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PROJECTS PLANS TIPS JIGS TOOLS

Canadian Woodworking

AUGUST/SEPTEMBER 2005 Issue # 37

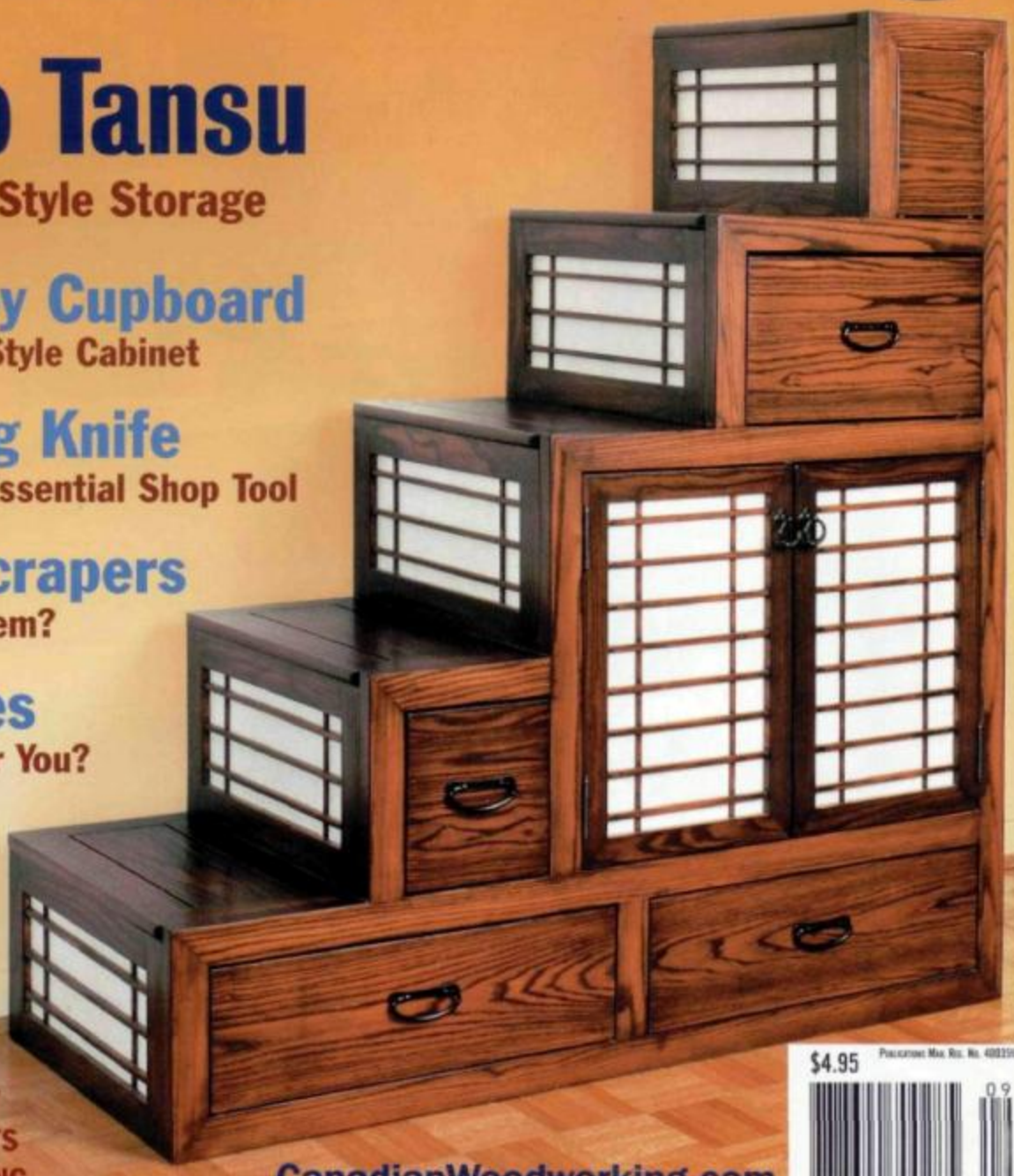
Step Tansu
Japanese Style Storage

Chimney Cupboard
Traditional Style Cabinet

Marking Knife
Make This Essential Shop Tool

Card Scrapers
Why Use Them?

Cyclones
Are They For You?



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Cover photo by Ray Pilon

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Linda Fulcher

Often there are no simple answers to "how-to" questions. You might read one finishing or joinery technique and then come across a different method or opinion.

For example, I have been considering the pros and cons of using a pressure washer to clean my wooden deck.

One summer about 10 years ago, I visited a friend, Rene, who excitedly took me on a tour of his yard. To my delight, he turned me loose with his new pressure washer. So that I would do no serious damage, he demonstrated how the pressure washer could take the stain off his deck.

As using a pressure washer to clean a deck seems to be a common practice, I figured that there is probably a standard pressure that most people use, so I set out to find out what it is.

However, the first answers I received were so varied that I decided to go to more sources. I consulted books, the internet, experts, friends, family and neighbours. The more information I got, the less I knew.

From those people who use pressure washers on decks, the recommended pressure (pounds per square inch or psi) ranged from 400 psi to 3200 psi. Quite a range.

It seems that this is the nature of asking a how-to question. Everyone has a different experience. Knowing what others have to say gives me a place to start, or at least to make an educated guess. Even if I can't be sure that I am using exactly the right method, there are a couple of things that encourage me to proceed anyway. The first is the delightful memory I have of using Rene's pressure washer, and the second is the joy I will experience in doing something first hand. Clear the deck! Here I come!

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Paul Fulcher

As we are putting together each issue of the magazine, there is invariably a point in the process that I experience an involuntary moment of appreciation. I stand back from the process of putting it all together and see the end result. Instead of all of the varied pieces, I see the completed magazine.

It can be triggered by a photo, an insight, or a combination of editorial content. However it starts, it ends in the realization that: "this is going to be our best issue ever!"

When I say it out load, I am often reminded "You always say that."

And it's true. I do.

But at the same time, I really do experience, and believe, that each one is "the best one yet".

I'm not sure for this issue whether it was choosing the photo for the cover, or the contrast of presenting a tansu and canoe in the same issue. It might even have been as I was laying out the two, somehow related articles, "Repairing your Power Tools" and the "Mystique of Hand Tools", that I saw the whole magazine come together . When I did, I said it like it was the first time ever: "I think this is our best issue ever".

I'm sure in your woodworking you experience the same thing. Somewhere between cutting out the parts and applying the final finish, you cross that threshold when assembled parts become one complete project. The whole takes on a life of it's own, as the finished piece becomes far more than the sum of its parts. It's a magical moment of creation that rewards us for our efforts.

As you go through this issue, and work on some of the projects, watch for that part of the process when the parts start coming together. As the many pieces start forming around the idea of your end project, stop and take a moment. This process is one of creation and should be savoured.

I hope as you experience this creative process, you stop, stand back and appreciate that what you are doing is just about to be your best project ever.

letters to

Good morning Mr. Theriault and my friends at Canadian Woodworking,

I would like to thank you very much for the $433 you saved me.

While reading the current issue of Canadian Woodworking (Issue #35), I noticed an article written by Mr. Theriault on Wooden Floor Vents.

I made 14 vents for my house. Those same vents happen to be available at my wood supplier at a cost of $30 each, which equates to a total of $483 including taxes.

By making the vents myself, the total cost was only $50 in wood, thus saving me $433.

It's not very often that I can calculate precisely the savings I get from my woodworking hobby and my magazine subscription.

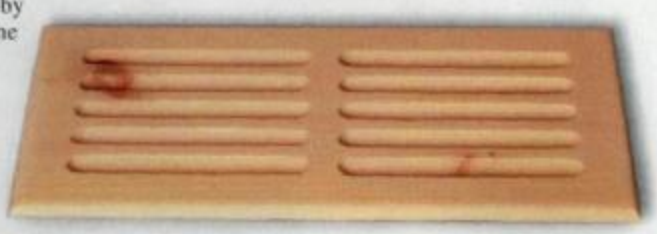
NICE!

Jocelyn P
Aylmer QC

Jocelyn,

Thanks for your letter. You are working with wood, saving money, and improving your home. Now that's the life. Does it get any better?

Linda



BY KEVIN GOOD & DOUG SCOTT

Canoe Repair

Few things are more Canadian than canoeing. Perhaps more than any other object, the canoe represents the history and culture of Canada. So when the gunwales, bow and stern deck plates of my canoe rotted away from exposure to the elements, it was almost as if an important piece of Canadian history had been destroyed. Fortunately the repairs were fairly straightforward.

Gunwale Preparation

Begin by removing the seats and thwarts. Ensure you accurately mark the locations for these, so reinstallation will be easier.

You'll want to accurately measure the width and depth of the inner and outer gunwale. In this case they both measured ¾" x 1¼". The exact length is not important at this stage as the gunwales are installed approximately 1 foot over-length, and then cut to final dimensions. The original gunwales were fabricated from red oak. We chose to replace them with maple, but you can use any hardwood that can absorb the inevitable strikes from paddles and bumping into docks. Other good choices are birch, mahogany, or cherry.

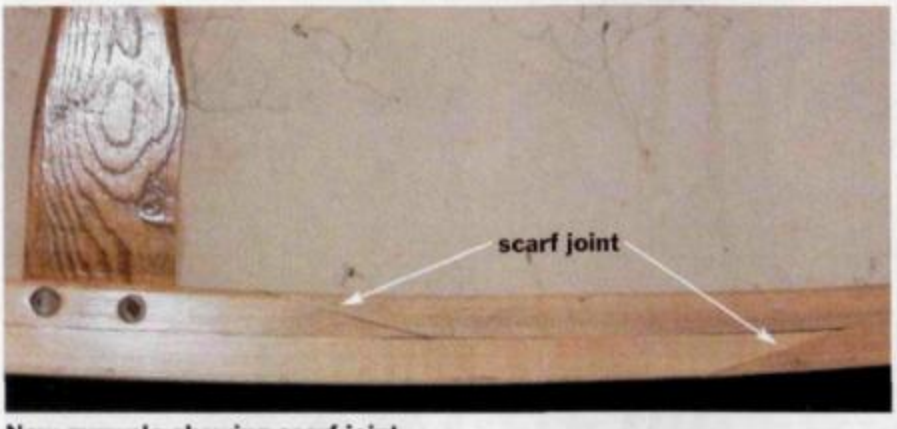
The installed gunwales on this boat measured 18 feet long. This is too long for a single board, so each gunwale was made from two pieces and joined with a scarf joint. In this case we used a 9' and a 10' piece, which provided us with the extra foot to be trimmed later. Aesthetically, it is nice if the scarf joints are in the same place on each side. If you used 9 and 10 foot pieces for the port outer gunwale, then you should also use 9 and 10 foot pieces for the starboard outer gunwale and the same for the inner gunwales. Make the scarf joint first, then put the pieces aside until the stock for the gunwale pieces is prepared.

For a scarf joint, the ratio of material thickness to length of joint is 3:1. In this case the gunwales are ¾" thick so the length of the joint is 3" x ¾" or 2 ¼". To ensure the joint fits properly, clamp both pieces together and make the angle cut through both boards at the same time.

The inner gunwales have a rabbet cut to accept the hull of the boat. The depth of the rabbet cut is the canoe hull thickness. In this case it was ¾". For safety reasons, ensure that you set up your table saw with a feather board when making the rabbet cut. You will also want to ensure that there is ¼" of material remaining at the top of the rabbet. The top outside edges of both the inner and outer gunwales should be rounded over using a ¼" round-over bit.

Now you can complete the scarf joint. Apply some thickened epoxy to the joint and clamp the two pieces together. Epoxy cures very hard so wipe off any excess now as it is quite difficult to sand after it has cured.

You now have two inner and two outer gunwales approximately one foot longer than their final dimension. Sand the gunwales using 80 grit paper, working

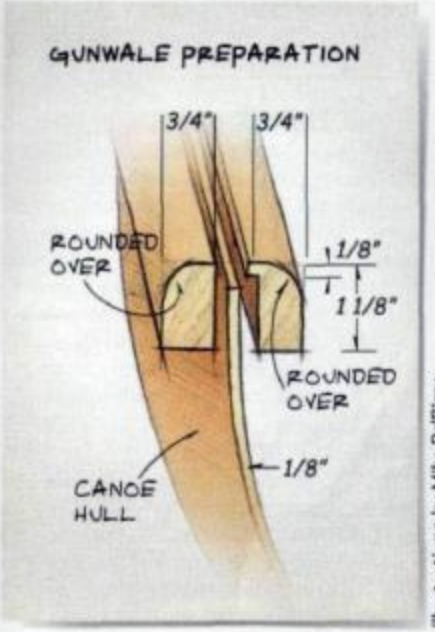


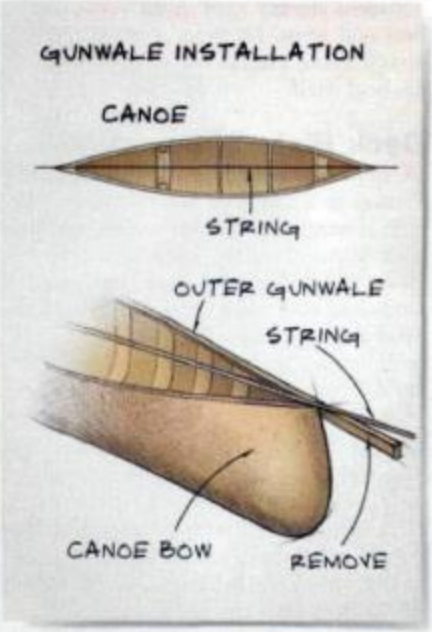
New gunwale showing scarf joint

MATERIALS LIST

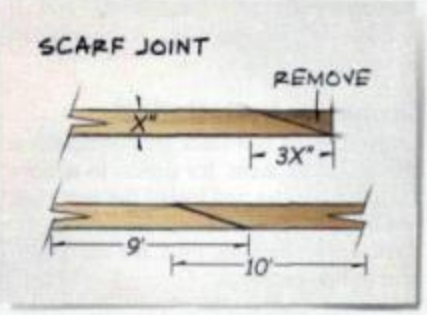
Solid wood for gunwales
cut to size
Solid wood for deck plate
cut to size
2 part epoxy
formulated for wood
Marine Varnish
with UV inhibitors
Marine grade caulking
Pan head screws
1 ¼" stainless steel
Pan head screws
2 ¼" stainless steel
or
Bronze ring nails
1 ¾" 14-gauge

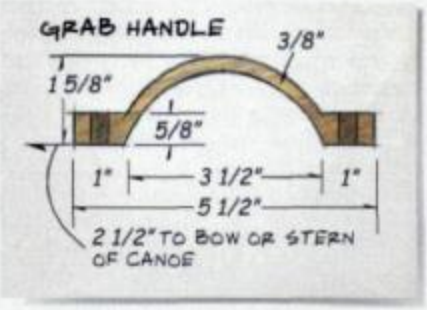
The size and length of gunwales and the deck plate will vary from canoe to canoe. Some may require 8 pieces for the gunwales, as in this project, others 4. The handles are made from leftover pieces.





Illustrations by Mike DelRizzo





Working with Epoxy

Two-part epoxy cures to a hard, impact resistant and waterproof solid surface making it an ideal product for preserving wood in marine environments. Mixing epoxy resin and hardener begins a chemical reaction that transforms the two liquids into a solid. Always wear rubber gloves and safety glasses and follow all manufacturers safety instructions.

When working with epoxy you should understand the terms **open time** and **cure time**. Open time is the time available after mixing for application, smoothing, shaping, and assembly. Cure time is how long you must wait before removing clamps, sanding, or moving on to the next step in the process. Open time and cure time are primarily determined by hardener speed and epoxy temperature. Each epoxy manufacturer will supply hardeners that will cause their product to cure at different rates. You should be aware that pot life after the epoxy is mixed will be significantly less than the open time specified in the product instructions. This is because pot life refers to a specific mass in a container, and open time refers to a thin film of epoxy and the rate of the chemical reaction is different in each case.

The other factor that determines open time and cure time is epoxy temperature. Basically, the warmer the temperature of the epoxy, the faster it cures. The temperature of the epoxy is determined by two factors; the ambient temperature (generally the air temperature surrounding the project), and the heat given off by the chemical reaction between the resin and the hardener. You should be aware that the larger the mass of epoxy that is mixed, the faster the reaction takes place, resulting in more heat being generated. In fact, eight ounces, or more, of curing epoxy will generate enough heat to melt a plastic cup and burn your hands. The same amount of curing epoxy applied in a thin coat will cure at a slower rate with a correspondingly lower temperature.

Cure times and open times will be stated in the product literature. Good advice is also generally available from the personnel at marine hardware stores.

Epoxy is often used for bonding joints. The preferred method of application is a two-step process. It prevents having epoxy-starved areas and helps with epoxy penetration into the wood. Before mixing the epoxy, check the joint fit and ensure the wood is clean and dry and the surface has been sanded with 80 grit paper. The first step is to wet all the surfaces that are to be joined with a straight resin-hardener mix with no fillers. The second step is to apply a thickened epoxy to one bonding surface. To obtain a thickened epoxy, add either a filler supplied by the manufacturer or simply add wood sanding dust to the resin-hardener mixture. Add enough thickener to give the mixture a peanut butter like consistency. After joining the pieces they should be clamped until fully cured. Try to clean up any mixture that squeezes out of the joint while it is still liquid, as epoxy cures to a very hard solid that is difficult to sand.

Epoxy is also used to provide a waterproof and smooth surface prior to final finishing with marine varnish or paint. To begin, ensure the wood is clean and dry. Next apply a straight, non-thickened mixture of resin and hardener to the wood. Disposable brushes or small rollers are ideal for this. Spread the epoxy so that there is a thin, consistent film over the piece to be coated. To be certain that the coated piece will be waterproof, apply at least two coats of epoxy. Before adding subsequent coats, allow the first coat to cure enough so that it can support the weight of the next coat. If all coats are added in one day there is no need to sand between coats. If you will be applying a top coat of varnish, or other finish, ensure that the epoxy is fully cured, then washed and sanded, before applying the finish. It must be remembered that epoxy provides no protection from the sun's UV rays so any wood that will be outside must be painted or varnished

CWM

through to 220 grit. After sanding, seal all surfaces of the gunwales with two-part epoxy.

