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Floor lamp p44



Patio planter p38



Kendama p60

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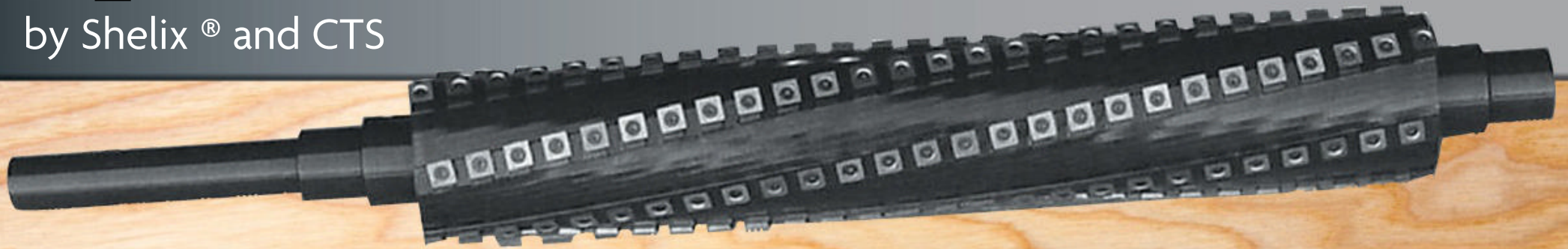
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**WOOD
CRAFT
SUPPLIES**

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Jan/Feb 2022



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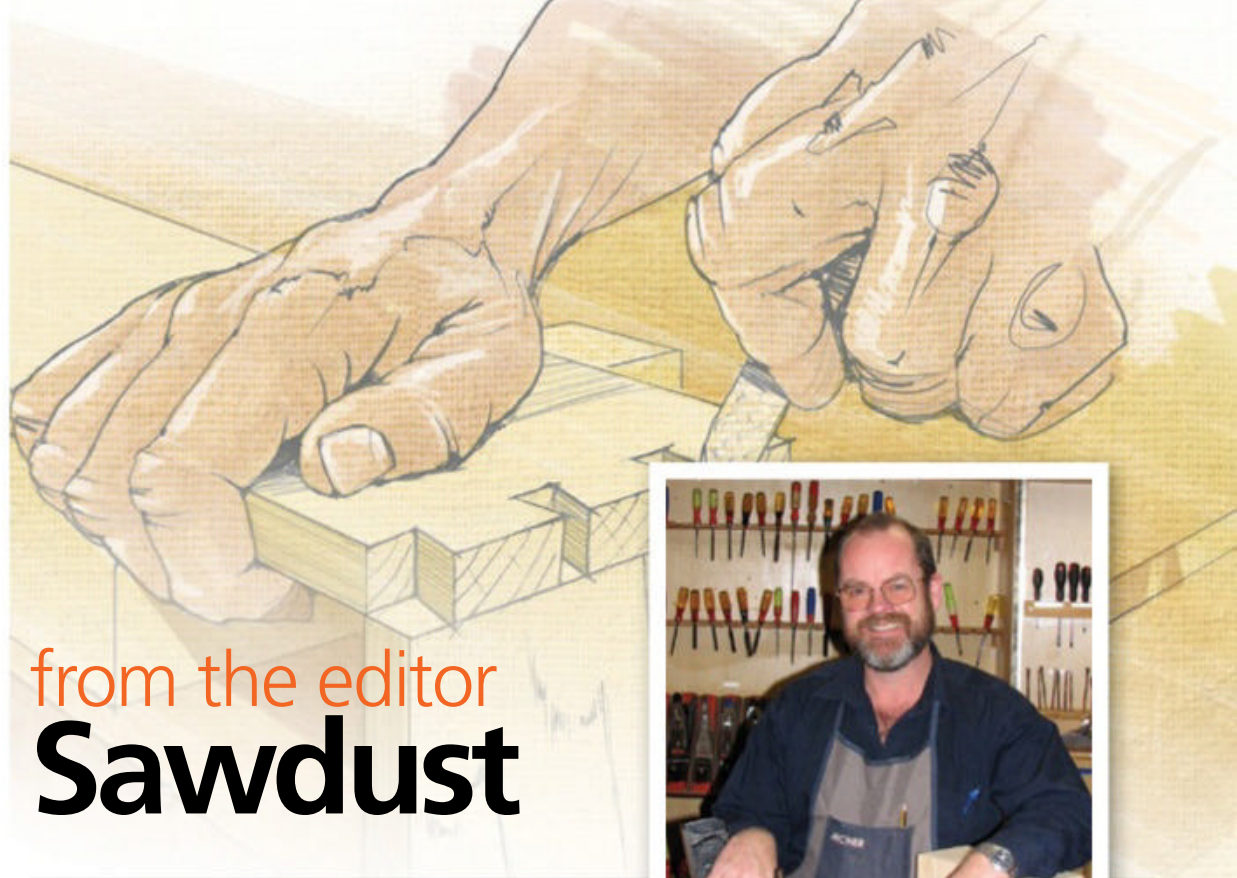
Empire Chest of Drawers..... 50

Split turning is the key feature in this chest.

woodturning

Kendama..... 60

A traditional toy that builds skills in both the maker and the player!



from the editor Sawdust



The weeping penstock that runs along Laughing Jack Road near Derwent Bridge in Tasmania is a sight to behold (see page 20). It is hard to appreciate how much straight-grained King Billy pine was used to cooper the huge pipe that transports water from the Clarence River to Bronte Lagoon. Coopering was once an essential industry. In the Age of Sail, barrels of all sizes were crafted for the transport of salted horse, sauerkraut, rum and gunpowder. Stevedores would pack firkins and kilderkins between barrels and hogsheads so cargo didn't shift in a storm. In some ways a ship can be seen as a half barrel filled with barrels. The ability of oak to be split with wooden wedges, steam bent and then crafted into watertight vessels allowed the Vikings, the Portuguese, the Spanish and then the British to build empires.

It is hard to underestimate how important the coopers' and shipwrights' crafts once were. The patio planter we build on page 38 pays homage to this lost art.

Reviewing Jennie Alexander's wonderful *Make a Chair from a Tree* was a real pleasure. Splitting green wood with wedges and then riving rungs with a froe and a drawknife is a truly zen way of engaging with woodwork; no power tools or sandpaper required. Just like the clever Shakers who inspired Jennie, the Jennie Chair takes you back to a simpler time when chairs were crafted by hand.

Happy woodworking!

Chris

Chris Clark, Editor

Australian Woodsmith acknowledges the Cammeraygal people, Traditional Custodians of the land on which this publication is produced, and pay our respects to their Elders past and present. We extend that respect to all Aboriginal and Torres Strait Islander peoples today.



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This symbol lets you know there's information online at: www.australianwoodsmith.com.au. There you'll see bonus cutting diagrams, articles on techniques, jigs and a lot more. If you don't have access to the internet, contact us on (02) 9439 1955.



STICKY TACK PAINTER POINTS

I was looking for a way to hold some small chess pieces in place while flocking the bottom. Blu-Tack to the rescue! It not only temporarily secures

the pieces, but it's the perfect solution to keep from marring up any of the finish I had already applied.

Marc Hopkins

Tips & Techniques



EVEN PRESSURE

In a moment of inspiration I thought of a quick tip to get even pressure when challenged with a large glue-up. By layering a couple of pieces of painter's tape in the centre of a board being used as a caul, I

created a "crown." This allows for the pressure to start in the centre of the caul ensuring even pressure when tightening down on your clamps.

Chris Fitch

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SAFETY IN THE WORKSHOP

Safety devices, such as riving knives, guards on table saws and guards over router bits have been deliberately left out of the line drawings in *Australian Woodsmith* projects in order to make them easier to follow. It goes without saying that where safety devices have been supplied by the manufacturers you should use them. We encourage the use of push sticks as good work practice.

Exercise vigilance and the greatest of care when using power tools, whether stationary or portable. Keep all your tools sharp and well maintained. Wear protective eyewear, a dust mask and a hearing protector when appropriate. By limiting distractions and developing safe work practices you will go a long way to avoiding workshop accidents. So, work safe fellow woodworkers. -Editor



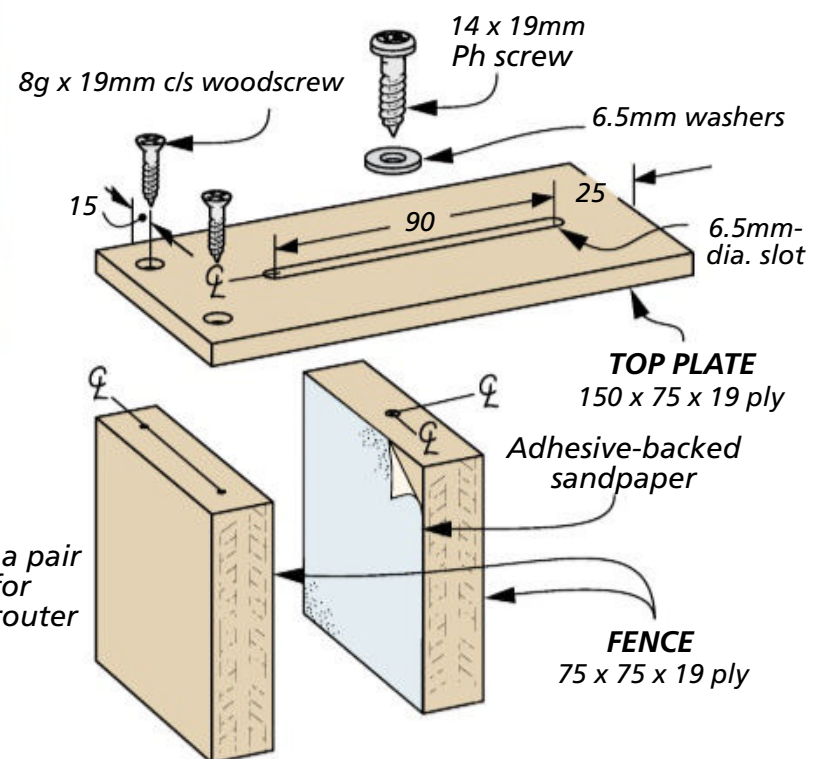
ADJUSTABLE ROUTER STOP BLOCK

There are occasions when I need to rout multiple mortises in a large workpiece. A recent project was a bed headboard. Instead of laying out the mortises and trying to eyeball where to stop routing, I decided to make a few stops that I could use with my router. You can see the stops in the photo at left.

SIMPLE, BUT IT WORKS. The construction of the stop blocks is easy. The stops are an easy build from plywood. A fixed front fence is attached to a top plate. The movable fence is attached to the top plate with a screw through a slot. This way, the stop block works with a wide range of workpiece thicknesses. The inside of the stops are lined with adhesive-backed sandpaper for extra grip.

To use the stops, I position them by aligning my router bit with my mortises. Then, I can use a couple of F-clamps to hold the stops in place.

John Doyle



NOTE: Make a pair of stops for positioning router

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TIGHTEN LOOSE MITRE BARS

I found that some manufactured mitre bars have a little play when placed in the slots of my table saw. To fix this problem, I used a strip of aluminium duct tape. The tape can be placed over the bar to take up the slack, but still slides easily and smoothly through the mitre slot.

Carol Holly

QUICK TIP

VICE GUARDS

This grey felt was thrown out after a company installed an air conditioning unit in a mall. It is perfect for vice guards especially for setting up hinges where you do not want to mar the finish. I don't know what it is called as there is no printing on it. It allows you to use sufficient force to hold the box lid, etc in

a vice without it moving, it also allows you to hold odd-shaped objects firmly without distorting them. I assume it has soundproofing capabilities. It is without a doubt the best thing I have used for this purpose. Ever.

Bruce Burton



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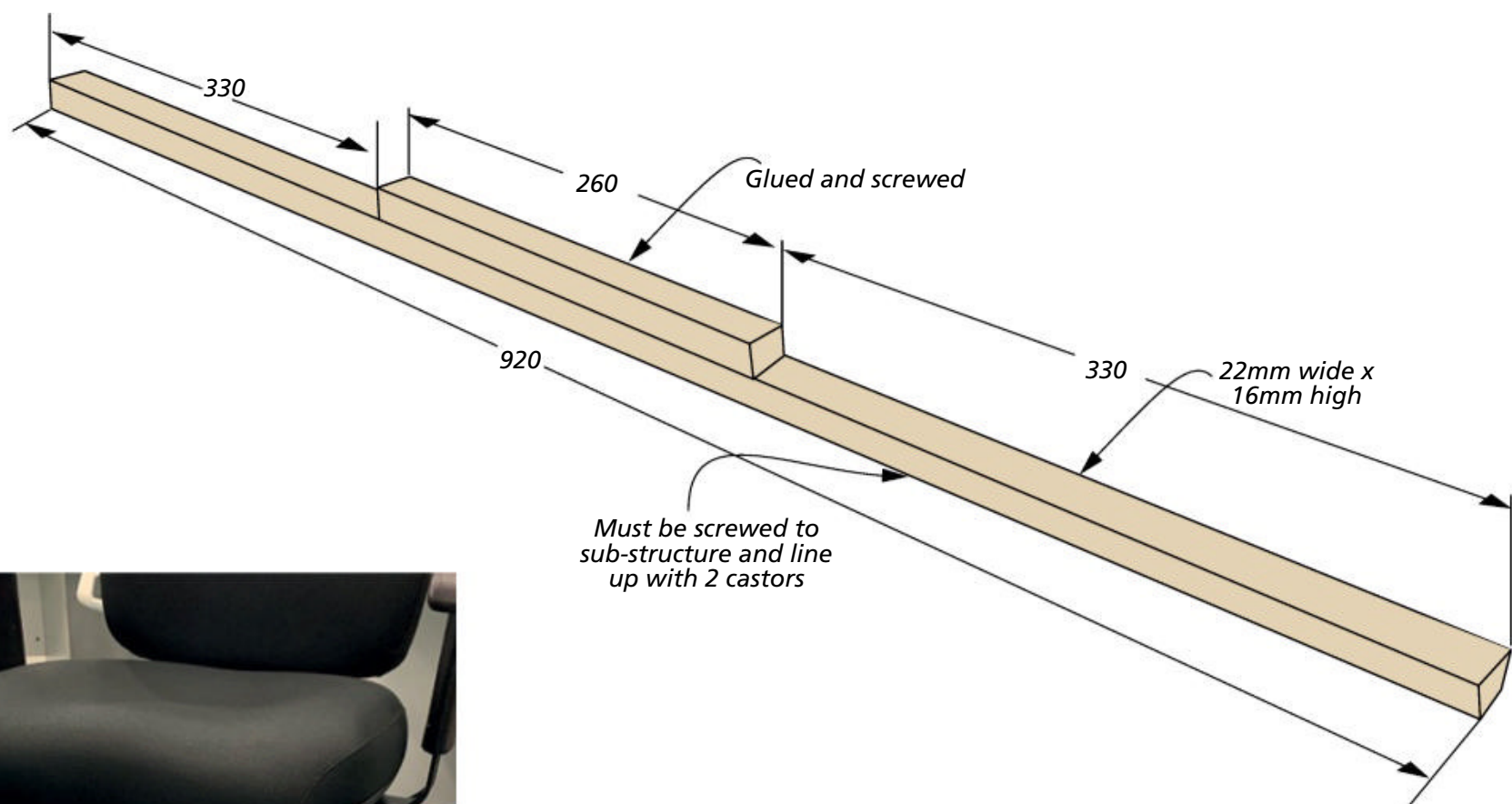
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CHAIR RAIL

I sell chairs and recently “invented” this device to help old, frail and physically disabled people. It secures a chair in situ so people can get in and out and move back and forth safely from a dinner table or desk. How it works. – It is a long piece of wood with a stopper in the middle (I simply call it a stick). It needs to be screwed to a sub structure and lined up with 2 chair castors. The width and height (thickness) of the stick must be machined to match the groove in the centre of the castor (most castors are the same). The photo at left shows the stick

screwed (from beneath) to a floor mat. You can find hard floor mats (no spikes) and carpet floor mats (with spikes) on the market. If the chair rail goes on to plush carpet or carpet with underlay, it will need to be screwed to 18mm-thick craft wood/chipboard. The closest thing that does the same job is up to \$1,400, a special chair with a complicated swivel lock mechanism.

This is a great use for your scrap timber and can help a frail friend or family member to enjoy eating at the same table as the rest of the crowd.

Paul van Lieshout



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HOW TO PLANE THIN PARTS

Nothing goes to waste in my workshop. At the moment, exotic offcuts get recycled into Kumiko trivets and lamp shades. Tweaking the thin sections used in kumiko is easily done if you have a non-

slip mat and a sharp plane. It is a game changer because the thin sections lay flat on the mat and lock down firmly with the pressure of a plane.

Brian Davey

DUST-FREE GLASSES

Looking for my glasses is a frustration in the workshop. One day, I was about to bin a used cleaning wipe container when I had a thought. If I screwed the container to my tool rack I could use it to both store my glasses and hang my earmuffs! It might look like a simple tip, however it has solved two storage problems and proactively upcycled another piece of plastic waste.

Jose Correra



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Next issue of *Australian Woodsmith* on sale 10th February 2022 - Issue 168



In our next issue we take you step-by-step through the process of making a crooked carving knife and then we challenge you to use your knife to carve a bowl. We profile a new way to cut dovetail spline joints and then present a Shaker-inspired sewing cabinet to showcase your dovetailing skills. The designer project is a traditional Mexican Campeche chair that incorporates a curved curule seat. We show you how to make the most of flush cut bits in the crafting of the curule components. The weekend project is a contemporary-styled bathroom cart that makes the most of a small space. The woodturning skill we showcase is the making of drawer pulls. As usual we feature clever tips and techniques from our generous readers.



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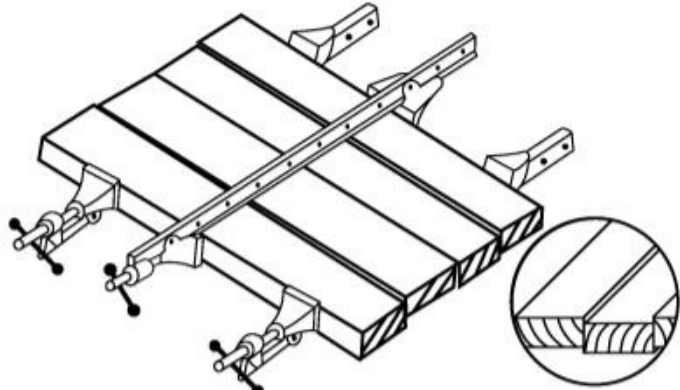
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Boys' Toys, Books & Gear

CARVING TOOL SHARPENING JIG

Honing a razor-sharp edge on a straight blade is a relatively simple action: all you do is nest the blade against the stone, lift it up a fraction, lock your wrist and hone. This process is near impossible to achieve when honing the curve of a gouge by hand. As you can see, this clever honing jig locks the gouge in place, allowing you to roll and hone the curved edge to perfection. The jig can also be used to hone V-gouges. This process requires the removal of the rocker foot and the insertion of two short and one long threaded sections into the tool holder. The V-gouge can then be mounted in the holder and the

blade introduced to the stone for honing, pivoting to the opposite side creates an exact duplicate of the honing angle. This clever jig also can be configured to hone straight edged chisels. This is done by inverting the rocker so that it acts as two feet instead of a curved contact. The blade is then inserted into the clamp, extended until the honing angle is arrived at and then locked down. The jig works best if its foot (in any of its three possible geometric configurations) nests at the same height as the surface of the stone. A very clever jig indeed! Available from Carroll's Woodcraft Supplies (cwsonline.com.au).



HOCK CHEF KNIFE KITS

Hock Tools has been making premium plane blades and breakers since 1981. Over the years the company has developed hardening and tempering techniques that allow their O1 and A2 blades to be ground and honed to a razor-sharp AND long-lasting edge.

Upgrading your plane can be as simple as just replacing the old plane blade (instead of buying a whole new plane). Hock Tools has engaged a French manufacturer of cutlery to make knife blades from their O1 grade tool steel (the O stands for the oil that is used to quench the high carbon steel). The 5" and 8" knife kits are supplied with three 1/4" pins and the instructions you should follow to make and attach your own scales.

Knife making is a growing hobby. I spent a weekend with Nordic Edge smithing my own blade and have gone on to replacing most of the scales on my kitchen knives (see Issues 164 and 165). I was pleased to see that Lie-Nielsen Toolworks Australia has added the Hock Chef Knife Kits to their catalogue. The curly birch handle block featured in the photo comes from Nordic Edge.

If you don't have a special piece of burl to fashion your scales from you should go to the Nordic Edge website and see what can be done with mammoth tusk! (lie-nielsen.com.au and nordicedge.com.au)

Robert Sorby
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U BEAUT PEARL HIDE GLUE

Three years ago, the Davis gelatine factory in New Zealand suffered a catastrophic fire, depriving luthiers of a locally sourced hide glue. The good news is that U Beaut granulated hide glue is back.

When I called Jim Carroll (Carroll's Woodcraft Supplies) to order some more hide glue I also asked him if he could supply a replacement pot to melt the glue in. His advice was to purchase a baby bottle warmer and use it as a melting pot.

Bottle warmers are more common than hide glue pots and both work on the same water bath principle. All you need is a glass jar that is a similar diameter to a baby bottle and the rest is simple.



As you can see, I marked 50 and 100ml volume lines on the jar, poured 50ml of water into the jar and then topped it up (to the 100ml line) with pearl hide glue. The next step was to pop the jar in the bottle warmer and then carefully fill the

warmer with cold water to a level 10mm above the 100ml mark. Twenty minutes on the maximum setting had the glue looking like honey. U Beaut Pearl Hide Glue is available from Carroll's Woodcraft Supplies (cwsonline.com.au).

MAKING A CHAIR FROM A TREE

by Jennie Alexander

John Alexander wrote the first edition of this groundbreaking book way back in 1978. John was a lawyer who distilled a deep appreciation of Shaker design principles into what has become the iconic "Jennie Chair" featured on the cover.

This third edition from Lost Art Press updates techniques and celebrates the life of a great chairmaker. Life is complicated. John transitioned to Jennie aged 77. Her friends and past pupils who helped update this edition refer to her as JA in the book (Jennie died in 2018 aged 88).

The book starts with ways to access straight grained hickory or white oak



logs. The main source for JA and the classes she taught was logs supplied by local arborists commissioned to remove ornamental trees. These logs were split (while green) with wedges and then rived along the grain with a froe.

The book goes into great detail on how to use drawknives, spokeshaves

and scrapers to craft the rungs, legs and back rests. JA crafted a chair stick that recorded the position of each rung and slat mortise so that the chairs would all conform to the same design.

Boring the mortises for the rungs was done horizontally and in such a way that rungs cleverly lock each other together. JA did not use sandpaper; she scraped each surface smooth and then buffed each component with a handful of shavings. Her preferred finish was walnut oil and citrus oil mixed 50/50, wiped on with a cloth and then buffed by hand.

Make a Chair from a Tree has inspired generations of chairmakers around the world and has deservedly become a classic. Available from Lie Nielsen Toolworks Australia (lie-nielsen.com.au).

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IKEDA NOBEX SAW BLADES

When it was time to replace the blade in our old Nobex Champion frame saw we decided to upgrade to a Japanese-made Ikeda tooth Nobex blade.

Unlike a typical Japanese saw blade, the Ikeda tooth blade is designed to cut on the push stroke. The challenge I set myself was to use the frame saw freehand to cut 36 London-style dovetails in upcycled 28mm-thick radiata pine

(it was 30mm thick but needed to be dressed to clean it up).

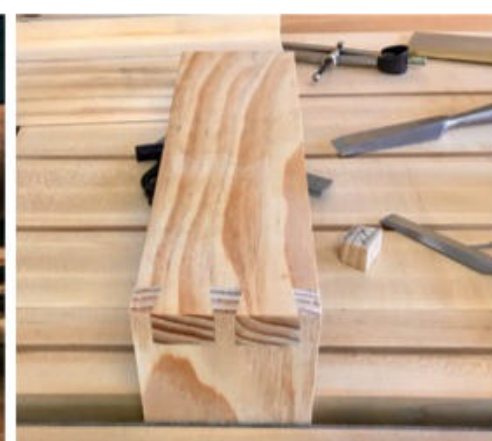
I was amazed at how quickly the Japanese sawtooth geometry cut each pin (four careful strokes is all it took). This blade is a gem! We have two Swedish-made Nobex Champion mitre boxes in our workshop, one is twenty years and the other just 10. As you can see, when we use the frame saw freehand, we tape

the guides to the front frame, crank the tightening bolt and saw away. Over the years both saws have lost their plastic handles and have needed replacements. If you have a Nobex Champion mitre box you should consider upgrading your blade to an Ikeda (and have a go at using the saw freehand). Available from Carroll's Woodcraft Supplies (cwsonline.com.au).



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Willo

Where There's a Will. A charity that is developing paths towards inclusion for the neurodiverse in every community.



▲ **Before and After.** Will with a handful of renovated bats and the amazing art that returns to his address.

issues have not stopped Will from loving life and making the most of his twin passions, cricket and using his hands to make things.

CRICKET

Will's love for cricket has him bowling at the local Robertson nets and joining in "The Last Over" with Robertson's third grade cricket team.

It takes a village to raise a child. This adage rings true for the community at Robertson in the Southern Highlands of NSW. Since 2013 Will's love for cricket has been celebrated at the end of a match by him being invited to bowl "The Last Over". Both teams return to the oval and clap Will on and off. It was while watching a game of cricket that Ange spoke to a friend and developed the idea of Will renovating old cricket bats and turning them into usable objects. Pretty soon the idea of using them as a canvas for artistic expression took hold.



▲ Will patiently sanding away the wear and tear of a couple of seasons at the crease.

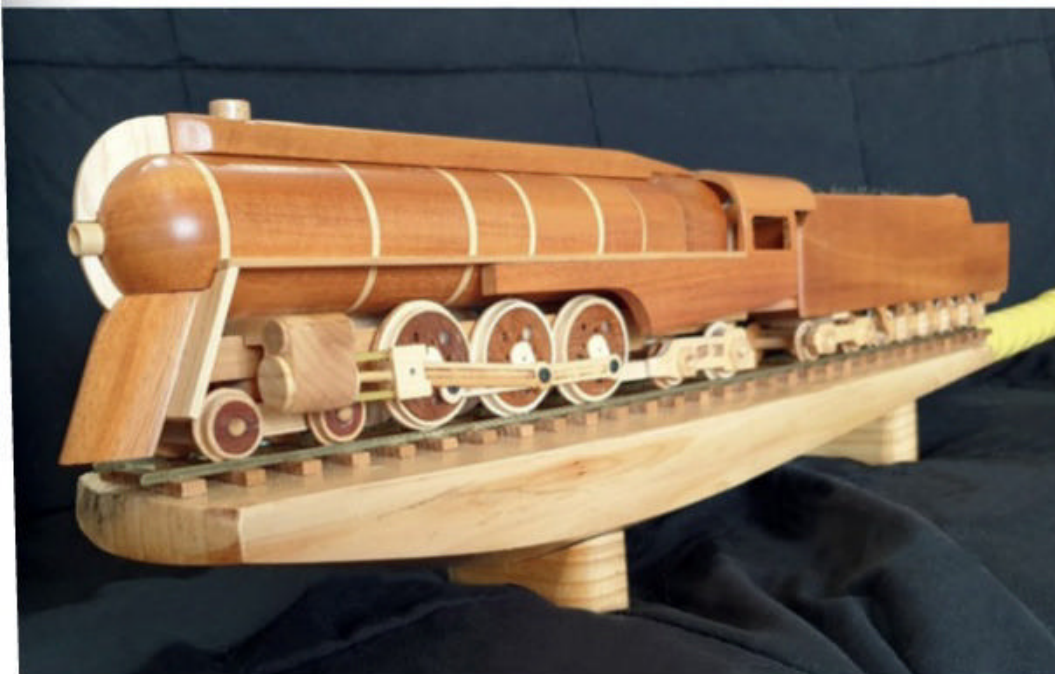


Ange and her son William both wear the same infectious smile. Twenty-five years ago, Ange Clarke brought William into this world. Little did she know what a journey the last 25 years would be and how her beautiful bundle of joy would galvanise a community. Ange is a fierce advocate for Will and has gone out on a limb many times to get her autistic son included in both his schooling, and later, wider community life.

Autism manifests itself with a spectrum of challenges for those born with this neurodiverse condition. For Will it includes an inability to read and write, delayed language abilities and challenges regarding reasoning, sequential planning and peer interaction. These



▲ James McMaster, Ange Clarke (CEO of Where There's a Will), John Kennis (President of the Robertson Men's Shed).



▲ The NYC Hudson from *Australian Woodsmith* 161 mounted on a cricket bat. The Governor General of Australia (and patron for Willo) has accepted this gift and it will be on display at Admiralty House in Sydney.

ROBERTSON MEN'S SHED

There are lots of people involved in Will's journey. Robertson Men's Shed was a space that Will used to sand his bats back to raw willow. James McMaster brought Where There's a Will (Willo) to the attention of *Australian Woodsmith* when he sent us an email that included an exceptionally well-made model of the NYC Hudson mounted on a cricket bat made by the Men's Shed and donated to Willo.

In the email James outlined the charity and the hope that other Men's Sheds would find the Wills (and Anges) in their community and develop ways to include them in their creative and sporting pursuits. James explained that Willo "sets out to inspire communities to lean

into disability and turn fear and ignorance into acceptance and understanding. They use a unique and successful process of inspiring artists and community members to paint cricket bats that have been refurbished by people living with intellectual challenges. These cricket bats are then sold/auctioned to raise funds for the charity."

IKNOWWILL

Ange met up with a local artist, Peter Browne, who quickly volunteered to paint a bat and to get his network of "Artists without Borders" onboard with the charity. Ange was bowled over by the response and soon had enough bats to mount an exhibition. That exhibition was hosted by the International Cricket

Hall of Fame/The Bradman Foundation on Will's 21st birthday. The event was attended by 300 locals, with an auction of bats to fund a workplace for Willo and momentum to allow Will and others to work more independently.

Since then, Where There's a Will has collected, refurbished and sent on more than 750 bats to artists around Australia and beyond. The charity has legs and is striving to get the message out that inclusion is the best way forward for the neurodiverse who live in our communities.

Ange Clarke is a force of nature, a fantastic mother and a great Australian. You will weep with pain and joy when you read her and Will's story on the Willo website (wheretheresawill.org.au Scroll down to "Read Will's Story"). **W**



▲ Artists from across Australia have donated their time and talent to the cause. The Robertson pub is the place to see the bats.



▲ Ben Quilty is just one of many well known artists who have come to know Will and to paint a bat for Willo.

Clever Cooperage

Taraibune, miso vats, fire buckets and marker bouys are all products of the cooper's craft.

Coopers have been crafting barrels, vats and all things round from wooden staves for thousands of years. At some time in the past a clever cooper found that oak staves cleaved from a log along the medullary rays produced a more waterproof barrel. Since then, oak barrels used to make wine (and then whiskey) have been made out of staves cleaved from quartered logs. In the past most wet and dry goods were stored and transported

in wooden barrels of varying sizes. Today (in the west) it is only wine that is aged in barrels. Stainless steel and plastic storage containers have made the cooper's craft almost redundant.



Taraibune are a traditional Japanese craft from Sado Island. They are used to gather seaweed, abalone and clams.

TARAIBUNE

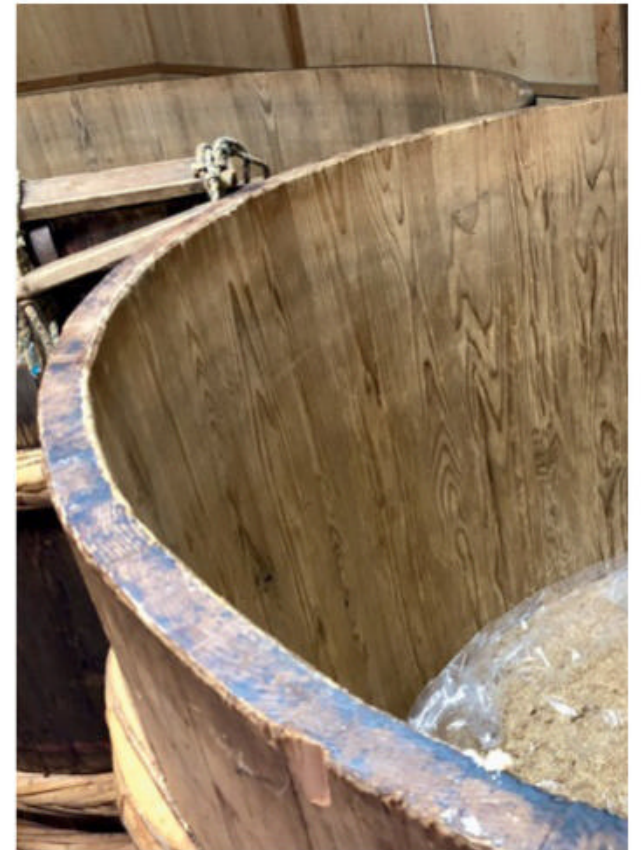
In Japan the cooper's skills are still prized. Any visit to a bathhouse will find you dousing yourself with water from a wooden bucket (while sitting on a wooden stool).

When you visit a temple, you may find a huge wooden vat filled with water and a pyramid of fire buckets stacked on top ready for action. The local sake brewery may use wooden vats to ferment the rice, while traditional miso is still fermented in huge cedar vats.

One very interesting use of the cooper's skills is the crafting of wooden tub boats on Sado Island. In issue 165 we reviewed Douglas Brooks' fabulous *Japanese Wooden Boatbuilding*. In chapter 9 Douglas documents the steps he followed in his apprenticeship with a local tub boat builder, Mr Koichi Fujii. Mr Fujii was a third-generation miso vat cooper who had retired aged 56 and had taken up the building and repair of the local tub boats. These boats were used for the harvesting of kelp, abalone and other shellfish, mostly by women. The



▲ The Ishii miso brewery has been making miso in tall wooden vats since 1868. Traditional braided bamboo hoops are now replaced with threaded steel rods.



▲ Soybean paste is fermented for up to three years in expertly-crafted breathable but waterproof vats.

boats are propelled by a paddle, with a stone counterweight used to balance the boat when the fisherfolk focus on the task at hand. The wooden box you can see has a glass bottom and is used to sight the kelp and clam beds. Besides the obvious craft of coopering the cedar staves so they are watertight, the other skill that Mr. Fujii had was to braid bamboo into hoops. This was his main task when he worked in the miso brewery. If you look carefully, you will notice that

taraibune are oval and not round. This is because they were originally designed to be carried across stony beaches on the back (like a turtle), plus it makes them more navigable. A quirk of Japanese tax rules is that the tubs are not boats and so do not incur any tax!

HUON PINE MARKER BOUYS

Cooper, Hooper, Blacksmith and Sawyer are all names that reflect the trade background of past generations. Cooperage is one of many lost trades worth

honouring. The buoy below can be found at the Low Head Maritime Museum at the head of the Tamar River. What is so amazing about this buoy is that it could have seen tall ships pass 150 years ago. The coopers who crafted it knew their business, they would have steamed the double tapered Huon pine staves and moulded them to make this elongated barrel shape as watertight as a wine cask. Very clever indeed. [W](#)



▲ A Japanese fire extinguisher. Fifteen buckets patiently waiting to empty the vat below.



▲ Huon pine marker bouys were used on the Tamar River from 1835 to 1960. Coopers crafted these amazing symmetrical bouys out of 19mm-thick double tapered staves.



Wooden Penstock

Wooden penstock is an amazing hybrid of the cooper's craft. The flexibility of the huge wooden pipes allows them to snake across the Tasmanian landscape.

Traditionally penstock was a word used to describe the pens that water was diverted into as storage ponds to be tapped when required to run water wheels.

Penstock is now a term used to describe the large-diameter pipes that run from a reservoir to a hydroelectric plant. Often, they are short concrete pipes that run down a dam wall; however, they can also be kilometres long and snake across a landscape until a suitable dramatic fall allows for the production of hydroelectric power.

Today the penstock that moves water from a reservoir to a power plant is mostly made of steel or concrete. In the past it was made with wooden staves. One advantage of coopered penstock was that it used existing labour and skill sets and did not require heavy machinery to install.

PENSTOCK COOPERAGE

Huge wooden vats (held together with iron hoops) are a common sight when visiting paper mills along the coast of British Columbia. Douglas fir staves held in place by staggered iron hoops hold the chemicals required to treat pulp when making paper. The same Douglas fir was also used in Canada and the US

to make wooden penstock for hydroelectric power stations.

