

An Opinionated Survey of Hollowing Tools-Part I

by Lyn J. Mangiameli

Introduction:

What shall follow are some comments on my experience and preferences in hollowing tools. As the title of this series of articles reveals, this is an opinionated survey and is influenced by the type of work I do, and the leisurely pace at which I prefer to do it. I am a recreational turner who turns a wide variety of artistic hollow forms, semi-hollow vessels and vases. The turnings I make range from small scale work to rather large and deep items.

No hollowing tool will handle every situation, though some will handle a broader range with greater performance than others. I have wanted functional and artistic concepts to determine the style of turnings I produce, rather than choosing designs which matched the limitations of specific tools. Thus, over the years I developed quite a collection of hollowing instruments and accessories. This has not only allowed me to make a greater variety of hollow turnings, but has also allowed me to directly compare the performance and features of the various tools.

Making those comparisons and reporting on them has taken on a life of its own, above and beyond my turning. Other turners have suggested hollowing tools they felt should be reported on, and many have graciously described for me their own experience (and sometimes lent tools). Some manufacturers have made me aware of their tools, and a few have sought my input on new designs or modifications to old designs. As a result, I have been able to examine and use a wider variety of hollowing tools than would normally be required for any individual turner's needs. Nonetheless, the measure of each tool has always been how well it serves my needs, and achieves results meaningful to me. My desires and priorities may differ from yours, so I have tried in the following articles to not only present my opinions, but also to carefully describe the objective characteristics of each tool, providing you with factual information that can help you form your own conclusions. There also is commentary on some discontinued tools, in the hopes this will increase your ability to compare more recently introduced tools to ones you might already have encountered, or still use.

Perhaps no segment of the woodturning tool market has seen such innovation and expansion as that of hollowing tools. I have tried very hard to make this survey a complete description of all those hollowing tools commercially available in North America, and to that end have delayed publishing my findings several times so I could include a report on yet another new device. In the end, I must admit defeat and

recognize that while this survey may be comprehensive, it will never be entirely complete (I do intend to update it from time to time, just as this is an expansion and update of an article from 2001). The attempt to be comprehensive has made for a lot of information, an amount more than can be waded through easily in one article. Therefore, the survey is presented in the form of five free standing articles: Full Sized Cutting, Scraping and Shear Scraping Tools for Hollowing; Small Scale Hollowing Tools; Detachable and Specialized Handles for Turning Tools; Torsionally Restrained Hollowing Systems; and Specialty Tool Rests and Accessories for Hollowing.

What immediately follows is the first of those articles.

Full Sized Tools

These tools are the first hollowing tools most woodturners will acquire, and for many will remain their primary, if not only, hollowing tools. Discussed here are tools which are hand held and controlled in ways not entirely foreign to a bowl or spindle turner. Indeed, most of these tools are often rather wide ranging in application, being capable of use when making boxes and deep bowls, as well as the more specialized hollowing applications associated with hollow vessels and sculptures. Some may even find application for external work, as well as their intended hollowing functions. Most of these tools are best suited for work that is five or more inches in size. This is a long discussion and to make it more manageable, the tools will be divided into three classes according to the approximate action used to remove wood.

Obviously all hollowing tools remove wood in some fashion. Some cutters use a lower included angle for their cutting edge and enter the wood with more of a slicing action. I classify these as cutting tools. Many tools of this style have an included guard that limits the depth of their cut. Another style of cutter uses a high bevel angle, and is often used with a burr applied to the edge. I classify these as scraping tools. Most scraping tools are designed to be used with the top of the scraping tip held horizontally, thus presenting the tool edge near perpendicular to the point of contact with the wood. Tools which use a scraping style of tip (i.e., high bevel angle, often with burr) but are intended to be positioned rotated at an angle of approximately 45 degrees as they contact the wood are classified as shear scraping tools. Most woodturners are familiar with shear scraping techniques, often using specially held gouges or traditional flat scrapers to smooth the external surface of faceplate work like bowls and other vessels. Shear scraping hollowing tools allow one to apply these techniques to the enclosed internal surfaces of hollow forms. Many scraping tools of traditional style also can be used for shear scraping by rotating them into an angled orientation to

the wood.

