

WOOD NEWS

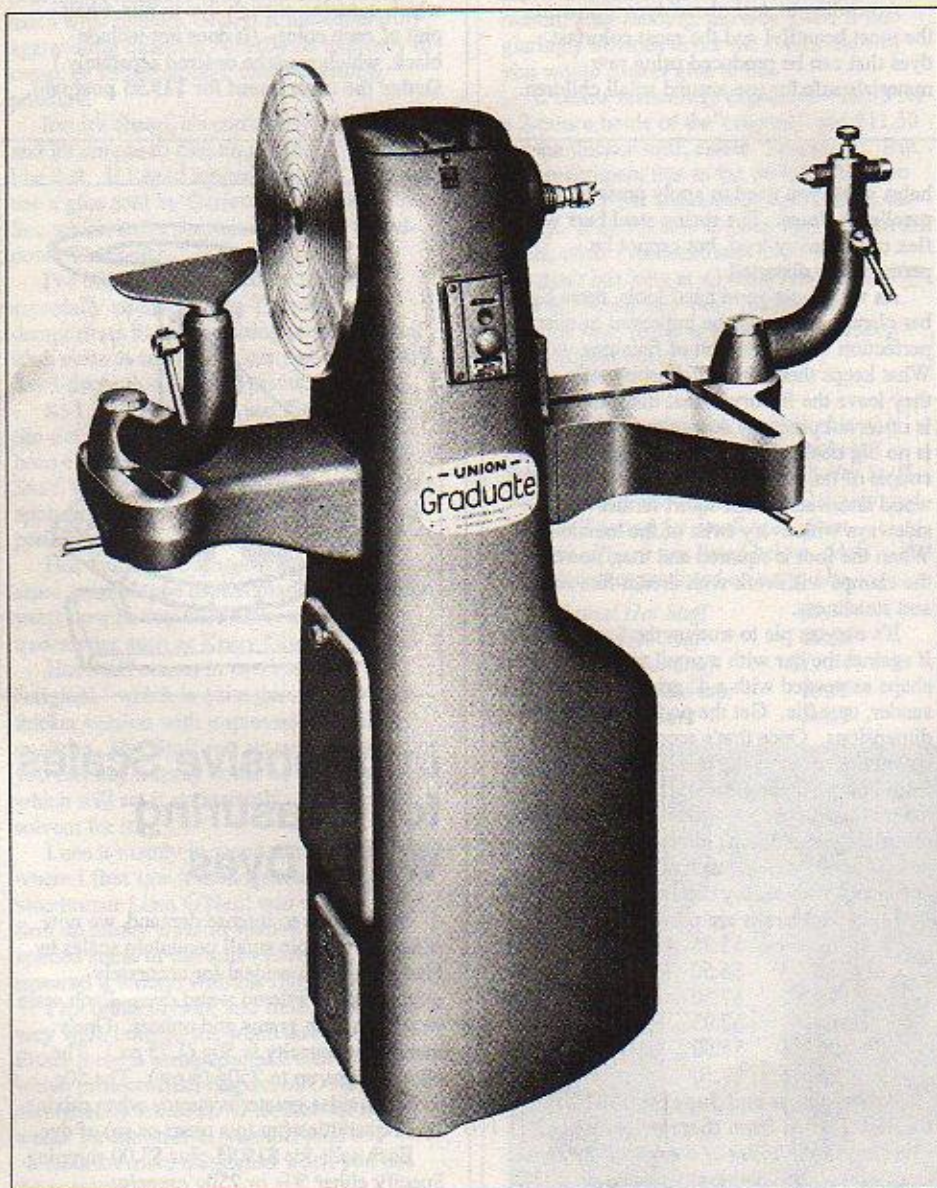
Published by Highland Hardware, Inc.

Serving Woodworkers

Number 19, Spring 1987

Now Available from Highland Hardware

Harrison Graduate Bowl Turning Lathe



SERIOUS BOWL TURNERS will be glad to find that Highland Hardware has added to its line of quality tools England's finest machine for faceplate work, the Harrison Graduate shortbed lathe.

Repeatedly recommended to us by visiting woodturning experts, the Graduate is the number one choice for turning large-diameter bowls. It features a maximum swing between centers of 14", and an outboard swing of up to 19-1/2" diameter. Its tremendous weight (375 lbs. not including motor) provides enormous stability useful in controlling heavy oversize bowl stock.

The shortbed model can also accommodate spindle turning up to 15-3/4" in length. The shortbed is a rigid iron casting, with a precision machined slot to locate the tailstock in any position along the bed. The versatile tool rest arm allows maximum freedom in positioning the toolrest.

For those interested in serious spindle turning on the Graduate lathe, heavy cast-iron beds are available optionally in lengths of 30", 42", or 54". Removing two bolts allows the bowl turning base to be removed and one of the longer beds installed.

This quiet, vibration-free lathe is a joy to use. It is currently available as pictured (not including motor) for \$2295 FOB Atlanta. We invite you to visit our store for a demonstration.

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Wood News is published 2-3 times a year. Subscription is free to Highland Hardware mail order customers, or begin a subscription by sending \$1.00 for a catalog.

Wood News solicits manuscripts contributed by our readers. We pay \$50.00 (in tools) per newsletter page for material selected for use in Wood News. Enclose black and white or color photos. Submit material to Editor, c/o Highland Hardware. Deadline for next issue is June 30, 1987.



New Arti Dyes Especially for Toymakers

WE ARE PLEASED to announce the introduction of more new colorful wood dyes manufactured by Arti in West Germany. These particular dyes are made especially for use on wooden toys, even those used by very young children and infants.

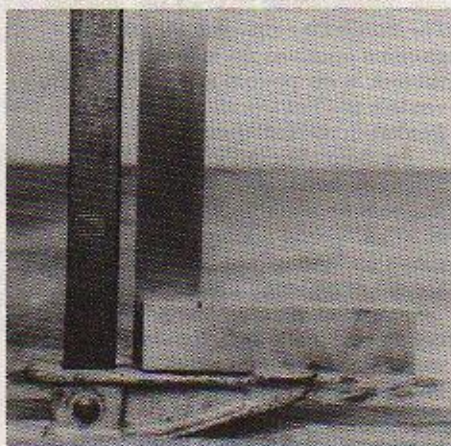
The wood dyes in this collection are made essentially from the same dyestuffs used in food coloring. The choice of dyestuffs is determined by the strict guidelines of the Dyestuff Commission of the German Research Institute, a West German government organization.

According to Arti, these dyes represent the most beautiful and the most colorfast dyes that can be produced using raw materials safe for use around small children.

Except for black, the dyes come in powdered form, and mix with hot water in much the same way as our Arti aniline dyes. (The black dye comes in ready-mixed liquid form.) Since the dyes are water soluble, it is still necessary for a (non-toxic) protective finish to be applied to the toys after the Arti toy dye has thoroughly dried. For this purpose, we recommend Behler's Salad Bowl Finish, which is completely non-toxic when dry and thoroughly compatible with the toy dyes. The salad bowl finish is available from us for \$6.95 per pint or \$9.95 per quart, plus shipping.

Available toy dye colors include bright red, dark red, orange, yellow, green, blue, brown, and black. Cost of the powders is \$12.95 per 100 grams, which mixes two to three quarts (actually ten quarts in the case of yellow and orange). A 1000 gram container of a single color costs \$89.95. The ready-mixed black dye costs \$6.95 per half pint or \$21.95 per liter.

The seven powdered toy dyes are also available from us as an assortment kit, which contains enough dye to mix a half pint of each color. (It does not include black, which must be ordered separately.) Order the assortment for \$19.95 postpaid.



Hot Flash

If you haven't already discovered them, let us tell you: Jorgensen's light steel bar clamps are the hottest thing since Lycra tights. They're quick, simple, inexpensive, and strong enough for all but the nastiest crush-to-fit joinery. The 6" and 12" sizes cost less than 4" and 6" C-clamps, and are so remarkably convenient that you haven't really lived until you've got a dozen of them on the shelf. The longer lengths offer the same 2-1/2" deep reach and light weight for all your modest to medium clamping needs.

A spring-loaded clutch allows the clamp to be set instantly to any desired opening, and furthermore makes it possible to set and tighten the clamp one-handed, a fabulous convenience. A swivel pad on the screw

helps when you need to apply pressure to un-parallel surfaces. The spring-steel bars will flex under heavy load, but cannot be permanently distorted.

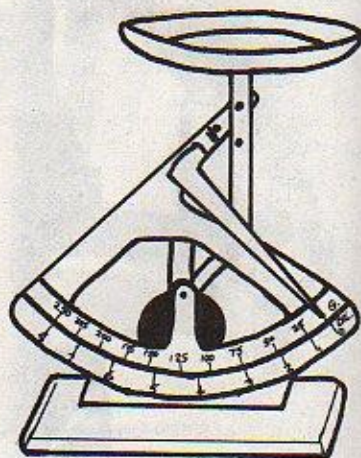
As with most good hand tools, these light bar clamps can easily be improved to near perfection with a little bit of finishing work. What keeps them from that happy state as they leave the factory is that the foot casting is often not precisely square to the bar. This is no big deal until you put the squeeze on a couple of un-dowelled bits of glue-smear wood and watch them squirt farther sideways with every twist of the handle. When the foot is squared and true, however, the clamps will work with dream-like ease and steadiness.

It's easy as pie to true up the foot. Check it against the bar with a small square, and re-shape as needed with a 4" grinder, a disc sander, or a file. Get the pad square in both dimensions. Once that's accomplished, soften the edges of the pad lightly to keep it from biting you or your work. Now try out the perfected clamp — you'll find it works effortlessly and doesn't move the stock around at all; you've just made yourself a better tool than money can buy.

Light bar clamps are priced as follows:

6"	\$5.95
12"	\$6.50
18"	\$7.50
24"	\$7.95
30"	\$8.50
36"	\$9.50

Between now and June 30, 1987
DEDUCT 10% from these prices when
ordering in multiples of 6 each of the same
size. Add shipping charge as listed on p. 31.



Inexpensive Scales for Measuring Wood Dyes

In response to intense demand, we now offer two reliable small pendulum scales by Hamilton that are ideal for accurately mixing our powdered wood dyes. Each scale weighs in both grams and ounces. One's maximum capacity is 50g (1.75 oz.). The other weighs up to 250g (8 oz.). The 50g scale provides greater accuracy when mixing small quantities (up to a quart or so) of dye.

Each sells for \$19.95 plus \$3.00 shipping. Specify either 50g or 250g capacity.

Hot Stuff

It's good stuff

By Jack Warner

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GLUE is obviously critical to the success of any woodworking project, but as long as it works I tend not to think much about it.

For most furniture projects I - like most other woodworkers - use yellow glue, generally Franklin's Titebond. It works, and that's what matters, even if it has some truly aggravating qualities - chiefly its tendency to creep, or slither around, under clamping pressure.

But it's cheap, it's commonly available and it's simple to use; no mixing or anything like that. If I need longer clamping time, I use a glue sold by Garrett Wade called Slo-Set, which looks suspiciously like watered-down Titebond.

I've often been tempted by hide glue, especially after watching Tage Frid demonstrate its quick-setting properties, but it's a mess to use and unless you use it every day I doubt that it's very practical.

So I will continue to use Titebond and Slo-Set for common applications. But I've been experimenting with a glue called Hot Stuff, which is intended for more specialized applications, and it has been an outstanding performer.

Hot Stuff is a cyanoacrylate glue, the same general type as that marketed for some years now in tiny little tubes under trademarks such as Krazy Glue.

Hot Stuff comes in two varieties, the "original," which is quite thin, and a much thicker version with improved gap-filling qualities. Hot Stuff sets up very quickly, but you can buy a spray bottle of accelerator which will set it up instantly. There is also a solvent for it.

I use it mainly in wood turning, which is where I first saw it demonstrated. The Irish woodturner Liam O'Neill was using it to firm up punky areas in spalted wood. He applied some of the thin variety and smeared it around with his finger.

I tried this myself, and found it worked very well, both on the wood and my finger. Either there is some special Celtic magic which protects Irish fingers, or O'Neill's are permanently armored. It took about two weeks for the stuff to wear off mine.

It's a lot more dangerous when you use the accelerator.

One of the most common uses I've found for Hot Stuff is in healing natural cracks. I squeeze some of the thin stuff down the length of the crack, then spray it with accelerator and quickly force the sides of the crack together. You can actually see the stuff set; it foams a little, and the shiny look of it suddenly dulls.

Once, in the heat of the moment, I got one finger a tad too close to the critical zone and discovered I had glued it to the bowl. You read about that sort of thing, of course, but you don't really believe it until it happens. I took the bowl off the lathe, one-handed, and stood there stupidly with it dangling from my finger like some silly magic trick.

That didn't last long, of course; the bowl was thin and soon only a piece of it was glued to my finger. Even using the solvent, it was a difficult and painful process removing it.

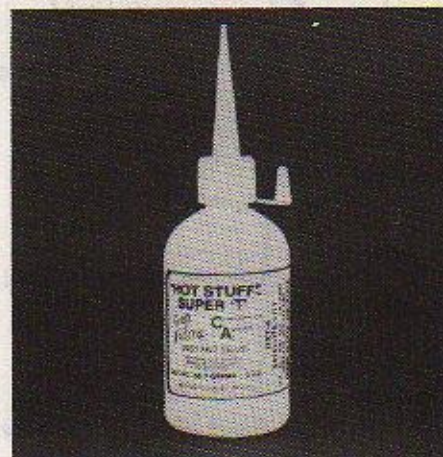
Hot Stuff is also excellent for securing bark to natural-lip bowls, and for gluing wood to metal or glass. For whatever reason, after sanding, the area glued is not glaringly obvious under the finish, the way you would expect glue to be.

It seems fearsomely expensive - \$9.95 for a 2-ounce bottle of the "original," and \$11.50 for the thicker stuff, called "Special T". But if you compare that to the three bucks or so you pay for the tiny tube of Krazy Glue, it's cheap. It also seems to keep very well on the shelf; other cyanoacrylates I've tried wouldn't last long at all once they were opened unless they were refrigerated.

Hot Stuff really is good stuff, but keep your fingers out of it.

Hot Stuff is available from Highland Hardware. In addition to Original and Special T, there is also "Super T" Hot Stuff, with viscosity midway between Original and Special T (good for small to medium cracks). Prices are listed below. (Add shipping charges listed on page 31):

Original Hot Stuff	\$9.95
Super T Hot Stuff	\$9.95
Special T Hot Stuff	\$11.50
Hot Stuff Accelerator	\$3.95
Hot Stuff Solvent	\$4.95



The Highland Jig

For grinding chisels and plane irons

FOR MANY YEARS, we have offered and sold large quantities of this simple but well-made and highly effective jig for properly addressing either chisels or plane irons to grinding wheels or blade sharpeners.

Distressed to learn that its maker had passed away last year and its production thus ended, Highland Hardware purchased the entire manufacturing operation from the maker's heir, and relocated it from Quaker Hill, Connecticut to Toccoa, Georgia. Production has now resumed, and we are pleased to make it available once again.

Known alternately in the past as the Rima jig, or accessory jig, it has now been dubbed "The Highland Jig", and we are confident that it will dance into your heart as one of the most useful (and affordable) things you can add to your sharpening arsenal. It is designed to hold any chisel or plane iron up to 2-5/8" in width (including chisels of tapering thickness, such as mortise chisels), and will function with virtually any grinder tool rest imaginable. It serves as a particularly valuable enhancement to the Makita 9820-2 blade sharpener (pictured above), which otherwise does not come equipped to sharpen either chisels or plane irons.

Integral guide lines permit the item to be sharpened to be accurately aligned within the jig before tightening the locking nuts. The amount of overhang of the blade from the jig determines the bevel angle which will be produced.

The Highland Jig is available from Highland Hardware for only \$10.00 plus \$3.00 shipping. Complete operating instructions are included.

Bowl Turning with the Superflute

The Advantages of High Speed Steel Turning Tools

By Roy Child

EVERY NEWCOMER to bowl turning encounters the difficult problem of removing rough grain patches which insist on appearing at certain points on the surface of the bowl. The patches seem impossible to remove no matter how sharp the tool or how fine the cut.

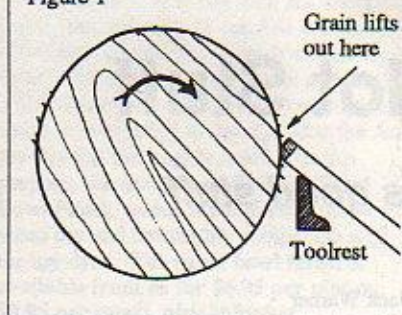
These rough patches occur typically at two places on the outside of the bowl and two on the inside. At these points, the fibers of the wood stick out, so that the edge of the tool lifts out the grain and separates the fibers causing "sore patches". The damage can go very deep into the surface depending on the tool used. A heavy cut with a partially blunt scraper can inflict serious damage, causing fibers to separate to a depth of 1/4". Typically, the rough grain can be lightly sanded smooth and may look satisfactory until a finish is applied. Unfortunately, the areas of disturbed wood fibers remain more absorbent than the

surrounding material, and when finished, go a shade darker and look very ugly. So what is to be done?

Many beginners resort to scraping or sanding, but this is very tedious since so much material has to be removed to get down to the undisturbed fibers. Likewise, heavy sanding requires a large expenditure for sandpaper, and the heat generated by friction can cause fine cracks, or even warp the bowl out of shape. Perhaps more importantly, the crisp appearance of the cut surface and edges is lost, leaving the shape lifeless with irregularly rounded edges so characteristic of the novice bowl turner.

The problem could be solved using a cabinet scraper, but this also is very time consuming. A sharp scraper can be used to cut cleanly against the grain, but only if it is used to take very thin shavings. To expect it to remove the required 1/8" or more of damaged wood is asking too much. Sharp scrapers very quickly become blunt scrapers, and many sharpenings are required before a bowl's surface becomes perfect. Also, the scraper has to "catch" only once and the surface is suddenly back to square one. Any attempt to take a heavy cut with a scraper will damage the surface more than the gouge did. Even a good sharp gouge taking a fine cut with the bevel rubbing can produce a rough finish. See Figure 2, which shows the overhead view with the gouge being held at right angles to the lathe spindle in similar fashion to the method of using a spindle gouge between centers. The side view, Figure 1, shows that the bevel is rubbing as it should. However, in bowl turning, using the gouge this way is incorrect, and will result in the gouge tending to leap sideways out of control. Also, a gouge used at this angle forces the edge of the tool directly into the wood, lifting wood fibers at the points on the surface where the tool is cutting "against the grain".

Figure 1



The solution lies in proper use of the gouge. Most text books I have read do not explain the method very clearly, so I will concentrate on describing the process in detail here.

Imagine a razor sharp knife used with a sawing action to take thin peelings off the stationary surface of a bowl. If carefully done, the slicing action of the blade will cut cleanly through the wood fibers, leaving an undisturbed surface even when used against the grain. If the knife blade were to be forced directly through the wood without a sawing action, it would lift up the wood fibers at points where it travels against the grain, and the resulting finish would be the same as that produced by the turning tool in Figure 2. Hence, the slicing or sawing motion is essential for achieving a good finish when the cut is against the grain. It helps the edge to cut cleanly. It only remains to find a method which simulates this sideways motion (slicing) of the blade while the bowl is rotating at speed.

In Figures 3 and 4, the gouge is being fed along the surface removing a shaving with the bevel rubbing to guide the tool. Note the the cutting edge in contact with the wood is almost vertical. The part of the bevel which is rubbing is at the side of the U shape, not

Figure 2 (Viewed from Overhead)

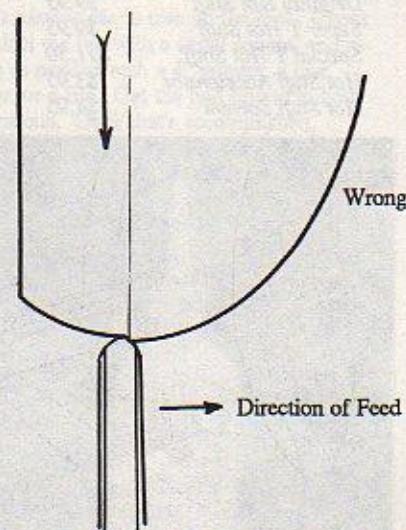
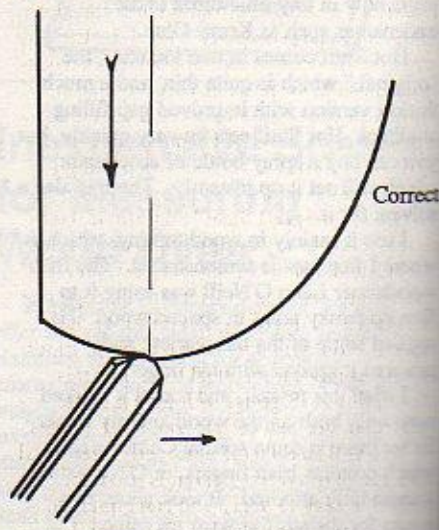


Figure 3



Gouge Cutting from Left to Right. Bowl is on Outboard Spindle.

the underneath. As the wood surface is moving downwards, the part of the edge which is cutting is slicing sideways through the wood at high speed as well as being slowly pushed into it. Here we have the slicing action required to give a perfect finish. If you go and try it, you will see that it really works!

The gouge must be properly sharpened with a straight or hollow-ground bevel to give plenty of support. I use an edge angle of about 40 degrees. The rest is placed as close as possible to the bowl to give maximum leverage and control. The slicing action is obtained with the gouge pointing slightly upwards so that the part of the edge in contact is at the proper angle (Figure 4). The bevel is made to rub as shown in the corresponding plan view (Figure 3) by moving the handle round sideways while the height of the handle is kept constant. The purpose of rubbing the bevel is to guide the cutting edge and to regulate the depth of cut. The bevel is made to bear on and to slide along the cut surface that the edge produces as the gouge is moved along. When the gouge is pushed, it moves along the rest in a direction more or less parallel to the bevel, removing wood as it goes. It is as if the bevel points in the direction the gouge will move when pushed. The handle must be swung round sideways away from the wood to increase the depth of cut or swung towards the wood, levering the edge away to decrease the depth of cut. The height of the handle is kept constant. As with all gouge work, the angle and not the pressure must be continuously regulated if the gouge is to take a cut of constant depth all the way round the curve of a bowl. During this cut round the bowl, the end of the handle is kept at the same height. This keeps the cutting portion of the edge at the same angle to the vertical. Raising the handle would bring the cutting portion of the edge closer to vertical, thus increasing the slicing effect.