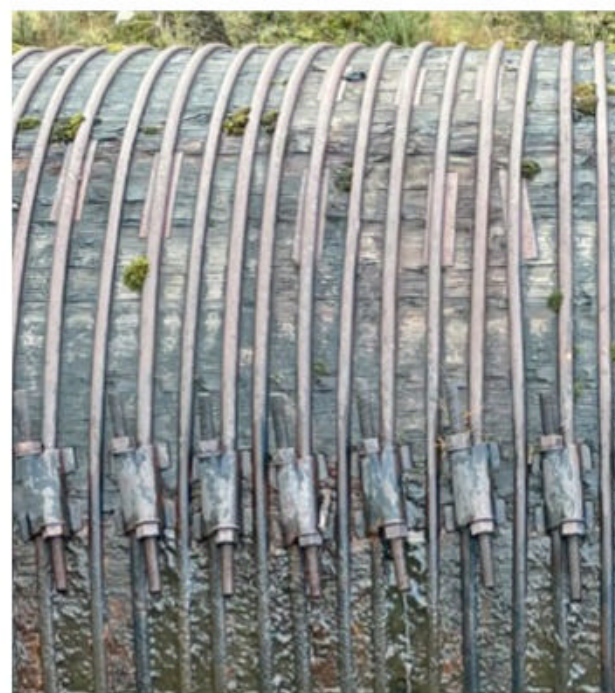
In 1913 the Australian Woodpipe Company was commissioned to manufacture the penstock for the Lake Margaret power scheme (near Zeehan on the west coast of Tasmania). The general manager of the company rejected the use of locally sourced King Billy pine, instead recommending tried and proven Douglas fir

from Canada. Imported staves were shipped across to Tasmania and then sent by train from Strahan to Lake Margaret.

The pipe section on the bottom of the facing page is on display at the Zeehan Heritage Centre and has a label on it that proved the general manager wrong. The Douglas fir deteriorated in the Australian sun and had to be replaced in 1938 with King Billy pine!



▲ This wooden penstock carries water from the Clarence river to Bronte Lagoon, Tasmania.



▲ Notice the steel sheet "Band-Aids" wedged under the hoops. These have been inserted to stop leaks.



▲ Greg Duncan rescued this section of King Billy pine penstock, polished it up, and now uses it as the counter at "The Wall" gallery.



▲ The wooden penstock featured on these pages runs beside Laughing Jack Road, off the Lyell Highway, east of Derwent Bridge.

LAUGHING JACK ROAD

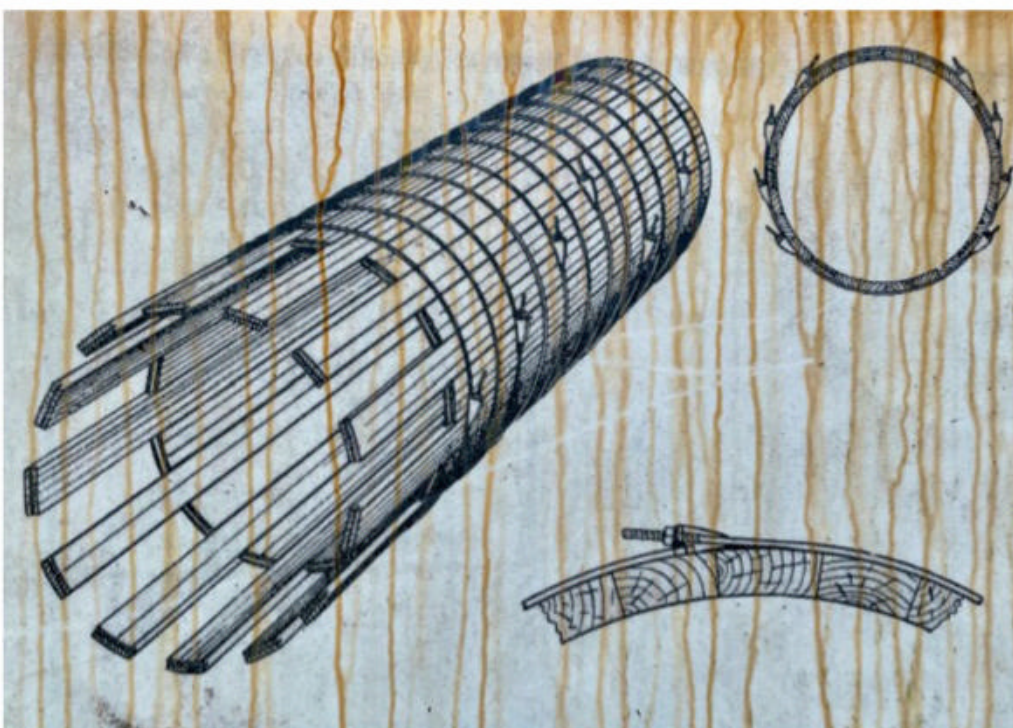
When you walk into "The Wall" gallery (just outside Derwent Bridge off the Lyell Highway) the first thing that greets you is a magnificent section of recycled Lake Margaret Power Station penstock (after 70 years of service the King Billy pine staves were replaced with Alaskan yellow cedar). The King Billy staves have been polished to perfection and the iron hoops spun around so they don't catch on visitors' clothing. It is hard to believe that such high grade luthiers' timbers were used to make

so many kilometers of Tasmanian penstock! After an hour enjoying the awesome Huon pine bas-relief carvings on display I asked Daniel Duncan if there was any penstock to be seen nearby? Daniel told me to turn right when I got to the Bronte Park sign and drive on to Laughing Jack Road.

As you can see, the penstock that runs beside the road is supported on concrete saddles. The natural flexibility of the wooden staves allows the penstock to follow the contours of the land. Water pressure keeps the staves pressed hard

against the iron hoops. The waterlogged King Billy pine weeps constantly, and "self-heals", occasionally springing a leak. If you look closely at the 68-year-old penstock you will notice wooden wedges and sheet iron "Band-Aids" have been inserted to stop leaks.

Wooden penstock is a creature of its time. It requires mainly manpower and timber, iron hoops and lots of blood, sweat and tears to create. Today timber is scarce and labour is expensive. Concrete and steel do not require a cooper's skills! **W**



▲ The advantage of wooden pipes is that they can arrive as a flat pack and be assembled onsite with a minimum of heavy machinery.



▲ This section of Lake Margaret penstock was originally made from Douglas fir. In 1938 it was rebuilt with King Billy pine staves.

True Grit: Sandpaper



Silicon Carbide

Silicon carbide is one of the hardest sanding media and it fractures as it wears. This means it produces fresh cutting surfaces so it continues to cut well down to the paper. Often used in wet sanding applications.

Garnet

One of the oldest media, garnet works well on wood. However, the grains dull as they wear, which tends to lead to quick wearing sandpaper. Some argue that garnet leaves the best surface.

Aluminium Oxide

Probably the most common abrasive, used extensively in power and hand sanding applications. Works well for wood and softer metals. Grains fracture as they wear and produce sharp cutting edges.

Zirconium

Heavy grit used on coarse belts and discs. It's the choice for heavy stock removal, but often comes with a higher pricetag. On the flip side, it lasts longer than aluminium oxide.

Ceramic

The addition of ceramic particles to aluminium oxide produces a long-lasting grit that works well on hardwoods and hard metals. It may leave too deep of scratches on softwoods.

Note: Colour does not indicate grit type. Refer to manufacturers' material for grit identification.

The old adage that you get what you pay for holds true of many things in the workshop. And that statement may be the most accurate when it comes to sandpaper. This woodwork must-have is easy to overlook. Because, let's face it. Nobody in their right mind enjoys sanding. But, with a quality sandpaper, and the right type for the job, sanding can be a little more bearable.

Here, I'd like to take a look at what makes a quality sandpaper. Then, I'd like to show you the types of sandpaper that I always have on hand in my workshop.

THE MEDIA

When it comes to sandpaper, the media (grit) is where the rubber meets the road so to speak. So, I figure that is a good place to start examining sandpaper.

You may not give a lot of thought into the grit composition when picking out sandpaper, but you should. Different types of media have different properties. Some of them fracture quickly and provide fresh, sharp cutting action throughout the life of the sandpaper. Others don't break down but instead turn "dull."

TYPES OF MEDIA. The chart to the left shows the most common types of sanding media and outlines some of their properties. The most common that you'll find for woodworking is aluminium oxide. It works well for both hand and power sanding.

Silicon carbide is another common abrasive. It's often used on paper that's labelled "wet-dry". The quick-fracturing grit works well for high-grit sandpaper and final hand sanding.

BACKING MATERIAL

The next important decision in choosing sandpaper is choosing the backing that your media is bonded to. Sandpaper isn't just paper-backed anymore.

PAPER. Paper-backed is the most com-

mon type of sandpaper. Paper backing is available in different weights. Weights A-C are lightweight and ideal for hand sanding. Paper weights D-G are heavier and made for machine sanding. The benefits of paper backing include being the most economical to produce and it is the lowest friction, reducing heat build-up.

CLOTH & FILM. One step up from paper backing is cloth and film. Both of these backings will come in a variety of weights, much like paper. (This is also where I would group some of the mesh sandpapers.) The benefits of cloth and film include being more flexible, they're tougher for machine sanding applications and they can also be used wet.

FOAM. Finally, one of my favourite backers for hand sanding — foam. Generally, foam is only for hand sanding (there are some exceptions). It's the most flexible backer and can be used wet or dry.

GLUE & COATING

The last key to choosing sandpaper is selecting the coating on the paper and choosing a paper that has a quality glue holding it together.

COATING. The amount of coating on sandpaper is referred to as either open, semi-open or closed. And that refers to the amount of the surface of the paper that is covered with grit. Open paper is about half covered with grit. Semi-open is about 75% covered. And closed paper is about 95% covered. The more open the paper, the less likely the paper is to clog up with sawdust.

GLUE. The adhesive that holds the media to the paper isn't something that's talked about often, but it certainly plays a role in how a piece of paper performs. A low quality (or old adhesive) will crack and the grit may even peel off the backing material. So, make sure your paper isn't old and crusty. The best quality papers use a resin adhesive.



▲ In my workshop, these are a handful of the different sanding media I keep on hand.

Now that we've talked about what to look for when purchasing sandpaper, I want to talk about what types of sanding supplies I always keep on hand in my workshop. I'm not super brand-specific with most things, but I've found that my favourite brand of sandpaper is Mirka. It's a brand our local woodworking supply store carries and it has quickly become my favourite. It's a little bit more expensive than other papers, but I find it saves me time in the long run while sanding.

POWER SANDING

In my workshop, I love hand tools. But, when it comes to sanding, nothing beats my random orbit sander. I like to have sanding discs in 120, 150 and 220-grit. I probably have some 320 and 400 grit floating around as well, but I generally keep that high of grit for hand-sanding (more on that in a bit).

GOLD & IRIDIUM. The two sanding discs that I use can be seen below. The Mirka Gold and Iridium are my choice. Both are aluminium oxide with an open coating, but the Iridium has some ceramic content so it lasts a little longer. I've also found the ceramic makes it cut a little more aggressively. If dust collection is your priority while sanding, the



▲ For hand sanding, I like a foam sanding pad that helps even out sanding pressure. The Goldflex is more flexible and cuts fast. The denser Norton SoftTouch pad is stiffer and allows you to match the radius of curved parts.

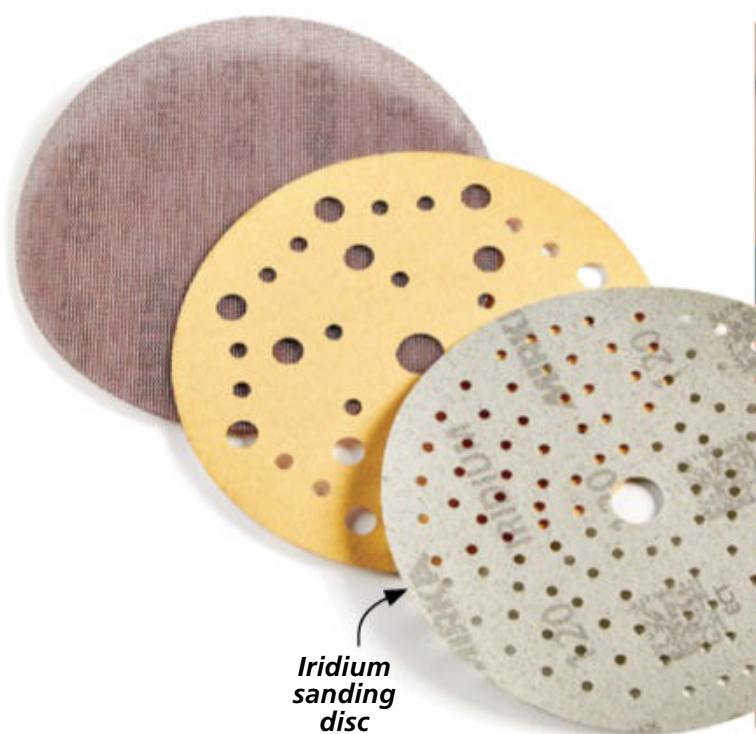
Abranet (also shown below) works very well. Personally, I make sure I keep a stash of Iridium in my workshop.

HAND SANDING

After I'm done with my ROS, I usually go to hand-sanding for an ultra-smooth finish. This can be done with sheets of paper, but recently my favourite has been foam-backed sanding pads, as they are easier to conform to detail (photo above).

GOLDFLEX PADS. The pads that I keep on hand are the Goldflex pads in 240 and 320 grid. I also have some Norton SoftTouch pads floating around my workshop and they work well also. The Norton foam is a little denser than the Goldflex.

For sanding larger, flat areas I like to use a sanding block. The rubber blocks I use have teeth meant to grip the edges of sheets of paper. Using sheets with the teeth is a pain in the



► For power sanding, I prefer to use the ceramic-mixture Iridium pad, because I find it lasts longer than other styles.





▲ Adhesive-backed sandpaper works well on items like mitre gauge fences where you need a little extra grip.

butt if you ask me. Instead, I like to load them up with my next must-have sandpaper — PSA paper.

PSA ROLLS

Pressure Sensitive Adhesive (PSA) abrasive papers are a game changer! Its "peal and stick" nature allows it to be used as a non-slip face on jigs and bespoke sanding profiles. Once you have used it you will buy it by the roll.

SANDING, SURE. Sure, PSA paper is great for sanding. I stick it on hardwood sand-

ing blocks and my rubber blocks and it works great. (I use Mirka Basecut in 9.5m x 115mm rolls because of local availability, but the other PSA rolls work just as well.)

OTHER USES. The beauty of the PSA rolls however, are their other uses. I keep a strip stuck to my outfeed table to place my sharpening stones on to keep them from sliding. In addition, anywhere you need extra grip (like a mitre gauge fence, shown above), is the perfect spot for it. The uses are countless.

SPECIALTY PAPER

Finally, I keep a collection of specialty paper on hand for certain tasks. Most specifically, I keep a handful of high-grit papers around for sanding finishes. Microstar 800 and 1000 grit covers almost all of my needs. It's a film-backed media that is aluminium oxide, and it can be used wet or dry. I suggest getting discs so that you can hand or power sand with them. You can see these below.

The next time you're in your workshop, take a look at the back of the sandpaper that you have on hand. You'll see some markings on there designating some of the things I talked about, like the grit type and the backing weight. And while you're looking also ask yourself if you're happy with the way that your current sandpaper works. If you are — great! But, if you think you could upgrade your sanding time just a little bit, do yourself a favour and go out and select some quality sandpaper using the insight you gained here. **W**



▶ Ultra-high grit sandpaper isn't something you need every day. But when you have a finish that needs sanding, you'll be thankful that you have some on hand.



Using Hide Glue

One of the keys to a successful wood-working project is assembling all the parts into a whole that stands the test of time. More often than not, some type of adhesive is used to hold everything together. And one glue that's stood that

test of time is hide glue. I know what you're thinking, hide glue is for traditionalists, or maybe you're thinking it's too troublesome to use. Well, I'm hoping to give you enough information about its uses and advantages to give it a shot on your next project.

WHAT IT IS

Hide glue has been used by furniture makers for centuries. It gets its name from the fact that the glue is made from the collagen protein found in animal hides (horse or cow hides). Traditional hide glue is usually sold in dry, granular form, like you see in the photo at left.

◀ Hide glue comes in different quantities, strengths and clarities (left). The dried glue is bagged in pearl or crystal form, as seen at left.



MAKING GLUE. Before it can be used, the glue must be soaked in water and then heated in a glue pot until it liquifies. Sounds like a hassle, right? Well, it's not as bad as it sounds and I'll talk more about that a little bit later.

ADVANTAGES. First I'd like to give you some reasons to use hide glue. One of the key reasons to use hide glue is that the glue bond can be reversed by soaking the joint in warm water, making it possible to disassemble a joint, if necessary. For this reason, hide glue is used by musical instrument makers and restorers of antique furniture.

Another advantage is that hide glue doesn't "creep" like polyvinyl acetate (PVA) glue. And unlike PVA glue, it also sands easily and will accept most stains and finishes.

Despite these advantages, the major downside for most woodworkers, as I

mentioned earlier, is that traditional hide glue has to be mixed and heated before use.

A couple of others are it tends to set up within minutes (which is a plus in some cases), and once mixed it has a limited shelf life.

LIQUID HIDE GLUE

To get around these inconveniences, Franklin International developed a liquid hide glue product in 1935, as shown in the photo below. By adding urea and other chemicals to traditional, hot hide glue, the glue remains liquid, even when it's at room temperature. This means you can use it straight out of the bottle, just like a standard glue.

Another brand of liquid hide glue is Old Brown Glue, which is shown in the photo at right. Old Brown is a little closer to traditional hide glue in that the only extra ingredient is urea. Unlike Titebond, which stays liquid at most temperatures, Old Brown will gel when the temperature gets below about 27°C. To get it ready for use you'll need to keep the bottle in a jar of warm water while you're working with it, as in the right margin photo.



OTHER ADVANTAGES

The convenience of use is the main advantage of liquid hide glue, but it also has some other advantages. The key one for me is its longer open time. Titebond hide glue doubles the open time (the time you need to join pieces together) of typical PVA glues to around 6-8 minutes and Old Brown is a 30-minute open time.

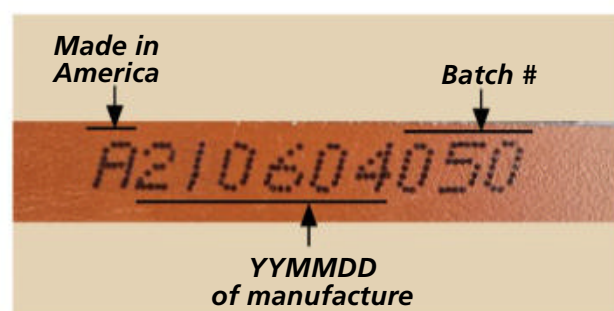
If you've ever had a complex project to assemble, you can appreciate the advantages. The extra working time gives you a better opportunity to position parts just right and then tighten all of the clamps before the glue starts to set up.

Another upside is that for most wood species, the glue lines will blend perfectly. And if you do end up with any glue smudges, the hide glue will be nearly invisible, even after you apply a stain or finish to the project.

DOWNSIDES

As you might expect, there are a few disadvantages. For starters, you'll need to keep your clamps in place longer. This gives time for the water to evaporate. I plan assemblies at the end of the day. This way, everything can dry overnight and I won't get anxious to continue when I shouldn't.

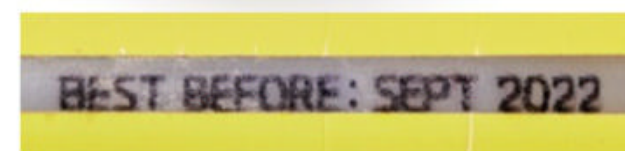
The reversability of the glue joint with heat and water means that it's best to use hide glue for indoor projects. And the additives used to create liquid hide glue decrease its strength, but I've never found this to be a problem. The glue is still strong enough for most furniture projects.



◀ Titebond is ready to go out of the bottle and doesn't require warming. You'll need to decode the manufacturing date (above) of the glue to ensure you're within the recommended two-year time frame.



Old Brown goes on more easily by keeping it in a jar of warm water (upper photo). The expiration date is key to ensure the glue is still good (lower photo).



One thing I do make sure to be aware of both when buying and using liquid hide glue is its shelf life. Like any glue, liquid hide glues aren't good forever.

Old Brown advertises an 18-month shelf life and they print the "Good Until" date right on the bottle. A quick glance at the bottle is all it takes to know if the glue is still good for use (photo above).

Titebond has a shelf life of 24 months. You'll need to decipher the code printed on the bottle to determine when it was made, though. In the code shown at left, the 'A' means it was made in America. The next six digits designate the YYMMDD of manufacture. So this bottle was manufactured on June 4, 2021, making it good until that same date in 2023. The last three digits are the batch number.

Finally, liquid hide glue costs a little more. In the grand scheme of things, the difference isn't enough to make it a key decision in choosing which glue I'm going to use on a project.

That covers liquid hide glue, but I did promise to get back to basic hide glue. For more on using it, turn the page.

THE PROCESS

I've found liquid hide glue to be the best option for the type of work I do since it offers many of the benefits as hot hide glue, like reversibility. But working with hot hide glue allows you to choose the characteristics you need for the task at hand. Plus, you can make exactly what you need using a simple process.

CHARACTERISTICS. While you can get down in the weeds learning about hide glues, in my opinion there are really two key characteristics woodworkers need to keep in mind. And that's hide glue's gram strength and clarity.

Hide glue comes in a wide range of gram strengths. The higher the gram strength, the stronger the cured glue is and the shorter its working time. This gram strength range varies, but most woodworkers will typically use hide glue with a gram strength of 192 or 251.

A gram strength of 251 will set up in about a minute, which is great for gluing up panels (more on this later). I like a little more working time so I like the 192.

As for clarity, a high clarity hide glue will have less visible glue lines. This is important for lighter coloured woods.

GETTING STARTED. Hide glues will typically come with instructions, but they boil down to a simple process of soaking the hide glue in cold water until all



- ▲ Following the ratio of water and glue recommended by the manufacturer is a good starting point. Add the glue to the water, stirring it in as you go to ensure everything is thoroughly mixed.

the water has been absorbed by the glue and then heating up the mixture. Of course, there are a few details that will help make the process a success.

SOAKING. Each hide glue has a recommended ratio of water to glue. For the 192 I use, that ratio is around 2 parts water to 1 part glue. The water should be cold and clean. To minimise any clumping and speed the process along, add the water to the glue pot and then slowly add the glue, stirring it into the water as you do this (photo above).

After you've done this a few times, you'll find that you can simplify the process by adding the glue to the pot and then adding just enough cold water to cover the glue. This ends up being pretty close to the correct ratio and avoids the hassle of the measuring process.

ADDING THE HEAT. Once the glue absorbs the water it'll look a bit like a gel, as shown in the lower left photo. Next, plug in your glue pot and let things heat up for 10 to 15 minutes.

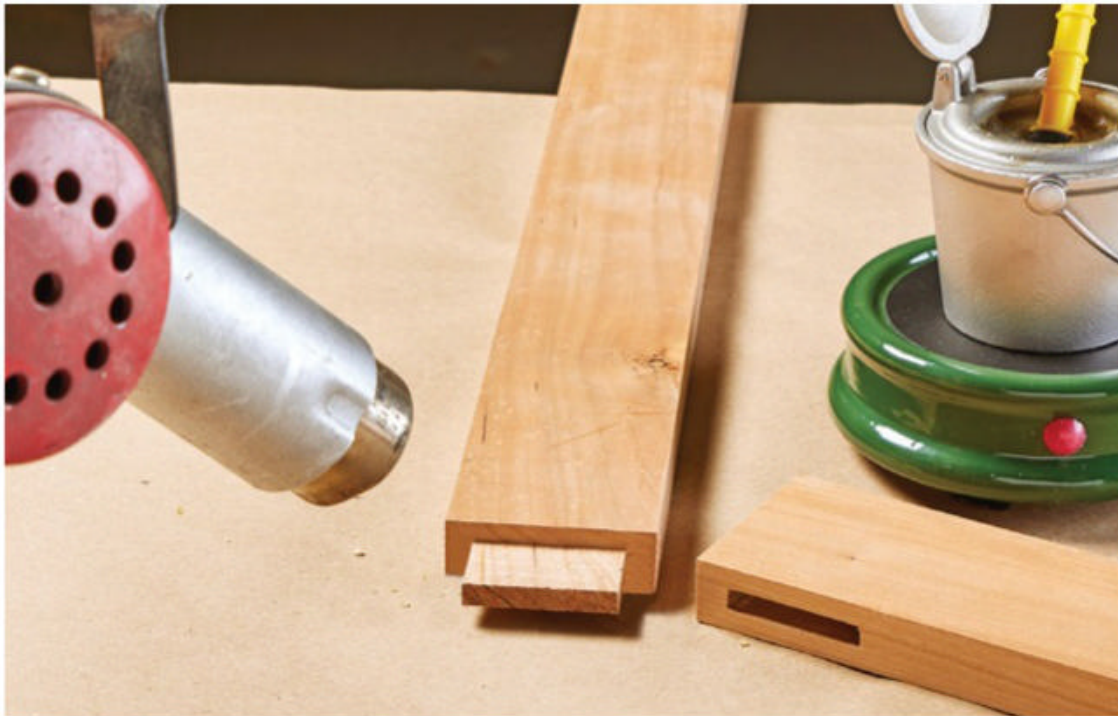
The mixture dissolves quickly in the



- ▲ You'll need to give the glue and water time to combine. When the mixture "gels" up, you're ready to turn it into hot hide glue.



- ▲ Adding heat is the final step to creating hot hide glue. A dedicated glue pot is great, but a simple double boiler set-up works as well. The key is to maintain a temperature of about 20°C.



- ▲ To ensure you have time to assemble multiple joints for a project, you can warm up the workpieces before applying glue. A heat gun or a hairdryer works well for this.



- ▲ Once parts of the joint are warmed up, spread the glue and assemble the joints as quickly as possible. Add the clamps and then wait for the glue to dry.

range of 43 to 65°C and will have a consistency of warm maple syrup. Just be sure to avoid heating the glue above 65°C. Besides increasing the evaporation rate of the water, it affects the protein in the glue and weakens the bond.

At this point, the glue is ready to use. It's best that the materials you plan on gluing be above 24°C degrees. I've used a heat gun to warm the parts up before applying the glue (photos above).

As mentioned earlier, hide glue cleans up easily with water and a rag. Although

hide glue has little effect on stains and finishes, I find it best to remove as much of the excess glue as possible.

RUB JOINTS. As I mentioned earlier, hide glue begins to set up almost immediately. This makes hide glue a great choice for gluing up panels using a rub joint, like you see in the photo below. After adding glue to the edges of each panel, place the two together and begin to rub the two along the joint line to squeeze out the excess glue.

At first, the two pieces will slide back

and forth easily, but it won't take long for the parts to begin grabbing. At this point, position the two parts, aligning the edges and ends. You can now remove the assembly from the vice and set it aside to allow the glue to dry completely, without the need for any clamps. It typically takes 24-48 hours for the glue to reach its final strength, but parts can be handled in a few hours.

CHEMISTRY. One of the benefits of hide glue is you can change its working characteristics by applying a little chemistry. One characteristic you can change is how fast the glue sets.

To buy a little time, you add salt or urea to the mixture. The amount varies depending on how much extra working time you want but it's best to experiment by adding up to 15% by weight. This should increase the open time to about 5 minutes or so. Of course, there's a downside. Adding anything to the hide glue to change its working characteristics typically reduces its strength. Regardless, for most situations, the glue is still going to be stronger than the wood itself.

There are more ways to change the characteristics of hide glue and you can learn more about them by doing a quick search online, but this gets you started.

FINAL DETAILS. Over time I've found myself turning to hide glue as my adhesive of choice for woodworking projects, specifically liquid hide glue. I think its advantages outweigh any downsides. For your next project, give hide glue a shot. I think you just might like it. **W**



- ▲ To create a rub joint, press the two edges with glue together, forcing the excess glue out by sliding the workpieces back and forth. As the glue begins to set, align the faces and edges and you're done.

Router Trenching Jigs

A hand-held router is a great tool for cutting trenches and grooves, especially on large or wide panels. The key is using a straightedge and a properly sized router bit.

Over the years, I've had the oppor-

tunity to use a number of methods and jigs for routing trenches. Each has its benefits and drawbacks but in the end, the results speak for themselves: straight, tight-fitting trenches and grooves that look factory-made.

CLAMPING STRAIGHTEDGE

One of the simplest ways to get straight trenches every time is to use a clamping straightedge, as in the photo on the previous page. These clamps quickly adapt to the width of the panel and lock securely without the need for additional clamps to hold them in place.

CALCULATING THE OFFSET. The main disadvantage of using a straightedge for this application is that you can't align it with the layout line for the location of the trench. Since the router base rides against the edge of the straightedge, you need to measure the offset from the edge of the router base to the edge of the router bit in order to locate the straightedge.

An easy solution to this problem is to attach an auxiliary fence to the clamp head, as shown in the photo on the previous page. After you make a pass with the router, you're left with a trench in the fence that you can use to quickly align with trench layout lines to position the straightedge the proper distance.

ROUTING TIPS. From here, it's just a matter of routing the trench (see the illustration below). Just be sure to use the same size router bit whenever you use this set-up. I also like to make sure that the same point on the router base is always against the fence. There's no guarantee that the



▲ A workshop-made T-square makes easy work of routing trenches of four different widths. The offset auxiliary router baseplate is the key. Each of the four edges of the baseplate positions the centreline of the trench in a different location.

router's baseplate is perfectly centred on the router, so orienting the router the same way ensures a consistently straight trench.

WORKSHOP-MADE T-SQUARE

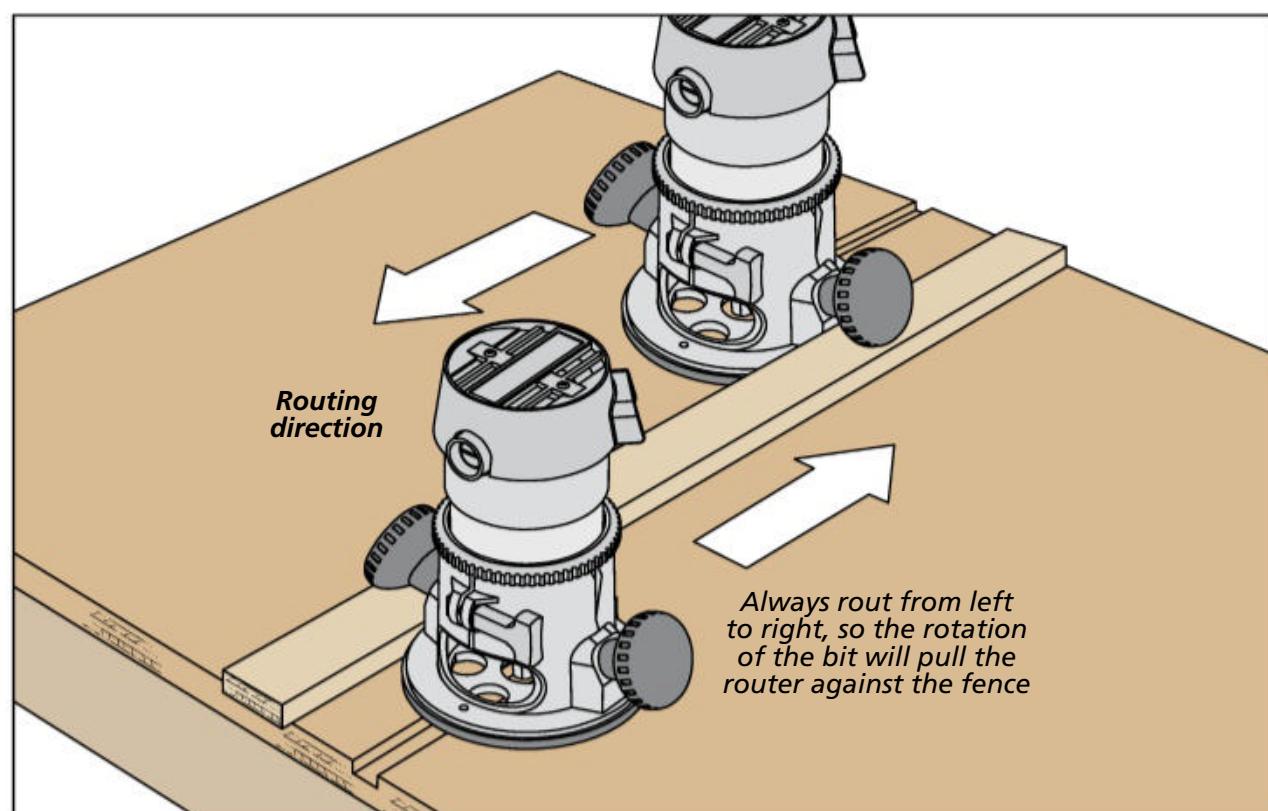
A versatile variation on this straightedge

set-up is shown in the photo above. It utilises a custom, offset router baseplate. With the appropriate size of router bit, you can rout four different trench widths depending on which edge of the base is riding along the straightedge.

The baseplate is a piece of 6mm acrylic (200 x 190). The centre of the 26mm hole for the router bit is located 76mm from the short edge and 89mm from the long edge. Then it's a matter of drilling holes to match your router's base to attach the baseplate. The photo above shows you where to place the markings for each trench width and orientation arrows. I use a permanent marker.

The fence for the T-square is made of 19mm plywood and the cleat is 19mm hardwood. The cleat is fastened to one end of the fence with glue and screws. Just make sure it's square to the fence before the glue sets.

Now, it's just a matter of routing trenches in the cleat. Just be sure to use the proper diameter bit based on the orientation of the baseplate.





▲ Dual fences are positioned on the workpiece using a spacer to accurately set the width of the trench. Check the spacing at each end before tightening clamps.

▲ Using an undersized bit (the same bit used to trim the bases of the jigs), make two passes to create the trench. The end result is a custom, perfectly-sized trench for a seamless joint.

There are other jigs you can use to rout accurate trenches. The ones shown here are a little more sophisticated, but can help guarantee accuracy and ease of set-up.

TWO STRAIGHTEDGES

The photos above illustrate a foolproof method to ensure a tight-fitting trench every time, regardless of the thickness of the mating material. The solution is a pair

of identical straightedges.

Each straightedge is made from a strip of 5mm Masonite as the base with a hardwood fence. The base is made extra wide. It will be trimmed to width after the fence is installed.

Before trimming the bases to width, you need to determine the size of router bit you'll be using to cut the majority of your trenches. This system relies on an under-

sized bit making two passes. For example, to rout a 19mm trench, I'll use a 12mm-dia. bit. This is the bit I'll use to trim the bases of the straightedges.

Truthfully, the opposite edges of each straightedge can be trimmed using two different sizes of bits. For example, a 9.5mm-dia. bit can rout trenches from 12-19mm wide. If you do this, mark the edges with the size of bit used.