Cutting Tools. In general, I often prefer cutting tools to scraping tools, particularly for working wet and semi-dry wood. For me, the tools with a cutting style edge can be used at slower rotational speeds, achieve a better surface, handle faults and other difficult spots in the wood with less difficulty (e.g., the guard tends to prevent them from dropping into voids), can remove wood more quickly, and the guarded models rarely catch so are easier to use and to learn on.

Woodcut Proforme: [Available direct through the Woodcut web site or through Craft Supplies] A long time personal favorite of mine. The tool can be purchased with a straight shaft, a canted slightly bent shaft, or a swan necked shaft. I find the slightly bent shaft the most versatile. The cutting head has a thin blade in a J shape, which leaves a large smooth outlet for shavings. For me, it provides one of the best cuts, is easy to use, has an effective and conveniently adjusted brass guard, and does not tend to clog (far less than most other guarded tools). It is excellent for small (but not miniature) to large turnings. The head is only slightly larger than the tool shaft diameter, allowing the tool to be used with a mouth little greater than the thickness of the shaft. The biggest limitation is the relatively short shaft length which restricts its use for very deep forms unless used with a long combination shaft and handle from Woodcut (see the separate handles article for two good choices). The shafts are 5/8 inch in diameter, but with a 3/4 inch adaptor sleeve, they work very well with the Stewart or Scorpion Armbrace, and can even be used effectively in restrained hollowing rigs like the Kelton and Clark. Older cutters used a separate blade attached to the cutting head with epoxy or brazed on. Recently, Ken has developed heads where the blade is milled directly from the hardened M2 cutting head. My early experience with these has been positive, though I still like the ability of the earlier versions to have the heads refurbished by brazing on new cutters (Woodcut does this for a modest fee). Ken Port continues to develop this tool and make improvements available to prior owners, for example, he recently came out with a new scraper head for use with one's existing shafts and handles. He is responsive to customer preferences and re-introduced the canted head shaft (my favorite of the three) based on customer requests. (See my full length article on using the Proforme at <http://www.fholder.com/Woodturning/lyn.html>)

Woodcut Cup Hollowing Tool. (Available direct through the

Woodcut web site or through Craft Supplies] This is a simple tool with a 10-3/4 inch straight shaft to which is angle mounted on one side an unguarded, replaceable 1/2 inch cup cutter similar to, and interchangeable with, the Munro (both are based on an early Teknatool design). The shaft and handle (the latter the same as that which comes with the Woodcut Bowlsaver) are of modest length, similar in size to the original Proform handles. The relatively short handle and shaft length, a narrow 1/2 inch shaft diameter, and the unguarded cup, makes the tool most suitable for end grain hollowing of smaller open forms such as goblets and vases where visual monitoring of the cutter orientation can occur. I recommend this tool only for those who have developed good tool control, as the unguarded cup cutter can dig in terribly if not oriented correctly and used with a fine cut. However, when properly oriented and used with finesse, this cup cutter can leave a truly outstanding finish with little if any tear out. I truly can start sanding at 280 to 320 if I have used the tool gently. It is one of the very best tools I have ever used for removing the nub at the bottom of a bowl or other vessel. It also is outstanding for carrying the cut across the bottom and through the transition to the sides. You quickly discover the Woodcut handle is pretty short and light if your cut becomes too aggressive or your orientation wanders and you begin to run into trouble; it helps to load the handle with lead shot. For those who already have a 1/2 inch bore steel handle, or who wish to make their own wooden one, this cup hollowing tool offers a very inexpensive means to broaden your hollowing capabilities and improve the off the tool finish of your vessels.