This slicing must not be overdone or the turning tool's edge will be dulled very quickly. The effect of friction and abrasion on the tool's edge when it is used to slice is severe, and becomes extreme when the edge is too close to vertical. A compromise is required if the edge is to survive even one trip around the bowl. I keep the edge about 20 degrees from the vertical when using a carbon steel gouge.

The High Speed Steel "Superflute" bowl gouge, made to my design by Henry Taylor of Sheffield, has a big advantage in that it is much more resistant to friction. Its edge can be brought 10 degrees or so closer to the vertical and it will stay sharp 20 or 30 times as long as any carbon steel tool. For this reason, this HSS gouge will give a better finish than the best carbon tool steel gouges.

You will find that if a properly sharpened HSS gouge of correct design is used, the method is easy to apply and can eliminate the rough patches entirely. The bowl then needs only light scraping and sanding before polishing.

Of course, good results can also be obtained using ordinary carbon steel gouges, provided certain precautions are taken. In particular, there is the risk with carbon steel that friction in cutting will overheat the cutting edge and draw the temper, making the edge soft and useless. (HSS is immune to this because it will stand high temperatures without losing its temper.)

When a carbon steel gouge is used, the lathe speed must not be too high and the bevel must not be rubbed hard, or the friction will be excessive. It is only necessary

"A gouge is much easier to control at higher speed. Again, a HSS gouge has a big advantage here because it can be used at very high speed without fear of dulling the edge."

to rub the bevel lightly to keep the tool from jumping out of its groove. The proper amount of pressure can only be learned with practice. In addition, more skill is required when using carbon tools because it is necessary to roll a carbon tool as it cuts. Many turners do this without knowing why. It involves slowly rotating the tool about its axis while maintaining all the other angles, as previously described. It sounds difficult, but can be learned with practice. The effect is to change continuously the portion of the gouge which is cutting, thus avoiding concentrating the heat and wear on one part of the edge for too long. Rolling the gouge helps to prevent burnt spots on the tool edge and makes the most of the steel available. Care must be taken not to dig the corner of

the gouge into the wood, or the tool may flip over and cause a dig-in. When rolling the gouge, one can even go so far as to turn the tool upside down and still be cutting correctly. Every part of the edge can be used before stopping to resharpen the edge.

The speed of the lathe must be a compromise. It must not be so high as to burn the tool or wear its edge away before it has time to complete the cut. A very low speed makes the edge last much longer, but cutting becomes tedious, especially on the finishing cuts. A low speed makes it easier for the gouge to ride up on the hard spots on the wood and to sink into the soft spots. This causes vibration, which gets worse as the gouge moves along unless the turner uses his "feel" to anticipate the behavior of the gouge and correct its movements before it gets out of control. A gouge is much easier to control at higher speed. Again, a HSS gouge has a big advantage here because it can be used at very high speed without fear of dulling the edge.

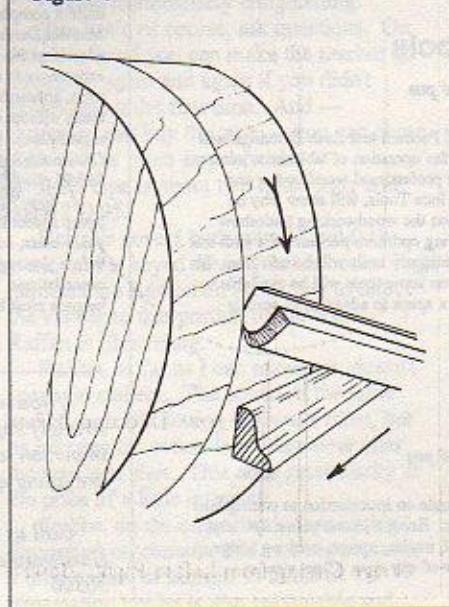
The principles and methods described apply to the inside of the bowl as well as to the outside, although rolling the gouge inside the bowl is possible only to a limited extent. However, complications arise when trying to obtain a good finish inside a bowl, and the shape and design of the gouge itself becomes important. Controversy exists over the correct type of gouge to use for bowl turning. Some turners favor a shallow-fluted pointed-nose gouge. Others favor a deep-fluted gouge ground straight across. I have done many cutting tests over the years trying the different shapes and styles of gouges in an effort to develop the ideal bowl gouge design. I have made my own tools to various designs on a small forge, and I have accumulated a very strange collection of gouges on my tool rack.

The result of all this experimentation is that I definitely favor the deep-fluted gouge with its edge ground straight across. This type of gouge makes the most of the power available from the motor and so is faster for roughing out the bowl. It is stronger and more rigid, so is easier to control and safer to use inside the bowl where it has to stick out a long way over the tool rest. It is also more convenient for making slicing cuts at the finishing stage.

If slicing with a pointed-nose gouge is attempted, it is awkward to get the cutting part of the edge to the required angle. The precise shape of the inside of the flute of the gouge becomes very important. Unfortunately, hand-forged gouges come out all different shapes, even when taken from the same batch. There are some that feel right and cut sweetly when you use them, and there are some that don't. It is a matter of luck when you buy your gouge — unless you happen to know what to look for and how to pick out a good gouge from a batch which also contains mediocre ones.

continued on page 7

Figure 4



Spring Seminars at Highland Hardware

Routers & Jigs

Saturday, March 21 9 am to 4 pm
Admission: \$25.00

Zach Etheridge will show fundamental router operation, as well as how to customize your router for precise and accurate work and accelerated production using this most versatile of woodworking tools. A special sale on router bits will be available for participants. Register early to reserve yourself a space.

Tage Frid Lecture

Friday, March 27 7:30 pm to 9:30 pm
**Location: The Habersham Room, Colony Square Hotel
14th St. at Peachtree**
Admission: \$5.00 (Free to those registered for seminar)

The most widely known and highly regarded woodworking teacher in the U.S. will share an evening of slides on woodworking and design, punctuated with his insightful commentary and penetrating wit. For those interested in broadening their design perspective or understanding woodworking in its broader context, this event will prove enlightening and satisfying.

Tage Frid Seminar

Saturday, March 28 9 am to 4 pm
Sunday, March 29 9 am to 3 pm
Location: Highland Hardware Seminar room
Admission: \$90.00

Employing his usual witty style, Tage Frid will share what he has learned during a lifetime of doing and teaching woodworking. Some of the topics covered will be wood as a material to design and work in, hand and machine joinery (including his hidden spline miter - as well as other more common joints) steam bending, veneering (including sandbag veneering), and finishing. Register early to avoid missing a chance to see and hear a truly remarkable woodworking teacher.

Using Stationary Tools

Saturday, April 4 9 am to 4 pm
Admission: FREE

During this one-day event, Brad Packard and Zach Etheridge will team up to cover techniques useful in the operation of tablesaws, jointers, planers and bandsaws. Brad, who is a professional woodworker and southeastern representative for Injecta Inca Tools, will show why he has become known as "Mr. Bandsaw" on the woodworking tradeshow circuit, as he offers insight into achieving optimum performance with this sensitive machine. Anyone owning stationary tools will benefit from this free day-long seminar. Special offers on some tools will be available to those attending this seminar. Reserve a space in advance, as seating will be limited.

Hand Tool Joinery

Saturday, April 11 9 am to 4 pm
Admission: \$25.00

Zach Etheridge will present a hands-on introduction to cutting butt joints, mortise and tenon, and dovetails. Bring a jointer plane, 1/4" and 1/2" bevel-edged chisels, mortise chisel, mallet, square, marking gauge, coping saw, and a fine-cutting backsaw of any type. Class size is limited, so register now.

Making the Shaker Dining Tray Using Traditional Dovetail Joinery

Saturday, April 25 6 pm to 10 pm
Sunday, April 26 10 am to 4 pm
Admission: \$60.00

Use of the handsome and durable hand-cut dovetail joint was an essential part of traditional Shaker craftsmanship. In this two-part workshop led by John Wilson, a college woodworking teacher from Lansing, Michigan, participants will create a Shaker dining tray with full dovetail jointed corners. After an introduction and demonstration by the instructor, students will learn to make bevel gauges for joint layouts and work with hand tools to create their own trays in yellow poplar. The finished project will measure 18" by 11" by 5" deep. The fee includes all materials, patterns, printed directions, and use of a shared pool of tools. Students wishing to use their own tools may bring chisels, mallet, dovetail saw, utility knife, and rule. Class size is limited to 15.

Fundamental Wood Finishing

Saturday, May 2 9 am to 4 pm
Admission: \$25.00

Zach Etheridge will provide a day-long demonstration of finishing techniques covering many of the most popular and practical finishes, including tung oil and Watco, oil-varnish mix, polyurethane, Deft, and brushing lacquer. Attention will also be given to wood preparation, staining and dyeing. Focus will be on using simple methods to achieve consistently outstanding results.

Building a Windsor Chair with Michael Dunbar

May 16-20 Saturday through Wednesday
Daily hours: 8:30 am - 5 pm
Admission: \$425.00

Each participant in this 5-day class will have the opportunity to build a complete sack-back Windsor chair under the guidance of Michael Dunbar, America's best-known Windsor chairmaker. The admission fee includes all necessary materials. *Prior woodworking experience is required.* Participants must bring their own hand tools, although a shared pool of tools will be available to borrow for those without certain tools (tools to be provided after registration). *For more information, call (404) 872-4466. Make a Windsor Chair with Michael Dunbar at Highland Hardware for \$13.95 plus tax begins.*

Space is limited, so you must register early. Some spaces have already been filled from the waiting list from last year's class, so please do not be disappointed if the class sells out before you register. A waiting list will be formed to allow for possible cancellations. A deposit of \$225.00 is required to register. The balance must be received by May 1.

If you would like to register for a seminar, we strongly suggest that you call us by phone or stop by in person to make a reservation, since many spots are filling quickly as a result of local advertising.

Call us at (404) 872-4466, or stop by Highland Hardware at 1045 N. Highland Ave, NE, Atlanta, GA 30306.

Bowl Turning

(continued from page 5)

Some common faults to look for in the cross-sections found in forged bowl gouges are shown in Figure 5. Another point to look for is the strength of the tang. The gouge must not flex where it fits into its handle — otherwise full advantage cannot be taken of the leverage given by the long handle. A good flute shape is like a French curve. It should have at some point on its edge a curvature which fits the job. When taking a cut inside a bowl with a good gouge, the turner should be able to find a part of the edge which cuts sweetly, leaves a perfect finish, and makes the gouge controllable without chatter or vibration or any tendency to run off course. Such ideal gouges are few and far between. An alternative is to buy a set of three or four gouges of different sizes and curvatures. The one that fits the particular job best and handles well is used. Usually the roughing out is done with a large gouge and the delicate finishing cuts are done with the smallest gouge in the set. But this can be expensive, and is unnecessary if one gouge of the correct flute shape will do all the work well and out-perform the usual set of forged gouges in every respect.

The "Superflute" gouge is the culmination of many years of experimenting to develop the ideal gouge shape, and is the first gouge to be manufactured by machining methods designed to achieve the perfect shape every time. And it has no tang — the specially developed handle has a taper fit to the blade, providing maximum strength and rigidity. Not surprisingly, it has become one of the most popular bowl gouges available today, and has earned its success with its consistently reliable performance.

Roy Child is a British designer and woodturner.

The Superflute is available from Highland Hardware for \$49.95 plus \$4.00 shipping.

We should note that since Roy Child's article was prepared, Henry Taylor has added to its line deep-fluted HSS gouges in 1/4" and 3/8" sizes as a complement to the Superflute. These are remarkably affordable, costing only \$19.95 (plus shipping) for the 1/4", and \$22.95 for the 3/8" size. They also are available from Highland Hardware.

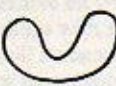
Figure 5



Straight sides. Cannot fit properly into the curve inside a bowl. Poor clearance for the escape of shavings.



Too shallow. Cannot take a full cut. Very hard to control.



Thin keel. Difficult to sharpen evenly. Cannot use the whole edge at the side of the 'U' shape.



Constant shallow curvature all round. Difficult to control. Liable to dig in. Only good for roughing out green wood.



Good shape. Choice of curvature for good control of a cut. Good for both fast roughing cuts and fine finishing cuts. Easy to control. Easy to sharpen.

As the World Turns . . .

By Jack Warner

©1987 United Press International

MY HOUSEHOLD recently crept a little further into the electronic age with the purchase of a videocassette recorder, and the best things I've watched on it thus far are not classic movies, but woodworking tapes.

These machines have a vast potential for education, and it's not being neglected.

Leading the field in woodworker's educational tapes is, not surprisingly, Taunton Press, publishers of "Fine Woodworking". Taunton has 11 tapes on the market so far, covering every aspect of the field.

Thus far I've watched just two of them, both on turning, because that's what I'm trying to learn at the moment.

One is "Turning Wood with Richard Raffan," the man who wrote the Taunton Press book of the same name. The other is "Bowl Turning with Del Stubbs," the noted young California turner.

Quibbles are few and small. There are a couple of rather rough edits in the Raffan

tape, and Stubbs has a tendency to mumble, forcing me to back up the tape in a few spots to make sure of what he said.

But production values in general are quite professional.

Videotaped instruction offers advantages that can seldom be had outside private lessons. The camera zooms directly over the instructor's shoulder and you can see quite clearly the angle of the cutting edge in relation to the wood, which of course is the critical thing for the beginning woodturner.

I found it immensely enlightening.

You can't, of course, ask questions. On the other hand you can make the teacher go through it again and again if you didn't understand it the first time. And — assuming you buy the tape — you can come back to it as often as you wish.

Each tape is about two hours long and costs \$39.95.

Raffan's covers both spindle and face work, and is keyed directly to his book. Page numbers are flashed on the screen to direct the viewer to that portion of the book Raffan is illustrating.

Raffan, as far as I can make out, doesn't speak on camera. The sound of the lathe and of the tools cutting is always there, but he narrates the action in a voice-over after the tape was shot. This adds great clarity at the price of a little intimacy.

Stubbs, on the other hand, does all his discussion on-camera. He's a little nervous, a little unsure of himself in terms of TV personality, but he is also personable and

entirely sure of himself when he's turning.

He discusses and demonstrates only faceplate work, and talks about esthetics and mechanics. There is a very interesting discussion of how he adds a shop-made clutch to a lathe so it can be stopped without turning the motor off.

Raffan's tape is formal instruction; Stubbs' is much more informal. Both proved invaluable to me. If you have a VCR and you are interested in woodturning, there is no better way you could spend \$80 than on these two tapes.

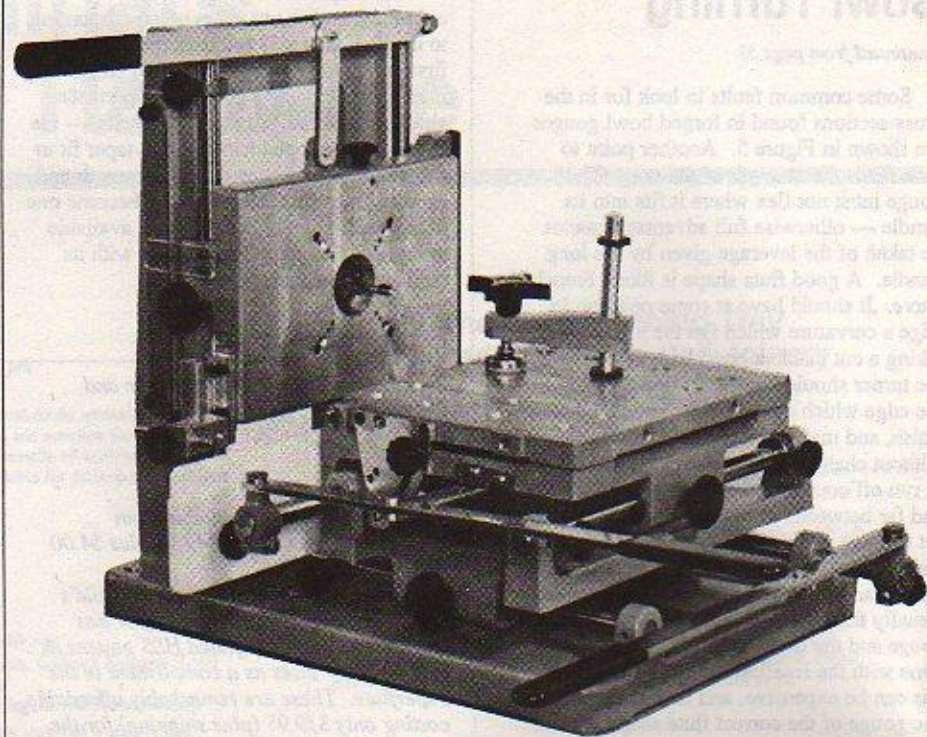
Order either VHS tape from Highland Hardware for \$39.95 each plus shipping. Turning Wood with Richard Raffan is also available as a set which includes the book and video together for \$49.95 plus shipping.

Highland Hardware also stocks the full line of Fine Woodworking Video Workshops in VHS format. The complete set of titles is listed below:

Bowl-Turning (Stubbs)	\$39.95
Turning Wood (Raffan)	\$39.95
Dovetail a Drawer	\$29.95
Wood Finishing	\$39.95
Carve a Ball & Claw Foot	\$39.95
Radial-Arm-Saw Joinery	\$39.95
Router Jigs & Techniques	\$29.95
Carving Techniques	\$29.95
Mortise & Tenon Joints	\$29.95
Small Shop Tips	\$29.95
Chip Carving	\$29.95

Multi-Router

Production Joint Maker



THE MULTI-ROUTER is a new American-made commercial-duty assembly machine designed for highly precise production of structural joints in solid wood. Mortise and tenon joints (up to 1/2" x 3") are the machine's specialty, and it will also produce box joints, dovetails, splined miters and round stub tenons. Simple and compound angled joints are easily set up with multi-position locator pins and a work table that tilts up to 45 degrees.

The work table is mounted on 3/4" solid steel ways which offer 8" of side-to-side and in-and-out travel. Linear ball bearings assure tight, precise movement with almost dreamlike ease and smoothness. Quick-set hold clamps may be set in any of 14 available mounting holes for securing practically any size and shape of stock. Pneumatic clamps are optionally available for production set-ups. 20" lever handles move the table along both axes with positive control and excellent mechanical advantage.

A vertical platen serves as router mount and as a positioning jig for stock set-up. The platen comes bored for mounting either a Makita 3612BR or a Bosch 1604 router; most other makes and models could be mounted with additional boring. This platen offers 6" vertical travel, and is equipped with a gas-cylinder return which smoothly raises the cutter above the work upon completion of a template-guided cut.

A variety of templates is available for production of tenons ranging from 1/4" x 2"

to 1/2" x 3". Other templates enable 3/8" box joints, 14 degree dovetails, and 1/2" and 5/8" round tenons. Mortise production is set up using adjustable stops on the ways and requires no templates. Custom templates are available upon request. A 3/8" ball-bearing guide stylus is normally used; a 1/2" guide is available for larger-scale jointmaking. A 3/8" spiral end-mill cutter will offer up to 2" depth of cut; 2-3/4" depth is possible with a 1/2" cutter. To use any of the templates, one of the optional ball-bearing tipped follower styluses must be used.

The Multi-Router weighs approximately 90 pounds, measuring 16" wide by 24" deep by 20" high. An optionally available stand provides a secure mount anywhere in the shop. Top-quality workmanship is in evidence in every part of this machine's manufacture. The maker (JDS Co. of Columbia, SC) is to be congratulated on a well-executed design.

The Multi-Router is in stock and on display at Highland Hardware. Introductory price is \$1295.00. Accessory items include the stand (\$79), stylus (\$45), and numerous templates (priced from \$13.75 to \$16.50).

Router Bits

Tongue & Groove Router Bit System

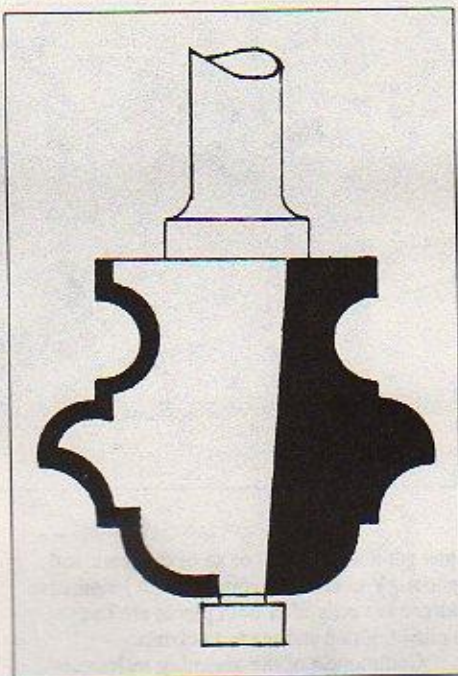
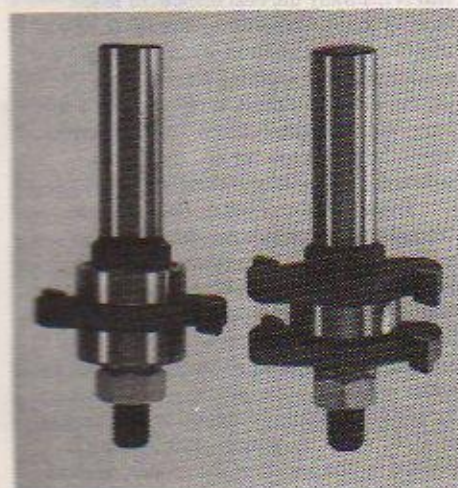
THIS NEWEST ADDITION to our selection of bits is designed for one-pass production of 3/8" wide by 1/4" thick tongues on stock ranging from 1/2" to 3/4" thick. Matching grooves can be cut by re-configuring the arrangement of bearings and cutters.

The tongue and groove system starts with a 1/2"-shank arbor (sorry, no 1/4" arbor available). For tongue cutting, two wing cutters are installed on the arbor with a sealed (as opposed to shielded) bearing in between; shims are provided to allow your choice of exact 1/4" spacing or a hair less if desired to avoid binding in the groove. The shims, incidentally, will insure that you can match tongues to grooves even after the cutters have been re-ground once or twice.

The arbor is set up with one wing cutter sandwiched between two bearings for cutting grooves of exact 1/4" width by 3/8" depth. It will be clever of you to label the two cutters and alternate their use for grooving, avoiding excessive wear on either one. An instruction sheet is provided with details on set-up and shim installation.

Note that there will be several situations in which this cutter system will come in handy in addition to standard tongue and groove work. The tongue will also be a fine little stub tenon. The 3/8" groove depth will work awfully well for home-brew rail and stile assembly.

