10 NEW TOOLS!

WORKSHOP SPECIAL

American Woodworker

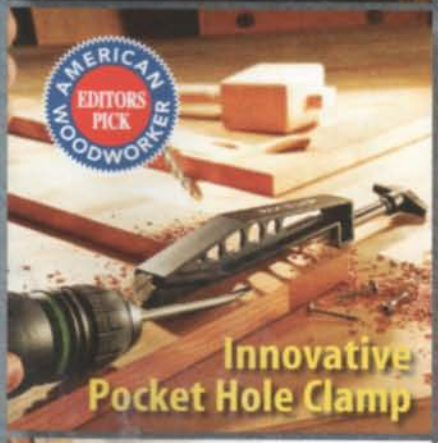
THE BEST RESOURCE FOR YOU AND YOUR SHOP

#148, JUNE/JULY 2010

Weekend Project: Small Tool Organizer

Fold-Up Saw Stand

The Art of Plane-Making



Innovative Pocket Hole Clamp

Build a Master's Workbench

Super-Strong I-Beams

Terrific Shop Tips!

Tips for Threading Wood

Better Dust Collection

Workshop with a View

Shop-Made Blast Gates

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10" Cabinet Table Saws with Riving Knife

- Motor: 3 HP, 220V, single-phase
- Table size with extension: G0690 -27" x 40", G0691 - 27" x 74¾"
- Blade tilt: left • Arbor: ⅝"
- Arbor speed: 4300 RPM
- Max. dado width: 13/16"
- Max. rip capacity: G0690 - 29½", G0691 - 50"
- Max. depth of cut: 3⅛" @ 90°, 2⅜" @ 45°
- Approx. shipping weight: G0690 - 542 lbs. G0691 - 572 lbs.

CAST IRON TRUNNIONS

3 HP LEESON® MOTOR!

Product Reviews & Awards ONLINE grizzly.com

FREE 10" CARBIDE TIPPED BLADE!

G0690 ~~$1250.00~~
SALE $1150.00

G0691 WITH EXTENSION RAILS ~~$1350.00~~
SALE $1250.00

$139 ANYWHERE IN LOWER 48 STATES

Cyclone Dust Collector

New!

- Motor: 1½ HP, 110V/220V, single phase, TEFC, 3450 RPM, prewired 110V
- Air suction capacity: 775 CFM
- Static pressure at rated CFM: 1.08"
- Intake port: 6" with included 5" optional port
- Impeller: 13½"
- Cartridge filter surface area: 6975 sq. in.
- Overall dimensions: 38¼" W x 23½" D x 68½" H
- Approx. shipping weight: 210 lbs.

COLLECTION DRUM IS MOUNTED ON CASTERS FOR EASY DUST REMOVAL

THE POWER OF A 2 STAGE CYCLONE IN A NEW COMPACT SIZE!

G0703 ~~$850.00~~ **SALE $795.00**

$69 ANYWHERE IN LOWER 48 STATES

10" Left Tilting Super Heavy-Duty Table Saw with Riving Knife

- Motor: 3 HP, 220V, single-phase, 3450 RPM
- Precision ground solid cast iron table
- Table size with extension wings: 40" x 27"
- Arbor: ⅝" • Max. dado width: ⅞"
- Cutting capacity: 8" L, 26" R
- Max. depth of cut: 3" @ 90°, 2⅛" @ 45°
- Approx. shipping weight: 514 lbs.

New!

SHOP FOX® CLASSIC FENCE

FREE 10" CARBIDE TIPPED BLADE!

G1023RL

INTRODUCTORY PRICE
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Sliding Table & Router Attachments
For G0690 & G0691 Table Saws

New!

SAW NOT INCLUDED

SUPERB QUALITY!

SLIDING TABLE ATTACHMENT
- Industrial grade anodized aluminum table size: 47" x 9"
- Telescopic anodized aluminum fence size: 28"-48"
- Max. cross cut: 48"

ROUTER TABLE ATTACHMENT
- Precision ground cast iron table size: 27" x 20"
- Unique "double cross" ¾" x ⅜" T-slots
- Universal router mount
- Table insert size: 4"

$39 LOWER 48 STATES

T10222 ROUTER TABLE ATTACHMENT ~~$395.00~~ **SALE $375.00**

T10223 SLIDING TABLE ATTACHMENT ~~$550.00~~ **SALE $525.00**

12" Left-Tilting Extreme Series® Table Saw with Riving Knife Feature

- Motor: 5 HP, 220V, single-phase
- Table size with extension: 30¾" x 48⅜"
- Arbor speed: 3600 RPM
- Arbor: ⅝" & 1"
- Max. dado width: ¾"
- Max. rip capacity: 36"
- Max. depth of cut: 4" @ 90°, 2¾" @ 45°
- Approx. shipping weight: 756 lbs.

FEATURES DIGITAL BEVEL ANGLE READOUT

INCLUDES 12" BLADE

EXTREME SERIES

G0696X ~~$1995.00~~
SALE $1895.00

$169 ANYWHERE IN LOWER 48 STATES

12" Baby Drum Sander

- Sanding motor: 1½ HP, 110V, single-phase
- Conveyor motor: ⅛ HP, 110V, single-phase, variable speed 5-35 FPM
- Drum surface speed: 2127 FPM
- Max. stock dimensions: 12" wide x 3½" thick
- Min. stock length: 8"
- Sanding drum: 4"
- Sanding belt: 3" hook & loop
- Dust collection port: 2½"
- Approx. shipping weight: 160 lbs.

G0459 ~~$695.00~~
SALE $525.00

$69 ANYWHERE IN LOWER 48 STATES

17" Heavy-Duty Extreme Series® Bandsaw with Cast Iron Wheels & Trunnion

MADE IN ISO 9001 FACTORY!

- Motor: 2 HP, 110V/220V, single-phase, TEFC
- Precision ground cast iron table size: 23⅜" x 17¼"
- Table tilt: 5° left, 45° right
- Max. cutting height: 12"
- Blade size: 131½"L (⅛" - 1"W)
- 2 blade speeds: 1700 & 3500 FPM
- Approx. shipping weight: 418 lbs.

Product Reviews & Awards

DELUXE RESAW FENCE & MITER GAUGE

EXTREME SERIES

G0513X2 ~~$995.00~~
SALE $895.00

$89 ANYWHERE IN LOWER 48 STATES

19" Heavy-Duty Extreme Series® Bandsaw

- Motor: 3 HP, 220V, single-phase, TEFC, 1725 RPM
- Precision ground cast iron table size: 26¾" x 19"
- Table tilt: 5° L, 45° R
- Max. cutting height: 12"
- Cutting capacity/throat: 18¼"
- Blade size: 143" L(⅛" - 1¼" W)
- Blade speeds: 1700 & 3500 FPM
- Approx. shipping weight: 480 lbs.

GEARED TABLE TILT MECHANISM

HEAVY-DUTY CAST IRON FENCE & CAST IRON TABLE TRUNNIONS!

MADE IN ISO 9001 FACTORY!

EXTREME SERIES

G0514X2 ~~$1395.00~~
SALE $1295.00

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6" Jointers with Mobile Base

- Motor: 1 HP, 110V or 1½ HP, 110V/220V, single-phase
- Precision ground cast iron table size: 7½" x 46"
- Max. depth of cut: ⅛"
- Rabbeting capacity: ½"
- Cutterhead diameter: 2½"
- Cutterhead speed: 4800 RPM
- Approx. shipping weight: 270 lbs.

FREE SAFETY PUSH BLOCKS

RACK & PINNION FENCE ADJUSTMENT

BUILT IN MOBILE BASE

G0452 1 HP MOTOR ~~$425.00~~
SALE $395.00

G0452Z 1½ HP WITH SPIRAL CUTTERHEAD
~~$695.00~~ **SALE $675.00**

$69 Ground Shipping ANYWHERE IN LOWER 48 STATES

8" x 76" Parallelogram Jointers

- Motor: 3 HP, 220V, single-phase, TEFC, 3450 RPM
- Precision ground cast iron table size: 8" x 76⅜"
- Cutterhead speed: 5350 RPM • Cutterhead dia.: 3⅛"
- Deluxe cast iron fence: 36"L x 1¼"W x 5"H
- Max. rabbeting depth: ½"
- Approx. shipping weight: 597 lbs.

G0490 ~~$895.00~~ **SALE $825.00**

$139 Ground Shipping ANYWHERE IN LOWER 48 STATES

G0490X WITH SPIRAL CUTTERHEAD
~~$1195.00~~ **SALE $1095.00**

12"x 83½" Parallelogram Jointers

- Motor: 3 HP, 220V, single-phase
- Precision ground cast iron table size: 12¾" x 83½"
- Cutterhead speed: 4950 RPM
- Max.depth of cut: ½"
- Max. rabbeting capacity: ¾"
- Approx. shipping weight: 1059 lbs.

PEDESTAL MOUNTED MAGNETIC SAFETY SWITCH

G0609 ~~$1895.00~~ **SALE $1795.00**

$250 Ground Shipping ANYWHERE IN LOWER 48 STATES

G0609X WITH SPIRAL CUTTERHEAD
~~$2250.00~~ **SALE $2195.00**

15" Planer/Moulder

- Motor: 2½ HP, 110V, single-phase
- Max. cutting width: 15"
- Max. cutting height: 6"
- Min. stock thickness: ⅛"
- Min. stock length: 17"
- Max. planer cutting depth: 3/32"
- Feed rate: 11 FPM & 22 FPM
- Cutterhead dia.: 3 15/64"
- Cutterhead speed: 5500 RPM
- Cuts per minute: 11,000
- Table size: 15" x 16"
- Approx. shipping weight: 181 lbs.

CONVENIENT BUILT-IN DUST COLLECTOR!

QUICK CAM ADJUSTABLE FEED ROLLERS

G0477 ~~$795.00~~
SALE $725.00

$69 Ground Shipping ANYWHERE IN LOWER 48 STATES

15" Planer

- Motor: 3 HP, 220V, single-phase
- Max. stock thickness: 8"
- Min. stock thickness: 3/16"
- Min. stock length: 8"
- Max. cutting depth: ⅛"
- Feed rate: 16 & 30 FPM
- Cutterhead dia.: 3"
- Number of knives: 3
- Knife size: 15" x 1" x ⅛"
- Cutterhead speed: 5000 RPM
- Table size: 15" x 20"
- Approx. shipping weight: 675 lbs.

PRECISION GROUND CAST IRON BED & INFEED OUTFEED TABLES

BUILT IN MOBILE BASE

G0453 ~~$995.00~~
SALE $925.00

$139 Ground Shipping ANYWHERE IN LOWER 48 STATES

20" Planers

- Motor: 5 HP, 220V, single-phase
- Table size: 20" x 25¾" (20" x 55½" with extension)
- Max. stock thickness: 8"
- Min. stock thickness: 3/16"
- Min. stock length: 7½"
- Max. cutting depth: ⅛"
- Cutterhead speed: 5000 RPM
- Feed rate: 16 & 20 FPM
- Approx. shipping weight: 920 lbs.

PRECISION GROUND CAST IRON BED & INFEED OUTFEED TABLES

BUILT IN MOBILE BASE

G0454 ~~$1495.00~~
SALE $1395.00

G0454Z WITH SPIRAL CUTTERHEAD
~~$2295.00~~ **SALE $2195.00**

$169 Ground Shipping ANYWHERE IN LOWER 48 STATES

12 Speed Heavy-Duty 14" Floor Drill Press

- Motor: ¾ HP, 110V, single-phase
- Precision ground cast iron table
- Table size: 11⅜" sq.
- Table swing: 360°
- Table tilts: 90° L & R
- Swing: 14"
- Drill chuck: ⅛" - ⅝"
- Drilling capacity: ¾" steel
- Spindle taper: MT #2
- Spindle travel: 3¼"
- Collar size: 2.595"
- Approx. shipping weight: 171 lbs.

INCLUDES BUILT-IN LIGHT (BULB NOT INCLUDED)

G7944 ~~$325.00~~
SALE $275.00

$69 Ground Shipping ANYWHERE IN LOWER 48 STATES

16" x 43" Swivel Head Wood Lathe w/Cast Iron Legs & DRO

- Motor: 2 HP, 110V, single-phase
- Precision milled cast iron bed
- Dist. between centers: 43"
- Swing over bed: 16" • Spindle bore: ⅝"
- Spindle & tailstock tapers: MT#2
- 10 speeds: 600- 2400 RPM
- Approx. shipping weight: 372 lbs.

HEADSTOCK SWIVELS FOR OUTBOARD TURNING

G0462
~~$525.00~~
SALE $475.00

$89 Ground Shipping ANYWHERE IN LOWER 48 STATES

2 HP Dust Collector w/2.5 Micron Bag

- Motor: 2 HP, 220V, single-phase, 3450 RPM
- Motor amp draw: 12 Amps
- Air suction capacity: 1550 CFM
- Static pressure: 11"
- Bag capacity: 5.7 cu. ft.
- Impeller: 12¾" balanced steel, radial fin
- Height w/bags inflated 78"
- Portable base: 21¼" x 33½"
- Approx. shipping weight: 126 lbs.

FREE 69376 2 STAGE CYCLONE SEPARATOR

MADE IN ISO 9001 FACTORY!

G1029Z2 ~~$279.00~~
SALE $269.95

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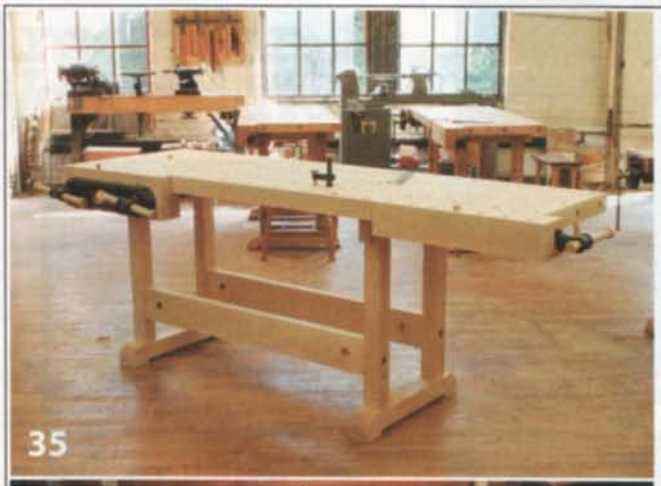

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American Woodworker

#148, June/July 2010

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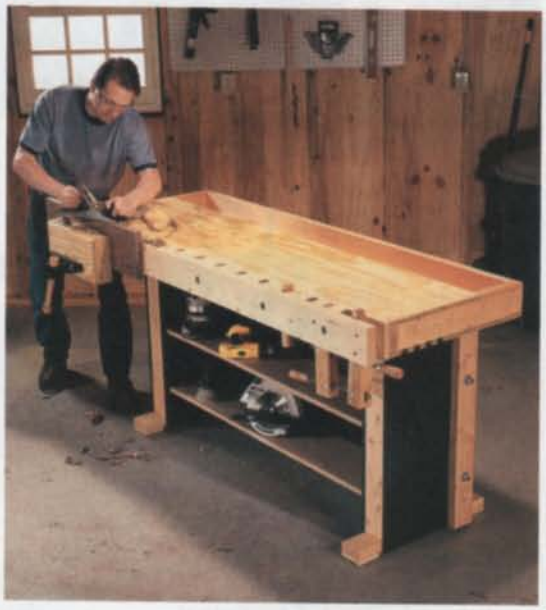

Budget Workbench

To see plans for a $250 cabinetmaker's bench, go to
www.AmericanWoodworker.com/WebExtras

Ultimate Miter Saw Stand

For the complete plans for a huge miter saw stand, go to
www.AmericanWoodworker.com/WebExtras

Optimize Dust Collection

For more dust collection tips, go to
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Sliding Miter Saws

To learn more about sliding miter saws, visit
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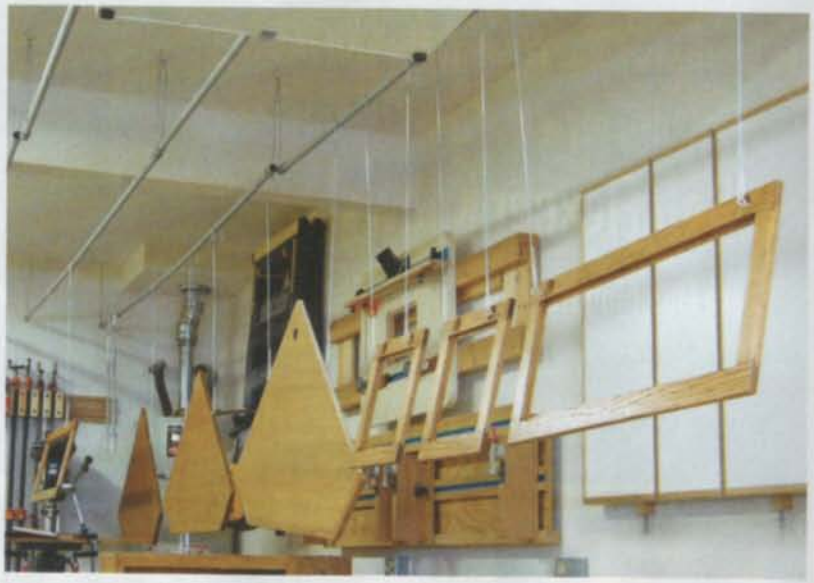
Terrific Tip!

Benchtop Lazy Susan

I FINALLY GOT fed up with rummaging through a drawer of small screwdrivers, nail sets and dental picks to find the one tool I needed. I built a revolving tool stand to make them more accessible.

The stand is composed of three layers, glued together, and mounted on a lazy Susan ring (www.leevalley.com, #12K01.3, $3.10). The bottom layer is 2" thick and 8" square; the middle layer is 1" thick and 6" square; the top layer is 1" thick and 4" square. I drilled lots of holes for my tools in the 1" rim on each layer and on top.

Randall H. Morse



Hanging Racks For Finishing

IN MY CROWDED SHOP, I needed room to finish the doors and shelves of a large cabinet while leaving enough space to continue building the case. So, I built three inexpensive racks to hang them.

The racks are made from electrical conduit. To build one rack, you'll need two screw-in J-hooks, a 10' section of electrical conduit, and two 2-screw conduit connectors. Screw the J-hooks into the ceiling rafters 10' apart. Install a connector on each end of the conduit. Fasten one of the connector's screws to the conduit and run a wire through the other screw hole to hang the unit from the J-hooks.

To use the rack, run an eye screw into the part being finished. Put the eye screw in an area that's hidden after assembly, and loop a wire through the eye. Hang the part from the conduit.

Dave Sheppard

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Mother's Day Gift Ideas

Garden Tools by Lee Valley

Gardening requires perseverance and elbow grease. Lighten the load with our wide range of efficient and versatile groundbreaking tools for preparing your garden beds. These excellent tools are made of high-quality materials for maximum strength and durability, and should give you years of service. We offer a variety of short-handled and long-handled spades, forks and cultivators because we know that using the right tool makes any job easier – easier on your joints and muscles, as well as on your plants.

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Shipping and N.Y. sales tax extra.

To order these products, call or visit us online. You can request a copy of our 172-page garden tools catalog or browse it online.

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Fold-Up Vac-Bag Station

I NEEDED SPACE for a 4' by 8' vacuum-bag station, but was at a loss about where to put it. I didn't have room for a freestanding table, but I did have a large blank wall above a shallow workbench. To use that space, I built a table that could fold down from the wall.

I screwed a 2x4 to the rear edge of the bench and used hinges to attach a 4x8 sheet of 3/4" MDF to the 2x4. I drilled holes in the MDF for the vacuum attachments, and then bolted the bag and a vacuum board to the MDF. I used rubber washers on the bolts, because the bolts penetrate the bag. The workbench supports the assembly when I fold it down from the wall.

Bob Edenhofer

Sacrificial Fence

I NEEDED A SACRIFICIAL fence for cutting rabbets with my tablesaw. All of the designs I'd seen required drilling holes in my saw's fence or positioning clamps strategically out of the way of the workpiece. I came up with a thick, sturdy fence that's easy to mount–and the clamps are always completely out of the way.

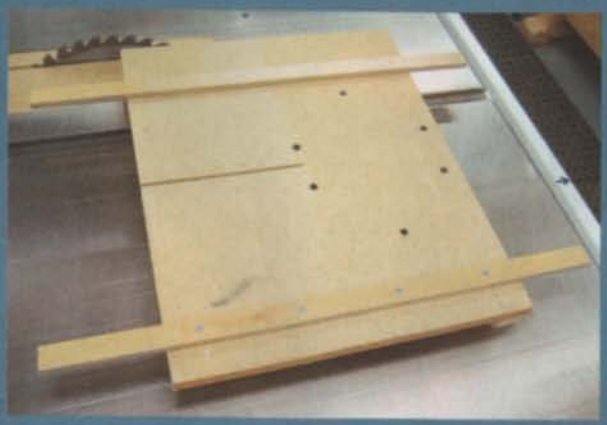
All you need are four 3/4" MDF strips about as wide as your fence is tall, and whatever length you want. Use two strips for the outside faces. Cut the remaining two strips to create holes to accommodate the heads of your clamps. Glue and clamp the assembly together, then square it up after the glue dries. When one side gets beat up, just flip the fence and use the other side.

Mitch Palmer

Durable Jig Runners

SOONER OR LATER, the wooden runners of your tablesaw jigs will wear and become sloppy, resulting in inaccurate cuts. Having just replaced my kitchen floor, I've made new runners using some extra pieces of laminate flooring. This stuff is stable, durable, inexpensive and available at home centers. A free sample may be all you need!

Serge Duclos



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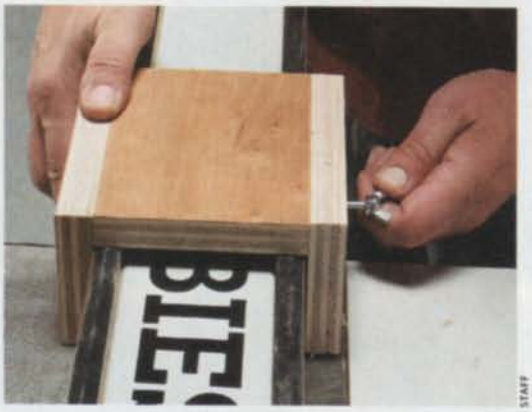
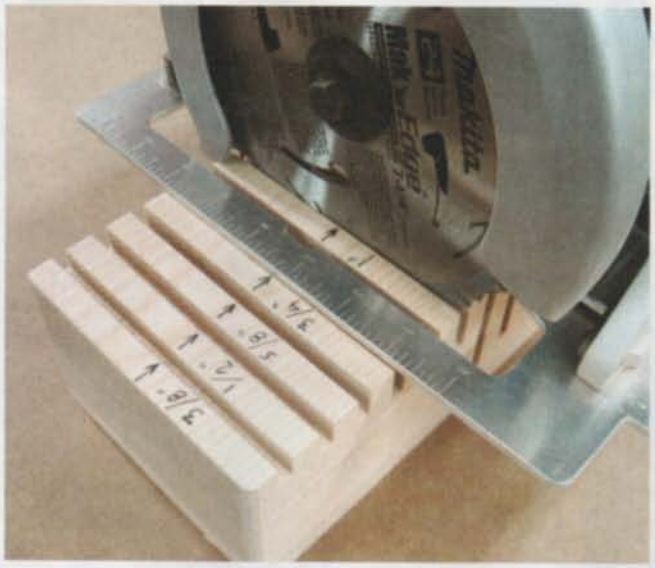


Saddle Stop Block

HERE'S A NO-FRILLS, ADJUSTABLE BLOCK for making stopped cuts. Cut three pieces of 3/4" plywood sized to fit your tablesaw's rip fence. Install a T-nut in one of the side pieces before assembly. Thread a short piece of threaded rod into the T-nut, and then secure a wing nut on the end of the rod with a jam nut. A plastic knob with a stud would work, too.