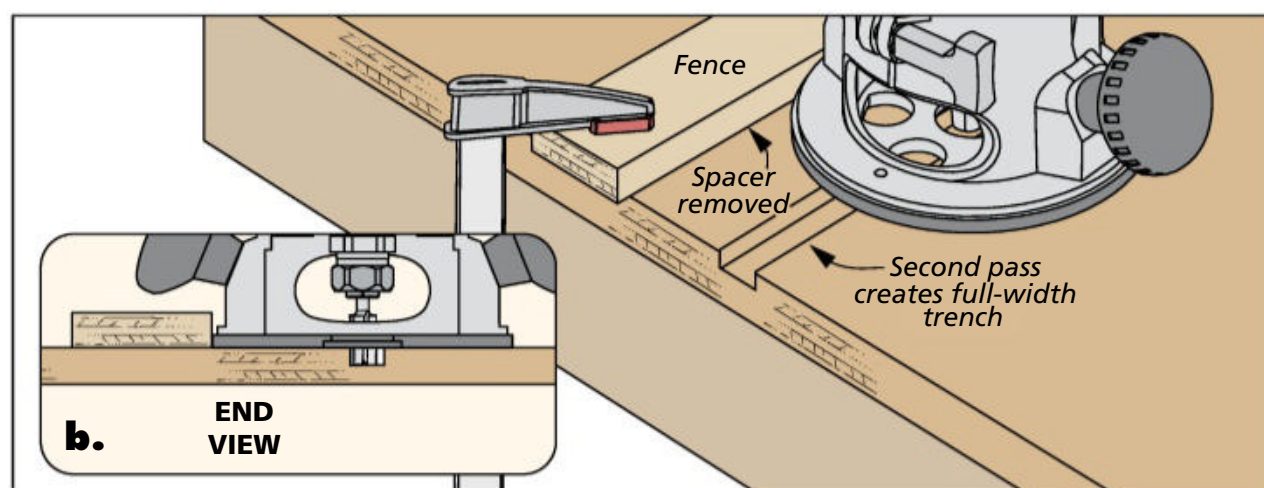
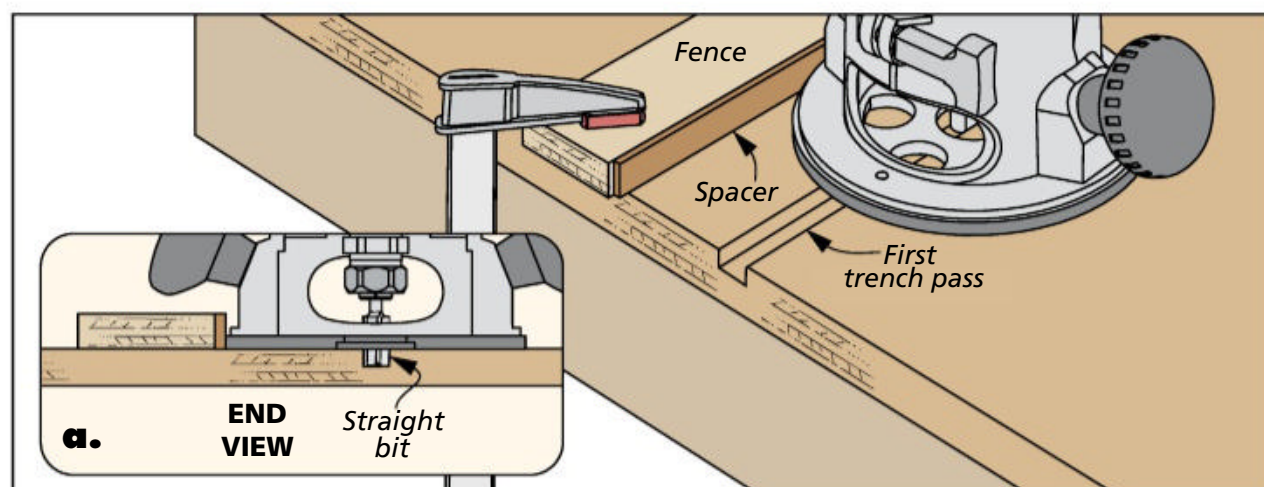
GUARANTEED FIT. As shown in the left photo above, use a scrap piece of the same material you'll be using to fit into the trench. Use it as a gauge to set the distance between the straightedges. Then simply make two passes, paying attention to the routing direction shown on the previous page.

FENCE & SPACER

Another simple system for routing trenches allows you to dial in the exact width of trench needed. You can see what this looks like in the drawings at left.

This method uses a simple fence with a spacer. The trench is cut in two passes: one pass with the spacer taped in place between the fence and router and a second pass with the spacer removed. The thickness of the spacer determines the final trench width.

SNEAK UP ON IT. The beauty of this method is that you can test the spacer thickness on scrap material. I start with the spacer a little thicker than I need. Then it's a matter of sanding or using a hand plane to sneak up on the proper thickness for the desired trench width.



Spaced Out Trenches. Using an undersized router bit and a spacer, you can rout trenches that are sized perfectly for your project. Size the thickness of the spacer for a perfect width.

Like the system in the drawings on the previous page, the spacer method requires a router bit that is smaller in diameter than the final trench width. For 19mm-wide trenches, again I'll use a 12mm-dia. router bit.

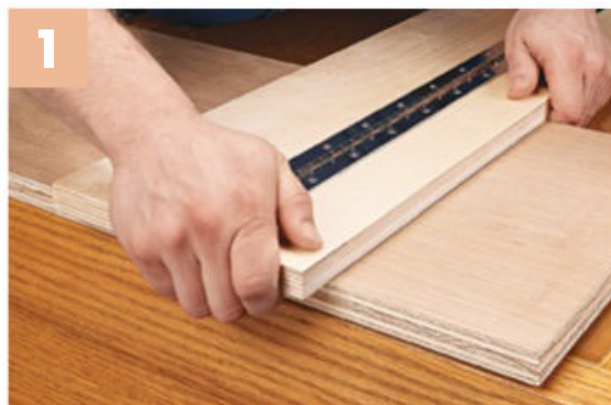
HINGED STRAIGHTEDGE

The straightedge shown on the right eliminates the problem of having to account for the offset of your router base when positioning the straightedge. The secret is in the hinged, drop-down fence.

Both the base and hinged fence are made from 19mm plywood. This jig uses a router bit sized for the final trench width. To size the width of the fence, measure from the centre of your router bit to the edge of the base. This will be the final width of the fence. Make the base 50mm wider than the fence to provide a ledge for clamping. Use a continuous hinge to fasten the two parts together (Photo 1).

QUICK & EASY ALIGNMENT. To use the jig, lay out the centreline of your trench. Drop the fence down and align it with the lay-out line, as you can see in Photo 1. Clamp the base in place. Then, before routing, flip the fence over to rest on the base, as in Photo 2.

Routing the trench follows all of the standard rules (Figure 3). Keep the orientation of the router the same throughout the cut. Routing left-to-right helps pull the router into the fence. Following both of these rules ensures professional results.



▲ The hinged fence on this trench jig facilitates locating the base of the jig relative to the final location of the trench. The three-step process shown above results in quickly routing perfectly positioned trenches every time.

ADDITIONAL TIP

There is a final thing I want to mention to help you get the best results. If you're using plywood for your project, its thickness can vary from sheet to sheet and within the same sheet. This makes routing perfectly-sized trenches in a single

pass difficult. Instead, I like to use a jig that requires two passes, as shown on page 32. This way, you can account for minor variations in thickness.

For hardwood applications, any of these jigs are perfectly suitable, including the stopped-trench jig shown below. **W**

STOPPED-TRENCH JIG

Fast & Repeatable Stopped Trenches. For some projects, you don't want the trench to be visible but you want the strength a housing joint provides. This jig is one solution. It features a stop to create a trench that stops short of the appearance edge of the project.

The jig is made from 12mm plywood and 5mm Masonite. Trenches in the fence form a T-track to house a coach bolt used to lock the stop in place with a star knob. A Masonite clamping ledge extends off of one end of the cleat. A trench routed in the cleat makes it easy to align the jig with the layout line for the trench. Then simply rout until the router contacts the stop.



▲ To create stopped trenches, a workshop-made jig uses a T-track to position the stop along the fence. You can also make a similar set-up using 19mm plywood and aluminium T-track. The cleat positions the fence for accurate routing.



Routing Circles

There are all sorts of ways to cut circles out of plywood or solid timber in your workshop. In my workshop, the band-saw and jigsaw jump to the front. The problem is that they both leave you with rough edges to contend with. I don't mind sanding and smoothing curved edges, but there's a way to avoid all of that work — your router. Well, your router and a trammel.

As you see in the photo above it doesn't always have to be a fancy set-up to give you a perfect circle with a finished edge. This simple trammel is nothing more

than a piece of Masonite with a block glued to it. The block has multiple pivot holes for predefined circle sizes.

BUILT TO LAST

The trammel you see on the next page is dandy if you need to make large circles and curves. It's easy to build, inexpensive and can be set just as quickly as the rip fence on a table saw. The secret is the arm — it's an aluminium ruler that I picked up at a hardware store.

As you can see in the Exploded View on the opposite page, this jig consists of

three main parts: a base for the router, an aluminium ruler that acts as a pivot arm and an adjustable pivot block that determines the size of the circle.

BASE. I started on the jig by making the paddle-shaped base shown in the Base Layout drawing on the next page. When mounting the router, the idea is to centre it about 150mm from the end of the base. And this isn't hard to do. The router's base is a ready-made template for laying out the shape of the base and then marking and drilling all the holes needed.

BLOCKS. After cutting the base to final shape, you can turn your attention to a pair of hardwood blocks. One block attaches to the base and allows you to mount the ruler. The other one will become the pivot block that's used to determine the size of the circle you cut.

Since both blocks are the same size (and small), cutting a groove down the centre to accept the ruler could be a challenge. To do this safely, it's best to start with an extra-long workpiece. Just make sure the depth of the groove is slightly less (0.5mm) than the thickness of the ruler.

Once the groove is complete, you can cut two blocks from the blank. Then glue one block to the base flush with the back edge.

PIVOT BLOCK. To create the pivot block, the second block is glued to a 5mm Masonite spacer. The spacer raises the pivot block to match the height of the mounting block on the base.

The next step is to drill three holes down the centre of the pivot block. The outside holes are used to attach a hairline indicator (added later).

The centre hole is for the pivot pin. This pin is just a cut-off bolt that's glued in place with epoxy.



▲ Drill a shallow 6mm hole for the pivot pin in the back side of the workpiece. Slide the pivot block along the ruler to match the radius you want. Then lock the pivot block in place. Set your router bit for shallow passes and drop the pivot pin in place. Finally, rout in a counter-clockwise direction.

INDICATOR. The key to this jig is the hairline indicator that's added to the pivot block. The indicator allows you to lock the ruler securely to the pivot block. Also, you can accurately set the radius of the circle by aligning the hairline over the ruler.

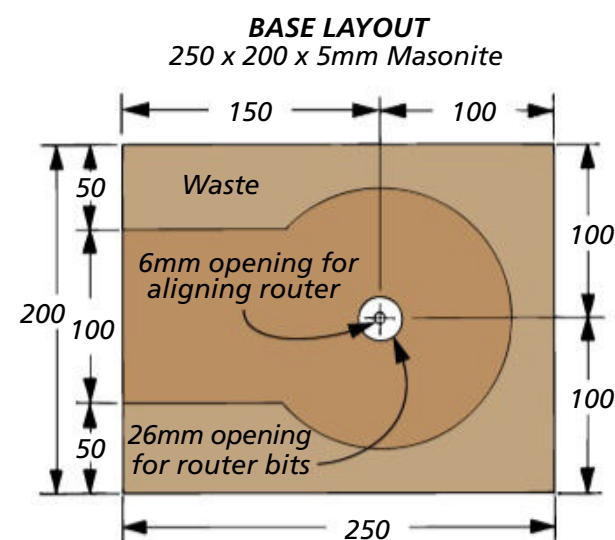
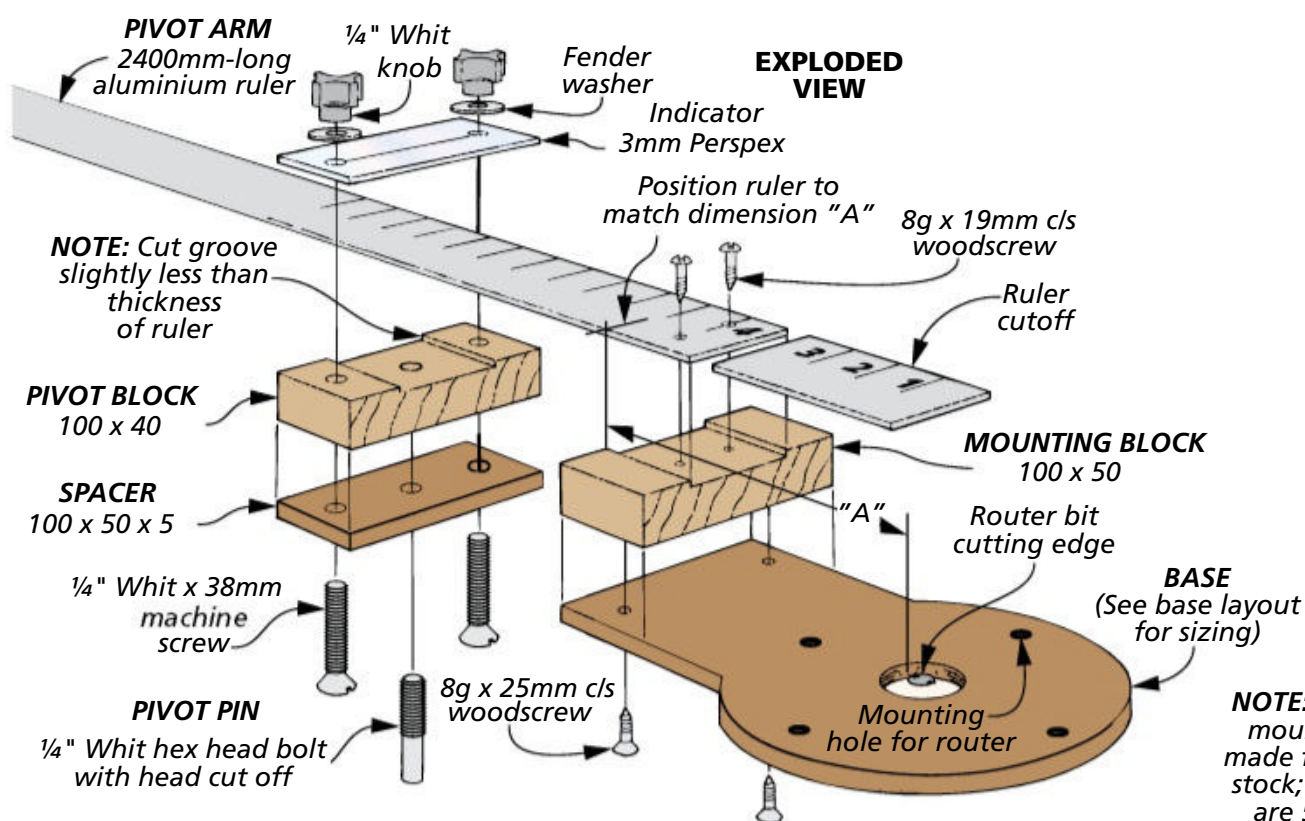
After cutting the indicator to size, drill a pair of holes to match the outside holes in the pivot block. Then scribe a hairline on the indicator, so it lines up directly over the pivot pin.

ASSEMBLY. Now you're ready to attach the

ruler to the mounting block on the base. But first, you'll need to install the router bit you're going to use for cutting the circles. I like to use a 12.7mm-dia. straight bit, but the important thing is that you always use the same diameter bit.

Now to find out where to attach the ruler, measure from the cutting edge of the bit to the back edge of the base.

To allow you to use the ruler to set the radius, position it so that dimension "A" aligns with the back edge of the mounting block. Then screw the ruler in place.



NOTE: Pivot block and mounting block are made from 19mm-thick stock; Base and spacer are 5mm Masonite



▲ Routing circles at your router table takes a little bit of set up. Once done, making circles is easy.

ROUTER TABLE

Here's a novel way of creating a circle without a trammel — making it on the router table. It's easier than you might think.

In order to make circles at the router table, all you need is a large plywood base (detail 'a'). A runner on the edge of the base rides along the side of the router table to let you rout into the base with control. And a dowel on the base creates a pivot point for rotating the workpiece above it.

You can cut circles of varying diameters with this method. Just cut into the base with the router bit until the distance from the centre of the dowel to the edge of the bit matches the radius of your circle. Then clamp the base in place.

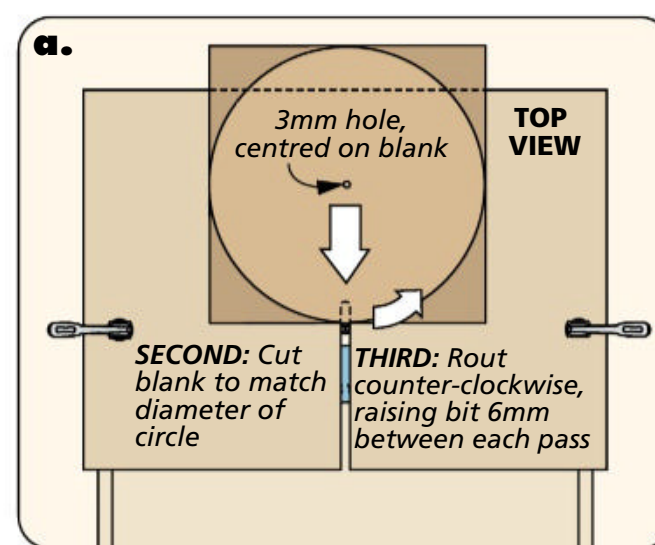
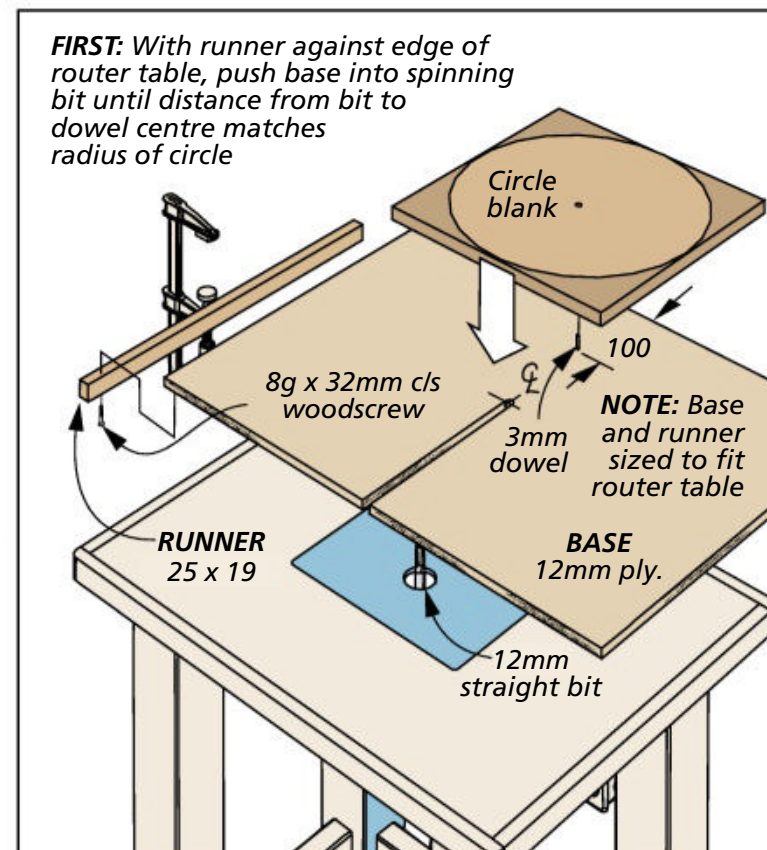
Next, cut the blank to size (again, detail 'a'), and drill a hole in the centre of the blank to fit over the dowel in the base. With the blank in place, turn on the

router, and rotate it counter-clockwise. A thick blank will need to be routed by raising the bit slightly between each pass.

SPECIALTY TRAMMEL

The trammel you see below is similar to the one in the lead photo, a simple Masonite trammel with multiple pivot holes. A while back we did a project for the kitchen — a pizza peel. One of the distinctive features of the pizza peel we made is the curved joint between the handle and the paddle. I cut these curves using a router and a 12mm-dia. straight bit. And to make sure I routed a perfect arc on both pieces, I used the router trammel you see below.

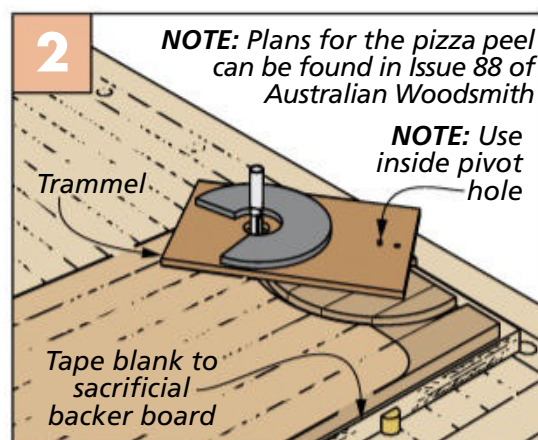
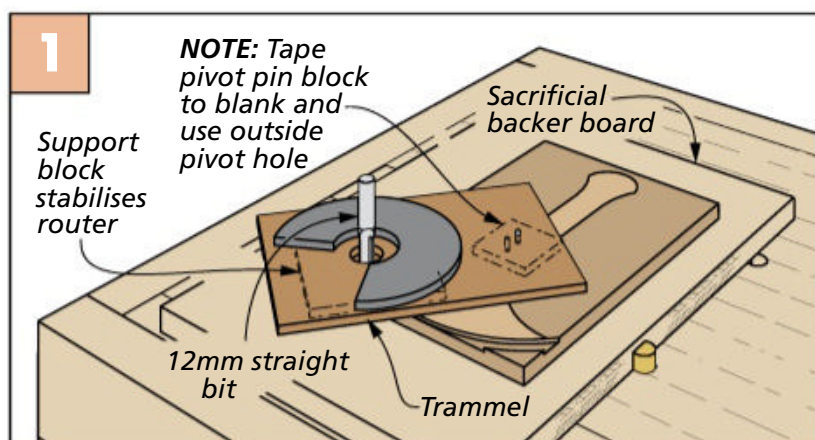
The trammel is nothing more than a piece of 5mm Masonite mounted to the base of the router. It fits over a steel pivot pin to guide the router in a perfect arc. I



used a finish nail with the head clipped off and the end filed as my pivot pin.

The radius of the curved joint between the handle and the paddle of the pizza peel is 115mm. But because you'll be cutting both an outside arc and an inside arc, you'll need to make two pivot holes in the trammel — measuring 115mm from either edge of the bit. As you see in Figure 1, you'll use the outside pivot hole to rout the arc on the handle. Then use the inside pivot hole to rout the arc in the paddle. Figure 2 shows this. You'll drill the hole for the pivot pin in the waste area.

PIVOT BLOCK. One other thing: to avoid leaving a hole from the pivot pin in my handle blank, I drove the pivot pin into a block of Masonite that was taped to the blank. Then to support the router, I added a second Masonite block to the bottom of the trammel (Figure 1).



SMALL BUT STURDY

When the task at hand is working with smaller arcs and circles, this small, compact version is just the ticket. And it will last a long time as well.

This trammel is the perfect solution for cleaning up the edge of a circular workpiece cut at the bandsaw. You can see in the photo at right that a router is mounted at the end of the trammel's base. The guide's centring pin, which is adjustable to the radius of the workpiece (240mm maximum), is secured by a hole drilled in the bottom of a round workpiece. This allows the router to pivot around a stationary centre point, creating a perfectly round circle.

MAKING THE TRAMMEL. You can start by shaping the baseplate from the pattern below. You can make the base as big as you like. Just apply the dimensions for the ends like you see below. The hole for the router bit at the one end of the trammel is chamfered to provide better visibility and chip clearance.

This trammel baseplate has a groove and slot to adjust the circle size, (drawing below). The purpose of the groove is to capture a flange nut that locks the knob (and pin) in place.

To make the thru-slot, I drilled 6.4mm holes at each end of the slot, then removed the waste between them at the router table.

As I mentioned, the centring pin is made from simple hardware items. It's just a 38mm-long $\frac{1}{4}$ " Whit bolt and a flange nut. To make it, clamp the bolt in a machinist's vice with the threads facing up. Then thread the flange nut all the way down to the smooth part of the shank. Using a span-

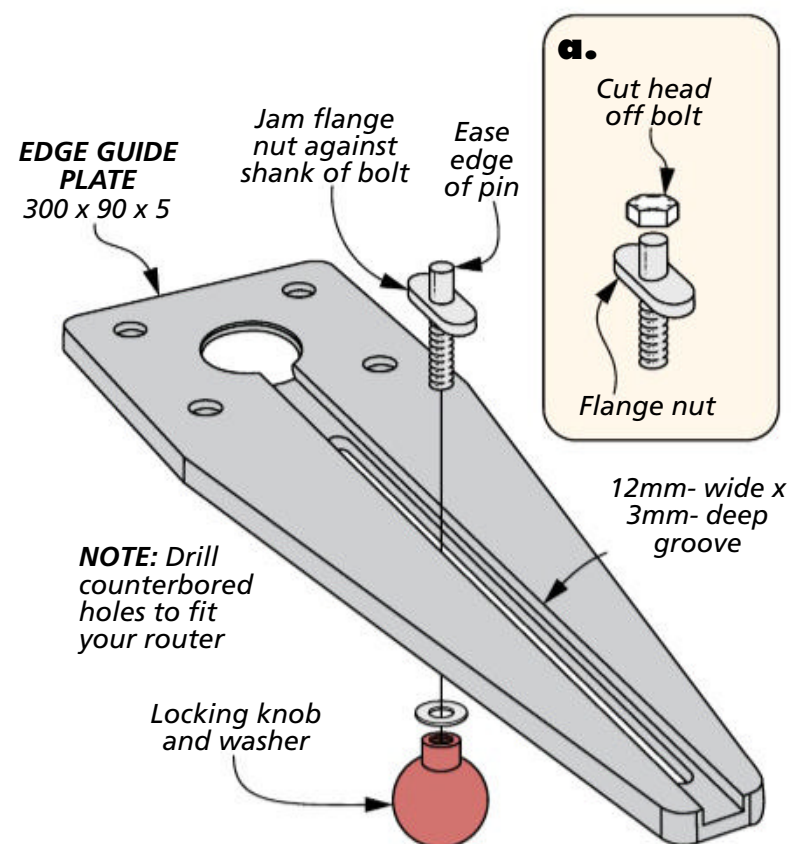


▲ Smoothing the edge of a circle was never easier. Drill a shallow hole in the underside of the workpiece for the pivot pin. Then loosen the locking knob and slide the bit in place.

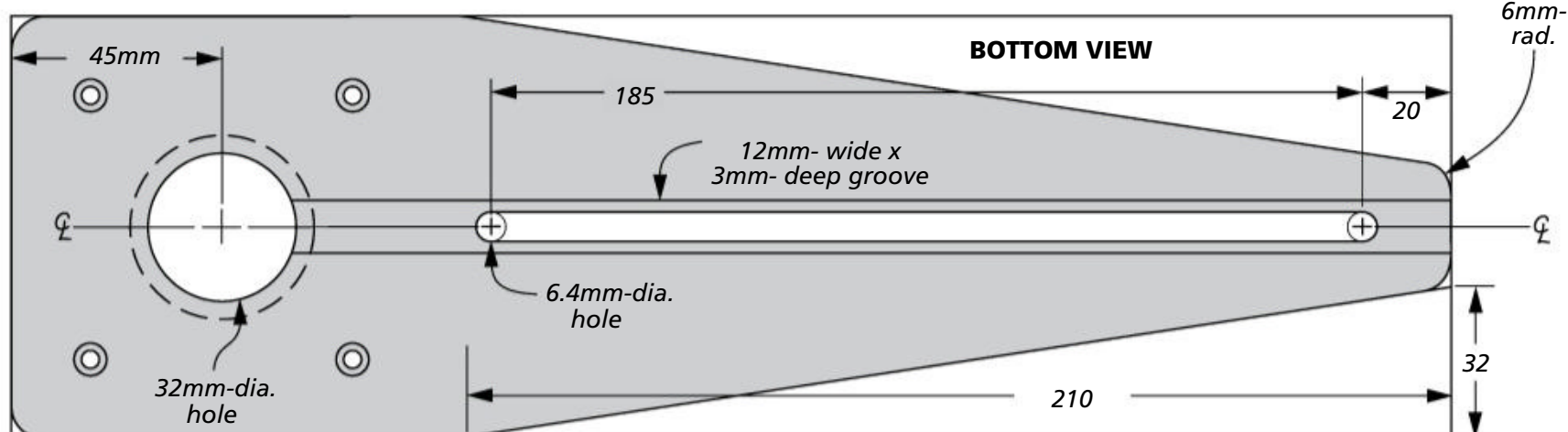
ner, tighten the nut securely. The goal is to keep the nut from loosening. Complete the pin by cutting the head off the bolt with a hacksaw and cleaning up the cut edge with a file. Detail 'a' shows you what this looks like.

Now you can drill the holes for your router and cut the base to shape as you see here. Then thread the centring pin into the locking knob, as shown in the drawing to the right.

That completes the last trammel. So, when it comes to making smooth circles and curves, you've got options now. **W**



PATTERN
(Enlarge to 200%)







Patio Planter

This outdoor project will throw you some fun curves in the workshop. Once the planter is complete, it's the perfect choice for showing off your gardening prowess.

It seems that whenever you want to make a replica of an existing piece, even something as simple as a barrel, there can be lots of upfront work to do. Most of that work has to do with measuring parts exactly and keeping track of how they interact. But that's just not the case with this little gem.

This planter is made out of cypress, and has the look of a barrel that's been salvaged from a previous life and resurrected for a new duty — holding floral decorations in the corner of your patio. Which is a perfect use for cypress. Cypress pine is a durable weatherproof option for fences, floors and patio furniture.

If all those angles you see in the upper inset photo have you scratching your

head, not to worry. There's a jig that makes the process as smooth as silk. In fact, other than at the start, you'll find that you're not going to need measuring tapes or rulers hardly at all with this project. A lot of what happens here falls in line with the "build-to-fit" philosophy. You'll make the barrel parts and then dry assemble them to find the size of the bottom. Then, use the completed planter to size the hoop.

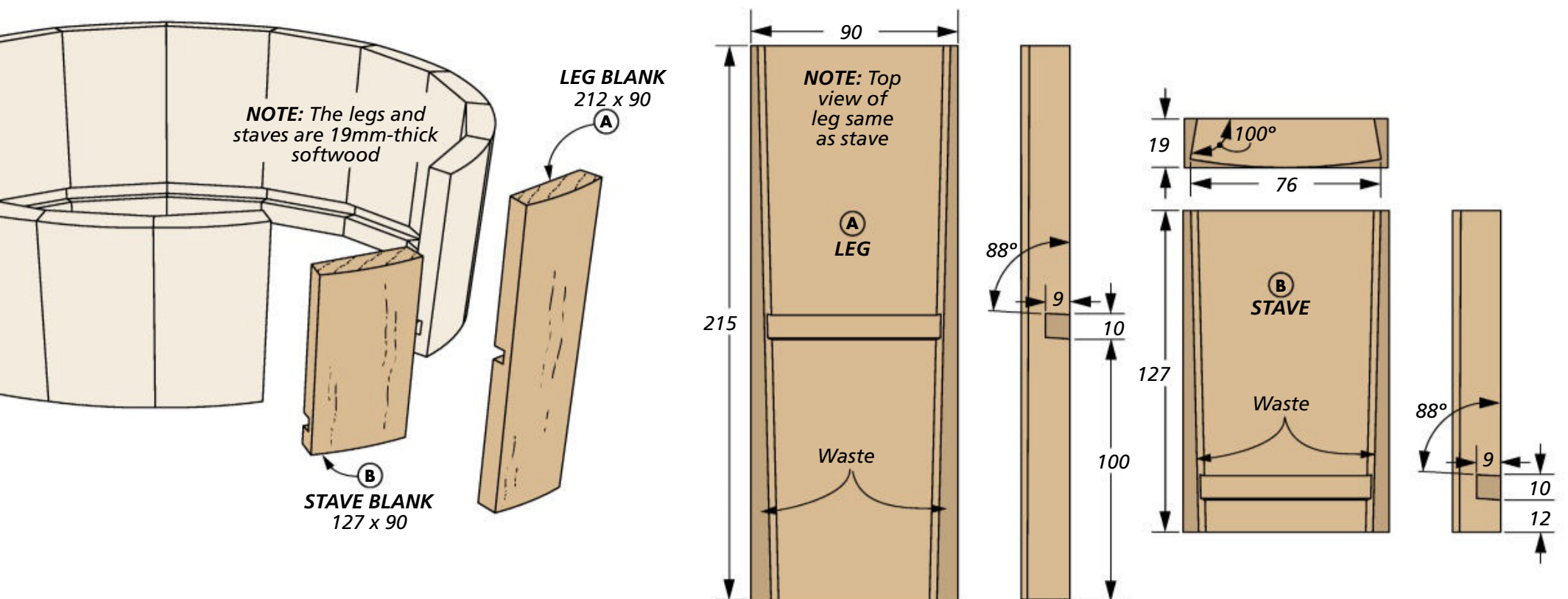
The copper hoop on the planter is an homage to the steel "quarter" hoop you would see on an oak whisky barrel. Our version is purely cosmetic. It takes a little work to make, position and fit the hoop, but it adds a lot to the look of the planter and is a fun side trip from making wood chips in your workshop.



▲ The bottom of the planter is made from the same material as the sides — cypress. The stave construction allows you to make a beautifully round planter out of tapered and bevelled boards.



▲ A workshop-made copper hoop adds some sparkle and shine to the planter. Making the hoop and adding the surface texture is a refreshing break from wrestling wood.



The LEGS & STAVES

As the drawings above show, the body of the barrel consists of two parts — the leg and the stave. The leg is the longer of the two and it does what legs do — lift the planter off the ground and provide ventilation for the underside. The shorter staves make up the sides of the planter. There are five staves between each leg to keep the barrel balanced.

OVERSIZED BLANKS. The details above show that the parts are cut to their final length, but left wide for the moment. Also, the top and bottoms of the pieces are left square. You could say leaving them so adds to the rustic charm of the planter, instead of doing the work of bevelling the ends.

TRENCHES FIRST. The drawing below

shows the next step. To hold the bottom in place, you need a trench in all the pieces. You'll need to account for the tilt of the barrel's sides when cutting the trench. Detail 'a' shows how to set the dado blade before making the cuts.

To make sure the staves and legs align at the top, cut a test piece after resetting the fence. When you're satisfied that they match, finish cutting the trenches in the remaining pieces.

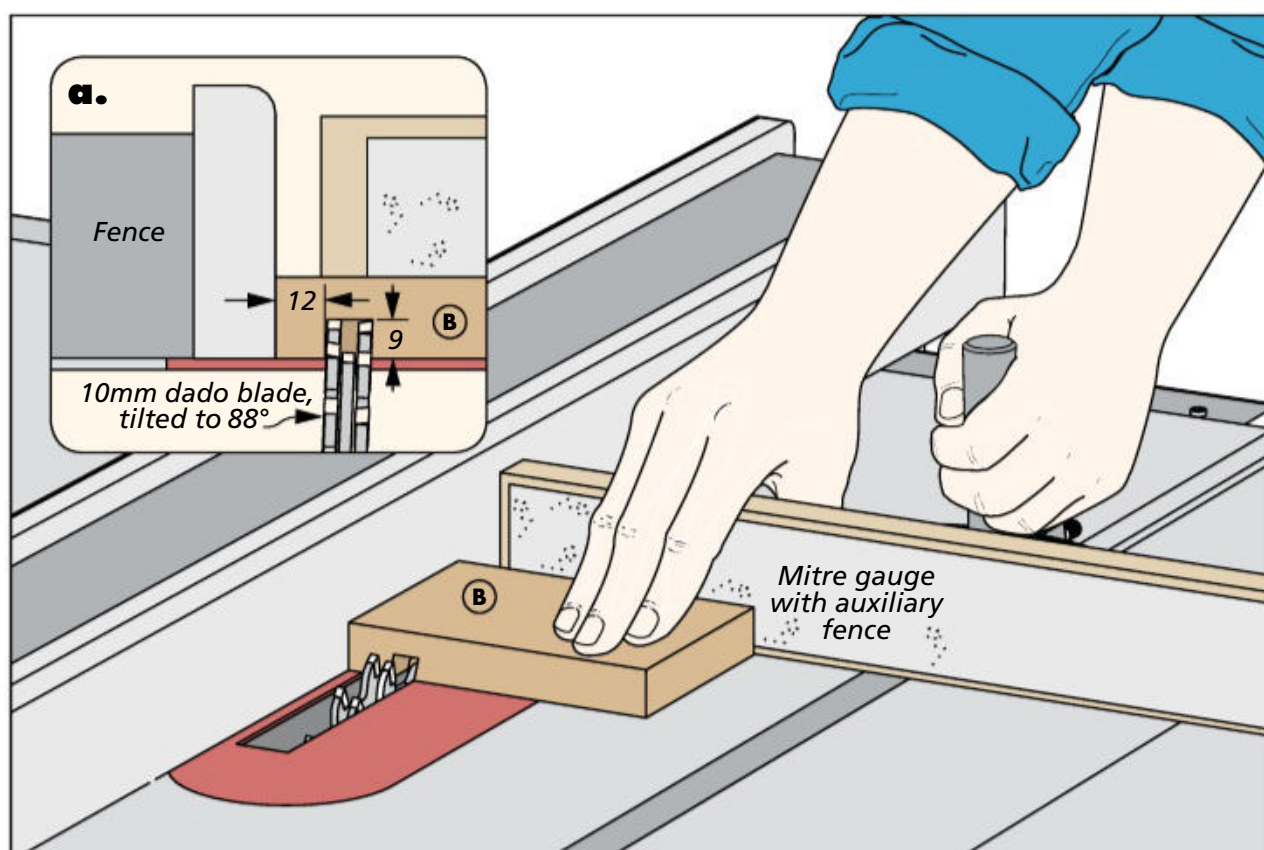
CREATING THE JIG

The jig you see on the next page is designed to cut the taper and the bevel on both the legs and the staves. You're going to use both sides of the jig to shape the parts. First, you need to make the base.

