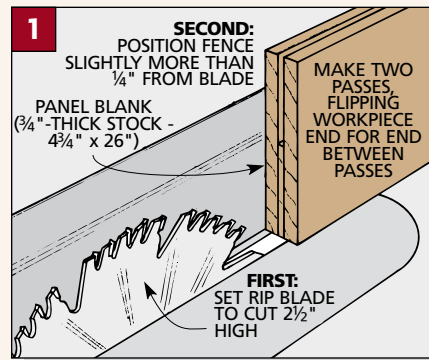
**PATTERNS.** Now use the patterns in the Designer's Notebook on page 5 to lay out the designs and cut them out.

## SIDES

After resawing and cutting the six panels to size, the next step is to make the grooved sides of the box.

**SIDE BLANK.** The two sides (B) start out as one blank of  $\frac{3}{4}$ "-thick stock. Cut the blank to finished width ( $4\frac{3}{4}$ ") and rough length ( $16\frac{1}{2}$ ") (Fig. 3).

**PANEL GROOVES.** Next, cut three  $\frac{1}{4}$ "-wide grooves for the panels to slide into.



I used the table saw with a rip blade to form all the grooves. But before cutting the grooves in the blank, cut a test piece the same size as the blank to check the width and position of each groove.

The first grooves to cut are the two outside ones (Fig. 3). To do this, I set the fence  $\frac{1}{4}$ " from the inside edge of the blade, and raise it  $\frac{3}{8}$ " above the table.

Now you can make one pass to cut a kerf in the test piece to form the outside edge of the groove. Then turn the piece end for end and cut a kerf near the other edge. When you're satisfied with the kerf depth and its distance from the edge, cut kerfs on both edges of the actual workpiece, following the same procedure.

Next you can reposition the fence and make a second pass on the test piece, so that the  $\frac{1}{4}$ " panels fit snugly in the grooves in the test piece. Then make the cuts on the actual workpiece to complete the two outside grooves.

You'll form the groove for the divider panel in the same way. This groove should be located 2" from the back edge of the box sides (Fig. 3).

**STORAGE CHAMBER.** Next, I cut a 1"-wide storage chamber by making a series of passes through the rip blade (Fig. 3).

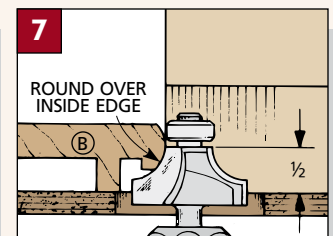
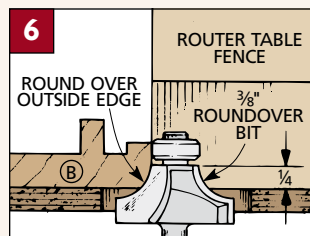
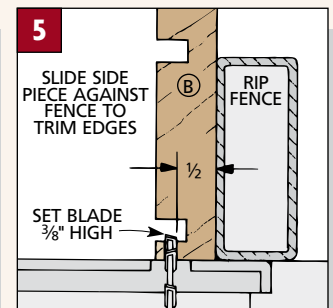
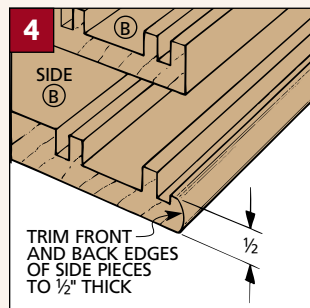
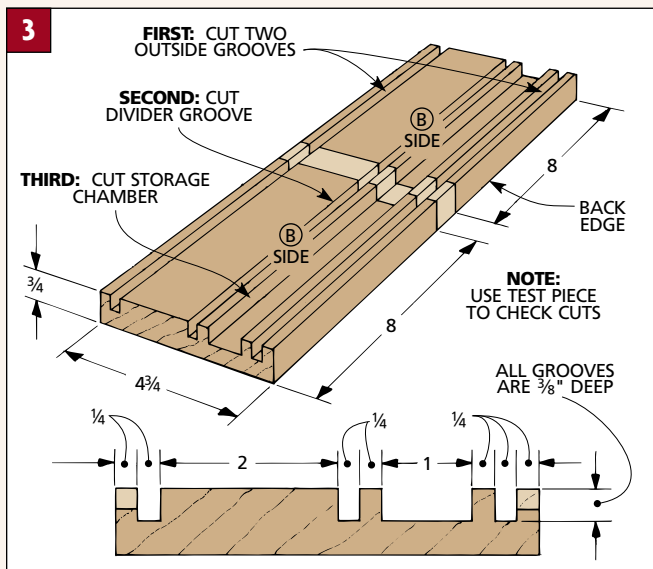
To make the sides appear thinner than they actually are, trim the front and back edges down to  $\frac{1}{2}$ " thick (Fig. 4). To do this, set the table saw blade  $\frac{1}{2}$ " from the fence and  $\frac{3}{8}$ " high (Fig. 5).