Gunwale Installation

Now that the gunwales are prepared it is time to install them. It's easiest to remove the old gunwales and install the new ones one side at a time. If you remove all the gunwales at the same time, the canoe will tend to flex outwards.

The next step is to ensure the bow and stern joints of the inner and outer gunwales fit properly. This is done by cutting the ends of the gunwales to the same angle so they fit exactly in the middle of the bow and stern. First you must find the exact centerline of the boat. To do this, attach a string directly down the middle of the boat from bow to stern, leaving about six inches of string extending beyond both the bow and stern. Now clamp the outer gunwale to the side of the boat with approximately six inches overlap both at the bow and stern. Lay the overlapping string tightly over the gunwale. The line of the string will show the angle to cut the gunwale. Follow this same process for both the inner and outer gunwales.

Drill and countersink the screw holes on the gunwales. For a better look, space the holes the same on both the port and starboard sides. Install the gunwales using high grade 1¼" stainless steel or marine bronze screws, otherwise you'll end up with rust streaks running down the side of your boat. Glue plugs into the countersunk holes. To ensure a tight fit use a tapered plug cutter when making the plugs. Use some of the scrap wood left over from fabricating the gunwales for the plugs. Follow this same process to install the inner and outer gunwales on the other side. At this point you should reinstall the seats and thwarts.

If there are any gaps in the joints at the bow and stern, fill them using thickened epoxy, being careful not to get epoxy on the boat itself.

Deck Plate Measurement

Carefully remove the original deck plates to use as a template for measuring the replacements. You'll want to fabricate the deck plates from the same wood as the gunwales but in any case use a good hardwood with a thickness of ¾". You can make the deck plates from one solid piece or from two or more pieces joined with either a biscuit or tongue and groove joint.

Deck Plate Fabrication

We decided to modify the design of the deck plates. Originally the deck plates were installed flush with the gunwales. We installed slightly larger deck plates that sit on the gunwales. Use a band saw to rough cut the deck plate stock to the approximate dimensions. To achieve the final dimensions, use a belt sander and drum sander. Test fit the deck plates to ensure proper fit. Once satisfied with the fit, finish sand the deck plates using the same procedure as the gunwales, then coat all surfaces with epoxy.

Deck Plate Installation

There are two methods for installing the deck plates. You can drill and countersink holes in the deck plates and attach them to the gunwales using 2¼" stainless steel or marine brass pan head screws. The second method is to join the deck plates to the gunwales using 1¼" 14-gauge bronze ring nails. Ring nails, also called boat nails, are easy to work with and add a nice colour contrast with the wood grain.

Now you can install a small fillet of thickened epoxy around the joint between the deck plate and the gunwales. This will ensure a watertight seal between these two pieces. To get a nice, clean fillet, put the thickened epoxy in a sandwich bag, cut the corner from the bag and gently squeeze the epoxy out, much like a cake decorator.

Grab Handles

To make the canoe easier to carry, we fabricated grab handles and attached them to both the bow and stern deck plates. Once again these were made from ¾" maple. We rough cut the grab handles with a band saw and then drum sanded them to the final dimension. After finish sanding we sealed the grab handles with epoxy. We then installed them using two stainless steel pan head screws for each handle.

Finish Work

Apply a final coat of two-part epoxy to seal all seams and to ensure all joints are fully bonded. Before you do this, tape off the boat under the gunwales so that you don't spill any epoxy on the boat. Once the epoxy has fully cured wash the wood with soap and water. This removes any amine blush that might have formed while sanding. Amine blush is caused by incorrect mixing of epoxy and hardener and shows up as a whitish, dull hue. Apply at least two coats of a good quality marine varnish with UV inhibitors, lightly sanding between coats with 220 grit sandpaper. The more coats of varnish you apply, the deeper and more lustrous your wood will look and the more it will be protected.

The final step is to apply a marine caulking to the underside of the gunwales. This will stop water from seeping under the gunwales and prevent rotting in the future.

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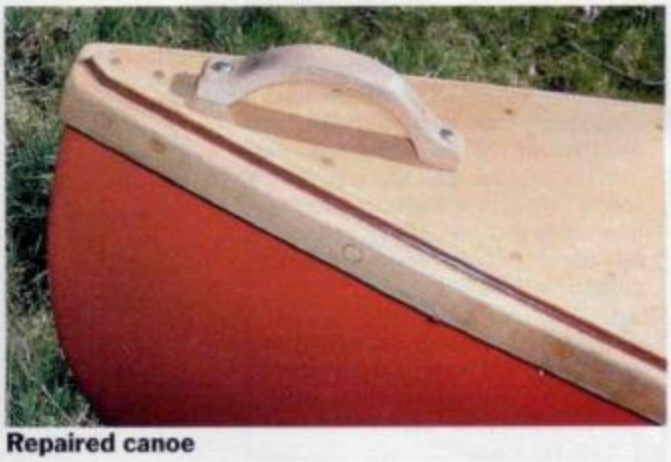
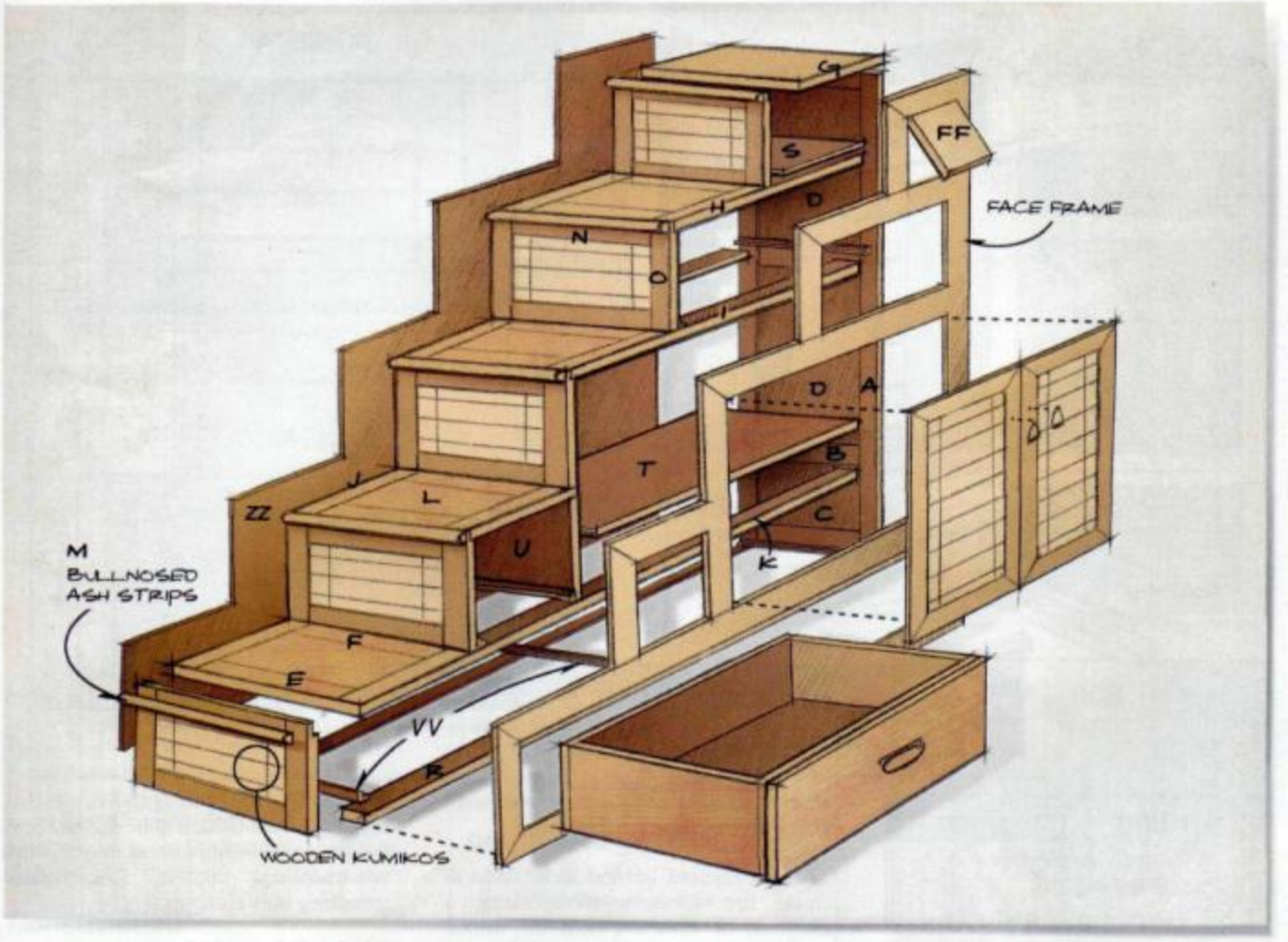
Damaged canoe



Repaired canoe

furnitureproject BY ROB BROWN

Step Tansu



The step tansu became popular during the early Edo period in Japan, in the 1600s, when livable space was at a premium. Japanese for 'trunk' or 'chest', tansus ranged from small three step units to larger five and eight step units.

HARDWARE

4	**Oval plate handles**	3½" x 1½"
2	**Ring pulls**	1⅞" x 1⅜"
4	**No-mortise hinges**	2" x 11/16"
4	**Rare-earth magnets**	⅜" diameter
4	**Magnet cups**	⅜" diameter
4	**Magnet washers**	⅜" diameter
2	**Japanese paper - doors**	16¼" x 10"
5	**Japanese paper - risers**	14" x 6¼"

The large step tansu fit into the architecture of a house serving two functions at once – easy storage for blankets and large household items, and easy access to the loft above. Traditionally, the height of a step tansu was directly proportional to the height of the second floor.

Japanese homeowners were taxed according to the livable area in their home. In order to save a little money come tax time, owners often relocated their large step tansu away from the loft. No access to a loft meant the loft was not livable, therefore untaxed. Those truly dedicated to tricking the tax-man, would construct their step tansu in two halves – an upper and a lower, and fasten the top half of the tansu with a hinge near the middle step, folding the upper portion into the lower portion creating a square cabinet, avoiding all suspicion.

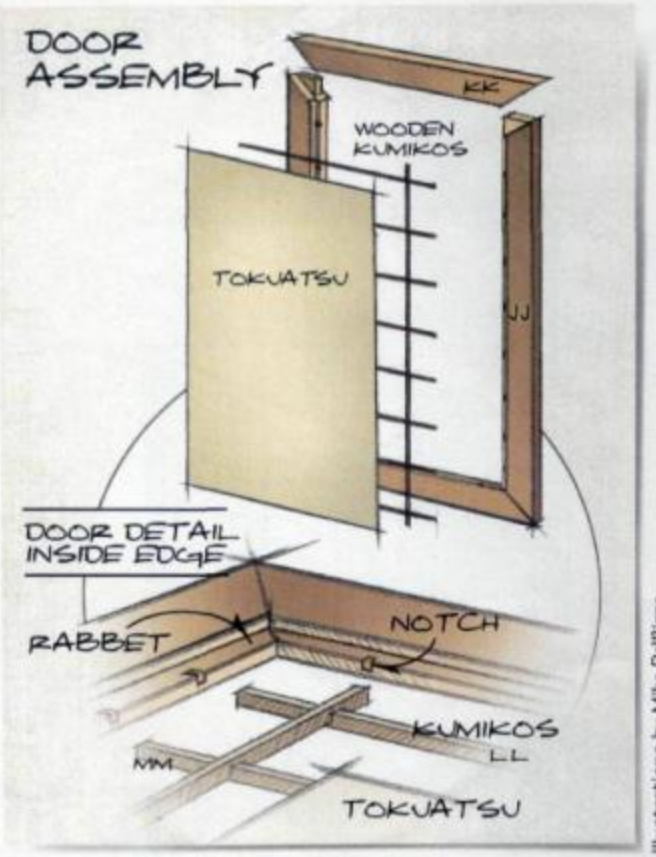
I designed this tansu for beauty and storage, not for evading Revenue Canada or accessing a second story. To use your own tansu to the fullest I recommend incorporating a solid, one piece riser as opposed to the risers featured here.

Design

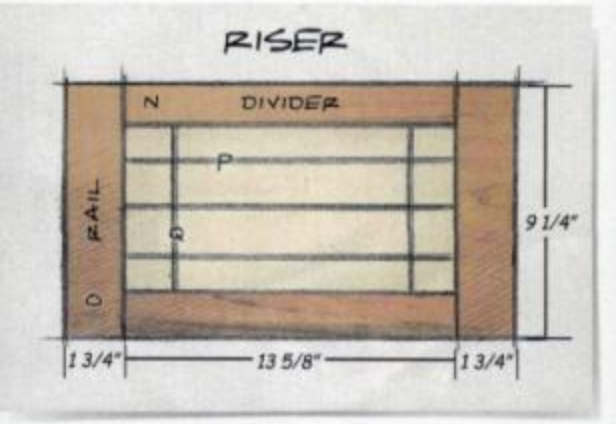
Most western furniture finds beauty in symmetry. I was drawn to the general design of a step tansu because of the balance it achieves in asymmetry. A step tansu is able to divide a room or invite you into a room, directing your eye to it and then towards another aspect of the room that holds it, such as the sitting area beside its steps, or a piece of art above its peak. This tansu has the potential to really become part of a room's personality, a rarity in much of today's furniture design. Also, our modern urban landscape requires space saving solutions; the tansu maximizes storage space at the bottom, providing more open wall space for

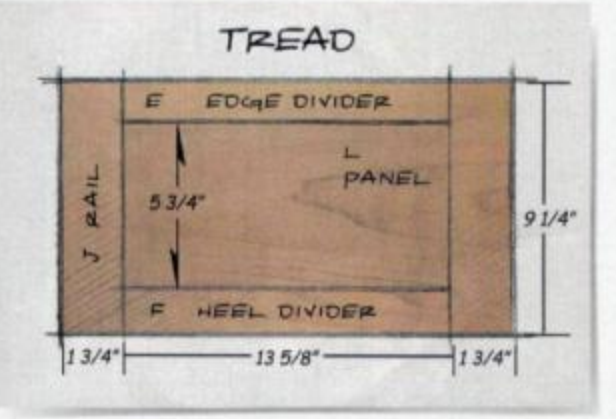
MATERIALS LIST - END FRAME

A	**2 End frame – stiles**	⅞" x 1¾" x 49⅛"
B	**4 End frame – rails**	⅞" x 1¾" x 14½"
C	**2 End frame – small panels**	⅞" x 14¼" x 8¼"
D	**4 End frame – large panels**	⅞" x 14¼" x 29"



Illustrations by Mike DelRizzo





TREAD and RISERS

E	4 Tread dividers – edge	7/8" x 1 3/4" x 14 5/8"
F	4 Tread dividers – heel	7/8" x 2 5/8" x 14 5/8"
G	2 Tread rails – upper	7/8" x 1 3/4" x 7 3/4"
H	2 Tread rails – upper / mid	7/8" x 1 3/4" x 16 5/8"
I	2 Tread rails – mid	7/8" x 1 3/4" x 25 3/4"
J	2 Tread rails – mid / lower	7/8" x 1 3/4" x 9 1/4"
K	2 Tread rails – lower	7/8" x 1 3/4" x 44 1/8"
L	5 Tread panels	7/8" x 5 3/4" x 14 1/2"
M	5 Tread nosings	3/4" x 7/8" x 17"
N	10 Riser dividers	7/8" x 1 3/4" x 14 5/8"
O	10 Riser rails	7/8" x 1 3/4" x 9 1/4"
P	15 Riser kumikos - horizontal	3/8" x 3/8" x 14"
Q	10 Riser kumikos - vertical	3/16" x 3/8" x 6 1/4"
R	2 Bottom rails (hardwood)	7/8" x 2" x 44 1/8"

art, and, not surprisingly, can be customized to fit perfectly under a loft stairway.

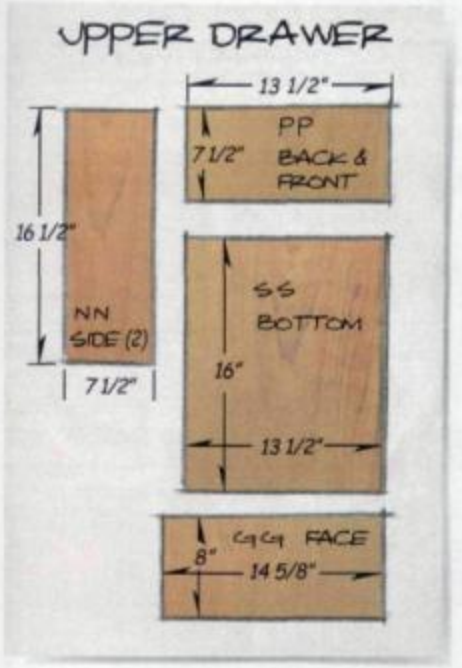
I began Equinox Interiors as an outlet to create fine furniture incorporating a multitude of materials from the natural world. Japanese furniture design focuses on simple lines with minimal ornamentation and involves the use of natural materials – wood, paper, reeds, stone or metal. My tansu design feels light because of the paper and kumikos (creating the grill-like design), even though the finish is quite rich and bold. By using traditional Japanese materials in a non-traditional context, I've created something truly contemporary.

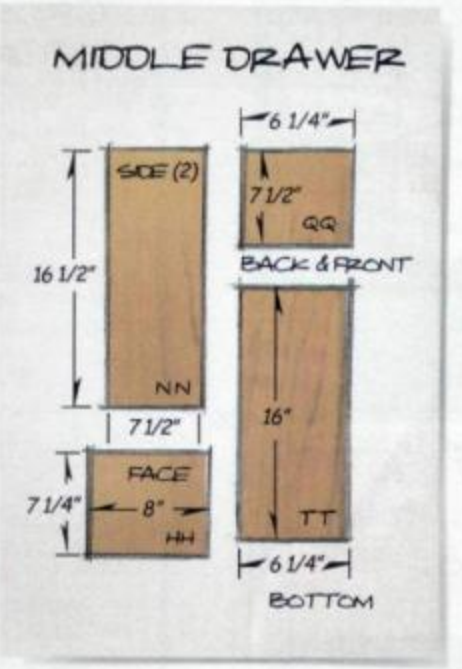
INTERIOR PANELS

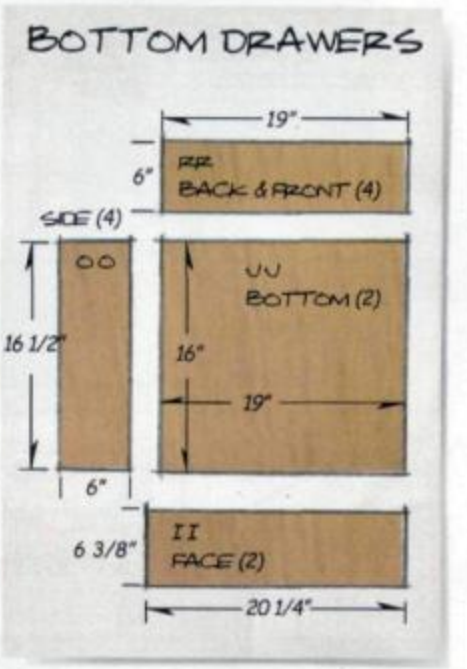
S	1 Bottom – secret compartment	1 5/8" x 7 1/2" x 14"
T	1 Bottom	1 5/8" x 14" x 26"
U	1 Side	1 5/8" x 11 1/4" x 14"

Materials

One of Japan's most highly sought after species of wood is zelkova, a ring-porous wood with a distinctive grain pattern, very similar to our common oak and ash species. Wanting to ground the design in Japanese tradition, and stay true to my Western roots, I chose to use solid white ash for the entire piece (short of the back and drawer boxes).