To use the stop block, position it behind the blade at the desired setting and twist the wing nut. That locks the block in place.

Ken Minnaert



Circular-Saw Depth Gauge

SETTING THE DEPTH-OF-CUT on my circular saw was awkward at best before I made this handy gauge. It's just a thick block of wood with 1/4" wide slots cut at precise, incremental depths. I made the slots on the tablesaw.

To set the depth-of-cut, I place the circular saw on the appropriate slot on the gauge, loosen the saw's depth stop, drop the blade until it bottoms out, and then re-lock the depth stop. The gauge also works upside down for setting the height of a tablesaw blade.

Serge Duclos

Hanging Glue-up Rack

I MOUNTED THIS TOWEL-BAR STYLE RACK on my shop wall for the times when I need to clamp up a small panel. It takes up very little shop space.

To make the rack, you'll need two 1/2" floor flanges, two 2" x 1/2" pipe nipples, two 1/2" 90°elbows, a 36" x 1/2" pipe, and as many 3/4" tees as you like. My rack is 36" long, but you can make it any length. The mounting pipe is 1/2" dia. The tees are larger–3/4" dia.–so they'll slide to wherever they're needed. If you're using more than two clamps, you'll have to do a little adjusting to get their heads to line up perfectly.

Ray Pruett

Cheap Waterstone Maintenance

I'VE USED WATERSTONES for years, and love the edge I get on my tools. Sharpening can wear a hollow in the stones, though, so they have to be flattened from time to time.

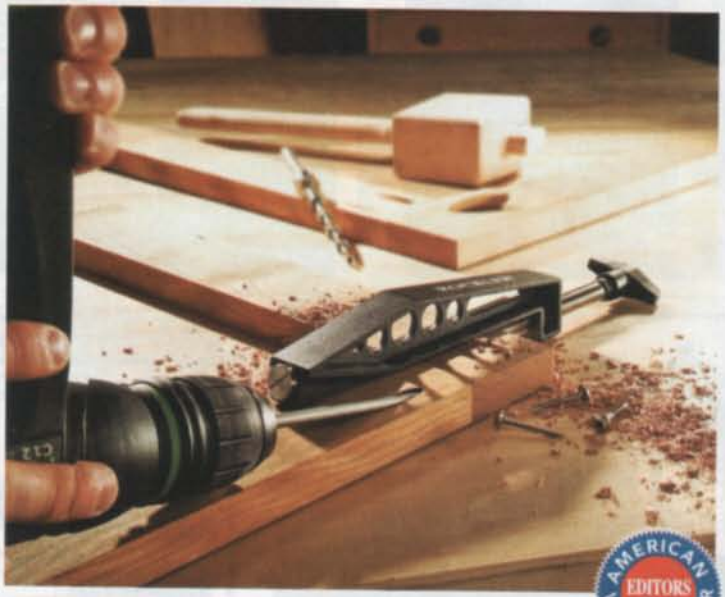
Most folks use coarse wet/dry paper to flatten their stones, but it's hard to find and isn't cheap. Instead, I use a cement paving block. These blocks come pretty flat, can be reused over and over, and when one gets dull and stops cutting, I just add it to my patio.

Brad Holden

Dust Collection Elbows

I USE A SHOP VACUUM for dust collection on my router table and drill press. It works well–but the vacuum's hose kinks when it turns the corner to the tool's dust port. I solved the problem by buying a couple of 1-1/2" PVC elbows from the hardware store. I put one in my drill press and one in my router table. Now the hose doesn't have to turn any corners. Depending on your vacuum's hose size, you may need a few PVC reducers as well.

Joe Scharle



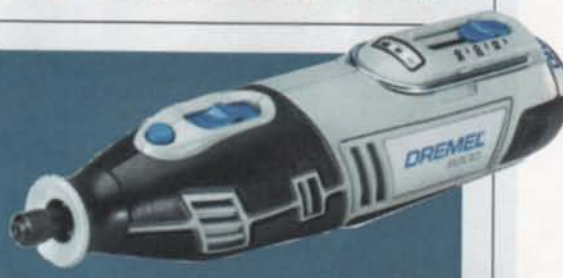
Easier Pocket Hole Assembly

POCKET HOLE JOINTS are quick and easy to make. For some applications, such as face frames, they're perfect. But if you've ever tried to assemble a face frame with narrow rails and closely spaced screws, you know that holding the pieces together can be a real bother–a standard clamp just gets in the way.

Rockler has solved that problem. Their new Pock-It Hole Clamp rethinks the way pieces are held together, and allows you to space screws as close as 1/2" apart, for rails down to 1-1/4" wide. First, you drill pocket holes the normal way. Then, you butt the pieces together, slip the Pock-It into one of the holes (it has an angled stud that fits right into the hole), tighten its clamp, and off you go. Clever!

This clamp's innovative design has earned it our Editors Pick Award.

Source: Rockler, www.rockler.com, (877) 762-5537, Pock-It Hole Clamp, #38518, $19.99.



Power and Freedom

REMEMBER WHEN DRILLS first went cordless? To no longer be bothered by that long cord trailing around–that's real freedom. Now, the Dremel rotary tool has gone cordless, too, thanks to lithium-ion technology.

The new Dremel 8200 is powered by a 12 volt, 1.3 aH lithium-ion battery, which recharges in one hour. The 8200 has a speed range of 5,000 to 30,000 rpm and is compatible with all Dremel attachments. Take it anywhere!

Source: Dremel, www.dremel.com, (800) 437-3635, Dremel 8200, $139.

This Dremel-carved basswood elephant head (3" x 3") is part of a jewelry box made by artist and MIT engineering student Jeffry Disko. See more photos of Jeffery's fine carving at www.americanwoodworker.com/WebExtras.

Strong Shelves

YOU LOVE WOOD–we know that. You love wood so much you've got piles of it all over your shop, just waiting to be turned into a masterpiece … if only you can find those boards you thought you had!

If organizing your wood is a problem, check out The Lumber Store from General International. It's a six-level steel storage rack, suitable for use indoors or out. The brackets are 12" long and spaced 6-1/2" apart. Total height: 40". Total solution to a messy pile? Yep.

The Lumber Store doesn't cost much more than building a rack from a bunch of 2x4s, and it's a whole lot easier to assemble.

Source: General International, www.general.ca, (888) 949-1161, The Lumber Store, #99-300, $55.99.

EDITORS: ANDREW ZOELLNER. TOM CASPAR - PHOTOGRAPHY COURTESY OF CONTRIBUTOR UNLESS NOTED

Easy Scribed Joints

DON'T LAUGH–we're fascinated by a new tool called the Perfect Butt. That's butt as in "butt joint," and this new scribing tool truly is darned near perfect.

The Perfect Butt is based on an old idea: To scribe a cabinet to fit against an uneven wall, you insert a pencil in the center of a wheel and roll the wheel along the wall, tracing its ups and downs on the cabinet. (This method works for copying curved profiles, too.) The usual trick is to use a washer as the wheel, but it can be awkward and inaccurate–assuming you even have a washer of the right size.

The Perfect Butt is much easier to use and will yield more accurate results. It's composed of a hollow tube–with a spring-loaded pencil inside–and five tracing wheels (11/16", 1-1/8", 2", 2-3/4" and 3-1/2" dia.) that fit onto the tube. The wheels spin, like bearings, so there's no drag as you trace your line.

This serious tool is beautifully engineered–it's definitely not a cheap plastic gimmick. It's made in the United Kingdom.

Source: M.Power Tools, www.m-powertools.com, (613) 525-3328, Perfect Butt Profile Scriber, $29.99.

Dust Duet

PAIR AN Oneida mini-cyclone with a Festool vac and what do you get? A dream machine for portable power tools–one that protects your health and keeps your shop clean.

The Oneida Dust Deputy mini-cyclone can be hooked up to any vacuum, but Oneida has specifically designed this model to connect to the top of the Festool CT 22 or 33 Dust Extractors, turning the pair into one integral, tool-actuated unit.

The dust from your tools first goes into the Dust Deputy, whose cyclone separates out all the large particles and deposits them in an easy-to-empty 9 gallon box. What's leftover then goes into the CT, whose HEPA filter captures 99.7 percent of particles .3 microns and larger (according to the manufacturer).

The major practical benefit is that the vac's filter will operate much more efficiently, because it can't get clogged up with large debris.

Source: Oneida, www.oneida-air.com, (800) 732-4065, The Dust Deputy - Designed for Festool Vacs, $229; Festool, www.festoolusa.com, (888) 337-8600, CT 22 Dust Extractor, Product No. 583366, $500; CT 33 Dust Extractor, Product No. 583368, $600.

Powerful Bar Clamp

MOST ONE-HANDED BAR CLAMPS are a mixed blessing: easy to use, but not very powerful. They're great for light assembly work, but for that extra strength needed to draw stubborn pieces together, well, it's back to fumbling with an old-fashioned, two-handed clamp.

Fumble no longer. A new one-handed clamp from Irwin, the XP600, delivers up to 600 lbs. of force, twice that of Irwin's SL300 one-handed bar clamps. You can really feel that extra power when you squeeze the clamp's trigger–you know you're in a whole different league. It's naturally a bit bulkier than the lighter-duty clamps, but still nicely balanced.

The jaws on the XP600 extend 3-1/2", the same capacity as many screw-type clamps. You can remove the fixed jaw of the XP600 and put it on the other end of the clamp to turn it into a spreader. The XP600s come in 6", 12", 18", 24", 36" and 50" lengths.

The Irwin XP600 merits our Editors Pick for taking one-handed clamps to a whole new level.

Source: Irwin, www.irwin.com, (800) 464-7946, XP600 Quick-Grip Clamp, $19.99 - $44.99.

Compact 12" Jointer

IF YOU'VE EVER HAD the good fortune to use a 12" jointer, you know how sweet it can be. Packing plenty of power and with a bed wide enough to joint virtually any board–or glued-up stock–it's a machine that effortlessly cruises through every job. If lack of space is keeping you from buying one, check out the new short-bed 12" jointer from Grizzly.

The tables on the G0706 are only 60" long, compared to over 80" on a standard 12" jointer. That's big enough for boards up to 5' or 6' long–which may be all the capacity you'll ever need.

The G0706 features a 3 hp, 220 volt, single-phase motor and a spiral cutterhead with 60 four-sided indexable carbide knives. Easy-to-reach pedestal-mounted controls and large handwheels make the jointer easy to use and adjust.

Source: Grizzly Industrial, www.grizzly.com, (800) 523-4777, 12" Jointer with Spiral Cutterhead, G0706, $2195.

Detail Rabbet Plane

YEARS AGO, I BOUGHT MY FIRST rabbet plane, a Clifton 410, to get me out of a jam. My bread and butter work was repairing antiques, and I needed a particularly narrow rabbet plane (the Clifton is only 11/16" wide) to repair some drawer supports. Thinking back to those days, I wish I also had owned a set of narrower rabbet planes, such as these new gems from Lee Valley. They've just issued three new Veritas rabbet planes that are 1/4", 5/16" and 3/8" wide. (They're also available in 6, 8 and 10 mm sizes.)

These tools are beautiful, stylish, well-engineered and extremely comfortable. The large, upsweeping handles nest perfectly in your palm. On the technical side, their 3" long bodies are made of ductile cast iron, the blades are 01 tool steel (which is easier to sharpen than A2 steel) and bedded at 15° (creating a 45° cutting angle). The mouth is fixed. The next time you must clean out a narrow dado or groove, just remember–there's a hand tool that can also do the job. *–Tom Caspar*

Source: Lee Valley, www.leevalley.com, (800) 871-8158, 1/4" Detail Rabbet Plane, #05P75.03, $65; 5/16" Detail Rabbet Plane, #O5P75.06, $65; 3/8" Detail Rabbet Plane, #05P75.08, $65.

Pinless Moisture Meter

HARVESTING YOUR OWN LUMBER from local trees makes a lot of sense, but if you're going to use it to build furniture someday, you've gotta know when the wood is dry enough to mill. To figure that out, you should have a moisture meter, such as this new model from Ryobi.

Many moisture meters have short pins that you must stab into your wood to get a reading. The Ryobi is pinless–you just scan it over the wood's surface. Naturally, this avoids poking a bunch of holes in your prized boards, a feature we really like.

The Ryobi meter's range is from 5% to 30% MC (moisture content), with an accuracy of ±3%. That's sensitive enough to tell you when your green wood is good to go, but not sensitive enough for finer calculations, such as figuring how much a drawer front will move over the course of a year. A 9-volt battery powers the meter, and it shuts off automatically after one minute of non-use to save battery life.

Source: Ryobi, www.ryobitools.com, (800) 525-2579, Pinless Moisture Meter, E49MM01, $44.97.

How Do You Create Endless Cabinet Door Making Possibilities?

Profile Shown:
Round Over
(#99-760)

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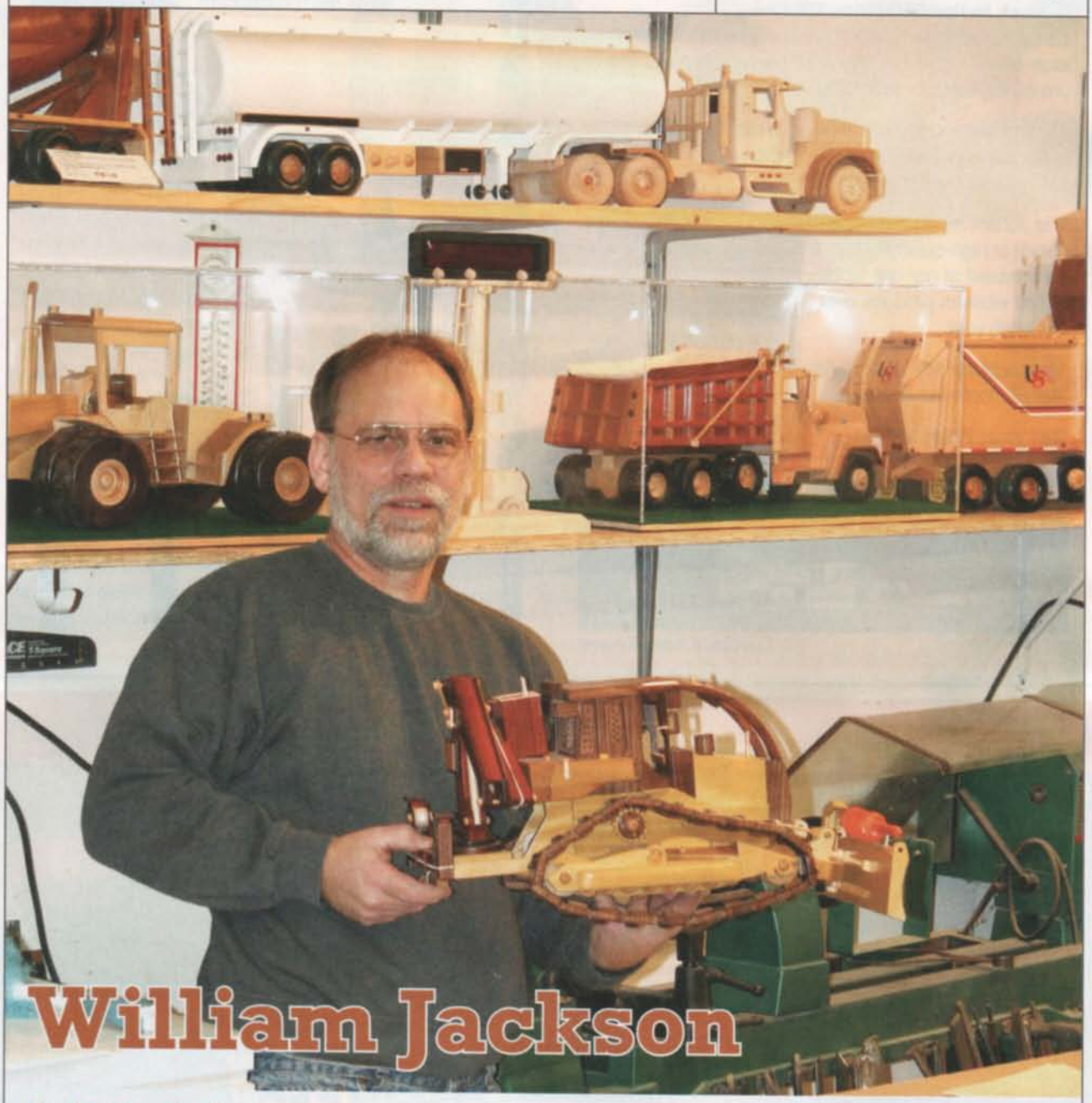
Low-profile Jigsaw

WE'VE NOTICED A NEW TREND among portable power tools: a lower center of gravity. Getting your hand lower down, closer to the work, helps you steer and balance a tool. It feels less tippy, giving you more control. Porter-Cable introduced a new random orbit sander last year, for example, that has a much lower profile than other machines. Now, Rockwell Tools has introduced a low-profile jigsaw, the Contour. It's only 6" tall.

The Contour feels like an extension of your arm. All the controls are within easy reach. It features variable speed, a three-position orbital cutting action and a built-in dust collection nozzle, which is surprisingly effective.

The Contour has a 5-amp motor with a cutting capacity of 3-1/2" in wood. It comes with a generous 10' cord and three T-shank blades to get you started.

Source: Rockwell Tools, www.rockwelltools.com, (866) 514-7625, 5.0A Contour Low-profile Jigsaw, #RK3734K, $149.99.



William Jackson

By Spike Carlsen

Thinking big, working small.

FEW PEOPLE CAN CREATE a wood replica of a concrete ready-mix truck or bulldozer with the precision and artistic flair of DeMotte Indiana woodworker William Jackson. And there's surely no one who's tackled as many unusual commissions in this unique niche of woodworking. About 90% of the replicas that William crafts are commissioned to honor or celebrate a company, special person, milestone or event. And William makes certain to weave the stories of those events into each of his pieces.

"One company had an employee who crashed into something every time he took the company golf cart out to inspect their facility," William explains. "So they asked me to build a golf cart that looked like it had run into a telephone pole. They presented it to him as a retirement gift."

"Another time I made a car as a gift for a traffic reporter who worked for a Chicago television station. She'd joked about never wanting to give birth on the jammed Eisenhower Freeway—but at 3:00 one morning, on the way to the hospital, that's exactly what she did." The car came complete with license plates that

EDITOR: TIM JOHNSON • PHOTOS COURTESY OF WILLIAM JACKSON.

Most of William's replicas, like this 3' long tanker truck, are commissioned by businesses.

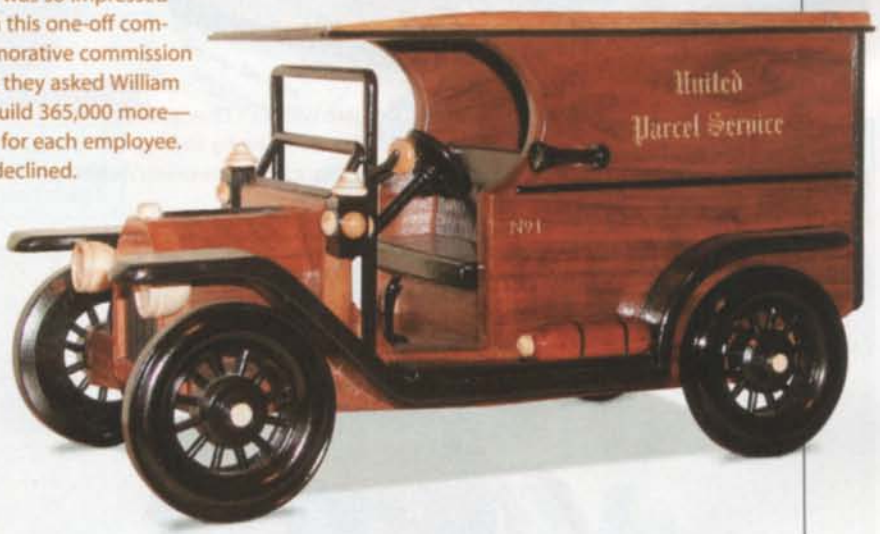
read IKE (the expressway's nickname), along with the baby's nickname (also Ike), date of birth, and birth weight emblazoned on the door.

Perhaps the strangest request came from two gentlemen who wanted a golf cart designed to carry a can of beer. They planned to convert it into a remote control vehicle that could deliver a brew from refrigerator to couch; they also planned to mass-produce it. Jackson built their customized cart, complete with an antenna disguised as a golf club, but their dream of striking it rich through mass production never came true.

Most of William's projects are considerably more complex than a beer-toting golf cart. The 48-year-old craftsman has tackled just about anything and everything that has wheels or tracks. He's built cranes, boom trucks, concrete pump trucks, road graders and forklifts. If you need a replica of the bizarre-looking truck that sprays lines on highways, he's the man to call. But he doesn't limit his skills to construction equipment. Fire trucks, locomotives and tractors are also in his repertoire.

Construction vehicles are a large part of William's work. "That's what built the world and that's what people ask for," he says. Unusual vehicles such as this paver/dump truck combo are a specialty.

UPS was so impressed with this one-off commemorative commission that they asked William to build 365,000 more—one for each employee. He declined.



Plan B

William fell into his vocation—literally. He'd learned whittling from his grandfather at a young age and he'd dabbled in woodworking since high school, but for most of his life he worked construction. One misty, sleety November evening, while installing plywood sub-flooring for a rush project, Jackson slipped and fell between the floor joists, severely

This 20" Hummer is available for $2,975. It's easier to maneuver than the real thing, and it gets much better gas mileage.

William's shop includes two lathes. He uses one to turn drums, tanks and other cylindrical components. The other is reserved just for turning wheels.

This 30" long Autocar garbage truck will dump, crush, roll and do almost everything else that the real trucks will do.

Compare William's Linecat dozer with the real thing by visiting www.AmericanWoodworker/WebExtras

damaging the bone, tendons and muscles of his right elbow. Though he visited doctor after doctor and underwent extensive physical therapy, his arm improved only slightly. At times it was difficult to pick up even a coffee cup, let alone a tool belt or a 2x4. The combination of stress and medications eventually led to a heart attack.

A doctor finally told him it was time to move to Plan B. "The only problem was, I didn't have a Plan B," William explains. He began fiddling with wood in his small workshop—an 8' x 10' shed with just enough room to turn around. He started building replicas by working from plans others had developed, but soon began designing and crafting his own unique pieces. One was a replica of a 1967 Volkswagon Beetle. His wife, Barbara, secretly entered it in the "Master Craftsman" contest sponsored by Sears. The car won in three areas: degree of difficulty, creativity and workmanship. A small photo of William and his creation went out in Sears flyers, orders began pouring in—and the rest is history.

Finding his niche

Though replicas are small, the number of hours required to create each one can be huge. Several years back, UPS commissioned William to create a replica of their first delivery vehicle, a 1913 Ford Model T truck (see photo, page 23). "My UPS delivery man was an older gentleman familiar with the early Model T's and he'd stop by everyday at lunchtime," William explains. "He'd coach me on the fine details of the grill and gear shift." It took almost 400 hours to complete the project. UPS was so happy with the piece that they asked if William could build 365,000 more—one for each employee

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as a Christmas gift. "I had to turn that one down," he laughs.