**BULLNOSE PROFILE.** After trimming the outside edges of the sides, rout a bullnose profile on them with a  $\frac{3}{8}$ " roundover bit in a router table. To do this, first raise the bit  $\frac{1}{4}$ " high and round over the outside edges (grooved face up) (Fig. 6). Then raise the roundover bit  $\frac{1}{2}$ " high, flip the workpiece over, and round over the inside edges (grooves down) (Fig. 7).

**PRE-ASSEMBLY.** Now cut the side piece into two 8"-long sections (Fig. 3). Then glue the back and divider panels in place between the two sides.

## BASE & LID

Begin making the base and lid of the night light by cutting an over-size blank to final width ( $5\frac{1}{4}$ ") and



rough length (12½"). Then you'll want to resaw and sand the blank to a final thickness of ½".

At this point, you can cut the blank into two pieces (each 6" long) to form a base (C) and a lid (C) (Fig. 8).

**ELECTRICAL FIXTURE.** A "finger slot" in the base allows access to the electrical fixture. To make this, bore two holes in the base, then cut out the waste between them with a jig saw (Fig. 8a).

Next, form a ¼"-deep groove for the electrical cord in the bottom of the base using the router table (Fig. 9).

After cutting this groove, soften all the edges of the top and bottom with a ⅜" roundover bit. To do this, raise the bit ¼" above the table (Fig. 10).

## ASSEMBLING THE BOX

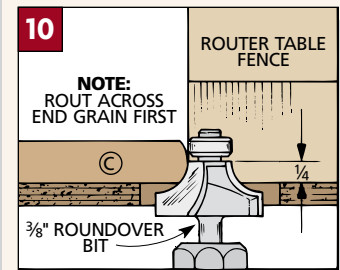
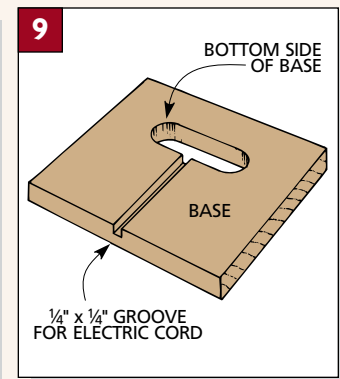
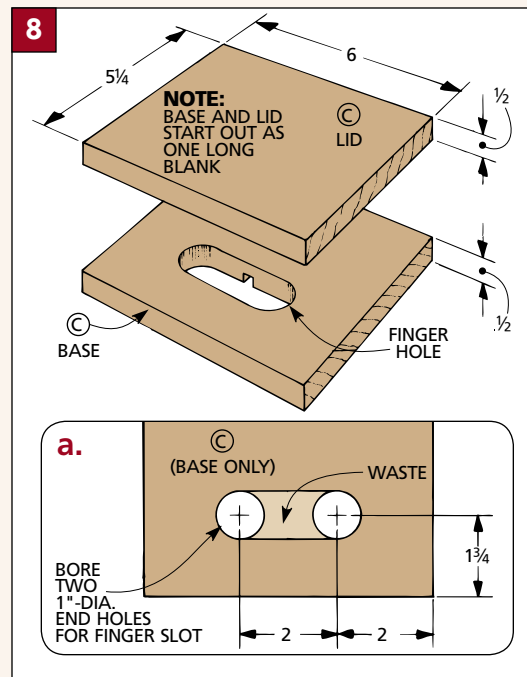
When the base and lid are complete, finish assembling the box. Do this by first drilling countersunk shank holes on the bottom side of the base (Fig. 11a).

Then center the base on the side assembly and temporarily clamp them together. The sides should be inset equally all around the base (Fig. 11). (In my case, this was ¼").