The paper I used is called Tokuatsu, hand-made in Japan and available in Toronto and Montreal at The Japanese Paper Place. Drastically different from thin Western paper, Japanese hand-made paper is world renowned for its amazing texture and versatility. Because wood fibers are woven together, the paper has strength similar to cloth.

Construction

I machined the large end frame, five identical risers and five (almost) identical treads first. The length of the front and back rails for each of the five treads varies, decreasing as the treads ascend, requiring shorter front and back rails to connect to the end frame.

The end frame is typical frame and panel construction, but the risers are a bit different. The frames for the risers are

DOORS and DRAWERS

EE 1 Strip
1/16" x 1/2" x 5 1/4"

FF 1 Secret compartment face
7/8" x 8" x 5 1/8"

GG 1 Upper drawer face
7/8" x 8" x 14 5/8"

HH 1 Middle drawer face
7/8" x 8" x 7 1/4"

II 2 Bottom drawer faces
7/8" x 6 3/8" x 20 1/4"

JJ 4 Door stiles
7/8" x 1 1/2" x 18"

KK 4 Door rails
7/8" x 1 1/2" x 11 7/8"

LL 16 Door horizontal kumikos
1/8" x 3/8" x 9 5/8"

MM 4 Door vertical kumikos
1/16" x 3/8" x 15 7/8"

NN 4 Middle and upper drawer – sides (plywood)
1/2" x 7 1/2" x 16 1/2"

OO 4 Bottom drawer – sides (plywood)
1/2" x 6" x 16 1/2"

PP 2 Upper drawer – fronts & backs (plywood)
1/2" x 7 1/2" x 13 1/2"

QQ 2 Middle drawer – fronts & backs (plywood)
1/2" x 7 1/2" x 6 1/4"

RR 4 Bottom drawer – fronts & backs (plywood)
1/2" x 6" x 19"

DOORS and DRAWERS

SS 1 Upper drawer – bottom (plywood)
1/2" x 16" x 13 1/2"

TT 1 Middle drawer – bottom (plywood)
1/2" x 16" x 6 1/4"

UU 2 Bottom drawer – bottoms (plywood)
1/2" x 16" x 19"

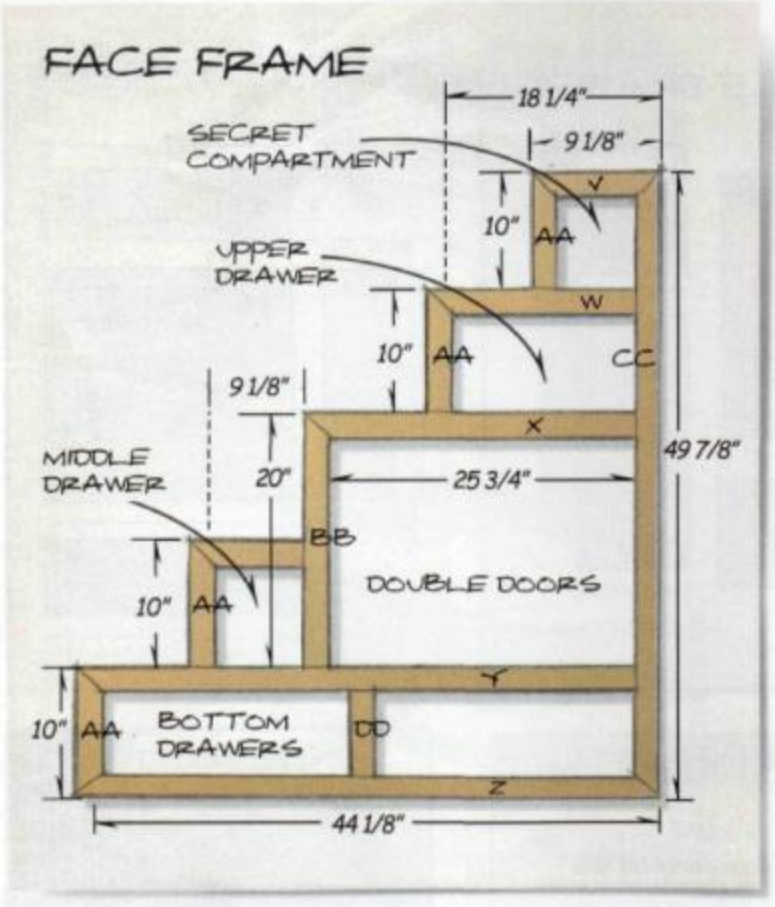
VV 8 Drawer slides (hardwood)
1 1/4" x 1 1/4" x 16 1/2"

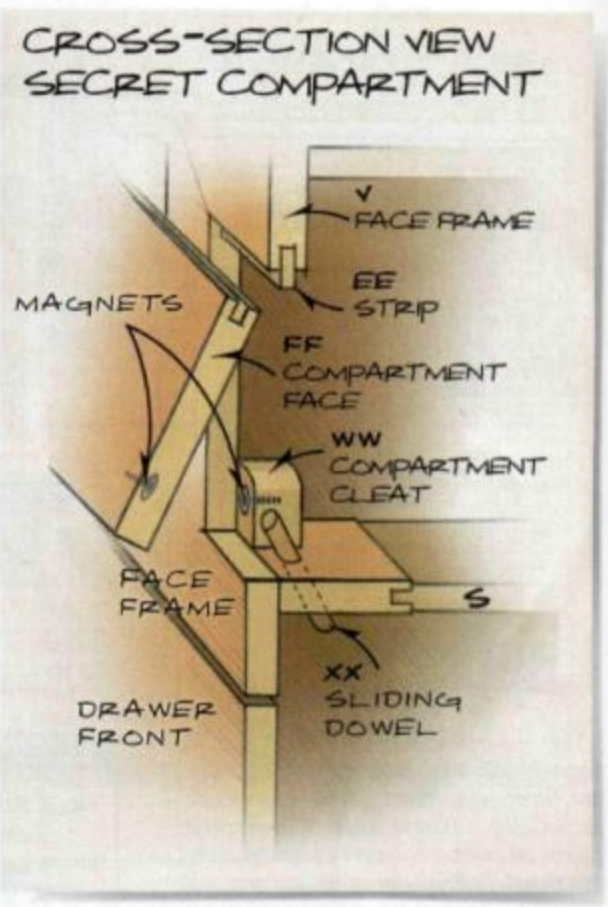
WW 2 Secret compartment cleats
7/8" x 1 1/2" x 1 1/2"

XX 1 Secret compartment sliding dowel (hardwood)
3/8" x 3/8" x 2 1/2"

YY 1 Door stop
7/8" x 1 1/4" x 2"

ZZ 1 Back (plywood)
3/8" x 45 1/2" x 49 1/2"





machined the same way as the end frame, but in place of the panels are wooden kumikos. These horizontal and vertical wooden members join each other with a lap joint. A notch is machined into the frame to accept each kumiko. The horizontal kumikos are ⅜" x ⅜", while the vertical kumikos are ⅜" wide but only 7/16" deep. Since the vertical members are half the thickness, I cut lap joints in the horizontal members only - simplified construction and the addition of an interesting visual element.

FACE FRAME

V	**2 Horizontal face frames** ⅞" x 1¾" x 9⅛"
W	**1 Horizontal face frame** ⅞" x 1¾" x 16½"
X	**1 Horizontal face frame** ⅞" x 1¾" x 25¾"
Y	**1 Horizontal face frame** ⅞" x 1¾" x 44⅛"
Z	**1 Horizontal face frame** ⅞" x 1¾" x 45¾"
AA	**4 Vertical face frames** ⅞" x 1½" x 10"
BB	**1 Vertical face frame** ⅞" x 1¾" x 20"
CC	**1 Vertical face frame** ⅞" x 1¾" x 49⅞"
DD	**1 Vertical face frame** ⅞" x 1¾" x 6½"

With the risers assembled, I machined a ⅛" x ⅛" rabbet on the top, inside corner of each riser to offer a seat for the tread to sit in. Since the treads and risers are ⅞" thick, this left a ¾" x ¾" gap. I routered a partial bullnose on the end of a ⅞" x ¾" strip of ash to glue in the gap for added strength, producing a ⅛" overhang.

The front and back tread rails extend to the end frame and are secured there with a double dowel joint, the exception being the 2nd lowest tread. It is joined to the underside of the riser above it and is glued in place.

There are two rails extending from the bottom of the lowest riser to the bottom of the end frame. These add strength and allow a surface to attach the face frame and drawer slides. Both front and back rails are joined with dowel joints.

Secret compartment detail

A solid bottom is required for the center cupboard and the secret compartment. These bottoms fit into the existing grooves machined in the sides of the front and back tread rails. A tenon must be machined on the edges of the bottoms to fit into the grooves.

Once all the machining is complete to this stage, I dry fit every piece. To dry fit this piece by myself was difficult, but not as tricky as gluing, assembling and clamping the tansu alone! It is possible to do this by oneself, with some planning, but a second pair of hands makes assembly much easier.

Once the glue has dried, I carefully laid it on its back and started machining the face frame. To streamline the process some planning was required. I decided where I wanted to use mitre and butt joints well before I began this stage - the outside corners are miter joints and the inside joints are butted. The butt joints were strengthened with dowels. The 1¾" wide face frame can be glued in place as you cut it. Before gluing the top piece of face frame into place, I machined a groove to accept a strip of wood. This 7/16" thick strip secures the upper portion of the secret compartment.

The frame now machined and assembled, I take the dimensions for the two doors. I like to machine and assemble the doors so they just barely fit into the space then trim the doors according to the specific size and angle requirements. This takes a bit longer to do but the result is doors that fit perfectly. I also machined and installed an interior side frame on the left side of the centre cupboard to divide this area from the small drawer.

The mitred door construction is very similar to most doors, the two differences being the rabbet cut on the inside edge and the notches to receive the kumikos. The rabbets and kumikos are necessary for securing the paper. I had to keep the risers in mind while machining notches for the kumikos on the doors, wanting their proportions to be similar.

I attached the hardwood drawer slides and constructed drawer boxes to match. The slides are 1¼" x 1⅛" solid with a ½" rabbet to accept the drawer. I use wooden slides because they are long lasting and when well built, provide years of smooth and easy use. Solid ash slab drawer fronts are machined and attached to the drawer boxes.

At the bottom of the secret compartment, ash cleats are placed on either side of the opening directly behind the face frame. Rare-earth magnets with steel cups and washers - (from Lee Valley), are fastened to the wood cleats to secure the small panel. A ⅛" hole accepts the dowel used to open the secret compartment panel. It is accessed from the open drawer below. A bit of pressure on the dowel overcomes the strength of the magnets, and the secret is unveiled.

Finishing

I sanded the entire piece with 150 grit paper. Sanding to a higher grit, however standard, would not allow the deep stain and glaze penetration that I was looking for. My first application was a mixture of Brilliant Crimson and Brown Mahogany aniline water stain (both available from Lee Valley), giving the tansu its red tones. I experimented with proportions and strengths beforehand. A wet coat was applied followed by a light sanding to remove any raised grain.

A coat of dark brown glaze was applied next, allowed to dry slightly, and then wiped off. The glaze tends to be left behind in the corners as well as in the pores of the ash, adding depth and character to the finish. In the interior of the tansu I applied a coat of dark reddish-brown pigment. Once everything was dry, I brushed on four coats of satin varnish, sanding between coats. Varnish dries more slowly than other finishes, but provides a very durable finish that lasts for years.

Final Touches

Working with the hand made Japanese paper is not as difficult as might first seem. The Japanese Paper Place offers literally thousands of styles, colours and weights of beautiful paper and the rice glue required to adhere the paper to the frames. I cut the pieces of paper to the appropriate size, applied rice glue to the frame and kumikos then put the paper in place. Rice glue is water soluble, and easy to work with. Once the glue has completely dried I lightly sprayed the paper with water. At first this makes the paper swell and distort – without fail, causing my stomach to jump each time! After about 15 minutes the paper starts to contract, becoming taught on the frame.

Finally, I applied a furniture paste wax to the drawer slides to allow for easy movement, and fit the tansu with hardware.

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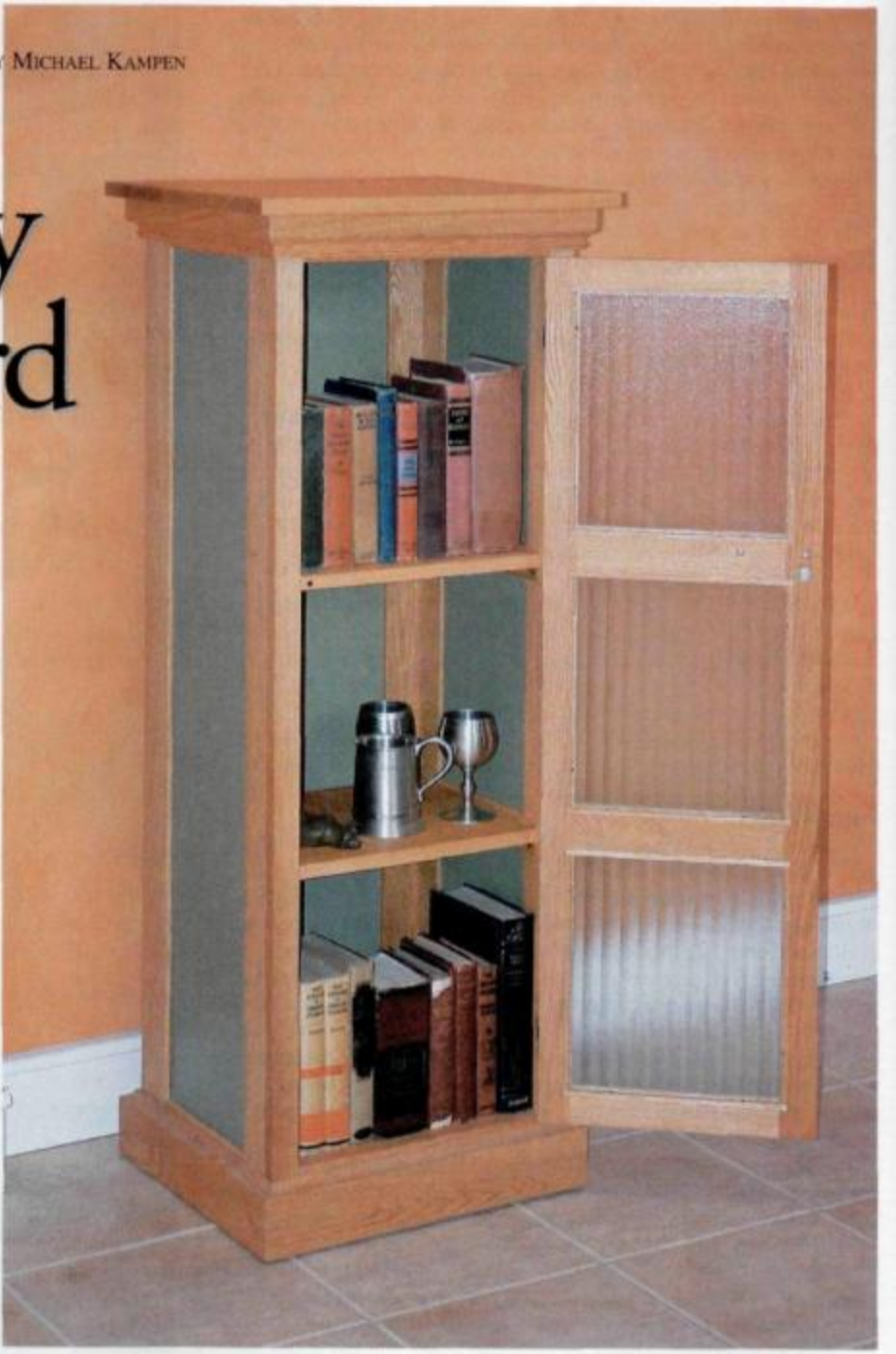
BY MICHAEL KAMPEN

Chimney Cupboard



Chimney cupboards have been with us for hundreds of years. Originally, they were found in kitchens, but in more recent times they have been used in bathrooms to store linens. It is a great way to increase your storage space, regardless of where you use it.

The easiest way to tackle this project is to break it down into separate sections and work through them in order. This allows you to adjust each step as you go. The first section is the main body, consisting of three framed panels and a face frame into which a three-panel glass door is set. I used red oak for this project.

Panels and Face Frame

Begin by laying out the stock for all of the frame and door parts. Arranging for complimentary grain patterns now will reward you with a fine looking finished cabinet. Mill all the stock to the same thickness in one session. This ensures all frame members are exactly the same thickness. At this stage, use some chalk and place a mark on the face side. A simple white slash, face up on every part as it goes on the router table eliminates the chance that parts may not line up later if the router bit isn't perfectly centered on the stock.

Rip and crosscut all the parts to the final dimensions. A technique that I use to ensure that all matching parts are the same length is to cut a blank to the correct length and then rip the two parts from this piece. When all of the frame parts are ready, rout a tongue on the ends of the rails. I used a router bit with a pair of ¼" cutters separated by a ¼" ball bearing in conjunction with a cross sled on my router table. When you have finished cutting all of the tongues, set up a ¼" grooving bit in the router and cut the grooves. I use a tongue and groove router bit set that cuts a ⅜" x ¼" tongue and corresponding groove. If your bit is different, you'll have to adjust the measurements. You could also cut the tongues and grooves on the table saw.