Old Style Rolly Munro Hollowers: These have been around for quite a while, but never seen formal distribution in the US. The early models handed down to me are in three different shapes (one straight, two of different swan necks), with long 5/8 shafts. The head is no larger than the shaft diameter. They use a low profile adjustable guard over a round cup-shaped cutter, the latter being somewhat like a smaller but more deeply dished BCT cutter. These have much the same performance advantages of the other cutting tools. They also have the advantage of easy cutter sharpening and the ability to rotate the cutter several times to expose a new edge before the need to sharpen again. I find these tools clog more readily and are less capable of thick aggressive cuts than the Proforme or the current articulated head version Munro has developed. The small round cutter gives only one cutting edge exposure (a small arc), while the J shape of the Proforme offers more choice of blade

[Continued on Next Page]

presentation. Still, I like these tools, and find them most helpful in making medium to larger vessels with a very small mouth.

New Munro Hollower: [Available from Lee Valley and Carroll's Woodcraft Supplies] This new version comes with two different arms, and when used with one of these arms (the head can also be mounted directly to the shaft), is truly articulating in that you can adjust position both at the head and at the arm's attachment to the main shaft. The downside is the head/arm combination is much larger than the shaft and for most will require a mouth of at least 1 inch. There is also the possible problem of one of the joints loosening and allowing the head to move within a form, though I have less problem with this than with other similar tools. Still, the Munro is remarkably capable of adapting itself to a wide variety of hollow shapes, can be adjusted for fine or aggressive cuts, clogs less than the earlier versions, has a nice long shaft, tends not to catch and is very easy to use. This is one of my favorite hollowing tools. (see my full length review of this tool at <http://www.fholder.com/Woodturning/lyn.html>).

BCT Supercut: [Available from Packard Woodworks and from The ToolPost in the UK] These tools are manufactured by Birtton Craft Turnery in England. This is a general purpose tool, originally designed as an alternative to a gouge. It is also marketed as a hollowing tool (principally by Peter Hemsley of the ToolPost) and is recommended for use when undercutting the lips of open and semi-open forms. Its principal feature is a round HSS concave cutter. If the Munro can be thought of as having a "cup" cutter, the BCT is more of a "dish" cutter, being shallower and available in larger diameters. The BCT tools are available in two versions, the Supercut Universal Tools and a simpler (and less adjustable) version called the Supercut Junior. The full featured Universal version is available in four sizes, labeled according to "dish" size: 3/8, 1/2, 5/8, 7/8. All come with a square cross sectioned shaft of the same size as the cutter, and ranging from 8 inches to 17.5 inches in length (with the supplied handle, overall lengths run from 24 to almost 48 inches). There are optional accessories like side handles and outriggers available for some sizes, as well as downsizing kits that will allow using the next smaller sized cutting dish on the three larger tools. It is recommended the cutter be oriented between an angle of 30 degrees for roughing cuts and 60 degrees for a shearing cut. I have yet to achieve what I would define as good performance from the tool (in my case the 5/8 inch version), and consider it inadequate as a deep hollowing tool. I find it hard to adjust and position for side cuts. In use, it tends to follow an uneven or out-of-round surface rather than cut through it. I find it slow to remove material and find nothing to recommend its quality of cut

over other tools. I dislike the articulating head as it can become loose within a hollow form or even when working across a bowl (a problem with many adjustable head tools) and the large Allen head bolt that attaches the main arm to the shaft sticks up well above the shaft requiring a larger minimum mouth size for clearance than the shaft alone would call for. Furthermore, the head requires the tool rest to be set farther back to accommodate those adjustable parts. The straight, square shaft of the tool is supposed to limit undesired rotation, but at the same time it makes it much more difficult to make small adjustments of tool position by intentional rotation of the tool (an issue with all square shafted tools). If you do use the tool rotated on its shaft, the sharp corners will chew up your tool rest. I am not fond of the length, weight, or shape of the wood handle that comes as part of the tool. Fortunately, it is easy to clamp the square shaft in a big metal vice and twist off the wooden handle, then use the metal shaft with any number of after-market steel handles or a handle of your own manufacture. Removing the handle from my 5/8 inch version of the tool leaves a tool shaft and head assembly of 15 inch overall length including a 3 inch long round tang (thus leaving a 12 inch working length). Positive attributes of the tool, are that it is easy to sharpen if you make their little jig (or use the superior Munro holder), and by rotating the cutting dish slightly, one can immediately obtain a fresh edge without having to return to the grinder.