Now drill pilot holes through the shank holes into the bottom ends of each side piece (Fig. 11a). Then glue and screw the base in place.

**LID BLOCK.** The lid fits snugly onto the top by means of a lid block that's glued to the underside of the lid (Fig. 12).

To make the lid block (D), start by cutting a ¾" piece of stock to fit the



opening of the light chamber (with an interchangeable panel in place).

With the lid block cut to size, you can rout a narrow chamfer along all four edges of one side of the block. (The chamfered edges let you remove and replace the lid more easily.)

Now, lay out the position of the lid block on the bottom of the lid (Fig. 12a) and glue the block in place.

**LIGHT BOARD.** The light has a spring retainer that's designed to seat into a ⅛"-thick board with a 1" hole (Fig. 13).

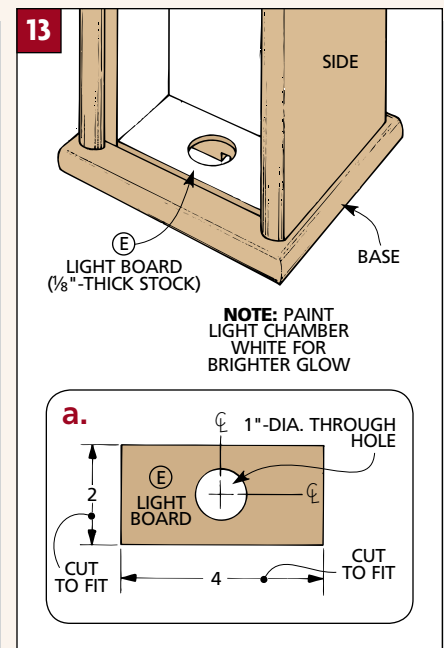
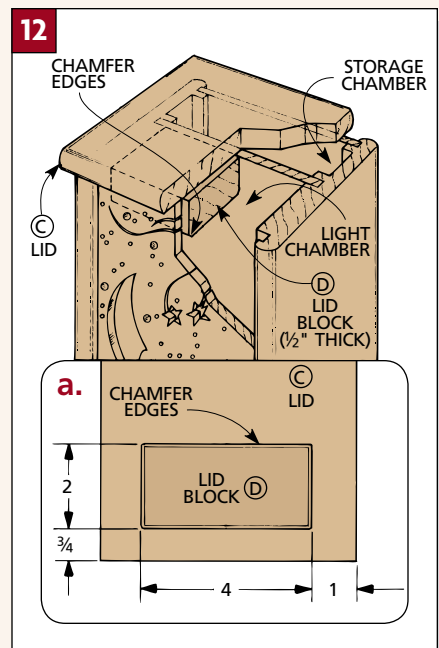
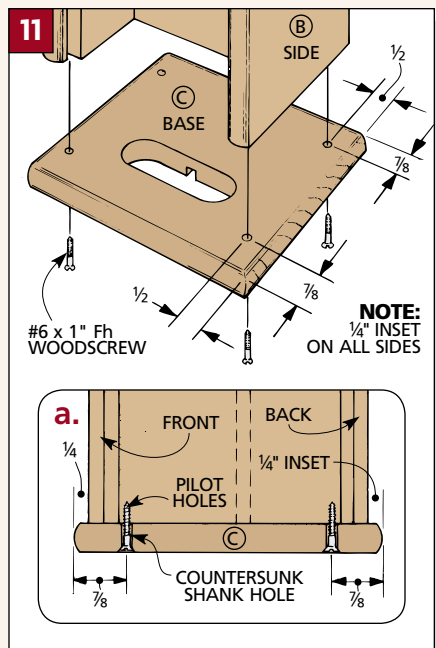
To make the light board (E), first measure the opening at the bottom of the light chamber. Then cut a piece of

⅛" stock to fit this opening (Fig. 13a). Bore a 1" hole through the center of this piece, then glue the light board in place in the bottom of the base.

**FINISH.** Finally, to complete the project, I applied a tung oil finish to the box.

**Note:** I found the box reflected more light through the panels after I painted the inside surfaces of the light chamber (not including the interchangeable panel) with a white enamel paint (Fig. 13).

Now you can glue a piece of felt on the bottom of the box. This will hold the electrical cord in place.



# DESIGNER'S NOTEBOOK

Perfect for a child's bedroom, these night light patterns provide a soothing glow when it's needed most. A hidden compartment inside the light holds the three extra panels when they're not being used.