In addition to machining the three frame-and-panel section and the face frame, there are additional tongues and grooves to machine, in order to assemble the four sections later.

Center Panels

Once you have prepared all the frame members, cut the three center panels from some ¼" MDF. Test fit the frame members and the center panel. The panels are finished with milk paint, and the oak frame is finished with oil and wax. For those who haven't used milk paint before, it is a finish that came to Canada with the early settlers more than 250 years ago. (I order mine from Homestead House Paints in Toronto). Because of the nature of milk paint, you must finish the center panel before assembling the frame around it. It will take two coats to achieve complete coverage. After the first coat, rub the panel down with fine steel wool, and then apply a second coat. After rubbing the second coat down, use some Watco oil to seal and

darken the painted surface. Glue up the back and side panels. You should also glue up the face frame at this point. Set the panels aside and move on to the door.

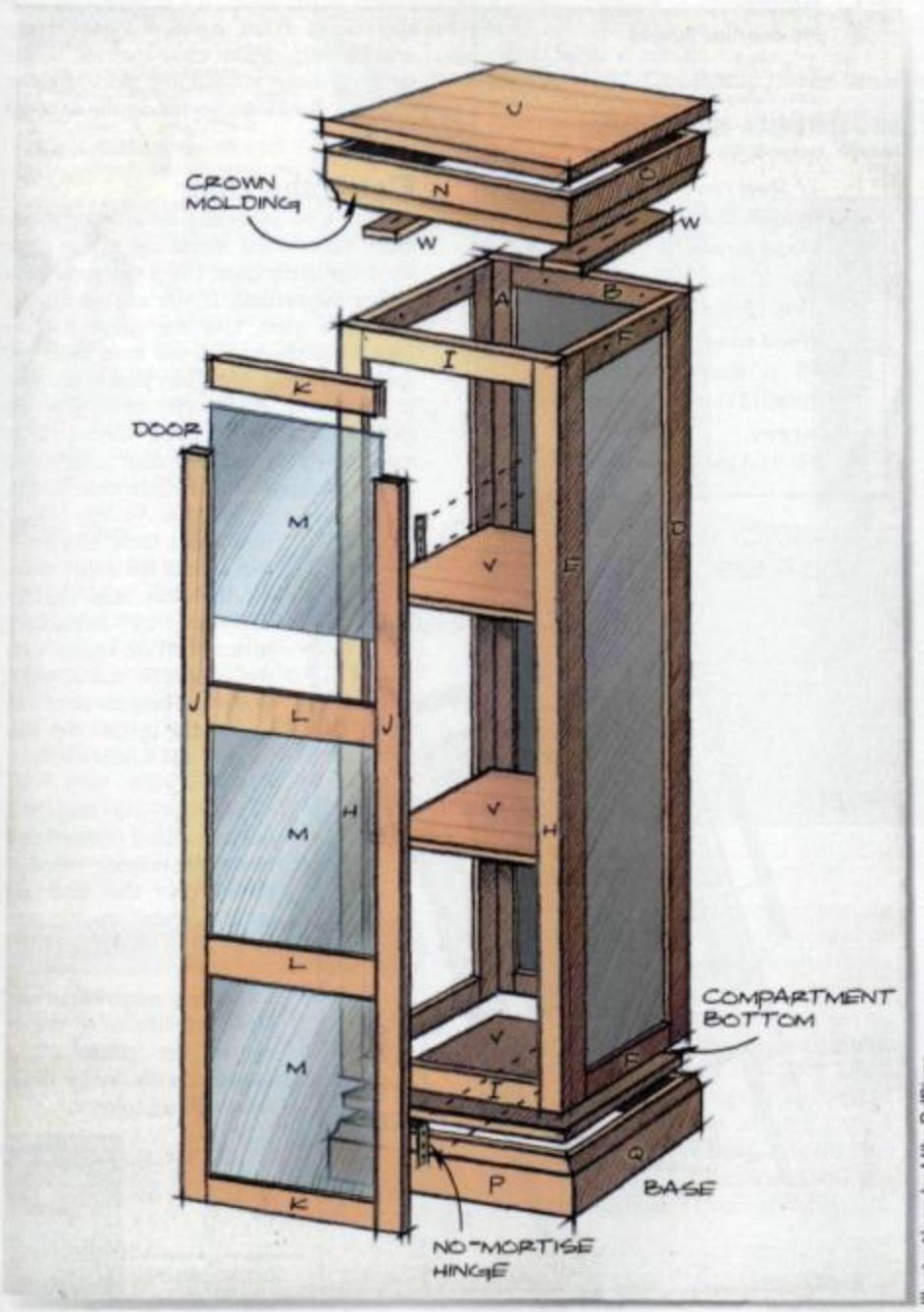
Door

Cut the rails and stiles for the door, and machine the tongues on the ends of the rails. There are four rails, with the center two being wider than the top and bottom. Set up the groove cutter in the router table and rout grooves on the stiles and the top and bottom rails. The wider center rails have a groove routed on both sides. There are two extra rails in this door without the benefits of a center panel to hold things square and flat, so I highly recommend going through the whole process once without glue, to be sure everything is perfect. When everything is square and flat, glue the door frame together.

Sand the oak frames for the front, back and sides. The best tool for this is a ¼ or ⅓-sheet finishing sander. Be sure not to sand the finish off the center panel. When the frames have been sanded, use compressed air or a cloth to clean away all traces of wood dust from the panels and from the oak. Apply Watco oil to all exposed surfaces, being careful not to get any in the tongues and grooves. This will make removing any glue after assembly much easier. Test fit the sides, back and face frame and then glue them together. Be sure that your assembly table is flat to help keep the glue-up square.

Top and Shelves

Prepare stock to glue up for the top and the three inner shelves. Try to choose the best-looking boards for the top. Glue up the four pieces and set them aside. Mill some stock for the ledger strips and for the top hold-down cleats. In order to allow for seasonal wood movement across the grain in the top, you will need to provide some elongated holes. The ledger strips that hold



Illustrations by Mike DelRizzo

Crown moulding

Magnetic catch

Bottom moulding

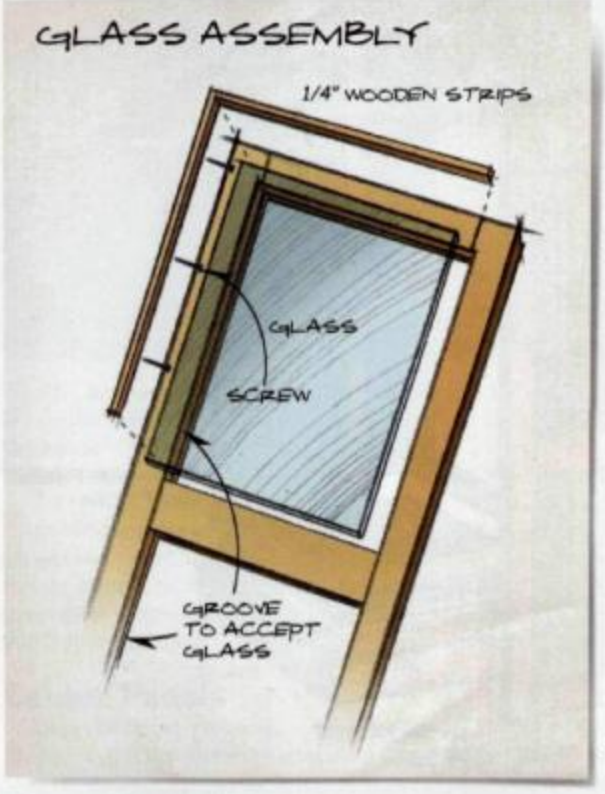
MATERIALS LIST
(T x W x L)

A	2 Rear panel stiles	¾" x 2⅜" x 46½"
B	2 Rear panel rails	¾" x 2¼" x 11¾"
C	1 Rear center panel (MDF)	¼" x 11 3/16" x 42 11/16"
D	2 Side panels, rear stile	¾" x 2¾" x 46½"
E	2 Side panels, front stile	¾" x 2⅜" x 46½"
F	2 Side panels, rails	¾" x 2¾" x 8¾"
G	2 Side center panels (MDF)	¼" x 8 11/16" x 42 11/16"
H	2 Face frame stiles	¾" x 1⅜" x 46½"
I	2 Face frame rails	¾" x 2¼" x 13⅜"
J	2 Door stiles	¾" x 1¾" x 42"
K	2 Top & bottom door stiles	¾" x 1¾" x 10½"
L	2 Middle door stiles	¾" x 2½" x 10½"
M	3 Textured glass panels	3/16" x 10½" x 11⅞"
N	2 Front & rear crown mouldings	¾" x 2" x 20"
O	2 Side crown mouldings	¾" x 2" x 17½"
P	2 Front & rear base mouldings	¾" x 3¾" x 20"
Q	2 Side base mouldings	¾" x 3¾" x 17½"
R	1 Bottom of compartment (Baltic Birch Plywood)	¾" x 14⅜" x 11⅞"
S	2 Lower shelf side ledger strips	¾" x 1" x 11¾"
T	2 Lower shelf front & rear ledger strips	¾" x 1" x 13"
U	1 Top	¾" x 16½" x 19"
V	3 Shelves	¾" x 11¾" x 14¾"
W	2 Top attachment cleats	¾" x 2" x 12"
X	4 Shelf supports	½" x ¾" x 11¾"

the bottom in place are attached to the carcass by #8 1¼" screws. Pre-drill and countersink these to avoid splitting such narrow pieces. With these strips installed, glue and screw the plywood bottom into place and install the levelling feet. Using these feet removes the weight of the cabinet from the base and transfers it directly to the cabinet. It also allows it to be levelled on an uneven floor. The strips that hold the top in place are attached by four #8 1¼" screws. To avoid splitting the stock, these should be pre-drilled and countersunk.

HARDWARE

1	Handle
2	No-mortise hinges 2" x 11/16" (Lee Valley #00H51.22)
1	½" Rare-earth magnet (LV#99K31.03)
1	½" Steel cup for magnet (LV#99K32.52)
24	Wood screws #4 ½" Black flat head (LV#01Z10.44)
9	Wood screws #6 ¾" Black flat head (LV#01Z11.64)
	Screws #8 1¼" (as required)



I used a ½" cove bit to machine the profile on the base moulding, and a Lee Valley large French Provincial bit to profile the crown. I didn't raise the bit to its full height, which allowed for a slightly altered profile. The crown and base moulding are attached with two screws per side, from the inside. Pre-drill and countersink these as well. You'll have to drill the holes for the side pieces of the crown upwards at a 45° angle to allow for the thickness of the top cleat.

Sand and finish the top and shelves with the same number of coats on both sides. Install the top from the underside, using six screws. If you choose to use glass panels in the doors, it's best to have your shelves in fixed positions behind the middle rails. Make up a pair of ledger strips and screw them into place. I chose all black hardware, including the exposed screws.

Finish the Door

Using a ⅜" rabbeting bit in your router table, remove the inside lip in the three openings in the door. Use a sharp chisel to square the corners. If you are not cutting your own glass, take the entire door to your local glass shop and have them cut the pieces to fit. The glass panels are held in place with ¼" wooden strips that are attached with small black screws. It is much easier to hang the door before you mount the glass. I used no-mortise hinges from Lee Valley which meant that there was a 5/16" gap around the entire door. As the door was slightly oversized by design, I trimmed off the excess with the table saw and a radial arm saw. Hang the door and install the glass. Fit the handle, and a door catch.

I like to use magnetic catches with a countersunk rare earth magnet installed in the door that lines up with a screw on the top shelf.

Sand any rough edges and apply a final coat of Watco oil to the entire piece followed with two or three coats of wax.

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BY ERIC JOLLYMORE

Demilune Table

Demilune tables have been around for centuries. Originally they were quite ornate; the one I've made is much more restrained. You can change the dimensions of the table to suit your taste, and you can use almost any wood. I have made this table out of maple and elm, but it would also look great in cherry, walnut or mahogany.

The Top

The top is the easiest part to make. Begin by gluing up the stock, then planing and sanding it smooth. Joint the edge that will be the back of the top. Then, using a circle cutting jig or template, bandsaw or rout the half moon shape. I chose to cut the top on my bandsaw using a jig. Once the edge is shaped, sand it smooth, then rout the edge with your favourite profile bit. Better to take two or three passes to shape the edge rather than doing it all at once. Finally, lightly sand or plane the back edge.

MATERIALS LIST
(T x W x L)

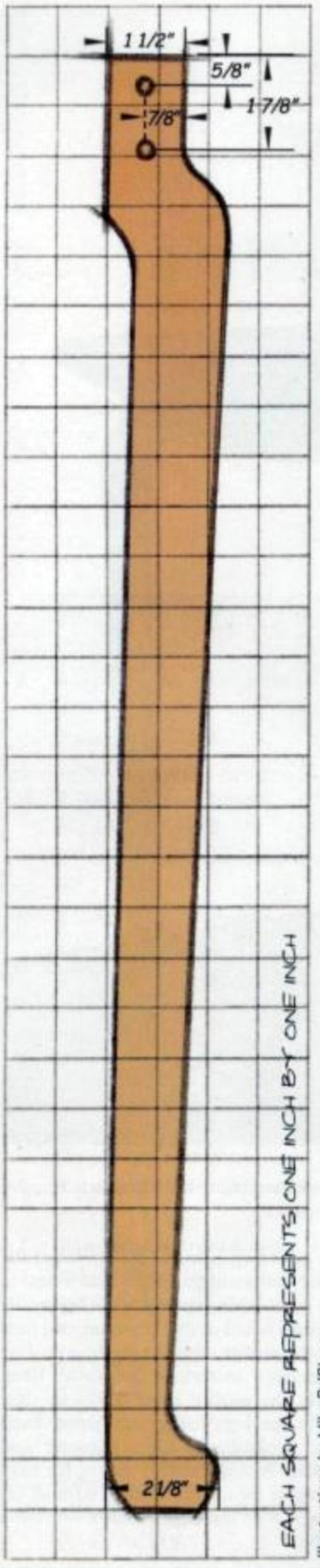
1	**Top**	7/8" x 14 5/16" x 24 5/8"
3	**Legs**	2 3/8" x 1 5/8" x 29" (rough)
1	**Straight rail**	3/4" x 2 1/2" x 17 15/16"
2	**Curved rail**	2 1/2" x 3 1/16" x 17 15/16" (rough) 7/8" x 2 3/8" x 13 1/8" (finished)
6	**Buttons**	3/4" x 1" x 1 3/4"

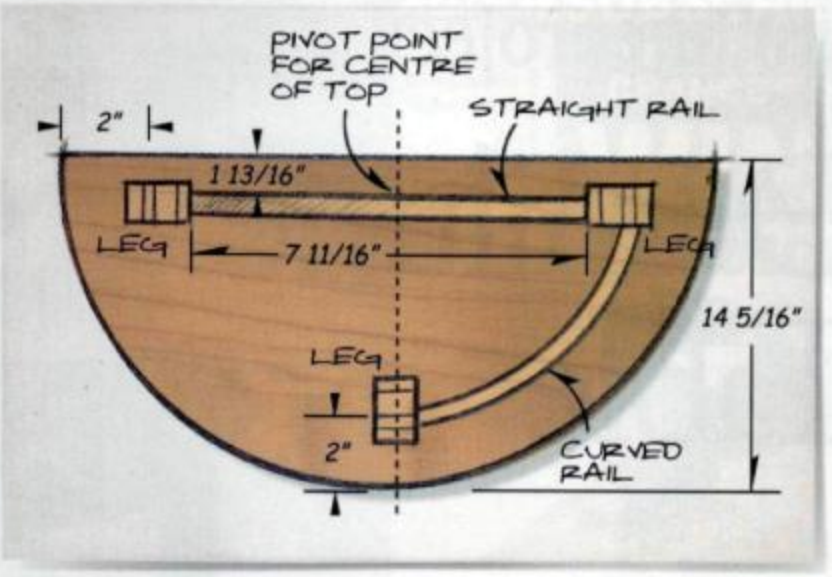
The Legs

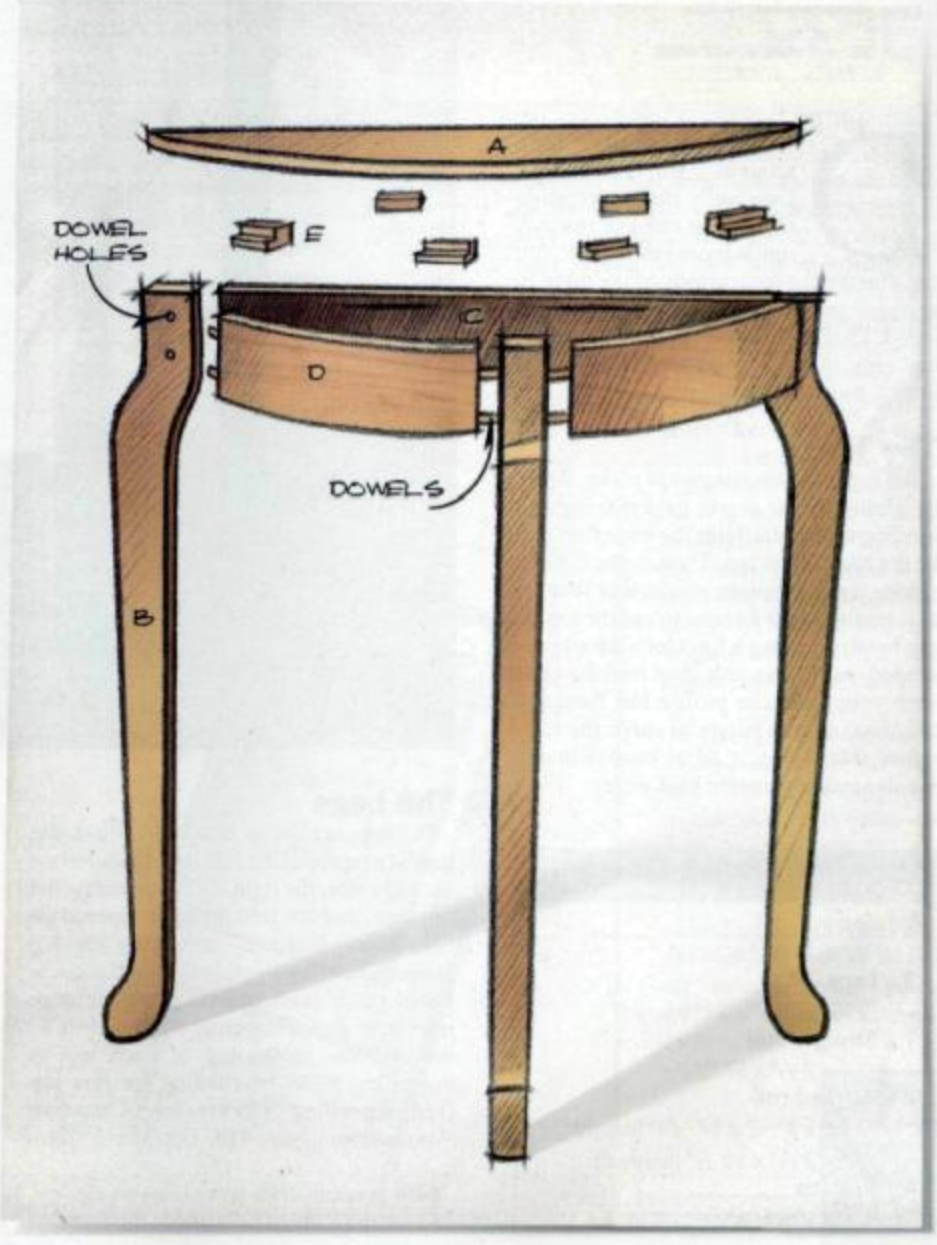
The legs are cut in two steps. First, the legs are tapered: the left leg is tapered on the right side, the right leg is tapered on the left side, and the middle leg is tapered on both sides. Begin by arranging the leg blanks according to grain flow and pattern. Label the bottom of each leg for future reference. Before tapering the legs drill 1/2" dowel holes at the top of each leg. A dowelling jig is best suited for this job (see dowelling jigs review Canadian Woodworking issue #16, Feb/Mar 2002).