William's pieces command high prices. A garbage truck recently sold for $5900, and an RV motorcoach—complete with bedding and couch—brought over $9,000. A gentleman in California commissioned him to craft a vintage train, complete with locomotive, tender, cars (including a circus car) and a caboose. The completed train was 16' long and carried a price tag of $19,000.

If it weren't for the dozens of wooden replicas and hundreds of small wheels and vehicle parts scattered about William's shop, it would look like a typical woodworking shop. His primary tools are a tablesaw, two bandsaws, two lathes, sanders, routers and an assembly table. He eschews CNC routers, laser engravers and other high-tech equipment. "I only have the tools I need," William says. "It's nothing fancy." He does everything himself, from taking each order, to selecting the wood, to building the replica, to shipping out the final product; he estimates that he's completed 2500 replicas over the past decade.

It's in the details

On many of William's vehicles, the components are operable. Dump trucks dump, readi-mix drums rotate, and blades raise and shift. On William's Linecat dozer, the blade moves up and down, the boom extends and swings 360°, the tracks turn, and the stabilizing outriggers move in every direction (see photos, opposite).

William occasionally uses exotic and wild-grained woods, but for the most part he sticks with more uniformly figured hardwoods, such as walnut, maple, bloodwood, purpleheart and ebony. "When you start putting snakewood into a vehicle, all you see is the grain," he explains. It just doesn't look natural and it becomes a distraction."

William uses Titebond II glue to assemble most of the pieces, and sometimes tints the glue with latex stain to match the color of the wood and disguise the joints. The logos found on many of his trucks are scaled down versions of the graphics created for full-size vehicles. Once the transfer has been created by a sign company, William cuts out and applies each letter individually. He finishes most of his pieces with 10 to 12 coats of satin lacquer. The result? According to Jackson, he's never had an unhappy customer and 90% of his clients are repeat customers.

Perhaps the banner on William's website sums it up best: "I am creating art that has a little of me, the client and the vehicle in it. That's what I'm after. For me, I get to put everything a guy loves into one thing: big steel, wood and power tools. What could be better than that?"

TO SEE MORE of William Jackson's creations, visit: www.woodenclassicwheels.com.

Spike Carlsen *is the author of "*A Splintered History of Wood: Belt Sander Races, Blind Woodworkers and Baseball Bats," *now available through Harper Perennial ($15.99, ISBN 978-0-06-137357-2).*

Scaling Down

How does one scale down a 26' long, 50 ton bulldozer into a 20" wooden replica that can sit on a bookcase? "I wish I could say, 'This is how I do it every time.'" William explains. "But I can't. It's sort of the same way Mary Poppins paints a picture. She says she's going to paint a rose, and—poof—it's done."

But William does follow certain procedures. He begins by asking clients to send him as many photos of the vehicle as possible; at a minimum, he requests pictures of the front, back, side and top. He often supplements this information with details gleaned from brochures or the Internet. He then combines the various angles into a handmade sketch, and works from that.

Each vehicle tends to dictate its own scale. William takes liberties with proportions, as some details would nearly disappear on a small-scale replica if they were accurately sized. Although William occasionally uses a scaled ruler or a calculator, he relies largely on dead reckoning. First, he crafts the basic shell of the vehicle. Then, like a sculptor working with a clay model, he builds, adds and removes elements until all of the proportions work. He'll often start by making the components oversize and then scale them down until they look right.

He'll sometimes send clients photos of the work in progress, to get feedback on certain details, "It's all a matter of time," William says. "And sometimes the frustration level can run pretty high. But when you do the same thing every day you figure out different avenues."

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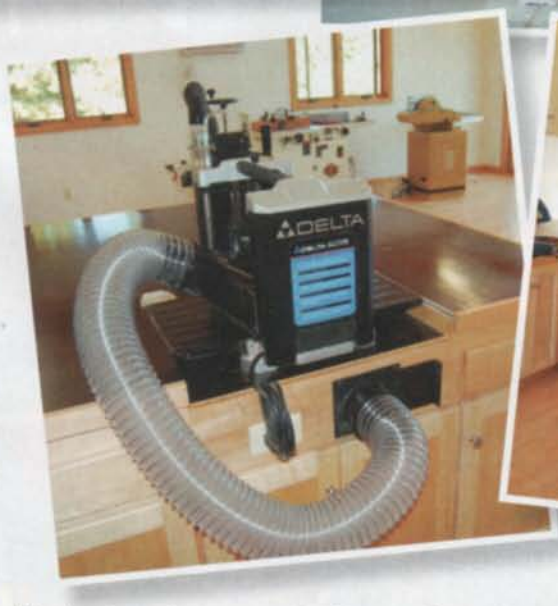
A Shop with a View

A FEW YEARS AGO, I moved to a Colorado mountain area on five acres, which gave me plenty of room to build my dream shop, a two-story design with 850 sq. ft. on each level. The upper floor houses my woodworking equipment in a spectacular room with a vaulted tongue-and-groove ceiling that's supported by a large laminated central beam. This construction eliminates support columns, thereby preserving valuable floor space. An air filter mounted below the ceiling beam provides ambient dust control. The floor is wood, which, as every woodworker knows, is much more comfortable than concrete. Double entry doors make it easy to move lumber in and completed projects out. This level also has a separate finishing room outfitted with an HVLP sprayer.

The basement level houses an Oneida dust collection system ducted to all the machines above and a 60-gallon air compressor with runs to three locations upstairs. There's plenty of room for wood storage as well. This layout works great, because all the noisy mechanical equipment is downstairs and all of the ducts and piping are out of the way. Large doors make loading and unloading a breeze.

My shop is efficient to heat, because all the exterior walls have sprayed-in foam insulation. Air con-



ditioning is rarely necessary in this mountain climate, so most of the time, the ceiling fan provides adequate cooling. A wall-mounted air conditioner stands ready, just in case.

When I built the shop cabinets, I used some tricks to save space and make it easier to handle lumber and plywood. For example, all of the tool and work surfaces are the same height (and even the stairwell wall cap), so no matter what tool I'm using, I won't bump into an obstacle at a different height.

The tablesaw's large outfeed cabinet is the heart of my shop. The top is made from phenolic plywood for a smooth, low-resistance surface. It has a removable section that reveals a recess for my planer, so I can use the cabinet's long, flat surface for support when I'm planing. Similarly, a drop-leaf table at the end of the cabinet is designed to position my router table flush with the surface. Dust collection is built in. And as the cabinet is completely outfitted with doors and drawers, both the planer and the router table can store inside.

I've been building toys for my grandchildren and projects for family members lately, but woodworking has been a lifelong passion.

Gene Fischer
Boulder, CO

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Jazz Age Mini-Lathe

SOME YEARS BACK, when the company I worked for relocated out of state, I lost my job. While hunting for a new position and feeling a bit down, I visited a shop that sold used woodworking machines. I found a little pick-me-up there in the form of a #700 Goodell-Pratt bench lathe, made in the late 1920s, which I talked myself into buying. The price was $80. My wife wasn't too keen about my purchase, but she said that fixing it up would be a good tonic for me.

She was right. I replaced the pulleys, which weren't original, by turning new ones from 2" dia. aluminum bar stock on my 12" woodturning lathe. I cleaned all the lathe's parts, repainted them black, added an on/off switch that would also reverse the motor's direction, and built a portable stand with a drawer. I also made a set of miniature turning tools from some used HSS reamers. All that work certainly kept me busy!

The lathe weighs 9-3/4 lbs. and stands only 8" high. It's 12" long overall, has a 5" swing over the bed and is 3-1/2" long between centers. I've since found that Goodell-Pratt made a wide range of accessories for it, including ones for metal turning. It makes a great mini-lathe, and provided a fun project when I really needed something to do. By the way, it took some time, but I did land a position with a very nice company.

Walter Kwiatkowski

Electric Coping Saw

MY SHOP IS EQUIPPED WITH almost every tool I need, but I take special pride in the first tool my dad gave me: a Dremel Model A Moto-Saw. I don't think there's anything like it made today.

I contacted Dremel about the Moto-Saw a few years back, and they said it was one of the first saws they made. It was first produced in the 1940s and discontinued in the 1960s. In 1961, about the time my dad bought it, the Moto-Saw cost $6.85. I still have the small four-page manual that came with the saw, and it lists a set of 12 blades as costing 60 cents.

I was only 9 or 10 years old when my dad gave me this unusual tool, and as I grew up, we spent many hours together working on cabinets and furniture. Now, it's the other way around–my dad works with me in my shop. Every once in a while, looking up at the Moto-Saw hanging on the wall, we share a fun story, back from the days when portable electric tools were still a novelty. Anything was possible then, even an electric coping saw.

Randy Hall

We'll pay you $100 to share your favorite tools, new or old, with fellow readers. Contact us by e-mail at **toolnut@americanwoodworker.com**, or mail us at American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121. If possible, please include digital photos of your tools.

EDITOR: TOM CASPAR • PHOTOS COURTESY OF CONTRIBUTORS

Master Cabinetmaker's Bench

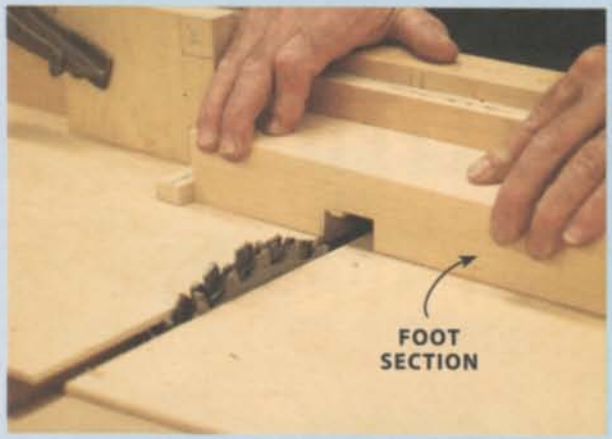
A proven design that will last a lifetime.

by Alan Turner

I HAVE MANY FINE TOOLS IN MY SHOP, but the most important one is my bench. It has a classic design, favored by cabinetmakers for generations.

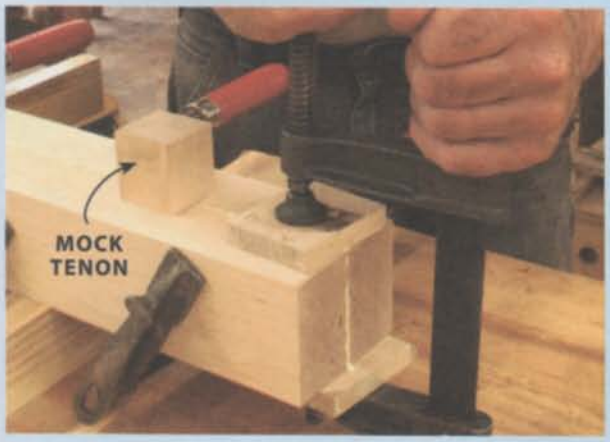
I've spent a long time refining the details of this bench. I've built 15 of them over the years, simplifying and improving the design each time. At Philadelphia Furniture Workshop, where I teach, I've helped students build dozens more.

The materials are top-notch. I've used the best wood (3" thick hard maple), the best tail vise hardware (imported from Germany), and made the bench plenty big and very heavy (it's 7' long and weighs 250 lbs). The materials aren't cheap, but for a lifetime of service, they're worth every penny.

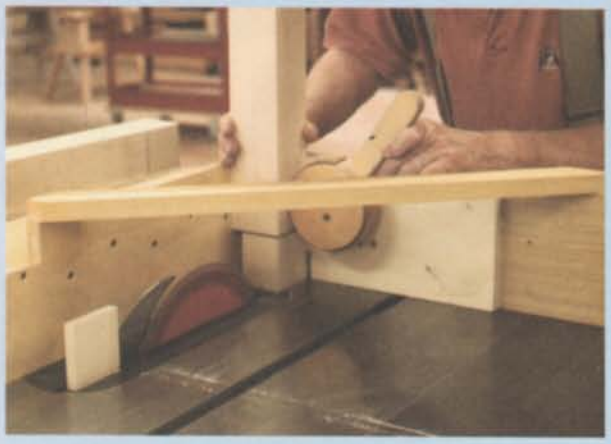


1 Start with the base. The legs are joined to the feet with large, through mortises (see Fig. A, p. 41). Each foot is composed of two pieces, which will be glued together later on. Begin making the mortises by dadoing each half of the feet.

2 Angle a portion of each dado using the bandsaw. This creates a flared opening for the leg's tenon, which will be secured by wedges.



3 Glue together the two pieces of each foot. Insert a mock tenon, covered with clear cellophane packing tape, into the dadoes. Clamp small, taped blocks above and below the feet to align the pieces.



4 Cut tenons on the legs using a tenoning jig. Using the bandsaw, cut two slots in each tenon to receive the wedges.

Key features

• **Thick top.** It will always stay flat. At 2-5/8" thick, it won't bend when you plane a board or bounce when you chop mortises.

• **Robust, knockdown base.** It will stand stiff under any pressure. It can easily be disassembled or retightened.

• **Strong, versatile vises.** You can hold work in nearly any position: between dogs, using the tail vise; vertical or horizontal, using the face vise; perpendicular, again using the tail vise; and flat–anywhere on the top–using a holdfast.

Build the base

Before you begin building, decide what height is best for you. It's easy to make this bench taller by adding thicker pads under the feet, but hard to make it shorter, once it's built.

Be picky about the wood for the entire bench, which is all hard maple. Reject boards that are twisted; they may never stay flat. Machine the pieces in stages, over a few days, so they have a chance to stabilize before you mill them to final size.

Mill the legs (A1; see Fig. A, page 41). Mill pieces for the feet (A2). Note that each foot is glued up from two pieces. Cut dadoes in the feet (they will become mortises for the legs; see Fig. B). Remove most of the waste using a bandsaw. Next, square the dados on the tablesaw, using a stop block and spacer (**Photo 1**). Finally, angle the ends of each dado (**Photo 2**), so the tenons can flare when wedges are inserted into them. Make two blocks the size of the leg's tenons to register the feet. Glue the feet together (**Photo 3**). Bandsaw a radius on the front end of each foot.

Cut tenons on the legs. Begin by cutting the tenons' shoulders all the way around each leg, then cut the cheeks using a tenoning jig (**Photo 4**). Only one setup is needed, because the legs and tenons are square. Drill 1/8" dia. holes in the tenons (they prevent the wedges from splitting the legs). Cut slots for the wedges, up to the holes, using the bandsaw. Cut the wedges (A3) on the bandsaw, making them extra long. Lay out the open mortises on the top of each leg. Remove most of the waste on the bandsaw and finish the joints using

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the tenoning jig.

Mill the top stretchers (A4). Assemble the legs and feet, without glue. Clamp a board across the legs to keep the assembly square. Mark the position of the dadoes on the top stretchers directly from the legs. Cut dados on three sides of each joint. Note that the top stretchers will be 1/8" proud of the top of the legs.

Rout mortises for the rails (A6) that connect the leg sets. Make a template and cut the mortises using a top-bearing pattern bit. Drill holes in the legs for the bolts that will fasten the rails to the legs (Fig. D). Drill holes in the top stretchers for the lag bolts that will be used to fasten the top. Make the rear holes larger than the front holes, to allow the top to expand and contract.

Plane, scrape and sand the legs, feet and top stretchers. Glue the two leg sets and drive home the wedges (**Photo 5**). Fasten pads (A5) to the feet. (Don't glue them. This allows you to change the bench's height later on.)

Mill the rails. Cut their stub tenons using a dado set. Clamp the rails between the leg sets. Continue the bolt holes by drilling as deep as possible into the rails with a 1/2" brad point bit. Disassemble the rails and continue drilling. Insert a bolt into each hole and mark the location of the nut holes in the rails. Drill these holes. Assemble the base (**Photo 6**).

Start the top

Make the main top (B1) in two sections of approximately equal width. Each section may be built up from any number of boards you wish. When cutting these 3" thick boards to width, I use an 18-tooth rip blade to ease the load on my cabinet saw's motor (see Sources, page 42). Joint one face of each board and plane the opposite side. (At this point, it's OK if the planer skips over some areas.) Joint one of the board's edges, rip the board to width, and joint the sawn edge. Glue the boards together. Mill and bring to final thickness the end caps (B2) and the long dog block (B3), but leave them 1" extra long. Plane the two glued-up top sections to the same thickness as these pieces (**Photo 7**).

5 Add stretchers across the top of the legs, then glue the feet to the legs. Drive wedges into the slots to flare the ends of the tenons. These joints will never come loose!

6 Bolt the base together. The bolts engage square nuts inside the rails.

7 The benchtop is made from 3" thick hard maple. Glue the top in two sections. Run each half of the top through the planer to even the glue joints.

8 Glue the top. Support it on straight, wooden bars. Clamp the ends to help align the two halves.

9 Rough-cut the ends of the top. Use a guided circular saw or a standard circular saw following the edge of a board. Cut from both sides.

10 To make the ends square and smooth, follow up with a router and straight bit. Use a board to guide the cut, which only goes halfway deep. Flip the top and finish the process with a long bottom-bearing bit.

11 Using a slot-cutting bit with a long arbor, make a series of passes to cut a 3/4" slot in each end of the benchtop. Then make end caps to fit the slots. The end caps keep the top flat, and are attached with bolts.

12 Move on to mounting the tail vise, whose metal parts are available as a kit. The vise travels on a steel guide plate, which must be precisely located using a shop-made gauge block.

Glue the two top sections using strong bar clamps (**Photo 8**).

Use a circular saw with a guide to cut the top about 1/8" longer than its final size (**Photo 9**). Saw from both sides. This top is heavy! To aid in flipping it, clamp a 4' long 2x4 to one end, across the top's width, and use the 2x4 as a lever. Cut the ends of the top to final length using a router and a guide (**Photo 10**).

Trim the end caps to final length. Using a slot-cutting bit with a 4" long arbor and a top bearing (see Sources), cut slots in the end of the top (**Photo 11** and Fig. E). Work from both sides of the benchtop to center the slots. Using the tablesaw, cut tongues on the end caps to fit the slots, again working from both sides. Drill three holes in each end cap for the bolts that secure the caps to the top. Make the front holes tight (3/8"), and drill the two rear holes at a larger diameter (5/8") to allow the top to expand and contract. Clamp the end caps to the bench. Lengthen the holes for the bolts by the same method you used for the rails above. Drill blind holes for the captured nuts.

I use holdfasts and other clamping devices to secure work to my bench. These generally require 3/4" dia. holes, drilled all the way through the top and end caps. I use a Colt Forstner bit for this work (see Sources).

Install the tail vise

I've searched long and hard for sturdy tail vise hardware that's not too difficult to install. The best I've found is made in Germany (see Sources). It consists of a plate that's fastened to the bench and a cage that's fastened to the tail-vise assembly. Note: this hardware is right-handed only.

Begin by fastening the plate to the bench. First, glue a block (B4) under the bench, flush with the top's edge, to increase the top's thickness (see Fig. F). (Don't apply glue under the end cap, though.) I fasten the plate with machine screws (see Machine Screw Joinery, page 43), so it's easier to remove for cleaning and lubrication. Alternatively, you can use a self-centering (Vix-style) bit and #14 FH screws. In any case, the plate must be installed precisely parallel

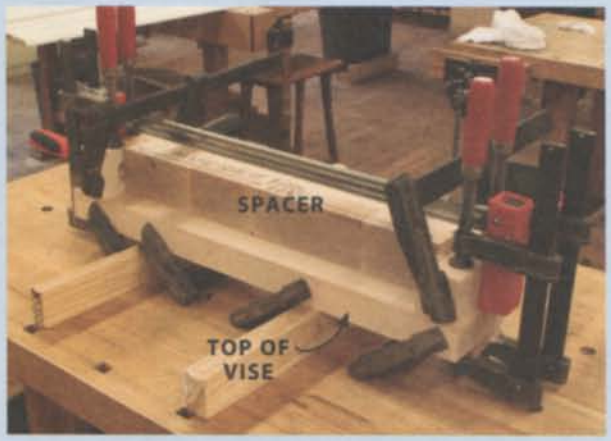
to the top of the bench. Make a spacing jig to locate the top of the plate (Fig. G). Clamp the jig and plate to the bench, then drill a pilot hole for one screw at one end of the plate (**Photo 12**). Install the screw, then drill a second hole and install another screw. Remove the gauge block and double-check that the plate is parallel to the top using a combination square. If it's not parallel, remove the second screw and use a different hole in the plate. Drill holes for the remaining screws and install the plate.

Build the tail vise. Mill the top (C1) and short dog block (C2) to thickness and width, but leave them 1/4" extra long. Mill the front jaw (C3) and rear blocking (C4). Drill a hole for the vise's screw in the rear blocking. To assist in gluing these parts together, make a 20-1/4" long spacer (**Photo 13**). Clamp this block between the front jaw and rear blocking, and then glue up the four pieces you've made. The top and short dog block should overhang 1/8" on both ends. When the glue is dry, trim the top and short dog block flush using a crosscut sled or flush-trim bit.

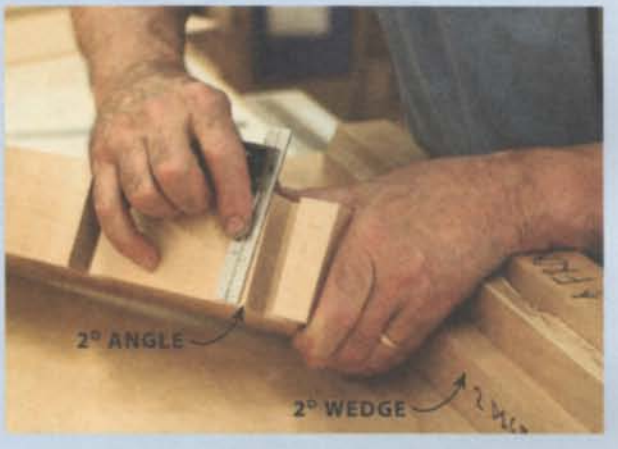
Next, cut the dog holes in the tail vise. They're angled 2° to the left, while the dog holes in the bench top will be angled 2° to the right (Fig. A). Cut the dog holes with a dado set using a sled with a 2° wedge screwed to the fence (**Photo 14**). (To help you make this wedge, a 2° angle rises about 3/4" over 20".) Make the wedge long enough to extend off both ends of your crosscut sled. You'll need this extra length later on, for the bench top's longer dog block. Note that the thin end of the wedge is to the left of the blade, to lean the dadoes the correct way. Clamp the tail-vise cage to the tail-vise assembly, and as before, drill and tap to mount it (**Photo 15**). Cut, drill and install the end cap (C5), leaving the overhang on the left, and mount the tail vise. It should be slightly proud of the benchtop, for now.

Complete the top

Next, install the long dog block on the front of the benchtop. To begin, screw the tail vise all the way in. Measure the distance from the front jaw to the



13 Glue together the top, ends and short dog block of the tail vise. Use a spacer between the ends to ensure that they're the correct distance apart.