To begin, set the blade on your table saw to 80°. Figure 1 on the next page shows this step. Now use your rip fence to cut the base width (about 2½ times the width of the leg). In the upper corner, mark this as side 1.

LAST OF THE LAYOUT. At the beginning of this article, I mentioned that you won't be using your measuring tape or ruler a lot on this project, you're coming up on that milestone now. Figure 2 shows the leg blank marked up and ready for the jig.

The next two figures show you how to locate the stops on the jig using the leg blank you just marked up. It starts with Figure 3, you're setting up the jig stops



Dado for Bottom. A dado blade in your table saw and an auxiliary fence attached to your mitre gauge lets you cut the trenches in the leg and stave blanks. Then you can move on to tapering the parts.

to cut the left side of the leg. When the glue on the stops sets, trim that side of the workpiece.

Now flip the jig to side 2. Spin the workpiece 180° and set the stops for the right side of the leg (Figure 4). Then, at

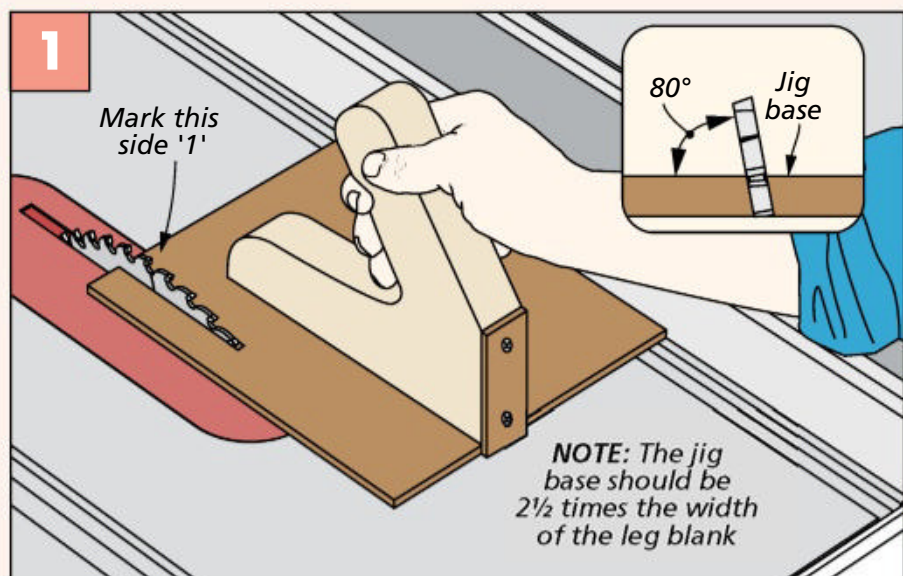
the table saw, make the second pass, defining the right side of the leg.

THE STAVES. Although the jig was created using the legs, it works just fine for the shorter staves. It's a good idea to mark the tops of the staves the same way you

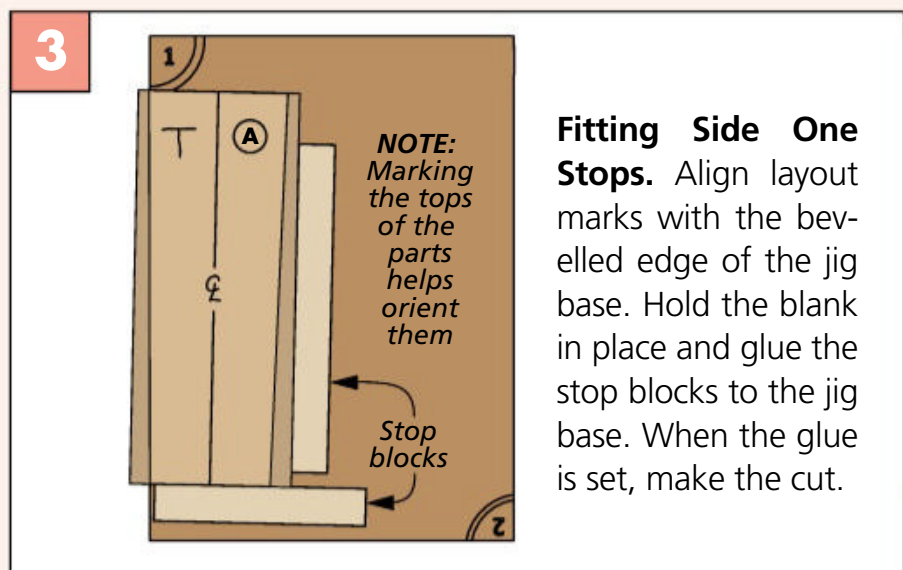
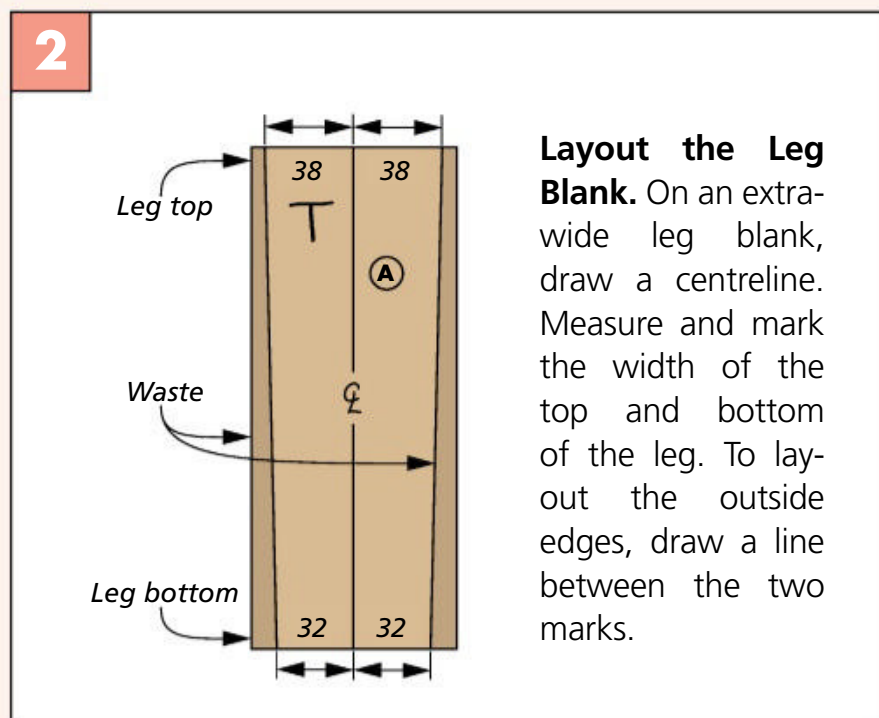
did the legs, just to keep track of the progression.

I cut all the left sides of the staves (Figure 5) before spinning the jig and staves (Figure 6). Now it's back to the bench to make the planter bottom.

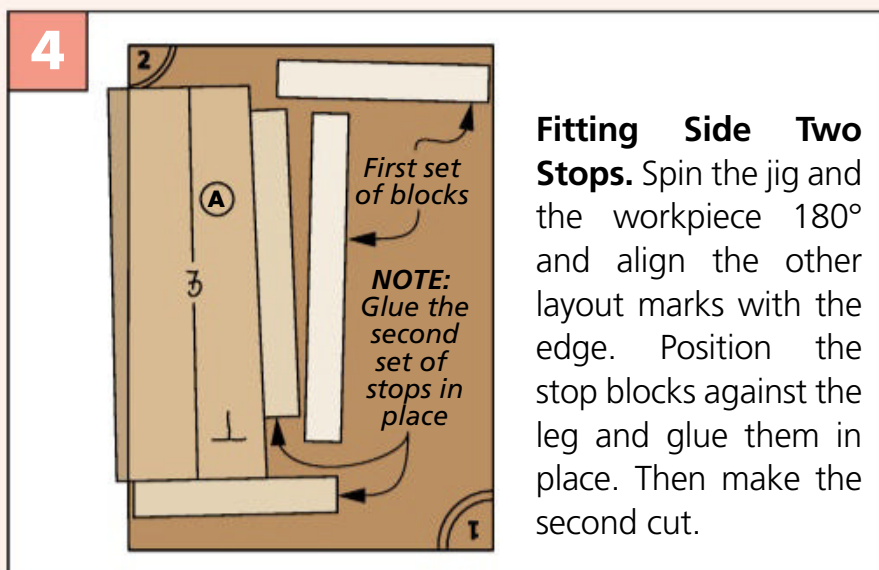
MAKING & USING THE JIG



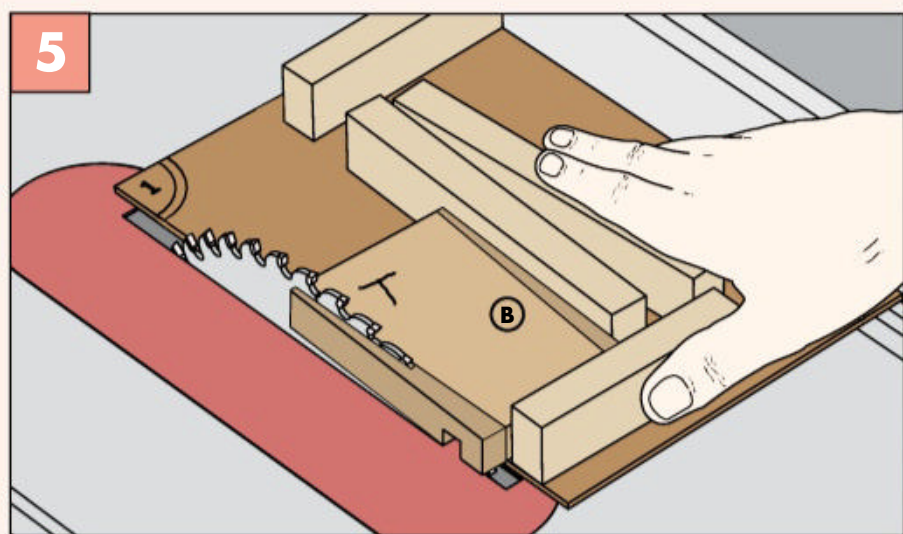
Size the Base. Start with a piece of Masonite that is longer than the leg blank and more than twice the width of the blank. Set the saw blade at 80° and rip the first edge.



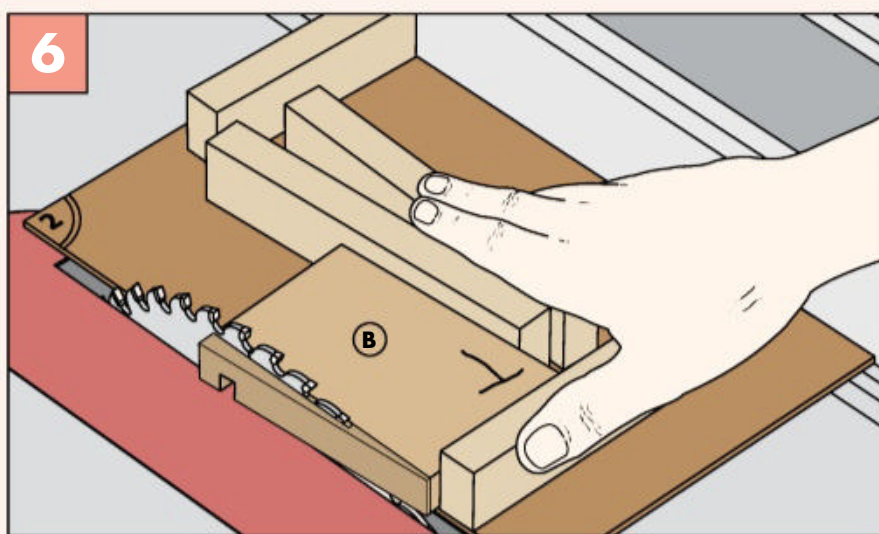
Fitting Side One Stops. Align layout marks with the bevelled edge of the jig base. Hold the blank in place and glue the stop blocks to the jig base. When the glue is set, make the cut.



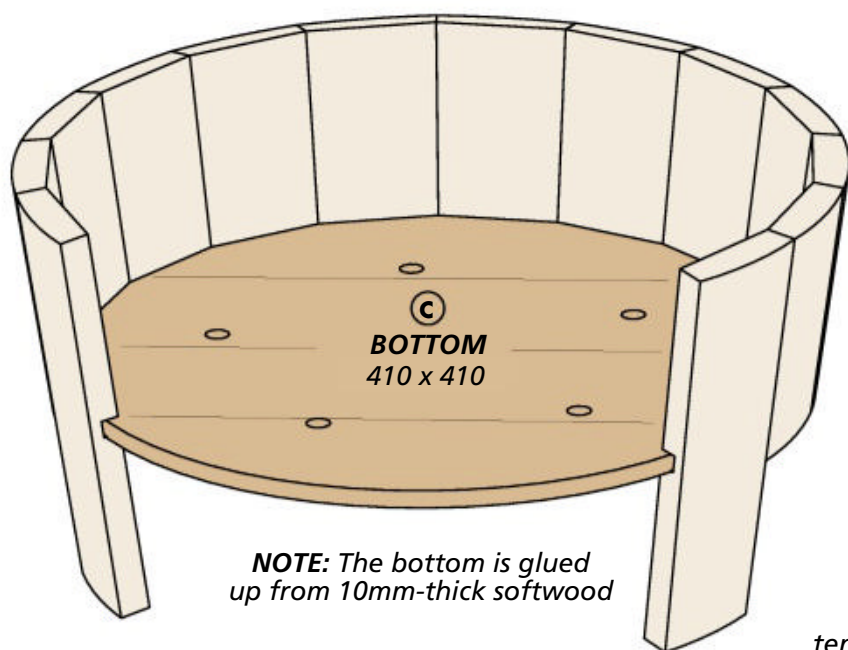
Fitting Side Two Stops. Spin the jig and the workpiece 180° and align the other layout marks with the edge. Position the stop blocks against the leg and glue them in place. Then make the second cut.



One Jig for Both Pieces. After cutting the tapered and bevelled sides of the legs, repeat the process for the staves. Cut all of the left sides first.

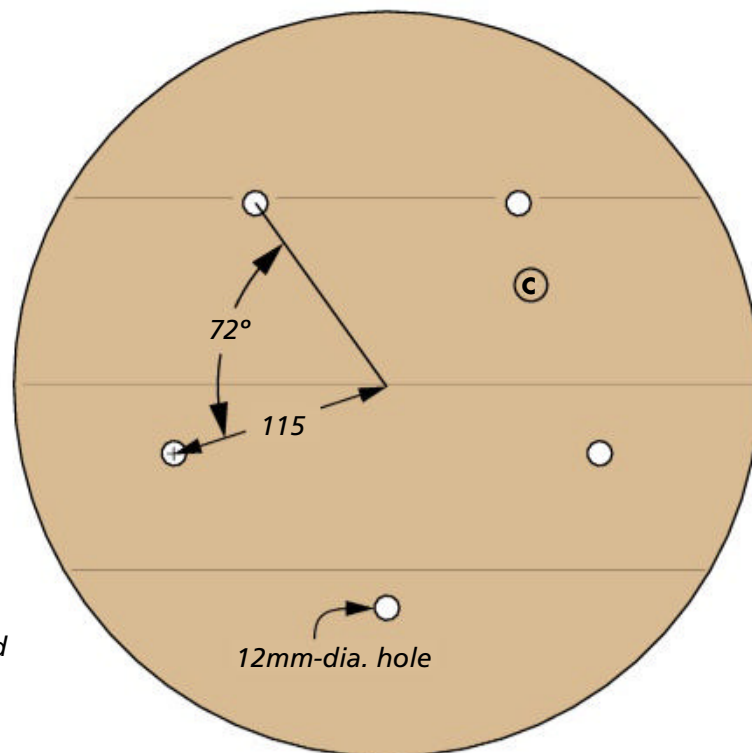


Spin & Repeat. The routine for the staves is the same as the legs. Turn the jig and the stave 180° to taper and bevel the right side of the stave.



NOTE: The bottom is glued up from 10mm-thick softwood

NOTE: Actual diameter will be determined after parts are cut and temporarily assembled (see box below)



The BOTTOM & THE HOOP

The bottom is made up of cypress boards that are planed to thickness, then glued up. After creating the round profile to fit in the trenches, you'll need to drill some weep holes for drainage.

GLUE UP. Thin material can buckle easily when clamped up. So, clamp lightly and check that the bottom is flat before the glue sets. If problems arise, you can clamp cauls across the boards to hold them flat.

SHAPE THE BOTTOM. To arrive at the final

size of the bottom, I did a dry assembly of the planter barrel like you see in the box below. Then, to create that shape, I used a trammel and my router to cut out the bottom. Note the foam board that protects the bench.

GO TIME. A slow-set waterproof glue is best to use when you have a lot of parts to glue up. Eighteen pieces mean 36 edges, so this job easily qualifies for that. One consolation is that the bottom of the

planter floats in its groove so there's no glue to worry about applying there.

SMOOTHING THE PLANTER. Rounding the barrel's surface is a great excuse to play with planes, spokeshaves and maybe a scraper or two — goldbricking never felt so good. Just take your time in the early stages to avoid tear out.

MAKING A COPPER HOOP

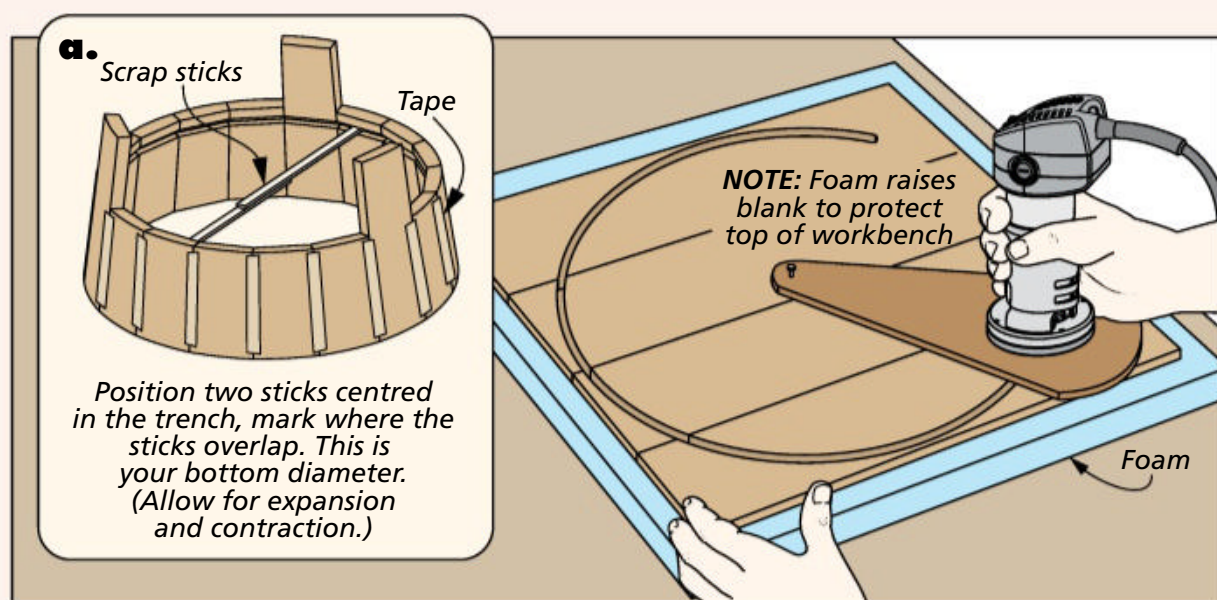
Adding a hoop to the planter enhances the look of the project. It takes some effort to make, position and fit the hoop, but it's worth it, in my opinion. It all starts with a copper bar that's 12mm wide, and long enough to wrap around the planter. As you see in the main drawing on the next page, the hoop is held together with rivets.

You'll need a metal-working vice, or an anvil with the traditional horn on one end. And throw in a ball peen hammer to bring it all together. Sizing and fitting the hoop on the planter requires you to flip it upside down on the workbench.

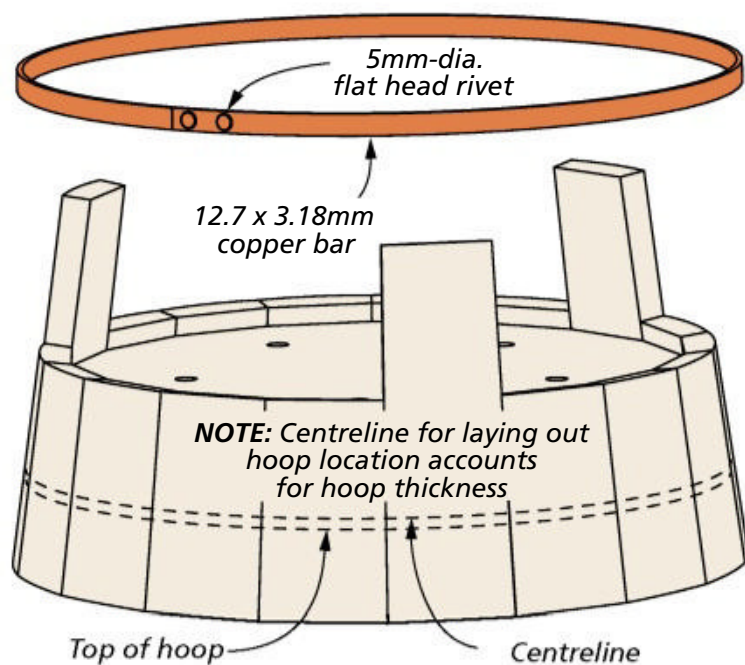
SIZE THE HOOP. To get the initial size of the hoop I started with a cloth measuring tape, the kind a tailor uses. The goal is for the hoop to land in the centre of the staves on the planter, so mark the necessary offset for the top of the hoop in several locations.

When you measure with the cloth tape, add 35mm to the overall length for the scarf joint that will tie the hoop together.

MAKE THE BOTTOM

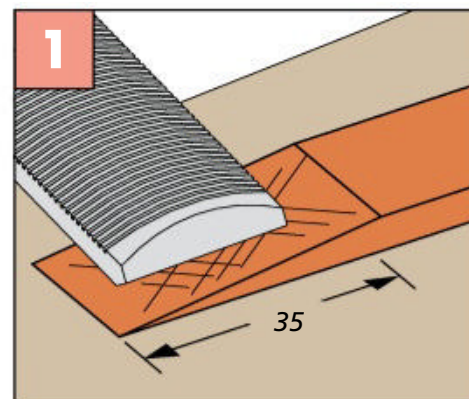


Size It Up. First, lay out all the parts edge-to-edge and tape joints together on the outside. Roll it up and tape the last joint, then measure inside the trench as shown to determine the bottom diameter (detail 'a'). Then rout the bottom to size.

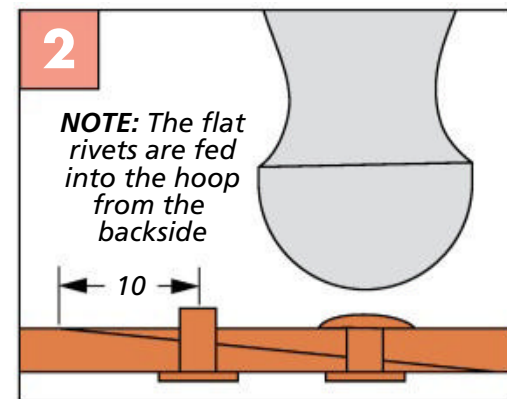


DRY FIT THE HOOP. To prepare for the dry fit, transfer the measurement to the strip of copper and cut it to length. If you're so inclined, you can shape a piece of scrap plywood to the needed circumference of the hoop. It doesn't have to be exact, just close enough that it prevents the bar from kinking while you're forming the initial shape.

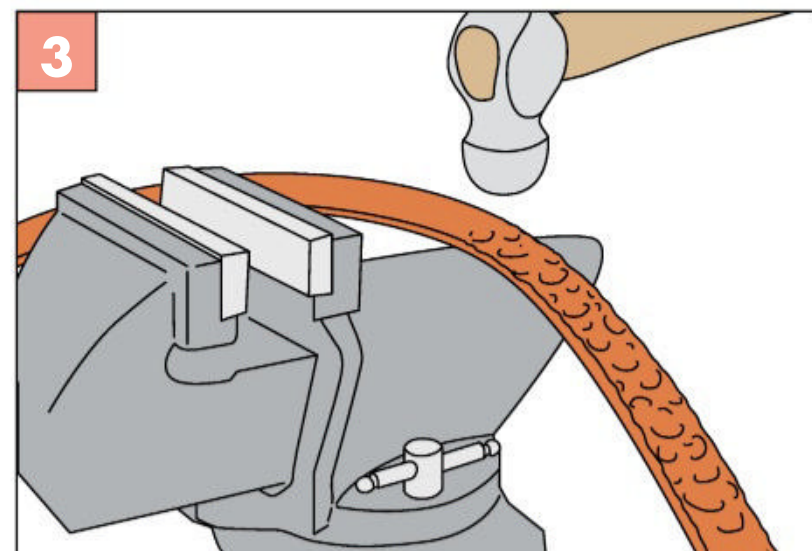
COMPLETE THE HOOP. The steps shown in Figures 1 through 3 above will guide you through successfully completing



Scarf Joint. File mating tapers on the ends of the hoop. It's good to leave them rough.



Rivets. Use your ball peen hammer to swell the rivets, locking the hoop ends together.



Peen the Hoop. To add character to the hoop, gently peen the outside surface and top edge of the copper with your ball peen hammer.

the hoop. When that task is done, it's time to attach the hoop to the planter.

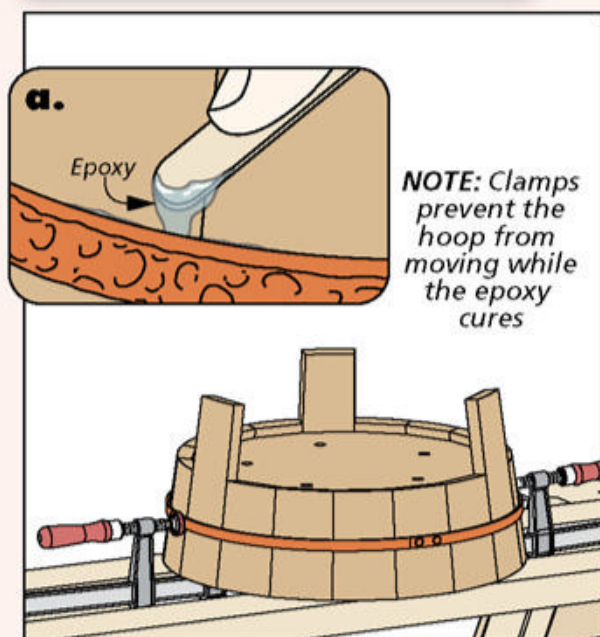
TACKLING A FUSSY FIT. To start, position the planter upside-down on the bench and try to tap the ring in place evenly on the planter. Use a wood block to avoid marring the edge of the hoop.

In theory, the hoop should "bite" into the staves and legs, holding it in place. If that works, great, you live a charmed workshop life. Then you can epoxy the hoop in place. The reality is that the hoop will want to pop free opposite of where you're working. So, here's another way to skin this cat. First, place the planter on a couple of wall studs that are set on a pair of saw horses. Now you can hold the hoop in

place with clamps. The box below to the left shows this set-up. To ensure the hoop stays put, I epoxied it to the barrel in multiple places. Let the epoxy completely set before moving on to the final steps.

All that's left to do is prepare the planter for outdoor life. Organoil Wood-guard is applied all over the planter. When it was dry, I painted the inside walls and bottom with black oil paint. When that's dry, pull out your green thumb and fill your new planter with your favourite flora. **W**

ATTACH THE HOOP

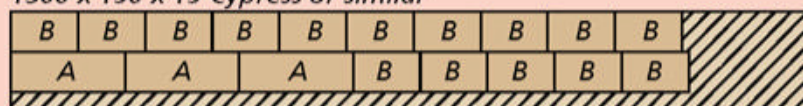


Get a Grip. Flip the planter upside-down and place on two studs (90 x 45). Clamp the hoop in place while epoxy sets.

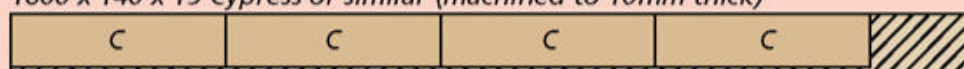
Materials, Supplies & Cutting Diagram

- A** Legs (3) 215 x 90 x 19 • (2) 5mm-dia. Copper Flat Head Rivets
- B** Staves (15) 127 x 90 x 19 • (1) 1525 x 12 x 3mm Copper Bar
- C** Bottom (1) 410 x 410 x 10 rgh.

1500 x 190 x 19 Cypress or similar



1800 x 140 x 19 Cypress or similar (machined to 10mm thick)



Floor Lamp

It will be easy to find your mid-century groove with this number hanging out in a room that requires a little more illumination.

The clean lines and sculpted look of this mellow lamp harkens back to an optimistic time. Fifteen pieces of wood and a dash of Scandinavian styling is the recipe for this project.

I chose mahogany for this lamp, because it plays well with the shade that you see in the photo. You'll make the shade, but it isn't as daunting as it might seem when you follow the steps that we highlight for you. We'll get to that later. For now, let's start with the legs.

LEGS. As you see in the main drawing on the next page, the three legs that define the shape of the lamp are each made up of two parts. The longer upright piece is tapered on the outer edge. The inside edge remains square to provide a consistent reference for the stretchers. The shorter foot is tapered on both edges. The two 24mm-thick pieces are mitred and joined together with dowels. Making these parts starts with cutting the blanks to size. Set the foot blanks aside for the moment and focus on the uprights.

HOLES. The uprights have three holes drilled in the edges. These counterbored holes are for screws that thread into inserts in the stretchers. At the drill press, start by drilling the counterbores, then finish up with the pilot holes.



MITRES. The mitre joints that connect the uprights and feet are up next. The mitre on the upright is easy enough, but the foot is different. The angle is created by the two tapers. There's a full-size pattern available at australianwoodsmith.com.au that you can use. Before tapering the foot, drill the dowel holes. Details 'a' and 'c' in the main drawing and the box below show this.

DOWEL HOLES. To drill the holes square with the ends of the blank, I used a self-centring dowelling jig. As the box below shows, this is easy to do with the part clamped in a vice. Make sure the holes are deep enough so the dowels won't bottom out.

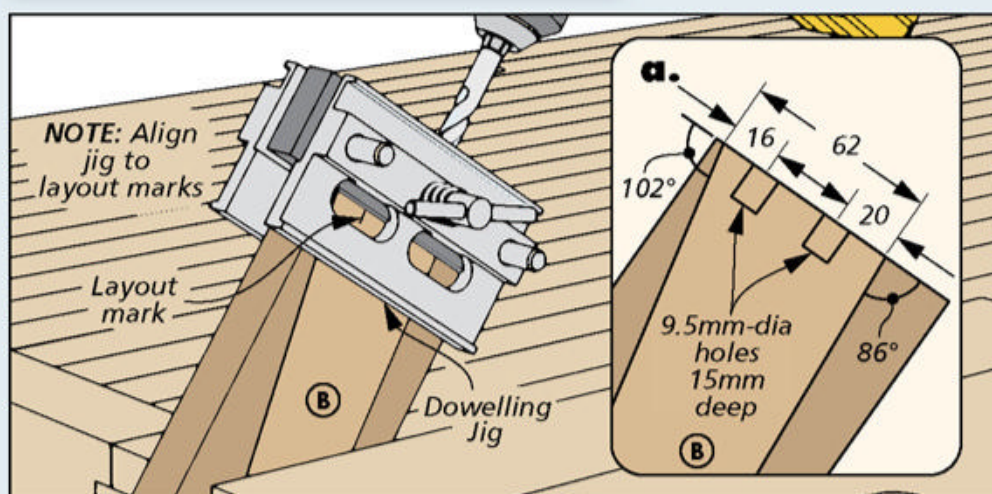
TAPER. A tapering jig will make short work of the long taper on the upright. As for the foot, you'll have to make a couple of passes to create its profile. Before gluing up the parts you have to dress the ends.

THE ENDS. There's a pair of 16mm radii on the top of the leg (detail 'b'). One creates a decorative scallop, the other just rounds off the end. The bottom edges of the foot have a 12mm radius (detail 'd'). After gluing up the legs, ease the edges with your router. You can now turn your attention to making the stretchers that bring the legs together.