Now you can draw taper lines on the legs and bandsaw about 1/16" outside the lines. Joint or hand plane the surfaces to remove saw marks.

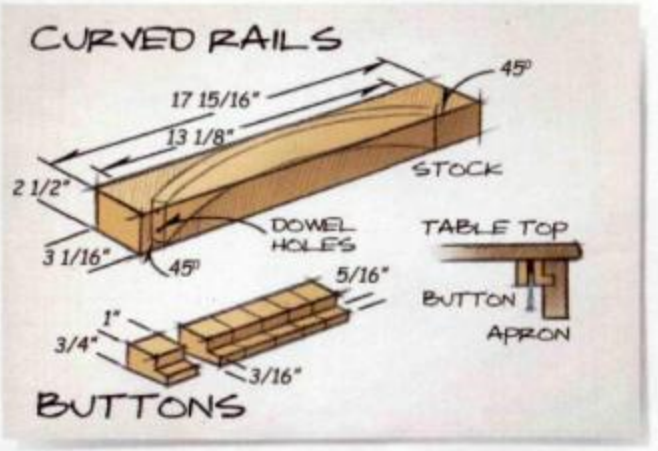
The next step is to cut the curves at the top and bottom of the legs. I find it best to make a full-scale drawing of the leg profile on Bristol board or thin plywood, and then trace the profile onto the leg blanks. Use the bandsaw to remove the waste. Keep outside the profile lines. You can then smooth the legs using sandpaper, hand plane, spokeshave, file, or router and template. A drum sander makes for easy shaping of the curved areas. To finish off the legs, rout the edges with a 1/8" round over bit.

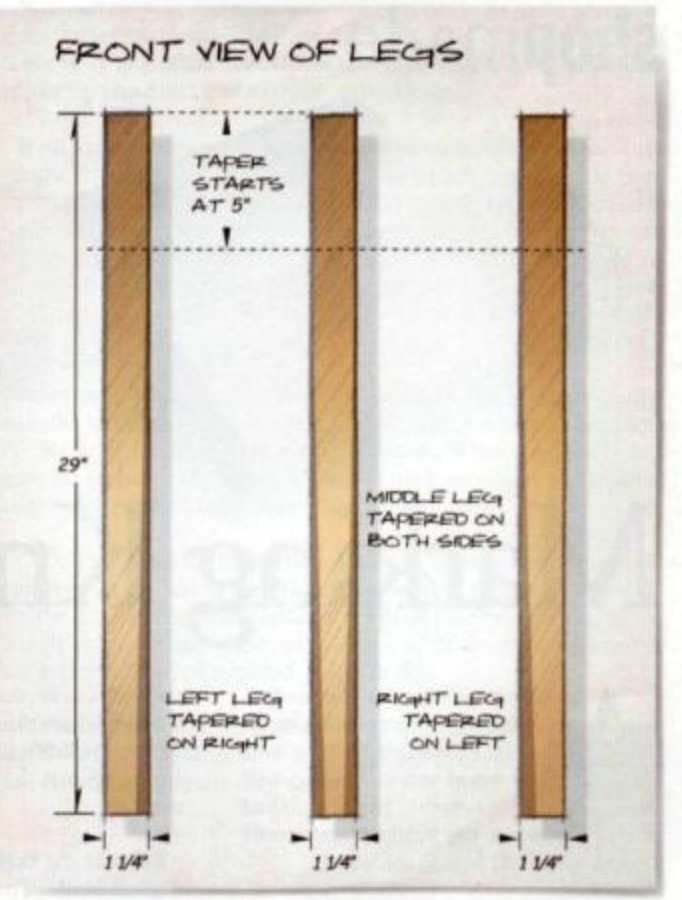






Illustrations by Mike DelRizzo





The Rails

There are three rails, one straight rail at the back and two curved rails at the front. The rails are joined to the legs with dowels. Make the straight rail, then use dowel pins to mark dowel hole positions on the rails to match those on the legs.

For the curved rails you will need two pieces of dressed stock 2½" x 3 3/16" x 17 15/16". The finished rails will be ⅞" x 2 ½" x 13 ⅛". Begin by drawing the shape of the rail on the stock. Then cut the two ends at 45°. Next, mark and drill the dowel holes.

Now you can cut out the curved rails on the bandsaw. Again, cut outside the lines. I find it best to use a drum sander to remove saw marks from the back of the rails and a random orbital sander for the front of the rails.

Note that the back rail is set in ¼" from the back side of the leg and the front rails are set in 5/16" from the back side of the leg. Finally, using a slot cutter, rout two slots on the inside of each rail for the buttons.

Buttons

I attach the top to the aprons with wood buttons, spacing two of them evenly along each rail. To make the buttons rout a rabbet across the end grain of a ¾" x 1¾" board. Mark cut lines every 1", and then drill and countersink a screw hole in the center of each button. Next, rip the board into 1" pieces on the bandsaw or table saw. Don't apply any glue to the buttons, simply screw them in place.

Assembling

Dry fit all the parts together before gluing. Doing so will allow you to make any last minute adjustments. Once you're satisfied with the way it goes together, glue the back rail and legs together, clamp and let dry. Then glue the two curved rails to the front leg and glue the curved rails to the back legs. Clamp with a strap clamp and let the glue dry. Finally, attach the top to the rails using the buttons.

Finishing

I applied a two-part Old Mahogany toner and stain on the table. First I applied the toner with a brush, then followed with a brushed on stain. Once the stain dried I sprayed on two coats of a lacquer finish.

You can apply almost any finish to a project like this, including varnish, waterbourne or oil.

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Marking Knife

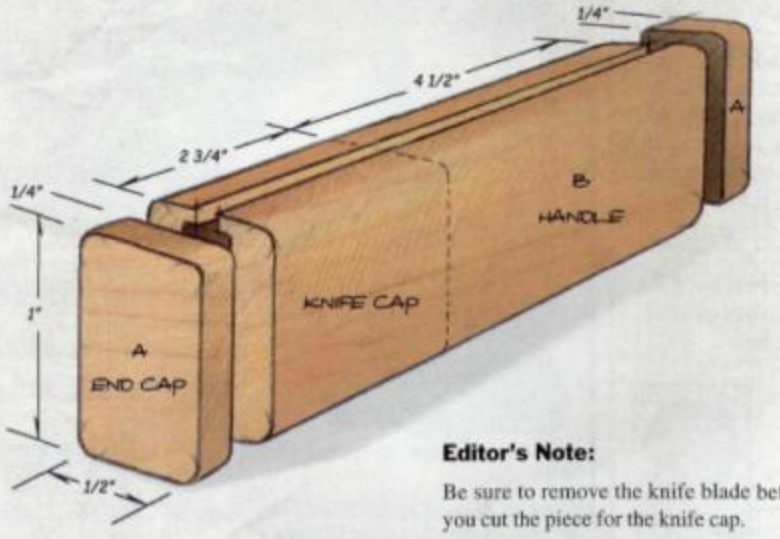
An accurate line is the cornerstone of good woodworking. It sets the standard for how well the wood you've crafted will come together in the finished work by guiding the steel of your tools through an exact plane in the wood.

The Marking Knife is one tool that will not only improve the marks you make to guide your cuts, it will also be a welcome addition to your collection of hand tools. If you don't already have one, you'll soon realize how useful it can be. If you're already using a store bought knife, you'll appreciate using one that you've made yourself.

With it's thin, sharp point, the marking knife scores the wood exactly where the cut needs to be, so you never again have to wonder which side of the pencil line to cut. To use the knife accurately, keep the bevel flush against a square or ruler when marking.

To make the knife, you need to start with a good blade. The one I use is from Lee Valley Tools. If your blade is different, be sure to change the dimensions on the stock accordingly.

Begin by cutting the two pieces for the handle. I used oak, but this knife would look great in almost any wood, including cherry, makore or bird's-eye maple. Cut two end cap pieces from the same or contrasting stock.



Illustrations by Mike DelRizzo

Editor's Note:

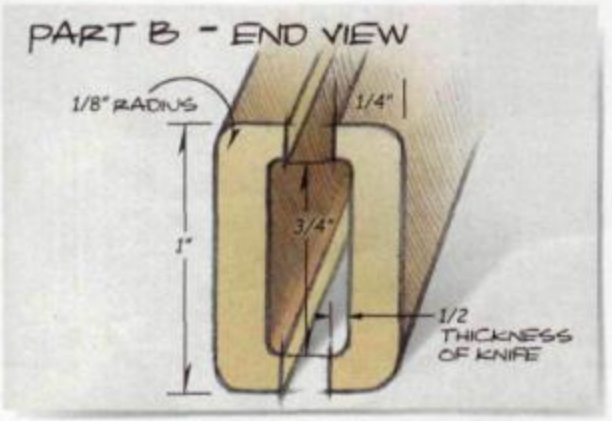
Be sure to remove the knife blade before you cut the piece for the knife cap.

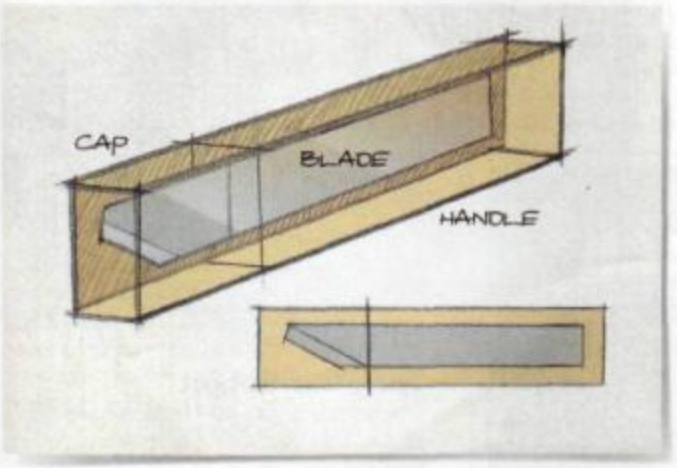
MATERIALS LIST

A	2 Oak end caps 1" x 1/4" x 1/2"
B	2 Oak handles 1" x 1/4" x 7 1/4"
	1 Bevel point blade 3/4" x 5/64" x 6 3/4" (Lee Valley # 38D04.02)

Rout the groove

Sandwich the knife





Next, set up your router table with a ½" straight bit set to take a 5/16" deep cut (approximately half the thickness of your blade). Set your fence ¼" from the bit. Check your settings on some scrap pieces and adjust the fence and router depths as necessary.

Rout a groove down the length of each piece along one edge. Since the pieces are fairly small, be sure to use a push stick and use firm, even pressure. Flip the pieces around and rout along the second edge to make the ¼" wide groove. Check to make sure the pieces fit together snugly over the knife blade. Place your knife blade into the groove of one piece and put the second piece over it. The two pieces of the handle should come together without any gaps. The knife blade should fit snugly, but not be so tight that you can't pull it out.

Once satisfied with the fit, glue the two handle pieces together with the knife blade between them. The blade should stick out about ½". Remove the blade before the glue sets. When the glue is dry, glue the end caps on each end. Sand flush if necessary and rout the edges of the knife handle with a ⅛" roundover bit.

Cut off the piece for the knife cap, using a mitre saw with the blade centered on the line in the illustration, leaving approximately 4 ¾" for the handle. Squeeze a small amount of glue into the slot in the handle and insert the blade until about 2 ¼" of the sharpened end of the knife blade is left exposed. Allow to dry.

Fit the cap onto the knife blade, then sand the knife lightly with #220 sandpaper and apply your favourite finish. Now enjoy your shop made knife.

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BY PAUL ROSS

Ball Box

This 'ball box' offers an excellent opportunity to develop and practice your hollow turning, as the body wall is the same thickness at all points. By adding a lid and finial it has been made into an attractive box. The contrasting woods, as well as the delicate shape of the body and lid are very important to the look of this piece.

I chose a piece of spalted maple for the body. It was light enough to highlight the shape yet rich with black streaks to set off the piece. For the lid I chose African blackwood and holly, which provide a striking contrast.

Roughing out Cylinder

First, mount a square 4" block between centers and turn it down to an even cylinder. Use a roughing out gouge with the flute up to knock the corners off. Then roll the gouge over on its side to produce a smoother cut. By using more of the metal of the gouge, you will produce a smoother cut. By ensuring that the flute always trails, you can make use of both sides of the gouge. (You've done all that work to grind the whole gouge, why not use it?)

Turn the Spigot

Now turn a spigot to hold the piece in a chuck. I do this with a ⅛" beading parting tool and use calipers to size the spigot.

Shape the front first, so that you can then judge the length of the body. Next, the bottom of the box is determined with a ⅛" parting tool. This will be your reference point to which you can shape the bottom. I

Turn cylinder with gouge

Size the spigot

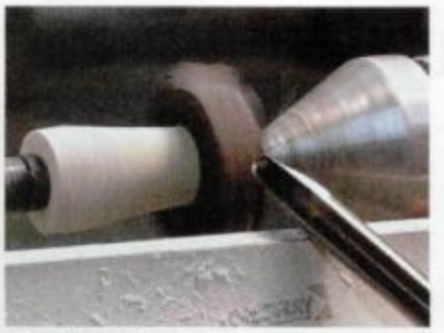
Shape the top

Establish bottom of box

Mark diameter of lid

Hollow out body

Glue holly to blackwood



Turn the lid

Shape the finial

leave the shoulder for the chuck jaws to sit on. Doing so is very important to ensure maximum "grab" from the chuck which is essential when hollowing out the inside.

Shape the Ball

Now shape the bottom to the reference point. Try to shape as flowing a shape as possible. Remember this is a ball box not an oval box.

Mount the piece in a chuck by grabbing onto the spigot. With this type of mounting you have tremendous holding power. Set a pair of dividers for the finished diameter of the lid and transfer this measurement to the body. I use a hand-held system for hollowing out the inside of the box, being careful not to disturb the inside diameter of the opening.

Sand and finish to your liking. I used melamine for my finish because it is a very durable finish that can stand up to being handled. Alternately, to turn the bottom I could have held the piece on a dowel in a chuck, or in a vacuum chuck and cut the waste off using a ½" skew.

Lid and Finial

I doweled the holly onto the blackwood instead of gluing them together. Doing so gives a much stronger joint, especially for a lid, which will be taken on and off.

A piece this small can be easily turned round in a few passes with a ¼" bowl gouge. Shape the lid and finial, blending them together.

Fit the lid with a sharp parting tool on the side of the blackwood. First, use calipers to get the fit close. Then, keep fitting the lid to the box until you obtain the correct fit.

For the underside of the lid, take the jaws off your chuck and screw on a rubber bung from a set of "jumbo" jaws. That will gently grab the finial of the lid and expose the underside. Keep in mind that without the metal jaws on the chuck there is no safety pin in place. Without that pin there is the possibility of the chuck being opened up too far and the base jaws flying out. The chances of that are slim, if you just grab the little filial, as the jaws would not be opened very far.

Finally, sand and apply a finish of your choosing.

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BY DAVID B. JOHNSON

Relief Carving

Relief carving is very appealing. Wood for carving is readily available, little working space is needed, good results can be achieved quickly, and, probably most important, the finished work can be displayed easily (like a painting). In fact, it sounds so good one must wonder why everyone isn't doing it!

In reality, relief carving is similar to watercolour painting. Many people begin painting with watercolours because they are so convenient and easy to clean up. With a little experience and study, they soon discover that watercolour painting is indeed the most difficult paint medium to master. Likewise, initial relief carvings can be quite successful and pleasing; however, mastering relief carving can be a lifelong challenge.

Many books have been written about relief carving. It goes without saying then that comprehensive instruction for relief carving is impossible in a short article. However, it is possible to provide a good starting point by demonstrating three fundamental attributes.

Before proceeding, it is worth stating what relief carving is. Relief carving is merely the flattening or compressing of a three-dimensional image. Here is a definition to help you get started on the right foot: "Relief Carving is the use of perspective, highlights, shadows, and texture to effectively create an illusion of depth".

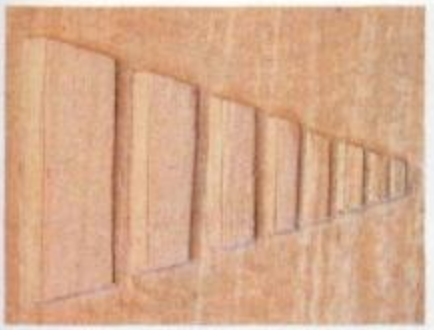
Perspective

An object seen up close looks bigger than the same object seen from a distance. That's the simplest type of perspective. Basically, perspective is achieved by making foreground objects big, by overlapping objects, and by foreshortening.