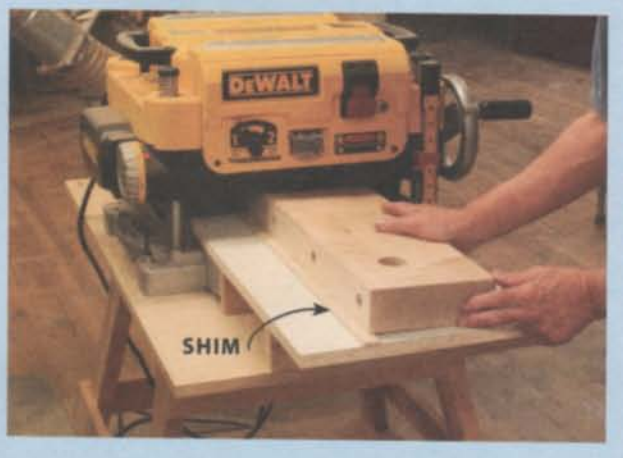
14 Cut dadoes, angled at 2°, in the tail vise's dog block and top. Use a long wedge to create the angle. These dadoes will become holes for the bench dogs.

15 Fasten the mating part of the guide plate inside the tail vise, then mount the assembly on the bench.

16 Cut dog-hole dadoes in a long block, leaning the opposite way from the dadoes in the tail vise. Glue the block to the benchtop.

17 Complete the benchtop by gluing a face piece on top of the dog block. Glue a similar piece to the front of the tail-vise assembly.

18 Glue an additional piece below the top in order to mount the face vise. Plane the piece so it's level with the edge of the bench.



19 Make the front of the face vise. Use a sled and shim to taper its inside surface. This 2° taper ensures that the vise will pinch at the top when it is fully tightened.

20 Install the front vise. You can use any kind of vise here–I'm using the Veritas Twin Screw. Its unique design minimizes the amount that the vise will rack from side to side.

left end of the bench–this will be the actual length of the long dog block. Cut the block to length and mark the locations of the dog holes. Be sure to take into account the guide bars and screws of your front vise–you don't want dog holes directly above them. Cut dados in the long block. Reverse the 2° wedge you used above so the dados lean the right way. Glue the dog hole block to the top (**Photo 16**).

Mill the front caps for the bench (B5) and vise (C6) and glue them on (**Photo 17**). Fasten the top to the base, then plane the caps and the top of the tail vise flush with the top. Make the bench dogs (E1 and E2, Fig. H).

Install the front vise

I used the Veritas Twin Screw vise on this bench (See Sources). This vise has a 16-7/8" opening between its two screws, which are connected by a chain. Turning one of the vise's handles also turns the other handle, which keeps the front of the vise parallel to the bench as it clamps a workpiece.

The Veritas is just one option; many other types of vises would work well on this bench. Whatever vise you use, its front face should be flush with the front of the bench. If your vise has iron jaws, cut a recess in the back side of the front cap for the vise's rear jaw before gluing the cap to the benchtop.

The Twin Screw comes with complete mounting instructions, but you'll have to add an additional piece under the bench top, a rear jaw (D1), to accommodate the vise. Mill this piece, then clamp it to the top and mark where the top's dog holes are located. Cut dados in the back of the rear jaw to align with the dog holes–note which way the dados should lean. Drill holes in the jaw for the vise's screws and glue the jaw to the bench. Plane the jaw flush to the top (**Photo 18**).

Make the front jaw (D2). Taper it from top to bottom using the planer and a shim (**Photo 19**). Install the front jaw, screws and chain (**Photo 20**). After everything is tight, plane the top of the front jaw flush with the benchtop.

Finish your bench by applying a light coat of thinned shellac. This gives the maple a pleasant amber tone, offers some resistance to stains, and prevents glue from adhering to the top.

Fig. A
Exploded View

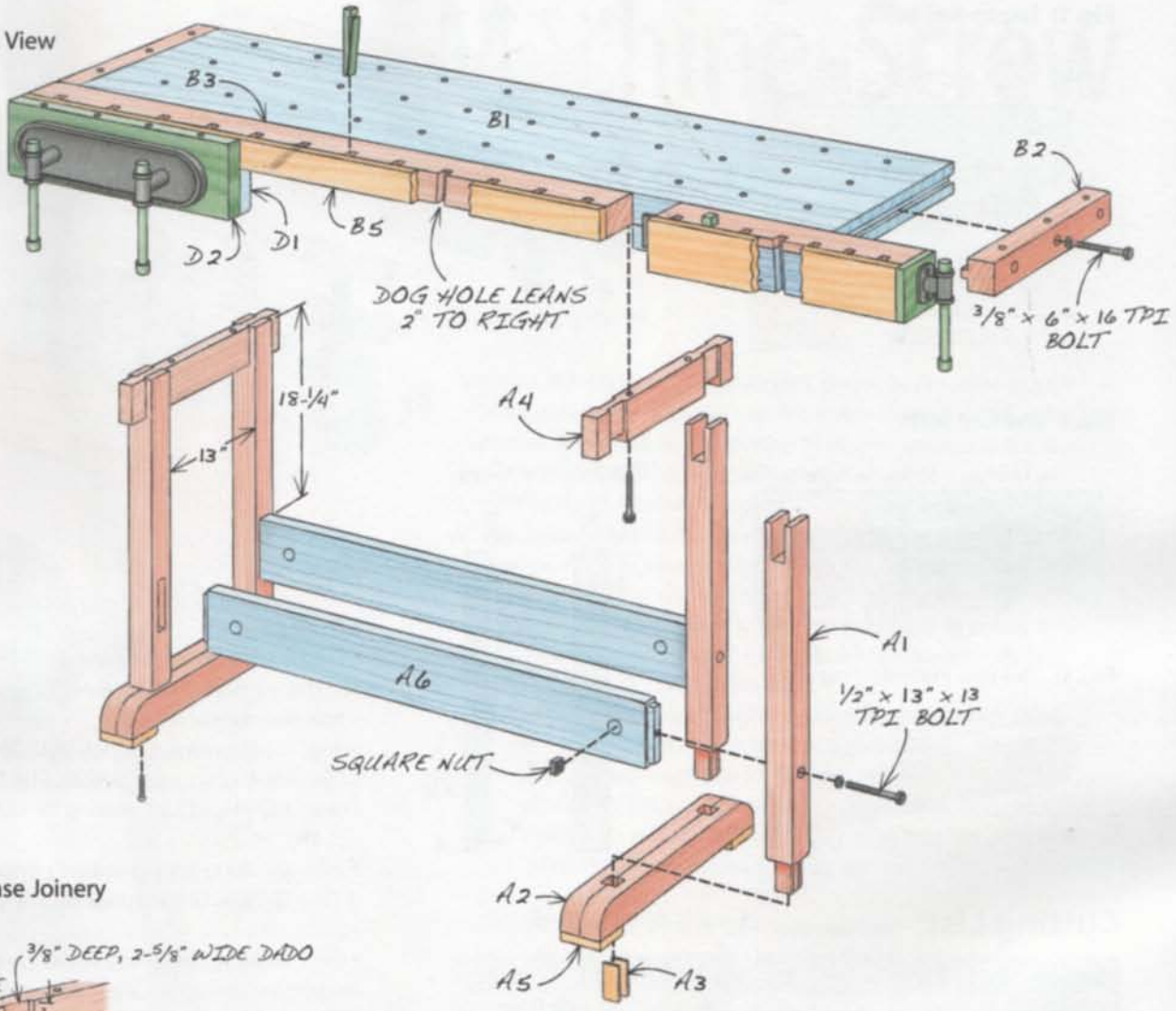


Fig. B Base Joinery

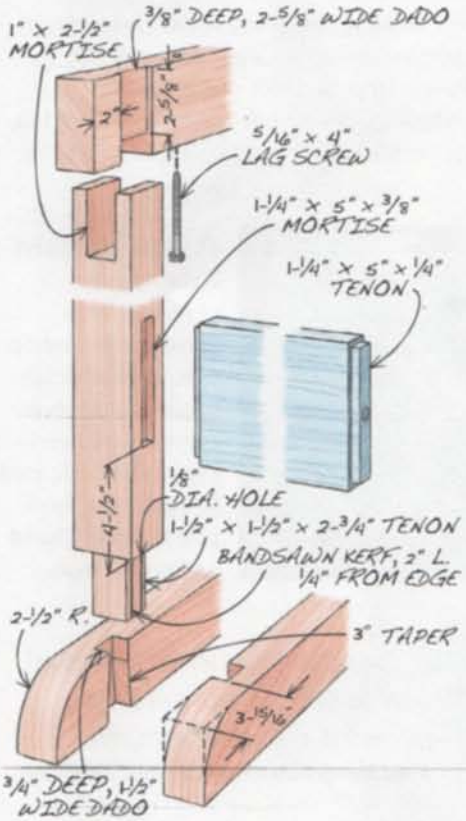


Fig. C Plan and Elevation

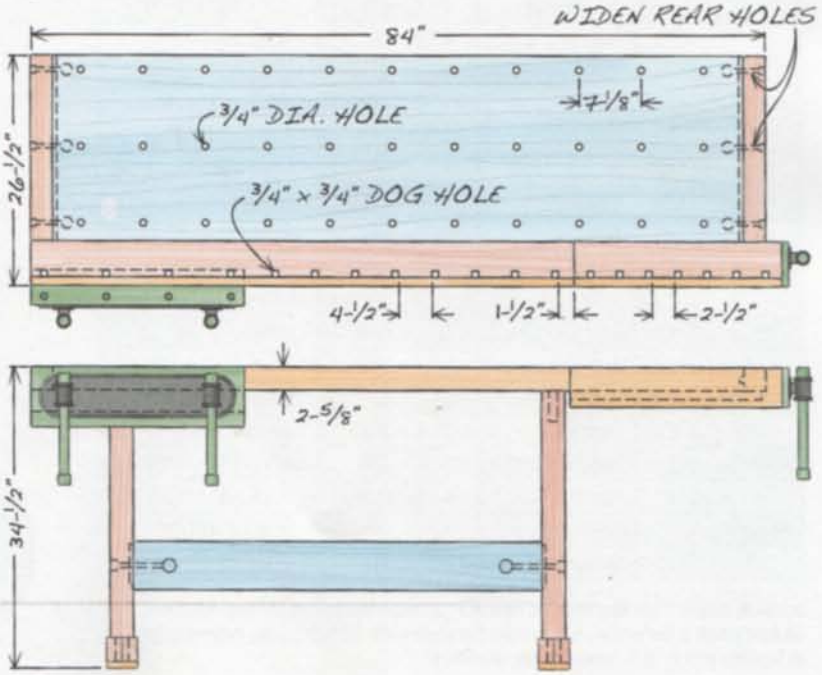


Fig. D Leg-to-Rail Bolts

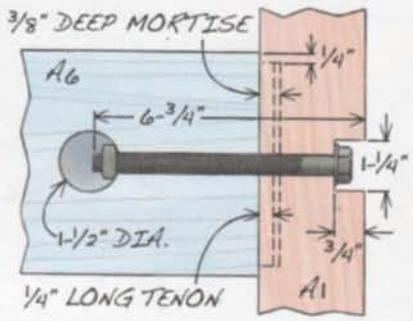


Fig. E End Cap Bolts

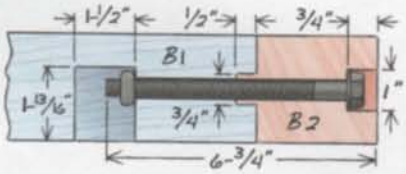


Fig. G Tail-vise Plate-setting Jig

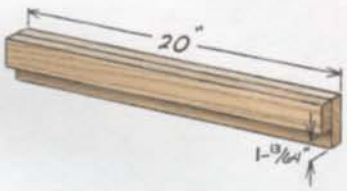


Fig. F Tail Vise

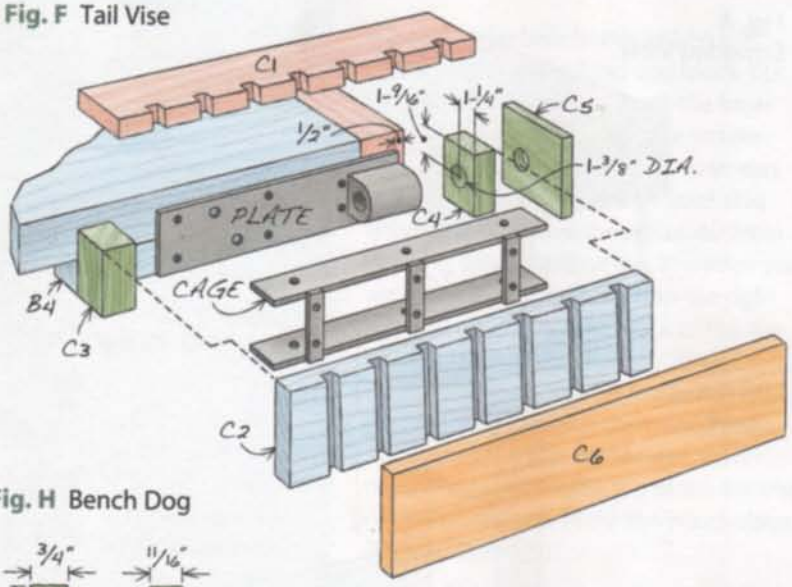
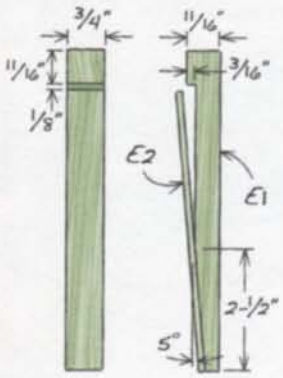


Fig. H Bench Dog



Cutting List: Overall Dimensions: 34-1/2" H x 26-1/2" W x 84" L

Section	Part	Name	Qty.	Stock	Th x W x L
Base	A1	Leg	4	12/4	2-5/8" x 2-5/8" x 31" (a)
	A2	Foot	4	8/4	1-3/4" x 2-3/4" x 25"
	A3	Wedge	8	4/4	3/16" x 1-1/2" x 2-1/4" (b)
	A4	Top stretcher	2	8/4	1-3/4" x 3-1/2" x 22-1/4"
	A5	Pad	4	4/4	3/4" x 3-1/2" x 3-1/2"
	A6	Rail	2	8/4	1-3/4" x 5-1/2" x 47-1/4" (c)
Top	B1	Main	1	12/4	2-5/8" x 21-1/8" x 79" (d)
	B2	End cap	2	12/4	2-5/8" x 3" x 21-1/8" (e)
	B3	Long dog block	1	12/4	2-5/8" x 4-3/8" x 62-1/8" (e)
	B4	Blocking	1	8/4	1-1/2" x 2" x 17-1/2"
	B5	Front cap	1	5/4	1" x 2-5/8" x 62-1/8"
Tail vise	C1	Top	1	5/4	1" x 4-5/16" x 23-3/4"
	C2	Short dog block	1	8/4	1-11/16" x 3-1/2" x 23-3/4"
	C3	Front jaw	1	12/4	2-3/16" x 3-1/2" x 2"
	C4	Rear blocking	1	12/4	2-5/8" x 3-1/2" x 1-1/2"
	C5	End cap	1	4/4	3/4" x 5-5/16" x 4-1/2"
	C6	Front cap	1	5/4	1" x 4-1/2" x 23-3/4"
Front vise	D1	Rear jaw	1	8/4	1-3/4" x 4-1/8" x 24-3/8"
	D2	Front jaw	1	12/4	2-1/4" x 6-7/8" x 24-3/8" (f)
Bench dog	E1	Body	2	4/4	11/16 " x 3/4" x 6-1/2"
	E2	Spring	2	4/4	1/8" x 3/4" x 5-11/16"

(a) Length includes 2-3/4" long tenon. (b) Taper at 3°. (c) Length includes two 1/4" long stub tenons. (d) Build initially in two sections, each no wider than planer width. (e) Plane to same thickness as top. (f) Taper this piece by by 2°, across its width, after fitting.

SOURCES

- Freud, www.freudtools.com, (800) 334-4107, 10" Thick-Stock Rip Blade, #LM71M010, $63.
- Woodworkersworld.net, www.woodworkersworld.net, (800) 266-0699, Whiteside 4" Long arbor, #A220, $10; 1/4" Slot Cutter, #6710A, $15.10; Bearing for 1/2" depth of cut, #B5, $4.
- Infinity Cutting Tools, www.infinitytools.com, (877) 872-2487, Colt Forstner Bit, 3/4" dia., #101-123, $27.90.
- Dieter Schmid Fine Tools, www.fine-tools.com (located in Germany), Large Tail Vise, #300650, 115 euros (approx. $160), plus shipping.
- Lee Valley, www.leevalley.com, (800) 871-8158, Large Veritas Twin Screw Vise, #05G12.21, $219.

Alan Turner is the founder of Philadelphia Furniture Workshop (www.philadelphia-furnitureworkshop.com), a woodworking school dedicated to traditional furniture built with hand and power tools.

For more information on making wedged through-tenon joints, as well as more photos on building this bench, visit: **www.AmericanWoodworker.com/WebExtras**

Machine-Screw Joints

To build the ultimate jig, use a tap.

by Alan Turner

WHEN I BUILD A JIG OR FIXTURE that needs to come apart, I don't use wood screws, I use machine screws–and tap holes in the wood to receive them. It's very easy to do, and requires only a few special tools (see What You'll Need, page xx).

Why do it? Maybe I'm just a fanatic about building good jigs, but let me put the case to you. It's hard to precisely position two pieces using wood screws, which can break or strip out if overtightened. Machine screws, on the other hand, can precisely position a piece. They're really hard to break, they can be run in and out of a threaded hole many times, and you can safely crank them tight.

One limitation, though, is your choice of woods to tap into. Stick to Baltic birch plywood and dense hardwoods such as hard maple, hickory and white oak. Most of the exotics are OK, too. Softer woods won't take and hold threads as well. As for sizes, I've found that 1/4-20 and 5/16-18 machine screws work best.

Begin with true holes

In order to accurately position the object you'll be fastening, you have to start out with true holes in the object itself. Maybe that seems obvious, but I've often encountered metal plates whose countersunk recesses aren't concentric with their pilot holes. If that's the case, the plate will shift out of position as you tighten the screws that hold it fast. Not good.

So, in showing you how to tap holes for machine screws, let me begin with a worst-case scenario. I'll be using a plate that's part of a workbench's tail vise (see Master Cabinetmaker's Bench, page 35). The countersinks on this plate aren't quite concentric with their holes, so the first thing I'm going to do, before tapping any holes, is to fix the plate. To begin, I dig out a piloted countersink whose pilot either exactly matches the holes in the plate, or is slightly larger than the holes. If the pilot is larger, I re-drill the holes in the plate (**Photo 1**). It's important to clamp the plate and, of course, use a drill press.

Next, I chuck up the countersink and re-drill (**Photo 2**). The bit's pilot guarantees that the new countersink is concentric to the holes in the plate. If you're building an all-wood jig, it's best to drill and countersink with a combination bit.

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Drill and tap

To find the exact center of the holes I'll be tapping, I go back to the drill I used to enlarge the pilot holes. I carefully position the plate on the wood, clamp it in place, and drill a small dimple in the wood (**Photo 3**). It's important to use a twist bit here–not a brad point–to accurately guide the bit I'll use next.

After all the holes are started, I replace the pilot bit with the bit appropriate to the tap I'll use. Common fractional-sized bits aren't a good choice, by the way. To make clean, full-sized threads, you must use a bit that's exactly the right size, and that's usually a drill from a numbered or lettered series of sizes. (This information is usually provided with the tap.) I usually drill all the way through the wood (**Photo 4**) to make tapping easier.

If I can't drill all the way, I drill at least 1/2" deeper than the portion of the machine screw that will go in the hole. (The taps I use start cutting full size threads at the seventh thread–about 1/2" back from the tip.) If the threads must continue down to the bottom of the hole, I begin with a regular tap, then switch to a bottom-cutting tap, which cuts full threads much nearer the tip.

Finally, it's time to tap the holes. If you've tapped holes in metal, you know that it can be a long, tedious process of constantly turning the tap in and out to clear the threads. It's much easier in wood. So easy, in fact, that I just use a cordless drill and drive the tap all the way through in one shot (**Photo 5**). I know, you're skeptical. But believe me, it works fine–just drill at a relatively slow speed, and you'll be a pro in no time.

Once you've driven the tap through the hole, it's risky to go backwards. I just remove the tap from the drill and pull it through the hole (**Photo 6**). Of course, if the hole doesn't go all the way through the wood, you'll have to back out the tap using the drill.

If I'll be running screws in and out of the holes quite often, I soak the threads with CA glue to make them more durable (**Photo 7**). (If, after gluing, the screw is hard to insert, I just re-tap the hole.) When I'm putting together or taking apart a jig, I use a shop-made driver to turn the screws (**Photo 8**).

What You'll Need

Tapping holes in wood requires a few tools that are available from an industrial supply house. The most important tool is the tap. I've found that a special tap with an undercut shank and a long, tapered point works best. (See Source, page 45, for supplies for 1/4-20 screws; supplies for 5/16-18 and other screws are also available here.)

You'll also need a twist bit sized for the tap. A 1/4-20 tap requires a No. 7 drill bit, while a 5/16-18 tap requires an "F" bit.

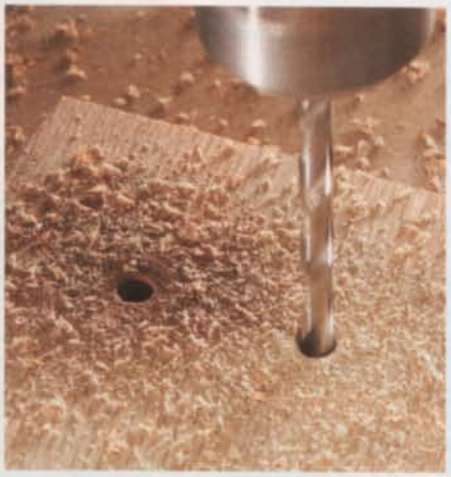
You may also need a piloted countersink bit to make absolutely true holes. The pilot is solid, and isn't interchangeable. These bits are available with pilots of many different diameters.

1 Tapping makes a strong, accurate joint. To show you how it works, let's mount a steel bracket (it's from a workbench vise). Its holes aren't machined quite accurately, so we'll begin by re-drilling them with a twist bit.

2 To ensure that the countersink in each hole is perfectly centered, re-drill them using a piloted countersink bit. The pilot's diameter must match the drill bit you used above.

3 Using the same bit you used for the pilot holes, position the plate and drill through it just enough to make a small dimple in the wood you'll be fastening it to.

4 Switch to a drill bit that's the root diameter of your tap. Center the bit on the dimple and drill all the way through the wood.



5 Chuck the tap into a drill, set the drill at low speed, and run the tap through the hole. The drill won't wobble–the tap's long, tapered snout will guide it straight through the hole.

6 Don't reverse the drill to remove the tap, because this may damage the threads you've cut in the wood. Instead, remove the tap from the drill and pull it through the hole.

7 For hard use, strengthen the threads in the wood with CA glue. Dribble glue in the hole, then insert a machine screw coated with petroleum jelly. After the glue cures, remove the screw.

8 I prefer to use machine screws that have an Allen head. To make assembly easier, I insert the screws with a driver made by cutting off the end of an Allen wrench.

SOURCE: MSC Direct, www.mscdirect, (800) 645-7270, Taper-style tap, 1/4-20, 5" long, #04680203, $31.59; Piloted countersink, 1/4" pilot, #02542223, $17.14; No. 7 drill bit, 6" long, #81408072, $8.38; Machine screws, 1/4-20, grade 8, socket drive, black oxide finish, 1-1/2" long, #05590120, $11.63 per 100.