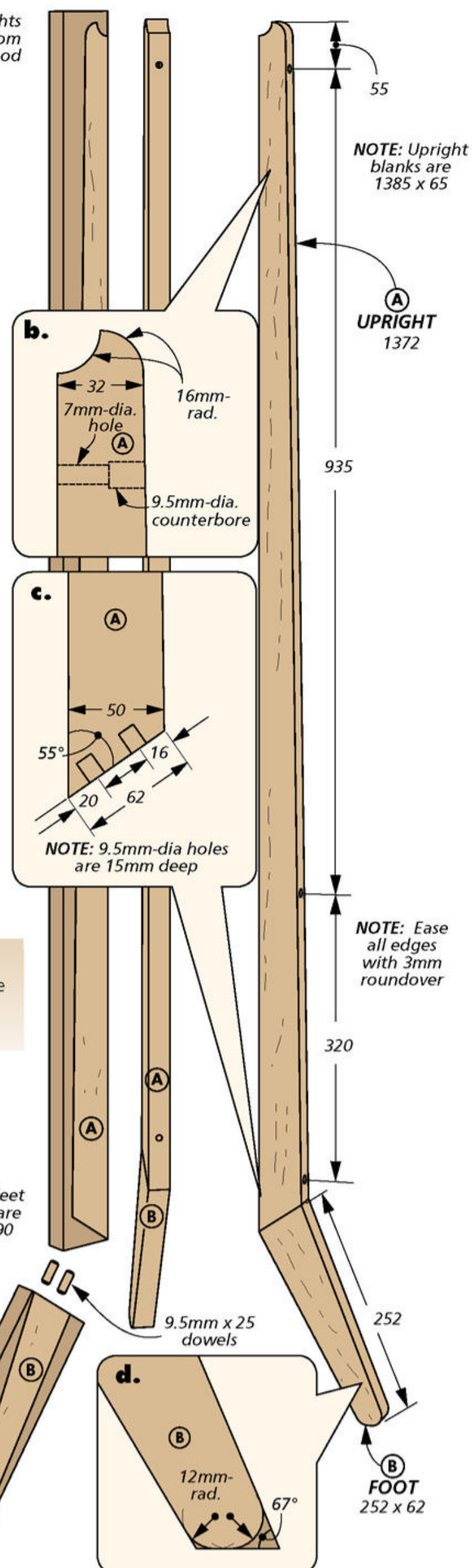
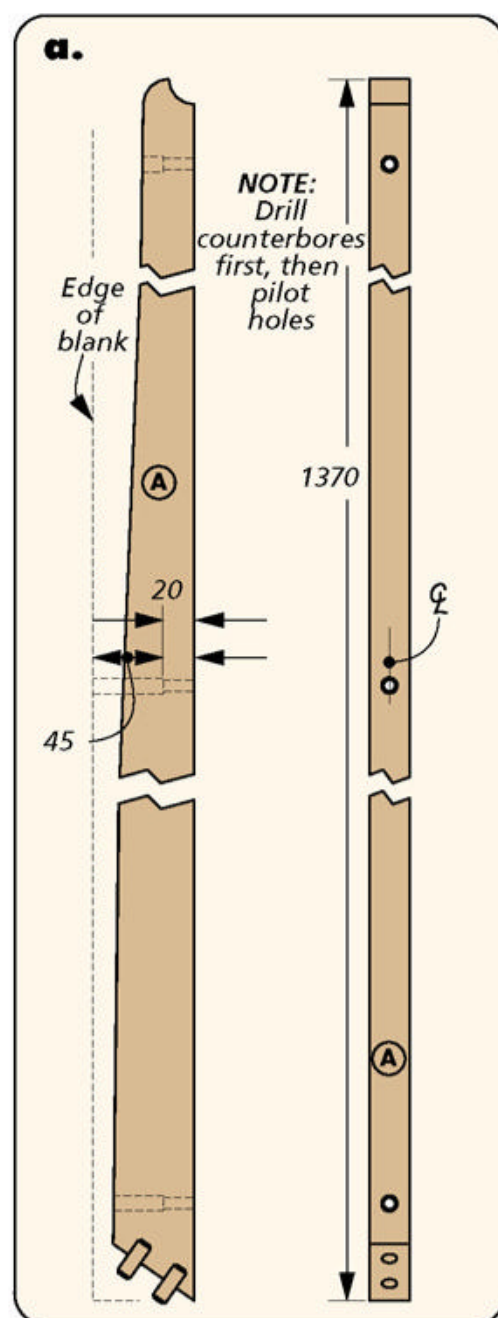
For leg and foot templates, visit our website at australianwoodsmith.com.au

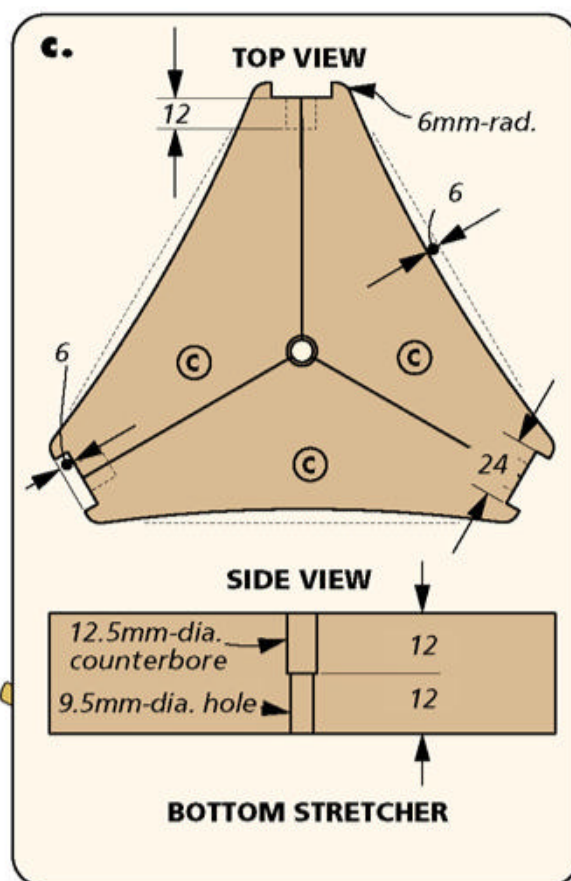
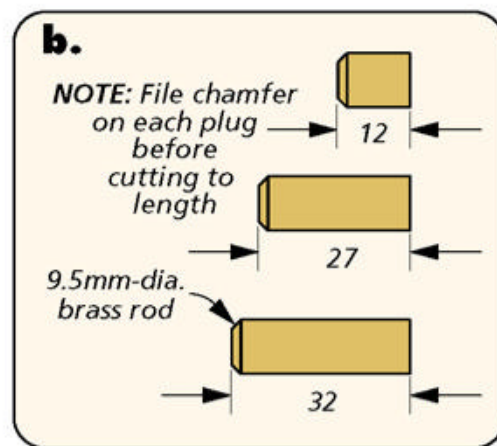
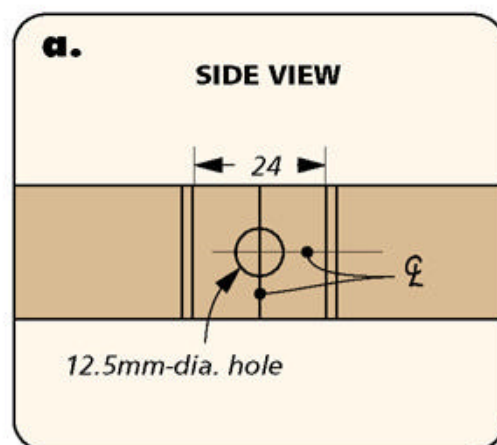
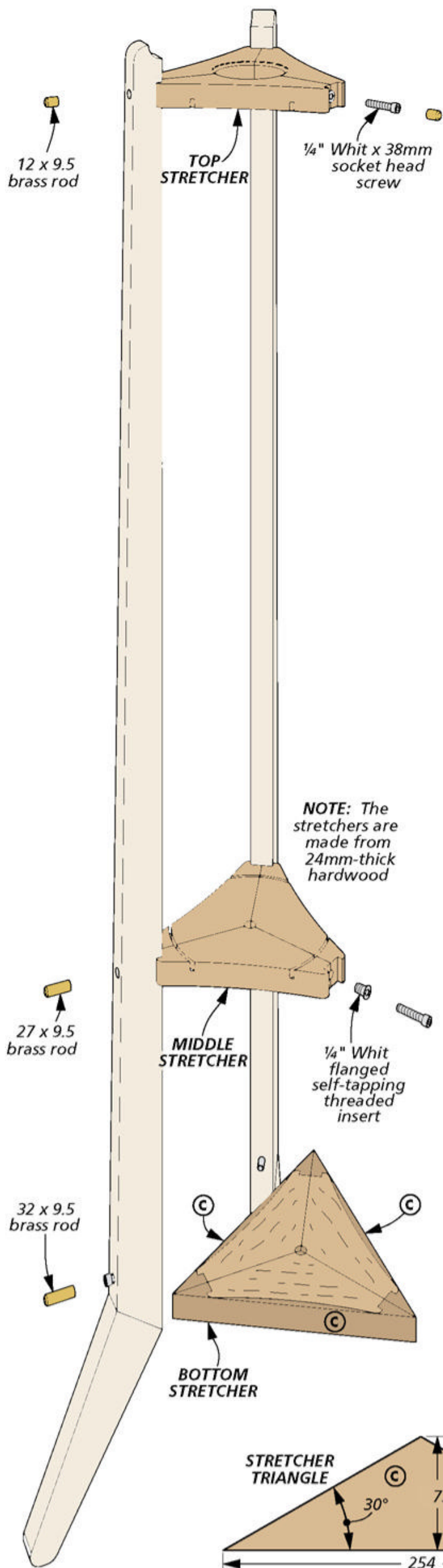
DRILLING FOR DOWELS



Holes for Dowels. A dowelling jig lets you drill holes squarely in the end of the upright and foot. Drill the holes in the feet (shown here) before you taper them. On the upright, cut the mitre first.

NOTE: The uprights and feet are made from 24mm-thick hardwood





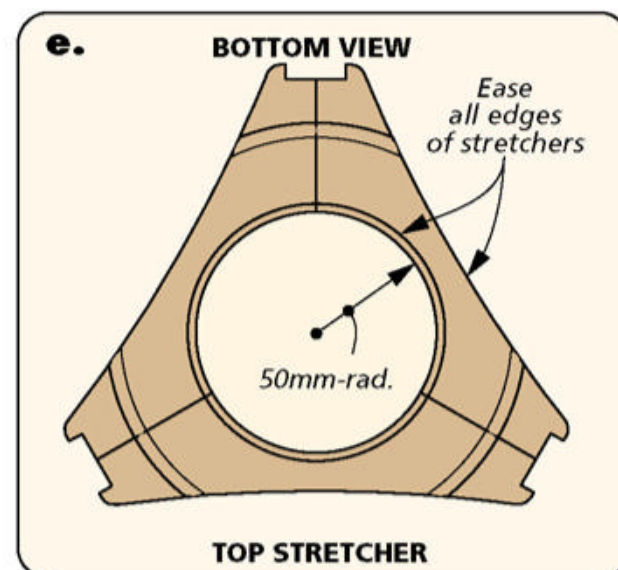
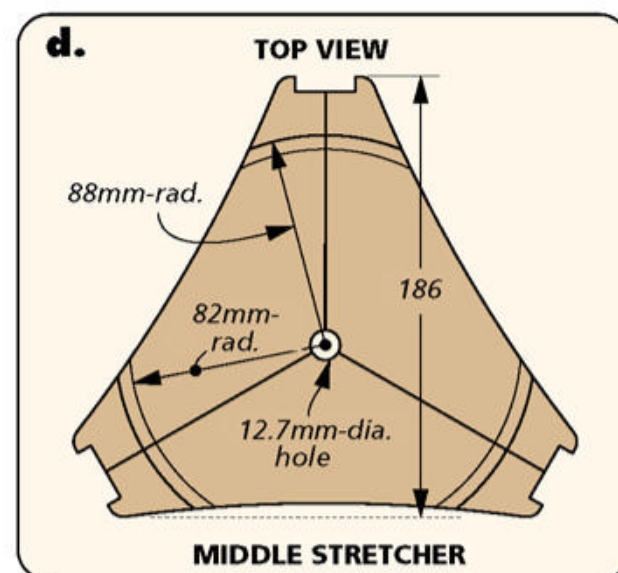
Three-sided STRETCHERS

Looking at the main drawing, you'll see that there are three 24mm-thick stretchers that bring the legs together to form the structure of the lamp. The basic profile is the same for all three stretchers — a simple triangle. (Once again, there's a full-size pattern for these available at australianwoodsmith.com.au)

The stretchers are glued up from three triangle-shaped pieces. Assembling the stretcher this way adds a little work to the process, but it has the benefit of a seamless look. The points of the triangle are squared off with a notch cut in them to receive the legs. Bolts and threaded inserts hold everything together.

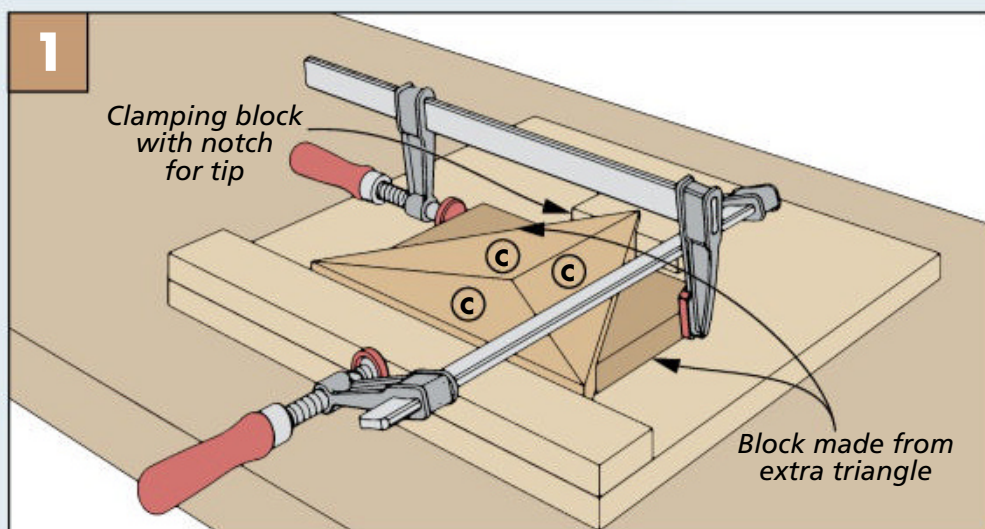
Each stretcher is then customised according to its position on the lamp. The details below show what needs to be done for each stretcher.

STRETCHER BLANKS. To get the ball rolling, cut blanks long enough to make the nine pieces required for the three stretchers. While you're at it, make an extra piece for a clamping jig to assemble the stretchers (Figure 1 at the top of the next page).

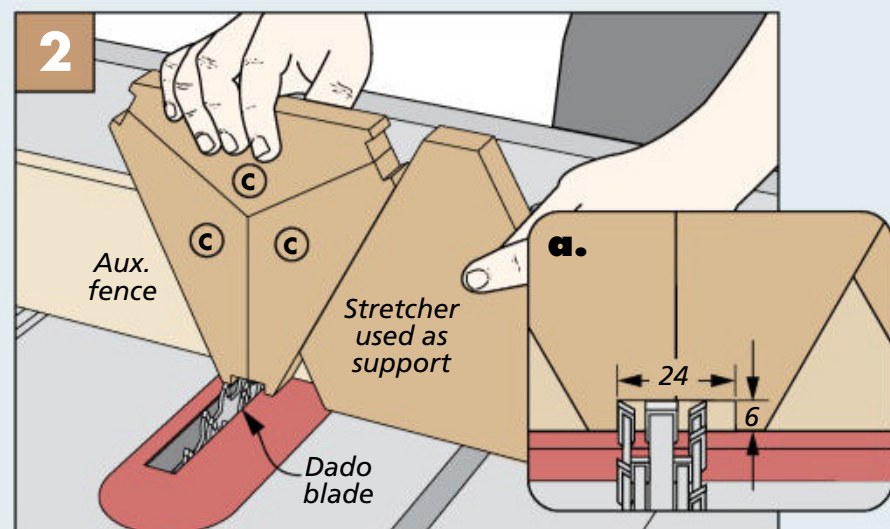


For a template of the stretcher profile, visit our website at australianwoodsmith.com.au

MAKING THE STRETCHER



Glue-up Jig. Gluing up angled pieces of wood can be a slippery affair. This jig guarantees that the triangle parts for the three stretchers will come together tightly and uniformly.



Notches. To make perfect notches, use an auxiliary fence on your mitre gauge combined with one of the stretchers as a support while nibbling away the notch.

The patterns that I mentioned earlier for the stretchers have the basic triangle shape. You can use that as a template to shape the triangles at the table saw or with your router and a pattern bit.

GLUE UP. The jig you see in Figure 1 is the best way to glue up the stretchers with tight joint lines. That extra piece you made is cut in half and used for the clamping blocks.

SQUARING OFF. Squaring off the points of the stretchers is easily done at the table saw. Just set your rip fence to the distance shown in detail 'd' on the previous page and trim the tips of all the stretchers. Then over at the bench, it's time to bring the dowelling jig back into the mix

to make the 12.5mm holes that hold the threaded inserts.

NOTCHES. There's one more trip to the table saw, this time using the mitre gauge. You need to cut the notches in the stretchers that cradle the legs. The simplest way to do this is to use one of the stretchers to support the other while nibbling away the notch (Figure 2 above).

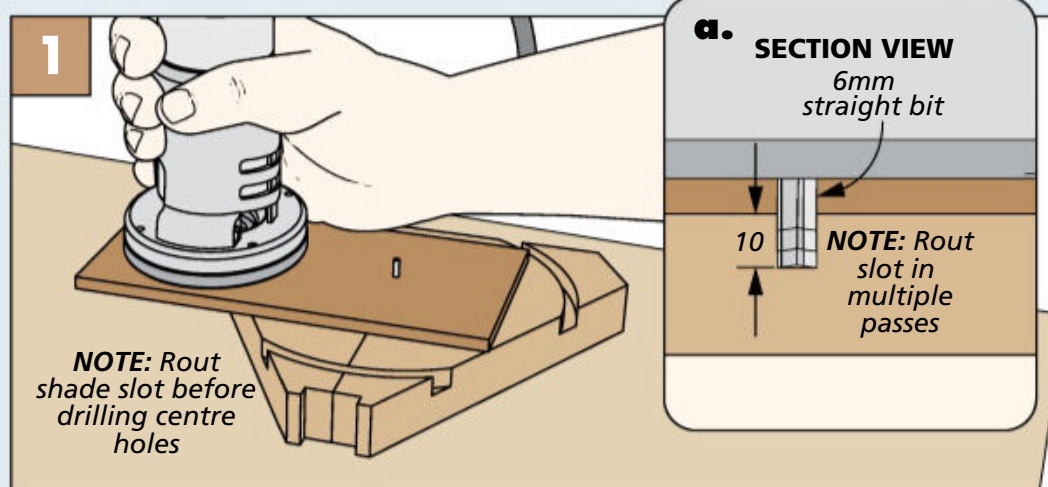
STRETCHER DETAILS. Now it's time to modify each stretcher according to its position on the lamp. I started by routing the slot in the middle and upper stretchers for the shade (Figure 1 below). Then I drilled the appropriate holes in each over at the drill press. The hole in the top

stretcher is large enough that I used the circle cutter you see in Figure 2 below. That leaves you with three details to complete the stretchers, starting with the overall final shape of each piece.

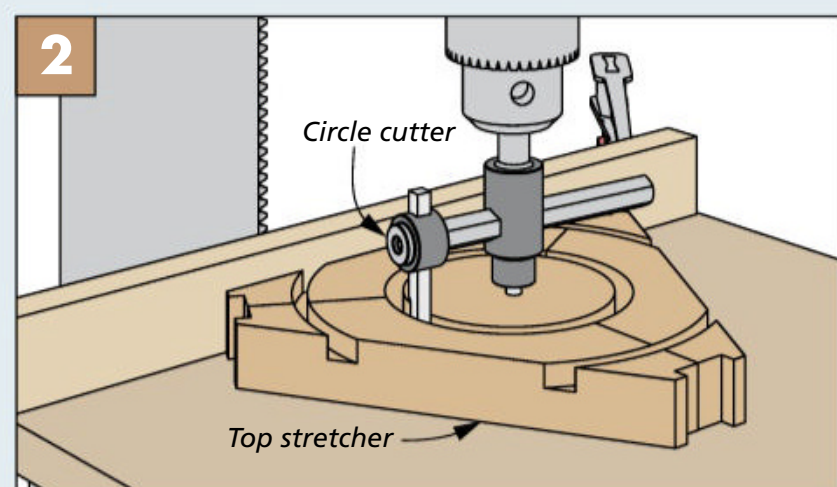
CURVED EDGES. The three edges of the stretchers have a subtle arc. That's easy to create using the template I mentioned earlier. Then install the threaded inserts. I used some epoxy to keep them in place. Lastly, make the brass plugs that will cover the screws (detail 'b' on the previous page).

With that task done, it's time to pack away the woodworking tools and clean up a bit. You've got a shade to make and some wiring to take care of.

DEFINING EACH STRETCHER



Trammel. Making the slot for the lamp shade is best done with a trammel attached to a palm router. Routing the slot in multiple passes ensures smooth results.



Circle Cutter. The large hole in the top stretcher gives you access to the bulb. To prevent burning, make sure the bit is sharp and take your time cutting the hole.



Making the SHADE

Making the shade for the lamp is not part of the normal routine on a woodwork bench, but hey, we're flexible right? At any rate, the step-by-step photos and drawings here should shed some light on the task.

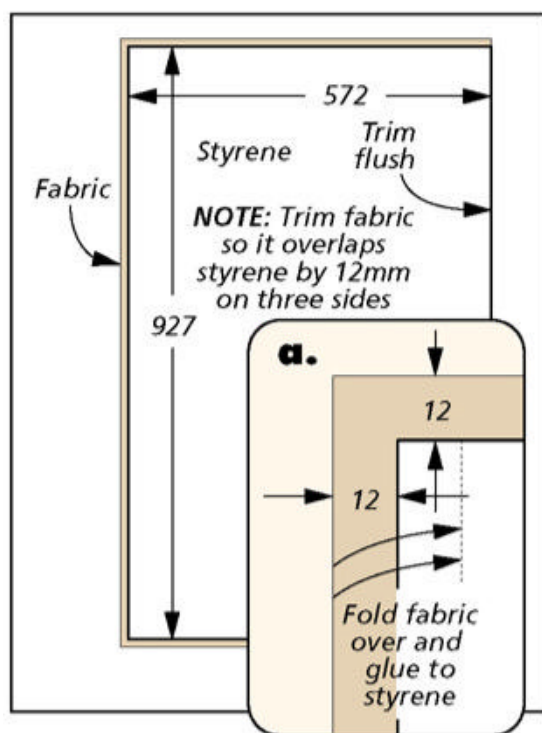
Here's a quick rundown of the supplies needed to pull this off. The shade is made of cloth purchased from a local fabric store. The material is adhered to a piece of adhesive-backed styrene that works well for this purpose. A pair of wire rings are needed to create the shape of the shade. And you'll also need some fabric glue. Sources on page 73 will help you locate these supplies.

SIZE THE STYRENE. The drawing below shows the final size of the styrene backing. Once this is cut, set it aside and focus on the fabric for the shade.

SIZE THE FABRIC. Start by ironing the fabric to remove any wrinkles. Then cut a piece that's larger than the styrene by a few centimetres in all directions. (The fabric will be trimmed after it's adhered to the styrene.) Now, tape the fabric down to a clean worksurface, removing any slack (Photo 1).

BRING THEM TOGETHER. For the next step, it's nice to have some helping hands. Place the styrene over the fabric. Do a thorough visual inspection to ensure that the fabric is straight in relation to the styrene. Start to peel the backing from the styrene at one end and position it on the fabric. Slowly pull off the backing while pressing the styrene in place (Photo 2). When the backing is completely removed, use a J-roller to firmly adhere the fabric to the styrene by rolling from one edge to the other.

FINAL TRIM. As you see in Photo 3, trim the fabric so it



Rough Sizing. To start, iron the fabric and tape it in place. This is the time to ensure that any pattern in the fabric weave is aligned with the backing.



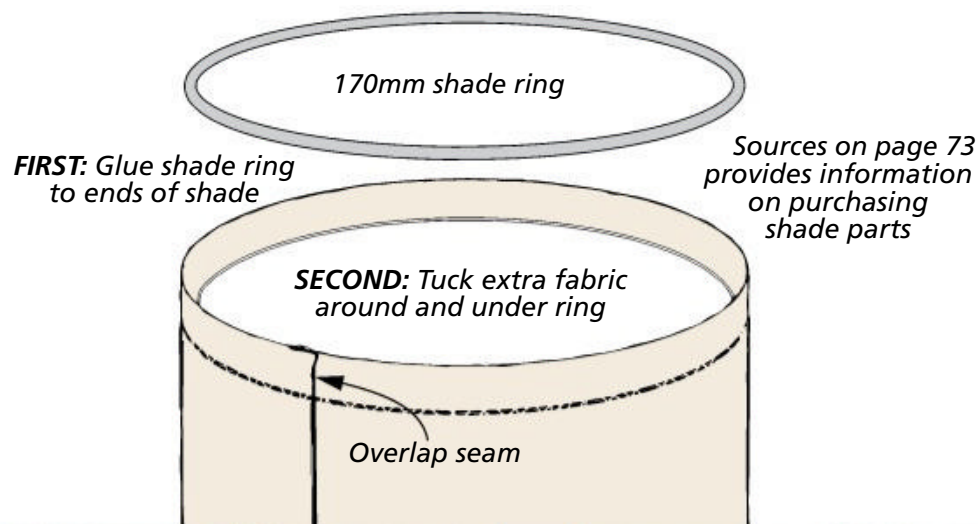
Attach the Styrene. With the help of a friend, peel the backing off the styrene. A J-roller (inset) does a good job of adhering the backing to the fabric.



Final Trim. Three edges of the fabric are trimmed longer than the backing. The long edge is folded and glued to the styrene (inset).



Roll Shade & Glue. Glue, cauls and clamps are required to properly shape the shade. Leave the shade clamped for a while to ensure the glue is dry.



Ring to Styrene. Glue the rings to the ends of the shades. Binder clips hold the rings in place.



Shade to Ring. Use a flat screwdriver to tuck the fabric under the ring.

overlaps the styrene by 12mm on the top, bottom and one edge. This is cleanly done with a rotary cutter. On the other long edge, trim the fabric flush with the styrene.

FINISHED SEAM. Next, fold and glue the extra fabric to the styrene backer along the long edge (Photo 3 inset). When the glue is dry, you can turn your attention to shaping the shade.

This starts by applying more glue on top of the fabric you just glued to the long edge. Then, place the trimmed edge inside the finished seam and clamp

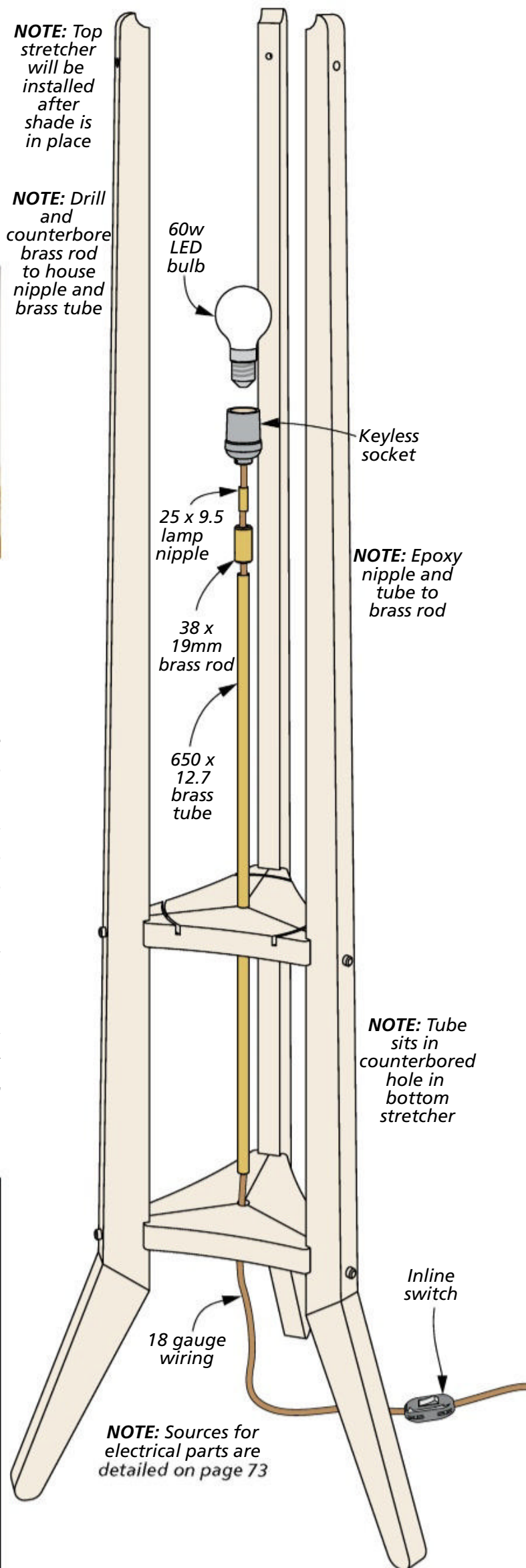
it with a caul that reaches through the shade (Photo 4). To finish the ends of the shade, see Photos 5 and 6 above.

FINAL DETAILS. While the shade was drying, I turned my attention to wiring the lamp. (You'll want to stain and finish the lamp before working on the wiring.)

To complete the assembly, you can drop the shade in place and install the top stretcher. The brass plugs that go over the screws are held in place with a friction fit. Now this hip little lamp is ready to take its place in the room of your choice. **W**

NOTE: Top stretcher will be installed after shade is in place

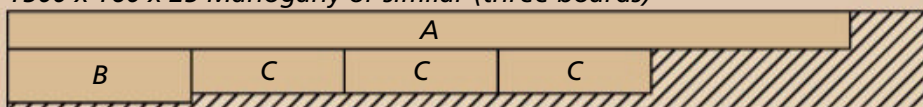
NOTE: Drill and counterbore brass rod to house nipple and brass tube



Materials, Supplies & Cutting Diagram

- | | | |
|-----------------------------------|----------------|------------------------------------|
| A Uprights (3) | 1372 x 50 x 24 | • (1) 9.5mm-dia. x 300 Brass Rod |
| B Feet (3) | 255 x 90 x 24 | • (1) 12.7mm-dia. x 650 Brass Tube |
| C Stretcher Triangles (9) | 254 x 73 x 24 | • (1) 19mm-dia. x 38 Brass Rod |
| • (3) 9.5mm-dia. x 150mm Dowel | | • (1) Inline switch |
| • (9) ¼" Whit Socket Head Screws | | • (1) Keyless Socket |
| • (9) ¼" Whit Threaded Inserts | | • (1) 2.4m Electrical Cord |
| • (1) 9.5mm-dia. x 25 Lamp Nipple | | • (2) 170mm Shade Rings |

1500 x 160 x 25 Mahogany or similar (three boards)







▲ The chest of drawers features five large drawers. Hardwood construction combined with half-blind dovetails make these drawers rock-solid no matter how much you load them up.

▼ The turned feet appear to be an extension of the split turnings that decorate the front of the case. However, a clever construction method allows you to create this illusion nearly effortlessly.



Empire Chest of Drawers

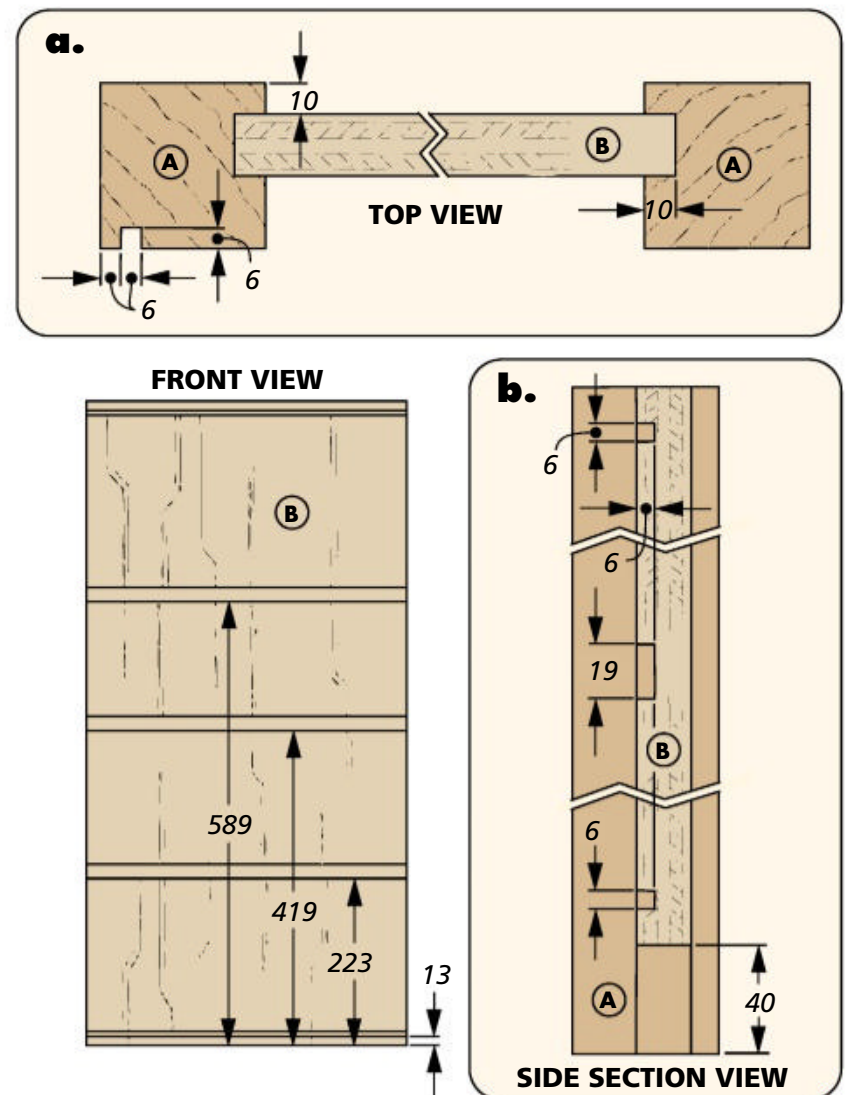
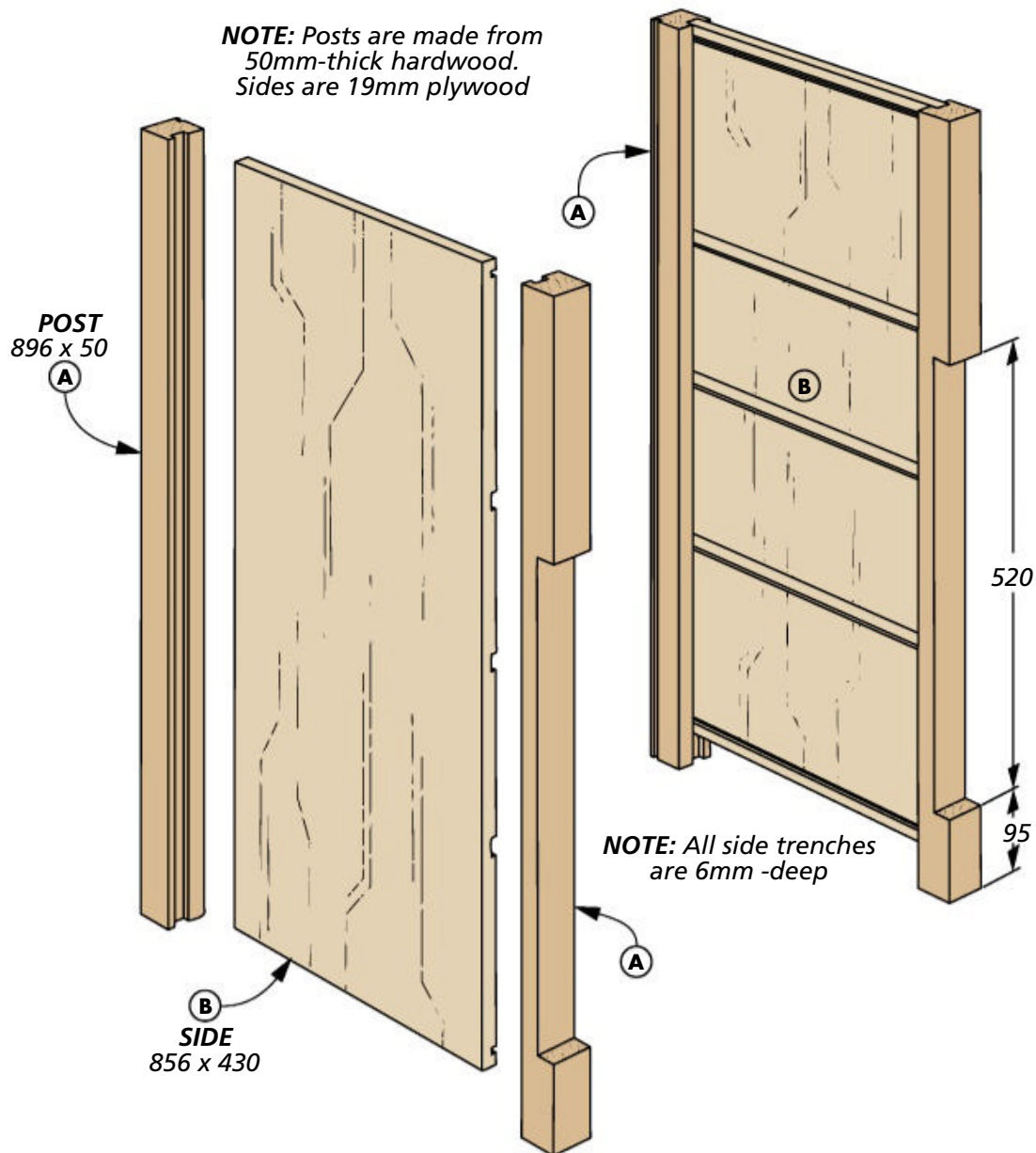
This take on the classic Empire chest of drawers is a modern rendition. It offers updated construction techniques while staying true to the design of Empire furniture.

When you hear the term Empire, the first thing that you think of may not be furniture. Personally, the term conjures images of Sith lords, Jedi and light sabers. However, the Empire style of furniture has some interesting features that really appeal to me. And when I saw the design of this chest of drawers, I was excited to see how it all came together. Before you start building, let's quickly talk about what the Empire style is, and some of the design features.

A LUXURIOUS FEEL. The Empire design movement is part the second phase of Neoclassicism (early to mid-19th century). The design was inspired by the Napoleon-era style from France, and the furniture reflects this elegant and luxurious style.

Some of the traditional Empire design features can be found in this chest of drawers. This starts with the heavy proportions, and a top drawer that's larger than the rest of the drawers. As you work down the chest, the drawers are graduated.

SPLIT TURNING. Another feature indicative of Empire furniture is scrollwork or turnings, often sitting below the top drawer. Here, we've featured a pair of split turnings that mirror the feet. Don't worry, they're straightforward to make. And speaking of making, turn the page because it's time to get started building this Empire chest of drawers.



Create the **SIDE PANELS**

The case of this Empire chest is built out of plywood. Plywood dividers separate the drawer openings, and all the plywood gets covered in edging. Up first is creating the corner posts that

capture the plywood panels.