## PATTERNS

■ The magic of the night light is in the scroll-sawn panels. Here are some suggestions for making four interchangeable panels. The patterns shown here are half size, so enlarge them 200%.

**Note:** The lighter areas of the drawings are those that should be cut away. (I used a No. 5 skip tooth blade to cut each of the patterns.)

■ First, finish sand each of the panel blanks. Then glue a pattern to the blank using spray adhesive or a light coat of rubber cement.

■ Before you begin to saw, drill starting holes for the pierce (or inside) cuts, and for the other holes.

■ On the Falling Stars panel, drill the holes for the background stars first (using  $\frac{1}{16}$ " and  $\frac{1}{8}$ " drill bits).

**Note:** The points on the moon and the falling stars will be sharpest if you form them with two intersecting cuts, rather than by trying to pivot around them.

■ For the Jack O'Lantern, drill out the stars ( $\frac{1}{16}$ " and  $\frac{3}{32}$ " bits) and the moon ( $\frac{3}{4}$ " bit) first. Then cut out the details of the pumpkin. Pivot around the blade only when cutting out the eyes and the mouth.

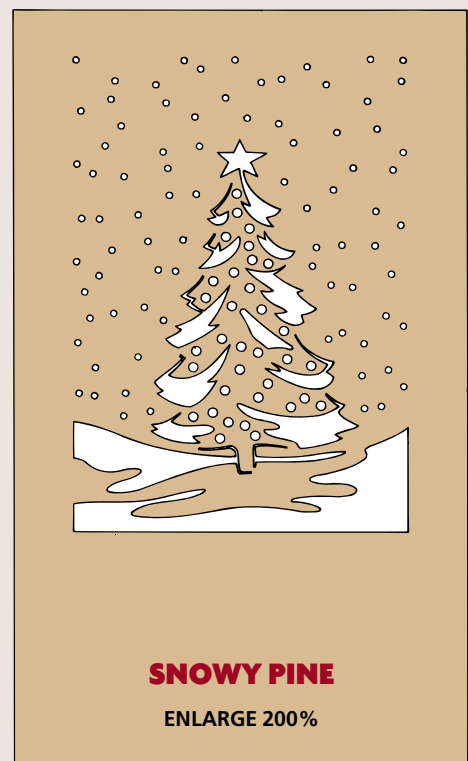
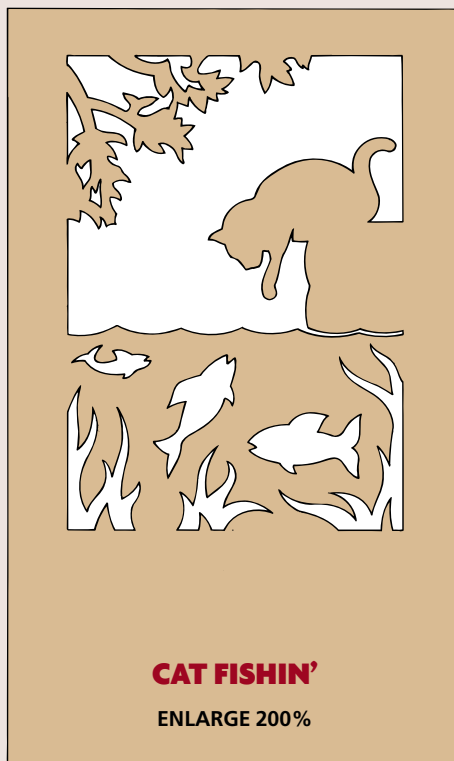
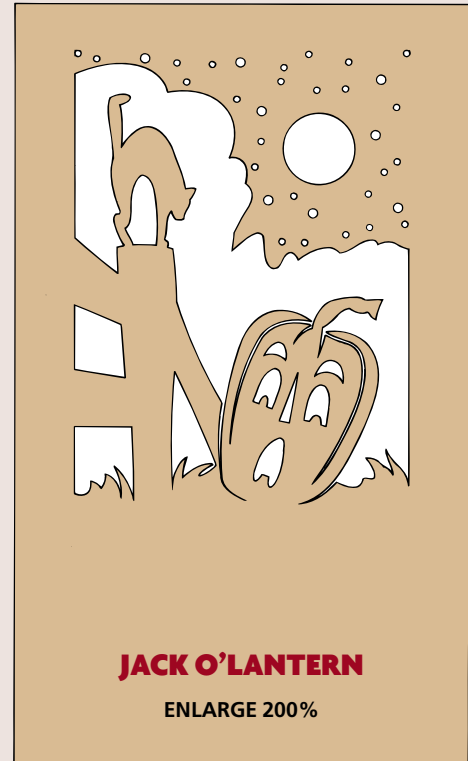
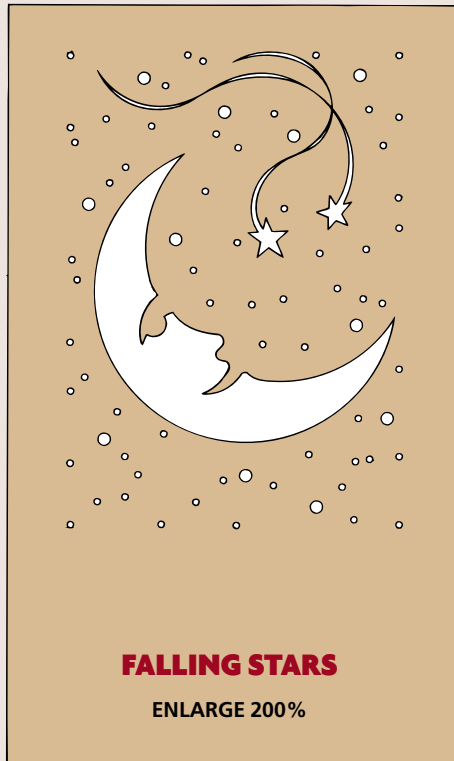
■ Next, cut around the fence parts. And finally, cut around the cat.