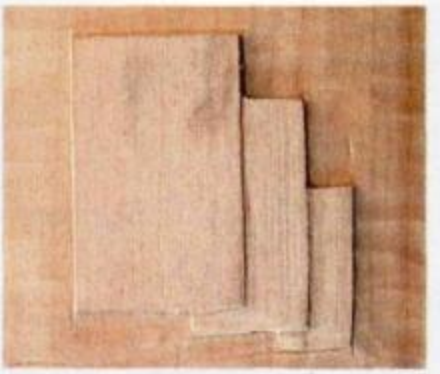
Highlights and Shadows

Light is reflected from objects. The object is shaded on the side away from the light source, and the object casts a shadow opposite the light source. Relief carving is very logical. That is, the apparent light source must be consistent throughout the carving and highlights must be opposite shadows. To the greatest extent, the perception of a light source is achieved by shaping objects and their surroundings appropriately.

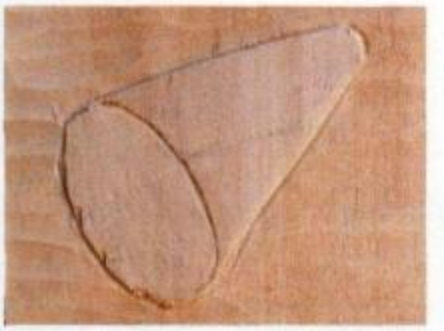
There are two specific conditions that may not be so obvious. A shadow will be cast from one object onto another when the objects are close together. If objects are far apart, there will not be any shadow. The approach taken to create this illusion of separation is counter-intuitive. In the simplest terms, to make objects look far apart, the edge where they join must be very thin. To make them look close a 'cast shadow' is created, by making the joining edge thicker, that is, farther apart. The shadow can also be enhanced by undercutting the edge.



Size diminishes with distance

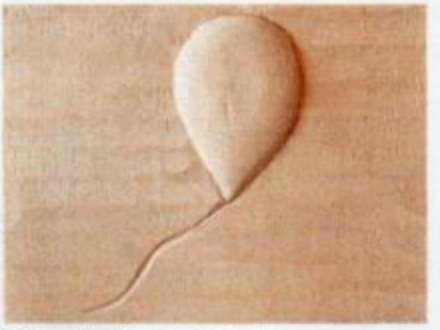


Overlapping objects



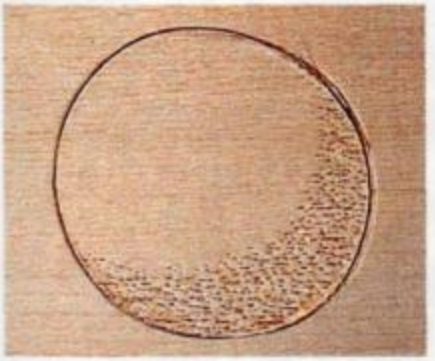
Foreshortening

Objects close - cast shadows

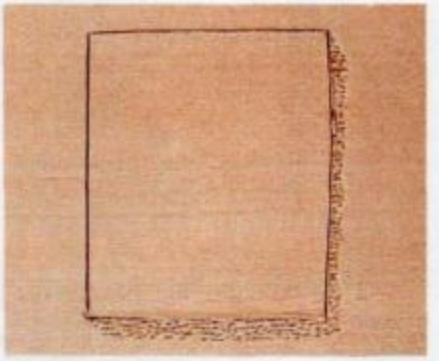


Objects far - no shadows

Texture as pattern



Texture as shadow



Texture as shadow

Coin shows relief techniques

Texture

The use of texture in relief carving may not be as obvious as perspective, highlights and shadows. Perhaps this is because the impact of texture is not as obvious as the other fundamental techniques.

Texture can help give an illusion of shape. It does this either in the form of a pattern or by simulating a shadow. A shadow can also be simulated by stippling an area with the point of a nail. In both cases, texture can be effective without any relief of the object; that is, it is not necessary for the surface of the object being textured to be higher than the surrounding material. Texture is particularly applicable to background objects since they are not as deep as those in the foreground.

Putting It All Together

The images on coins are excellent examples of relief, and demonstrate various combinations of the techniques described in this article.

Although the relief work on a coin a is only 1/10th of a millimeter deep, the images appear three-dimensional thanks to the effective use of perspective, highlights, shadows and texture.

It may come as a surprise to hear that there aren't any tricks to relief carving. Instead, a few skills and knowledge are far more necessary for relief carving than for carving in the round.

In particular, one needs to hone drawing skills and be familiar with the science of art (e.g. vanishing points). In addition, a selection of well-sharpened carving tools is essential.

Most important, one must be prepared to spend time planning. As with many other endeavors, it is appropriate to say "Time spent planning is time well spent."

In the next issue, we will apply the techniques introduced here, and complete a small relief carving project.

DAVID BRUCE JOHNSON
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Frame & Panel

Matched Frame and Panel bits
Left bit routs ends,
Right bit routs rails & stiles

Assembled

The Frame & Panel (F&P) joint is typically used for doors in cabinets. It can also be used for cabinet panels and internal frames and structures. It makes a nice looking door that can accommodate the expansion and contraction of wide panels that occurs as a result of seasonal changes in humidity.

What You Need

While you can make a simple frame and panel joint using Tongue & Groove bits (see Canadian Woodworking, Issue #36, June/July 2005), traditional frame and panels are made using matched F&P bits or a single convertible F&P bit that has cutters you change to rout the two matching profiles. To use either of these bits you will need a router table.

How to Make the Joint

Begin by cutting all the pieces of your frame to finished lengths.

Set up the first bit in your router table to the correct depth, depending on the thickness of your stock and the pattern of the profile. Since the bits have bearings, it isn't absolutely necessary to use a fence, but for safety, set your fence in line with the bearing to support your stock as you run it through the bit. Once set up, rout the inside edges of the rails and stiles.

Rout rail and stile

Rout rail ends

Next, you need to rout the matching profile on the ends of the rails. To do this, switch bits and set the bit to the correct depth, matching the rails and stiles you have already cut. Again, set the fence so that it is in line with the edge of the bearing to support the stock. Use a squared push stick and rout the ends of the rails. These ends will fit into the stiles to make the frame.

If you are using a flat panel, you don't need to do anything else with the router table. If you are using a thicker panel, you need to use a panel raising bit to take down the edge of your panel so it will fit into the frame. Set up the panel bit to the depth necessary to create the correct size lip and position the fence to support the stock. Rout a test piece and test the fit, adjusting the bit height as necessary. Rout all four edges of the panel, starting with the end grain ends, then rout the other two ends.

Test fit the panel in the frame. When satisfied, glue the frame together where the rails and styles meet. Use a small amount of glue at the top and bottom of the panel in the center of the rail only; this will allow for the expansion and contraction of the panel.

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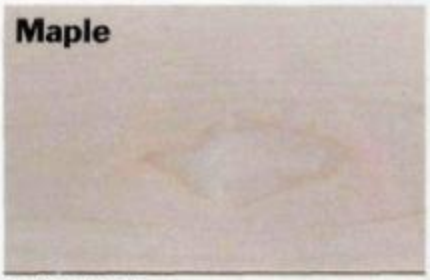
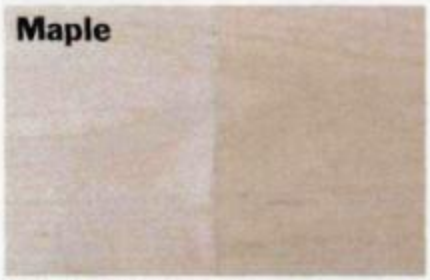
Waterborne Finishes

You might be surprised to know that waterborne (or water based) finishes are just about as durable as varnish finishes. That's because waterborne finishes are comprised of acrylics or polyurethane dispersed in water. They are non-flammable, almost odourless, have fewer solvents in them than their oil based cousins, clean up easily with water, dry quickly, and are non-yellowing. If that isn't enough, because they dry so quickly you won't get a lot of dust adhering to the finish. On the down side waterborne finishes don't impart any color to light woods like maple and don't bring out the depth or warmth in darker woods, like cherry or walnut. They can be a bit more finicky to apply, in part because they are more sensitive to temperature and humidity fluctuations during application, and they don't rub out as nicely as lacquer or shellac.



Unfinished

Unfinished



Left: finish wiped on
Right: finish brushed on
No sealer coat

Left: finish wiped on
Right: finish brushed on
No sealer coat

Safety

Waterborne finishes are less toxic and safer to use than oil-based finishes and lacquer. The "EF" that you might see on some products stands for 'environmentally friendly'. Nonetheless, you should still wear a suitable respirator, and ensure there is adequate ventilation in the room in which you are working.

Clean-up

The easiest part is cleaning up. Water and a mild detergent are all you need. Just make sure you rinse your brush well so that you don't contaminate the finish the next time you use it.

What You Need

For large flat surfaces use a paint pad; for smaller surfaces or on intricate details, use a high quality nylon brush. It's a good idea to keep separate sets of brushes for

Left: finish wiped on
Right: finish brushed on
Both have shellac sealer coat

waterborne and oil-based finishing. Strain the finish through a paper paint strainer as dried bits of waterborne don't re-dissolve when they drop back into the can; the little bits will crud up your finish. If you plan to apply the finish by rag it's a good idea to use distilled water rather than tap water, wherein iron salts can cause dark spots to appear in the finish. Additionally, waterborne finishes are said to be sensitive to changes in their pH balance, which can be upset by tap water. You will also need sandpaper, as sanding between coats of finish is required. If you use stearated sandpaper make sure you entirely remove the dust from your last sanding as it may contaminate the finish.

Products

There are numerous brands of waterborne finishes on the market and not all these finishes will give you the same results. If you will be including waterborne finishes as part of your finishing repertoire, then you might want to try several until you find one that you like best. Some products are more suitable for spraying, others for brushing (so if brushing, make sure you get a brush-specific product). Generally a high quality finish will cost more than a lower quality finish. Waterborne finishes come in the standard matte, semi-gloss and glossy formulations. Target Coatings' 'Oxford Super Clear Polyurethane' gives a clear finish with exceptional clarity. Their 'Oxford Hybrid Varnish' is a blend of oil-modified resins with waterborne acrylics that give the classic hues of a traditional oil-based varnish. Other quality waterborne products include Fuhrs' International Waterborne Urethane Finish, Old Masters' H20 Waterborne Polyurethane, Minwax's Polycrylic and Fletco's Diamond Varathane.

Prepare the Surface

Regardless of the finish you apply, the first step is to properly prepare the surface. (See "Surface Preparation" Canadian Woodworking, issue #25 Aug/Sept 2003). Remember to sand with the grain and remove dust between grits. A tack cloth comes in handy for this. Shine a light across the surface of your work at about a 30° angle to spot any lingering scratches.

Sealing, Staining and Filling

Some people apply a sealer before laying on the waterborne finish. This is because the first coat of any finish will raise the grain of the wood, and a sealer is easier to sand than the waterborne finish. Either way will work. However for dark woods its best to apply a sealer coat of de-waxed shellac, which will add an amber tone to the wood, giving it the depth and character typically associated with oil based finishes. On woods with large pores or wavy grain the shellac will help prevent blotching. Finally, if you want a glossy finish on open pored wood like oak or mahogany you can fill the pores.

Number of Coats

The number of coats you apply will depend on the level of durability you want. For instance, if you are brushing the finish on a table top you should apply at least four coats, while for the apron you might apply one or two coats. To get the same level of protection with a wipe-on finish you would apply twelve to sixteen coats on the top and four to six on the apron.

Applying the Finish

When you open a can of waterborne finish the contents will look milky white; not to worry, it will turn clear as it dries. Stir the finish according to the manufacturer's instructions. Don't shake it or else bubbles will form and mar the finish. Pre-condition the brush by wetting it for a moment in water, then wring out the excess. Dip halfway up the bristle length, and then apply the finish to the surface. Brush it on as quickly as you can in light, smooth strokes, and then come back and "tip" it off to smooth out the finish. If you miss some spots leave them for the second application. Don't apply the coats too thin or else brush marks are more likely to show. Take care not to apply the finish when the temperature or the humidity are either too low or too high. You should be safe if you aim for a temperature of around 20°C and a 40% humidity level.

Allow the finish to dry according to the manufacturer's instructions, which can be as soon as 1 hour. Sand lightly with 400 grit paper or synthetic steel wool, remove the dust, and then apply a second coat and allow it to dry, followed by a third and fourth coat. You should wait at least four weeks for the finish to cure before you apply any wax.

If you want to wipe on the finish, add about 10% water to the finish. You can apply it by pad the same way you apply shellac (see "French Polishing" Canadian Woodworking, issue #29, April/May 2004.

CWM

BY HENDRIK VARJU

Scrapers

Card scrapers, burnisher and file

A card scraper is the kind of tool that doesn't make a lot of sense at first glance. You'll probably read about them several times but ignore them. After all, sandpaper works well and takes little skill to use. And when sandpaper gets dull, you just throw it away and grab a new "sharp" sheet.

However, soon after learning how to use a scraper you'll appreciate its benefits. It will create shavings instead of sawdust, removing far more material in a shorter span of time. For me, it's a great tool for quick smoothing of problem areas and it's also handy for removing small areas of finish missed by a chemical stripper.

How Does it Work?

A card scraper is a thin piece of hard steel that can cut small wood shavings using a sharp corner. Even with no burr at all, a scraper will cut using just the sharp, 90° corner. Forming a tiny burr along the edge of the scraper using a tool called a burnisher, makes the scraper even more aggressive, effectively turning it into a tiny hand plane.

Filing the edge

If you look at the illustrations, you'll see a burnisher in use on the edge of a scraper. The burnisher is simply a hardened steel rod that is drawn at a slight angle across the edge to create a burr. If the edge starts at a crisp 90°, then the burnisher will distort the edge into a rounded shape, folding the metal into a tiny hook with a sharp point. Secure the scraper in a vise and hold the burnisher at about 5° to 15° from horizontal. A few strokes with the burnisher will create a hook capable of cutting shavings.

Why Use a Scraper?

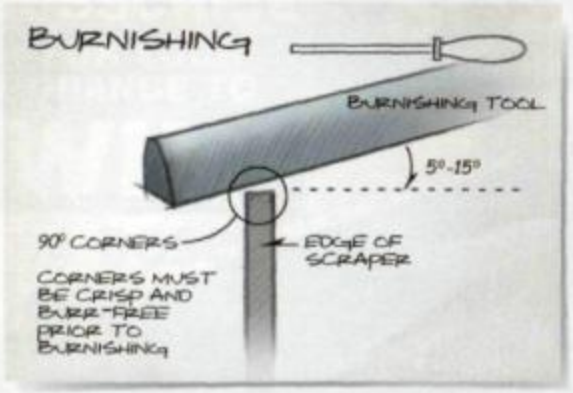
While a scraper is capable of completely replacing sandpaper and preparing wood for final finishing, I think you'll find that sandpaper is still going to be your main finish preparation tool. A scraper must be re-sharpened (or "re-burred") often. Also, tiny nicks in the cutting edge, which are easily created while cutting through pin knots or other dense areas, will leave trails of fine lines on the surface. This is similar to the long stripes left behind by nicked jointer or planer knives.

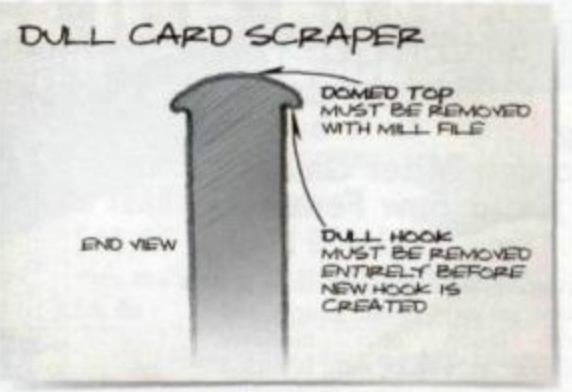
For me, the beauty of a scraper is its ability to remove material much faster than sandpaper. For example, have you ever noticed how long it takes to remove pencil marks with sandpaper? Three or four strokes with a scraper will do more work than several minutes of hand sanding.

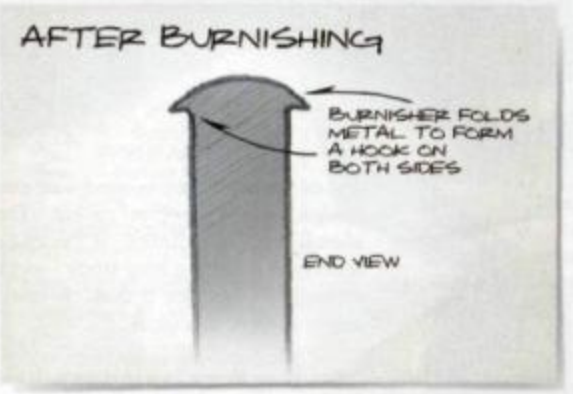
A scraper is also useful for removing minor tear-out. By bending the scraper with your thumbs, you create a curved cutting surface that can focus on a small area of tear-out. You should also scrape shavings from a larger area surrounding the tear-out so as not to create a noticeable dip in the wood. If you create a much larger concave area and your finish is not super glossy, then your eye won't notice the slight hollow.

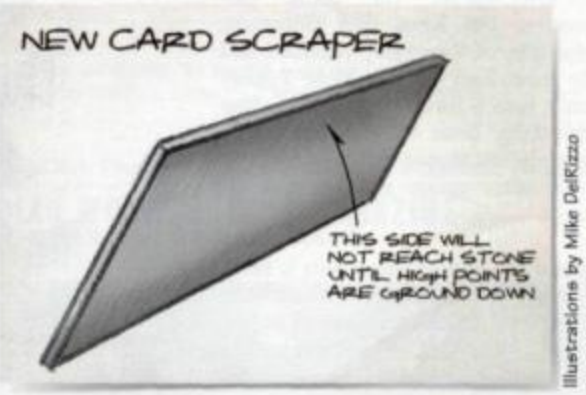
You can also use scrapers to remove other problems such as very distinct mill marks. This can happen when you run your boards too quickly through your milling machines, such as jointers, planers and

Holding the scraper









Illustrations by Mike DelRizzo

routers. But it can also happen on a jointer, for example, if you didn't have enough downward pressure close to the cutterhead, causing the board to vibrate up and down as it passed over the knives.