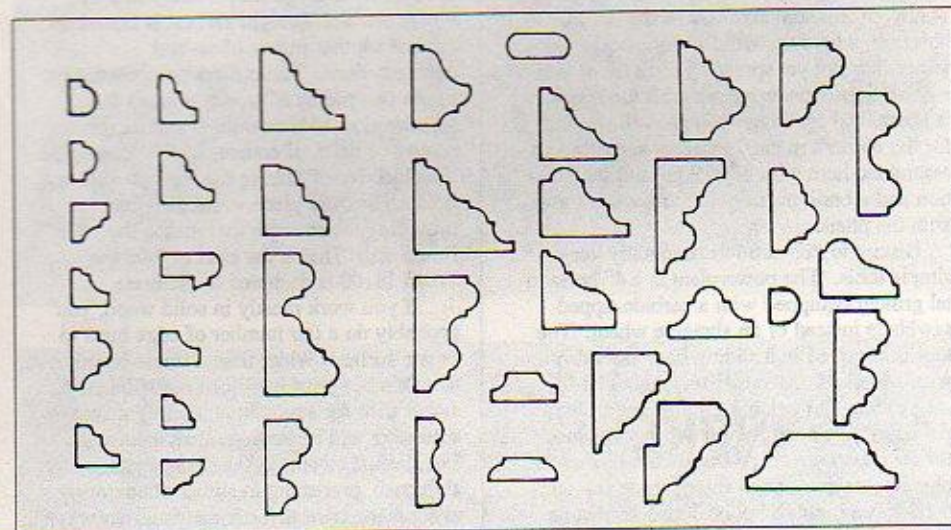
The tongue and groove router bit assembly is in stock and available for \$42.95 plus \$4.00 shipping.



Freud Perfekta Router Bit

MORE GOOD NEWS on router bits: the long-awaited Freud Perfekta router bit is finally on the market six months after its first appearance in ads and catalogs. This remarkable bit will produce twelve different mouldings with single-pass efficiency, and will mill numerous additional patterns with two or more passes. For making or reproducing custom mouldings and edge treatments ranging from simple to ornate, this bit will be a great addition to your capabilities. 1/2" shank. Bit diameter is 2-1/4". Maximum cutting length is 1-7/8".

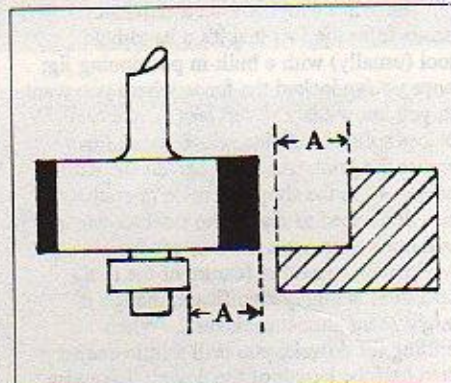
The Perfekta router bit costs \$99.95 plus \$6.00 shipping.



Multi-Bearing Rabbet Bit

WHILE WE'RE on the subject of new router bits, we should mention another innovation that made its debut in our 1987 catalog: it's a rabbet bit offering four rabbetting widths rather than the standard 3/8" only. Interchangeable guide bearings offer 1/4", 5/16", 3/8" and 7/16" widths (dimension A in the illustration) at whatever depth you choose. Please note that our catalog listing for this bit erroneously specifies that 1/2" width is possible. It should have read 1/4".

This bit is available in a shank diameter of either 1/4" or 1/2" (please specify). Price for either is \$34.90, plus \$4.00 shipping.



Freud JS100 Biscuit Joiner

By Zach Etheridge

THE ADVENT of an extremely affordable edition of the Lamello-style assembly tool has been greeted with wild enthusiasm by thousands of woodworkers who would rather switch than fight their doweling jigs any longer. There are still some corners of the world, however, where the word about biscuit joiners has not yet spread. For those of you who've been wondering what all the hoopla is about, and for those who are still waiting for the owner's manual to make sense, we've assembled here a bit of background information and a basic user's guide to acquaint you with the phenomenon.

Biscuit joiners are fundamentally very simple tools. The powerplant is a 4" horizontal grinder equipped with a carbide-tipped sawblade instead of an abrasive wheel. The tool is mounted in a sliding base assembly with a vertical nosepiece, leaving a slot for the sawblade to emerge through the front. An adjustable horizontal fence jigs the tool for accurate assembly. In use, the blade plunge-cuts grooves to any of three pre-set depths; ready-made splines (also known as biscuits, plates, chips, or wafers) are inserted in the grooves to align pieces being joined.

The joiner's highly touted efficiency arises from the fact that it's a hand-held tool (usually) with a built-in positioning jig; once you've locked the fence where you want it, you know that the surfaces of any two pieces splined together will be dead flush across the joint. And you can do the work anywhere in the shop; for most operations you don't need to clamp the stock down, and you don't even have to clean off the workbench. Another feature of the tool's operation is highly significant, though it might seem almost accidental. When drilling for dowels, you drill a little deeper than half the length of the dowel. Likewise, the biscuit joiner is calibrated to cut a groove a little deeper than half the width of the splines. This incidentally makes the groove a little longer than the splines. The leeway granted by this excess groove length means you don't have to spend any time trying to locate the tool terribly precisely;

just get it within 1/8" or so of the mark and shoot. You concern yourself with lengthwise alignment only after both pieces are cut, splined, glued and ready to clamp.

Commonest of the assembly techniques used in the average shop is the butt joint, where one flat, straight surface is butted up against another in any of several configurations. There is no interpenetration of the two pieces of wood. Rather, the woodworker adds dowels or splines (or screws or nails, of course) which accomplish the objective of linking the separate pieces, holding them in place while glue cures or providing the strength that makes the joint functional. This is the kind of joint the Freud JS100 is designed to facilitate.

If you work mostly in solid wood, you probably do a fair number of edge butts to create surfaces wider than a single board. This kind of joint is splined for efficiency rather than for strength; a good tight face-to-face joint will be stronger than solid wood, but it won't sit still as the clamps are tightened, preferring to slither obnoxiously around and leave adjacent surfaces anything but flush, presenting the unhappy woodworker with a tedious flattening chore and a panel of dubious final thickness. In this kind of joint you might not need to use more than one spline every ten or fifteen inches, though more may be required if the wood isn't agreeably flat and true. A few seconds of layout and cutting with the joiner, a couple more seconds spent inserting splines, and you're ready to glue up a joint that will require no more than the lightest lick of scraper or sandpaper to be perfectly flat and flush.

In other kinds of butt joints splines are required to hold the joint together, such as in miters, tee or corner joints where end grain surfaces abut, offering little or no reliable glue strength. Here you'll find that splines provide significant advantages over dowels, not only because they can be installed so much faster but because they offer much more wood-to-wood glue surface as well. In this kind of joint you'll want to use as many splines as you can reasonably

stuff in there since they're the only source of structural integrity. Cutting in a number of splines side by side is easy as pie, and if there's room of course you can shoot them in in tandem as well.

The oval splines are die-cut from solid beech stock which is heavily compressed as it's being cut. Thus they're very strong, good with all kinds of glue, and highly motivated to swell upon contact with the moisture in glue. A dry spline fits snugly into the 5/32" kerf cut by the assembly tool. Just for fun dip a spline in water for a few seconds, slip it quickly into a groove, and wait a couple minutes for it to swell and clamp itself in; now you can't pull it out with pliers. Don't worry -- the splines do not expand hard enough to distort surfaces as close as 1/8" away, but you may be sure that they provide a tenacious hold for excellent structural strength.

Cleverly enough, all the assembly tools currently on the market use the same size blade to do the work, so they all use the same sizes of splines. There are three sizes available: #0 small, #10 medium, and #20 large. Since the thickness is the same for all three, their length and width are what determine the choice of size for a given joint. The #20 spline, 15/16" wide by 2-7/16" long, provides the most glue surface and is naturally the best choice for load-bearing joints. When length or depth of cut must be limited, such as when mitering narrow stock or applying a solid lip to plywood, the #0 spline, 9/16" wide by 1-7/8" long, will be a good choice. And of course when the #20 is too big and the #0 too small, the #10 will be just right.

There are liberal but distinct limits to what the biscuit joiner can do. The 5/32" thickness of the splines means that stock thickness is rarely a problem. Splines can be used easily and safely in material down to 3/8" thick. Minimum depth of cut is about 3/8" for the #0 spline, so your stock must be wider than that; for example, a hardwood lip for plywood should be milled to a minimum of 7/16" wide. A more significant limit is defined by the length of the splines, or more



precisely, the length of the groove the joiner cuts for a given size.

The length of cut defines the minimum length of any surface to be joined; the groove cut for a #0 spline is about 2-3/32" long, so the piece of wood you're cutting into must be wider than that. This sets your lower limit for stock width when you're doing end-grain butts, such as in face-frame construction. *The narrowest face-frame stock generally usable in biscuit joinery will be 2-1/4".* If 80% of your work is done in 1-3/4" framing, then biscuit joinery may not be the greatest thing that ever happened to you. A lot of cabinetmakers have taken to designing their work to use wider stock, though, in order to take advantage of the tremendous efficiency of biscuit joinery. (I've explored the possibility of biscuit joinery for narrower stock; unfortunately, it doesn't seem feasible to design a tool which can cut a short groove that's deep enough to be of any use.)

The Freud JS100 Biscuit Joiner is available from Highland Hardware for \$175 plus \$6.00 shipping. Add \$30 for an assortment of 1000 biscuits, which includes about an equal number of each of the three sizes.

Basic Biscuit Joinery Illustrated

Figure 1. Lay out the pieces to be assembled and mark across joint lines where you want them splined. There's usually no need to measure; just stay a couple of inches away from ends or edges.

Figure 2. Use a jig block to set the JS100's fence to locate the cut. For installing single splines, use a block slightly thinner than the stock you'll be joining. This ensures 1. that the fence is parallel to the blade, 2. that the groove will be cut close to center of stock thickness, and 3. that the cut is registered from the surface of the workpieces regardless of the condition of your workbench.

Figure 3. You'll probably find that many of your most common joints are variations of the basic butt. Single splines serve to align surfaces where joint strength is assured.

Figure 4. Two or more splines side by side for strength are easily cut in by setting the fence close to one surface and then flipping the workpiece for a second cut. Eyeball accuracy is good enough to transfer your mark from top to bottom surface.

continued on next page



Figure 1

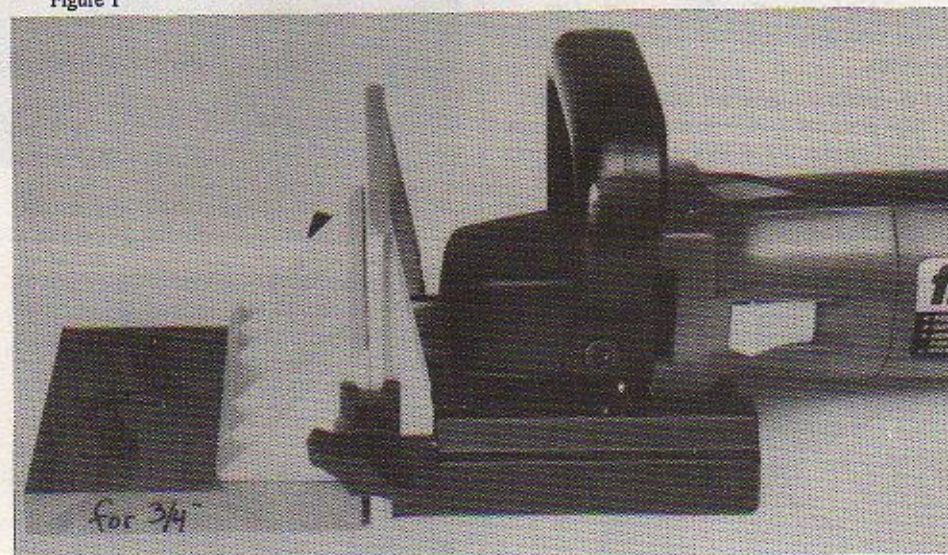


Figure 2

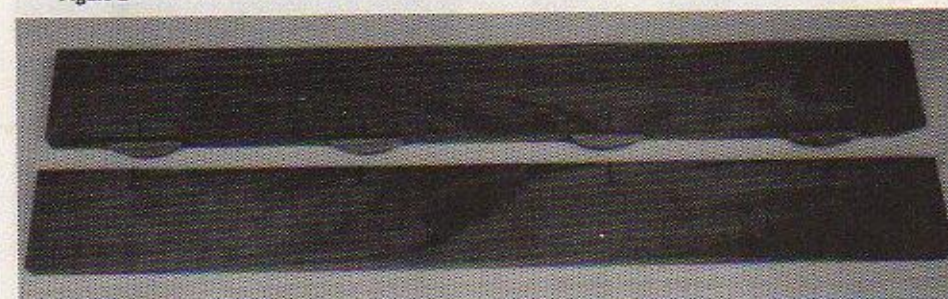


Figure 3

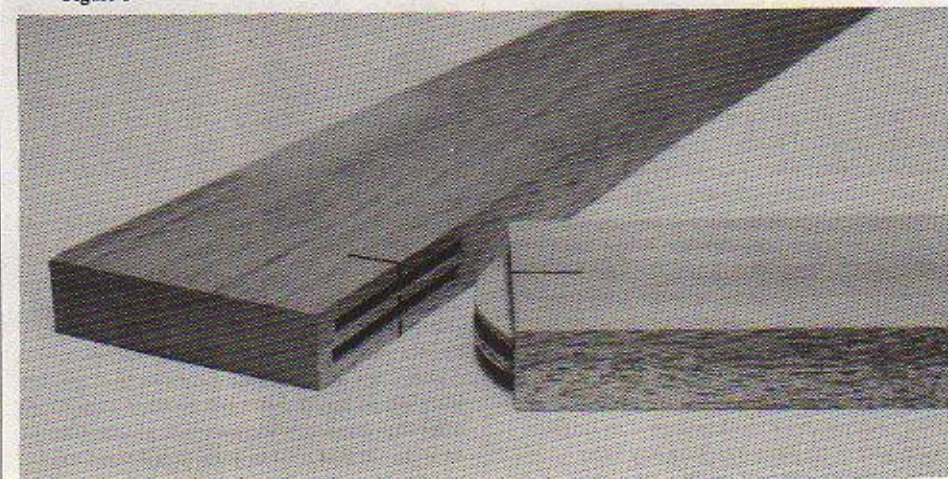


Figure 4

Basic Biscuit Joinery Illustrated

(continued from previous page)

Figure 5. The fence is mounted upside down for splining miters like this one. Use two or three sizes of splines to avoid cutting too deep.

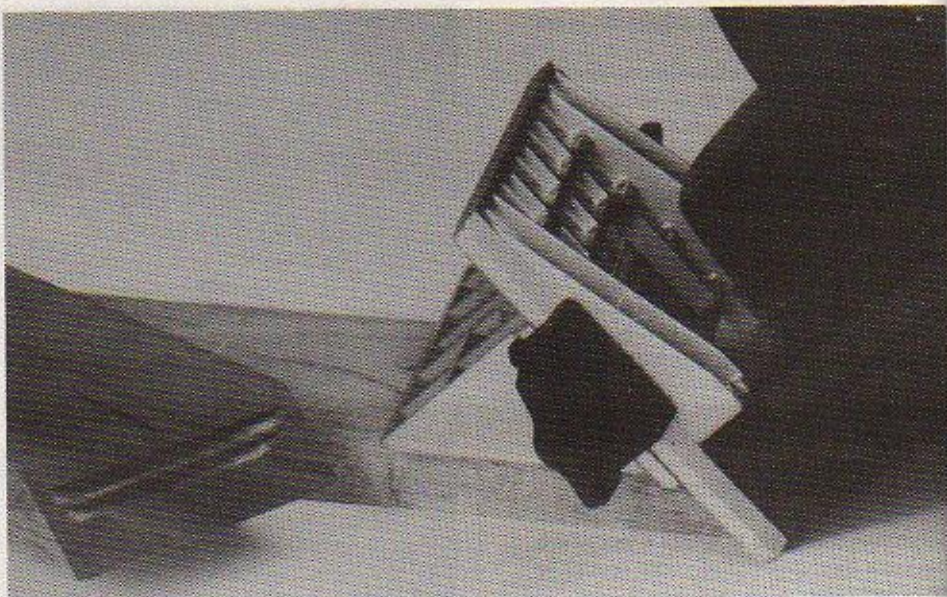


Figure 5

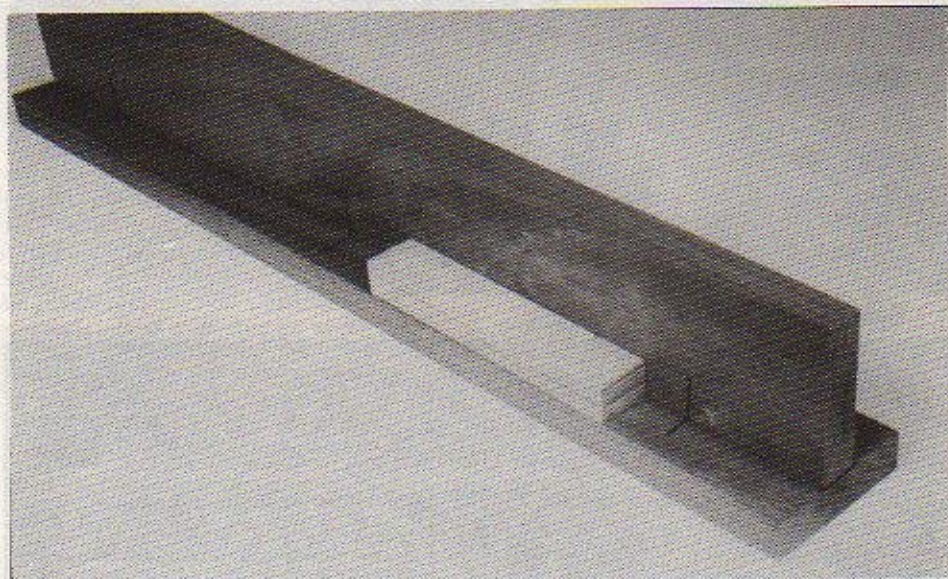


Figure 6

To set up for a face-frame joint like this one (Figure 6), make a jig block as wide as the offset shoulder. Make the cuts in the frame piece with the joiner resting on its base. Align the fence using the jig block atop the frame piece (Figure 7), and then cut the face piece with the fence registered on the edge (Figure 8).

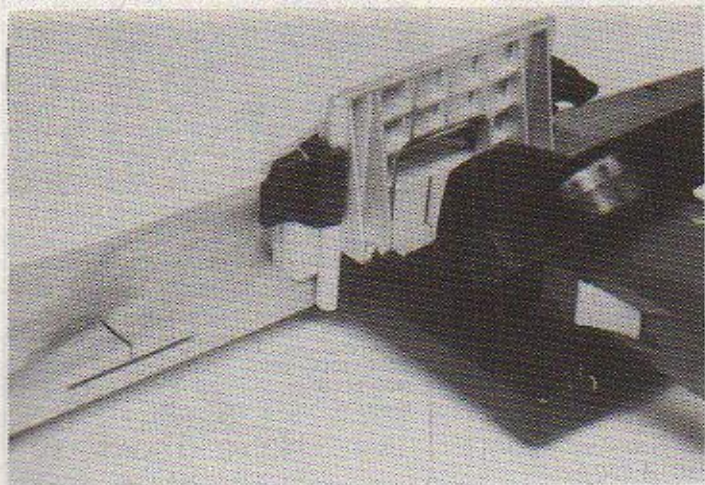


Figure 7

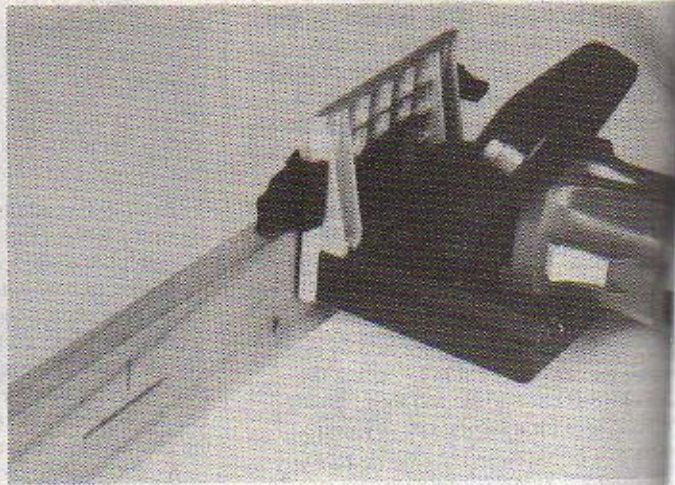


Figure 8

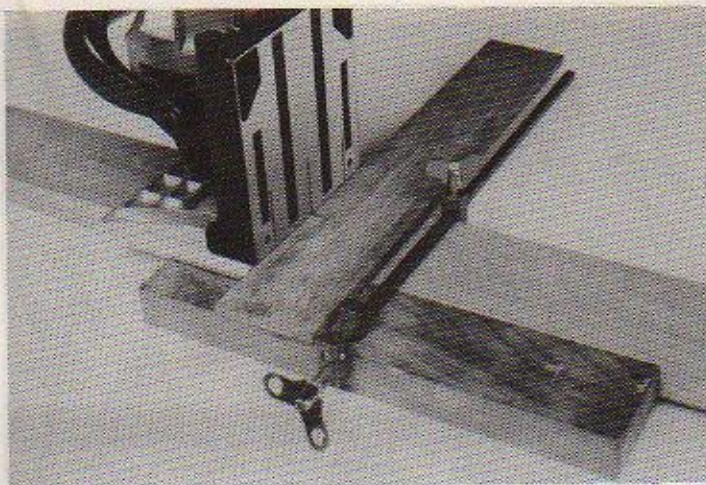


Figure 10

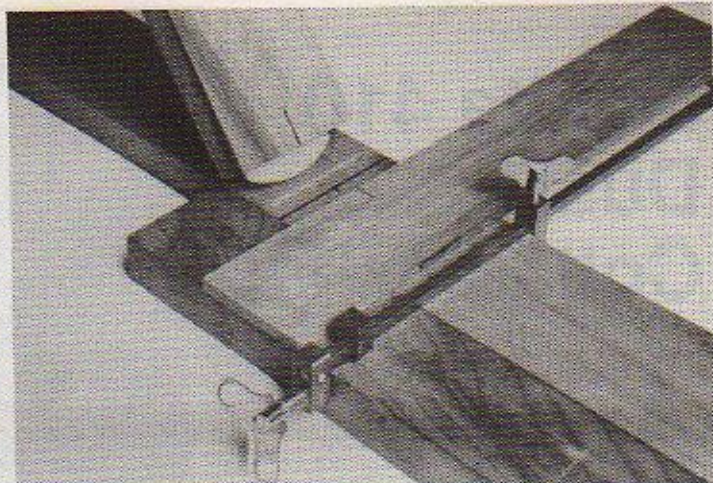


Figure 11

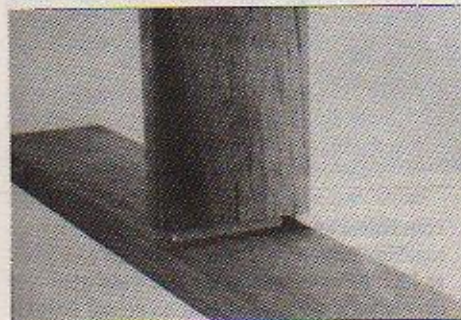


Figure 9

In this joint (Figure 9) the fence is removed for both cuts. Register the base of the tool along the layout line on the horizontal piece and make the plunge cut (Figure 10). Then make the end-grain cut with the tool and vertical member flat on the bench.