■ Cat Fishin' requires a lot of starting holes, it's easiest to drill them first, then cut out the smaller areas.

■ Cut around the cat last so you'll have plenty of support when you're scrolling between the leaves.

■ For Snowy Pine, drill holes for the snowflakes ( $\frac{1}{16}$ " bit) and the tree ornaments ( $\frac{3}{32}$ "). Then drill starting holes for the snow on the branches. Next cut the tree outline, and finally the snow on the ground.

■ Finish the panels by dipping them in a shallow pan of tung oil. Then poke out the excess finish from the drill holes with a wire brad.



# TECHNIQUE . . . . . Scroll Sawing

For me, time in the shop is all about relaxing, even though most of the woodworking I do requires me to be on my feet for long periods at a time. But occasionally, I'll get to sit in front of my scroll saw and work on a small fretwork project for a little change of pace.

Using a scroll saw really isn't that difficult, it just takes a little patience and the right setup.

## GETTING READY

Just like any project, there's always a little preparation to be done before you can actually get started cutting on a small project like a picture frame.

**CHOOSING A PATTERN.** The first thing to do is pick out a pattern — and some are easier than others. I find an organic design with curved, flowing lines, are easier than a geometric design. It's harder to cut straight lines and repeated shapes because mistakes stand out.

**MOUNTING A PATTERN.** With the pattern selected, cut a solid-wood panel to size and mount the pattern. (You could also use plywood for scroll saw panels, that is if you don't mind seeing the plies after it's cut out.) To mount the pattern, I first make a photocopy and use a temporary spray adhesive. It goes on quickly and comes off without a mess. (Just make sure you use a temporary adhesive.)

**BACKING UP THE PATTERN.** With the pattern in place, I often take one extra



precaution — especially on panels that will be seen from the back as well as the front (when you take out the panels to switch up the design). I use a backing board to reduce the chance of having chipout on the back side of the panel (*Fig. 2*).

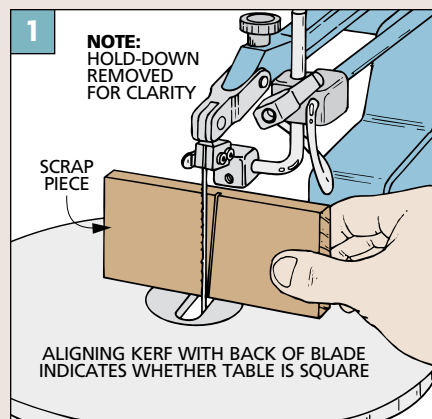
## PREPARING THE SCROLL SAW

Now that the scroll saw panel is ready, make sure your scroll saw is too. First, it's important that you have the right blade. For cutting intricate fretwork patterns,