To see a video on tapping wood, go to:
www.AmericanWoodworker.com/WebExtras

Small Tools Cabinet

Simple joinery creates a compact cabinet with full-size storage.

by Tim Johnson

WHEN I SPIED AN OLD MACHINIST'S CHEST loaded with narrow drawers in my neighbor's garage, I knew my small tools were finally going to have a permanent home. My version isn't nearly as grand, but it's just as useful, and it only took a couple of weekends to build.

Simple joinery is the key. Everything assembles with rabbets and dadoes, glue and nails. The drawers feature applied bottoms with integral pulls. The upper drawers slide on grooves sawn in the cabinet. The bottom drawers operate traditionally—they aren't as "groovy." The cabinet shown here requires one half sheet (30" x 60") of 1/2" Baltic birch plywood, one half sheet of 1/4" tempered hardboard and about 8 bd. ft. of solid wood. The design is easily modified, so feel free to make changes based on your tool collection or available space.

Build the cabinet

1. Cut the top, bottom, ends, and divider to final size (A through D, Fig. A, and Cutting List, page 48).

2. Cut 1/4" deep rabbets in the ends of the top and bottom for the sides. Baltic birch plywood is undersize in thickness, so use a scrap piece to determine the rabbets' exact width.

3. Use the same setup to cut rabbets for the back in the top, bottom and ends.

4. Cut dadoes in the top and bottom for the divider. Size the dadoes to the thickness of your plywood and make sure they line up.

5. Cut a 1/8" deep by 1/4" wide dado in a piece of scrap plywood. Then test-fit your hardboard—which is usually undersize in thickness—to make sure it fits and slides easily. If your hardboard binds, widen the dado slightly. When you're satisfied with the fit, cut dadoes for the hardboard drawer bottoms in the ends and divider (Fig. B).

6. Clamp the box together without glue. Then cut the back (E) to fit.

7. Assemble the box with glue and nails (**Photo 1**). This assembly must be square. Remove any squeezed-out glue, including the corners inside the cabinet, between the bottom and the sides and divider. Hardened glue left in these corners may affect the operation of the bottom drawers.

8. Cut the base sides and ends (F and G) to final size.

9. Use the tablesaw or bandsaw to cut tenons on the sides and matching open mortises on the ends. Glue and clamp the base together.

10. Fasten the base to the cabinet (**Photo 2**). To center the base, simply align centerlines marked on the base and cabinet.

Build the drawers

11. Start by cutting hardboard drawer bottoms (H and J) to fit the dadoes in the cabinet (**Photo 3**). The gap from side to side should measure 1/16" or less; 1/32" is optimal. Ease the hardboard edges by sanding, if necessary, to make each bottom slide smoothly.

12. The two lowest drawer bottoms slide directly on the cabinet—cut them exactly 1/32" narrower than the drawer openings.

13. Rout 1/32" deep by 3/4" wide grooves in each drawer bottom, one 1-1/8" from the front edge and one 3/8" from the back edge (**Photo 4**).

14. Pencil a centerline on each drawer bottom and drill a stopped hole for the washer (Fig. C).

15. To cut the drawer bottoms' straight front edges, install a fence on your bandsaw and cut in from both ends, stopping at the pull profile. Saw the profile separately, after the front edges have been cut. Tidy up the profile's curves, if necessary, with a sanding drum mounted in a drill press or in an oscillating spindle sander.

16. Glue in the washer (**Photo 5**).

17. Mill the drawer fronts and backs (K through N) to fit the grooves in the drawer bottoms and cut them to final width. Next, carefully cut the drawer fronts to length, 1/32" shorter than the drawer openings. Finally, cut the drawer backs to length, 3/32" shorter than the drawer opening. This will make the assembled drawer shorter at the back, to ease entry into the cabinet. As the drawer slides in, the fit

1 Make sure the box is square. There aren't a lot of parts in this project and the joinery is simple, just rabbets and dadoes. But if the box isn't square, the drawers will be tough to fit.

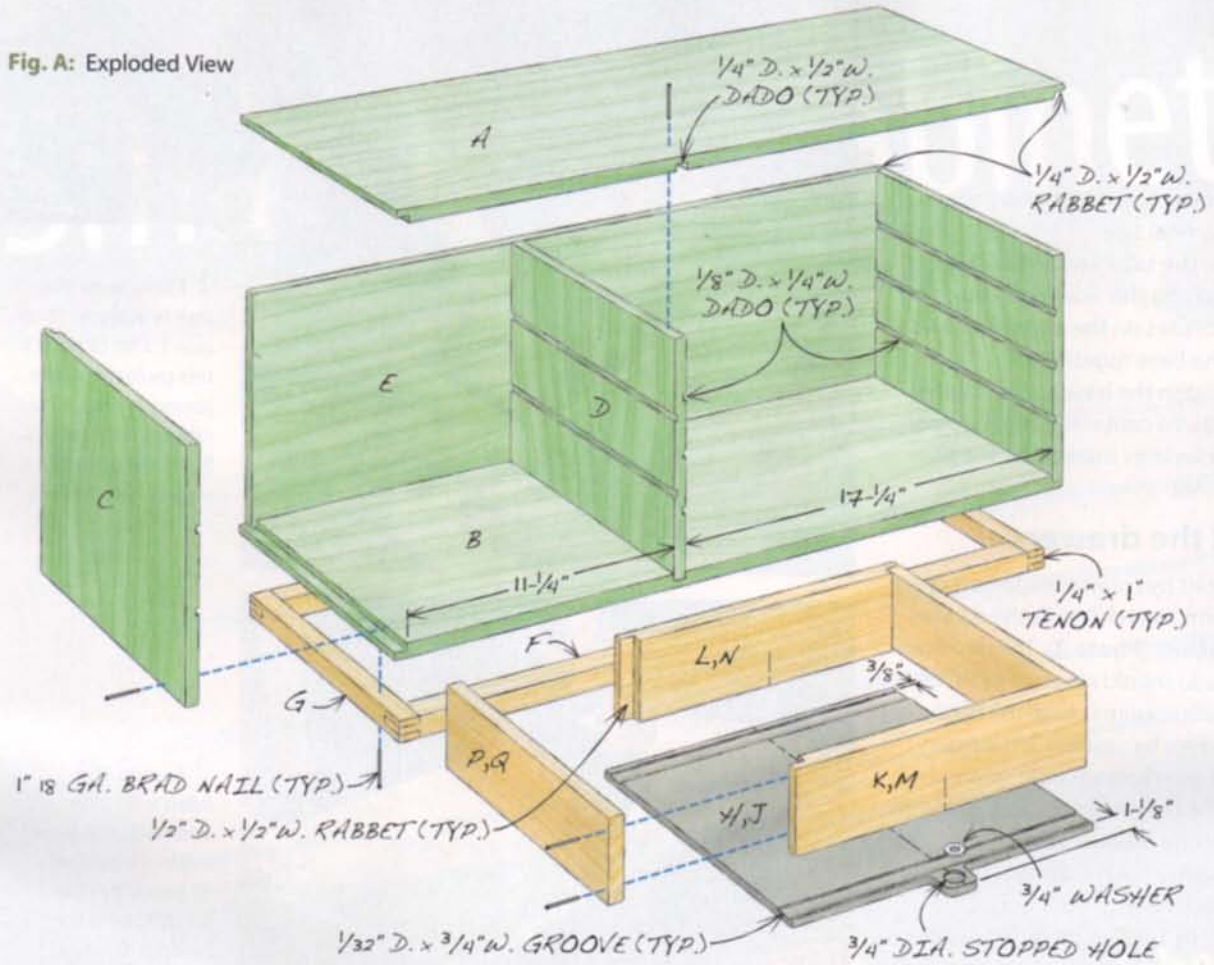
2 Fasten the base with glue and nails. The base raises the cabinet to provide extra clearance for the bottom drawers.

3 Test-fit the drawer bottoms in the dadoes. Each one should slide smoothly without binding and protrude 1" when it butts against the back of the box.

4 Cut shallow grooves in both ends of each drawer bottom. These grooves accurately position the drawer front and back.

PHOTOGRAPHY: JASON ZENTNER • ILLUSTRATION: FRANK ROHRBACH

Fig. A: Exploded View



Cutting List: Overall Dimensions: 30"L x 11-3/4"D x 9-1/4"H

Part	Name	Qty.	Material	Th x W x L
A	Top	1	Baltic birch plywood	1/2" x 11-3/4" x 30" (a, b)
B	Bottom	1	Baltic birch plywood	1/2" x 11-3/4" x 30" (a b)
C	End	2	Baltic birch plywood	1/2" x 8-3/4" x 11-3/4" (a, c, d)
D	Divider	1	Baltic birch plywood	1/2" x 8-3/4" x 11-1/4" (a, d)
E	Back	1	Baltic birch plywood	1/2" x 8-3/4" x 29-1/2" (a)
F	Base side	2	Soild wood	3/4" x 1" x 29"
G	Base end	2	Solid wood	3/4" x 1" x 10-3/4"
H	Short drawer bottom	3	Hardboard	1/4" x 11-15/32" x 12-1/4" (e, f)
J	Long drawer bottom	4	Hardboard	1/4" x 17-15/32" x 12-1/4" (e, f)
K	Short drawer front	3	Solid wood	3/4" x 2-1/2" x 11-7/32" (g)
L	Short drawer back	3	Solid wood	3/4" x 2-1/2" x 11-5/32" (g)
M	Long drawer front	4	Solid wood	3/4" x 1-13/16" x 17-7/32" (g)
N	Long drawer back	4	Solid wood	3/4" x 1-13/16" x 17-5/32" (g)
P	Short drawer side	6	Solid wood	1/2" x 2-15/32" x 10-1/4"
Q	Long drawer side	8	Solid wood	1/2" x 1-25.32" x 10-1/4"

(a) Thickness is nominal; all dimensions are based on actual 1/2" plywood thickness.
(b) Cut 1/4" D x 1/2" W (nominal) rabbets on both ends and back.
(c) Cut 1/4" D x 1/2" W (nominal) rabbet on back.
(d) Cut 1/8" D x 1/4" W dadoes for drawer bottoms.
(e) Cut the lowest drawer bottom 1/32" narrower than the drawer opening.
(f) Cut 1/16" D x 3/4" W dadoes for drawer front and back.
(g) Cut 1/2" D x 1/2" W rabbets on both ends.

Fig. C: Drawer Pull Profile

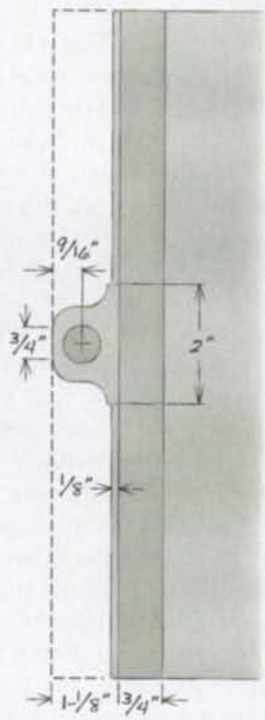
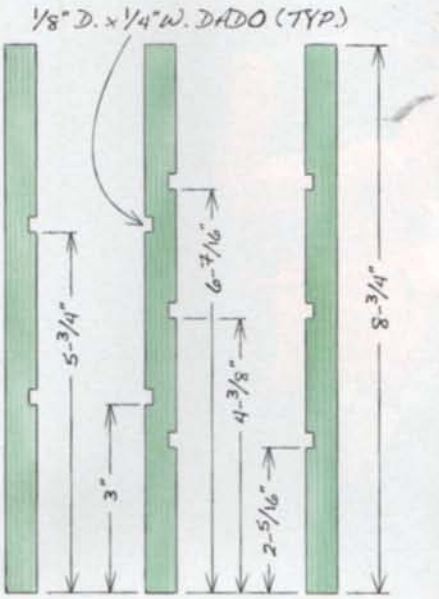


Fig. B: Drawer Dado Details



will gradually improve, and when the drawer is fully closed, the gaps between the cabinet and the drawer front will be negligible.

18. Mill the drawer sides (P and Q) to thickness.

19. Cut 1/2" x 1/2" rabbets for the drawer sides in the ends of the drawer fronts and backs.

20. Mark the centerline of each drawer front and back. Then carefully center them when you glue them to the drawer bottoms (**Photo 6**). Note that the edges of the two bottom drawer fronts should be flush with the edges of their hardwood bottoms.

21. Cut the drawer sides to width, so they're flush with the tops of the drawer fronts and backs.

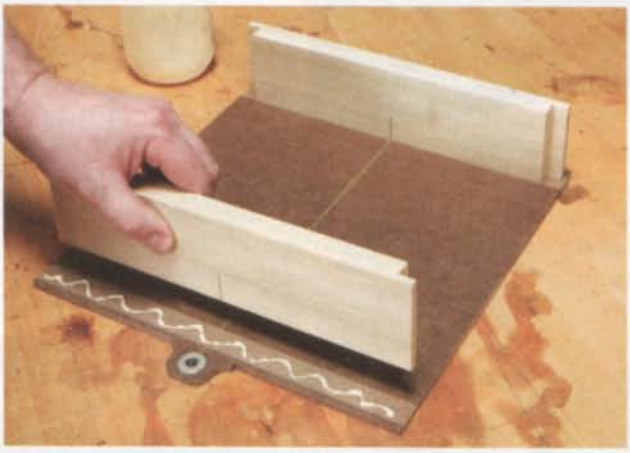
22. Cut the drawer sides to length, to fit between the rabbeted drawer fronts and backs. Then glue and nail them in place to complete the drawers (**Photo 7**).

Final assembly

23. Test-fit each drawer and make any necessary adjustments. To make the drawers slide like glass, rub a bit of wax on the edges of the drawer bottoms and in the cabinet's dadoes. You can adjust the drawers' fit from front to back by trimming or shimming the back edge of their hardboard bottoms.

24. Finish-sand the cabinet and drawers. Then apply your preferred finish. For this type of project, I prefer shellac.

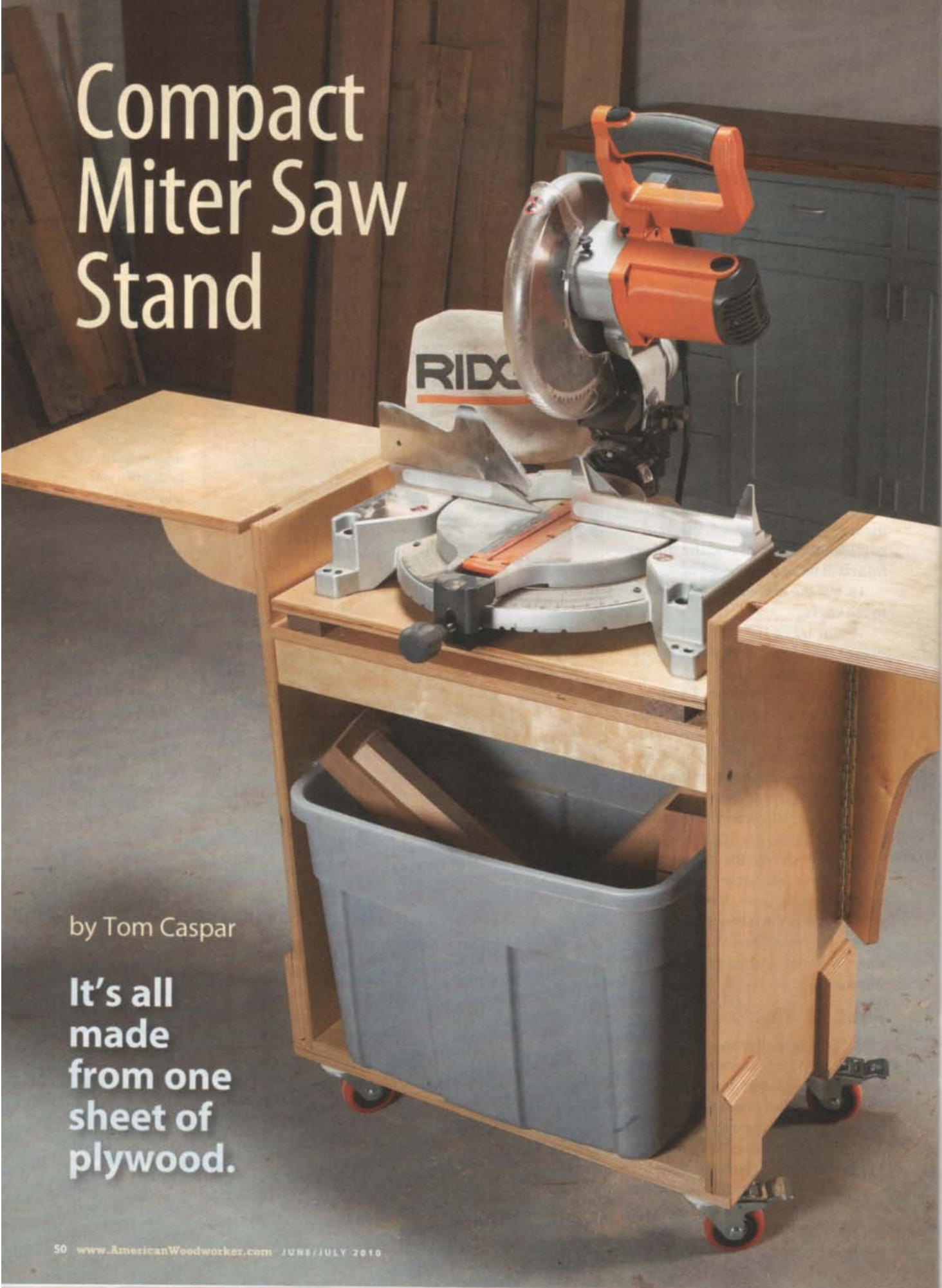
5 Complete each drawer pull. After bandsawing the profile on the front of each drawer bottom, drill a stopped hole and glue in a washer. The washer makes the pull easy to grip.



6 Center the drawer front and back when you glue them to the bottom.

7 Fasten the drawer sides with glue and nails. Cut the sides slightly narrower than the drawer front and back, so the drawer's top edges are flush.

Compact Miter Saw Stand



by Tom Caspar

It's all made from one sheet of plywood.

SPACE IS AT A PREMIUM in my small shop. Everything goes on wheels and is as compact as possible–including this miter saw stand. I made the stand quite strong and stiff, so it can withstand being pushed and pulled around my cracked and uneven concrete floor.

I put a bin for cutoffs underneath the saw, but you could use this space for shelves or drawers, instead. The stand could also be easily modified to accommodate a mortising machine or other benchtop tool simply by changing the thickness of two spacers under the saw's platform. Or, you could make it into a shop cart, with a drawer above and doors below.

I built the stand from one sheet of 3/4" Baltic birch plywood, which is composed of 13 layers of birch veneer. Baltic

birch is great for shop projects because its edges are ready to go right off the saw. That's a big advantage over other types of plywood, whose edges should be protected with banding. Without that banding, the outer veneers of most plywood will splinter and fray with use.

Baltic birch comes in 5x5 sheets. I designed the stand to make the maximum use of one sheet. If you can't get Baltic birch, or if you want to cut the cost of this project, you can certainly build the stand from a different type of plywood. There's plenty of material for all the parts in a standard 4x8 sheet.

Most 10" or smaller miter saws should fit this stand, but you would probably have to build a wider and deeper version to accommodate a 12" saw or a sliding miter saw. In any case, check your saw's dimensions before you build the stand to make sure the saw will fit.

PHOTOGRAPHY: JASON ZENTNER • ILLUSTRATION: FRANK ROHRBACH

Cut the parts

1. Rip the sheet approximately in half, at 30-1/2" (see Cutting Diagram, page 52). Rip the 30-1/2" section into two 15" wide pieces. Rip the other section into one 15" piece and one 14" piece. From the three 15" pieces, cut the sides (A), shelf and bottom (B), platform (G) and wings (K).

2. Crosscut the 14" piece to make the two wing supports (M). From the remainder, cut two pieces to make the stretcher (C). Cut these pieces 1/4" extra wide and 1" extra long. Glue them together to make a blank that's 1-1/2" thick. Once the glue is dry, rip this piece to final width, but leave it extra long.

Build the case

3. Cut biscuit slots to join the sides, shelf and bottom (**Photo 1**). Glue the parts together (**Photo 2**).

4. Cut the stretcher to exactly fit the space between the two sides. Glue the stretcher to the bottom of the shelf, set back 1/4" (Fig. A). From the outside of the case, run screws into the stretcher.

5. Cut the feet (D) and braces (E). Glue the braces to the case first, using spring clamps to make alignment easier, then add the braces. Add screws under the feet for additional strength. The feet and braces stiffen the front of the case and provide a wider stance for the casters.

6. Rout a rabbet for the back (F) using a rabbeting bit and bearing (**Photo 3**). Square the corners with a chisel, or leave them round and shape the back to fit. Cut the back to size and screw it to the case, using 5 screws per side.

Add the wings

7. Cut the brackets (L), miter their ends, and glue and screw them to the sides of the case. Position the brackets about 1/16" above the sides, then trim them flush with a router.

8. Cut two 36" long continuous hinges with a hacksaw to make two hinges for the wing supports and two for the wings (see Cutting List). Miter the ends of the short pieces, to match the brackets.

9. Cut the wing supports using a jigsaw or bandsaw (Fig. D). Round over the top edge of each wing support with a rasp and sandpaper. Drill pilot holes and fasten the long hinges to the wing supports (**Photo 4**). Place the stand on its back and install the wing supports (**Photo 5 and Fig. A**).