The clamp-on square shown here can be a very helpful jig for shelf and other tee-butt joints. A Japanese hatakane clamp (see page 59 of our 1987 catalog) is conveniently attached by drilling two holes in the stock. Note that the bar of the square must be at least 3/8" thick.

Here's a method for using the clamp-on square for cutting a reinforced tee joint, with two splines side by side in 3/4" stock:

On the horizontal member, use a 3/16" thick block to locate square outside of layout line (resulting in the set-up shown in Figure 11). Put base of tool against square for first cut. Put both 3/16" and 1/8" blocks between square and base for second cut.

On the cross member, put the 3/16" block under the stock for first cut. Put the 1/8" block under tool for second cut.

Save Time & Money with Freud's new JS100 Biscuit Joiner

\$175.00

plus \$6.00 shipping



Biscuit joinery is sweeping America! Thousands of woodworkers are discovering the incredible speed and accuracy which biscuit joinery makes possible during cabinet and furniture assembly.

Now Freud's new model JS100 biscuit joinery tool makes it affordable for everyone. While other biscuit joinery tools cost from \$300-\$600, you can order the Freud tool today for only \$175.00 plus \$6.00 shipping. Send check or money-order, or charge by phone toll free.

Joining plates come in 3 sizes and can be bought in boxes of 1000 each, or as an assortment of 1000 (which includes an equal number of the 3 sizes). Cost per 1000 is \$30. No additional shipping charge for plates when purchased with the JS100. Add \$3 shipping per box when buying joining plates separately. Specify size 0, 10, 20, or assorted.

Send \$1.00 for our complete tool catalog (free with order).

MC/Mex Users outside GA
ORDER TOLL FREE
(800) 241-6748
(Orders Only)

highland hardware

1045 N. Highland Avenue, Dept. W
Atlanta, GA 30306 (404) 872-4466



Figure 12

The Lamello glue bottle (Figure 12) is a great convenience for getting glue where you want it on the walls of the groove. (We offer it for \$18.00 plus \$3.00 shipping).

Another Lamello innovation is the K-20 clamping plate. The barbs on this high-strength plastic #20 spline grip the walls of the groove to hold joints together tightly when conventional clamping isn't feasible. When assembling a hard-to-clamp object, substitute one of these clamping plates in place of every third or fourth joining plate. The K-20 plates hold the joint together until the glue sets in the remaining plate slots.

K-20's come 50 for \$12.95, or 250 for \$49.95, available from Highland Hardware.

PLATE JOINERY FOR THE PROFESSIONAL



SAVE \$63.00
on our LAMELLO
STARTER PACKAGE!

While less-expensive plate joiners now exist on the market for providing rapid, efficient cabinet and furniture assembly, the Lamello Top remains the best choice for the production-oriented professional.

The Lamello is an industrial-duty plate joiner rated to handle heavy continuous use. Its powerful 600-watt motor features a slip clutch not found on other plate joiners, essential for heavy plunge cutting in hard woods. Its unique, patented, adjustable pivoting fence provides instantly accurate horizontal or vertical register for most common kinds of joinery, and sets to any angle between 0 and 90° as needed.

When buying your Lamello, save by choosing our Starter package, which for \$695 includes a Lamello Top (list \$599), a Lamello glue dispenser, a replacement carbide cutter, a pair of Lamello spanner clamps, and 1000 joining plates (about an equal number of the 3 sizes). Bought separately, the items would cost \$758. **You save \$63!**

Take advantage of this opportunity to save on a professional machine which will revolutionize the assembly process in your production shop. To order, send \$695.00 plus \$6.00 shipping (check or money order) and we'll rush your Lamello Starter Package to you via UPS. Includes one-year factory warranty.

Send \$1.00 for our complete tool catalog (free with order).

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Makita 410 Dust Collector

ADUST COLLECTOR is usually one of the last machines to be acquired by small-shop operators — not because it isn't needed, but because mere safety, convenience and efficiency aren't coveted as enthusiastically as a new air compressor or a second bandsaw or a multi-port quadruphobic electro-psychic thingamabob, all of which probably cost about the same as your typical medium-duty dust collector.

Disadvantages for most dust collectors to date have been that they're inexplicably expensive, brutishly bulky, horribly heavy, and much too loud. They're useful, though. You can get by without one for a while, but by the time you've got a thickness planer or any kind of sanding equipment laid in you realize that waste disposal is more of a necessity than a luxury. Those piles of shavings and layers of dust can escalate from nuisance to outright hazard in less time than it takes to complete one small project. And of course a dust collector does more than keep your work area clean; it also keeps dust and junk out of your lungs and eyes and other valuable accessories.

The Makita 410 dust collector is an astonishing little machine that manages to be practically everything you'd ever want in a small-shop vacuum system. It's small: the machine itself is an 11" cube which takes up less room on the floor than your feet do. It weighs only 20 pounds, so it can be moved effortlessly around the shop or can be securely mounted in an out-of-the-way place if you choose to run fixed ducting. The fan moves 307 cubic feet per minute (cfm) with intake hose and dust bag installed. That's not a high volume rating (figures from 500 to 1200 cfm are fairly common for small collectors), but the 410 works better than many much larger machines anyway. The key factors are *intake velocity* and *static pressure*, both of which are enormous on the 410.

The static pressure rating tells you how insistent the machine is about forcing dust and chips through itself; a machine with low static pressure may be easily discouraged despite a high cfm rating. The Makita 410 is rated at 20", where figures of 3" to 10" are common on larger machines. Airflow velocity (determined by dividing the cfm rating by the intake duct cross-section) is pretty obviously important; the faster the air

moves, the less likely it is to let dust and chips dally in the duct and clog up the works. The Makita 410 uses 3" intake hose, providing an intake velocity of 6253 feet per minute (71 miles per hour!). It's interesting to compare that figure to what you might see on a much larger machine: for example, a fairly typical 1100 cfm collector using 6" duct will provide an airflow some 650 feet per minute *slower* than the 410. All these numbers can give you some idea of how well the 410 dust collector works, but you'll get a much better idea by hooking it up to a machine and turning it on. We've used the 410 to exhaust a 16" planer, which it handled flawlessly, and to exhaust a 12" tablesaw, which was no problem at all. Connected to our Ryobi AP-10 planer (pictured above), the collector appears to work at 100% effectiveness.

The 410 uses a welded steel fan, so it shrugs off knots or other hard knocks without damage. The waste collection system works like a dust bag on a belt sander; the bag serves as both filter and chip dump. The huge 8 cubic foot bag zips open for emptying, and is reattached to the fan with the greatest of ease. Incidentally, the machine won't run unless the intake hose is installed — it is virtually impossible to harm yourself while cleaning or moving the machine. The 410 comes with 8' of heavy vinyl flex hose; additional lengths are available if you choose to exhaust the machine into an outdoor collection bin or other large-capacity storage system. Rated at 9 amps (1-1/2 hp), the 410 will handle up to thirty feet of total (intake plus exhaust) hose length. If you choose to mount the collector in a central location, 3" PVC pipe can be used as ducting to your various machine locations. The 410 is so portable, however, that many shops will find it

convenient enough to take it along to each machine as needed. Though it's not nearly as loud as most larger collectors, the 410 isn't exactly what you'd call quiet; the 10,000 rpm fan does generate a fair amount of moderately high-pitched noise. We recommend the use of hearing protection whenever you run the machine for extended periods.

After all the specs and hoopla, one item of interest still remains to be covered. When cheap collection systems start at \$50 and portable units may run upwards of \$70, it's quite refreshing to note that Highland Hardware offers immediate delivery on the Makita 410 for just \$299.95 plus \$6.00 shipping within the 48 states.

Dust Collector Hoods

Ready-made cast-aluminum hoods are available for several models of Makita planers and planer-jointers as listed below. In addition, we include with each 410 dust collector a plan for easily making your own dusthoods to fit other machines by adapting ordinary stove pipe fittings.

Makita 2030 planer	\$92.00
Makita 2030N (planer)	\$47.00
Makita 2030N (jointer)	\$45.00
Makita 2040 planer	\$138.00

Extra Lengths of Hose

While many kinds of hose can be used with duct machines, Makita offers an extremely high quality flexible vinyl hose which features smooth inner walls for maximum efficiency. It is available in the lengths listed below:

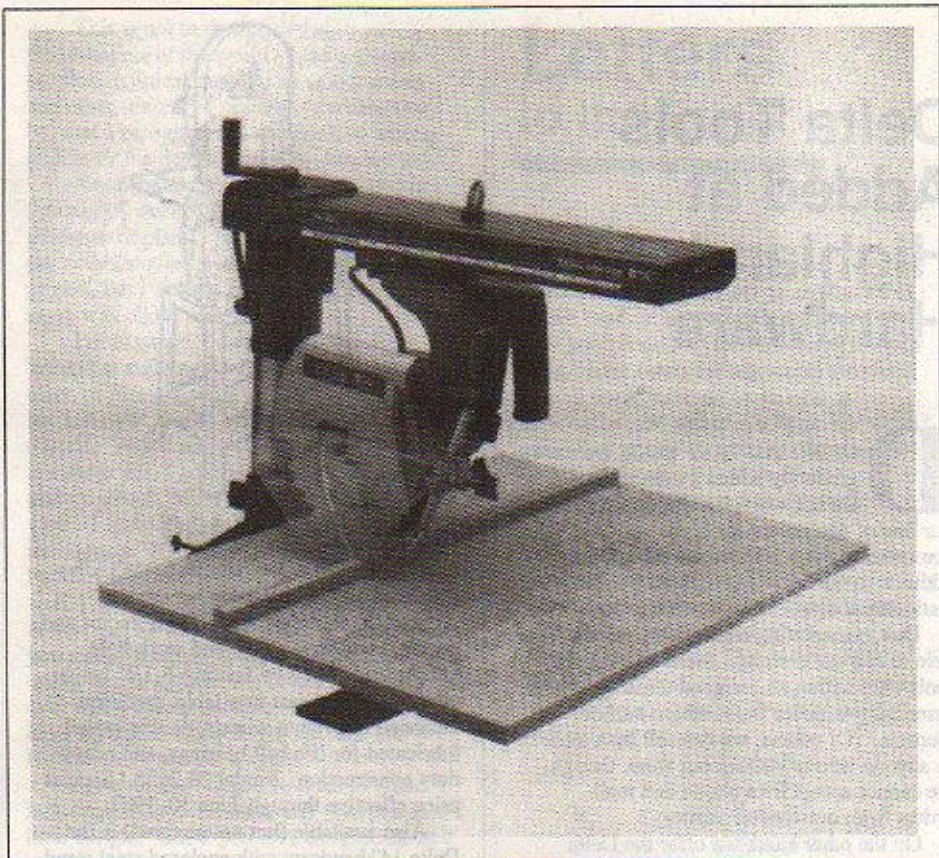
8 feet	\$62.00
16 feet	\$109.00
32 feet	\$209.00



New Ryobi Portable Radial Arm Saw

WE HAVE RECEIVED our first shipment of Ryobi's innovative new bench-top radial arm saw, and are impressed by many of its features. While the blade size is only 8-1/4" in diameter, careful design of the arbor has permitted a full 3" maximum depth of cut at 90 degrees, or 1-3/4" at 45 degrees. Its 11 amp (2 HP) 110 volt motor provides plenty of power, and is switched on and off by conveniently located controls. The no-load blade speed is 5000 rpm, while the accessory spindle features a speed of 18,500 rpm for routing operations.

Perhaps most convenient of all is the tool's overall weight: just 53 lbs., making it light enough to carry to the job, or store under the workbench when not in use. Also appealing is its introductory price of only \$245.00 (list price is \$445.00). An optional stand is available for \$49.00. Both can be shipped by UPS.



Free Legstand and Knives

Ryobi AP-10 Planer Special

A special purchase enables us to offer two free gifts with the purchase of an AP-10 Thickness Planer between now and June 30, 1987. Acknowledged as the hottest new power tool of 1986, the AP-10 continues to grow in popularity as more woodworkers realize its tremendous value and outstanding performance.

Now the deal is sweeter than ever, with a custom steel legstand (pictured with planer on opposite page) plus a replacement set of steel knives included free. This unique offer is a Highland Hardware exclusive.

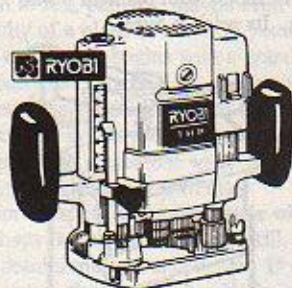
The package deal sells for \$399.00, plus \$6.00 shipping.



TR-30U LAMINATE TRIMMER

Heavily constructed 3/4 HP trimmer delivers 29,000 rpm. Cast aluminum housing with non-marring base. Weighs only 3 lbs. 1/4" collet. 3.8 amps. Includes straight guide, trimming guide, and bit.

10.33.31 Laminate Trimmer 79.95



R-150K 1 HP PLUNGE ROUTER KIT

This is the nicest small router we've seen on the market. Features rugged but lightweight all ball bearing construction, 3-position depth stop, 0-2" plunge capacity, 1/4" collet capacity, and 24,000 rpm speed. Weighs 6 lbs. Carrying case and guide fence are included.

10.33.01 1 HP Plunge Router 89.95



SG-1000K 4" SANDER-GRINDER KIT

This is an unbeatable deal on a small industrial-duty grinder. Hardened steel gears, all ball bearing. Includes reversible side handle for extra control, spindle lock for easy changing of grinding wheels. 4.3 amp, 11,000 rpm. 9-1/4" long. Weighs 3.5 lbs. Kit includes backing pad for sandpaper, grinding wheel, rugged plastic carrying case.

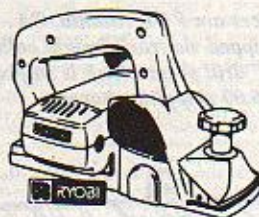
13.33.01 SG-1000K 4" Grinder 59.95



S-500A ORBITAL SANDER

Despite its ultra-compact size, this pad sander is one of the most efficient on the market. Uses a sanding sheet 3" x 5-1/2" (1/6 of a full size sheet). 1.5 amps, 12,000 rpm. 2.6 lbs.

15.33.01 S-500A Pad Sander 39.95



L-120UK 3-5/8" PLANER

Easy to change blades make this little planer a real pleasure to use. 3-5/8" width surfaces 2x4s in one pass! Two-knife cutterhead rotates 15,000 rpm. Length is 10". Maximum depth of cut is 3/64". Maximum rabbeting depth is 1/4". All ball bearing construction. Standard equipment includes carrying case, fence, blade adjustment gauge, and blade sharpening holder.

03.33.11 L-120UK 3-5/8" Planer 89.95

03.33.12 Pair Repl. Steel Knives 11.65

Delta Tools Added at Highland Hardware

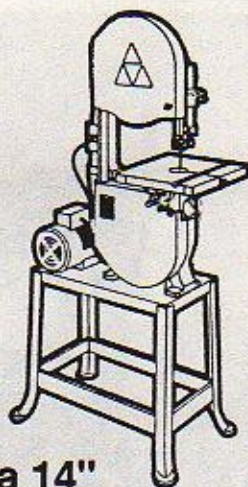
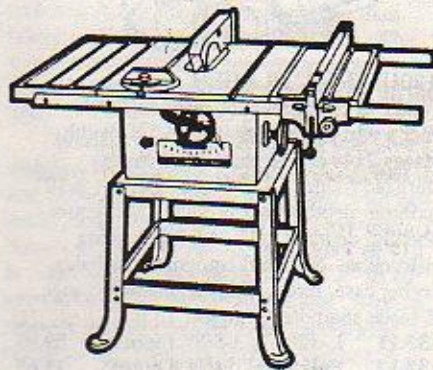
DURING THE PAST YEAR, we have gradually added a number of Delta's woodworking machines to our line of equipment for home and commercial shops. These are offered in addition to our Inca, Makita and Ryobi stationary tools.

Due to marketing restrictions, we are able to sell our premium Swiss-made Inca tools only within an assigned territory, which essentially includes the northern half of Georgia. (Of course, we can sell Inca tools to anyone who is visiting our store, though we cannot accept Inca phone and mail orders from outside our territory).

On the other hand, we offer the Delta tools listed on this page to our customers all across the country. If you choose to purchase one or more of them from us, you can rest assured that you will receive the same conscientious and knowledgeable service which customers have come to expect from Highland Hardware.

Stationary tools often represent a large cash investment for a woodworker, and we believe you are entitled to the kind of dealer support necessary to get good results. So whether it means rapidly processing your initial order, providing prompt shipment of parts and accessories, or offering needed advice in person or by phone, we stand ready to offer you top quality service.

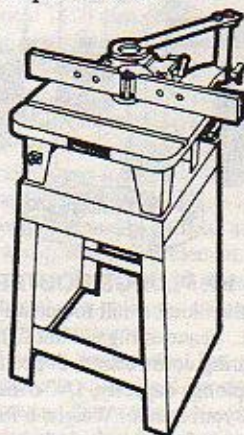
Delta prices are FOB Atlanta, GA. Items are shipped via truck freight collect, except for 8" drill press which is shipped via UPS for a \$6.00 shipping charge.



Delta 14" Bandsaw \$499

This special offer includes Delta's long-respected 14" woodcutting bandsaw completely equipped with 1/2 HP motor and switch, open steel stand, and work light attachment. The saw features 6-1/4" height capacity, tilting cast-iron table, precision-balanced aluminum wheels, double-sealed, lubricated-for-life ball bearings, and heavy-duty construction. Model 28-243S. Special price effective through June 30, 1987.

Also available (but not pictured) is the Delta 14" bandsaw with enclosed steel stand and 3/4 HP motor with resilient frame mounting. Its price is \$769.

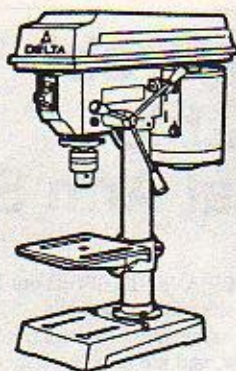


Delta Light-Duty Shaper \$499

Another limited-time offer, this Delta shaper's price includes a 1 HP motor and a steel stand. It features a 1/2" diameter ball bearing spindle assembly, stable 15-1/2" x 18" cast iron table, and a fully adjustable fence. Price is good through June 30, 1987.

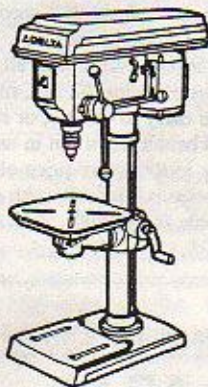
Delta 10" Contractor's Saw \$719

This price includes 1-1/2 HP motor and steel stand. Cast-iron table plus extension wings measures 40" x 27", providing 24" rip capacity on either side of blade. Jet-lock self-aligning rip fence and miter guide are included. Model 34-410S.



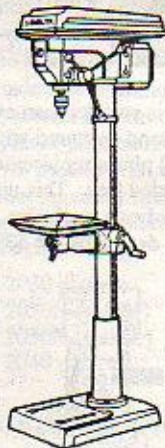
Delta 8" Bench Drill Press \$99.95

Features 5 spindle speeds, 1/4 HP motor, and tilting table. Model 11-950.



Delta 14" Bench Drill Press \$219.95

Features 1/2 HP motor, 5 spindle speeds, swivel-type tilting table with raising and lowering mechanism. Model 14-040.



Delta 16-1/2" Floor Drill Press \$279.95

This has become our single most popular Delta tool. Features 3/4 HP induction motor, 12 spindle speeds, and swivel-type tilting table with raising and lowering mechanism. Model 17-900.

Calamity, Frailness, Yet Delight

by Jack Tuberville

If it feels good, do it!

— Anarchist slogan

THIS ARTICLE is in response to Wallace McFarlane's article "Commodity, Firmness, and Delight", published in last fall's issue of *Wood News*. His theme was that there is some art in woodworking, and that not all people have or acquire the artists "eye". Further, without the "eye", or guidance from outside, such as plans or models, the eyeless artisan will produce some rather unlikely "art".

Well, I guess I have to agree with him. Judging from his article, he obviously understands art, and I'm sure his work has both commodity and firmness. His writing is definitely a delight. All of this is important, especially if you are trying to make a living at it. But having voiced support for the value of the "eye", let me also say that whether you have it or not doesn't really matter. It doesn't matter if your work is "uneasy with itself", or even that it "stinks up the years".

What matters is whether or not, after having done the work, regardless of the outcome, you got more out of it than you put in. Was it worth doing, did you enjoy the process, and was all the work expended worth the pleasure of having done it?

That's called "return on investment", and that return can be figured in terms of pleasure as well as economics. If it sells, it's economically feasible. You should make more. If it feels good, it's emotionally feasible. You should do it again.

I don't believe anyone works in wood purely out of the profit motive. So it's not just "art that sells" but art that feels good in the doing. And as far as generating that unique, perfectly proportioned object is concerned, what I see in most craft shows and displayed in most shops is pretty much the same. Whether it's a unique design, elegant proportions, or just plain novelty, it is soon copied and becomes more or less standard, although some are more artful copies than others.

This is not to denigrate the woodshapers of the world. I have always ascribed mystical qualities to woodcarvers and other makers of sawdust. Perhaps that's because I recognize my own lack of artistic ability, or the determination to develop it.

Nevertheless, I've never let it stand in the way of working in wood, albeit with the guidance of plans. True, I've never been perfectly satisfied with the outcome of any project, but I suspect most artists feel the same way about their work.