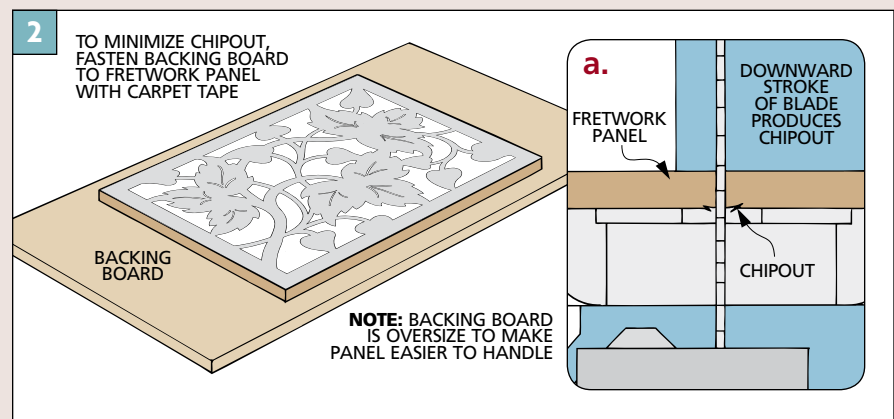
I generally use a No. 5 reverse tooth blade, as you can see in the Shop Tip box on the next page.

With the blade installed, I tension it so it will only flex  $\frac{1}{8}$ " from front to back under finger pressure. Then I cut a kerf in a piece of scrap stock to use as a guide to square up the table (*Fig. 1*).

Adjust the hold-down so it applies enough pressure to keep the wood on the table, but not so much that you can't feed the stock through. Finally, make a test cut to see that it cuts properly.



**Squaring the Table.** To square a scroll saw table, cut a kerf in a scrap. Then line up the kerf with the back of the blade.



**Backing Board.** The downward stroke of a scroll saw blade tends to chip out the bottom face of a panel. To minimize this, I like to use a reverse tooth blade and attach the panel with double-sided tape to a backing board made from  $\frac{1}{8}$ " hardboard.



**Jack O' Lantern Panel.** It's important to make sure you have clean cuts on both sides of panels that get illuminated from the back. Use a reverse tooth blade to ensure both sides of your panel look good (see Shop Tip below).

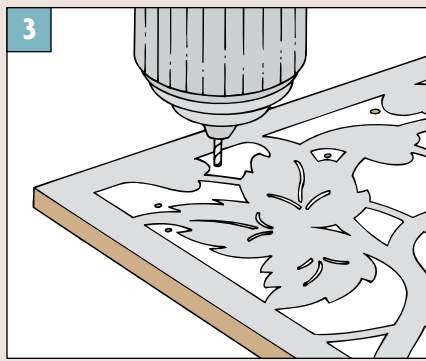
## GETTING STARTED

Now you're ready to start the fretwork. But actually, the place to begin is at the drill press, not the scroll saw.

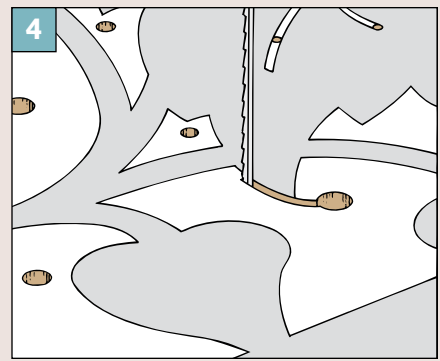
**STARTER HOLES.** Because fretwork is mostly inside cuts, the first step is to drill starter holes so you can feed the scroll saw blade through the panel (Fig. 3). And make sure the starter holes are away from the lines to avoid chipout (Fig. 4).

**MAKING THE CUTS.** When the holes are drilled, you can begin cutting. With patterns like those on page 5, there's no particular progression. But some patterns have one or two very large openings. A large opening will usually leave the panel fragile in some areas, so I cut them last.