10. Fasten the short hinges to the wings, then turn the stand upside down and install the wings (**Photo 6**).

11. Make the wedges (N), leaving them extra long for now. Counterbore and drill holes for the screws that will fasten the wedges to the wings, then cut and smooth a ramp on the end of each piece (Fig. B). Clamp each wedge blank in approximate position (Fig. C). Open each wing support and fine-tune the wedge's position until both wings

Fig. A Exploded View

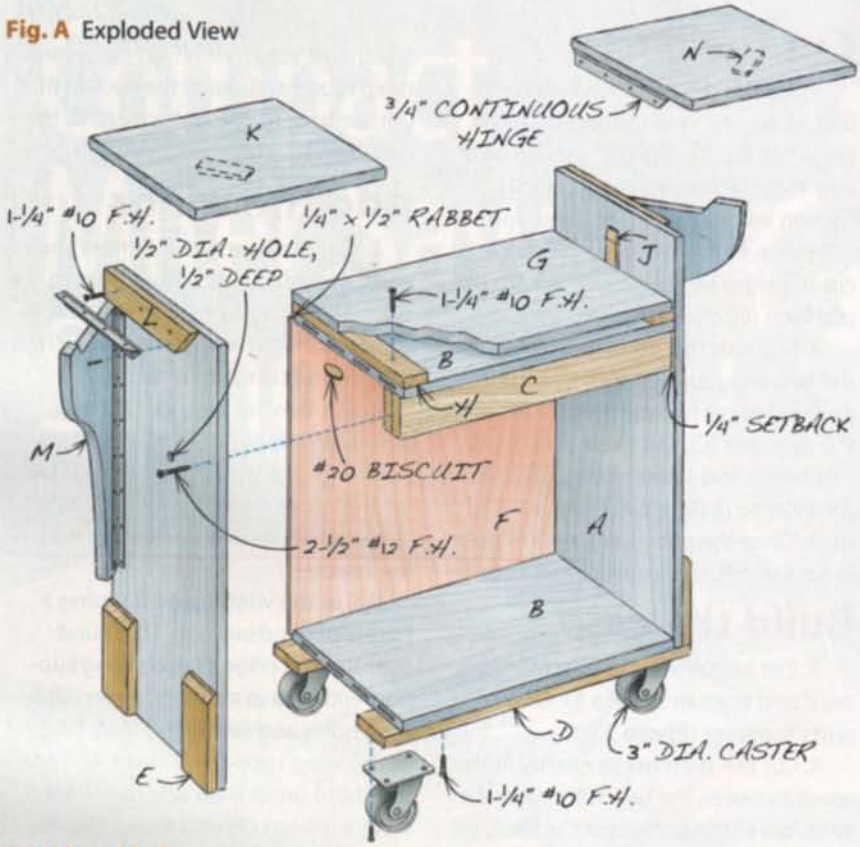


Fig. B Detail of Wedge

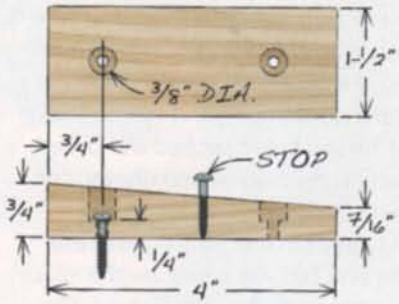
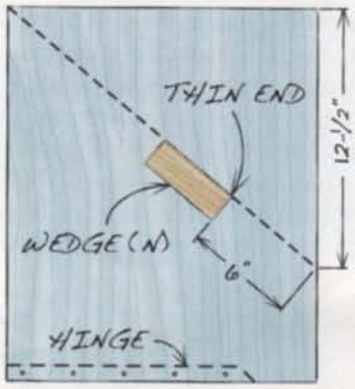


Fig. C Location of Wedge



Cutting List:

Overall Dimensions: 34-1/4" H x 28-1/4" W (closed) x 15" D; Well is 23-1/2" L x 15" D

Part	Name	Qty.	Material	Th x W x L
Box				
A	Side	2	Baltic birch	3/4" x 15" x 29-3/4"
B	Shelf & bottom	2	Baltic birch	3/4" x 15" x 23-1/2"
C	Stretcher	1	Baltic birch	1-1/2" x 2-1/2" x 23-1/2" (a)
D	Foot	2	Baltic birch	3/4" x 3-1/2" x 26-1/2"
E	Brace	4	Baltic birch	3/4" x 3-1/2" x 6"
F	Back	1	Hardboard	1/4" x 24-1/4" x 24-1/8"
G	Platform	1	Baltic birch	3/4" x 15" x 23-1/4"
H	Spacer	2	Hardwood	3/4" x 2" x 15" (b)
J	Shim	1	Hardwood	1/4" x 1" x 3"
Wing				
K	Wing	2	Baltic birch	3/4" x 15" x 18"
L	Bracket	2	Baltic birch	3/4" x 2" x 12-1/2"
M	Wing support	2	Baltic birch	3/4" x 14" x 21"
N	Wedge	2	Hardwood	3/4" x 1-1/2" x 4" (c)

(a) Glue from two pieces of 3/4" material.

(b) Make as thick as necessary to bring the saw's table level with the wings.

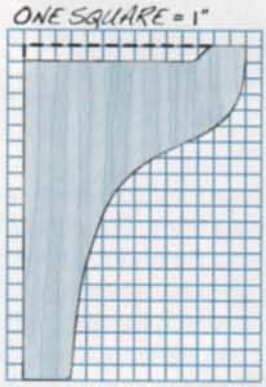
(c) Make these pieces 12" long, then cut to length after locating their position.

Hardware:

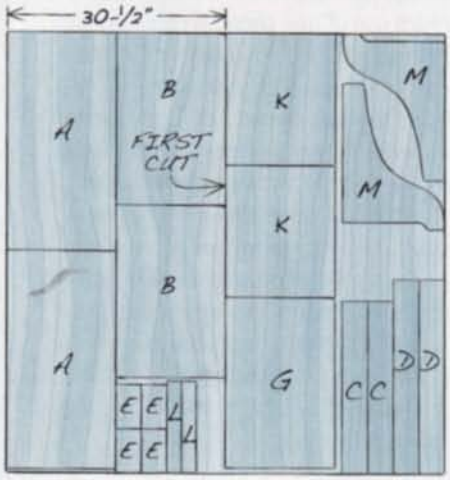
- 4 Locking casters, 3" dia.
- 2 Continuous hinges, 3/4" wide x 36" long. Cut two pieces 19-1/2" long and two pieces 11-1/2" long.

To see variations of this stand, go to:
www.AmericanWoodworker.com/WebExtras

Fig. D Wing Support Pattern



Cutting Diagram for 5' x 5' Baltic Birch



Cut biscuit slots to join the case together. This stand is made from Baltic birch plywood, which doesn't require edging.

Glue the case, using large L-shaped blocks to ensure that it's square.

Rout a rabbet for the back. Support the router by clamping a board inside the case, level with the case's upper edges.

Fasten a continuous hinge to each wing support, using a long, square block for alignment. Drill pilot holes using a self-centering bit.

On a flat surface, place the case on its back. Position the wing support 2-1/4" down from the top of the case, then fasten the support to the case.

Turn the case upside down and attach each wing.

Open the wing support about 50°. Position a wedge-shaped block under the support and clamp it to the wing. Fasten the wedge to the wing.

Flip the stand and place your saw on a platform. Measure the distance to the top of the stand. Make spacers equal to this thickness–they'll go under the platform.

Fasten the saw to the platform. This arrangement allows you to easily move the saw outside the shop, to work on your house or around the yard.

are level with each other (**Photo 7**). Each wing support should open about 50° and stop about halfway up the wedge's ramp. Once you're satisfied with each wedge's position, screw the wedges to the wings. Add a screw to each wedge to serve as a stop for the wing support. Drill a hole in each side of the case for this screw to nest in.

Mount the saw

12. Place the platform on the stand's shelf. Place your saw on the platform and measure the distance from the saw's table to the top of the stand (**Photo 8**). This distance will be the thickness of the spacers (H) that go under the platform. Fasten the spacers to the shelf and replace the platform and saw. Check to make sure that the saw is level with the stand's sides. Reduce the spacer's thickness or add shims as necessary.

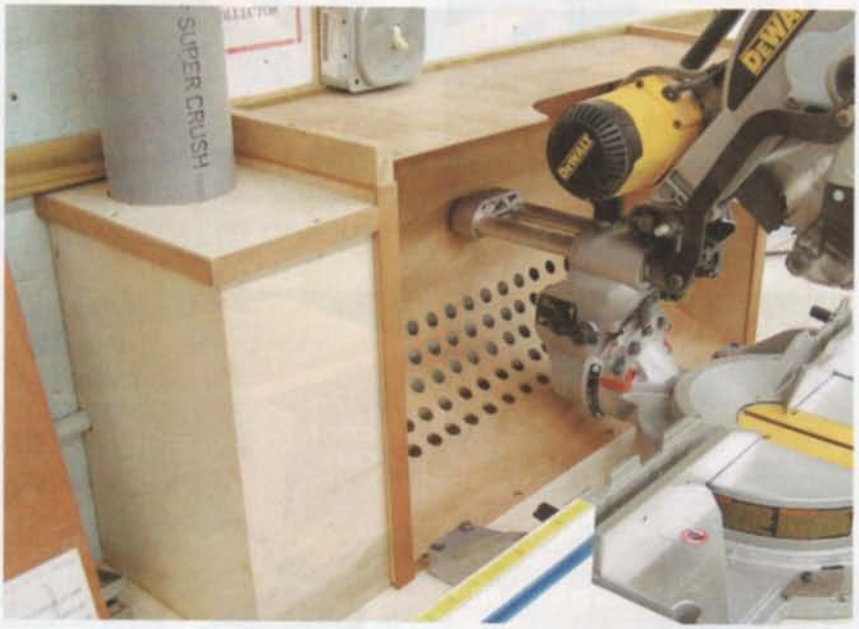
13. Nail a tight-fitting shim or two (J) to the sides to prevent the platform from wiggling. Taper its upper end to make the platform easy to remove and drop in place (**Photo 9**).

14. Remove the wings, wing supports, hinges and back. Round over all edges of the case and other parts with a router and a 1/8" roundover bit. Apply a polyurethane finish to all the parts, except the back. Re-attach the wings and wing supports, re-fasten the back, and add the casters.

Miter Saw Dust Collection Box

Effective control for a notorious sawdust creator

By Bob Selkirk



IN ADDITION TO BEING VERSATILE, accurate and virtually indispensable, my sliding miter saw also excels at spewing sawdust and resisting effective dust collection. I tried connecting a shop vacuum, but even when I remembered to turn it on, the vacuum only collected about half of the dust. I also got tired of reattaching the hose every time it came loose from the saw—a fairly frequent occurrence, because of the saw's sliding, rotating and tilting action. So when I installed a central dust collection system in my shop, I decided to try something different.

My collection box isn't anything fancy, but it captures most of the dust. Even if I don't religiously turn on the dust collection system, the captured dust settles inside the box, so it gets removed the next time I turn on the system.

I took advantage of the wall behind my saw and the bench that it sits on to build my collection box—they serve as the back and bottom of the box. You'll probably have to alter the design to make it work for your saw and its location.

Create the curved front

I used a piece of door skin to make the curved front that forms the heart of the collection box (**Photo 1** and Part A, Fig. A, page 55). Door skins are only 1/8" thick, so they're flexible. They're available at home centers in x 3' x 7' sheets, and cost about $30.

To establish the overall size of the box and the front's curved shape, mount one cleat on the wall behind the saw and another on the bench surface. Then flex the front piece and slide it between the cleats (Fig. B). For my installation, the wall cleat stood 15-1/2" above the bench and the bench cleat stood 10" away from the wall.

To create the ends (B), cut both pieces to size and place one next to the open end of the setup. Mark the front's curve on this piece. Then use a bandsaw to cut the curves in both pieces. Drill rows of 3/4" dia. holes in the curved front and then fasten it to both ends with glue and nails.

Test-fit the saw, to make sure the curved assembly will accommodate its full range of motion. I had to cut a notch in the right end of my assembly, to allow the saw's 60° rotation to the left (**Photo 2**). As my saw doesn't rotate as far to the right, I could position the box so that the left-hand end didn't require a slot.

Assemble the box

Fasten the curved assembly to the wall and the bench. Cut the right end cover (C) to final size, including the notch for the saw, and attach it to close off the assembly's right side, using nuts and bolts and spongy self-adhesive tape to minimize air leakage. This fastening method allows access to the space behind the curved front, should it become packed with debris or if something important falls through one of the holes.

A plywood box for the dust collection hose (D—G) closes off the assembly's left side. An opening in the side of this box allows the collection system to draw air through the holes in the curved front (**Photo 3**). To create the opening, one side (D) is shaped to match the assembly's curve and the back piece (E) is cut short. Fasten the assembled hose box with nuts, bolts and spongy tape.

Make a lid (H) to complete the hose box and a collar (J) to clamp the hose. Install the hose and then screw the lid to the box. Install trim pieces (K) to cover all the exposed plywood edges.

Fasten a plywood top (L) to complete the box. To accommodate my saw, I had to elevate the top with risers (M) and cut out the front. My 1/4" top sagged a bit, so I glued on a beam (N) to stiffen it.

To learn more about sliding miter saws, visit:
www.AmericanWoodworker.com/WebExtras

EDITOR: TIM JOHNSON • PHOTOGRAPHY: BOB SELKIRK

A curved front with air holes is the heart of my collection box. The wall behind the saw and the bench that it sits on act as the back and the bottom of the box.

A notch in the right end of the box allows the saw's full range of motion.

An opening in the side of the hose box allows the collection system to draw sawdust through the holes in the curved front.

Fig. A: Exploded View

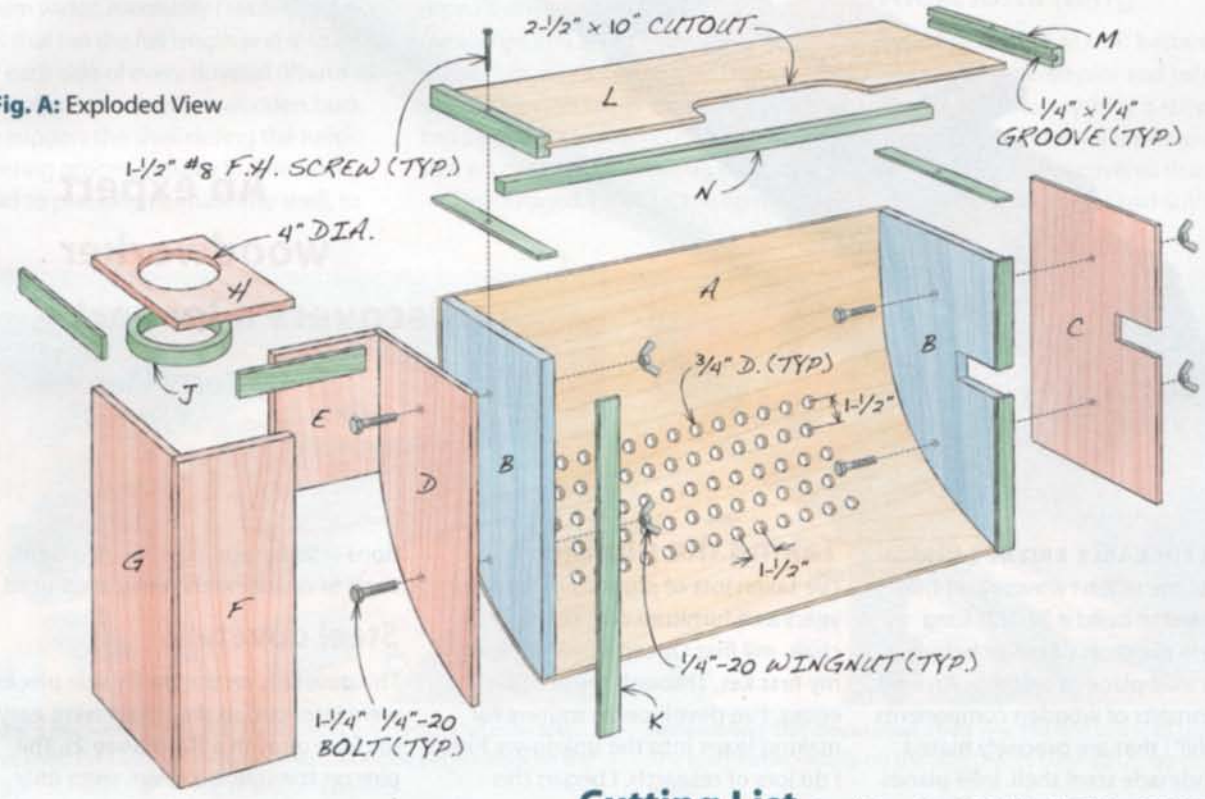
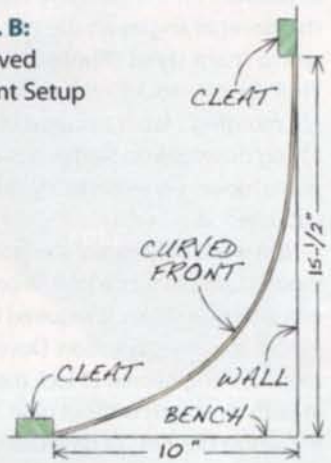


Fig. B: Curved Front Setup



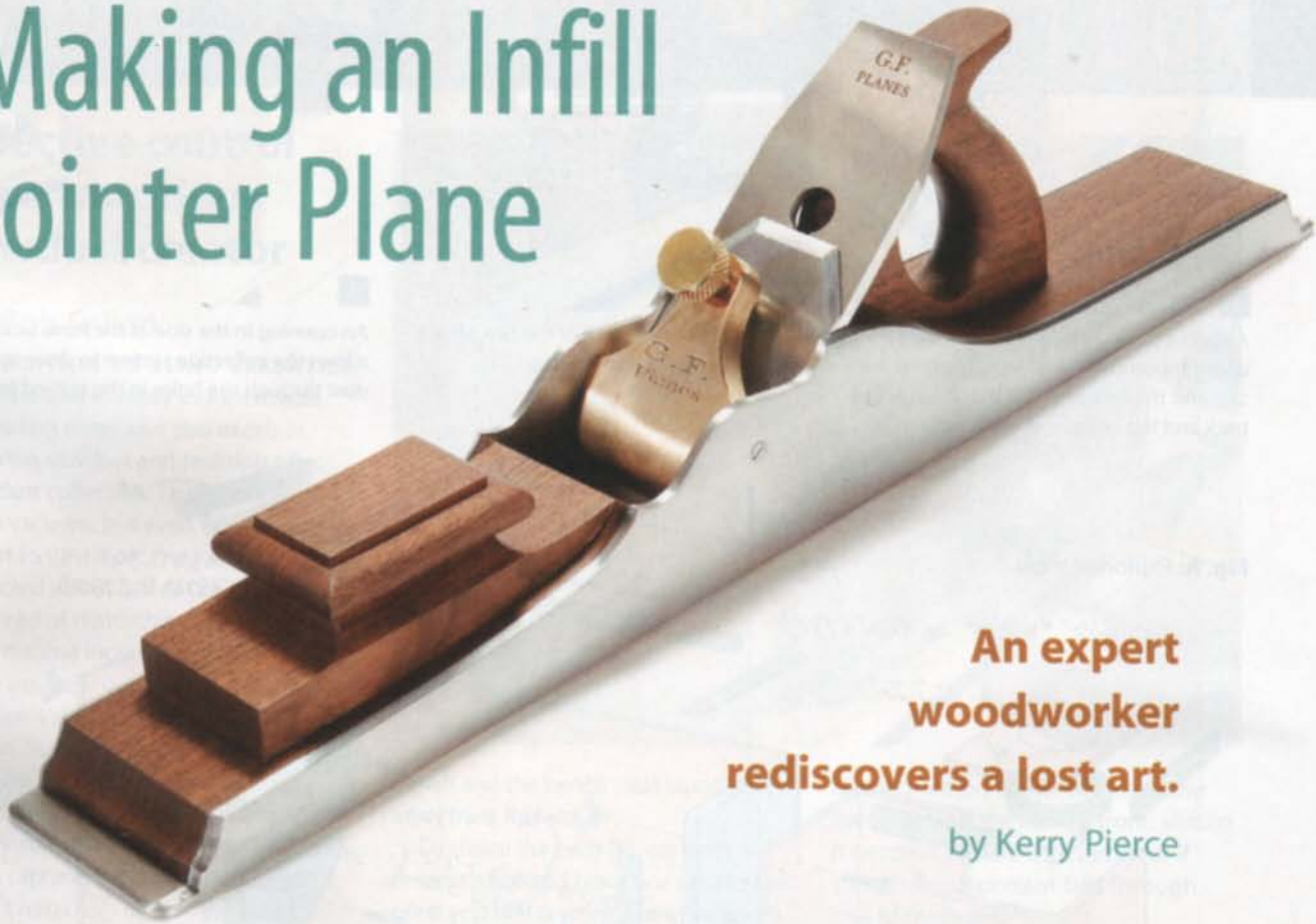
Cutting List

Overall Dimensions: 16-3/4" H x 34-7/8" L x 10-1/4" D

Part	Name	Qty	Material	TH x W x L
A	Curved front	1	Door Skin	1/8" x 20-1/2" x 28-1/4"
B	End	2	Plywood	3/4" x 9-7/8" x 15-3/8" (a)
C	Right end cover	1	Plywood	3/8" x 10" x 15-1/2"
D	Box right side	1	Plywood	3/8" x 9-5/8" x 14-1/2"(a)
E	Box back	1	Plywood	3/8" x 5-1/2" x 7"
F	Box front	1	Plywood	3/8" x 6-1/4" x 14-1/2"
G	Box left side	1	Plywood	3/8" x 9-5/8" x 14-1/2"
H	Box lid	1	Plywood	3/8" x 6-1/4" x 10"
J	Collar	1	Hardwood	1" x 7" dia. (b)
K	Trim	1	Hardwood	1/4" x 1-1/8" x 72"
L	Top	1	Plywood	1/4" x 9" x 27-1/4"
M	Riser	2	Hardwood	3/4" x 1" x 9"
N	Beam	1	Hardwood	3/4" x 3/4" x 26-3/4"

(a) Back edge is shaped to fit curved front.
(b) Trim to fit inside DC box.

Making an Infill Jointer Plane



An expert woodworker rediscovers a lost art.

by Kerry Pierce

KNOWLEDGEABLE FRIENDS tried to dissuade me when I announced that I'd decided to build a 22-1/2" long infill-style plane, as I'd never before built an infill plane of any size. An infill plane consists of wooden components (the "infill") that are precisely mated to a handmade steel shell. Infill planes from English manufacturers such as Norris and Spiers were state-of-the-art tools during the last quarter of the 19th century and are highly collectible today, prized for both exquisite craftsmanship and superior performance.

I couldn't resist the pull of working wood with a tool I'd made myself, and I reasoned that my handmade infill jointer plane would perfectly complement the vintage infill smoothing planes that I regularly use. So I took the plunge, and ordered the 22-1/2" jointer-plane kit from expert toolmaker Gerd Fritsche of Germany (**Photo 1** and Source, page 59).

Taking the plunge

I've taken lots of plunges in my forty years as a furniture maker: my first chair, my first Queen Anne highboy, my first kas. Through these experiences, I've developed a routine for making leaps into the unknown. First, I do lots of research. I began this project by acquiring and studying the instruction manual for the plane kit I'd decided to purchase. Next, I spent hours locating and poring over every online source that addressed the topic of infill plane making—the best was Peter McBride's chronicling of his recent forays into the process. I knew that making and fitting the wooden frog, tote and bun wouldn't be a problem. My concern was the metal-working, as the sole and sides of an infill plane are dovetailed together and cold forged. While trying to think my way through each of the project's metal-working processes, I sent questions—56 by actual count—to Gerd, each of which he patiently answered.

Steel dovetails

The dovetails on the shell's side pieces were laser cut, so the edges were easy to clean up with a file (**Photo 2**). The pins on the sole, however, were only approximations, so I placed each side in position on the sole, and marked the dovetail angles on the pin stock with a sharp stylus (**Photo 3**). Then, I filed the pin stock to the mark. A single morning's labor resulted in tight-fitting dovetails on both sides of the plane, dovetails remarkably like those I cut in wood.

But that's only part of the story. In wood, dovetails lock a joint in only one direction—glue is required fix the joint in the other direction. Dovetails in metal are engineered to lock the joint in both directions without glue. In fact, the whole business of dovetailing an

EDITOR: TIM JOHNSON • PHOTOGRAPHY: THIS PAGE, JASON ZENTNER; ALL OTHERS, COURTESY OF KERRY PIERCE

infill plane shell is based on the fact that cold, hard steel can be made to flow. The pins and dovetails are all cut a bit long, so they protrude when the joint is assembled. In addition, both shoulders of each dovetail are beveled, so gaps appear in the assembled joint. The protruding ends are then beaten into the bevels with a ball peen hammer, to tightly lock each dovetail in both directions. Hammering also fills any tiny gaps left between the sole and the sides.

I didn't know how to size the bevels at first, so I started small and then sent photos to Gerd. He told me to make them wider; eventually I settled on bevels that ran the full length and thickness of each side of every dovetail (**Photo 4**).