For instance, I dabble in wood boats. When I'm sighting down a spar I wish was truer, or fitting a chine that doesn't want to lay just right, I head off frustration by asking myself, "Will it serve the purpose?" If the answer is yes, I let it go. You have to be philosophical. Mine is a utilitarian point of view. I leave the artwork to craftier individuals. And make no mistake, boat building can be artistic. I've seen boats I would no more trust to water than to fire. A boat can be a tool or an end in itself, and you can take equal pleasure in either its utility or eye appeal. No boat I build will ever win a beauty contest, but each one will have sufficient utility to get me, like the Hobbit, there and back again.

Some of the things I've done to wood lack commodity, firmness, and give precious little delight. But if you love the process as much as the product, it is enough. Not enough to sell, perhaps; maybe even unworthy of a place of honor in your home. But every project begins with a grand anticipation of what will be. Forget that the product doesn't quite live up to the promise. What counts is that you tried and, probably, some part of it turned out well; and, it is hoped, you learned something.

For most of us, the process is where it's at, perhaps because we lack the skill, the eye, or the commitment to excellence. If we can participate in the process, gradually improve, and occasionally bring forth something to be valued - then I believe that is enough.

Whether you have the "eye", aptitude, art, craftsmanship or ability, don't take up another line of work unless you really don't like what you're doing. You may end up with some odd-looking firewood, but you could certainly do worse.

Calamitous results notwithstanding, if it feels good, do it! Again and again.

The author is an amateur woodworker from Clinton, Tennessee.

Letters to the Editor

Dear Sir,

I just wanted to take this opportunity to thank you for sending me your *Wood News*. I have used information from *Wood News* with good results. Since receiving the Fall issue I have made the adjustable mortising jig and think it should be helpful to me. I noticed that the author is a bank lawyer so I guess that is why he used so many words and such few dimensions on the sketches. That may be because most of the figures they use are dollars.

I am seventy-eight years old and have been working with wood as a hobby for fifty years. I have never sold anything because my children are always there to claim it before it is finished. That is the way I planned it anyway.

Thank you again for *Wood News* and your catalog.

Sincerely,

J. E. Slate
Marietta, Ohio

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Long a favorite of beginning carvers, Charles Marshall Sayers' *The Book of Woodcarving* is a clear, unimposing and thoroughly effective introduction to a rewarding craft. We've put the book together with the essential tools which Mr. Sayers specifically recommends in his book: Acorn brand chisels from Henry Taylor Tools of Sheffield, England. The five-tool set includes a 1/2" #29 parting tool (V chisel), along with 3/8" #3, 3/8" #7, 5/8" #5, and 1" #3 gouges, complete with a custom denim tool roll for convenient storage.

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Emile Dufrene

Boatbuilder from Lafitte

By Tom Frazer

AVONDALE SHIPYARDS of New Orleans has a fancy CAD/CAM computer system to design and manufacture ocean-going vessels on the banks of the Mississippi River. The high-tech acronym CAD/CAM stands for Computer Aided Design/Computer Aided Manufacturing. By twiddling knobs, engineers can enlarge, reduce, and alter complicated plans represented by glowing lines on their video terminals. When a design is complete, computer-guided cutting torches burn out parts from sheet steel with complete accuracy.

But on the banks of Bayou Barataria in the fishing community of Lafitte, about half an hour's drive south of New Orleans, 77-year-old boatbuilder Emile "Bill" Dufrene has something better than a CAD/CAM computer: his head.

Dufrene generally is credited as inventor and developer of the locally famous Lafitte skiff, a fishing boat remarkably adapted to the needs of fishermen who ply the shallow waters of south Louisiana's bays, estuaries and bayous. Lafitte skiffs come in just about any size you want, from outboard-powered boats as small as 15 feet to V-8-engined craft up to 45 feet long.

What makes Dufrene special is that, without plans, he can build a Lafitte skiff to any length a customer specifies, and every time, the width and various curves will be in perfect proportion. As a wooden boatbuilder, Dufrene is his own human CAD/CAM computer.

A Lafitte skiff is particularly useful to local fishermen because of its high speed and shallow draft. Most often powered by Chevrolet or Oldsmobile V-8's adapted to

marine use, the boats skim over the shallow waters at speeds approaching 60 miles an hour. This allows early-rising fishermen to run a long string of crab traps or trawl for shrimp and still return home well before suppertime.

Dufrene "invented" the prototype skiff about 50 to 60 years ago after he began learning the art of wooden boatbuilding as a youngster of 13, helping his uncle Etienne Billiot. Billiot had picked up the craft from Dufrene's father, Noel, a master boatbuilder. Noel died when Dufrene was six years old.

"My daddy was one of the first boatbuilders around here," explains Dufrene.

Born in a house on Bayou Pirouge about 15 miles from Lafitte, Dufrene also has been a trapper and fisherman. He moved to Lafitte when he was 17, and for almost half a century, has made his own shrimp trawls. "I wasn't very big, but I could do just about anything," recalls Dufrene. "I was strong as hell and worked hard."

While trawling for shrimp years ago with a slow-moving round-hulled lugger, Dufrene realized he needed a shallow draft boat that would get up and go. "The first one I built had a sharp 'V' for a bow and a flat bottom," he says. "As the years went by, I kept improving it. Gradually, I built a flare into the bow." Later he would build a more complicated "V" bottom that retains a flat-bottomed skiff's speed yet makes for easier riding in choppy water.

The skiff has always had a broad rear deck extending over the water that allows a fisherman to pull his trawl out of the water without getting it tangled in the propeller.

Unlike their Down East and New England counterparts, boatbuilders of south

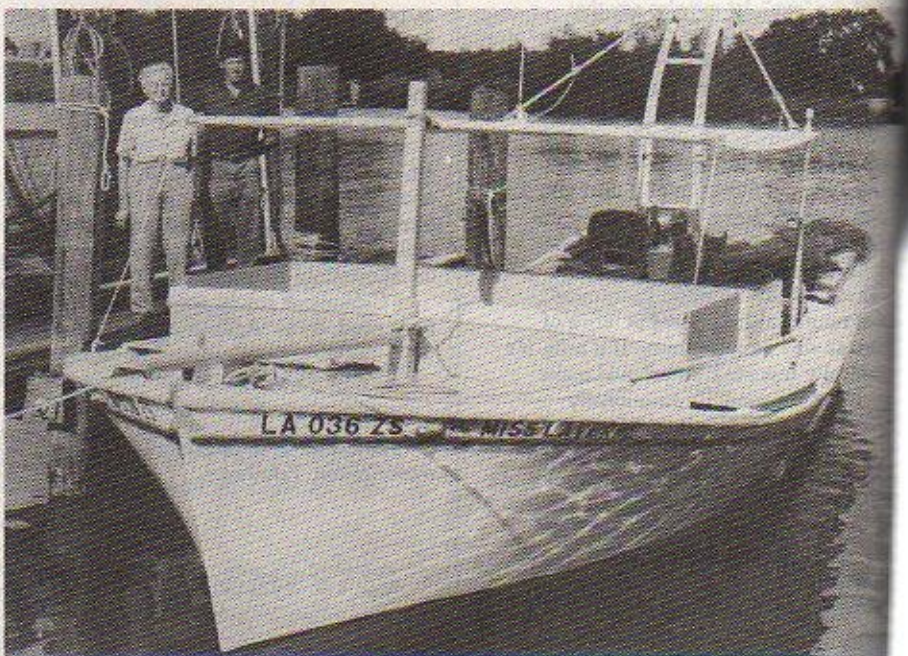


Emile "Bill" Dufrene in his workshop in the fishing community of Lafitte, Louisiana.

Photo by Bevil S. Knapp

Louisiana rarely, if ever, build according to plans or blueprints. Rather, construction is a handed-down art that entails a lot of copied measurements and a raft-load of templates.

Dufrene is no exception. He's never attended school and doesn't use a car. But he can build circles around any other wooden boatbuilder in south Louisiana's Cajun country. Although he has specialized in Lafitte skiffs for fishermen, Dufrene has built everything from Indian-style cypress dugouts to 60-foot round-hulled luggers that prowled the far reaches of the Gulf of Mexico in search of shrimp.



Emile "Bill" Dufrene with his son Lionel and Lionel's 28-foot Lafitte skiff, the most popular type of fishing craft in Louisiana's shallow saltwater bays. Lionel uses the boat to trawl for shrimp.

Photo by Tom Frazer

"I built dugouts at first, but it became hard to find cypress logs," says Dufrene. As for the round-bottomed luggers, he's made 60-footers with a 12-foot beam and a 13-foot-deep hull. Others were 56-footers, 53-footers, and 46-footers. "I made a lot of 46-foot luggers," says Dufrene.

In between, he's built the marshman's shallow water pirogue, a 12- or 14-foot craft propelled by paddle or pushpole. Then he's built the larger versions with a square stern called a "mudboat". Powered by an air-cooled gasoline engine mounted inboard, a mudboat can push through water so shallow that its propeller is churning in gooey mud.

Then for the famous World Championship Pirogue Races held annually in Lafitte, Dufrene came up with his own needle-thin 22-foot racing pirogue made of quarter-inch plywood. The hull has a slight "V" shape near the bow, but from that point back, the bottom is flat. Decked with a sheet of plastic to keep out spray, Dufrene's specials look very much like the racing sculls found on the Charles River in Cambridge, Massachusetts.

I'm the one who started building V-bottom racing pirogues," says Dufrene. "A V-bottom gives better speed. You can't make them any better for regular paddling. They're open construction with a few ribs."

Explaining that traditional pirogues are 14 or 15 feet long, Dufrene says when he studied the possibility of making an improved racing model, he decided that "if they were narrower, they would paddle faster. And it really worked."

If ordinary pirogues are notoriously easy to tip over, Dufrene's racing versions promise an almost certain dunking. Where the paddler sits in their center, the 22-foot racers measure only 11 inches wide at the bottom and 17 inches wide at the top. Once a pirogue racer himself, Dufrene offers this advice: "A man can hardly sit in it, but if you can paddle it, you can balance it."

In 1969, Gretna insurance executive William Ellsworth showed Dufrene a small model of a steam launch and asked if Dufrene could build a 30-footer for him. "Of course," answered Dufrene, and he proceeded to construct Ellsworth's "SL Mascot," the only steam launch in Louisiana. Powered by an 18-horsepower steam engine, the launch looks somewhat like a tugboat and has an elongated cabin.

Says Ellsworth, "It was really interesting watching old Bill work. He had no plans; he just put it together. I had a scale model of my boat, and that's what he used as an example."

Dufrene used 1-inch cypress planks which he would steam in order to bend them into shape. "He would steam the planks and nail them on. Those planks had more curves than Jane Russell," Ellsworth recalls.

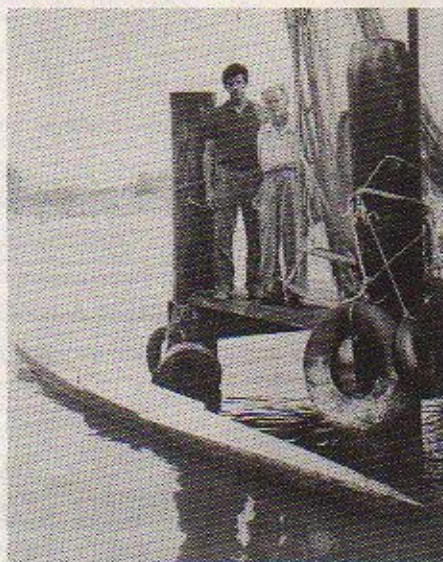
Five years ago, Ellsworth decided that his boat was too cramped for comfort, so he sought out Dufrene. "Can you somehow lengthen her by another nine feet?" Ellsworth asked. "That don't worry me. I



Dufrene built William Ellsworth's 30-foot steam launch "Mascot" in 1969. He later cut it in two and extended it to 39 feet. Photo by Bevil S. Knapp

can do it," responded Dufrene. So when the water was high, he brought the launch around to his shed on the banks of Bayou Barataria and winched it over log rollers into the shed. Dufrene then proceeded to saw the boat in half with a hand saw, winch the bow forward exactly nine feet, and finally, "fill in the gap" with a new keel, ribs, planking, the lot. "You can't see where the section was added," Dufrene says with obvious pride. During the work, Dufrene also widened the launch's beam from eight to nine feet. "You never could see it was a repair job," he says with pride.

Dufrene's boat shed fronts Bayou Barataria at the end of Dufrene Lane. Since he began building boats in it 48 years ago, the shed has been altered and enlarged three times. Weathered and sagging precariously in several places, the shed is



The Dufrene's showing off a 22-foot racing pirogue built by Bill. Photo by Tom Frazer

filled with piles of wood and hull templates. Several racing pirogues hang from the rafters. The only power tools in sight are a bandsaw and a table saw.

Bow stems are often crafted from Spanish cedar timbers which Dufrene shapes into a graceful curve with an adz. He uses a wood chisel to chip out a groove on either side of the bow stem to accept the ends of cypress planks.

"Very few people on the bayou know wood like Bill," says Vic Billiot of nearby Crown Point and a first cousin of Dufrene. "When he picks up a piece of wood, he'll turn it two or three times and look at it before he cuts or bends it. He's just got so much experience."

Billiot says when Dufrene built 50- and 60-foot shrimp luggers years ago, "he used mostly hand tools: hand saws and a hand adz. He wouldn't sand the hull, but would plane it smooth with a hand plane." Adds Billiot, "He built many a fine round-bottomed lugger, and he was especially good at building round cabins. When I was young, they talked about him building boats."

Dufrene is set to build a larger, 38-foot Lafitte skiff for Lionel to replace his son's current 28-foot skiff. He's got all the materials for it.

Now near the end of his career, Dufrene remains full of pride. "Anything they want - I can build it out of wood," he insists.

Tom Frazer of Metairie, Louisiana is a newspaper writer, woodworker, and frequent contributor to Wood News.

©1987 by John Wermescher

Please don't be misled by claims you may hear about building a usable boat in a weekend or two. You will always discover that along with such claims comes a schedule of ifs, ands and buts. I have no quarrel with the "Instant Boat" systems that are becoming popular. Phil Bolger has designed and Herb "Dynamite" Payson has marketed and promoted a series of "tack and tape" boats that are built quickly and easily by the amateur. This is great, for it gives the untrained boatbuilder a chance to get out a usable boat at a minimum of risk in materials and labor. I have recommended Payson's book in a previous column.

Begin with a set of plans. When you order a set of plans from a reputable designer, you will receive a package of sheets and schedules to work from. Often a designer will offer "study plans" at a fraction of the plans' cost. This is simply an outboard profile of the boat, perhaps a drawing or two more, some photos if there is a completed boat, and a write-up about the boat's characteristics and building ease. The cost of this study package is deductible from the plans when you order.

To illustrate a good set of plans, I have turned to Mr. John Atkin. He and his father, Billy Atkin, have spanned most of a century in designing fine small wooden boats. The plans and writings of these two men have inspired thousands of lovely craft. If you want solid boat designs and solid information on small boats, you can do no better than Atkin. See the reading reference at the end of this column.

Mr. Atkin has provided us with the plans for **Captain Cicero**, a 29'10" "knockabout" sloop, designed jointly by Billy and John Atkin some years ago for the late E.B. White. The lines, drawings, and Table of Offsets - done in the distinctive Atkin style - are illustrative of a typical round bottom traditional set of plans.

When you take your set of plans out of the wrapper and look the sheets over, you will likely find the following:

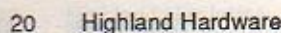
A set of Lines together with a Table of Offsets. This is the heart of the whole thing. With this alone, a professional boatbuilder can do the job. We'll talk about this in detail.

Outboard Profile and Plan. This usually shows some of the boat as she looks on deck and some below decks. That's the Plan. The Profile shows how she'll look sitting in the water, viewed from a dinghy out to the side.

Inboard Profile. Again, a side view, but in section, slicing through the boat to show interior layout.

Framing Plan. This is a view from above showing, on half the boat, how the hull is framed; i.e., one side of the frames, stringers, etc. The other half shows the deck framing.

Scantling Midship Section. This is a cutaway through the boat crossways to show



thing always to bear in mind with templates and patterns. Paper changes shape. Plywood and hardboard don't.

What to do with a set of plans? Two things: use the Lines and Offsets to loft the boat full size. Study the rest to learn how to proceed with setup and joinery. That's it.

Now I see I must climb back up on my soap box again. I'm not young and my legs are bad, so climbing up on the old soap box is painful, but necessary. There is — always has been — argument about lofting lines full size. Has something to do with laziness.

You see ads for plans that read "No lofting necessary". Fine. Many boats are built without lofting to full size. Occasionally some are even successful. If you get a set of plans for the instant-type of boat and the designer provides you with information in a manner that eliminates the need to loft full size, and you feel fully confident, go to it.

However, you are hereby warned. If you build in the conventional manner, you must loft to full size. If you are going to build a fifty footer, you'd better find yourself a building with a 55-foot smooth wood floor to loft on. Failure to do this is just asking for future grief. So many dimensions, angles, curves and shapes have to be adjusted for fairness for the whole thing to work right. Only on a full-size lofting can you have these things there at your feet, ready to transfer to actual stock.

But I'm getting ahead of myself. We'll talk about lofting next time. Now you need to understand how the set of Lines and Table of Offsets provides you with the means to loft. It is important to understand how the designer arrives at his set of Lines and Table of Offsets.

In days of yore, and sometimes today even, he built a "half model". This was an actual model of the boat he had in mind, made of soft pine or mahogany, and to some scale, perhaps 3/4" to the foot. For a twenty footer, he'd have a model fifteen inches long. Since both sides of a boat are identical, there was no need to waste time and wood on a full model. He made only half of it and glued it to a board. There's more to it than this simple explanation. If you're interested in half-model theory and construction, look up the material listed at the end of this column.

The designer would whittle away, turning the half model in his hand this way and that, looking at every curve, sanding and scraping, adding a bit here, shaving a bit there, until he was satisfied that he had created a shape which would perform the way he intended. He then gave it a few coats of shellac to seal it, glued it to a board, and proceeded to take a number of special measurements from it.

Modern designers accomplish the same thing graphically, using mathematical and geometric techniques to get a set of lines down on paper to scale, which represent the modeled shape. Ultra-modern designers use a computer with software specific to the process.

Whatever method is used to arrive at a boat's shape - and we're talking about only the hull shape here, the part that moves through the water, up to the deck - there is a standard of presenting measurements to describe that shape. This must be grasped to know anything about how to reproduce the lines full size, or to build the boat.

Imagine, if you will, that you have a wooden model of the boat and you take it to the bandsaw, turn it on its side, and begin slicing through it at $3/4"$ intervals, parallel to the waterline of the boat. You'll end up with a stack of $3/4"$ slices all parallel to the boat's waterline. One of those cuts should pass right through the boat's Designed Waterline (DWL). The shape of that slice, i.e. the edge line, is the DWL. The shape of the slice just above it is $3/4"$ away from the

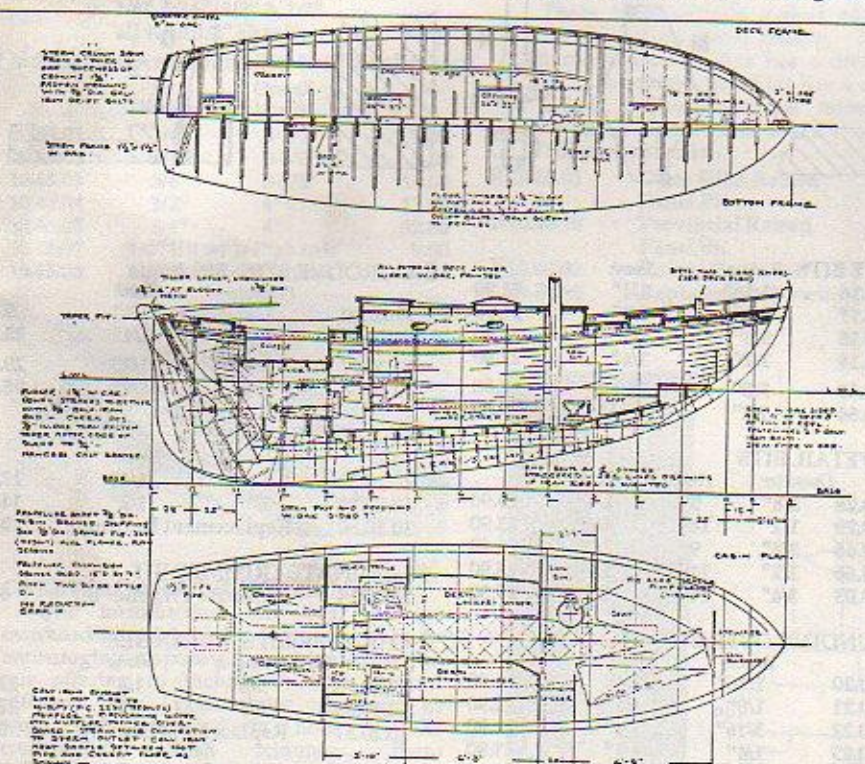
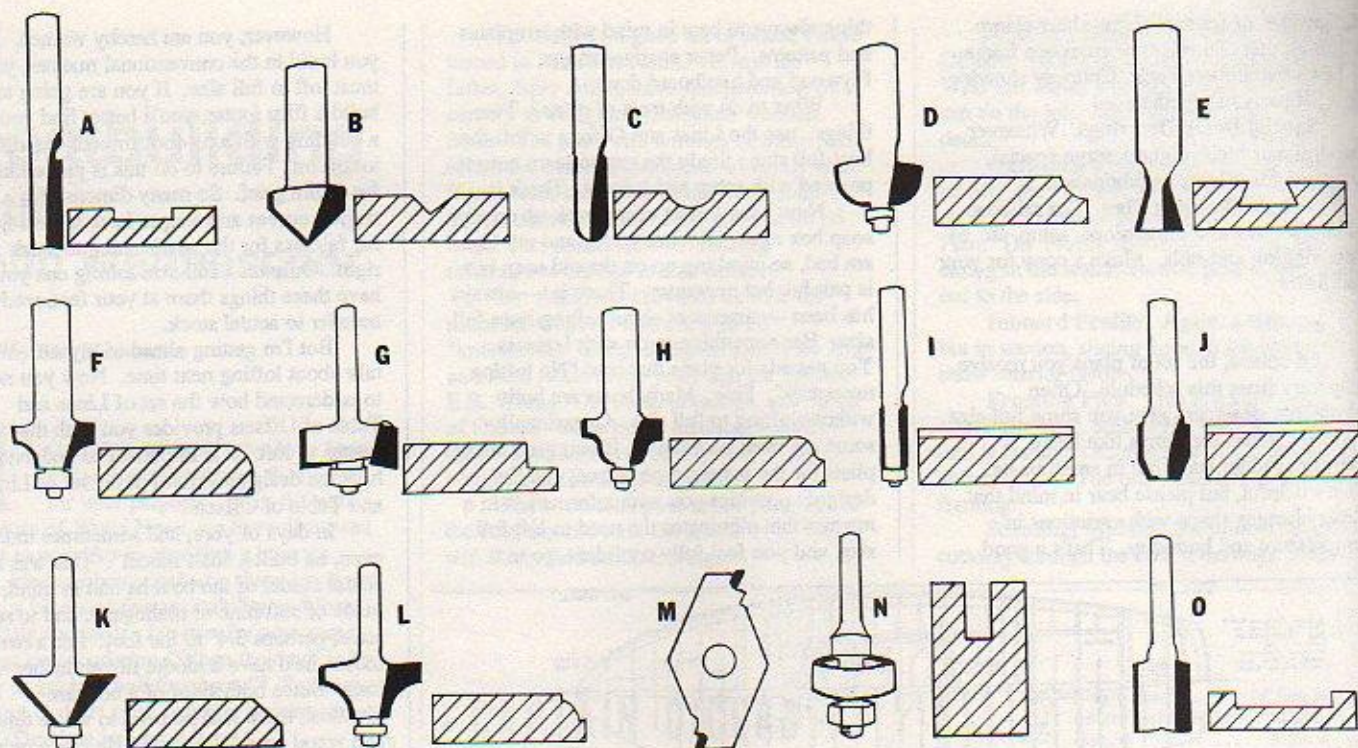