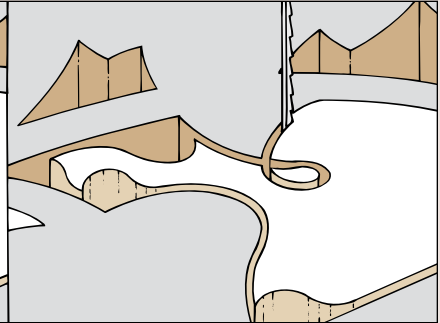
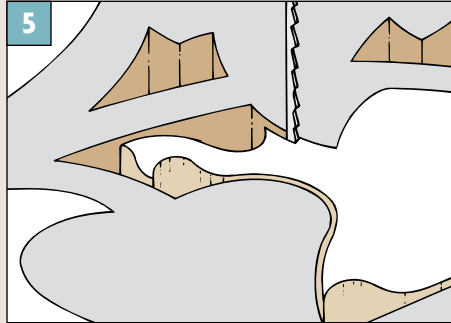
I tend to remove the waste from an opening in small pieces, instead of trying to get it all in one shot.



**3** **Starter Holes.** Drill  $\frac{1}{8}$ " holes wherever you can. The small veining in parts of this pattern require  $\frac{1}{16}$ " starter holes.



**4** **Hole Locations.** Locate starter holes at easy "entry points." But keep them away from the lines to avoid chipout.



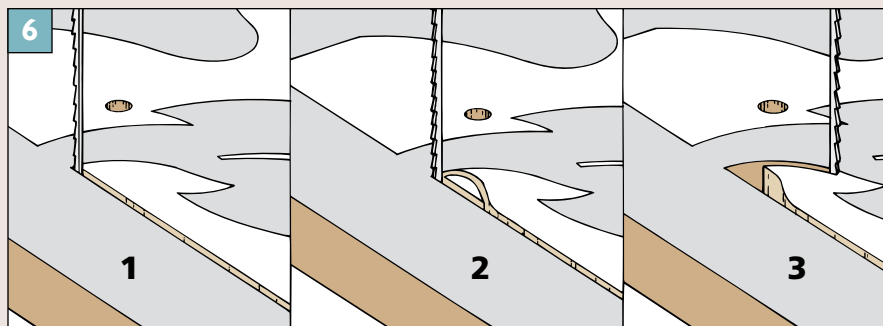
**5** **Cutting Outside Corners.** Clean, sharp corners aren't difficult — just take your time. To cut an outside corner, you don't need to make a quick, sharp turn. Instead, loop your way around in the opposite direction.

For example, some sharp corners I'll cut in two or three steps (Fig. 5). For other corners, the trick when rotating the panel is to push the piece against the sides and back of the blade (the edges that don't cut).

With fretwork, the thing that takes some getting used to is rotating the panel as you work. Fortunately, all this takes is a little practice.

**FEED RATE.** Finally, your feed rate is very important. Don't push the wood through too fast. I like to work slowly using gentle pressure. If your blade is bowing under the pressure, you're moving too fast. For cutting

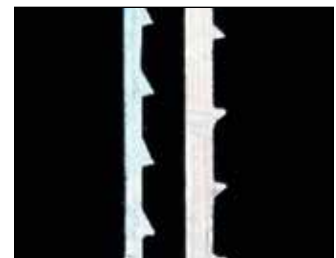
straight lines, you can clamp a guide fence onto your saw's table and feed your stock by it.



**6** **Inside Corners.** Instead of cutting an inside corner in a single pass, I often try to do it in three steps. First, cut straight into the corner (Step 1). Then back the blade out and loop around from the other side to get a crisp corner (Step 2). Now spin the piece around and continue cutting out from the corner (Step 3).

## SHOP TIP

### Choosing Blades



Skip tooth blades (on left) work fine for scroll work that will only be seen from one side. But for panels that are seen from both sides, I prefer a "reverse tooth" blade.

Unlike a skip tooth blade, the teeth at the bottom of a reverse tooth blade (on right) face up. This way, the bottom teeth cut on the upstroke to reduce chipout.



Several projects call for thin stock (less than  $\frac{3}{4}$ " thick). Sometimes you can buy thin stock at the lumberyard or through a mail-order catalog, but you'll often pay a premium price.

Another solution is to make thin stock yourself — by resawing a thick piece into two (or more) thinner pieces. This way, the wood costs less, and with just a little extra work, you get the stock the exact thickness you want.

**TABLE SAW.** Normally, I like to use a band saw for resawing. A sharp  $\frac{1}{2}$ " resaw blade slices through a board like butter and with the thinner kerf on a band saw there is little waste. But if you don't own one, and the pieces you're resawing aren't too wide (up to 6 inches), you can resaw them on an ordinary table saw.