Some Pitfalls

There are a few common reasons hobbyists fail to master the technique of burnishing a scraper:

1) Most scrapers don't have flat sides when purchased. Rub them on their sides on a flat waterstone and you'll see an irregular dull gray pattern. Continue rubbing the scraper on its side until the gray pattern is continuous, near and up to the cutting tip. Only then will you achieve a crisp 90° corner every time you reburnish a dull scraper.

2) When a scraper gets dull, you can't just reburnish it. You need to restore a crisp edge before a burnisher can create a new burr. Start by jointing the edge flat with a mill file, holding the scraper in a vise and holding the file steady at approximately 90°. Push the file across the top edge until it appears wider and flatter, removing the curvature created by the last burnishing.

3) In addition to using the file, which is called "jointing the edge", you need to remove any old, dull burrs still felt on the sides of the scraper. Lay the scraper flat on your waterstone, pushing the leading edge away from you. Don't pull the tool or you'll fold the burr back onto the edge. A medium grit stone such as 800 or 1000 grit will do. Stop only when you feel no burr left anywhere.

4) Reburnish using a fairly mild angle. Use enough pressure to create a burr you can feel, but don't overdo it. Pushing too hard can fold the burr over too far, making the effective cutting angle too steep. Holding the burnisher at too high an angle will fold the burr over so far that it doesn't come in contact with the wood at a convenient angle.

Shavings

Scraping plane and hand scraper

No Going Back

Once you learn to sharpen and use a card scraper, you'll reach for it more often and wonder what you ever did without it. Start with regular scrapers in various thicknesses. The thicker the scraper, the heavier the shavings. Then buy some curved ones, including the goose-neck scraper I like to use on shop-made crown mouldings. Soon you'll gain an interest in scraper planes, which make large scraping jobs on flat surfaces easier by giving you two handles and a flat sole to control the cutting action. Being able to plane wood without the usual tear-out issues involved with regular hand planes will make you a believer in no time.

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Kreg Precision Miter Gauge and Band Saw Fence

Kreg Miter Gauge

It's a frustrating fact of woodworking life that most tablesaw mitre gauges and bandsaw fences offer mediocre performance. No wonder there is such a large after-market for these two accessories. The Kreg Tool Company, manufacturer of the highly regarded and widely used Kreg Pocket Hole Joinery system (see review in Canadian Woodworking, Issue #5, Oct/Nov 2001), has recently introduced two new products into the mitre gauge and fence after-market.

Assembly on both of these units is fairly straightforward because of the excellent documentation. Welcome features on the Kreg Gauge include 5 nylon adjustment inserts on the bar that enable snug bar movement along the mitre track (to adjust for inevitable wear) an optional T-Slot washer if your table saw top has a T-Slot in the mitre track; nylon buttons that slide the gauge across the table top; a clever curved flip-stop that allows you to slide the work piece under the stop without having to manually raise the stop out of the way; an adjustable cursor that makes re-alignment of the stop position quick and easy (very handy if you have saw blades of differing thicknesses); a hole and pin system in the handle that enables you to make quick and precise positive stops at +/- 0°, 10°, 22.5°, 30° and 45°; and a vernier scale so that you can make incredibly accurate adjustments in increments of 1/10th of a degree.

The features on the Kreg Fence, are less extensive: nylon buttons that slide the fence across the table top; an adjustable cursor for easy alignment of the stop position; and a fence that is easily adjustable to be parallel to the blade. Two optional but highly recommended accessories are the Micro-Adjuster that lets you dial in very precise fence positions, and a Re-saw Guide that enables you to make drift angle adjustments on the fly as you bandsaw your stock. There is a 4½" guide for 14" band saws and a 7" guide for 16" saws (and 14" saws that use a riser block extension).

Miter gauge with second flip stop

Kreg bandsaw fence

The value of any tool is ultimately a function of its performance. After using both these accessories in the shop for over three months I can recommend the Kreg Gauge with a caveat, and recommend the Kreg Fence without reservation. Their performance is both a function of good design, quality of materials, and good craftsmanship. The fence on the Kreg Gauge was square to the saw blade at both ends, while the movement of the fence was precise without any slop. The pin system in the handle works very well, allowing for quick and easy adjustment from 90° to 45° and back – the two most frequently used positions in most shops. The flip stop is one of the best that I've used – an excellent design. Now for that caveat. The 24" aluminium fence flexes at the end of the fence when cutting long stock – not much, around 1/64", but flex it does. A steel fence might resolve this issue.

The Kreg Fence is a real gem. I mounted it on a 16" Laguna bandsaw, and it works like a dream. What sets this fence apart from the others I've used is the ease of adjusting the fence parallel to the blade, and the convenience of the micro-adjuster. Used in conjunction with the Re-saw Guide and a sharp blade I could quickly align my stock and make precision cuts with ease. An exceptional product.

CWM

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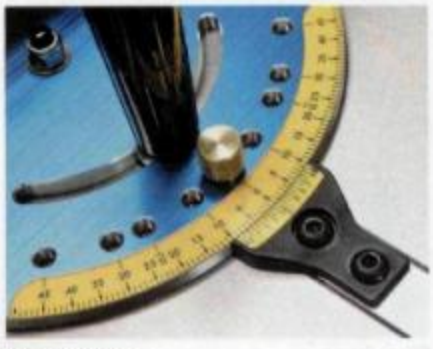


Pin system

Power Tool Maintenance

Power tools face damaging heat and mechanical stress every time they are used.

Even common dust can accumulate in a tool, creating heat build-up and excessive friction, both of which cause the tool to run hotter and wear prematurely.

However, with just a little bit of care and maintenance, your power tools can last you substantially longer.

Replacing Power Cords

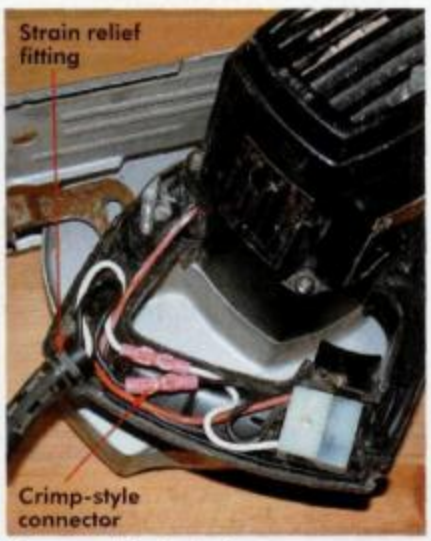
Power cords are one of the first items on a portable power tool to fail. They are subject to substantial use, and sometimes, unexpected amputations. Usually cords are easy to replace. Begin by clearing a workspace; you don't want to lose screws or other small bits in sawdust. At the place where the power cord enters the tool carefully remove all screws that hold the housing to the tool. Remove the damaged cord, taking note of the way it was originally installed. Higher priced tools normally have more easily replaced cords than the less expensive models. In the case of the (inexpensive) saw in the photograph, the power cord is fastened directly to the switch.

Cut the damaged cord close to where it enters the tool, and install a new cord of the same size, properly installing the strain relief fitting. Use either crimp-style butt splice connectors, as in the photograph, or small wire connectors, to reconnect the power cord to the switch. Re-position all of the parts, including the strain relief, the way they came from the factory and re-install the housing screws.

Another method of terminating power cords is shown on the router. This higher quality tool has wires that are terminated in small clamp mechanisms, tightened using a precision screwdriver. When using this fastening method, strip only enough insulation from individual conductors to make the connection. Twist individual conductors together to avoid having any stray strands cause a short circuit later.

If your power cord continually pulls out of your extension cord, try replacing the straight blade ends with either twist lock connectors or one of the new locking cord ends that will keep them snug.

If you use your tools on a job site, you might want to try this: Replace the ends of your power tool cords with the twist lock type, and make one extension cord with the matching end. That way, nobody else will have the matching end on their cords, and you won't be chasing down borrowed tools.



New cord installed

Replacing Brushes

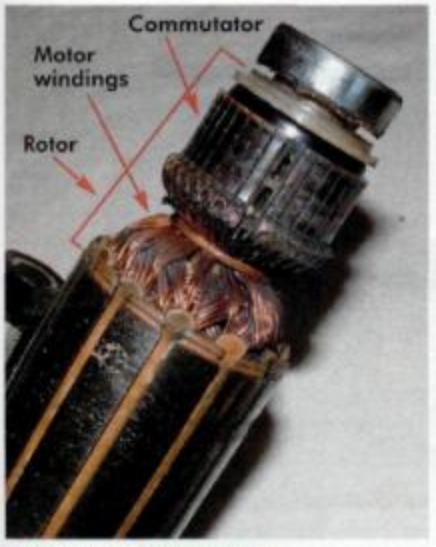
Brushes are often the next item to fail on a power tool. The brushes transfer electricity from the stationary part of the power tool to the rotor, which makes up the core of the motor. When you look into the vent holes near the brushes you will notice some bluish arcing, which is normal. Excessive arcing and power loss in a power tool means the brushes may need replacing.

In the example in the photograph, the brush access is through a couple of non-conductive discs about the size of a nickel.

To remove the old brushes, use a screwdriver to undo these, and you will see the top of the brushes. Sometimes they will fall out if you hold the tool on its side. Remove them and look at them. If they show normal wear, all that is required is to insert a fresh set. Brushes are an inexpensive item and can be ordered from your tool dealer.

If your inspection shows damage beyond normal wear and tear, do more investigating. In the case of this router, the brushes had substantial chunks broken off

Replace brushes



Defective commutator

their leading edges. The only moving part to come into contact with the brushes is the commutator at the top of the rotor, so that is where to look for the cause of the mechanical wear.

The commutator is a band of small copper segments that attach to the ends of the motor windings. These can suffer from a carbon build-up from the arcing. This is removed with a special eraser, obtainable at electrical supply houses. Don't use sandpaper for this; any grit falling off the sandpaper will cause damage inside the motor. Emery cloth is an absolute no-no. The particles on emery cloth conduct electricity, and when these get lodged in the motor they not only cause extreme wear, but also may cause a short circuit and fire.

In the case of the router in the photo, one of the copper segments on the commutator had broken away causing a gap that was breaking sections off the brushes. The only way to repair it is to replace the rotor and install new brushes.

Periodically inspect your tools for dirt and mechanical wear. A blast of compressed air to clean out dust goes a long way toward preventing excessive heat and wear. Keeping the brushes in good shape will keep your tools running at peak efficiency, and replacing damaged and worn power cords reduces chances of getting an unexpected shock.

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Bench Top Lathe

If you've ever wanted to try woodturning, but thought that the space requirements and cost would be too much, think again. Benchtop lathes can take up as little as 12 square feet of floor space, the size of many small closets. Quite a few models can be had for under $300, and the other accessories you will need (turning tools, face guard and the like) will cost under a hundred dollars. So, for about the price of a portable planer, jointer, or mitre saw, you can enjoy the craft of turning.

Sum of its Parts

Before buying a lathe it's a good idea to become familiar with the various components of this rather uncomplicated machine. Benchtop lathes are part of the portable machinery family. They are small enough to be mounted on a work table, and can be somewhat easily moved around the shop. Like all portable machines they are plug and play, operating off a standard 15 amp circuit. Lathes are quiet in operation – you can happily use one in a basement or garage without upsetting your family or neighbours. Benchtop lathes come in a range of sizes and configurations, from the tiny 'miniature lathe' (under 8" high and 24" long), to the 'maxi lathe', like the General 25-100M1, which comes in at a hefty 106 pounds.

There are two kinds of turning that you can do on the lathe: spindle turning, also called 'turning between centers', and face plate turning, also called 'bowl turning'. A spindle is essentially an elongated round object, such as a chair leg or pool cue. You can turn both spindles and bowls on the benchtop lathe. The lathe has two ends, a ridgid base (the bed ways), and a motor.

Headstock and Motor

On the one end of the lathe is the headstock, comprised of a spindle and flywheel, along with a pulley and v-belt. The spindle is the main rotating shaft to which work-holding devices are attached, such as the spur center or face plate. You attach stock to the spindle for bowl turning. The spindle is mounted on precision bearings and passes through the headstock. A pulley is attached to the other end of the spindle, with a v-belt connected to the motor shaft to provide rotational force. The flywheel allows you to manually rotate the spindle. You will notice that a hole goes through the flywheel to the end of the spindle.

Sometimes the spur center is difficult to remove; insert a round punch bar into this hole and gently tap out the spur centre. The distance from the center of the spindle to the top of the bed determines the maximum diameter of a work piece that you can turn on a lathe. This is called the swing. If you plan to exclusively turn bowls and the like, then you'll want the largest swing you can get.

You adjust the speed on the lathe by loosening a belt tensioning knob and moving the v-belt from one step to another on the pulley. Of course, there are benchtop lathes that come with variable speed, but you'll pay a premium for them.

Tail Stock

On the other end of the lathe is the tailstock, comprised of a quill, quill handwheel and a spur live center. Notice that while the headstock is stationary, the tailstock slides along the bed ways. The quill lock lever locks the tailstock in position at any place along the bed, while the quill handwheel allows you to manually turn the quill. You mount long stock in between the tailstock and head stock for spindle turning. As for the spindle on the headstock, there is a hole that goes through the quill to enable you to drill into the end of work. The longest piece of work that can be held between the spur center of the headstock and the live center of the tailstock is called, logically enough, the 'distance between centers'. On a typical benchtop lathe this distance will be from 10" to 15". This is fine for turning tool handles, small legs, door handles and the like, but too short for table legs, bed posts or pool cues.

Carriage and Tool Rest

Turning tools require a solid surface against which they rest while cutting into stock. The tool rest sits atop a moveable carriage, which locks in position at any place along the bed. There are a range of specialized tools rests that you can purchase.

Bed Ways

The ridgid base of the lathe, called the 'bed ways', holds the headstock and tailstock together, along with the motor and the carriage. It also provides the necessary weight to stabilize the lathe.

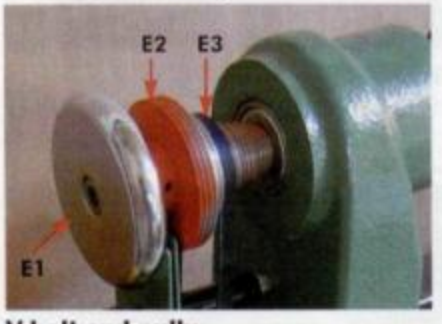
Holding Stock

Most lathes will come pre-packaged with a faceplate, a flat metal plate that is mounted on the spindle to hold irregularly shaped work. It's often used when turning bowls and platters. Stock is attached to the faceplate with screws. A spur center and live center usually come with the lathe as well; these hold stock between the spindle and quill.

Safety Considerations

While we consider the lathe to be one of the easier shop machines to use, it is important that you understand how to use it, and take the necessary safety precautions.

It's good practice to use small stock for your first turning, progressing to larger and more complicated projects. Ensure that you don't allow loose clothing or hair to dangle in front of the lathe; they can easily get caught up. A face shield is a good investment, along with a respirator when you're sanding. After you mount stock on the lathe, and before you switch the motor on, always turn the spindle wheel by hand to ensure that the stock revolves freely. Make sure you are standing to the side before you turn the lathe on; if anything comes off you'll be out of the line of fire. Always start with slow speeds for large stock or awkwardly shaped stock that may be out of balance.



V belt and pully

The General 25-100M1

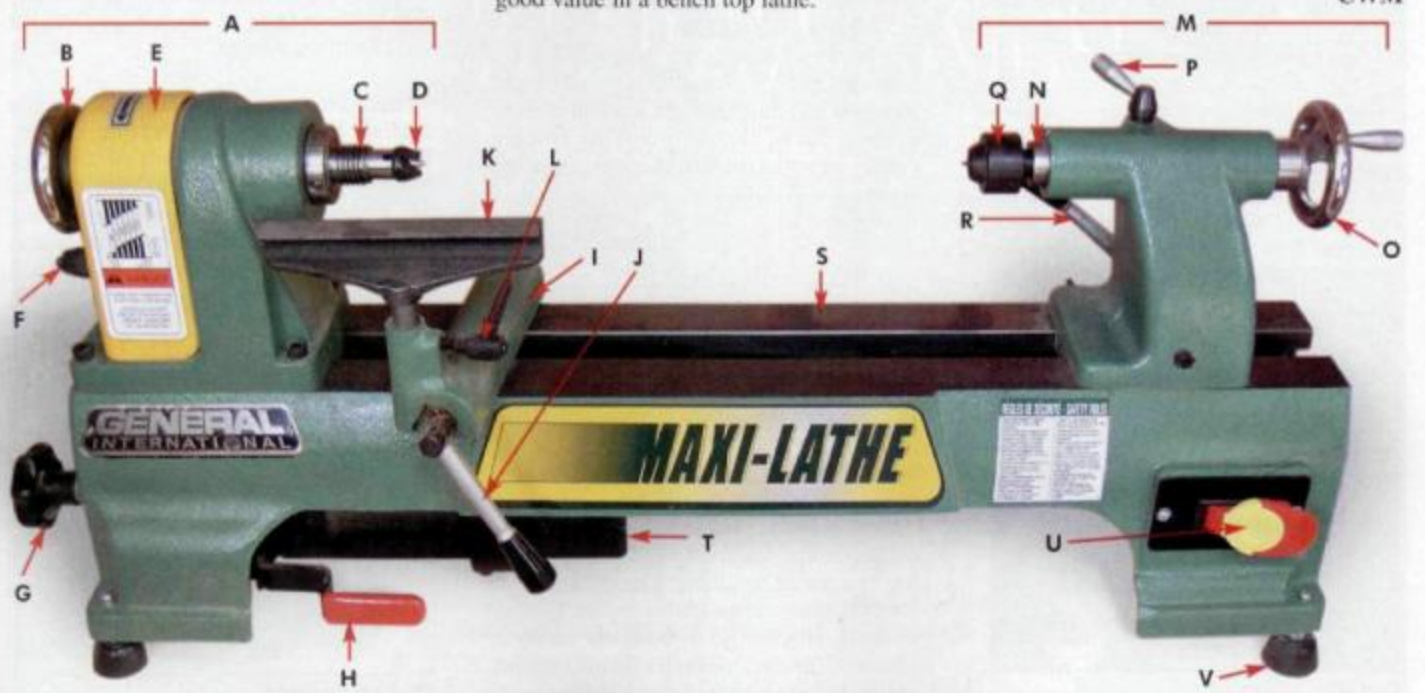
We like the all cast-iron construction of the General, which reduces vibration to a minimum. This is much preferable to models that use a combination of iron and aluminum. In use, we didn't need to bolt the lathe to the bench top. The fly and quill wheels are a nice size, and the levers easy to manipulate. Adjusting spindle speed is a snap. The ½ HP induction motor is smooth and quiet, affording 6 spindle speeds from 480 RPM to 4,023 RPM. A nice touch is having the speed selection instructions on the plastic v-belt cover. The spindle thread is a standard 1" – 8 TPI, which will enable you to use a wide range of aftermarket accessories. The on/off switch is in an optimal location, right up front. At 6½" wide, the General's tool rest is a good size. It rotates smoothly, and the carriage is quick to engage and disengage. You can turn stock up to 7½" over the top of the tool rest carriage, and up to 10" over the bed. Excellent for such a small lathe. The maximum length of stock you can turn is 15", though you can purchase an optional bed extension to expand the distance between centers to 45". This is a great feature that enables you to expand the utility of the General as you develop your turning skills. The General represents very good value in a bench top lathe.