Vermec TCT Cutter and Adjustable Cutter: [Available from Carroll's Woodcraft Supplies (Australia)]. This is part of an interesting hollowing system from Australia, see the Scraping Tools section below for a description of the other components. Vermec makes both a guarded and unguarded disk cutter, somewhat more like the shallower BCT dish cutter than the deeper cup cutters of the Munro and Woodcut tools. The unguarded disk cutter uses a Torx bolt to mount a 10 mm Tungsten Carbide disk to a round 14 mm shaft (midway between 1/2 and 5/8 in diameter). It looks somewhat like the Woodcut Cup Cutter, but for the cutter being more shallowly dished. A guarded version of the disk cutter, is available that can be mounted to either a straight shaft or a shaft that can be fitted with either one or two curved articulating sections. The two sections used together make almost a half circle. The guard allows one to control the aggressiveness of the cuts, and looks simple to adjust, but adds slightly to the bulk of the head, and has upward facing bolts that look prone to pack with shavings. The tungsten carbide disk should give good edge life, but at the expense of being brittle and thus more easily chipped. Vermec comments that when not in use, the guard can be fully advanced to help protect the disk from

damage. This looks to be a useful hollower, but as of this writing I have not yet tested it (one is one its way, so check More Woodturning and my website for a possible future review or update to this report).

Crown Beaver: [Available from many suppliers including Lee Valley, Woodcraft and Woodworker's Supply] This relatively new tool comes in both straight and an angular swan necked version-I only have the straight version. Unlike almost all the other cutting hollowing tools, this one comes mounted to a wooden handle, a handle I wish they did not include because it does not allow one to control shaft extension length. Though the shaft is moderately long (14 inches when removed from the handle), its 1/2 inch diameter and the light weight wooden handle seriously limits the distance it can be used over the tool rest. It uses a fixed guarded cutter that is integral to the shaft. The bottom mounted cutter blade alone adjusts, which makes for easier adjustment that that on the Hamlet hollowers. The cutter is oval shaped and works well, indeed better than most. Hopefully Crown will soon apply their cutter design to a larger diameter shaft that is available unhandled. If they do, I think this may become a desirable hollowing tool, particularly with Crown's reputation for modest pricing. (see my review of this tool at <http://www.fholder.com/Woodturning/lyn.html>)

Exocet: [Available from Jacques Coulombe] Comes in 3 versions: Standard, Junior and Super, two shaft styles (straight and "cobra"), two different heads (round and elliptical) and several different camlock handles. Very expensive, but made using exceptional attention to detail and quality of materials, such as D2 tool steel (cutter) and 303 stainless steel (guard). All use a double ended cutter that can be reversed when one end dulls. Like the Proforme blade, cuts can be taken off the side as well as the tip. Pushing cuts are generally more effective than pulling cuts. The guard on the Standard and Super versions "features" a micro-adjustable knob at its base to control positioning. I find the small knob to be a torment to adjust. The Standard version has 1/2 inch diameter shafts; the Super has thicker 5/8 inch diameter and much longer shafts. Lots of accessories are available, including over-sleeves to stiffen the shafts (which makes them physically as well as functionally like larger diameter solid shafts). Many have noted the "Cobra" shaft is not particularly effective at reaching into the area under the rim of

narrow mouthed, deeply shouldered forms. I have one round head Super with a straight shaft which usually is fitted in the Exocet long handle. Though beautifully made, I find this tool to perform not as well in my hands as the Proformes and Munro. It clogs more readily and is more difficult to align for a good cut.