Resawing on the table saw is really just a ripping operation. But instead of the workpiece lying on its face, it's fed through the blade standing on edge.

**SET-UP.** The first thing I do when setting up my table saw to resaw is to install the proper blade. For the smoothest cut, I like to use a sharp, 24-tooth rip blade. A rip blade is thicker, so there's less tendency for it to flex while cutting.

**SPLITTER.** Whenever I resaw thin stock on the table saw, I also like to use a zero-clearance insert with a splitter

(Fig. 2). The insert prevents the workpiece from slipping down between the blade and the opening. And the splitter keeps the wood from "pinching" the back of the saw blade and kicking back.

There are plenty of nice manufactured inserts available, but I like to make my own out of hardwood. Medium-density fiberboard (MDF) can also be used. I use the insert that came with my saw as a template for laying out the new insert. And I glue in a splitter made out of a piece of  $\frac{1}{8}$ "-thick hardboard (Fig. 2).

Also, since I want as much control over the workpiece as possible, I like to attach a tall auxiliary fence to the saw's rip fence (Fig. 1). This makes things safer because it helps keep the workpiece standing up straight during the resawing.

**MAKE CUTS.** To make the cut, I set the fence to resaw the board about  $\frac{1}{16}$ " thicker than the final desired thickness. (After I finish resawing, I remove the marks left by the blade with a hand plane or thickness planer.)

Begin resawing by using a push block to feed the board past the blade. Also, be sure to hold the piece tight against the fence. (A featherboard clamped to the saw table can sometimes help.)



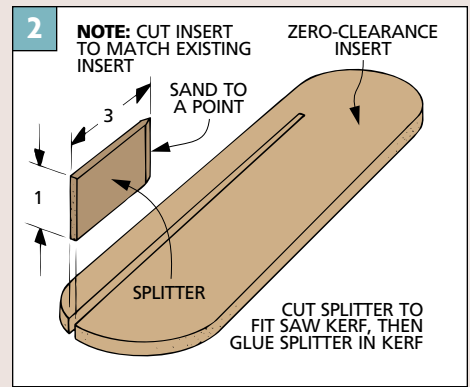
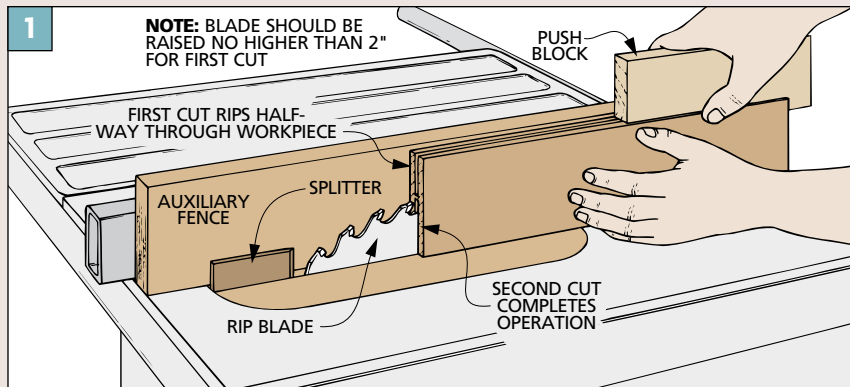
**Note:** Use a push block that hooks over the back of the workpiece (Fig. 1).

I usually make the cut by gradually raising the blade to its full height. After making the first pass, flip the piece end for end (keeping the same face against the fence) and make a second cut on the opposite edge (Fig. 1).

On stock that's 3" wide or less, try to complete the cut with the second pass. (The fewer cuts the better.) But if the stock is wider than 3", raise the blade in  $\frac{1}{2}$ " increments and run both edges through the saw a second time. Continue raising the blade in  $\frac{1}{2}$ " increments until the cut is complete.

**WIDE BOARDS.** If the stock is wider than the capacity of your table saw (about 6" for most saws), you can use a hand saw to finish the cut and separate the two pieces. (A rip saw works best.)

There's one other thing to mention. When resawing on the table saw, you may experience small ramps (or gouges) at the start and end points of the resawn piece. To solve this problem, start with a blank that is about 6" longer than the desired length, then cut off the ends after you're done resawing.



# Night Light

Use the space provided to design your own night light panel.