HARDWOOD CORNERS. Start by milling the posts to size. I chose to use cherry, but just make sure that your stock of choice is available in 50mm thickness for the

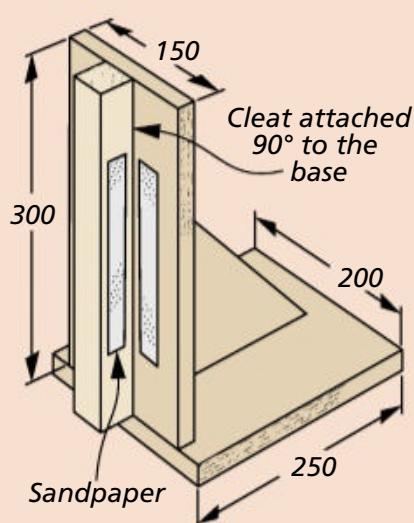
posts (or you'll have to glue them up). At the table saw, cut a wide groove on the inside face of each post. This is to capture the plywood sides, like you see in the main drawing above and in detail 'a.'

Set the front posts aside for a moment, and cut another groove on the inside faces of the rear posts. This will be for the back that you'll create later.

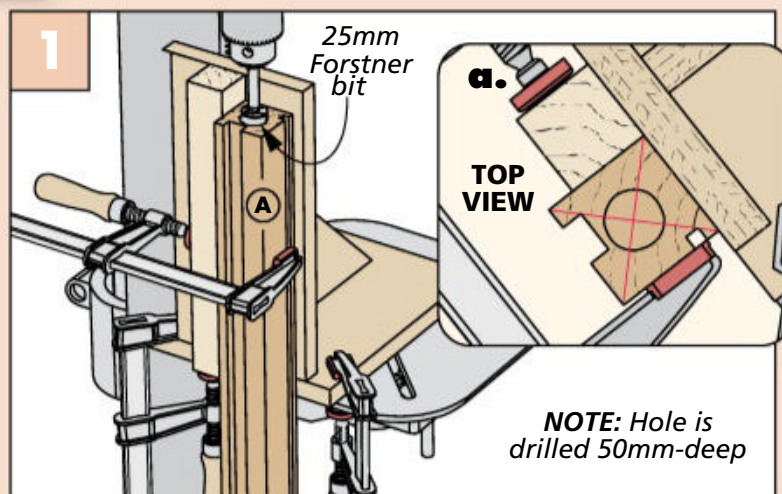
FOOT HOLES. Now, you can drill a hole in the bottom of each post. These will be for the feet that you'll turn later. Take a look at the box to the left to see how this is done. In short, I used a jig to hold the leg vertically at my drill press. Then, I used a Forstner bit to drill the hole to the proper depth.

NOTCHED FRONTS. With the holes drilled, there's one more thing to take care of on the posts. And that's cutting the large notch in the front posts. To tackle these, I defined the ends of the notch at the table saw. Then, I cut the bulk of the waste away at the bandsaw (Figure 1, next page). Leave a little bit of waste here. You'll want

VERTICAL HOLE JIG



Drilling Guide. The guide is a right-angle block with a cleat attached to the face.



Foot Mortises. With the guide clamped in place, swing the table to one side to drill the holes for the feet. Back out the bit occasionally to clear the shavings.

to clean up the cut at the router table (Figure 2). Just use a long auxiliary fence on the router table, and make a light, planing cut to clean up the face. Any remaining waste in the corners can be cleaned up with a sharp chisel.

SIDE PANELS. The sides of the chest (and the dividers) are plywood. Here, I chose a quality cherry veneer plywood. There's some simple joinery here, but first cut the side panels to size.

TRENCHES. Trenches on the inside of the panels capture the dividers (detail 'b' previous page). The top and bottom divider have a tongue cut on the ends, so those trenches will be a little narrower than the middle three.

When you're ready to cut the trenches, you can pick your poison. Generally, for plywood panels (if they're not too large) I like to cut trenches on the table saw. If you choose this route, set up the dado blade to match the plywood thickness. Alternatively, you could cut the trenches with a router and straight bit. (I would use a narrower bit and make two passes for a snug fit.) See page 30 for some techniques on routing grooves and trenches.

ASSEMBLY. After the trenches are cut, you can glue the corner posts to the sides. Make sure to align the top of the posts

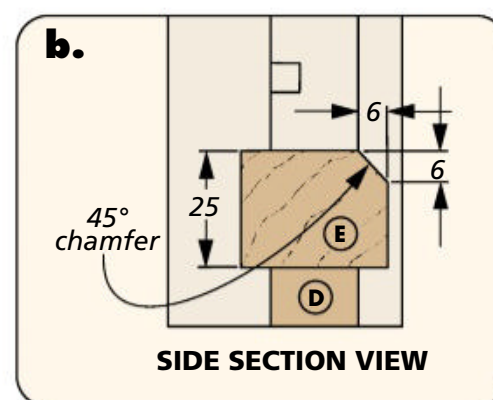
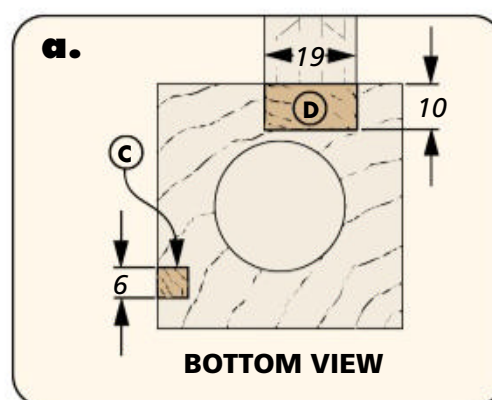
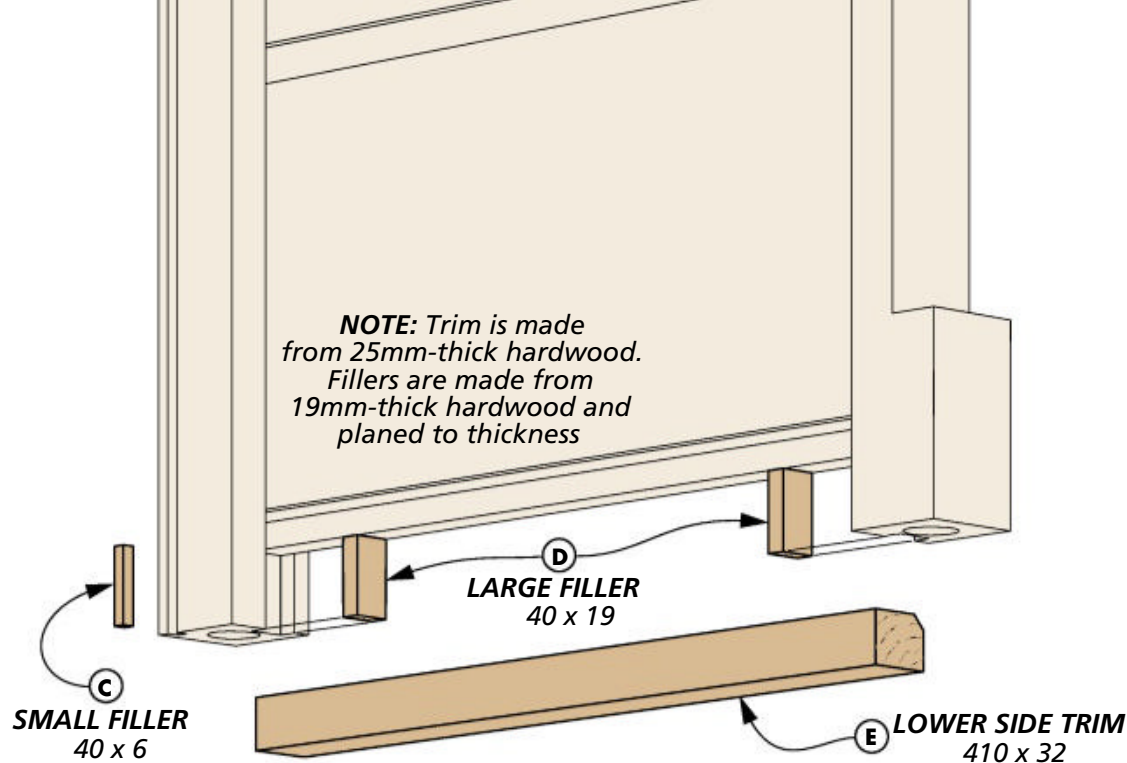
flush with the sides. With the clamps applied and the glue drying, you can tackle a few final details on the side assemblies.

FILLERS & TRIM

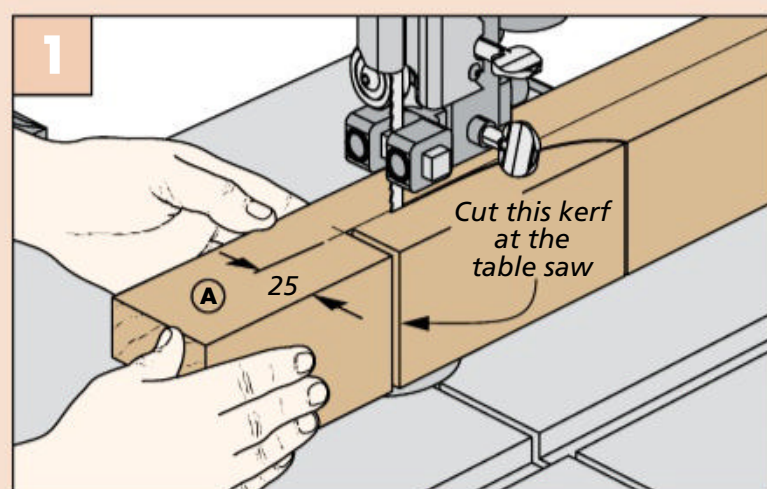
After gluing up the side assemblies, you'll notice that the groove for the side panel is visible on the bottom of the corner post. So, you'll want to cut a small filler block and plug the groove, along

with the groove for the back (detail 'a' and the main drawing above).

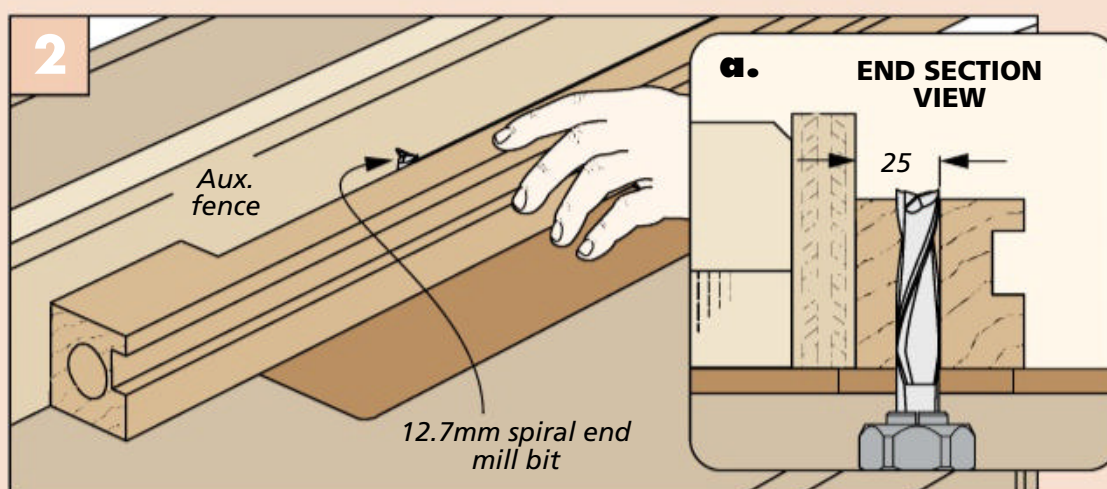
The last detail to knock out is a thick piece of trim that's attached to the bottom end of the side panel (detail 'b'). Start with a long blank, then rout a chamfer along one edge. You'll need another piece of trim for the front of the chest later, so I made an extra. Cut the trim to fit and install it with glue and a couple of pin nails to hold it while the glue dries.



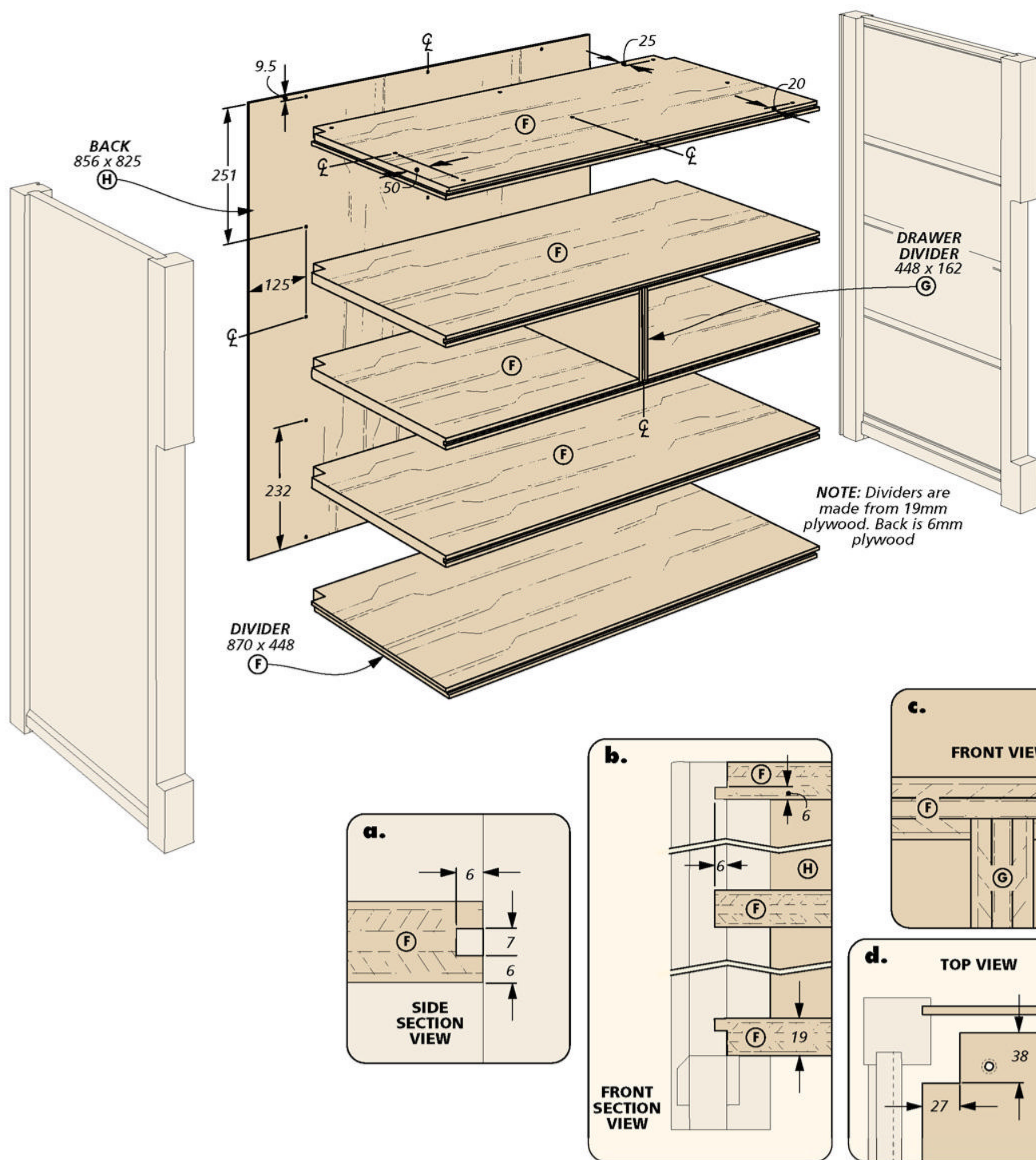
MAKE A BIG NOTCH



Post Notch. At the table saw, kerf the ends of the notch. Then saw out the waste at the bandsaw. Leave a small amount of waste inside the line.



Planing Cut. Use a long auxiliary fence and spiral end mill bit at the router table to make a planing cut inside the notch. Remove a small amount of material with each pass to leave a smooth surface.



A set of **DIVIDERS**

Creating the dividers is up next. Like the side panels, the dividers are made from plywood. After the dividers are installed, you'll cut some hardwood edging to dress them up.

PLYWOOD DIVIDERS. As you can see in the drawing above, there are a total of five horizontal dividers. They're all the same size. A tongue cut on each end of the bottom and top dividers fits in the nar-

rower trenches in the side assemblies (detail 'b').

After cutting the dividers to size, you can cut a trench in the second and third divider, as seen in detail 'c.' This is to fit a shorter, vertical drawer divider (simply cut this to size). Like before, I cut these at the table saw with a dado blade. Before leaving the table saw, form the tongue on the ends of the bottom and top divider.

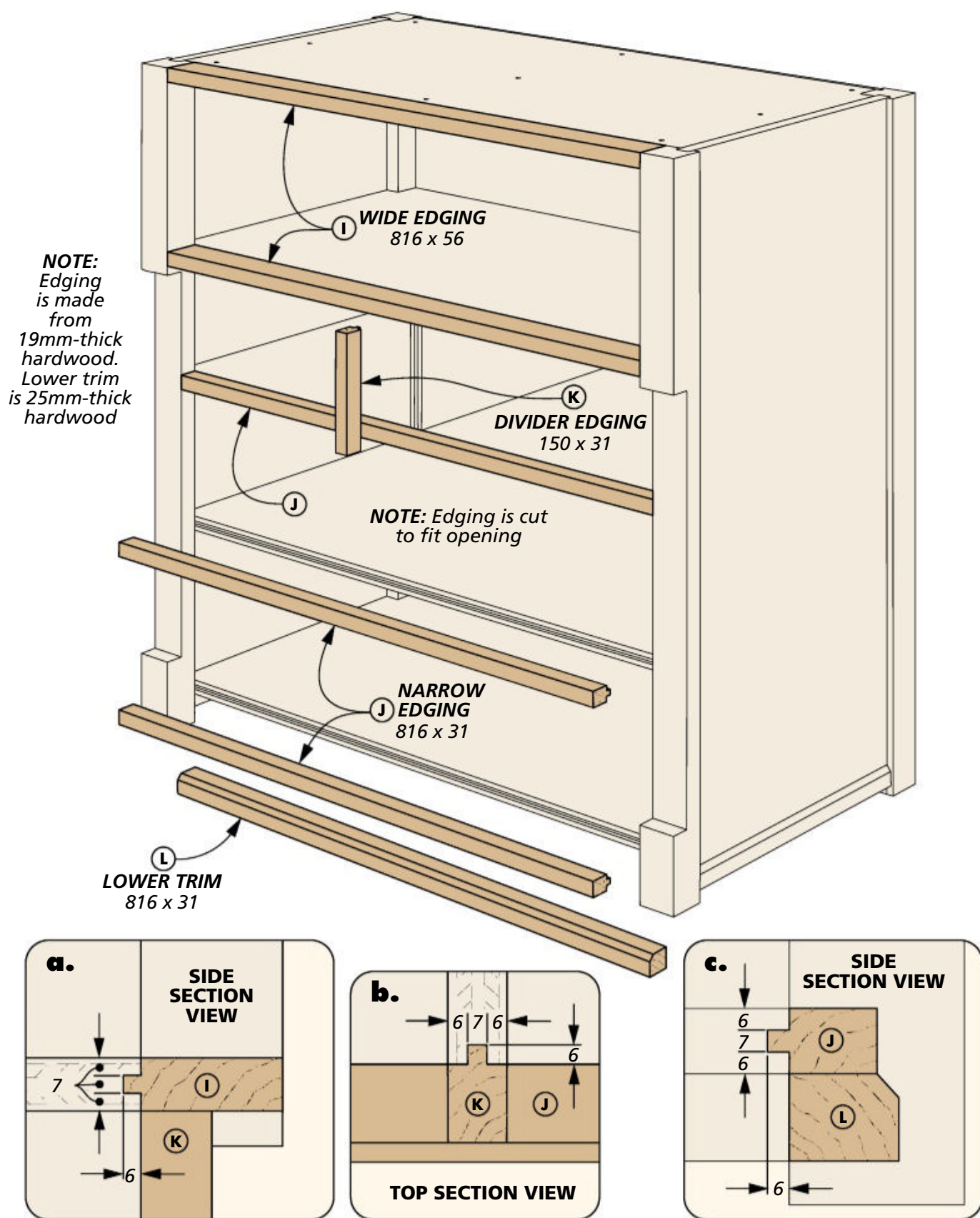
GROOVED FRONTS. The front edge of the plywood dividers will receive some hardwood edging that you'll make in a little bit. To create a strong bond, the edging is attached using a tongue and groove. Cut the groove in the front edge of the dividers with a slot-cutting bit, as seen in Figure 1. Cut the groove in all of the divider fronts, including the drawer divider.

NOTCHES. Back at the bench, you have two more tasks before you can install the dividers in the case. The first is to notch the back corners of each divider, as seen in the main drawing on the previous page and detail 'd.' The notch will fit around the back corner post. To create the notch, simply cut to the layout line with a jig saw. The final detail is to pre-drill the holes in the top divider to attach the top later (drawing on previous page).

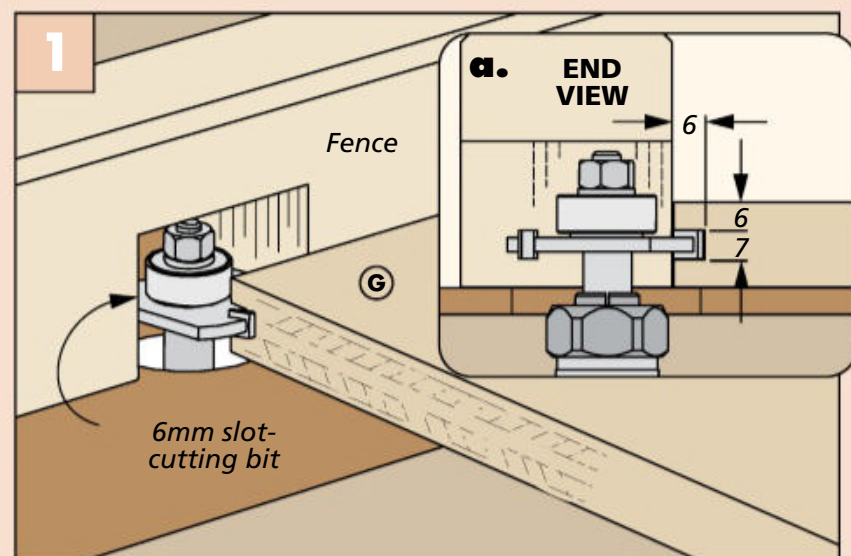
ADD THE DIVIDERS. Now, you're ready to glue the dividers to the side panels. These simply slip into the trenches, along with a bead of glue. To keep the assembly square, I cut the back to size and slipped it in the groove in the rear post (don't attach it yet). Then, clamp the case together while the glue dries.

EDGE IT

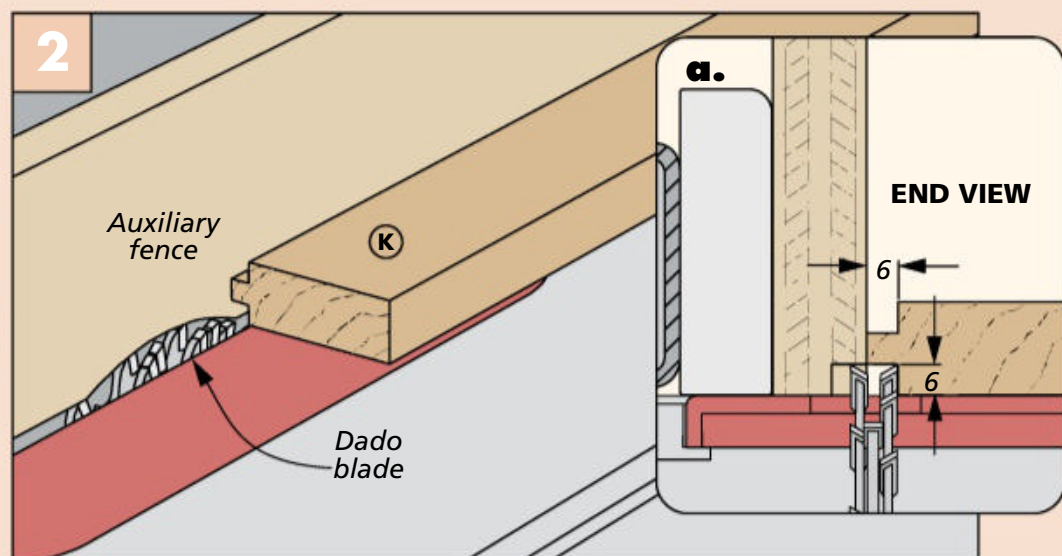
Now you can tackle the edging to cover the plywood edges. This is cut from hardwood, and has a tongue cut on one edge (detail 'a' and Figure 2) to slip in the groove in the divider. Note that the top edging is wider to create the protruding drawer opening. After forming the tongue, cut each piece to fit. I removed the back so I could glue and clamp the edging in place. Lastly, apply the front trim piece below the bottom divider. You can see the edging in detail 'c.'



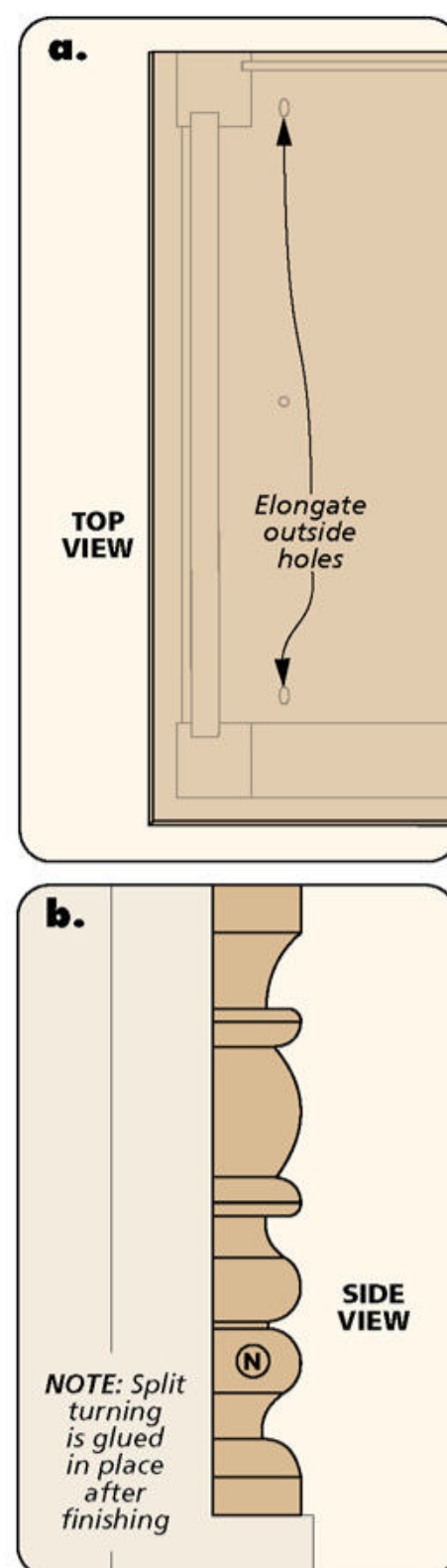
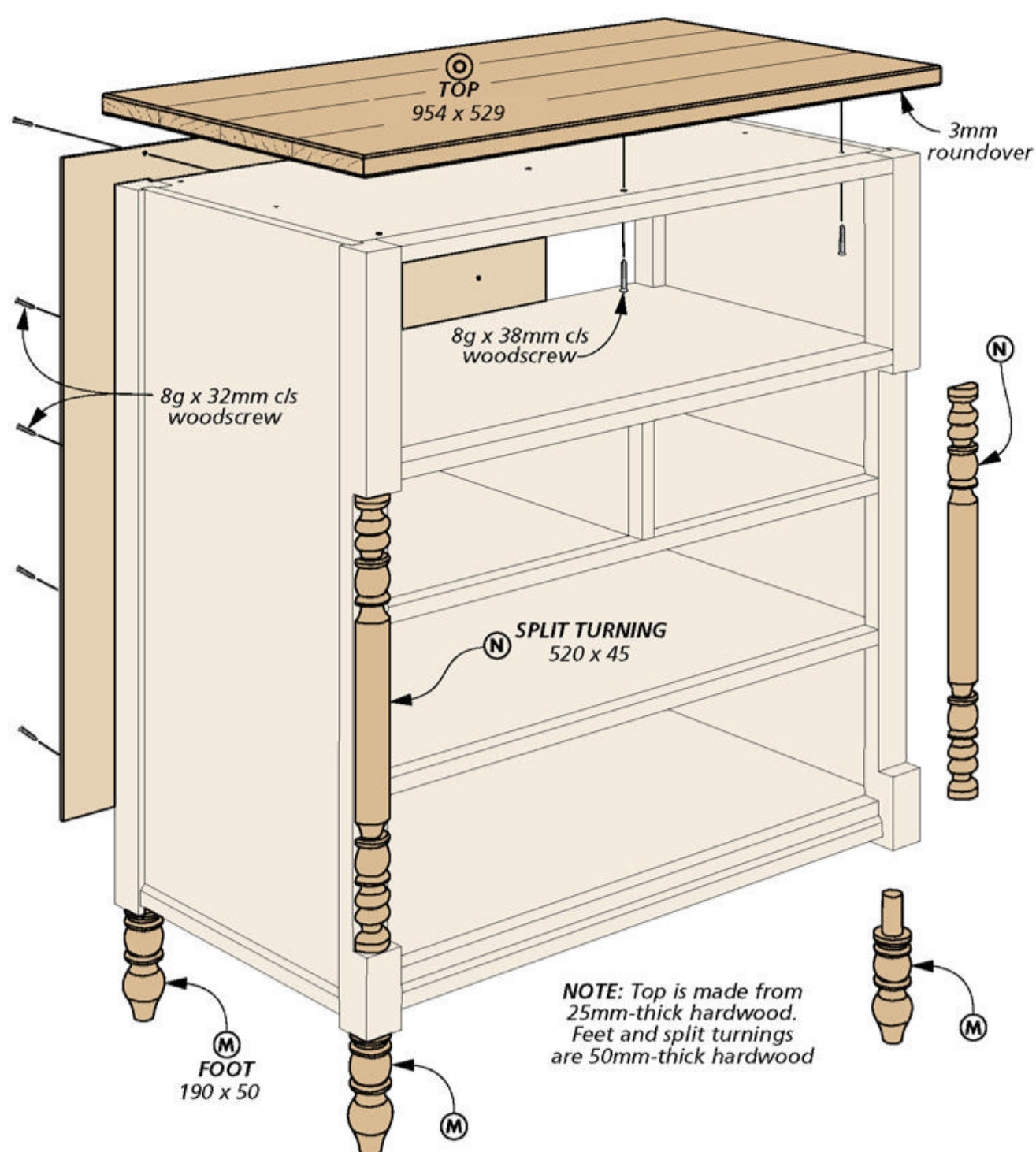
GROOVE & TENON



Slot the Dividers. Using a slot-cutting bit in the router table, cut a groove in the front edge of each divider. Use a mitre gauge to guide the drawer divider during cutting.



Edging Tongue. Bury a dado blade in an auxiliary fence to form a tongue on one edge of all the edging. Check the fit with a scrap piece to get a snug fit in the divider groove.



Making the **TURNINGS & TOP**

With the bulk of the case complete, you can shift your focus to some of the more intricate details of the chest. This will start with the turnings — a pair of split turnings for the notches in the front posts and the four feet. Then, you'll tackle the top.

FEET FIRST. Creating the feet is a straightforward exercise in turning. Start with four blanks, cut a little long. (I used the same 50mm stock as the posts.) If you feel inclined, you can use the table saw to bevel each corner and make an octagonal blank. (I enjoy turning, so I skipped this step and went straight to the lathe.)

At the lathe, set your blank up in a drive centre or chuck. Use a roughing gouge to turn the blank to a 50mm cylinder. Then, use a parting tool to form a tenon on one end. This will fit into the holes you drilled in the bottom of the posts, so double check the size with calipers as you go.

PROFILED FOOT. With the tenon fitting into the hole, you're ready to turn the feet to shape. The profile I used can be seen on the next page. To keep the feet consistent and to help check my progress, I made a reverse template out of Masonite. Just use a combination of spindle gouges

and scrapers to refine the shape. Don't worry too much about following the pattern exactly. Just make sure to get the four feet close in appearance.

Once the turning is done, use a parting tool to cut the feet to final length. Then, set them aside for finishing later.

SPLIT TURNING. Now that you're warmed up on the lathe, you can take care of the split turnings that fit in the notches on the front posts. These start as two extra-long blanks that are glued together with a piece of thick paper in between them. After turning, the blank will be split apart along this paper-glue line.

Once the glue is dry, drill a hole on each end of the blank, slightly larger than the points on your live centre and drive spur. This will prevent the pressure from the tailstock from splitting the blank along the glue line. As before, turn the blank round, then form the shape (shown to the right) using spindle gouges, scrapers and sandpaper.

SPLIT IT APART. Once the profile is complete, use the parting tool to cut the blank to length. Then, remove the turning from the lathe and use a plane blade to split the blank along the glue joint.

Scrape and sand any remaining glue and paper before staining and finishing the turnings. The split turnings and feet are stained darker than the rest of the chest (refer to Sources on page 73 for finishing info). Once the finish is dry, you can glue them in place. I drove a couple of long pin nails into each turning to hold it in place while the glue dried.

SOLID WOOD TOP

The top of the chest is made of full 25mm-

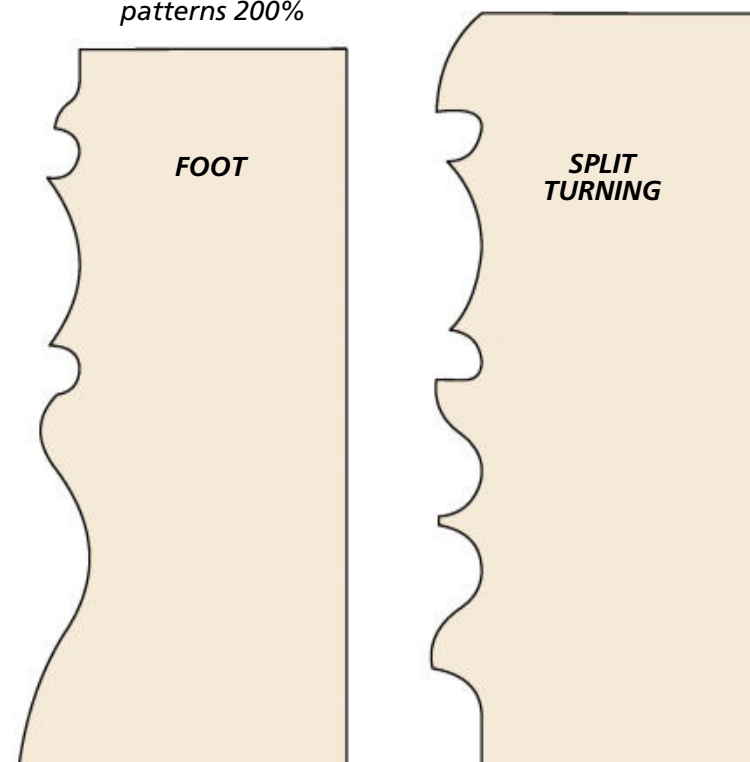
thick hardwood. This keeps it in theme with the heavy proportions that are found on the rest of the case.

GLUE UP. Because the top is fairly wide, I created the top from multiple boards rather than one large, wide plank. Start with your stock planed to thickness. Glue up the panel in two sections, using clamping cauls to keep the sections flat. Once each section is dry, glue them together for the final width and scrape or sand the gluelines flush.

SLOTTED HOLES. With the top glued up, you can cut it to size. A small roundover eases the top and bottom edges. Then, you can prefinish the top like the turnings.