I also had to make a wooden buck to support the shell during the hammering process (**Photo 5**). The buck had to precisely fit inside the shell, to keep it rock solid. The buck was drilled to receive the steel rods that would later be used as rivets, and blocks were screwed on to support the edges of the shell sides. I also lag-bolted "L" brackets to each end, pulled down tight against the sole and torqued C-clamps around each area I intended to hammer. I repositioned these clamps each time I moved to a new pin or dovetail.

Unfortunately, these preparations weren't enough to hold everything in position when I started hammering. Almost immediately, the sole and sides began to drift apart. I was able to retard this migration by repositioning my clamps and drawing them up more tightly, but very slight drifting continued. And by the time I'd finished all the ball peen hammer work (**Photo 6**), the sole was visibly bowed along its length.

Discouraged, I shut off the lights and closed up the shop, convinced that the plane was never going to happen. But after a good night's sleep, I went back to the shop with renewed confidence.

Using a straightedge and feeler gauge, I determined that my hammering had left the sole with an end-to-end arc that bowed .030" at the midpoint. That's a significant error, one that wouldn't permit the plane to take an effective shaving. But because the sole was cut from very thick stock, I knew the shell was redeemable. All it needed was a little filing and lapping.

Whole lotta filing

When I first applied my 14" bastard file to the hammered pins and tails, I was pleased at how quickly it removed material. But as I worked down to the finished surfaces, I discovered that the stray hammer blows that had skittered

1

Here's my infill plane kit. Notice that the frog, handle (or tote) and knob (or bun) are missing. These wooden parts comprise the "infill," for which this type of plane is named.

2

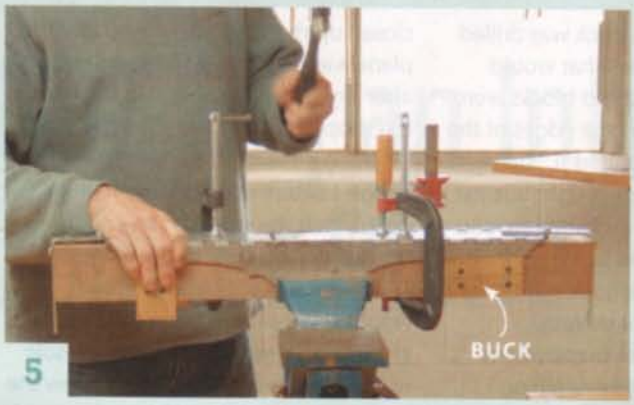
Assembling the dovetailed shell was the first order of business. The laser-cut dovetails on the side pieces cleaned up quickly with a file.

3

I used the dovetails on the sides to mark the pins on the sole, which were only rough-cut. Filing these joints to fit was pretty easy. However, unlike dovetails in wood, metal dovetails must lock the joint both vertically and horizontally.

4

Locking the joint horizontally was a tedious two-step process. First, every dovetail shoulder in both side pieces had to be beveled from the inside out, to create gaps in the assembled joint.



5

The protruding pins then had to be mashed down by hammering, to force the metal to fill the gaps in the joints. To successfully hammer the joints, the shell had to be rigidly supported on a dedicated wooden "buck."

6

These dovetail pins show the hammering process. The left pin hasn't been hammered. The middle pin has been partially hammered and has begun to fill the gaps. The right pin has completely filled the gaps and is ready for filing.

7

Filing down the hammered pins and dovetails and flattening the sole took forever. Eventually I had to put on gloves, because the file was shredding the skin on my palms and fingers.

8

Making the wooden infill parts was the easiest part of the project. I patterned the frog, tote and bun after vintage designs that I admired.

off target and dinged the sides and sole were excruciatingly difficult to clean up.

I filed and filed and filed to level the sides and sole (**Photo 7**). The actual work probably took only five or six hours, but frequent—and essential—rest periods extended the process to nearly a day and a half.

Making the infill parts

I planned to use locally harvested walnut for the infill and I'd decided to build a plane without a blade adjuster, because I wanted to include the attractive bandsawn line at the front of the tote that's typical of adjuster-less planes. That line is lost on planes with adjusters, because the front edge of the tote is mortised to house the adjuster. I finally settled on a design similar to the tote and frog on a large Spiers panel plane I that owned (**Photo 8**).

The bun started out like one on a Mathieson plane I admired, but by the time it was finished, its origins would be hard for anyone but me to recognize.

100 hours of solitude

Constructing this plane took far longer than I expected, because, except for fabricating the wooden infill parts, every process was new to me. Even drilling the six rivet holes through their bushings was a challenge that stretched out over most of a day, because I struggled to find a workable method (**Photo 9**). And it wasn't until I drilled the last hole that I felt like I knew what I was doing. Fitting the infill pieces went smoothly (**Photo 10**), but tapping the mounting holes in the lever cap was another story (**Photo 11**).

But it was the lapping process, something I thought I understood, that dragged construction past the 100 hour mark. For years, I've used a flat marble windowsill siliconed to a spruce 2x6 as my lapping table. I adhere sandpaper to the marble surface and then work the plane back and forth (**Photo 12**). I've used this set-up to lap the soles of dozens of metal planes. Typically, I use 220 grit paper, or 150 grit if the sole has pronounced high spots. In all my previous experience, an hour's work with 150 grit paper had always been enough to flatten even the worst plane sole.

Of course, I'd never had to remove a .030" arc from a sole that spanned three times the acreage of a smoothing plane's sole. For most of a day, I lapped with 150 grit paper, and all I managed was a pair of shiny patches at each end of the sole. I switched to 120 grit to start the second day. I was optimistic; I may even have whistled. But after a morning of futility, I

Using my vise to press-fit the infill bushings went smoothly. However, drilling rivet holes through the bushings took almost an entire day, and I destroyed a half dozen drill bits in the process.

Precisely fitting the infill parts was actually enjoyable, because I felt like I knew what I was doing. Here, I'm leveling the bedding surface for the plane iron.

Tapping the lever cap was no picnic. In fact, I had to send for a replacement cap, because I mangled the original one.

Lapping the sole flat took eons, mainly because it was very large and because I stoically kept using sandpaper grits that were too fine.

switched to 100 grit.

Lapping is hard work, because you have to apply constant downward pressure as you slide the plane back and forth on the abrasive to remove metal. As an amateur plane maker, I probably pushed down harder than necessary—hard enough to make the muscles in my chest and shoulders burn.

By the end of the second day, I was spending more time resting than lapping. I counted my strokes, forcing myself to continue until I'd reached 100. Then, to keep up my spirits, I'd turn the plane over and measure the incremental growth of the shiny patches. Eventually, I found a 50 grit sanding belt, cut it open, and glued it to my marble slab. Within two hours—working at an almost frenzied pace, because I could finally see signs of progress—the sole was satisfactorily flat.

The verdict

Eight weeks passed between the day I unwrapped my infill jointer plane kit and the day it created its first shaving. During that period, the plane was what I thought about each morning as I entered my shop and what I worried about each night when I went home.

I worried because I knew I was in over my head. Very little of my woodworking experience seemed relevant to the metalwork the plane required, and the sure-handed exactitude with which I executed the first few steps in the plane's construction soon gave way to hesitation. I began to make mistakes, some of which remain visible (to me, anyway) in the finished plane.

My plane isn't perfect, but it is what an infill jointer plane should be: sturdy and massive, with a tight mouth and a flat sole. And it sure takes a sweet shaving.

SOURCE

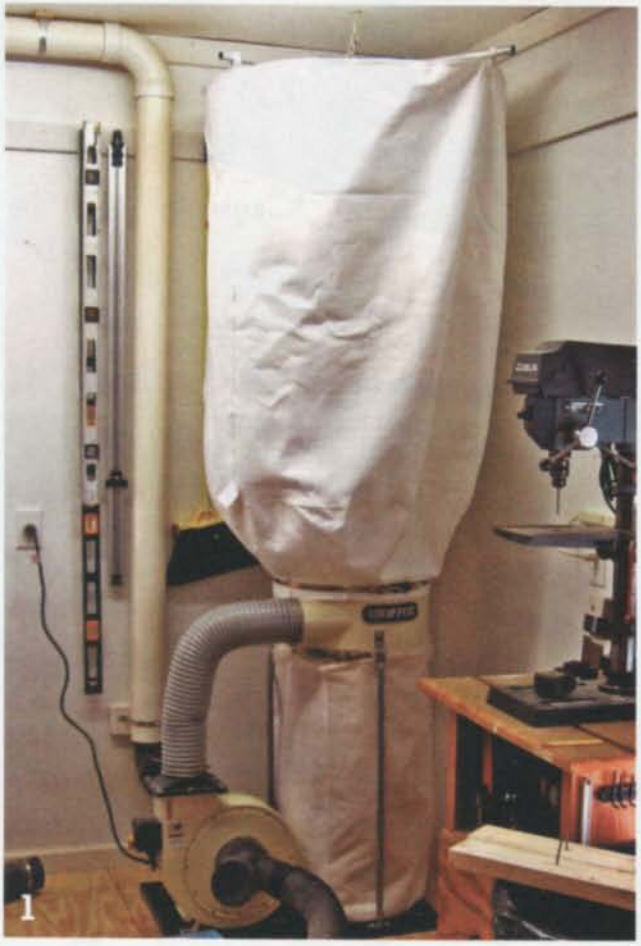
Gerd Fritsche, Traditional-Handplanes, www.traditional-handplanes.com, +49 (8388) 893, 22-1/2" Jointer-Plane Kit with steel sides and sole, 2-1/2" high-alloyed blade, and infill template, $490.

Kerry Pierce is the author of 19 woodworking books, including *Hand Planes in the Modern Shop* (Schiffer Publishing), which will be released later this summer. Kerry is also an instructor at Marc Adams School of Woodworking in Indianapolis. He lives in Lancaster Ohio with his wife Elaine.

Optimize Your Dust Collector

Improve performance by installing a larger filter bag.

by Tim Johnson



YOU MIGHT NOT NEED a more powerful dust collector after all. That's the word from woodworkers who've replaced the original equipment filter bags on their collectors with bags that are more efficient. You might ask, "What can be more efficient than the 1 micron bag that came with my collector?" The answer is a 1 micron bag that's properly sized for your machine and surface-treated for optimal performance, according to the folks at American Fabric Filter Company (AFF). They specialize in custom-made filter bags for dust collection systems.

The right size bag

A properly sized filter bag provides the correct air-to-cloth ratio, which allows most of the dust that enters to slow down and fall out of the air stream before it reaches the filter. The ratio is determined by the collector's rated air output (calculated in cubic feet per minute, or CFM) and the filter's surface area and CFM rating. Ideally, according to AFF, the bag's total CFM rating should be 50% to 100% greater than the collector's rated air output.

Many single-stage dust collector manufacturers include the bottom bag when calculating the air-to-cloth ratio. This allows using a smaller bag on the top, which minimizes the collector's overall size. However, as the bottom bag fills with debris, the machine's air-to-cloth ratio and its dust collection capability both decrease. A better solution is to use a non-breathing collection bag on the bottom and a correctly sized filter bag on top. The only drawback is that this setup usually requires more space.

Low can velocity

Here's a simple test to see if a replacement filter bag will improve your dust collector's capability: Turn it on—if the top bag inflates with a pop and is firm to the touch, a new bag could help.

A rigidly inflated bag is a sign that its filter media is clogged, or that the collector's can velocity is too high (which is probably why the filter is clogged). Can velocity is the speed at which air enters the filter. For optimal filtration, can velocity should be minimized; otherwise, the dust in the air stream gets forced into the filter, where it inhibits the airflow. Once the filter is impregnated with dust, it's difficult to clean.

A larger bag lowers the can velocity, because it has more volume, which allows the air to slow down before it contacts the filter. A filter will operate most efficiently if there's a large difference between collector's can velocity and it's inlet velocity (the air speed at the impellor). When that's the case, most of the dust will fall out of the air stream, and the dust that's left won't be densely packed against the filter's surface. In fact, because of the low can velocity, the dust will typically fall off on its own.

Like a larger filter bag, a cartridge-style pleated filter is more effective than a typical OEM filter bag, because the pleated filter's surface area is much larger. However, cartridge filters typically have higher can velocity than a large bag, according to AFF, because of their compact size (usually considered an advantage), which keeps the filter close to the air stream. The high can velocity won't allow the dust to

PHOTOGRAPHY: COURTESY OF AMERICAN FABRIC FILTER CO.

Replacement filter bags that are properly sized to match a dust collector's rated airflow are an economical upgrade. Prices start at $75 for straight tube-type bags (**1**). Efficient replacement bags can be shaped to fit the available space (**3**), and should be supported so they don't collapse when the collector is turned off (**2**). According to American Fabric Filter Company, which specializes in custom-made dust collection bags, most dust collectors come equipped with bags that are too small.

fall off the pleated filter on its own, so the filter is likely to require more frequent cleaning.

A thin dust cake

The layer of dust that forms on the inside surface of the filter is called the dust cake. A thin dust cake is important for peak performance. In addition to providing most of the fine filtration, this thin cake creates a barrier that keeps the incoming dust-laden air from impregnating the filter. Of course, if the dust cake becomes too thick, filtration suffers. That's why low can velocity is so important—it allows most of the dust cake to slough off when it gets too heavy, leaving only the thin layer, which permanently remains on the filter.

A singed surface

Polyester felt is preferred for filtering wood dust, but not all polyester felt bags are the same, because the surface of the felt can be treated to address specific types of dust. Wood dust doesn't easily stick to felt that has what's called a "singed" finish. Untreated felt, on the other hand, acts like a wood-dust magnet. AFF recommends polyester felt with a singed finish for capturing wood dust, because of its high breathability, fine-particle filtering capability and excellent dust cake build/release properties.

In a nutshell

By pairing the correct filter fabric with the proper surface treatment and the correct air-to-cloth ratio for the collector's air flow, it's possible to capture dust particles as small as 1 micron. Initially, the felt fabric does the filtering, while a very thin layer of fine dust builds on its singed surface. This thin dust cake then does the actual filtering of all subsequent dust that's blown into the bag. As the cake builds in thickness, the felt's singed surface prevents it from adhering permanently. When the cake becomes too heavy, it simply sloughs off, leaving behind a thin layer to continue the process.

Here's an easy way to improve dust cake release on any new filter: Precoat it with flour. Just use the collector to suck up 1 lb. of flour for every 10 sq. ft. of filter surface. This does the same thing as sprinkling a handful of flour before rolling out a pie crust—the flour releases the dust cake much as it releases the dough. For more dust collection tips, go to www.AmericanWoodworker.com/WebExtras.

Source

American Fabric Filter Company, www.americanfabricfilter.com, (800) 367-3591, Custom filter bags made to order. Prices vary.

For more dust collection tips, go to: www.AmericanWoodworker.com/WebExtras

Torsion Beams

by Tom Caspar

What Is A Torsion Beam?

A torsion beam is simply a narrow torsion box–a structure that's designed to resist bending and twisting, yet be light in weight. It's based on the same engineering principles as a skyscraper's I-beams or the rails of a train track. A torsion beam is composed of three sections: a top and bottom, two sides, and a series of web pieces inside.

This torsion beam is made from 1/2" MDF and 1/4" tempered hardboard. Both of these materials are fairly flexible, but when glued together, the beam is almost as stiff as if it were completely solid. This beam is 6" square and weighs 3.3 lbs. per lineal ft. A 6' beam, for example, weighs only 20 lbs.

THE NEXT TIME YOU NEED a sturdy, level work surface, I've got the perfect solution for you: sawhorses and a pair of torsion beams. Torsion beams are incredibly strong and will always be dead straight; they're easy to make and inexpensive.

But best of all for a crowded shop, torsion beams don't take up a lot of room. They're easy to store in a corner or on a rack. You can make torsion beams in various lengths and just pull out the size you need, when you need it.

Materials

Make the beams from 1/2" MDF and 1/4" tempered hardboard. Both materials are quite flexible–and that's actually an advantage. Unlike plywood, which can be warped, these materials will stay flat and straight as you build the beams.

A simple requirement is the key to success: you must be able to saw a straight line. To accurately cut large sheetstock, you should have an outfeed roller or table behind your tablesaw. It also helps to have a similar support in front of your saw.

The beams are 6" square and can be made any length you wish. They're best made in matching pairs, so you should cut enough parts to make two at a time. I've found that pairs of 4', 6' and 8' beams fit all my needs. To build this set of three pairs, you'll need two sheets of MDF and two sheets of hardboard. But even one pair, of any length, is handy to have around the shop.

Mill the parts

Begin by cutting the top and bottom pieces to length and width (see Cutting List, page 64). Cut the side pieces to final size, too.

Cut 3/16" deep grooves to receive the sides (**Photo 1**). Make them about 3/16" wide, using a standard blade. (The hardboard

PHOTOGRAPHY: JASON ZENTNER

What Are Torsion Beams Used For?

If you had a large, perfectly flat, rock-solid assembly table in your shop, you probably wouldn't need torsion beams. Got one? Well, most folks with small shops don't, either.

Placed on top of a pair of sawhorses, torsion beams are basically a knock-down, modular assembly table. Torsion beams are ideal for a small shop because you can store them in a corner or hang them on a wall and set them up whenever needed. It's best to have a few pairs in different sizes, from 4' to 8' long, so you don't have to take up any more space than your project needs.

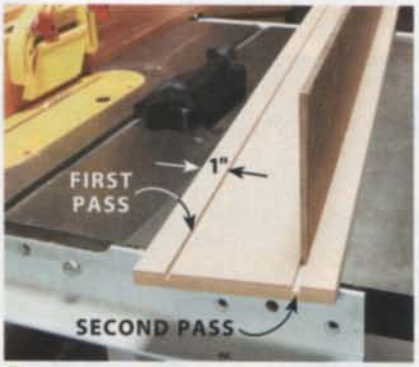
To make a terrific worktable, place a piece of plywood or a hollow-core door on top of the beams.

They're the next best thing to a giant assembly table. Maybe better!

is only nominally 1/4" thick; its actual thickness is usually closer to 3/16".) Make the first pass on each piece with the fence set 1" from the blade. Then, move the fence approximately 1/16" and cut a second set of grooves. Make a few trial cuts in scrap stock to get the correct fence setting–it's a fussy fit. When you're done, the sides should drop into the grooves with little or no resistance. Use featherboards to ensure that the grooves are parallel and have a consistent depth.

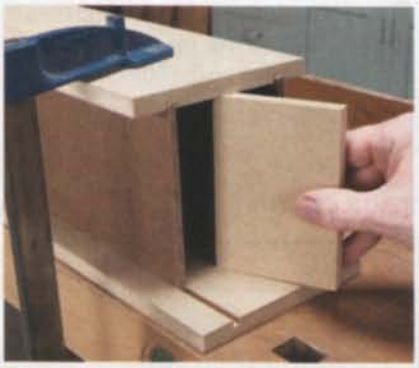
Next, cut the web pieces to width and length. Their exact dimensions are determined by the width and depth of the grooves. First, rip one or more blanks to width (**Photo 2**), then cut the web pieces to length (**Photo 3**).

To make the beams comfortable to handle, rout a 1/8" roundover on all edges of the top and bottom pieces. Check that all the sides fit into the grooves (there may be some variation in the hardboard's thickness). If one edge is too thick, sand it with 80 grit paper until the piece slides in the groove. Break all the edges of the sides with 80 grit sandpaper so they will be easier to fit



1 Cut shallow grooves in the top and bottom pieces of the beams. The sides should fit loosely in the grooves. Make two sets of parts, to build a pair of beams.

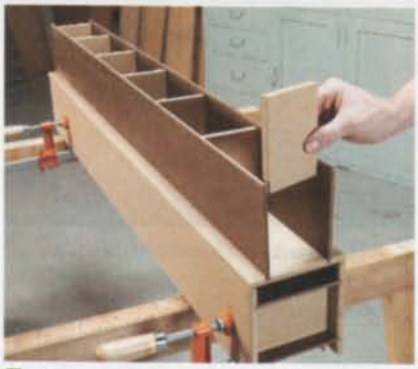
2 Rip a blank for the web pieces. Make it exactly the same width as the distance between the grooves.



3 Temporarily assemble the top, bottom and sides. Crosscut the web pieces so they exactly fit between the top and bottom.

4 Disassemble the beam and mark lines across the bottom to locate the web pieces.

5 Assemble one beam, without glue, and turn it on its side. This creates a level surface for gluing up the other beam.



7 Place the sides in the grooves. Apply glue to all four sides of each web piece and stand them in position.

6 Place the second bottom piece on the clamped-up beam. Run a thick bead of glue down both grooves.

8 Apply glue to the top piece and drop it in place. The next day, use this beam as a support for gluing up the other beam.

into the grooves when you glue the beams together.

Assembly

Mark the locations of the web pieces on the bottom piece (**Photo 4**). Space the outer web pieces 1" in from the ends. Space the remaining web pieces about 8" to 10" apart.

Create a level surface for gluing the beams. The easiest way to do this is to use one of the beams itself as a gluing platform (**Photo 5**). This is an important step. If you were to glue the beams on a bowed or twisted surface, they wouldn't come out straight.

Place the bottom on the platform and run a generous bead of glue down both grooves (**Photo 6**). Next, drop the sides into the grooves. Run a thin bead of glue around all four sides of each web piece, and stand them on their lines (**Photo 7**). Run beads of glue down the grooves in the top piece and put it in position, starting at one end (**Photo 8**). As you lower the top, the sides will automatically align with the grooves. Make sure the top is seated along its full length by sighting down it or placing a straightedge on it.

Clamp every 8" or so, or simply place weights (bricks or cinder blocks) on top of the beam.

Cutting List For two 4' torsion beams

Part	Qty.	Th x W x L
Top and bottom	4	1/2" x 6" x 48"
Side	4	1/4" x 5-3/8" x 48"
Web	14	1/2" x 3-1/2" x 5"

Place a hollow-core door on top of the beams to make a sturdy, flat table.

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Make Your Own Blast Gates

They're cheap! All you need is some PVC and plastic laminate.

by Alan Schaffter

A CENTRAL DUST COLLECTION SYSTEM is a big improvement to any shop, but the cost can really add up. With commercial gates going from $4 to over $50 each, building your own can help lower the bill. I make my own gates from a little bit of MDF, some PVC pipe or coupling, a few scraps of plastic laminate and plastic laminate adhesive. This design will work for 4", 5" or 6" blast gates (the dimensions below are for 4" gates).

Before you begin, note the diameter of the hoses or pipes that you're planning to hook up to the gate. With this design, you can make the inlets and outlets of each gate any diameter you wish, to fit your system. On most commercial gates, the inlet and outlet sides are the same diameter.

In my shop, I run 4" or 6" flex hose between each machine and the gate. That means that the PVC inlet side of the gate must fit inside a hose. I've found that flex hose with plastic reinforcing works best. (If the fit is too tight, try warming the end of the hose with a heat gun to stretch it.) The outlet side of my blast gates is a larger diameter. I use PVC pipe between the blast gate and the dust collector, so I made the outlet side from a short piece of PVC coupling, which fits around the PVC pipe.

Alan Schaffter is a retired Naval Officer and a lifelong woodworker and tinkerer. He lives in Washington, North Carolina.

Make the gate bodies

1. Cut two 6" x 6" squares of 1/2" or 3/4" MDF for the gate body halves. You can also use plywood that's flat and smooth or melamine-covered particle board.