V BELT AND PULLY	
E1	Hole for punch out bar
E2	Pulley
E3	V belt

LATHE PARTS	
A	Headstock
B	Flywheel
C	Spindle
D	Spur center
E	Belt guard
F	Side guard lock lever
G	Belt tension knob
H	Belt tension lever
I	Carriage
J	Carriage lever
K	Tool rest
L	Tool rest lever
M	Endstock
N	Quill
O	Quill handwheel
P	Quill lock lever
Q	Spur live center
R	Tailstock lock knob
S	Bed
T	Motor
U	On/Off switch
V	Feet

In an upcoming article we'll examine lathe tools and other work-holding accessories. We'll also take the General midi lathe through its paces.

CWM



BY CHESTER VAN NESS

Cyclones

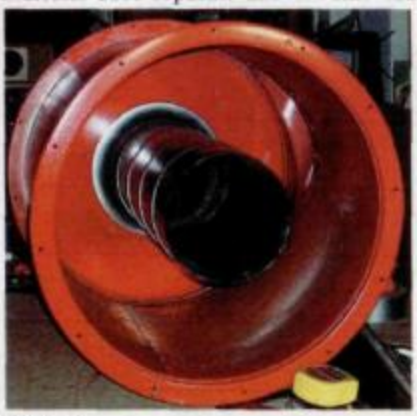
Installed cyclone system

In this article I'll discuss the cyclone dust collector: how and why it works, and what the advantages and disadvantages are for the home hobbyist.

Cyclones have been around for years, predominantly at sawmills, and feed mills. More recently, smaller versions of these dust collectors have become popular for the home workshop. You can purchase them in many different sizes and configurations. You can either purchase the cyclone alone, or as part of a system with a blower, filter and dust bag or box. A number of people that I have talked to over the years have either built one from scratch or tried to modify an existing unit.

The manufactured system typically costs over twice what you would pay for a traditional 'bag over bag' unit with the same horse power. On top of this cost you should also be prepared to spend extra money on piping, as cyclone units are stationary, while bag systems are typically portable. For most bag collectors you can simply connect your machines to it, plug it in and use it. The cyclone system requires more planning. To operate effectively you need to consider the design of the required airflow, volume and pipe sizes.

Bag collectors have a type of cyclone separator built into them to separate the heavy material from the airflow, and drop it out to the lower bag. While not a true cyclone they are semi-efficient; the heavy material does separate and the fine dust travels to a filter bag to be separated from the airflow. Since the heavy material does not pack into the lower bag, and the dust only drops off the filter when the machine shuts down, these units require more maintenance than a true cyclone.



Outlet

Cyclones consist basically of a metal cylinder that sits atop a metal cone. Air with particulate (i.e. wood dust and shavings) enter a pipe in the side of the cylinder and exits through a vertical pipe. There are basically three principles involved in the functioning of a cyclone.

Centrifugal force comes into play as the air carrying dust and shavings enters the cyclone. The air is directed to spin by the design placement of the inlet pipe and the internal shape of the cyclone. The spinning action throws the shavings and dust particles against the wall of the cyclone and out of the mainstream of the air flow. Friction takes over and causes the shavings and dust particles that are riding along the surface of the cyclone's wall to slow down. The cyclone cylinder size and height must be designed properly for the intended airflow and material to allow the shavings and dust the right amount of time to drop out of the airflow. This process carries on as the spinning action carries the shavings and dust down the inside wall of the cone.

As the air exits it must make an abrupt change in direction, turning up and into the vertical pipe located in the center of the cyclone. While air can make this abrupt directional change, the dust and shavings suspended in the airflow cannot. This tends to throw the rest of the particles out of the airflow and they drop down the outlet.

Most small, homeowner types of cyclones, are designed to sit directly over top of a waste container. The cyclone and container have to be sealed for the system to work efficiently, as both are under a vacuum. The cyclone outlet should connect vertically down to the center of the top of the waste container. The materials exiting the cyclone are spinning and will pack themselves into the waste container. To assist this process, the container should be round, and of equal diameter from top to bottom. That makes it easier to empty the waste.

Larger commercial units have rotary air lock vales at the bottom of the cyclone that allow them to be dumped continually into waste bins or trucks without loosing vacuum in the system.

There are a few advantages to using a cyclone in your dust collection system. With a cyclone, nothing but air and very fine dust goes through the fan. So, with no bits of wood, nails, or screws ever making it to the fan blades, damage to the fan is eliminated, and any possibility of sparks in the waste is greatly reduced.

Pre-separator

The discharged air is virtually clean, so the filter will last longer and need less cleanings. Also, since the waste enters spinning, it packs itself into the drum.

Cyclone without blower

The major disadvantages to a cyclone system is that they require about 8 feet of head room, making them impractical if your workshop is in a basement. Also, because of its support structure, the footprint of most cyclones is larger than conventional portable bag over bag collectors.

As a rule, cyclones are not portable and therefore you will have to layout permanent piping to connect the unit to your equipment.

When purchasing a cyclone consider the following:

- The cyclone should be specifically rated for wood dust
- The CFM rating on the cyclone must be adequate for your machinery requirements
- The inlet header should be at least 6" for a 1 HP motor
- The waste barrel should sit directly below the cyclone
- The filter should capture material between .2 and 2.0 microns
- Emptying the filter should not present a safety or health hazard to you
- The location in which the cyclone will be installed must be able to accommodate the weight and height of the unit.

Lastly, cyclones are not for everyone. If you have a small shop and a limited budget, then a small portable unit modified with a good filter bag is probably all you need. If that's the case, then always remember that with all non-cyclone units, everything that enters the dust collection hose goes through the fan.

The manufacturer's installed saftey barrieres should not be removed to improve performance. The added airflow does not make up for the loss of safety .

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Editors Note:

Many of the companies that sell cyclone dust collectors provide a free system design service when you purchase a system. They provide the correct layout, diameter piping and branch arrangement based on the the size of your shop and the size and type of machinery you have. A properly tapered ducting system will ensure that a balanced airflow is delivered to your machines.

BY LAURA MORRIS

White Ash

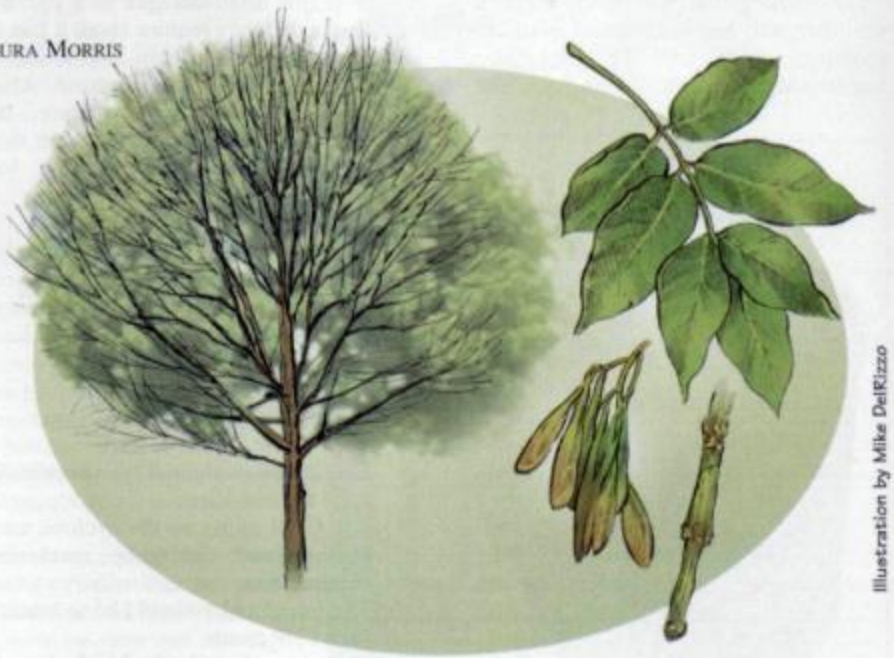

Illustration by Mike DelRizzo

White Ash (Fraxinus americana)

White ash is part of the olive (Oleaceae) family and is one of four ashes native to Canada. Interestingly, ash dosen't grow in stands, but is distributed among other hardwoods like the sugar maple, red oak and butternut. You'll find it scattered through the southern parts of Ontario, Quebec, and New Brunswick, as well as throughout Nova Scotia and Prince Edward Island.

White ash is generally not as tall as sugar maple, but can reach a maximum height of around 100 feet and about 36 inches in diameter.

Uses

White ash is a valued hardwood. Its admirable strength, hardness, and elasticity make it ideal for such products as baseball bats, billiard cues, hockey sticks tool handles, utility furniture, and vehicle and boat parts. This versatile wood is also widely used for fine flooring, cabinetry and furniture.

Physical Properties

Woodworkers appreciate the lustrous look of white ash, as well as the wood's typical straight grain pattern that is similar to red oak. White ash also offers the artisan a coarse texture and an inviting colour, which is usually a creamy white to yellowish sapwood, and a light to medium brown heartwood.

White ash also has great character. It is tough and hard with excellent shock resistance and steam bending qualities, making it a popular choice for making chairs and other furniture pieces which have curved pieces. The wood is fairly stable and dries faster than the norm, with minimal shrinkage when drying. There is no particular odour or taste to the wood. It is, however, susceptible to fungi and beetles.

Working Characteristics

There are many good reasons to work with white ash on your next project. For starters, it responds well to hand tools and machining, leaving a normal dulling effect on equipment. Another benefit to working with white ash is that it has good properties for gluing, nailing and holding screws. That being said, pre-drilling is recommended for optimal results. There is some tendency for the wood to split, so choose your boards carefully.

White Ash

Finally, stain responds wonderfully to this wood. Because of its uneven texture (alternately smooth and coarse) you can stain it to resemble oak. It also looks stellar when ebonized or stained with bright semi-transparent colours. Just keep in mind that stain applied to white ash often comes out a bit brighter. Also, the wood is porous, so pore filler is recommended to achieve that quality finish.

White ash is widely available in both solid and veneer forms, and is moderately priced, at about $4.50 per board foot. If you are looking for a wood that combines both strength and lightness, white ash might just be the best choice for your next project.

LAURA MORRIS
www.lauramorris.ca

Working characteristics

Radial shrinkage	4%
Tangential shrinkage	7 %
Volumetric shrinkage	13%
Weight	40 lbs/cu ft
Crushing strength (max)	6,763 lbs/sq in

Mystique of Handtools

Illustration by Mike DelRizzo

Probably everyone involved with woodworking has noticed the expanded interest in hand tools. Almost all manufacturers, importers, distributors and retailers have caught onto this very unexpected, rapidly expanding market. I say 'unexpected' because, after all, we are in the 21st century, and sophisticated cordless power tools and computer controlled production machinery seem to have taken over the work place.

So, why is there a growing interest in hand tools? In order to understand this phenomenon, we need to look at the virtue or benefit of using hand tools. One of the most outstanding features of using a hand tool is the direct involvement between the person, the tool and the wood. Whereas older hand tools may be collected for their historical or increasing value, new handtools are most likely being purchased to use.

The general increase in the complexity of our daily lives may be driving people to activities that feature more personal control. In using a hand tool the sense of control is both immediate and direct.

Picture the personal control required to use, for example, a hand plane. When you press down on the front of a plane and push it with sufficient force from behind, you will get an instant result. A shaving appears from the plane and you see a smooth surface on the wood. There is no delay in receiving feedback. We could have achieved a similar result in half the time and with considerably less energy, if we had used a hand held electric planer, passed the piece of wood across a joiner or used a thickness planer. This indicates that part of the attraction of using hand tools is the involvement of physical exertion.

Another example will help to unravel this part of the mystery. I have two sons in their 20s who enjoy rock climbing, one of the many extreme sports that is becoming popular these days. In order to keep in shape, to be able to climb the rocks, they rigidly govern their diet and train four times a week. They then drive tremendous distances to have the opportunity to climb natural walls of rock, some reaching 3,000 feet in height. They wear a safety harness and rope, which is clipped into anchors on the rock face. The strength of their fingers and toes and the agility of their bodies propel them to the top. They often wear the skin off their finger tips and callous their hands from pulling on the rock so aggressively. Such behaviour only makes sense when you realize they are not climbing simply to get to the top. If that were their goal they could certainly get there more quickly and efficiently without climbing. No, their desired experience is the climbing itself. When they get to the top, their desire has been fulfilled. It's obvious when they return, satisfied, relieved, relaxed and looking forward to the next climb.

If we apply this example to planing a piece of wood, it might suggest that part of the goal of hand planing is the deliberate intent to expend energy, rather than singularly trying to achieve a planed surface on the board. If part of our motivation is to expend energy, using the joiner or the planer defeats the purpose. It is the physical exertion required in using hand tools that allows an opportunity to shed feelings of stress and anxiety.

When I was I young boy, I went through a particularly difficult time at school. I came home one day, bored, depressed and angry. My mother gave me a hatchet and a large block of wood and suggested that I hack away. The result was a lot of perspiration, a few chips, and a much more relaxed me. Maybe a similar process is at work when you chop out a mortise with a chisel and mallet or engage in a similar task.

By using hand tools we not only become more involved in the creative process, we also benefit from the rejuvenating effects of relieving frustration and stress.

In this rapidly changing world, with all its stresses and tensions, hand tools offer us a way to let go of all the concerns and turmoils of everyday life. They also give us a way to be more actively involved in, and rewarded by, the creative process.

If you are not already doing so, try incorporating hand tools into your woodworking. You will soon find that you are not just using a tool to effect wood. Rather you will discover that you are working with the tool to the benefit of both your project and your self.

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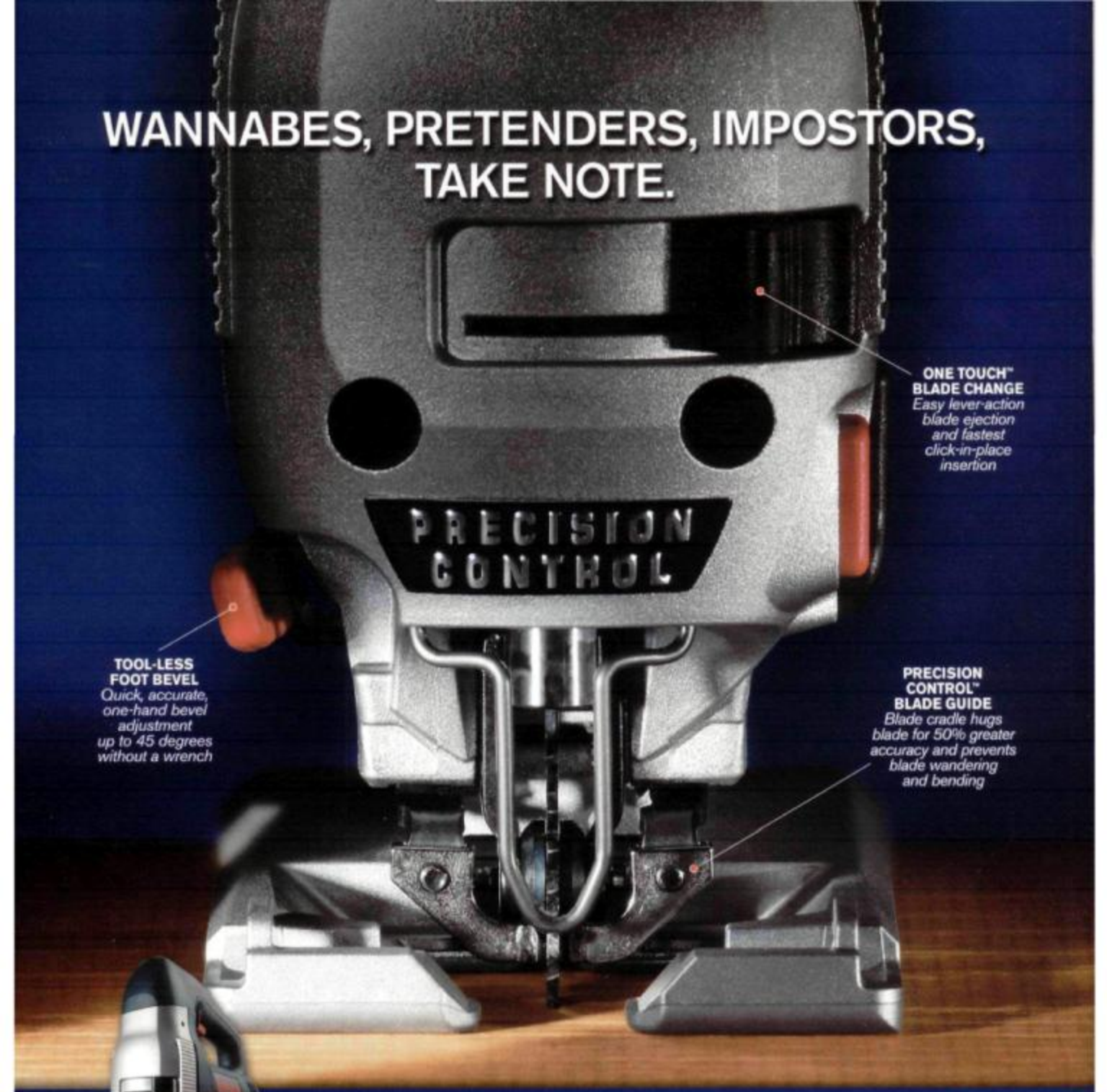

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