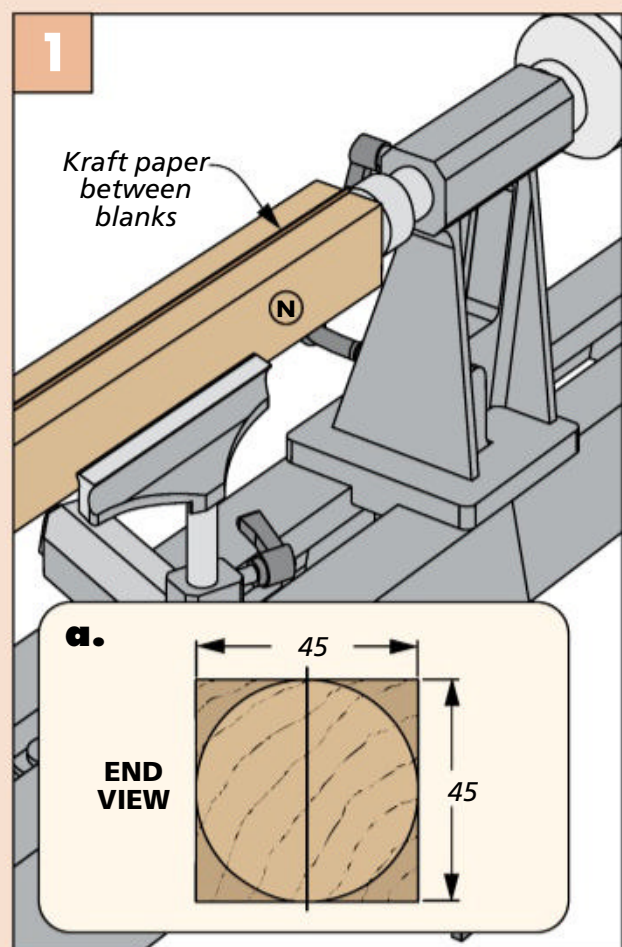
Before attaching the top, slip the back into place and install it with screws driven into the dividers. The top gets attached to the top divider with screws. First however, I took a minute

NOTE: Enlarge patterns 200%

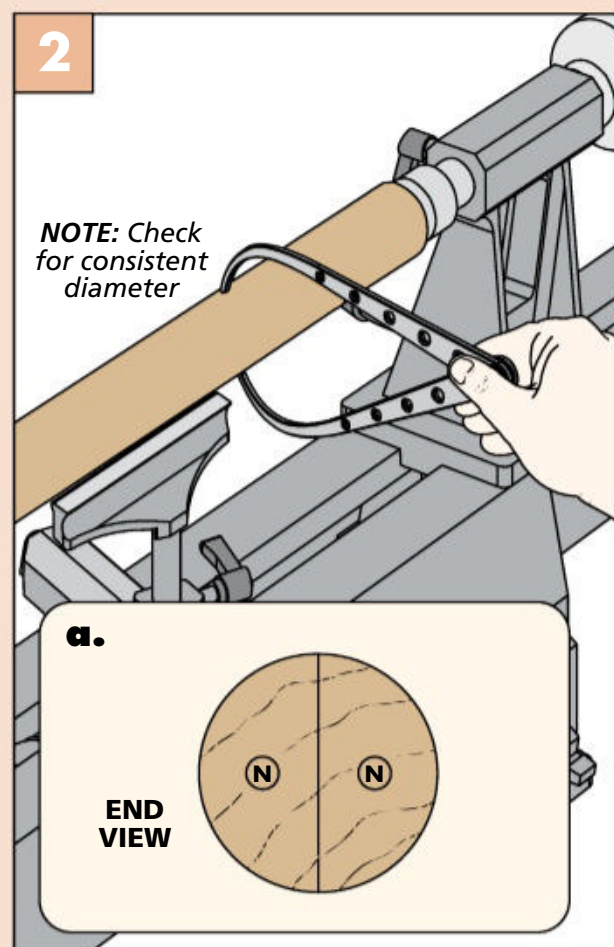


to elongate the outside holes I made in the top divider using a file. This allows the top to expand and contract with any variations in humidity.

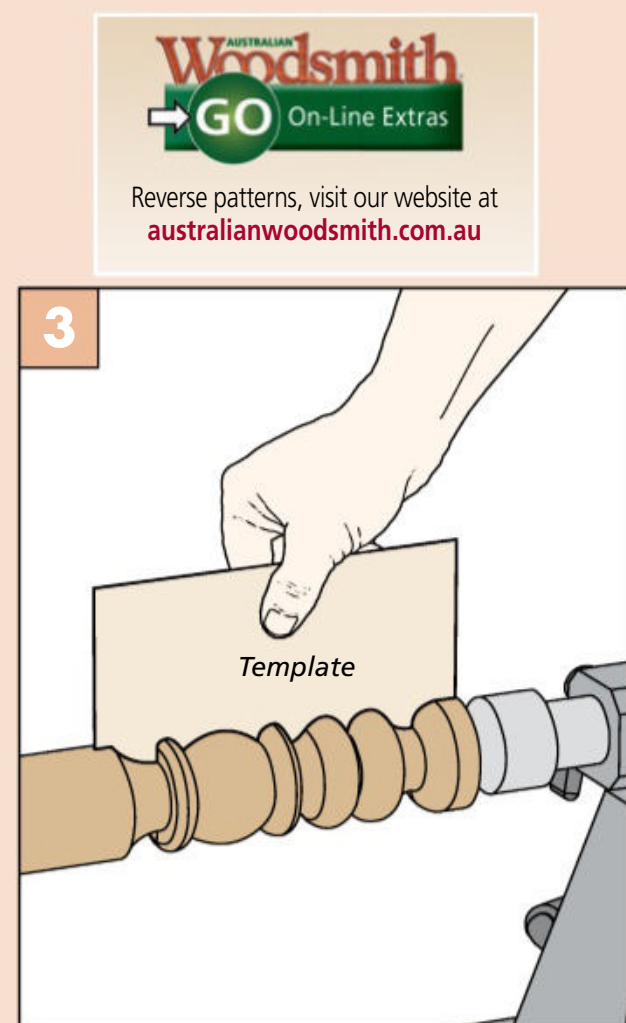
MAKING A SPLIT TURNING



Split Blank. Glue up two blanks with paper in between and hold it in the lathe between centres.



Turn It Round. Use a roughing gouge to turn the square blank into a cylinder, using calipers to verify a consistent size.



Turn the Shape. Turn the blank to shape. Check the profile using a Masonite template as a reference.



Reverse patterns, visit our website at australianwoodsmith.com.au

A nice set of DRAWERS

A chest of drawers without drawers is nothing more than a squatty bookcase. And that's the final step of this journey — to fill the case out with drawers. All told, there are five drawers that are graduated in size. The top drawer is the tallest, while the smaller split drawers are the shortest. The drawer sides and back are made from pine, while the drawer fronts are solid cherry.

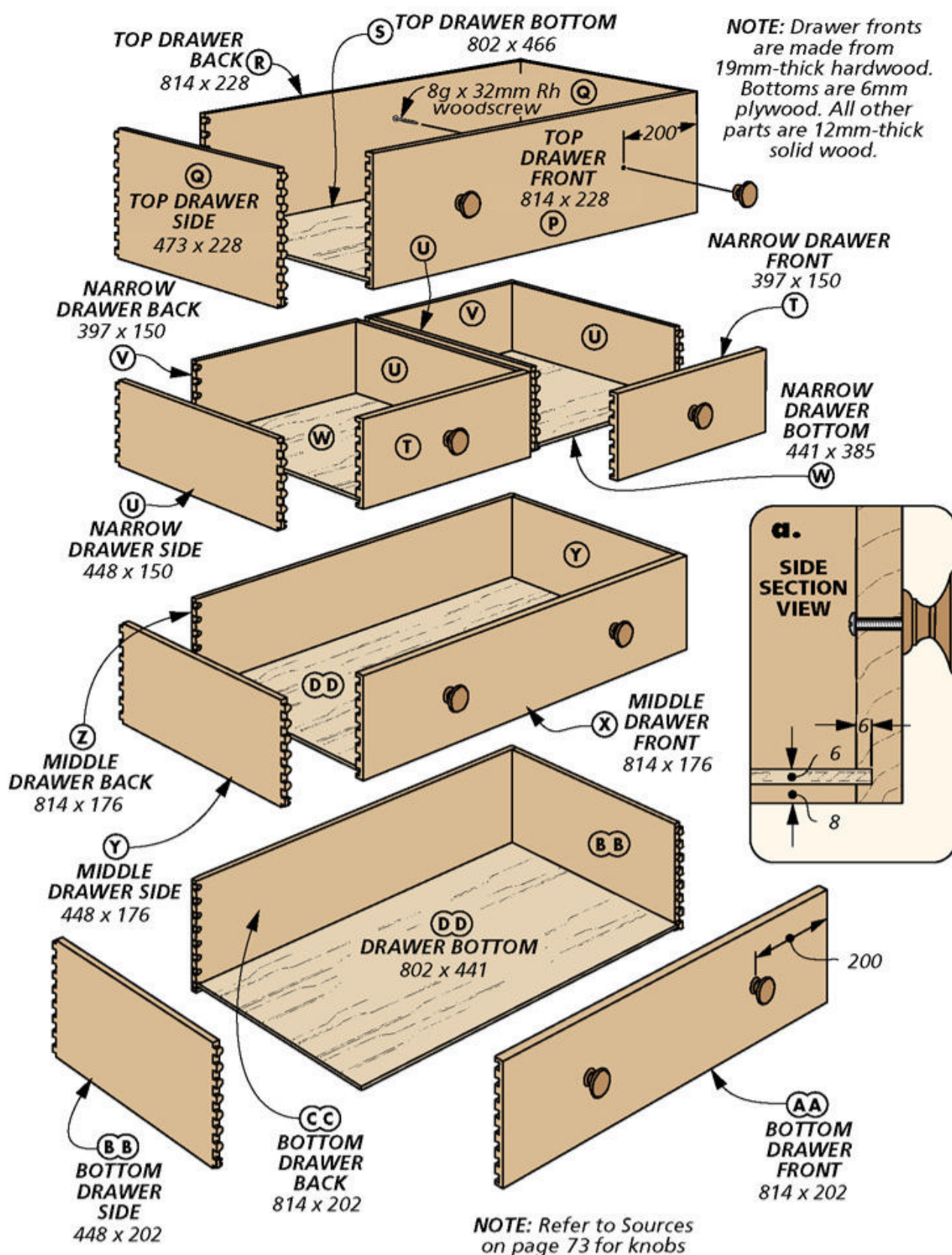
BIRDS OF A FEATHER. Even though the drawers are all different heights, there are some common dimensions. The bottom two drawers and the top drawer are all the same width. While that makes milling your stock straightforward, you do need to keep all the drawer parts in order. After milling the stock to size (be vigilant and cut the drawer fronts to match the openings), carefully label each part and each corner. This will come in handy for the next step — dovetailing.

DOVETAIL JOINERY. For drawer joinery, it's hard to argue with dovetails. They look great and are strong. Which is why I chose to use them on this project — these drawers are large and will be bearing a lot of weight when they're loaded up.

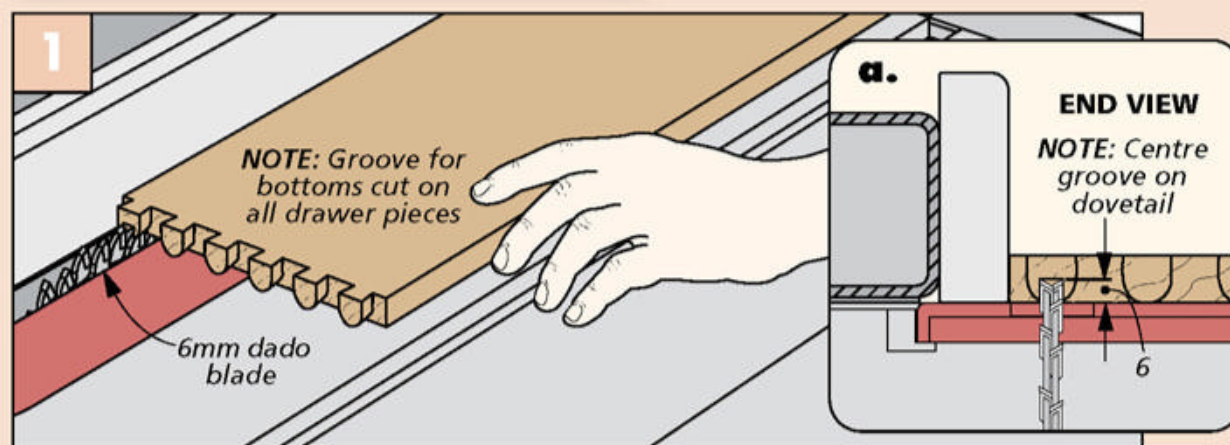
Half-blind dovetails (such as the layout shown in the margin above left and main drawing above) are fairly straightforward to cut using a dovetail jig. Take a look at the instruction manual that came with your jig for the details on setting it up for half-blind dovetails.

BOTTOM GROOVES. After the dovetails are cut, head over to the table saw. Here, you'll cut a groove near the bottom edge of each drawer part for the bottom (Figure 1). After pre-finishing the drawer fronts, assemble the drawers.

BOTTOM GROOVES. After the dovetails are cut, head over to the table saw. Here, you'll cut a groove near the bottom edge of each drawer part for the bottom (Figure 1). After pre-finishing the drawer fronts, assemble the drawers.



GROOVE FOR BOTTOMS



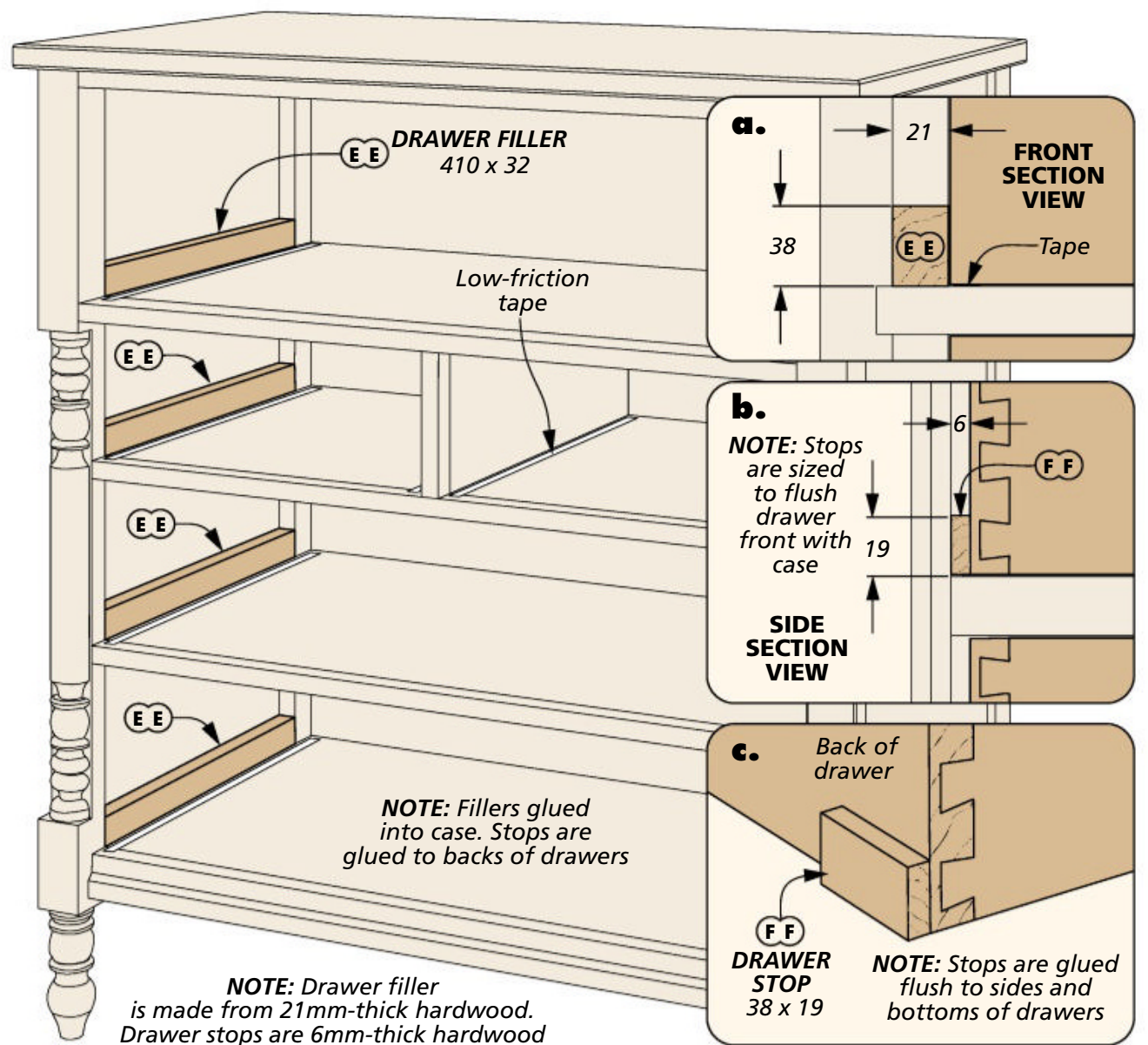
Bottom Groove. After cutting the dovetail joinery, install a dado blade in the table saw and cut a groove on the inside of each drawer part. Centre the groove on the bottom dovetail of the drawer.

FINAL DETAILS

There are only a few things left before you can call this chest of drawers complete. The first is to install knobs on the front of the drawers. You could turn these if you'd like (they're 50mm-diameter), or you can purchase some like I did.

Hardwood drawer fillers get glued against the side panel in each drawer opening (main drawing and detail 'a'). I also installed drawer stops on the back of the drawers (so I could sand them to finetune the drawer fit). A couple of strips of low-friction tape on the areas where the drawers slide will help them operate smoothly.

With that, you can slide the drawers into the case and move your finished Empire chest into your home. **W**



Materials, Supplies & Cutting Diagram

A	Posts (4)	896 x 50 x 50
B	Sides (2)	856 x 430 x 19 ply
C	Small Fillers (2)	40 x 6 x 6
D	Large Fillers (4)	40 x 19 x 6
E	Lower Side Trim (2)	410 x 32 x 25
F	Dividers (5)	870 x 448 x 19 ply
G	Drawer Divider (1)	448 x 162 x 19 ply
H	Back (1)	856 x 825 x 6 ply
I	Wide Edging (2)	816 x 56 x 19
J	Narrow Edging (3)	816 x 31 x 19
K	Divider Edging (1)	150 x 31 x 19
L	Lower Trim (1)	816 x 31 x 25
M	Feet (4)	190 x 50 x 50
N	Split Turnings (2)	520 x 45 x 45
O	Top (1)	954 x 529 x 25
P	Top Drwr. Front (1)	814 x 228 x 19
Q	Top Drwr. Sides (2)	473 x 228 x 12
R	Top Drwr. Back (1)	814 x 228 x 12
S	Top Drwr. Btm (1)	802 x 466 x 6 ply
T	Narrow Drwr. Frts. (2)	397 x 150 x 19
U	Nar. Drwr. Sides (4)	448 x 150 x 12
V	Nar. Drwr. Backs (2)	397 x 150 x 12
W	Nar. Drwr. Bttms. (2)	441 x 385 x 6 ply
X	Middle Dwr. Front (1)	814 x 176 x 19
Y	Middle Dwr. Sides (2)	448 x 176 x 12
Z	Middle Dwr. Back (1)	814 x 176 x 12
AA	Bttm. Dwr. Fronts (1)	814 x 202 x 19
BB	Bttm. Dwr. Sides (2)	448 x 202 x 12
CC	Bttm. Dwr. Back (1)	814 x 202 x 12
DD	Drawer Bttms. (2)	802 x 441 x 6 ply
EE	Drawer Fillers (8)	410 x 32 x 21
FF	Drawer Stops (10)	38 x 19 x 6

- (24) 8g x 32mm c/s Woodscrews
- (8) 50mm Wooden Knobs w/screws
- Low-Friction Tape

ALSO NEEDED:
One 2400 x 1200 sheet of
6mm pine plywood,
Two 2400 x 1200 sheets of
19mm cherry plywood

2400 x 190 x 12 Clear Pine (Two Boards)



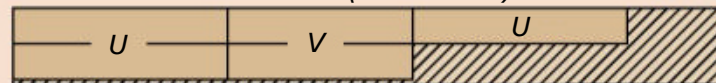
2400 x 140 x 12 Clear Pine (Two Boards)



2400 x 140 x 12 Clear Pine (Two Boards)



1500 x 190 x 12 Clear Pine (Two Boards)



2100 x 190 x 19 Cherry (Two Boards)



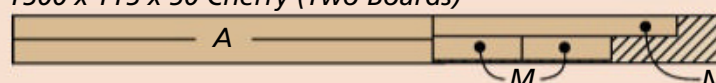
2100 x 190 x 19 Cherry (Two Boards)



2400 x 190 x 25 Cherry (Two Boards)



1500 x 115 x 50 Cherry (Two Boards)



Kendama



Richard Findley faces up to the task of making this traditional Japanese 'sword and ball' skill toy for his boys to play with.

My challenge this month is to make a kendama. I've seen them and the tricks people can do with them but have never made one, so this, and perhaps learning a couple of the tricks, should be a fun one.

A kendama is a Japanese skill toy, a little like the traditional ball and cup that some readers may have played with as children. Unlike the European traditional toy, the kendama has three cups of different sizes, just to make it more of a challenge.

There are three parts to the kendama. The 'ken' roughly translates into 'sword' and is the central shaft with a rounded spike on the top and a small cup at the base. The 'sarado' is the cross piece which sits on the shaft, locking in place with a tapered hole and features two cups of different sizes. The ball is

called the 'tama' and the three parts are attached with a piece of string.

RESEARCH

I've seen these online and they seem to be available in a range of sizes. I assume that, as there is a Kendama World Cup held in Japan annually, along with various other competitions around the world, there must be a 'standard' or 'official competition size' that they are made to.

Perhaps it's me being British and liking rules and guidelines, or just that with every other sport I've ever been involved in, the main apparatus – whether that is a ball, bat or racquet – has to meet certain regulations to be allowed in competitions. However, after a considerable amount of searching online, I couldn't

find any official dimensions for a kendama. So I found a couple of different sources and averaged out the dimensions – converting one from imperial sizes, written in decimals – and eventually coming up with my own sizes for the kendama I created which, I think, looks authentic.

There are lots of videos online showing how different people have made their kendamas – some are quite creative, others look decidedly dodgy. The main challenge, as far as I can see, is going to be making the sarado, which has cups at each end. After some thought I have a plan, so make a start.

TIMBER

The ball is the largest diameter at around 62mm and I find a block of beech which

will suit. I also find a length of beech which was an off-cut from another board at 55mm square, which will do the ken and sarado perfectly. Most of the commercially available kendamas seem to be made of beech, so it seems a safe bet, although almost any wood could be used, I'm sure.

TAMA/BALL

I begin with the ball as it seems to be as good a place to start as any. I have turned many balls over the years, some just as plain spheres, many more as part of finials. As the tama needs a hole drilled in it for the ken to fit in, I decide to hold it in the chuck and turn as much as possible before drilling, rather than turn a complete sphere and then try to drill it afterwards. For some jobs, an 'eye-balled' sphere is good enough, but as this is a very tactile object, being a hand-held toy, it needs to be accurate, so I cut an MDF template to help guide the shape as I turn.

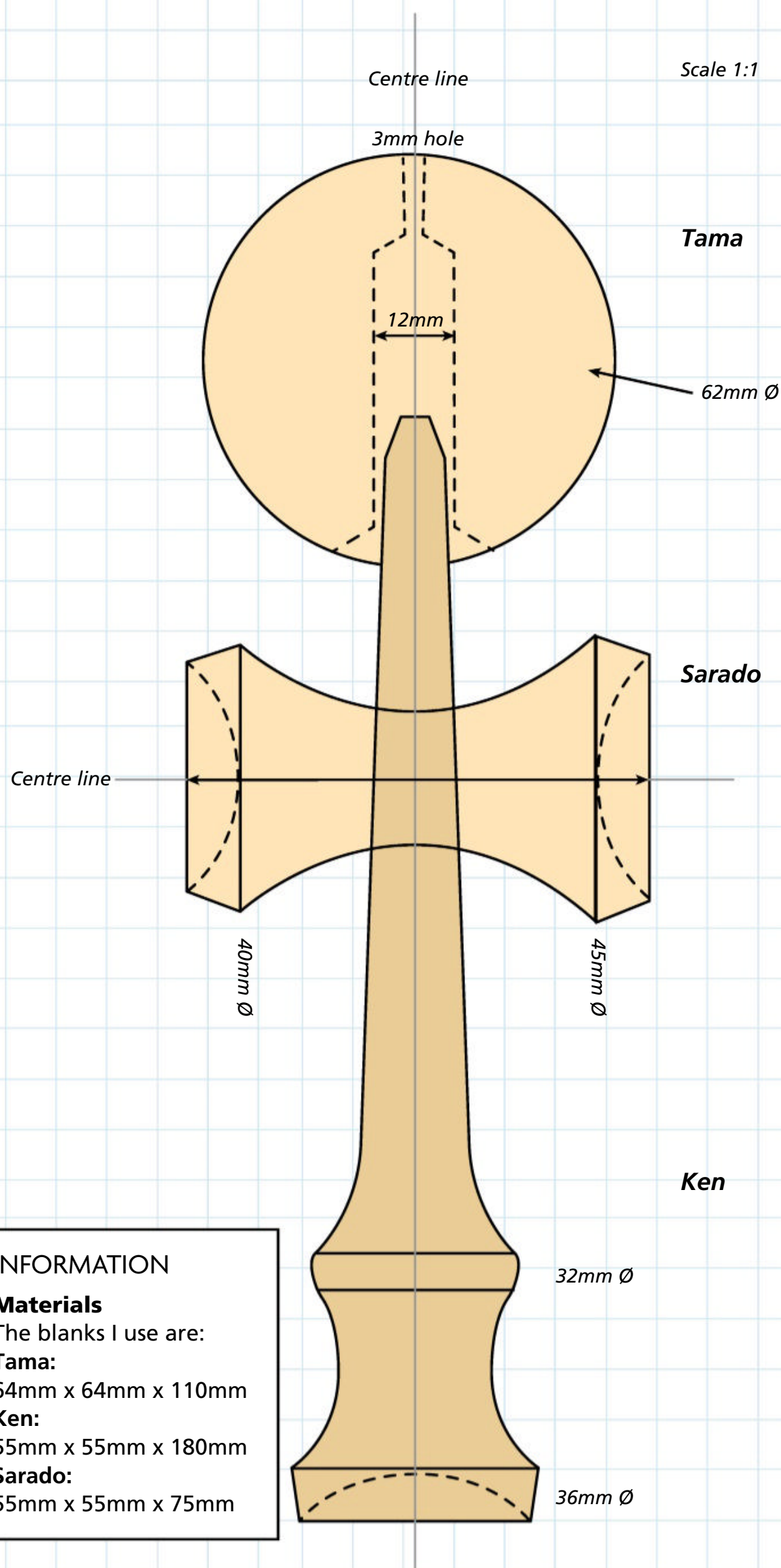
The blank is deliberately over-long to give me plenty of room between the sphere and the chuck. There's nothing worse than struggling for working space between a large spinning chuck and the project. I turn it by eye at first then refine it with the template. Before the connection between chuck and sphere gets too small, I drill a 12mm hole around 45mm deep into it using a drill chuck in the tail-stock. I then add a chamfer to the edge of the hole with the wing of my gouge. I continue to refine the ball and take it round to the point where I can part it off.

If you manage to make a perfect sphere at this point you should sand before parting and then just tidy the small remaining pip. Annoyingly, I'm not 100% happy with the sphere I have turned so I decide to perfect it using a pair of wooden cups, which fit in my chuck and on to my Oneway live centre.

By mounting the ball with the end grain pointing vertically I can take light shearing cuts and refine the shape. I rotate it and repeat a couple of times, only removing a tiny amount each time, but gradually improving it. I then sand it from 120 to 240 grit, changing the orientation of the ball between the cups several times during the sanding process, finishing it with a fine abrasive pad. My finished tama is 61mm in diameter, so a touch smaller than I'd aimed for, but well within tolerance.

Construction Overview

OVERALL DIMENSIONS: 205 x 62 x 70



INFORMATION

Materials

The blanks I use are:

Tama:

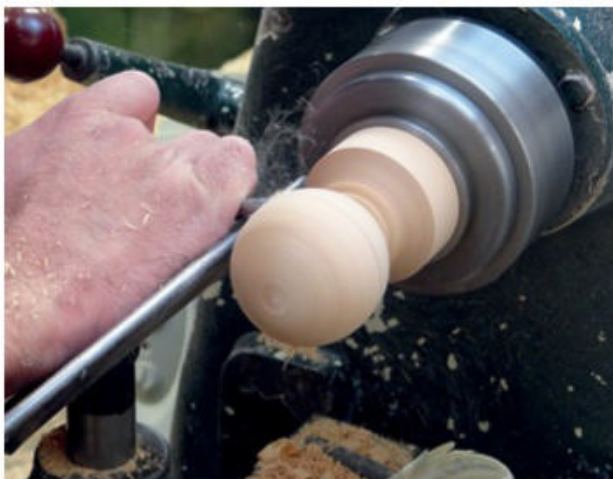
64mm x 64mm x 110mm

Ken:

55mm x 55mm x 180mm

Sarado:

55mm x 55mm x 75mm



▲ Turning the tama/ball.



▲ Drilling the hole in the tama.



▲ Checking against the template.



▲ Correcting the shape between wooden cups.



▲ Checking the size of the finished tama.

SARADO

The first thing I do with the block for the sarado is find the centre of one side and drill right through with a 10mm bit on my pedestal drill. This forms the hole that allows it to sit across the ken. It makes sense to drill it before turning as, once it is turned with each end having different diameters, there seems very little chance of getting the hole central and straight. Here my greatest risk is the edges of the hole chipping out as I turn, but with such a small hole I don't expect any real issues.

I need to turn cups on either end of the blank but hadn't seen a method online that would give a perfectly smooth and curved cup. My solution is to turn the blank into a cylinder and add a

chucking tenon on each end. My Axminster 'C' jaws hold a 56mm tenon, but the advantage of a scroll chuck is that, although 56mm is the 'perfect' grip size, they will happily hold 5mm or more in either direction, so holding my 55mm blank is no problem. The cups are both smaller than the timber at 40mm and 35mm so, with the blank held in the chuck, I mark the diameter with dividers and begin to turn out the waste material from the cut with my spindle gouge. I use the lower wing with the flute at the 10 o'clock position and swing the handle away from me in the same way that I might hollow a box. When I'm close to the shape I want, I switch to my curved negative rake scraper and perfect the curve.

When I made the template for the sphere I also made the opposite template, which allows me to check the curve of the cups. The only guidance I could find online is that the cup should be deeper than the ball, which makes it a little easier to catch it, so when I test it, I make sure it only touches at the rim. Satisfied, I sand the cup to the same standard as the ball. I reverse the sarado blank in the chuck and cut the other cup in the same way.



▲ Drilling the sarado blank.



▲ Beginning to turn the cup with a spindle gouge.



▲ Refining the cup with a negative rake scraper.



▲ Checking the cup is deeper than the ball with a template.

TAPERED HOLE

I now have a cylindrical blank with cups turned at each end. Before I go much further I feel that I need to address the tapered hole. The great advantage of using tapers is that they lock securely in place, but are totally knock-down in nature, so the kendama can be taken apart if something gets damaged or the string needs replacing. For me, it isn't a great problem as I have a pair of tapered reamers which give me a perfect 6° taper, a small one ideal for this purpose and a larger one that I use for chair work.

The reamers I use are known as cello reamers as they are designed for instrument work, but can obviously be used for any woodworking application. I simply hold the blank in my vice and twist the reamer through the hole until the

hole is tapered along its entire length.

But what if you don't have a reamer? Tapered drill bits are available, as are stepped drills, which may well work. One YouTuber drilled a stepped hole through his using a series of different sized drills, which seemed to work. This could possibly be improved slightly using a small carving gouge and smoothing the taper.

One online source shows the sarado being mounted in the lathe with the hole on centre and the tapered hole being turned, which is more complex, but definitely an option. Alternatively, a straight hole could be drilled and, so long as the fit onto the ken is tight and the taper of the shaft of the ken begins in the correct place, it should still lock the sarado in place. Glue wouldn't be an option as the sarado does need to be removable.



▲ Reaming the hole in the sarado.



▲ The small cello reamer.



▲ The wooden driving domes.



▲ The sarado held between dome centres.



▲ Turning the sarado.



▲ Sanding the sharp edges of the cups.

TURNING THE SARADO

Having reamed the tapered hole through the sarado, I need to mount it between centres, holding by the cups in such a way that I won't damage them. My solution is to turn a dome for my chuck, using the sphere template to ensure a good fit. I then drill and tap a piece of cross-grain tulip so that it screws onto my Oneway live centre.

Once I have it running true, I cut a chucking tenon into the back of it and mount it in the chuck to turn another

dome. I can then screw it back onto the live centre and I have a pair of wooden domed drive centres to drive my sarado. If you have a standard live centre, a wooden cup could easily be turned to fit over it and a dome cut into this to work in the same way.

With the sarado firmly held between the wooden dome centres, turning it is fairly straightforward. I make sizing cuts at each end with callipers to achieve the desired diameters, adding the 8mm-

wide taper down to the cup at each end. I can then turn the flowing cove in the centre. This needs to roughly match the shape of the tama as it needs to all slot and sit together neatly when not in use and when spiking the ball.

Satisfied with the shape, I sand it to the same standard as the rest of the kendama. When I remove it from the dome drives I notice that the edges of the cups are very sharp, so I give them a thorough sanding to smooth and round them.



TURNING THE KEN

The ken is possibly the most simple of the three parts to make. As I had with the sarado, I turn it to a cylinder between centres and add a chucking tenon at one end. With it held in the chuck, I can turn the cup in the base of the ken in the same way I had for the sarado.

At 180mm long, I am working a little way away from the chuck but don't suffer from any vibration issues. You could use the fingers of your front hand to

support the work if needed.

Happy with the cup, I remount it between my smallest drive centre and the wooden dome still fitted to my live centre. I make a sizing cut at the base and cut the 8mm-wide taper down to the cut, just like on the sarado. I can then turn the shallow cove at the base and begin to turn the taper which allows the sarado to fit tightly in place.

I know that the end needs to be around 10mm in diameter to easily fit

into the 12mm hole in the tama. This gives me points of reference to work to as I refine the shape of the taper, using my beading and parting tool as a skew. By using the small drive centre I am able to remove the ken from the lathe, test fit it into the sarado and adjust until I am happy. The sarado should sit around 65mm above the fillet on the lower part of the ken. I mark this, adjust until everything sits just right and sand. I add the taper to the tip before parting off the ken and hand sanding the tip.



▲ Beginning to turn the ken.



▲ Refining the taper to fit the sarado.

DRILLING

Happy with how it all slots together, I need to drill some holes for the string. It is at this point that I feel a bit of pressure as everything had gone so well up until now. It would be very easy to mess it up by drilling holes in the wrong place. I have some black waxed cord in one of my odds-and-ends boxes from when I made a couple of items of jewellery for a commission a few years ago and decide this should do the job. I suspect it is a little stiffer than is ideal, but sometimes you have to use what you have. Checking with callipers, it is a little less than 2mm in thickness. I test it compared to a 3mm drill in a thin scrap of wood and it slots through nicely, so I'm ready for drilling.

I begin with the tama. This is simple enough; I just need to continue the existing hole right through. I suppose I could have done this when I drilled it earlier, but I hadn't. The drill is just long

enough to reach right through, thanks to the chamfer on the ball.

Next, I drill the ken. This is the next easiest hole as it needs to be straight through the shaft in the centre of where the sarado sits. I mark the position and carefully drill through into a cork sanding block, which prevents damage to the ken and my bench. I countersink the reverse of the hole, which allows the knot in the end of the string to sit neatly out of the way.

The final two holes are in the sarado. They don't simply go straight through the side into the ken, but are drilled at an angle. As with most other aspects of the kendama, I am guessing as to their exact position based on pictures and videos. I drill around 5mm away from the top of the tapered hole in the sarado, aiming to exit into the hole about halfway down. A hole needs drilling each side as the kendama is strung differently for left- and right-handed players.



▲ Drilling the ken.



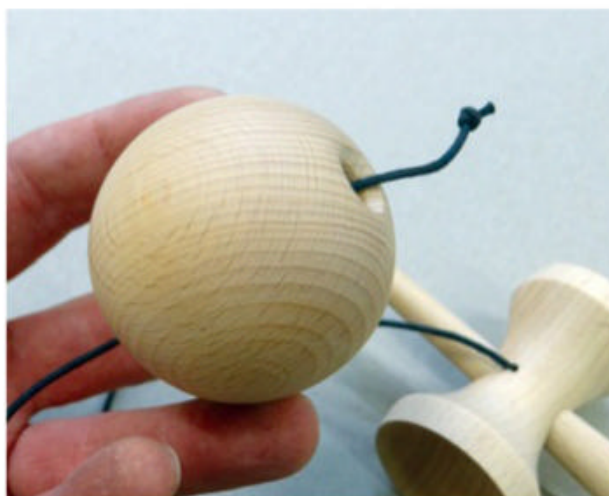
▲ Drilling the sarado.