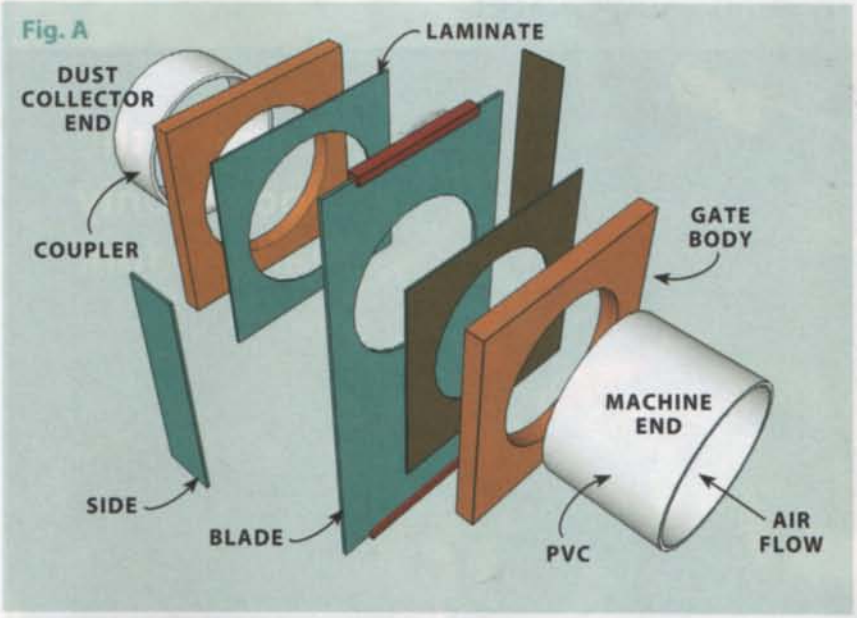
2. Drill an access hole and use a jigsaw to cut holes in the center of each gate body to fit your inlet and outlet (Fig. A). My inlet is a piece of 4" PVC pipe, which requires a 4-3/16" dia. hole. My outlet is a piece of 4" PVC coupling, which requires a 4-1/2" dia. hole. Use a spindle sander or file to achieve a good fit.

3. Apply laminate adhesive to the backs of two 6-1/4" x 6-1/4" pieces of laminate and one face of each gate body. When the adhesive is dry to the touch, apply the laminate to the gate bodies. Trim the edges with a router and flush-trim bit, but don't open the hole yet.

4. Cut the inlet and outlet pieces to length (**Photo 1**). Make a large V-shaped cradle to hold the pieces of PVC, and attach the cradle to your tablesaw's miter gauge. Raise the saw's blade so it barely cuts through the PVC's wall. Push the cradle into the blade and rotate the PVC to cut it apart.

5. Roughen the PVC, then use epoxy or polyurethane glue to secure each piece in the cutout in each gate body. Make sure the pipe pieces bottom out against the laminate.

EDITOR: TOM CASPAR • PHOTOGRAPHY AND ILLUSTRATION: ALAN SCHAFFTER



6. When the glue has hardened, drill a hole through the laminate. Use a drill bit that's about 1/4" larger in diameter than your flush-trim router bit. Use your router to enlarge the hole (**Photo 2**).

Make the blade and sides

7. Make the gate's blade by joining two 7" x 14" pieces of laminate back to back with laminate adhesive. Cut this piece to 5-15/16" x 13".

8. Use double-faced tape to temporarily attach the blade to the laminated face of the inlet gate body. Position the end of the blade 1" past the 6" square (the 1" margin leaves room for a handle). Drill a hole in the blade and use a flush-trim bit to enlarge the hole, as you did in Step 6.

9. Make the gate sides from two 1-1/2" x 6-1/2" pieces of laminate. Apply a 1/8" wide strip of tape to the middle of the back of each piece. The tape prevents adhesive from sticking to this area.

10. Soften the sharp edges of all laminate pieces with a file or sandpaper.

Assembly

11. To create clearance for the blade when you assemble the gate, put two layers of painter's tape near the edges of one face of the blade (**Photo 3**). Rub paste wax on the faces of the gate halves. Apply strips of tape down the middle of the side pieces, to prevent the pieces from adhering to the blade.

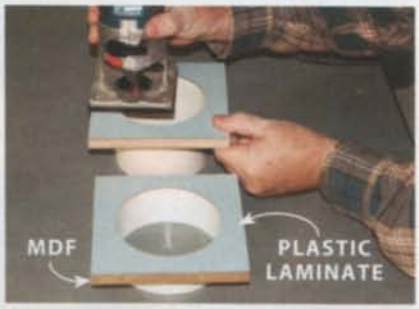
12. Carefully apply laminate adhesive to the backs of the gate sides and two edges of each gate body. Avoid getting adhesive on the faces of the gate halves. Remove the strips of tape from the gate sides before the adhesive sets up.

13. Once the laminate is dry to the touch, position the blade between the gate halves. Lightly clamp everything together and apply the side strips (**Photo 4**). Be careful: You only get one chance to position the sides. Use a roller or rubber mallet to ensure the sides make a good bond with the gate halves. Trim the sides flush with a router.

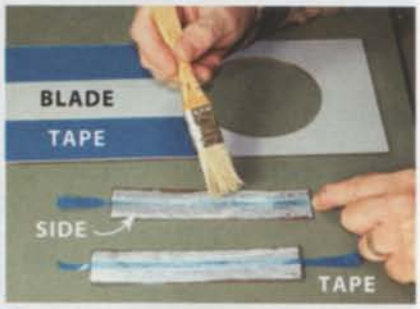
14. Remove the blade from the gate and peel off the tape. Clean and wax the blade. Screw handles to each end of the blade.

To see a VIDEO on how Alan built an automatic system for opening and closing blast gates, go to: www.AmericanWoodworker.com/WebExtras

1 Cut short lengths of PVC using the tablesaw. ***Caution:*** To prevent kickback, use a V-shaped cradle and raise the blade just enough to cut through the pipe's wall.

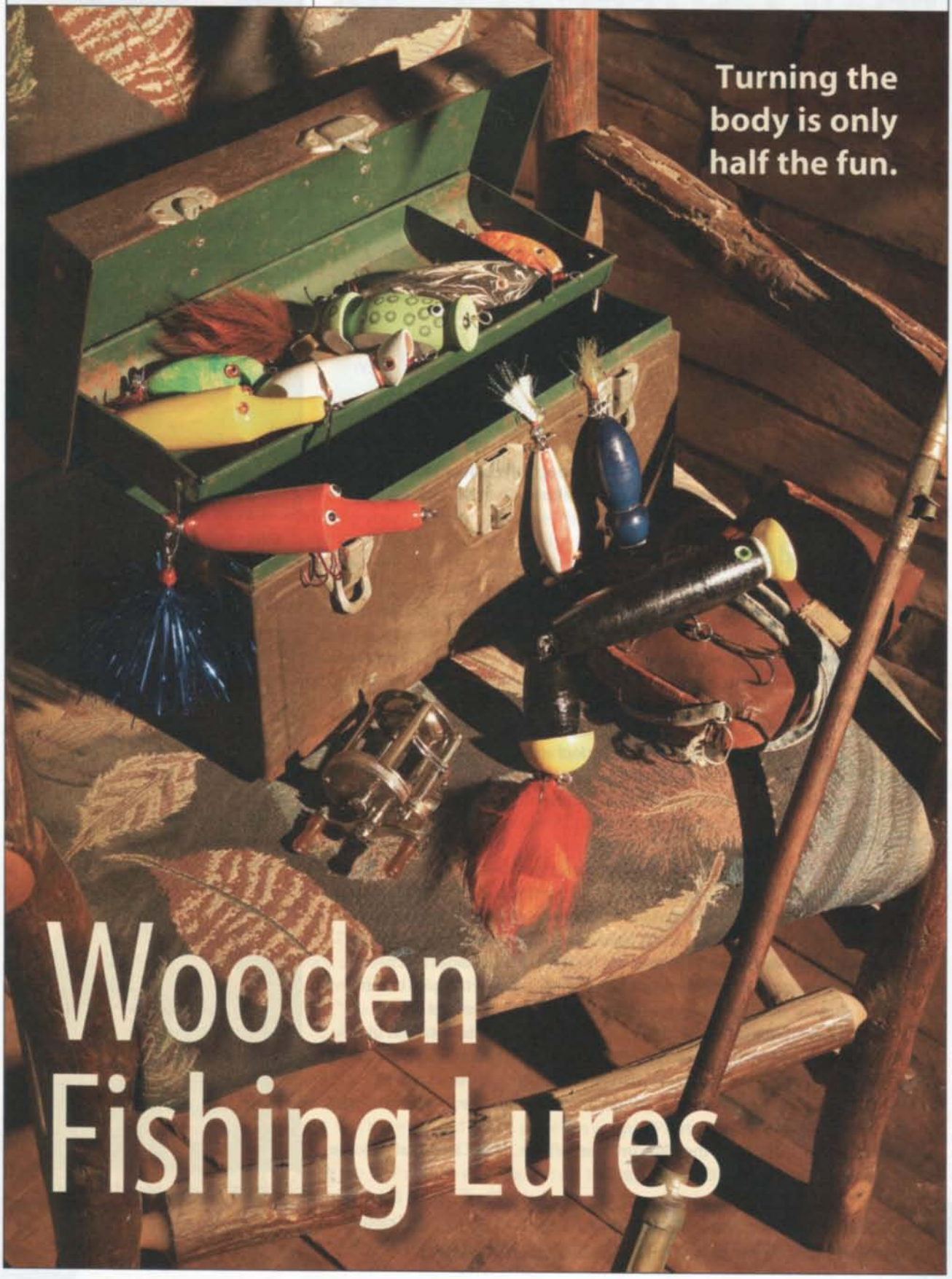


2 Glue the PVC into two pieces of MDF covered with plastic laminate. This creates each half of the gate body. Use a flush-trim bit to finish off the holes in the laminate.



3 Make the gate's blade and sides from plastic laminate. Add tape to the blade to provide clearance during assembly. Assemble the gate with glue.

4 Clamp the gate body together and add the sides. Once the sides are secure, remove the clamps and blade. Add a handle to the blade, and you're ready to go!



Turning the body is only half the fun.

Wooden Fishing Lures

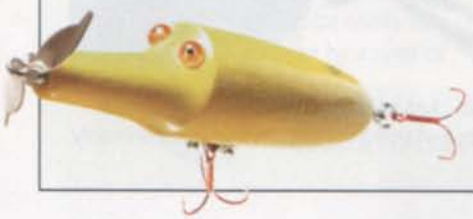
EDITOR: TIM JOHNSON • PHOTOGRAPHY: JASON ZENTNER

WHEN I PICKED UP Dudley Murphy and Rick Edmisten's *Fishing Lure Collectibles* (see Sources, page 71), my interests in fishing, antiques and wood turning met head-on: Now I'm hooked on making wooden fishing lures. I know this passion is somewhat irrational, because plastic lures are abundant and economical—and they catch fish. I make my own wooden lures because it's fun. I love recreating old patterns as much as I love to explore my own theories on catching fish. I enjoy testing unusual shapes and unique finishes. And I can report first-hand that catching a fish with a lure I've made myself is delightful. You should try it yourself.

I like to fish for bass, musky and pike, which are all known to feed at the surface, so most of the lures that I make are designed to skip across the water. These "top water" lures can be made from almost any wood that holds screws well. (There's nothing worse than having a trophy fish escape because it was able to rip out the screw that anchored the hook to the lure!) I usually work with poplar and start with 1-1/2" to 1-3/4" square blocks. My bass lures range from 2" to 5" in length, while my musky and pike lures tend to be 5" to 11" long.

Use your imagination

Usually, turning a wooden lure is basic spindle work, but the shapes you can experiment with are almost endless. Mimic a minnow or a small fish, a crawfish, a frog, a mouse, a bug, or a bird. Sometimes the turning doesn't resemble anything specific from nature.



Most lures are simply shaped, so they're easy to turn with a skew chisel or detail/spindle gouge. Cylinders and elliptical shapes like this one are typical. Sizes vary, depending on the type of fish you want to catch.

Embellish the basic shape to create variations. Adding a head and unique details, such as lips and a necklace show individuality that's not always found on factory-made lures.

Add a hollowed-out collar to create additional sound and surface disturbance. The hollow shape makes the lure chug and pop as it's pulled across the water. To hollow the collar, cut in with a skew chisel, long point down.

Create a lure with an offset snout by turning on two different centers. Turn the body with the blank centered between the ends. Then offset the blank's mounting point at the tailstock end to turn the snout.

Most lure shapes are turned between centers with basic tools (**Photos 1 and 2**). If you're adept with a skew chisel, you can complete most of the work using it alone. Use the skew or a 1/2" round-nose scraper to create a detail that gives the lure more "action" (**Photo 3**). Use a 3/8" detail/spindle gouge and turn from two different centers to create a lure with an unusual face (**Photo 4**).

Refer to old lure shapes you find appealing, or use your imagination to dream up your own shapes (**Photo 5**). Whatever the shape, it'll take only minutes to complete, so you might as well turn several at a time (**Photo 6**).

To eliminate any chance of a fish ripping out the hook, attach the hook to a length of stainless steel wire (.030"—.040") that runs all the way through the lure (**Photo 7**). Drill a 1/8" hole and glue in 1/8" aluminum tubing to house the wire. Then insert the wire and use pliers to create loops at both ends for tying on the lure and for mounting the hook. This through wire also creates a nice foundation for adding propellers, beads and other details.

What fish want

To attract fish, wooden lures are usually painted, and they almost always have eyes—as far as I can tell, fish just don't appreciate plain wood.

Historically, lures were brush-painted, dipped, marbled or sprayed. Red was often used as the primary color, or for details, in the belief that predator fish would view it as blood, a sign of injury. Examples decorated with real frog skin have also been documented. All of these options are open to the contemporary lure maker (except, perhaps, the frog skin option).

5

Create your own designs. I call this one the "Leapin' Lacer." The turning is just a squat-shaped ellipse with hollowed collars at both ends. But to a largemouth bass, the completed lure will look like a tasty frog (Photo 10).

6

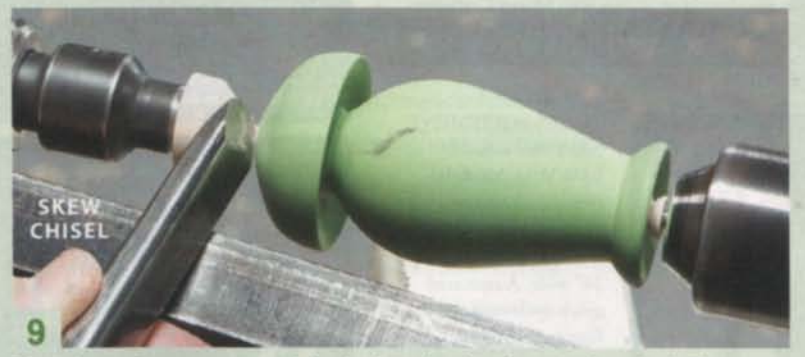
Most lures take ten minutes or less to turn, so it makes sense to turn multiples, whether they're unique or all the same. Leave the waste attached for now—it makes painting much easier.

7

To strengthen any lure, drill all the way through and mount the hook on stainless steel wire. Install the lure in a scroll chuck and drill from the tailstock end, using a long bit and a Jacobs-type chuck.

8

Here's the lazy man's painting method—just hold the brush and let the lathe do all the work. Run the lathe very slowly and thin the paint so that it flows evenly onto the lure.



Turn down the waste material at both ends, after the paint has dried. Then part off. This step shortens the time it takes to produce finished surfaces on the ends.

Flattening one side on a sanding disc transforms the turned body of the "Leapin' Lacer" into a frog—especially from a largemouth's viewpoint. Adding hardware (and occasionally lead weights) ensures that the lure will orient correctly in the water.

Attach eyes, hooks, weights and other hardware to complete each lure. Outsmarting fish isn't always easy, so use both your experience and imagination. And don't hesitate to change hardware that doesn't seem to work.

I usually use a variation of the brush-painting method to apply paint while the lure is still on the lathe (**Photos 8 and 9**). Epoxy paints are the most durable, but they take a long time to dry, which makes applying multiple colors a lengthy process. I often use acrylic paints for the color coats, followed several days later by a coat of clear epoxy paint, for durability.

Another option is to carve or sand the turned body, before or after painting, to make the lure attract more piscean attention as it moves across the water. Carving the head end of a lure will make it wobble or dive, much like hollowing on the lathe. A bit of sanding can dramatically change a turned lure's appearance (**Photo 10**). Viewing historical examples is a great way to get ideas for additional shaping (see Sources).

Eyes really do make a difference—just ask anyone who casts a lure. Eyes can be painted on or dotted, or they can be small tacks or nails that are driven in and then painted. You can also buy eyes made of glass or plastic, adhesive backed or with stems for gluing into a hole—or even doll eyes with loose pupils, for that "come hither" look that may help you hook the big one.

Please the consumer

An almost endless array of options exists for mounting hooks and adding the final touches that make a piece of wood irresistible to fish (**Photo 11**). You can buy hardware (see Sources), strip it from an old lure, or make it yourself from metal or plastic. You can keep it simple or go for broke by installing hooks wrapped with fur or feathers, eyelets, diving lips, spinners, propellers, fins, collars, glass and metal beads, wire, spacers, cup washers, weights and split rings. The bottom line during the entire lure-making process is to think like a hungry fish, because ultimately, hungry fish will be your greatest critics.

SOURCES

Dudley Murphy and Rick Edmisten, *Fishing Lure Collectibles: An Identification and Value Guide to the Most Collectible Antique Fishing Lures Vol. I (2nd Ed)*, Collector Books, 2001.
Barlow's Tackle Express, www.barlowstackle.com, (972) 231-5982; Jann's Netcraft, www.jannsnetcraft.com, (800) 346-6590; Moore's Lures, www.mooreslures.com, (715) 356-6834.

Alan Lacer is a woodturner, writer, instructor, and avid fisherman who lives near River Falls Wisconsin. To see more of Alan's work, visit: www.alanlacer.com.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Oops! Crazy Mistakes Woodworkers Make

Homesteader

WHILE I WAS VISITING my brother in Florida, he showed me his latest toy, a Wood-Mizer portable sawmill. A huge hickory log was mounted on the cutting platform. Sawdust puffed as the blade effortlessly sliced a 3" thick section from the top of the log. "That was the 'clean cut,'" he said. "The next cut will be the first lumber-maker." He pushed the blade back into the log, and in only five minutes, we were stacking a beautiful 10' long board.

My brother was pulling the saw back to make another pass through the log when, only inches from his hand, a small red, yellow and black striped snake wriggled out of an old woodpecker hole. "Yikes! That's a coral snake!" I thought, remembering the old cautionary rhyme "red on yellow, kill a fellow."

Fortunately, my brother wasn't fazed. "Give me that shovel," he said. "I forgot—I usually probe holes like this one with a wire before I cut." I expected him to bash the snake, as we would have done as kids, but instead, he deftly scooped it up and tossed it back into the woods. "Coral snakes eat mice and other vermin," he explained calmly, even as I was taking deep, cleansing breaths and trying to swallow.

D. Thompson

Miter Miscue

I DECIDED TO USE MDF to build an air scrubber for my shop. That MDF holds a nice, sharp edge was an important consideration, because I planned to miter all of the joints. I started by cutting 45° miters on the piece for the right side of the box. Unfortunately, the piece slipped as I picked it up, and its sharp mitered edge cut the palm of my right hand. I cleaned and bandaged the cut and called it quits for the day. The next day I went back to the shop and mitered the piece for the left side. You guessed it. This piece slipped, too, and I now have matching scars, one on the palm of each hand.

Bill Halsey

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EDITOR: TIM "OOPS!" JOHNSON • ILLUSTRATION: STEVE BJORKMAN

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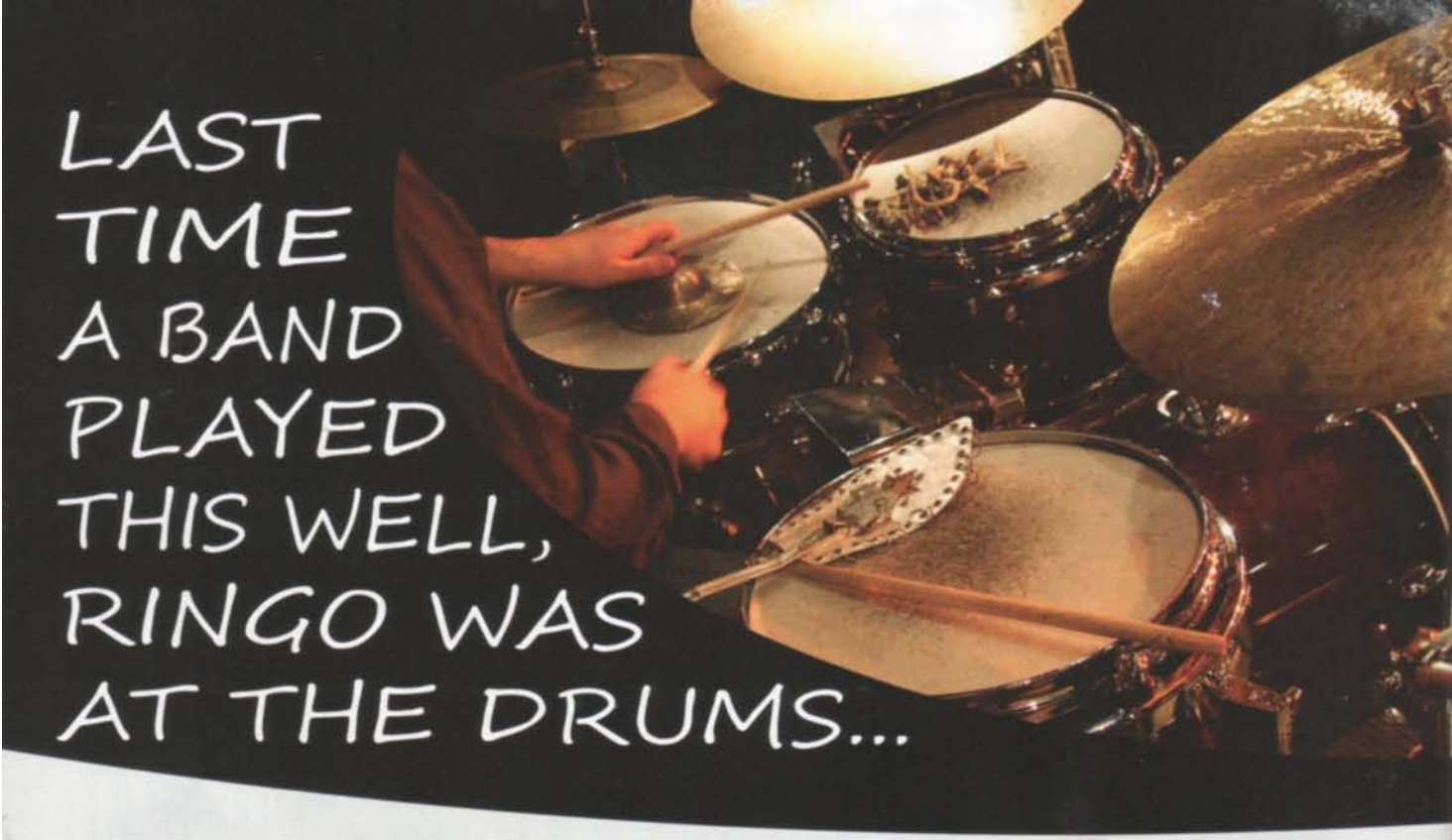

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