TABLE 25-10' x 25-0' x 5' x 4-0' N ARIKLEVO ENDOCRONT V														
STATION	A	B	C	D	E	F	G	H	I	J	K	L	M	N
UNDER SIDE OF RAIL CAP	0.0	4.4%	4.2	3.0%	3.7	3.3%	3.1	2.8%	2.7%	2.5%	2.3%	2.1%	2.0%	1.9%
BASE TO R2	8.3	0.0%	4.0	4.0	3.7	3.4%	3.1	2.8%	2.6%	2.4%	2.2%	2.0%	1.8%	1.7%
• B1	6.2%	4.8%	3.3%	3.2%	2.9%	2.7%	2.5%	2.3%	2.1%	1.9%	1.7%	1.5%	1.3%	1.2%
• WBBET	5.1%	3.2%	2.0%	2.0%	1.7%	1.5%	1.3%	1.1%	0.9%	0.7%	0.5%	0.3%	0.2%	0.1%
• KHEL	4.1%	3.4%	2.0%	2.0%	1.7%	1.5%	1.3%	1.1%	0.9%	0.7%	0.5%	0.3%	0.2%	0.1%
• TOP OF IRON					2.4									
• • • LEAD						2.1%								
• • • SHAFY							1.7%							
BASE TO SHAPE (EDGE OF DRUM)	3.3%	3.6%	3.3	2.1%	2.0%	2.4	2.4	2.2%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%
HALF BREADTHS														
UNDER SIDE OF RAIL CAP	0.0%	1.3%	2.2%	2.2%	2.0%	1.7	1.5	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
LL 6	1.5	2.2%	2.2%	2.2%	2.0%	1.7	1.5	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
LL 4	0.2%	1.8%	2.2%	2.2%	2.0%	1.7	1.5	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
LL 2	0.15%	2.1%	2.0	2.0	1.7	1.5	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
LL 1	0.0%	1.2%	2.2%	2.2%	2.0%	1.7	1.5	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
WL 1			0.1%	0.1%	1.7%	2.2%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%
WL 2					0.4	0.5	0.4%	0.7%	0.8	0.7%	0.6%	0.5%	0.4%	0.3%
HALF SIDING OF KHEL			0.2%	0.1%	0.2%	0.3%								
DIAGONALS														
D1			0.1	0.7	0.11	1.1%	1.8%	1.4%	1.5	1.4	1.1%	0.1%	0.4	
D2			0.1	0.1%	1.4%	2.0	2.3%	2.5%	2.4	2.5%	2.0%	1.7	0.0%	
D3			0.0%	1.4%	2.5	2.1%	2.4%	2.4%	2.7%	2.4%	2.1%	2.1%	1.0%	0.10%
D4			1.5	2.6	2.3%	3.0%	4.1%	4.4%	4.8%	4.6%	4.0%	3.4%	3.4%	2.2

DIMENSIONS IN FEET AND INCHES TO OUTSIDE OF PLATING.

(continued on page 30)



CARBIDE TIPPED ROUTER BITS

Our industrial duty router bits are carbide tipped and sharpened to a mirror edge for clean fast cutting. All bits have high hook angles for better chip clearance, and all cutting edges are radially relieved to reduce friction. Order these professional bits with confidence.

A STRAIGHT BITS

	Cutter Diameter	Shank Diameter	
10.20.01	1/8"	1/4"	9.90
10.20.02	3/16"	1/4"	9.90
10.20.03	1/4"	1/4"	9.90
10.20.04	5/16"	1/4"	10.80
10.20.05	3/8"	1/4"	10.80
10.20.08	7/16"	1/4"	11.90
10.20.06	1/2"	1/4"	11.90
10.20.07	5/8"	1/4"	11.90
10.20.08	3/4"	1/4"	13.30
10.20.89	7/16"	1/2"	11.90
10.20.81	1/2"	1/2"	11.90
10.20.53	5/8"	1/2"	13.80
10.20.54	3/4"	1/2"	14.90
10.20.55	7/8"	1/2"	17.70
10.20.56	1"	1/2"	18.90

C ROUND NOSE BITS

	Radius	Shank	
10.20.59	1/16"	1/4"	16.80
10.20.60	1/8"	1/4"	17.60
10.20.12	3/16"	1/4"	19.90
10.20.13	1/4"	1/4"	19.90
10.20.14	5/16"	1/4"	20.50
10.20.15	3/8"	1/4"	20.90
10.20.82	1/2"	1/4"	33.90
10.20.61	1/4"	1/2"	24.20
10.20.62	3/8"	1/2"	28.90
10.20.83	1/2"	1/2"	42.30
10.20.84	5/8"	1/2"	49.30

D COVE BITS

	Radius	Shank	
10.20.16	3/16"	1/4"	24.90
10.20.17	1/4"	1/4"	24.90
10.20.18	3/8"	1/4"	24.90
10.20.19	1/2"	1/4"	27.90
10.20.63	3/8"	1/2"	26.80
10.20.64	1/2"	1/2"	29.80

E DOVETAIL BITS

	Diameter	Angle	Shank	
10.20.28	3/8"	9°	1/4"	13.90
10.20.29	1/2"	14°	1/4"	13.90
10.20.65	3/8"	9°	1/2"	14.90
10.20.66	1/2"	14°	1/2"	15.90
10.53.03	3/4"	14°	1/2"	49.50

F ROUNDING OVER BITS

	Radius	Shank	
10.20.20	1/16"	1/4"	21.90
10.20.21	1/8"	1/4"	21.90
10.20.22	3/16"	1/4"	21.90
10.20.23	1/4"	1/4"	21.90
10.20.24	5/16"	1/4"	23.30
10.20.25	3/8"	1/4"	23.30
10.20.26	1/2"	1/4"	26.50
10.20.68	1/4"	1/2"	22.50
10.20.69	5/16"	1/2"	24.50
10.20.70	3/8"	1/2"	24.50
10.20.71	1/2"	1/2"	28.50
10.20.27	3/4"	1/2"	42.50
10.20.85	1"	1/2"	90.00
10.20.86	1-1/4"	1/2"	120.00
10.20.87	1-1/2"	1/2"	128.00
10.20.50	Replacement Bearing		3.80

G RABBETTING BITS

	Depth	Shank	
10.20.30	3/8"	1/4"	22.60
10.20.72	3/8"	1/2"	22.60
10.20.50	Replacement Bearing		3.80

H ROMAN OGEE BITS

	Radius	Shank	
10.20.31	5/32"	1/4"	29.90
10.20.32	1/4"	1/4"	30.90
10.20.73	5/32"	1/2"	29.90
10.20.74	1/4"	1/2"	30.90
10.20.51	Replacement Bearing		3.80

B V GROOVE BITS - 90° Angle

	Diameter	Shank	
10.20.10	1/4"	1/4"	9.80
10.20.11	1/2"	1/4"	23.30
10.20.57	5/8"	1/2"	29.80
10.20.58	3/4"	1/2"	35.90

I FLUSH TRIM BITS

	Cutting Length	Shank	
10.20.33	1"	1/4"	12.50
10.20.75	1"	1/2"	14.50
10.20.50	Replacement Bearing		3.80

J LAMINATE TRIMMER BIT

10.20.34	Laminate Trimmer Bit	8.90
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K CHAMFER BITS - 45° ANGLE

	Carbide Length	Shank	
10.20.76	5/8"	1/4"	22.50
10.20.35	5/8"	1/2"	22.50
10.20.51	Replacement Bearing		3.80

L BEADING BITS

	Radius	Shank	
10.20.36	1/16"	1/4"	21.80
10.20.37	1/8"	1/4"	21.80
10.20.38	3/16"	1/4"	21.80
10.20.39	1/4"	1/4"	21.80
10.20.40	5/16"	1/4"	23.30
10.20.41	3/8"	1/4"	23.30
10.20.77	1/4"	1/2"	22.50
10.20.78	3/8"	1/2"	24.60
10.20.79	1/2"	1/2"	28.50

TWO WING SLOT CUTTERS

	Thickness	
10.20.43	1/8"	10.90
10.20.44	1/4"	10.90
10.20.45	1/4" Arbor & Bearing	5.50
10.20.88	1/2" Arbor & Bearing	5.50
10.20.49	Replacement Bearing	3.80

O MORTISING BITS

	Cutting Diameter	Shank	
10.20.46	1/2"	1/4"	10.80
10.20.47	5/8"	1/4"	12.30
10.20.48	3/4"	1/4"	13.80
10.20.80	1-1/4"	1/2"	21.60

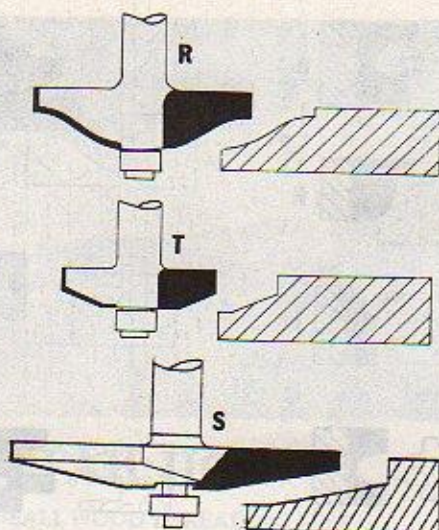
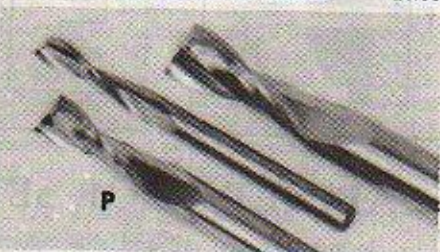
SPIRAL END MILL ROUTER BITS

The popularity of these indispensable bits has grown steadily since the publication of Tage Frid's article on mortising with a plunge router in *Fine Woodworking* (#30, Sept. 1981). The cutting edges extend all the way along the bottom of the bit, allowing it to be plunged vertically like a drill bit into the surface of a workpiece, and then moved laterally like a conventional router bit to create mortises or slots for splines. Steep spiral flutes can plunge vertically as deep as the shank allows, and can easily handle a 3/8" depth of cut per pass. These high-speed steel bits are the fastest, cleanest-cutting mortising tools we've seen. Offered in five sizes, all with 1/2" shanks. Also available are the 1/4" bit with 1/4" shank, and the 3/8" bit with 3/8" shank.

10.45.06 Set of 4 Spiral Bits
1/4", 5/16", 3/8" & 1/2"
all with 1/2" shanks 36.00

P Individual Spiral Router Bits (1/2" shanks)

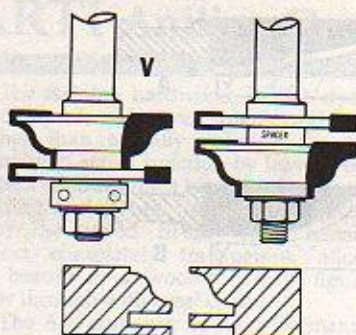
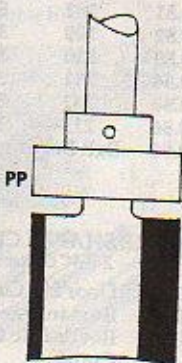
Bit	Diameter	Overall Length	
10.45.01	1/4"	3-1/4"	9.00
10.45.02	5/16"	3-3/8"	9.50
10.45.03	3/8"	3-1/2"	10.00
10.45.04	1/2"	4"	11.50
10.45.05	3/4"	4"	32.50
10.45.07	1/4" Bit w/ 1/4" shank		9.00
10.45.08	3/8" Bit w/ 3/8" shank		10.00



RAISED PANEL BITS

These large carbide tipped router bits are useful for all panel raising. The ogee fillet raised panel cutter has a diameter of 2-1/2". The raised panel bit has a diameter of 1-3/4". The Provincial raised panel cutter has a diameter of 3-1/2". All have 1/2" diameter shanks.

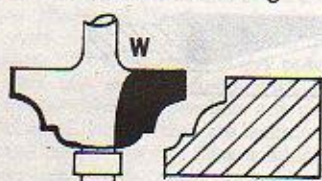
R 10.60.01	Ogee Fillet Raised Panel Bit	66.50
S 10.60.18	Provincial Raised Panel Bit	92.40
T 10.60.02	Raised Panel Bit	42.50
10.20.50	Replacement Bearing	3.80



V RAIL AND STILE BIT

This remarkable carbide bit reconfigures to cut both a rail and matching stile in 3/4" stock. 1-3/4" diameter. 1/2" shank.

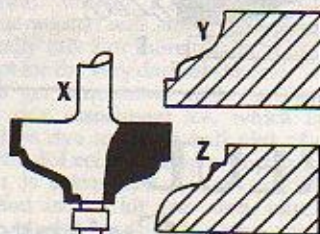
10.60.05	Rail and Stile Bit	78.40
10.60.08	Replacement Bearing	9.00



W CLASSICAL BITS

Carbide tipped. 1/4" shank model is 1-1/4" in diameter. 1/2" shank model has 1-1/2" diameter.

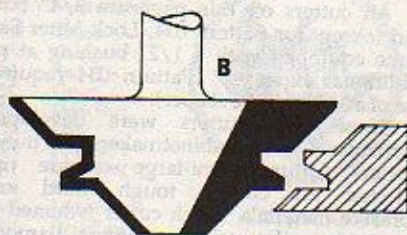
10.60.03	Classical Bit, 1/4" shank	29.95
10.60.04	Classical Bit, 1/2" shank	39.95
10.20.50	Replacement Bearing	3.80



OGEE FILLET BIT

This carbide tipped bit comes with two bearings, Y and Z, which when used with the bit produce the patterns illustrated respectively. Shank diameter is 1/2".

X 10.60.06	Ogee Fillet Bit	42.50
Y 10.60.07	Repl. Bearing Y	3.80
Z 10.20.50	Repl. Bearing Z	3.80



B LOCK MITER BIT

Carbide flutes ground to 45° have symmetrical tooth pattern for cutting effective glue surface in miter joints. The bit will trim stock from 1/2" to 1-1/8" thick. Note: on 3/4" or thicker stock, rough-cut the miter and use the bit only to trim the final shape. (1/2" shank)

10.60.83	Lock Miter Bit	89.95
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U PICTURE FRAME ROUTER BIT

This unique bit bores a hole in the back of a picture frame or plaque creating an interior lip to grip the head of a nail or screw. 1/4" shank. High speed steel.

07.51.07	Picture Frame Bit	16.95
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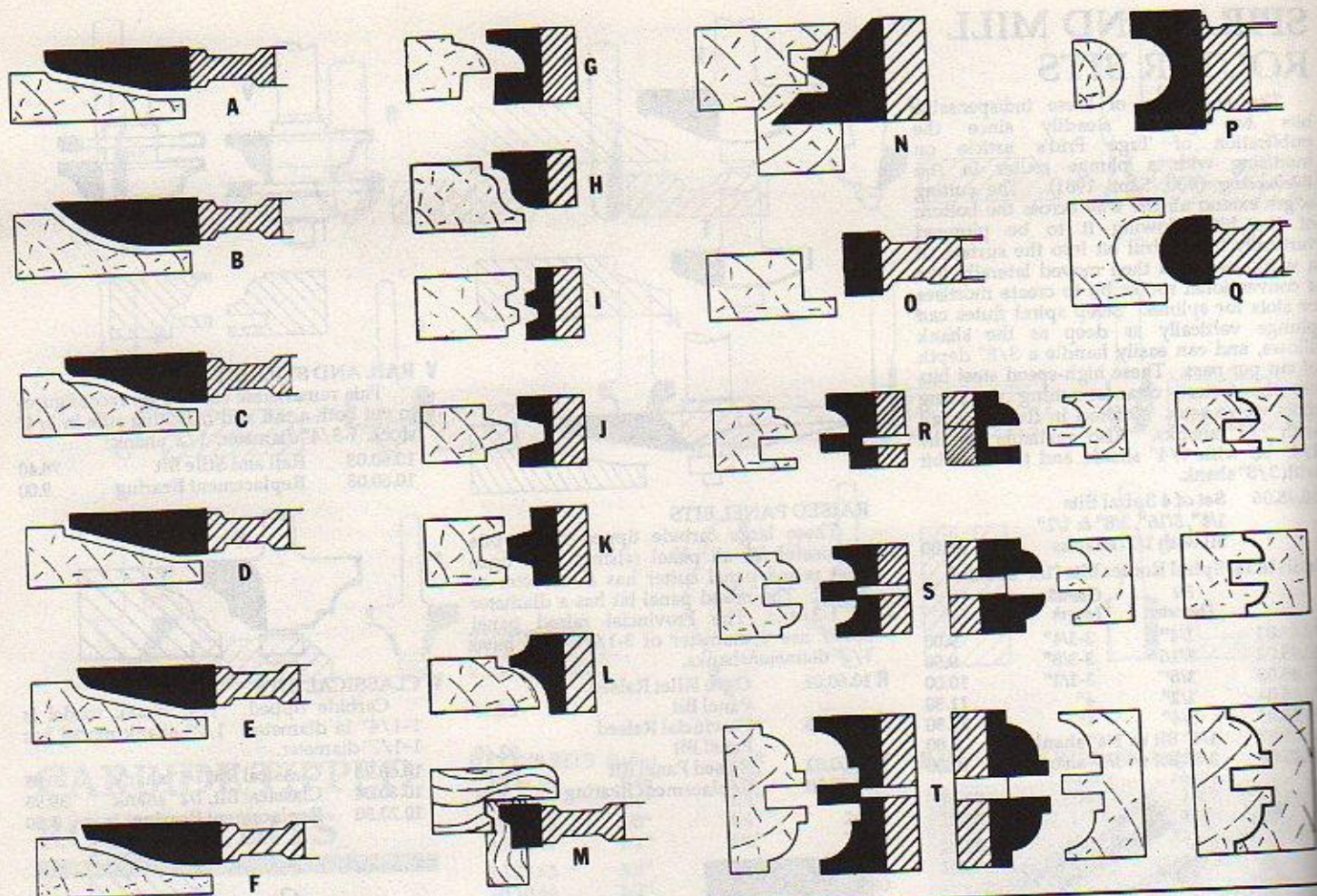
OVERHEAD-PILOT FLUSH TRIM BITS

Our introduction last year of the overhead-pilot trim bit has brought such an encouraging response that we've expanded our offering to include a total of four different bits. Prices have improved as well, we're pleased to note.) Like conventional flush trimmers, these overhead bits are ideal for final template-guided shaping of roughed-out stock, pattern duplication, edge truing, and so on. In many situations, however, the bearing on the bottom of the conventional bit gets in the way, and that's where these overhead-pilot bits really shine. Note that the maximum depth of cut will be considerably greater than the bits' cutting length, for as soon as part of the workpiece has been trimmed the template can be removed and the work itself used as a guide.

The 1/2" and 3/4" bits have 1/4" shanks for use in any router. The 1" bit has a 3/8" shank, and the huge 1-1/8" bit has a 1/2" shank. Please note that the max. cutting depth listed below may vary slightly depending on the design of your router.

Overhead-Pilot Flush Trim Bits

	Diameter	Cutting Length	Maximum Depth	
10.53.18	1/2"	11/16"	1-1/4"	19.95
10.53.19	3/4"	3/4"	1-1/2"	21.95
10.53.20	1"	1"	2"	23.95
10.53.22	1-1/8"	2-9/16"	4"	135.00



FREUD Shaper Cutters

Freud has long set the standards for industrial duty carbide-tipped shaper cutters. Now the range has been expanded, and the precision cutters illustrated here make available Freud's most popular cutter patterns for owners of shapers with 1/2" or 3/4" spindle diameter.

All cutters on this page are 3/4" bore and (except for pattern 034, Lock Miter Set) come equipped with a 1/2" bushing at no additional expense. (Pattern 034 requires use of a 3/4" spindle shaper).

These new cutters were developed particularly with cabinetmakers in mind. Cutters feature extra-large carbide tips selected for cutting tough, hard and abrasive materials. Each cutter is honed to a precision edge using a 400-grit diamond wheel. All are three-wing cutters built with a special anti-kickback design for operator safety. Ball bearing rub collars are available for straight edge, raised panel, and rail and stile cutters.

Each cutter is manufactured to instrument-gauged accuracy, properly balanced, and submitted to rigorous quality control procedures.

We are pleased to make these high quality carbide tipped shaper cutters available to you at very affordable prices.

RAISED PANEL CUTTERS

	Pattern No.	Stock Thickness	Cutter Dia.	
A 11.20.51	202	5/8"	5"	99.95
B 11.20.52	209	3/4"	5"	99.95
C 11.20.53	210	3/4"	5"	99.95
D 11.20.54	211	3/4"	5"	99.95
E 11.20.55	212	3/4"	5"	99.95
F 11.20.56	213	3/4"	5"	99.95
11.20.86	Ball Bearing Rub Collar			35.00

3/4" BORE SHAPER CUTTERS

	Pattern No.	Cutter Width	Cutter Dia.	
G 11.20.57	001	2-7/8"	5"	49.95
H 11.20.58	005	2-7/8"	5"	49.95
I 11.20.59	031	2-7/8"	5"	49.95
J 11.20.60	032	2-7/8"	5"	54.95
K 11.20.61	033	2-7/8"	5"	54.95
L 11.20.62	044	2-7/8"	5"	59.95
M 11.20.63	240	2-7/8"	5"	54.95
N 11.20.64	034	2-7/8"	5"	99.95

0 STRAIGHT EDGE CUTTERS

	Pattern No.	Cutter Width	Cutter Dia.	
11.20.65	140	1/4"	2-7/8"	36.95
11.20.66	141	3/8"	2-7/8"	39.95
11.20.67	142	1/2"	2-7/8"	44.95
11.20.68	143	5/8"	2-7/8"	46.95
11.20.69	144	3/4"	2-7/8"	49.95
11.20.70	146	1"	2-7/8"	54.95
11.20.87	Ball Bearing Rub Collar			35.00

CABINET DOOR SET

Includes EC-260 rail and stile cutter, EC-210 raised panel cutter, EC-001 door in cutter, and EC-031 reversible glue joint cutter, all packed in a fitted wood case along with an instruction booklet.