STRINGING THE KENDAMA

Now would be the time to apply the finish of your choice, whether that is a simple oil to show off the wood or some sort of paint to add a bit of 'je ne sais quoi' to your kendama. For the purposes of the article I am leaving mine unfinished for now, but may get creative later, so for now, the next step is to string the kendama.

I start at the tama, threading the string through the 3mm hole, tying it off and pulling it back. Technically, there should be a little bead inside the ball which, I think, helps the string to move without twisting. I haven't added one, but I think I could either turn or buy something if I find the need.

I am left-handed, so I hold the sarado



▲ Stringing the tama.

with the big cup facing left – a right-hander would hold it with the big cup facing the right, and thread the string through the hole closest to me. This then goes onto the hole in the ken and is tied off and the



▲ Making sure it goes through the correct hole in the sarado.

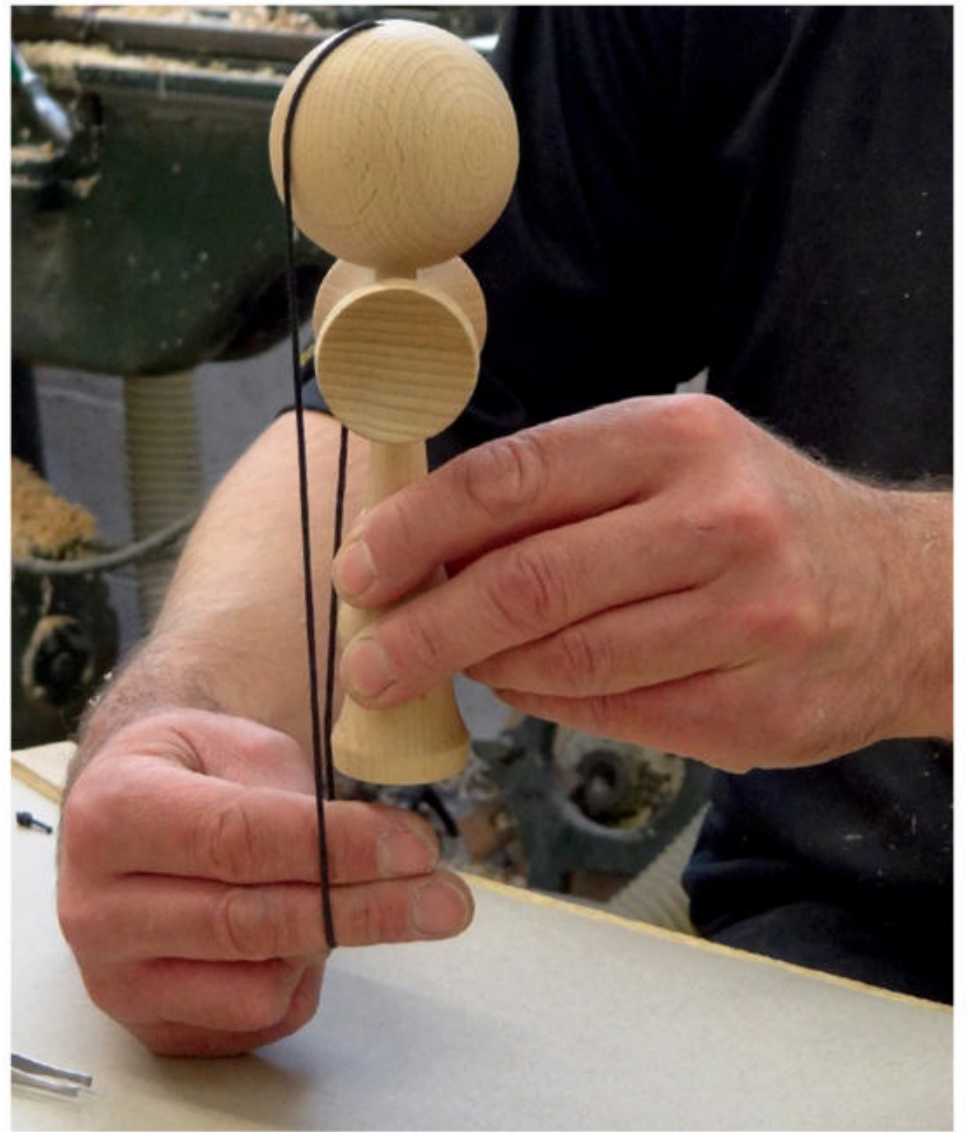
knot pulled back to sit in the countersunk hole. The sarado can then slot onto the ken, keeping the string neatly in place. Everything goes together amazingly well and it feels good and solid.



▲ The knot sits in the countersink on the ken.



▲ With the sarado and string in place.



▲ Checking the length of the string.

The final thing to check before trying some tricks is the length of the string. Advice online suggests that, with the tama on the spike, the loop of string should be either two or three finger-widths longer than the length of the kendama, so I cut a little off the string until it sits just right. All I need to do now is learn a few tricks.

CONCLUSION

This has been a fun little project. I always enjoy problem-solving, so working out how to hold the different parts to turn them was an enjoyable challenge. I will give it to my boys to play with and hope they don't smash anything with the swinging ball. They will

probably enjoy adding some stickers or paint to personalise it, although with two boys, I can see I might need to make a second. Take a look online for 'kendama basic tricks' to find out how to get started with a kendama and 'advanced kendama' to see what is actually possible. **W**



▲ Trying out a basic trick.



The finished kendama.

A Fresh Angle on Tilted Tenons



▲ Two types of angled tenons are easily solved by making a simple wedge to guide the workpiece.

One of the best aspects of woodworking is noodling out a process to accomplish a task. In my experience though, I then look for a different approach that offers a simpler way of getting the same result. The obstacle this time was cutting angled tenons. A couple of recent projects illustrate this.

ROCKING CHAIR. First up is a rocking chair. The design calls for the seat to be wider at the front and narrower at the back. This means the side rails angle from front to back. So I needed a way to cut an angled tenon on each end to fit the front and back legs, as shown in the photo at left.

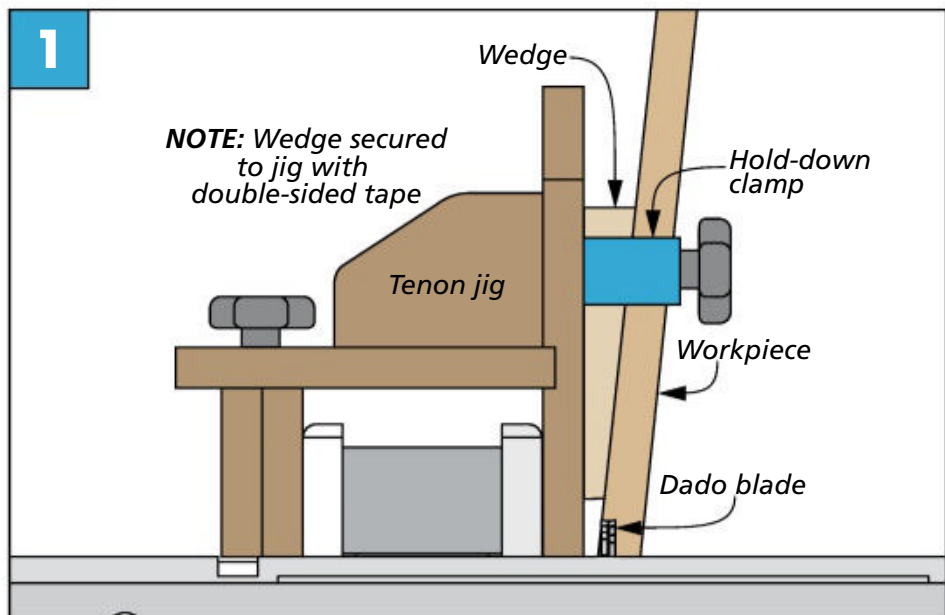
My usual approach to straight and square tenons is to use a dado blade in the table saw and guide the workpiece with a mitre gauge. I use the rip fence as an end

stop to get consistent tenon lengths.

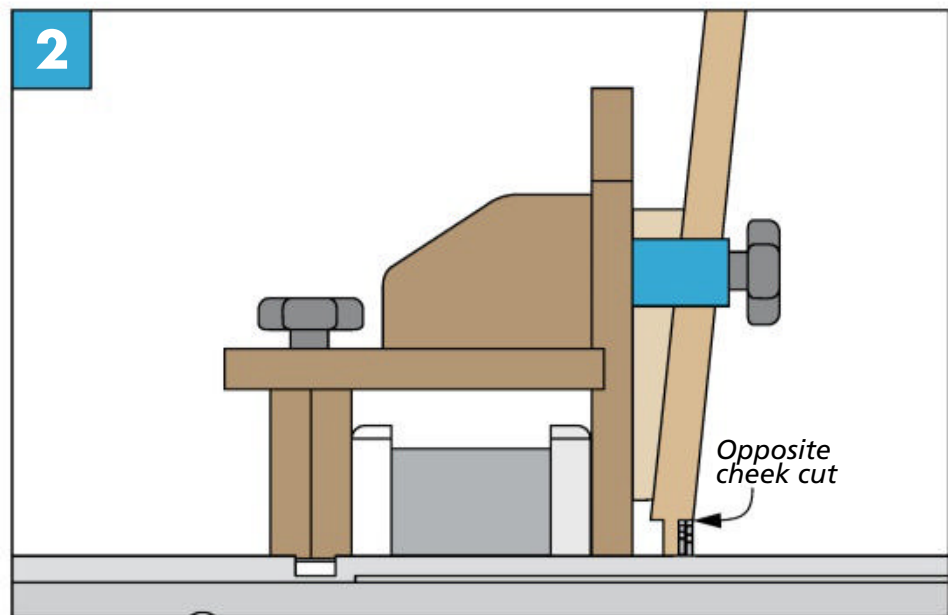
I tried modifying this method in order to cut the tenons for the rocking chair. It can work, but you end up with quite a few set-ups where errors can creep in. Doing a little research in some books and online led me to a shockingly straightforward solution — a wedge.

WEDGE SECRET. The gist is that you make a wedge that matches the angle of the tenon. Then you use it to position the workpiece in relation to the saw blade. One of the main advantages is that the one wedge serves as a reference for all the cuts, so it guarantees consistency. Another advantage is that the saw blade remains fixed at 90°.

MAKING THE WEDGE. For wedges, I like using pine construction timber. It cuts



Tenon Jig. Slip the wedge between the tenon jig and the workpiece to tilt the part in relation to the blade. Make a cut on one face of the tenon.



Opposite Face. To cut the opposite tenon cheek, all you need to do is reposition the rip fence. Make small adjustments until the tenon fits the mortise.

easily, and I can refine the shape with hand tools with little effort.

Lay out the slope of the angle you need along a face. Cut close to that line at the bandsaw (though a jigsaw works, too). I use a hand plane to trim the wedge down to the layout line. Just be sure to keep the edge square to the face.

I want to make a point here about accuracy. In very few instances do you need to hit the angle dead on. If you end up a fraction of a degree off, don't sweat it. Since the wedge is your reference, all the joints are going to be consistent and things will turn out just fine.

CUTTING THE TENON. It's time to put the wedge to work. For this, I'm using a

tenon jig that rides along the rip fence, as in the main photo on the previous page. (Refer to Workshop Notebook on page 72.) Secure the wedge to the jig and high enough to remain clear of the dado blade.

Figure 1 at right shows the set-up for the first cut. Side note: it doesn't matter which tenon cheek you start with. Install a dado blade to form the cheek in a single pass. It's always a good idea to make test cuts on a scrap piece to dial in the settings.

To cut the opposite cheek, all that's necessary is to reposition the fence (Figure 2). To form the top and bottom shoulders of the tenon, I've found a hand

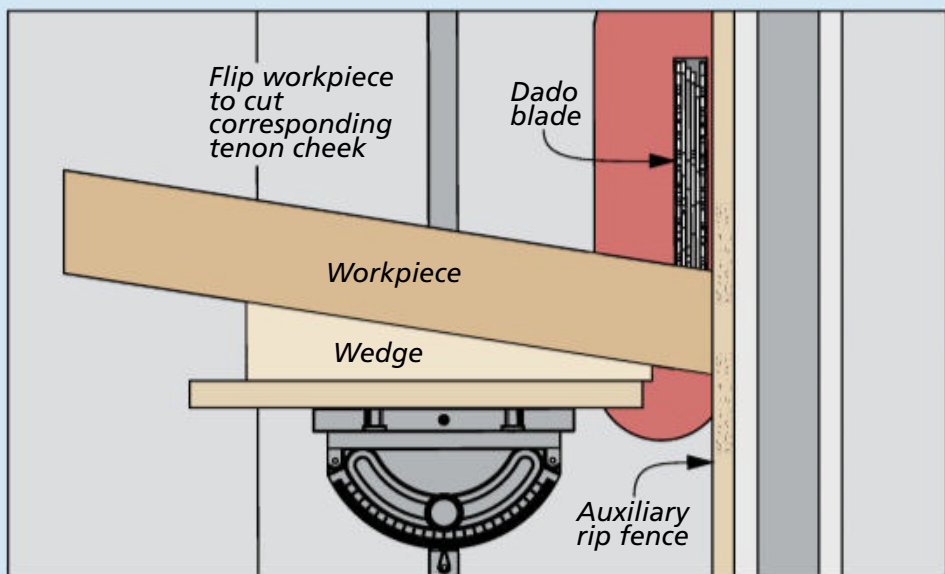
saw works just as well as making another set-up on the saw.

GARDEN BENCH. The other project (and another type of angled tenon) is a garden bench. Here the legs angle out, so the tenons on the stretcher that connects them must be angled as well (left photo on the previous page).

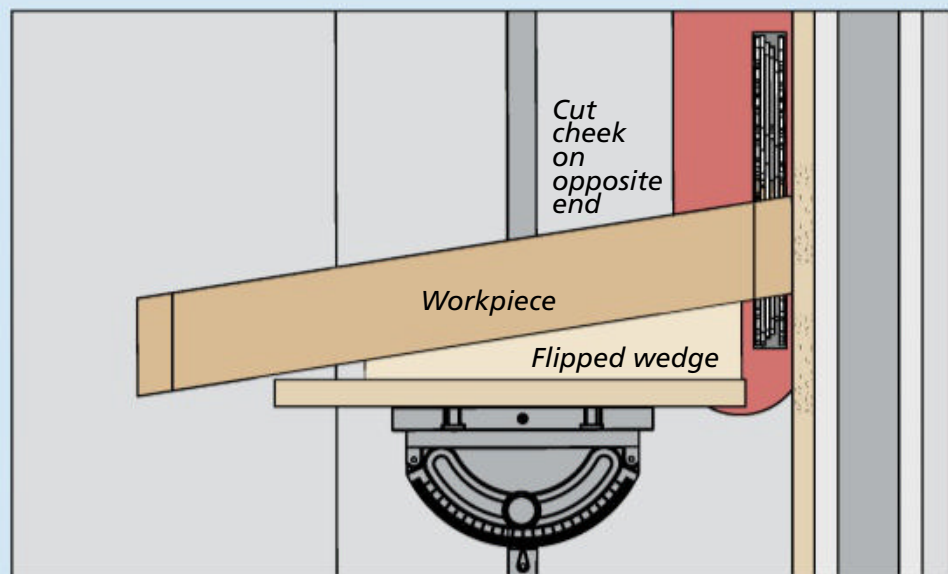
The drawings below show how a wedge works here. The wedge fits between the workpiece and the mitre gauge (which stays at 90°). To cut the opposing cheek, all you need to do is flip the wedge around.

Angled tenons don't come up often. However, knowing a simple solution for accurate results means you can approach the project with confidence. [W](#)

TENONS ON THE ENDS OF ANGLED PARTS



One Face. Align the wedge to match the angle at the end of the workpiece. Use the rip fence as an end stop to control the length of the tenon. Repeat on the opposite end of the piece.



Then the Other. To cut the other face, flip the wedge end for end. Leave the rip fence set to the tenon length. Then complete the tenons at both ends.



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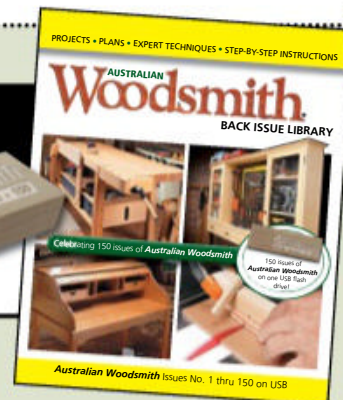
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The winner of the Japanese Tools Australia Gotoku plane from Issue 164 is Trevor Duxbury of Summerland Point NSW. Congratulations!



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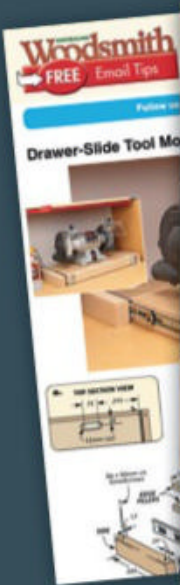
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Tiny Treasures DoveTails Competition 2022



The theme for the 2022 Sunshine Coast Wootha Prize is DoveTails. *Australian Woodsmith* is sponsoring the \$2500 prize for Tiny Treasures.

It is a near certainty that in April-May 2022 the Tiny Treasures Competition will run and *Australian Woodsmith* will be happy to hand over the \$2500 prize money to the winner.



▲ The Tiny Treasure needs to fit into a 130 x 130 x 110mm post-pak. It is both stored and presented on a cleverly designed plywood plinth.

State border closures shut down the Maleny Wood Expo in 2020 and 2021. Even if the borders close again (fingers crossed that they don't) the team at Maleny Wood Expo is hopeful that Tiny Treasures can be showcased online and that the judges can nominate the winning entry.

WOOTHA PRIZE

Wootha Prize offers wood artisans working in sustainably harvested Australian timbers from native forests or plantations, recycled or weed timbers, the opportunity to showcase their work to the broad Maleny Wood Expo audience and win the overall first prize of \$10,000.

TINY TREASURES

Australian Woodsmith challenges you to think "outside the box" and come up with a beautifully designed and exquisitely crafted work that can fit inside a box!

The genius behind this category is to make the competition accessible to anybody across Australia: no need to hire a trailer and drag your creation across the countryside, just post it!

Applicants need to go to malenywoodexpo.com so they can submit a description of their proposed (or existing) entry. Successful applicants are then sent a post-pak so they can post their Tiny Treasure in for a chance to win.

The winner of the Tiny Treasures competition will also be in the running for the \$10,000 Wootha prize!

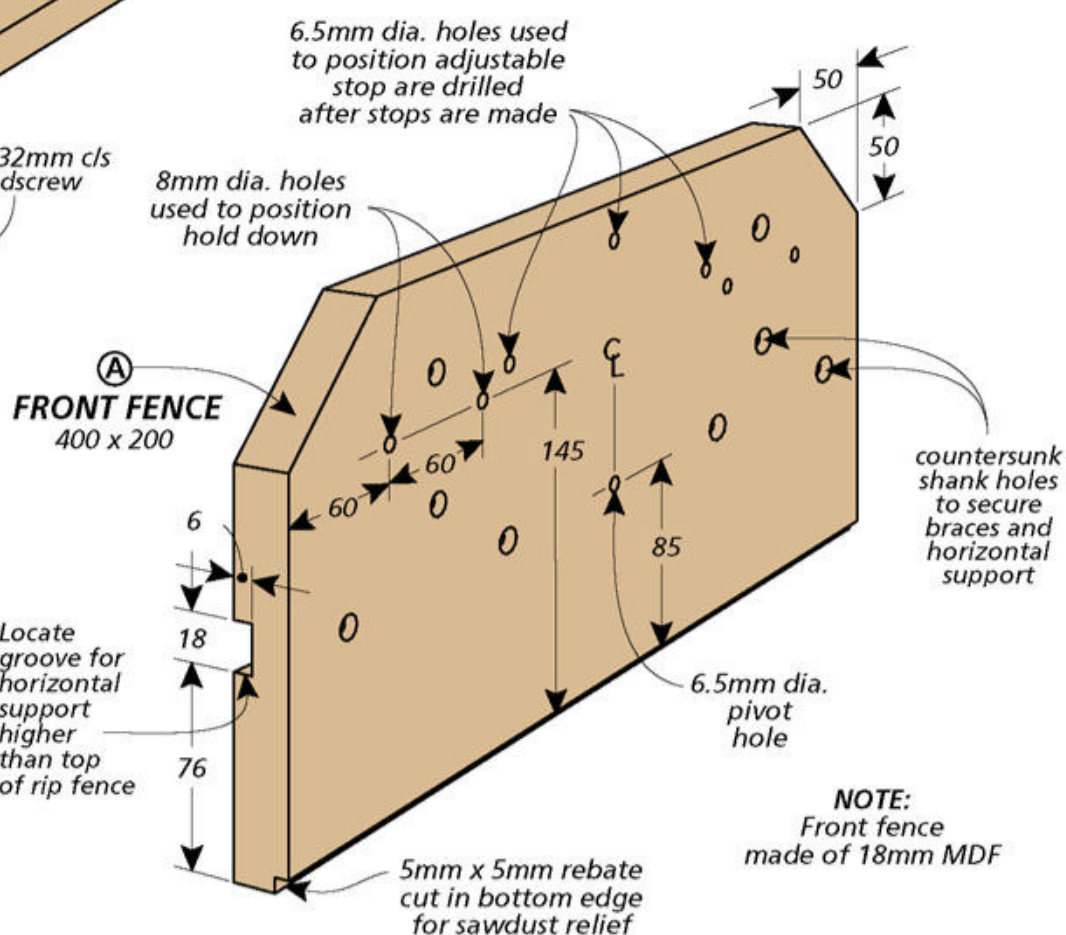
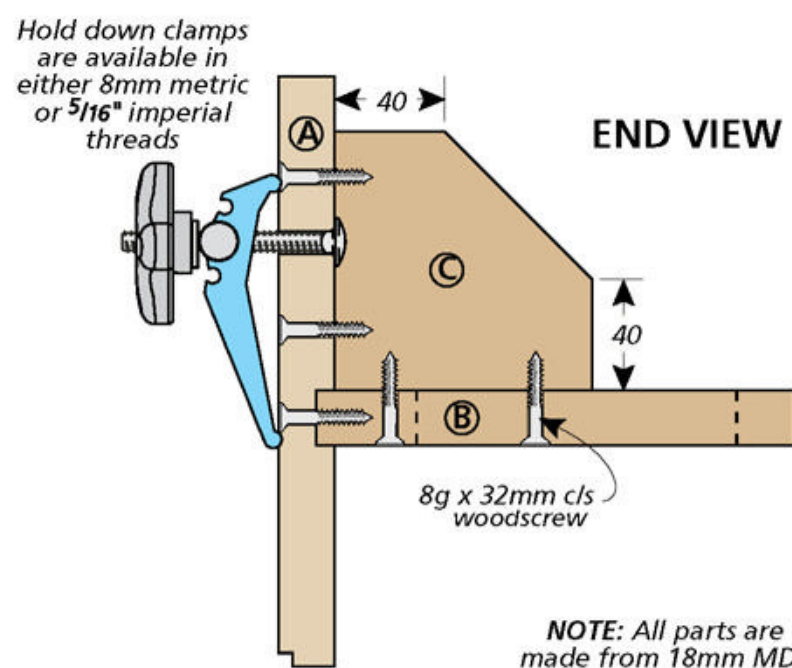
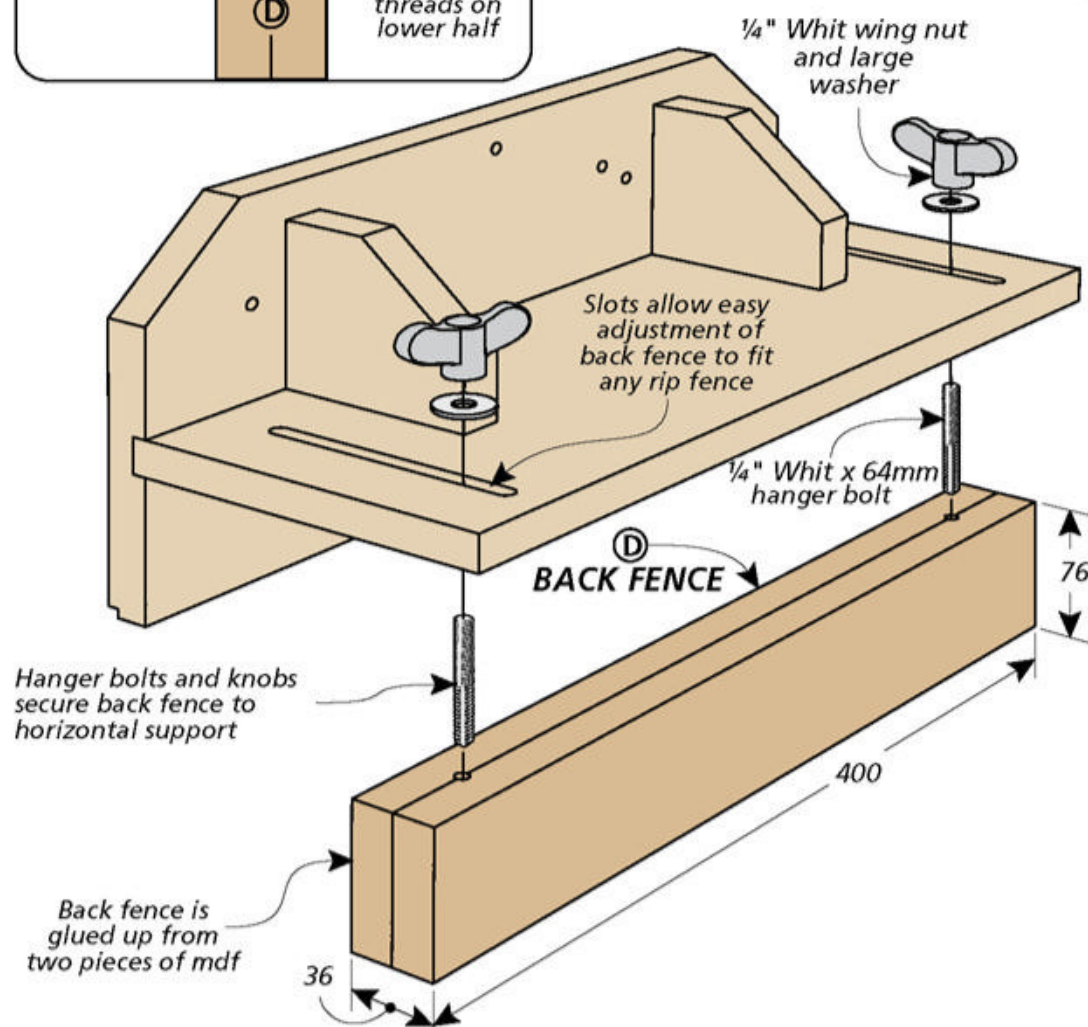
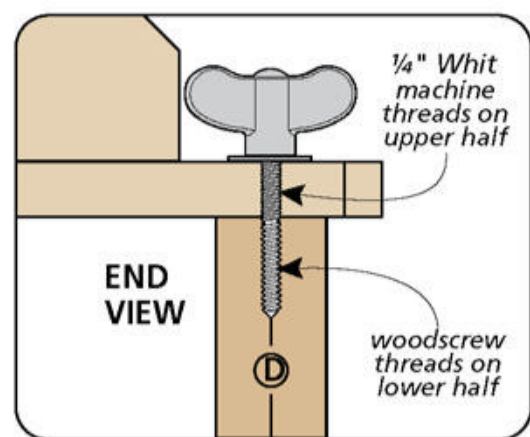
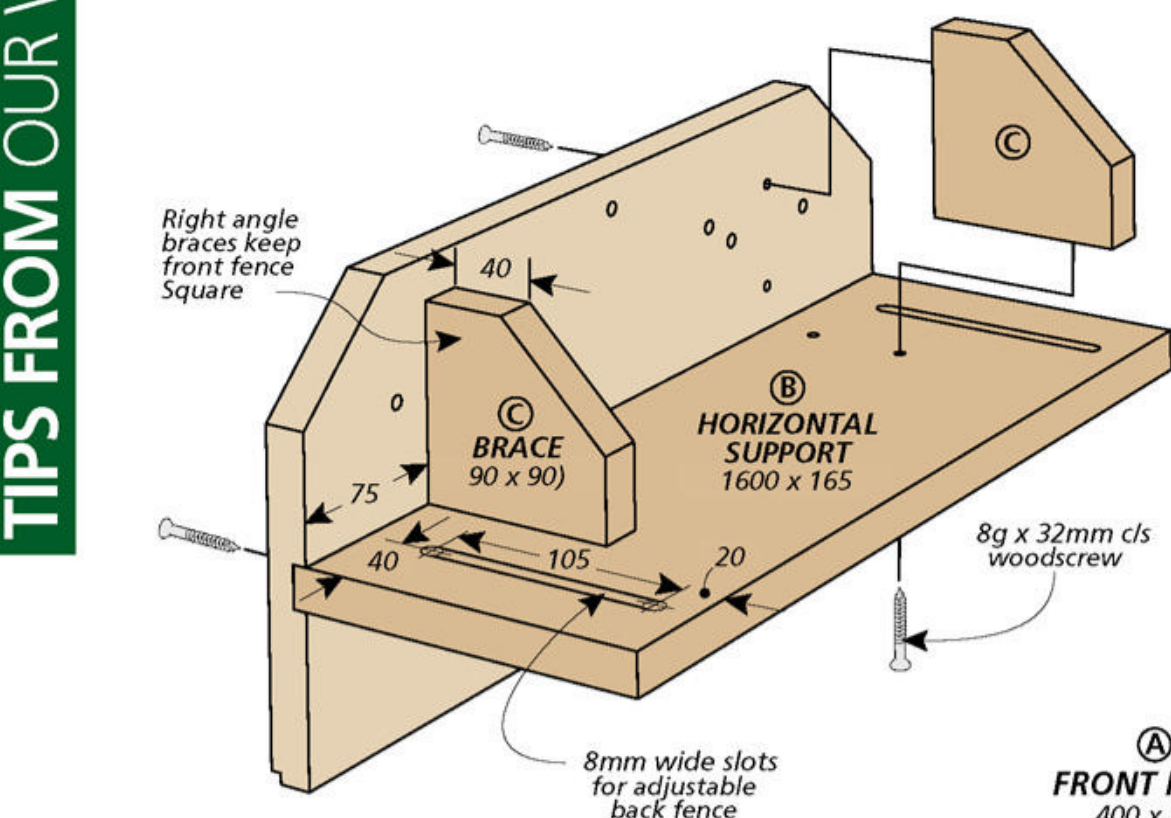
TALES OR TAILS

The theme "DoveTails" is open to interpretation. It may be that you run with the infinite array of joinery techniques that use dovetails to weave timber together.

It may be that a dove and its tail opens up a world of sculptural interpretation for you. Or it might be that you play with dovetails in a new and creative way (like Julia Allan's delightful dovetailed eggs).

We are looking forward to handing over a cheque for \$2500 to a crafty and clever artisan who comes up with a gorgeous piece that stuns the judges and spreads the word that making something with your hands is a profoundly wonderful thing to do. **W**

Workshop Notebook & Short Cuts



VERTICAL TABLE SAW JIG

The jig shown here is designed to be a multi-purpose jig for your table saw. Not only can it be used to hold a workpiece vertical to cut tenons, but it can also be used to hold a workpiece to cut bevels at angles not possible with the workpiece laying flat.

MDF BONES. As you can see in the drawing, all of the parts are made from MDF. The jig should be sized to fit over your rip fence, but be a fit that allows it to slide freely back and forth while holding a workpiece.

USING THE JIG. To use the jig, you have a couple of different options. You can attach vertical stops with screws to back up the workpiece. Or, you can use countersunk holes, as you see in the drawing above, to mount cleats with bolts.

When using the jig to cut bevels, I've found it is easiest to remove all cleats and use a pair of clamps to hold the workpiece against the upright. Once the workpiece is clamped in place, you can simply position the fence, with attached jig, and make your cut. **W**



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Austral Wright Metals
australwright.com.au
copper bar

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bestabrasives.com.au
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Mirka abrasives

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carbatec.com.au
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LN103, dowel plate

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HIDE GLUE

Titebond Hide Glue is available from Timberbits, Carbatec and Timbecon. Vesper Tools is the place to go for your supply of Old Brown Glue.

Carroll's Woodcraft Supplies has U Beaut pearl hide glue in stock. The advantage of a bottled glue is its ease of use, however making your own from pearl grains will produce a stronger and quicker setting bond, plus the shelf life of the dry pearls is longer than the bottled version.

ROUTING GUIDES

You can make your own straight edge for your router, however there are several clever aluminium extrusion straight edges on the market that clip onto the stock you are routing with the flick of a wrist. Timbecon has the Baladonia power tool guide rail, while Carbatec stocks the original Festool guide rail that revolutionised accurate routing and sawing in the workshop.

If you are looking for a trammel to route curves and circles (and don't want to make your own) Timbecon stocks the Ultimate Router Base System.

PATIO PLANTER

The most expensive component in the planter is the copper hoop. Copper has risen in price dramatically. Austral Wright Metals is one place you can purchase 12.7 x 3.18mm (½" x ⅛") bar. The best place to buy the two M5 x 6mm copper rivets is online via eBay.

FLOOR LAMP

All 240v electrical work should be done by an electrician. However, one way around this challenge is to hack an IKEA standing lamp and upcycle the components into the floor lamp. This is a much cheaper alternative than a visit to your local electrical retailer.

Lampshade styrene and other lampshade supplies are available from 3 Chooks lampshades. The 170mm-dia shade ring can be found on eBay.

EMPIRE CHEST

The 50mm drawer pulls used in this chest are available from Kennedy Hardware (Cherry Knobs—C13). The best local supplier is Keeler Hardware. They stock a similar 40mm-dia. cedar/mahogany woodscrew knob.

In Issue 168 we will be showing you how to turn your own drawer pulls.

- *Patio Planter.* This outdoor planter will help you show off your gardening skills as well as using a few woodworking techniques. We show you how starting on page 38.

Final details



- ▲ *Floor Lamp.* It will be easy to find your mid-century groove with this lamp. Plans begin on page 44.



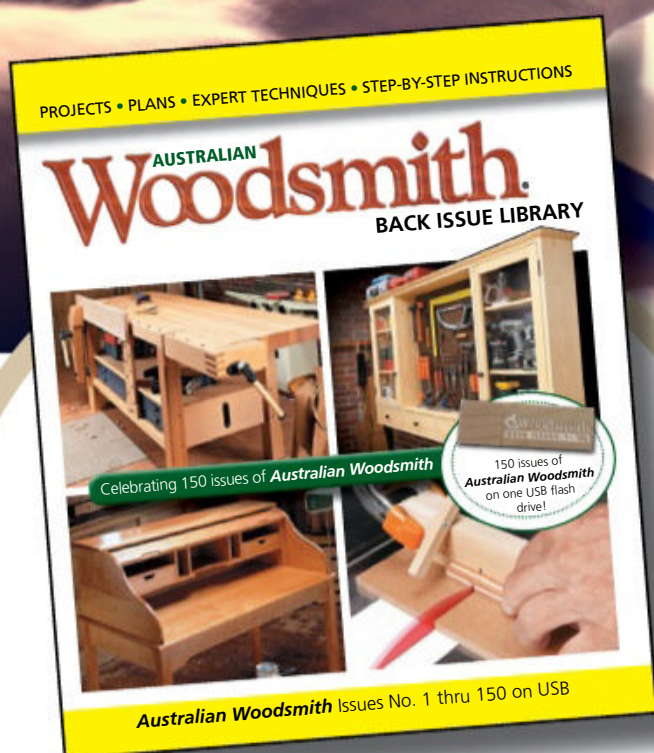
- ▲ *Kendama.* Richard Findley shows you how to make this Japanese skill toy. Turn to page 60 to learn more.
- *Empire Chest of Drawers.* This take on the classic Empire chest of drawers is a modern rendition. It offers updated construction techniques while staying true to the design of Empire Furniture. Instructions start on page 50.

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