11.20.90 EC-900 Cabinet Door Set 325.00

P CONCAVE RADIUS CUTTERS

	Pattern No.	Width Opening	Radius	
11.20.71	120	1/4"	1/8"	49.95
11.20.72	121	3/8"	3/16"	49.95
11.20.73	122	1/2"	1/4"	49.95
11.20.74	123	5/8"	5/16"	49.95
11.20.75	124	3/4"	3/8"	49.95

Q CONVEX RADIUS CUTTERS

	Pattern No.	Cutter Width	Radius	
11.20.76	101	1/4"	1/8"	49.95
11.20.77	102	3/8"	3/16"	49.95
11.20.78	103	1/2"	1/4"	49.95
11.20.79	104	5/8"	5/16"	49.95
11.20.80	105	3/4"	3/8"	49.95

RAIL AND STILE CUTTER SETS

	Pattern No.	Stock Thickness	Cutter Dia.	
R 11.20.81	260	3/4"	2-7/8"	199.95
S 11.20.82	266	1"	2-7/8"	199.95
T 11.20.83	270	1-3/8"	2-7/8"	199.95
T 11.20.84	274	1-3/4"	2-7/8"	199.95
11.20.85	Ball Bearing Rub Collar			35.00



LEIGH ROUTER DOVETAIL JIGS

During the past few years Leigh jigs have revolutionized the business of cutting dovetails. They offer infinitely variable size and spacing of pins and tails, surprisingly easy set-up, and a degree of precision which has to be seen to be believed. Though these are not inexpensive tools, they are far more affordable than many other dovetailing jigs on the market, and they represent a sound investment for any shop where dovetails are commonly used assembly joints in one-of-kind or production pieces.

There are two kinds of Leigh dovetail jigs, and two lengths of each. Models A and B are the original models which were designed for cutting through dovetails only. They offer 12" and 24" width capacity respectively. They can be used to produce dovetails at 14°, in stock up to 1" thick (the pin piece must be rabbetted to fit the maximum depth of the dovetail bit used on the tail piece). The jigs may be used with 1/2" or 3/4" dovetail bits, along with 5/16" or 1/2" straight bits and 7/16" OD or 5/8" OD guide bushings.

Models C and D are the 12" and 24" lengths of the deluxe model which allows cutting of either through or half-blind dovetails with the same variable spacing and precision set-up. In through-dovetail mode, these models are designed for cutting at an 8° angle, providing a sleeker and more custom look to the joint, particularly in thick stock. In half-blind mode, both halves of the joint are cut with the same dovetail bit (much like the operation of conventional half-blind jigs); thus any angle of bit will be usable (7, 8, 9, 14, 15° etc.) With models C and D, an 8° 1/2" dovetail bit and a 5/16" straight bit are included as standard equipment. 8° bits in other sizes are offered below. Models C and D also simplify control over joint tension and fit, though all four Leigh jigs are easy to set up, and once set, perform reliably time after time in the production of precisely sized dovetails.

10.53.01	Model A Leigh Jig	149.00
10.53.02	Model B Leigh Jig	219.00
10.53.03	Model C Leigh Jig	295.00
10.53.04	Model D Leigh Jig	349.00

Dovetail Bits				Max.
	Dia.	Depth	Sharik	
10.53.11	3/8"	1/4"	1/4"	29.50
10.53.12	1/2"	13/16"	1/4"	29.50
10.53.13	11/16"	1"	1/2"	39.50
10.53.14	13/16"	1-1/4"	1/2"	49.50

BEALL WOOD THREADING KITS

Wood threads can be produced on dowels on a production basis with a router using the Beall wood threading kit. Any router attaches to the housing, and as a dowel is fed through the appropriate sized insert, a HSS 60° spiral veiner bit cuts perfect, uniform threads every time. The only router adjustment required is setting the appropriate depth of cut. Manual taps are provided for cutting matching internal wood threads.

Sold as a complete outfit for three sizes of dowels (1/2", 3/4", and 1"), or choose one size to begin and add other sizes of inserts and taps later as needed.

Included in a kit are molded plastic housing, threaded insert for appropriate size, matching tap, router bit, and instructions.

Beall Wood Threading Kits		
10.53.51	3 Size Kit Complete	125.00
10.53.52	1/2" Kit Complete	57.95
10.53.53	3/4" Kit Complete	59.95
10.53.54	1" Kit Complete	64.95
10.53.55	1/2" Tap & Insert Only	29.95
10.53.56	3/4" Tap & Insert Only	33.50
10.53.57	1" Tap & Insert Only	38.50
10.53.58	Spare Router Bit	11.50



J ROUTER DOVETAIL JIG

This simple fixture is useful in producing 1/4" and 1/2" dovetail joints quickly and accurately on boards up to 8" wide. By following the contour on the template of the fixture with 5/16" or 7/16" guide bushings, flush, offset, and rabbetted dovetail joints are possible in the 1/2" size and flush dovetails can be made in the 1/4" size.



10.64.01	Router Dovetail Jig	24.95
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ARTI Aniline Dyes

For staining hardwood, aniline dyes are much preferred over pigmented stains. Rather than actually coloring the wood, pigmented stains function by leaving on the wood a residue which tends to obscure subtle shading and figure. Aniline dyes actually color the wood fibers while remaining almost completely transparent, allowing the beauty of a wood's natural figure to show through with great clarity.

The Arti company of West Germany has been known since the 1920's as the world's leading manufacturer of aniline dyes. In his heralded book *Adventures in Wood Finishing*, George Frank speaks of Arti's leadership in the dye making industry, and the outstanding consistent quality of their dyes. Until recently, however, Arti dyes were almost impossible to find in the U.S.

Now Highland Hardware is pleased to make Arti dyes readily available to our customers. The dyes come in dry powdered form, and are easily mixed with boiling water to economically produce any quantity in liquid form. Instructions are included.

Listed below are the 12 available colors of *Artiporin* dyes, which are especially formulated for open-pored woods (such as oak, mahogany and walnut) and the 24 colors of *Articidol* dyes for all other woods. A chart of the 36 colors is available from us for \$1.00 ppd. The chart is free on request when accompanied by an order for dyes.

The dyes are available in packages of 100 grams (about 3.5 oz. net wt.) and 1 kilogram (about 2.2 lbs.). Although concentrations will vary, 100 grams will generally mix 2 or more quarts of liquid dye (except for the very darkest shades).

To get acquainted with the Arti dyes, order our assortment kit, which includes sufficient dye to mix a half pint of each of 10 *Articidol* colors, along with a color chart of the 36 colors and a user's guide. Dyes included in the kit are: red, blue, green, gray, black, rosewood, light mahogany, light oak, medium walnut and dark pear.

When ordering individual dyes, specify the quantity, weight, color number, and color name of the dyes you want.

19.60.01	Arti Dye, 100 grams	9.95
19.60.02	Arti Dye, 1000 grams	64.95
19.60.03	Color Chart (postpaid)	1.00
19.60.04	Assortment of 10 Dyes	19.95

ARTICIDOL DYES

(for most woods)

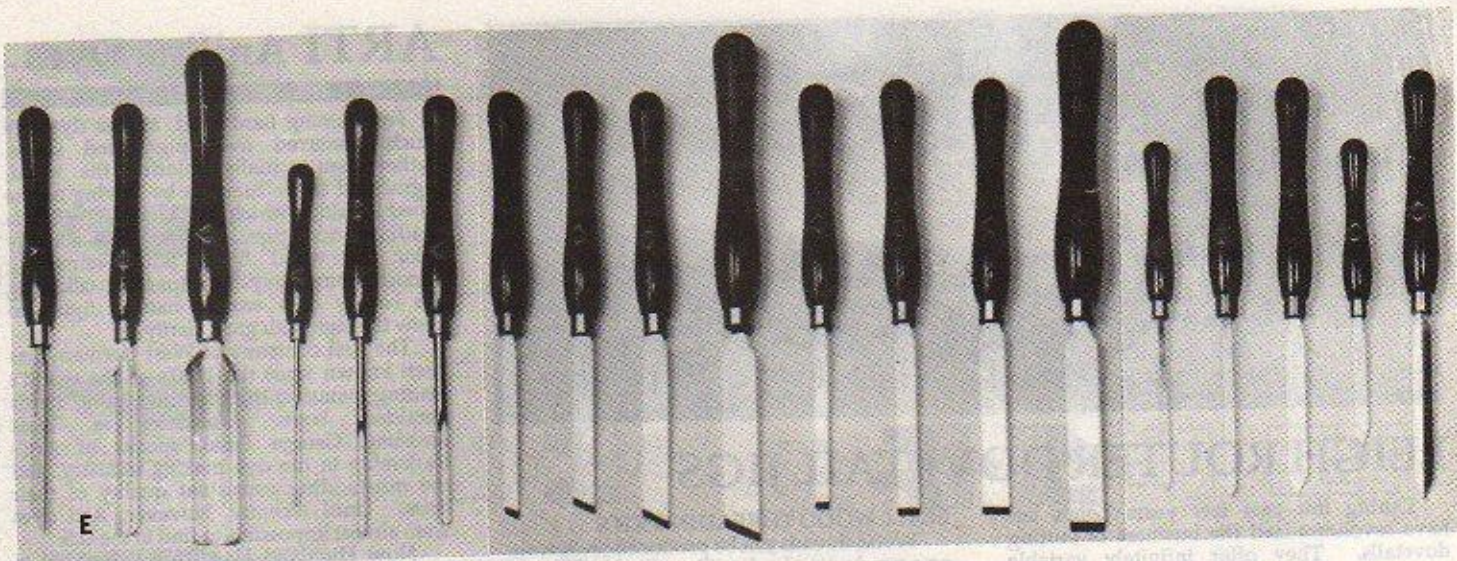
1150	Yellow
128	Orange
129	Red
124	Green
138	Dark Blue
118	Grey
1834	Antique
106	Light Oak
841	Teak
1843	Light Pear
1836	Dark Pear
103	Light Mahogany
1832	Cherry
486	Light Walnut
1845	Red Walnut
574	Medium Walnut
102	Rosewood
104	Dark Mahogany
107	Dark Oak
101	Dark Walnut
100	Antique Walnut
115	Moor Oak
1839	Dark Rosewood
134	Deep Black



ARTIPORIN DYES

(for open-pored woods)

1605	Light Oak
1601	Teak
1609	Light Walnut
1610	Medium Walnut
1602	Medium Oak
1604	Mahogany
1615	Olive Oak
1616	Smoked Oak
1607	Antique Oak
1611	Walnut
1603	Dark Oak
1612	Dark Brown



HIGH SPEED STEEL TURNING TOOLS

High Speed Steel turning tools represent a major breakthrough in edge tool technology, and provide the beginner and professional alike the satisfaction of sustained periods of high performance at the lathe without the inconvenience of frequent sharpening.

Diamic High Speed Steel tools feature a special steel especially formulated for its toughness, as well as its ease of sharpening to a fine edge and long edge-retaining characteristics. High Speed Steel's outstanding resistance to abrasion and frictional heat accounts for its ability to hold edges many times longer than turning tools of traditional carbon steel. The keen edge needs less pressure to cut and makes the tool easier to control. Fine finishing at high speed can be achieved to give a silky finish not possible with carbon steel tools.

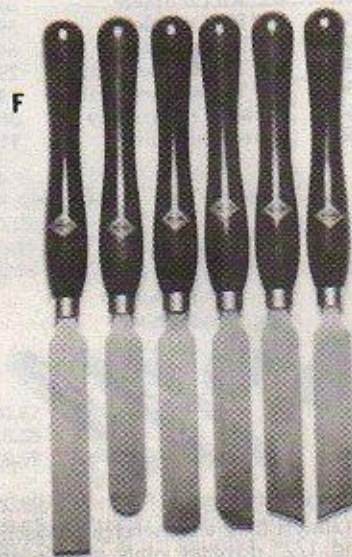
Peter and Roy Child, respected English woodturners and designers, collaborated with Henry Taylor Tools of Sheffield to produce this fine collection of tools which are without equal in today's marketplace.

Tools are available individually, or as a set of the 3 turning gouges - 1/4", 3/8", and 1/2", or as a basic set of 6 tools, which includes the 3 turning gouges, 3/4" roughing out gouge, 1/2" skew, and 1/8" standard parting tool. Tools range in length from 13" to 19" long.

E High Speed Turning Tools		
14.23.36	Set of 6 Basic Tools	89.95
14.23.37	Set of 3 Gouges	39.95
14.23.42	1/8" Fluted Part Tool	29.95
14.23.43	3/4" Roughing Gouge	28.50
14.23.44	1-1/2" Roughing Gouge	49.95
14.23.45	1/4" Turning Gouge	10.95
14.23.46	3/8" Turning Gouge	14.50
14.23.47	1/2" Turning Gouge	19.95
14.23.48	1/2" Skew	14.95
14.23.49	3/4" Skew	18.95
14.23.50	1" Skew	19.95
14.23.51	1-1/4" Skew	29.50
14.23.52	1/2" Square	14.95
14.23.53	3/4" Square	16.95
14.23.54	1" Square	19.95
14.23.55	1-1/4" Square	29.50
14.23.56	1/4" Bead & Part	10.95
14.23.57	3/8" Bead & Part	14.95
14.23.58	1/8" Std. Parting Tool	19.95
14.23.59	1/8" Small Parting Tool	12.95
14.23.60	1/8" Diamond Parting	26.95

HIGH SPEED STEEL BOWL SCRAPERS

Diamic HSS bowl scrapers take advantage of the same outstanding technology as the other HSS turning tools for excellent performance and long periods of use between sharpenings. The tools are created from solid HSS bars 3/8" thick by 1-1/2" wide. The exceptional mass and resulting rigidity damps out vibration allowing an extremely smooth finish. Safe to use even with a large overhang over the tool rest. Overall length is 19". Available singly, or in a set of all six. You may also specify your selection of any three HSS scrapers.



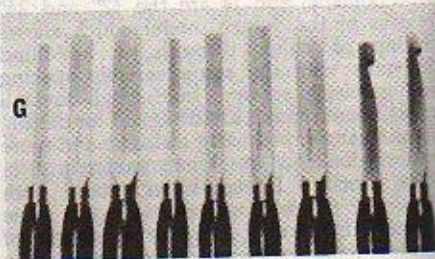
F High Speed Steel Bowl Scrapers		
14.23.38	Set of 3 Scrapers	99.95
14.23.39	Set of 6 Scrapers	195.00
14.23.40	Straight Scraper	39.95
14.23.41	Full Round Scraper	39.95
14.23.42	Domed Scraper	39.95
14.23.43	Righthand Half Round	39.95
14.23.44	Righthand Skew	39.95
14.23.45	Left-hand Skew	39.95



G HIGH SPEED TURNING SCRAPERS

The assortment of Diamic HSS bowl turning scrapers described at left has been expanded to include the popular square and round nose patterns in smaller sizes, and also two new patterns have been added. The round side cutting scraper and diamond side cutting scraper are ideal for turning the inside lip of bowls.

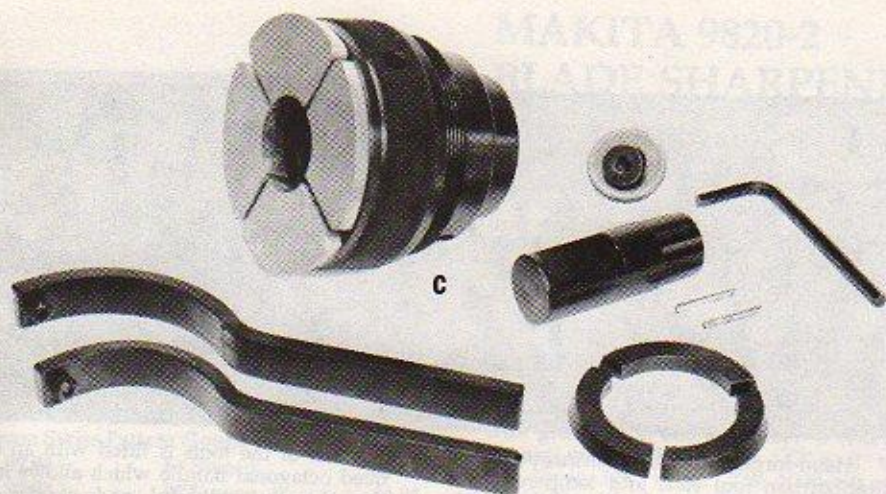
High Speed Turning Scrapers		
14.23.66	1/2" Round Nose	14.95
14.23.67	1" Round Nose	19.95
14.23.74	1-1/4" Round Nose	29.95
14.23.68	1/2" Square	14.95
14.23.69	3/4" Square	16.95
14.23.70	1" Square	19.95
14.23.71	1-1/4" Square	29.95
14.23.75	3/4" Round Side Cutting Scraper	19.95
14.23.76	3/4" Diamond Side Cutting Scraper	19.95



H SUPERFLUTE HSS BOWL GOUGE

The Superflute is a strong, well-balanced gouge manufactured by Henry Taylor Tools and designed to outperform other deep bowl gouges. Its blade is top quality High Speed Steel, carefully milled to an exact shape and precisely heat treated to the right temper. Its long hardwood handle is designed to increase leverage and provide a good grip. The blade takes a sharp edge that will last through hours of use roughing out, shaping and finishing. Size of the cutting edge is 3/4". The tool is 26" long overall.

14.23.35	Superflute
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PRECISION Combination Chuck

After years of research, the makers of the famed 6-in-1 chuck have made significant improvements in design, resulting in the new Precision Combination Chuck. This new chuck retains the most useful features of the 6-in-1, and adds new features as well. The new chuck is also engineered to allow for greater accuracy in all operations.

The Precision Combination Chuck operates as an expanding dovetail collet chuck, 3-way split ring chuck, collar chuck, internal screw chuck (cup chuck) and 1" pin chuck. Included as standard equipment are the body, outer ring, center boss, 1-3/4" 3-way split ring, 3-1/2" expanding dovetail collets, wrenches, and complete instructions.

Available optionally are faceplate rings, additional expanding collets, additional split ring sizes, additional pin chuck sizes, a spigot/collet chuck, and adjustable collet chucks. To use an adjustable collet chuck, order the collet conversion kit and either size adjustable collet.

Send us a SASE to receive a free copy of the operating instructions for this sophisticated chucking system.

C PRECISION COMBINATION CHUCK

	For Lathes By	
14.17.11	Sears Craftsman	99.95
14.17.12	Myford	99.95
14.17.13	Myford (outboard)	99.95
14.17.14	Rockwell 12"	99.95
14.17.15	Rockwell 12" (outbd.)	99.95
14.17.16	Shopsmith	99.95
14.17.17	Powermatic	99.95
14.17.18	Rockwell Homecraft	99.95
14.17.19	Hegner	99.95
14.17.20	Tyme Avon	99.95
14.17.21	Rockwell Beaver	99.95
	COLLETS	Diameter
14.17.41		3-3/4"
14.17.42		2-3/4"
14.17.43		2-1/2"
14.17.44		2"
14.17.45		1-3/4"

FACE PLATE RINGS

	For Collet Size	
14.17.51	3-1/2" or 3-3/4"	7.50
14.17.52	2-3/4"	6.50
14.17.53	2-1/2"	6.50
14.17.54	2"	6.50
14.17.55	1-3/4"	6.50

ADDITIONAL 3-WAY SPLIT RINGS

14.17.57	1-1/4"	9.95
14.17.58	1-1/2"	9.95

ADDITIONAL PIN CHUCKS

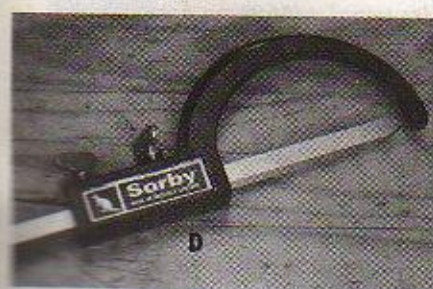
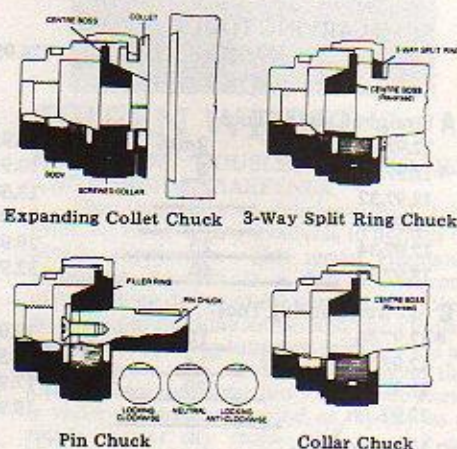
14.17.61	5/8"	12.95
14.17.62	3/4"	12.95
14.17.63	1-1/2"	12.95

SPIGOT/COLLET CHUCK

14.17.70	2" Spigot - 1-7/8" Collet	39.50
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ADJUSTABLE COLLET CHUCKS

14.17.71	Collet Conversion Kit	24.50
14.17.72	3/4" to 1" Collet	21.95
14.17.73	1-1/4" to 1-1/2" Collet	21.95



SIZING TOOL

An excellent tool for rapidly and accurately sizing turning work. The tool consists of a 3/8" beading and parting tool or 1/4" standard parting tool and is set to the diameter desired (up to 3-1/2"). Accurate repetitive cuts can then be made without the need for calipers.

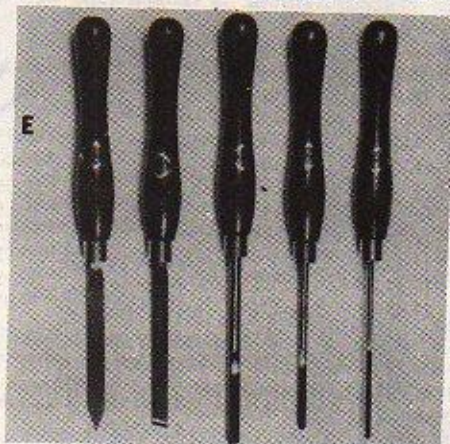
14.17.51 Sizing Tool 14.95



E SMALL HSS TURNING TOOL SET

These little Diamic brand high speed steel turning tools are extremely well made, and are excellent for intricate decorative turning. Though small in size they are well balanced for maximum control. Blades are approximately 5-6" long. Overall length is about 12". Set includes 1/6" gouge, 1/4" gouge, 3/8" gouge, 1/2" skew, and parting tool.

14.23.20 Small HSS Turning Set 49.95



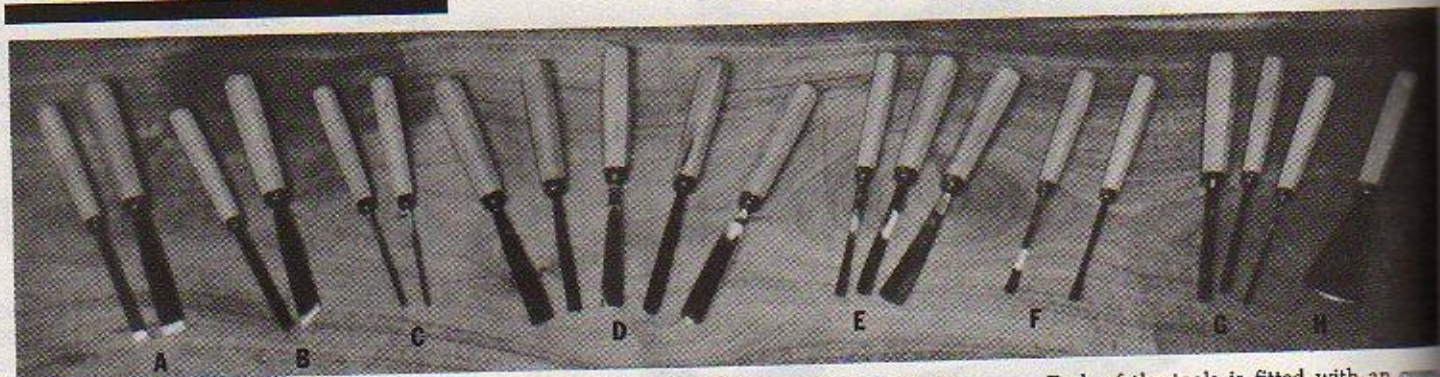
F SIDE-GROUND HSS DEEP GOUGES

During his 18-year turning career, the well-known Irish woodturner Liam O'Neill has developed an unusual method of side-grinding deep fluted bowl gouges, and now does over 90% of his bowl work using 3 of the modified tools. One advantage is that because the angle of the nose bevel is very steep, it can cut with the bevel rubbing, with the gouge over on its side, right to the center of the bottom of the bowl. The sharp side bevel can shear off a fine cut leaving a smooth surface even on end grain and spalted wood. Liam has supplied us with some of these (unhandled) Sorby bowl gouges which he has personally re-ground and signed. Included are instructions for using and sharpening, along with plans for making your own oversized handles.

Side-ground HSS Deep Bowl Gouges

14.17.91	1/4"	45.00
14.17.92	3/8"	50.00
14.17.93	1/2"	55.00
14.17.94	Set of 3	140.00

CARVING TOOLS



STAG Carving Tools

We are pleased to offer Hirsch Stag brand carving tools, regarded by many as Europe's finest woodcarving tools. Manufactured in Germany continuously since 1780, the Stag tools are second to none in performance and quality.

Hand-forged of West Germany's finest high carbon tool steel and tempered to a Rockwell hardness of 61, these carving tools are known for their ability to take an edge that will remain sharp during long periods of demanding professional use. The tools are finely polished inside and the bevel carefully ground. Some honing may be necessary before use.

Each of the tools is fitted with an oversized octagonal handle which allows for an exceptionally powerful and sturdy grip. Overall length of the tools averages 11".

Available in a set of 12 tools, or choose from among our variety of individual tools to suit your specific needs. Sizes listed are in mm. Items marked with • are included in the set of 12 tools.

STAG CARVING TOOLS

12.97.99 Set of 12 174.95

A Straight Carving Tool

12.97.98	2mm	10.95
• 12.97.31	6	10.95
12.97.32	14	13.50
12.97.33	18	14.95
12.97.34	25	19.95
12.97.35	40	32.95

B Skewed Carving Tool

• 12.97.36	10	10.95
12.97.37	14	13.50
12.97.38	20	17.95
12.97.39	25	19.95

C Veiner Gouge

• 12.97.96	1 V	23.50
12.97.97	2 V	23.50

#3 Straight Gouge

12.98.01	6	14.95
12.98.02	10	14.95
12.98.03	14	17.95
12.98.04	20	21.95
12.98.05	25	24.95
12.98.06	35	27.95

#5 Straight Gouge

• 12.97.40	6	14.95
12.97.41	10	14.95
12.97.42	14	17.95
12.97.43	20	21.95
12.97.44	25	24.95
12.97.45	35	27.95

D #7 Straight Gouge

12.97.46	6	14.95
12.97.47	14	17.95
12.97.48	20	21.95
• 12.97.49	25	24.95
12.97.50	35	27.95

#9 Straight Gouge

12.97.51	6	16.95
• 12.97.52	10	16.95
12.97.53	14	18.95
12.97.54	18	21.95
12.97.55	25	31.50
12.97.56	35	49.95

#11 Straight Gouge

12.97.57	6	16.95
• 12.97.58	10	16.95
12.97.59	14	18.95
12.97.60	18	21.95
12.97.61	25	31.50

#4 Bent Gouge

12.97.62	6	16.95
• 12.97.63	10	16.95
12.97.64	14	18.95
12.97.65	25	29.95
12.97.66	35	39.95

E #6 Bent Gouge

12.97.67	6	16.95
12.97.68	10	16.95
12.97.69	14	18.95
12.97.70	25	29.95
12.97.71	35	39.95

#8 Bent Gouge

• 12.97.72	6	16.95
12.97.73	10	16.95
12.97.74	14	18.95
12.97.75	25	29.95
12.97.76	35	39.95

#11 Bent Gouge

12.97.77	6	18.95
12.97.78	10	18.95
12.97.79	14	20.95
12.97.80	25	33.95
12.97.81	30	42.95

F #8 Spoon Gouge

• 12.97.82	10	16.95
12.97.83	14	18.95
12.97.84	25	32.95

#39 V Gouge

• 12.97.85	4	21.95
12.97.86	8	21.95
12.97.87	12	23.95

G #41 V Gouge

12.97.88	6	21.95
12.97.89	10	21.95
• 12.97.90	14	23.95

#45 V Gouge

12.97.91	4	21.95
12.97.92	8	21.95
12.97.93	12	23.95



MAKITA 9820-2 BLADE SHARPENER

With the introduction of our "Green wheel" silicon carbide coarse stone, one of our most popular machines has become twice as much tool for the money. Designed by and manufactured especially for Highland Hardware, the Green wheel (sold separately) brings to the 9820-2 the speed of a bench grinder for heavy stock removal on machine knives or hand tools, and provides carbide sharpening capability with remarkable economy, as detailed at right.

The 9820-2 comes equipped for sharpening jointer and planer knives up to 16" long with great speed and accuracy. It will handle any make of knife from 1/2" to 2" wide and up to 3/8" thick. The 1000-grit stone supplied with the machine will put a fine edge on even the dullest knife in a hurry, or will hone in less than a minute after grinding on the green wheel. An



optionally available 6000-grit stone is usually used for final polishing on hand tools, but can be used for putting a superior edge on machine knives when they're being used on really challenging lumber.

The great advantage of the Makita sharpener over conventional grinders lies in its use of waterstones; sharp, fast-cutting abrasives found only in Japanese waterstones and the cooling action of gravity-fed water lubrication allows efficient, non-stop sharpening while completely eliminating the danger of overheating a knife's cutting edge and spoiling its temper.

Doing your own sharpening with a 9820-2 also provides several important advantages over using commercial sharpening services: **ECONOMY** - you don't need two sets of knives; spend twenty minutes with the set that needs sharpening and put them right back on the machine. Your knives will also last many times longer when they're not subjected to an arbitrarily heavy and wasteful grind. And if you run carbide knives, see the description of the Green wheel - buying your own carbide capability can cost less than one sharpening! **QUALITY** - the standard 1000-grit stone provides an edge much sharper than the usual commercial grind, sharp enough to shave if you're good at it. This lets your machines do their job better and easier than ever, so you reduce wear on the machines, improve your millwork and reduce finishing time. And your knives will need sharpening less often to boot.

The 9820-2 will also put an edge on just about any hand tool in the shop. An optional accessory jig (made in USA) lets you grind and hone chisels and plane irons (up to 2-1/2" wide) to a straight, sharp bevel without worrying about heating the

edge. Carving tools, turning tools, even kitchen knives and scissors can easily be worked with the tool rest removed for full access to the stone.

Technical data is as follows: motor is rated for continuous duty at 175 watts, 1.6 amps at 110 volts, with no-load speed of 560 rpm. Weight (with stone) 19 lbs. Stones are 8" diameter, 1" thick, easily interchanged. Water supplied by removable, variable-flow tank. 16" machine knife holder (holds two or three short knives in tandem) is standard equipment.

The 9820-2 has long been one of our best-selling power tools; we've always recommended it as an excellent buy in a sharpening machine, and we're very proud to have improved it once again with the introduction of the Green wheel. For all your grinding and sharpening needs, we think there's no better value anywhere.

O 02.10.01	9820-2 Sharpener	195.00
P 02.26.01	Accessory Jig	10.00
02.64.30	120 Grit Green Wheel	39.00
02.10.03	1000 Grit Med. Wheel	32.00
02.10.04	6000 Grit Fine Wheel	45.00
02.10.05	Spare Wrench	2.50



GREEN WHEEL

NEW STONE DOUBLES AS GRINDER AND CARBIDE SHARPENER

After two years of development a true grinding stone is now available to owners of Makita sharpeners. This recent Highland Hardware product is a 120-grit silicon-carbide stone designed for very fast grinding on damaged machine knives and hand tools - and for sharpening tungsten carbide tools as well. (Please note we don't recommend the Green wheel for router bits.) Since the stone is water-cooled it can grind as rapidly as a much coarser dry stone with no risk of heating the tool, and yet the resulting edge is surprisingly smooth and sharp. High speed and carbon steel tools can then be further honed very quickly on the 9820-2's 1000-grit wheel; carbide knives can be refined if desired with diamond hones or on wet-or-dry silicon-carbide paper. Our performance tests on the Green wheel show that it wears just quickly enough to avoid any clogging or glazing; its relatively soft composition also insures a good bite on the hardest materials.

We're delighted to have qualified the 9820-2 as a fast grinder as well as an excellent sharpener, and we're quite pleased to have done so economically. Local sharpening services charge \$1.80 or more per inch of carbide knife; the Green wheel costs less than sharpening one 12" pair of carbide planer knives!

If you already own or are about to purchase a Makita sharpener, the Green wheel will significantly enhance maintenance of your edge tools.

Q 02.64.30	120-Grit Green Wheel	39.00
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SPECIAL
THROUGH JUNE 30, 1987
FREE GREEN WHEEL
with purchase of 9820-2

A \$39.00 value!



U 50mm Swiss Pattern Gouge		
12.97.94	#5 Sweep	44.95
12.97.95	#7 Sweep	44.95

U #5 Back Bent Gouge		
12.98.07	6	17.95
12.98.08	10	17.95
12.98.09	14	18.95

V #6 Fishtail Gouge		
12.98.13	10	14.95
12.98.14	14	18.95
12.98.15	20	23.95

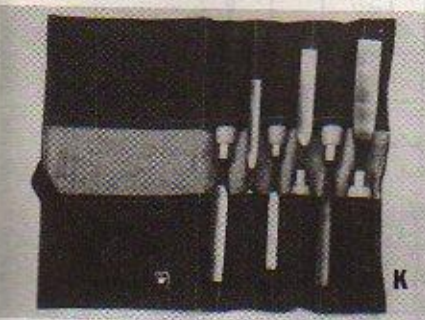
#39 Curved Parting Tool		
12.98.10	6	23.95
12.98.11	10	23.95
12.98.12	14	27.95



J TOOL ROLL POUCH

Designed by a carver who knows what your carving tools deserve. Room for 20 full-sized tools in heavy denim pockets. End of roll is sewn into a moisture-resistant dark brown vinyl pouch which zips up to protect tools from rust while traveling or in storage.

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Boatbuilding with John Wermescher

(continued from page 21)

DWL, so expanded to full size, it is the "12 Inch Waterline". The next one up is the 24 Inch Waterline. The shape of the slice just below the DWL is the -12 Inch Waterline, etc. If you traced these slices carefully in order on a sheet of paper, you'd have the first important Lines — the Waterlines.

Now imagine taking your model to the bandsaw, and holding it in a normal floating position, as it would sit in the water, taking off slices from the side, parallel to the boat's center plane, through stern, sternpost, and keel. This set of shapes is called the Buttock Lines, or simply, Buttocks.

Now suppose you took a half model and turned it so that you made diagonal slices along the length of the hull, not parallel to anything or to each other — just along diagonal wedges. These are the Diagonals.

These three groups in the Lines drawing, often superimposed on top of each other, tell the builder or designer a lot about how the boat will move through the water. The practice of drawing them on top of each other (the diagonals are often drawn on one side of a reference line and the other two on the other side) is confusing at first sight, but one gets used to it and it is handy.

Now finally imagine slicing your model crossways, like a bologna. This gives you sections which, when drawn on either side of a vertical centerline, comprise the Body Plan. By convention, the forward half of these section lines are drawn on the right side of the vertical center line and the after half on the left side.

By now you should perceive a grid forming. This grid is the basis for measurement and getting the Table of Offsets. Keep in mind the three views of the boat: Profile, looking at the boat from the side, as if you were in a dinghy; Plan, looking down from above, seagull's view; and Body Plan, looking at the boat dead on from forward or aft of the boat.

The basis of the grid is the Station spacing. That's what you produced when you sliced the boat like bologna. If you have a boat 20 feet long, it might make sense to make your spacing two feet, giving 11 stations, probably named 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10. Each station represents a two-foot interval along the boat's length.

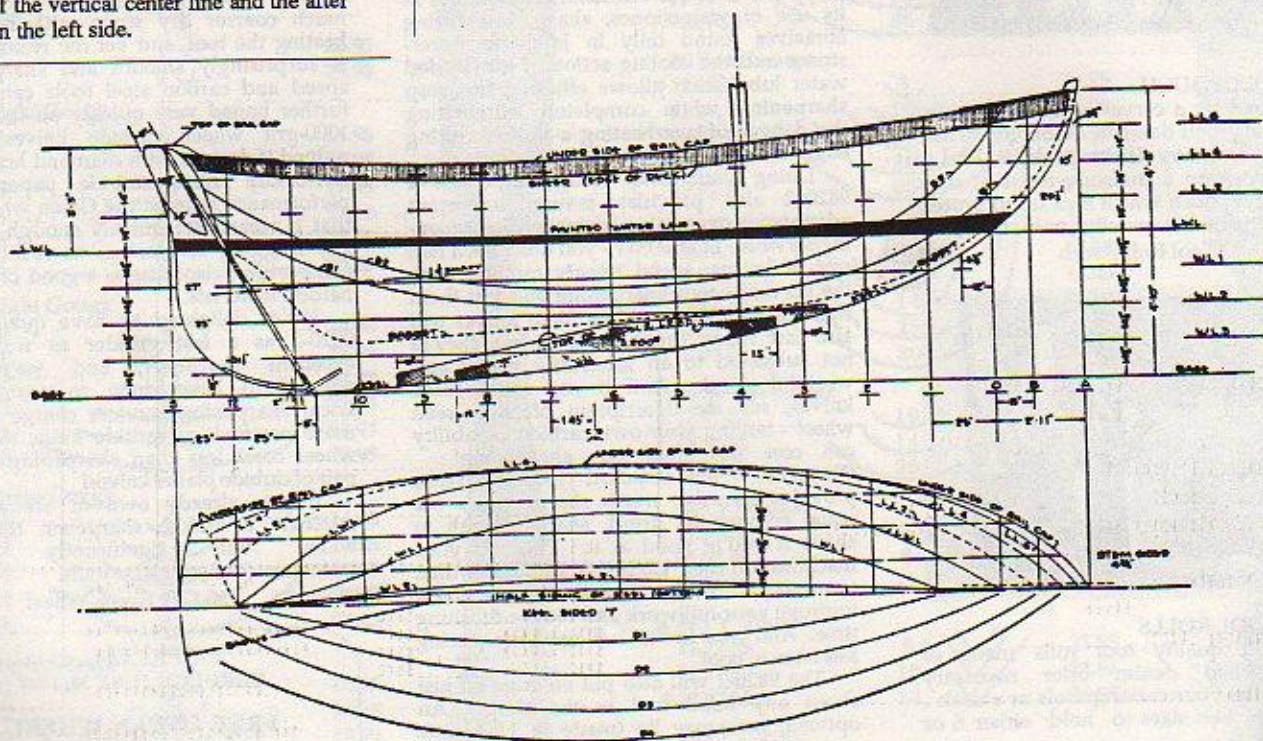
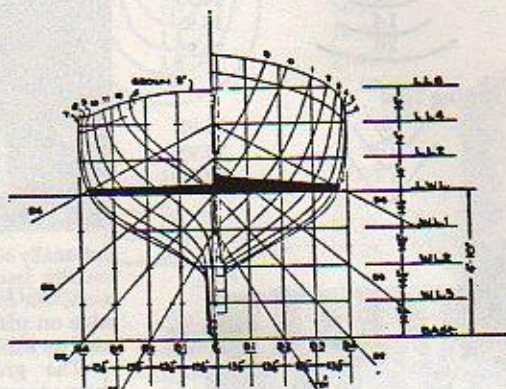
Looking down in Plan view, the buttocks give us straight lines parallel to the boat's center line and crossing the station lines at right angles. Looking at the boat in Profile, we see that the waterlines are straight lines, parallel to the DWL, again crossing the station lines at right angles.

The Body Plan can show no station

lines, just the sectional outline of the hull at each station. The buttocks are straight lines, parallel to the center vertical line, and the waterlines are straight lines, parallel to the DWL. Here is where we can see the diagonals running from some point on the vertical center line to a point on the hull, where they intersect with the hull surfaces more or less straight on, rather than at some sharp angle, as the buttocks and waterlines may do here. That is the value of the diagonals, to give a straight dead-on type of measurement to the planking surface.

Buttocks and diagonals are only of much value in a round-bottom design. The lines for a V-bottom boat are much simpler, and for a flat-bottom boat, simpler yet. But in a round-bottom boat, the designer is trying to describe how to build a very complex, ever-changing series of curves and he needs all these lines to do it.

Having arrived at this set of Lines, by whatever studied method he uses, the designer carefully inks them on vellum, using as thin a pen as he can and fairing them as



he goes with long slender ship's curves and plastic splines. He does the very best he can. But he knows that at 3/4" to the foot scale, the width of his ink line can give an error in the finished boat of enough size to leak a lot of water. This, friend, is why you have to loft the boat full size. Unless the designer has done it (and some do) — carefully fairing his full-size lines, taking his offset measurements from these, and perhaps even developing measurements for plank shapes for you . . . unless the plans you get are like that, you'd better clean up a smooth floor and loft the lines.

The Table of Offsets is compiled by taking measurements from the Lines drawing, out from the centerline along station lines, or up and down from the DWL along station lines. But rather than give dimensions up and down from the DWL, the designer will usually strike a Base Line on the drawing parallel to the DWL and at some convenient distance below it. That Base Line often doubles as the centerline (CL) in the Plan View. Thus are these lines superimposed on top of each other.

The designer will divide the Table of Offsets into two parts: Half Breadths and Heights from Base.

Half Breadths are just that, measurement of half the hull from the centerline out to the hull skin. It is very important to remember that all measurements in the Table are to the outer hull skin, the paint. All measurements in the Table are given in feet, inches, and eighths. Thus, 2-4-5 means the measurement is 2 feet, 4-5/8 inches. 2-4-6 means 2 feet, 4-3/4 inches. A + or - after the last digit means add or subtract a sixteenth.

Let's take an example of Half Breadths. Working with the plan view, the designer

measures out along Station O to the first Waterline. Chances are he'll get no reading, since the first Waterline doesn't go as far as Station O. He'll leave that space in the Table blank. He then goes to Station 1, measures out along that line to the first waterline and gets half an inch. At a scale of 3/4" to the foot, that's 8 inches. He'll enter 0-8-0 in that space of the Table which is in the column headed Sta. 1 and the row labelled WL1, or whatever he's calling it.

Then, on to the first Waterline measurement at Station 2, then 3, and so on until he has filled in the row for the first waterline at each station. Same for the other waterlines.

Heights above Base are done the same way, but are measured along each station line up from the base line. The important ones are heights to keel, keel rabbet (if there is one), chine (in a flat or V-bottom boat), and sheer. If the boat is round-bottom, heights will be given for the buttocks also.

Also, in a round-bottom boat, there will be a third part to the Table, labelled Diagonals. These are measured along the diagonal from the point where it intersects the vertical center line to the point where it intersects the hull outer surface. This departs from the grid, though you will often notice that a designer's diagonals start where a waterline intersects the vertical center line, and somewhere along its length, crosses the intersection of a waterline and buttock, in body plan. This makes it easier to lay them in on the full-size lofting body plan.

The Body Plan is really an assembly of the measurements laid down in Plan and Profile and this is how it is set up and how it is lofted, *not* from measurements in the Table, but from distances picked off the lines you have in Plan and Profile. To confuse the unwary further, as if it were necessary,

the Body Plan is often drawn over the other lines, using one of the station lines as a vertical center line. Don't despair. Some very slow people have managed to get the hang of reading boat plans. You can, too.

This all meshes into lofting, which is reversing what the designer just did, taking the Table of Offsets and converting it back to curved line, but this time, full size. We'll go into that in detail in the next issue. Meanwhile, study Mr. Atkins' plans reproduced here and understand how all these lines relate to each other. Remember, waterlines are straight lines in profile, lovely sweeping curves in plan. Buttocks are straight lines in plan, sensuous curves in profile. Never mind. Diagonals are straight only on the body plan and are curves representing an oblique view of the hull, neither plan nor profile. In the body plan, both waterlines and buttocks are straight lines, but the shape of the hull at each station is described.

References:

Book: *Half-Hull Modelling* by the Apprenticeshop. Plans and patterns for half hull models.

Magazine: *WoodenBoat*, PO Box 78, Brooklin, ME 04616 (you can pick up a current copy at Highland Hardware). Lists excellent books on small boats, design, shiplore.

Plans for hundreds of small boats ranging in size from 6'4" to 50'3":
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