Hamlet Big Brother: [Available from several sources including Packard Woodworks and Craft Supplies] Another guarded cutting tool, in this case a ring. The original 5/8 diameter straight shaft at 18 inches is longer than the Proforme shaft but shorter than the Exocet Super. It now also comes in a shorter (14 inch long), smaller (1/2 inch diameter), "Little Brother" version, and a large 3/4 inch diameter straight shaft "Goliath" version. The Goliath shaft is 24 inches long, giving it up to an approximately 22 inch exposed length when mounted in a handle. There are also 1/2 inch small radius (swan necked) and 5/8 inch large radius, curved shafts. The usual configuration is a straight shaft with a head that can be swiveled off axis to make cuts difficult or impossible for some other cutting tools, but which also makes for potentially very strong torsional forces. The standard Big Brother has a good handle of a nice 26 inch length (the 1/2 in version comes with a 17 inch handle; the Goliath with a 31). The ring cutters are 1/2 inch, 3/4 inch and 1 inch in outside diameter for the Little Brother, Big Brother and Goliath, respectively. Some prefer matching the 1/2 inch Little Brother ring and guard to the 5/8 inch Big Brother shaft so as to obtain a finer, less aggressive cut while retaining the shaft strength of the larger tool. The heads and guards are held to all the shafts with single top mounted Allen head bolt, making precise adjustment a nightmare (try adjusting the guard without the head wanting to move). Because of this, I dislike this tool. I also find this tool more prone to clog than most cutting tools, but to be virtually indestructible. Whenever I need to do something abusive, I use this tool (since I don't care if it dies), but it has held up to the worst things I have been able to do to it. The versatility of the tool is increased by the availability of six differently shaped optional scraper tips that can bolted to the shaft in place of the head and guard. I have not seen it, but Hamlet now has a \$10 instructional video on the use of their hollowing tools for those who would like to investigate this system further.

[Continued on Page 6]

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Hollowing Tools Continued from Page 5

Oneway Termite: [Available from almost every woodturning supplier] Smaller unguarded ring tool. Three interchangeable and replaceable M4 high speed steel tips are available, from #1 small (3/8"OD) to #3 large (5/8"OD) in size, the 3/8 inch being the smallest ring cutter I am aware of. The smaller tips are particularly good for hollowing boxes, goblets, and the like. I had difficulty getting the hang of this tool, but with the excellent instructions from Herman deVries, <http://www.hdv.net/> I feel I have now mastered it. The tool measures 23 inches in overall length without a tip installed, the handle making up 15.5 inches of that length. I am happier with the tool since cutting off the stock wooden handle and using a steel handle (Oneway, Kelton, etc). Without the handle, the shaft measures 11-1/4 inch with a #2 tip installed. Shaft diameter is 1/2 inch tapering slightly smaller on the tip end. Recently, Oneway has made available a larger 5/8 inch diameter, 16 inch long, unhandled shaft. This is a good match for the larger 1/2 and 5/8 inch cutters. Herm has a version where he mounts the #3 tip to a long, large diameter shaft and sculpted wooden handle, and uses the tool for hollowing of deep vases and the like. I have christened his tool the "Big Bug." Those who have used the Big Bug have provided glowing reports of its performance. Herm has since manufactured an even larger version which he calls the "Bigger Bugger." Though not a perfect fit, you can also adequately mount the Termite heads in the end of the long Berger Viking, Jordan and Pencil Scorpion straight shafts. My only real complaint with these tips is the awkward method of recommended sharpening that involves using a Oneway supplied grinding tip in a high speed router. I use a die grinder instead. Fortunately the CPM M4 steel gives very good edge life.

Martel Hook tools: [Available direct from Martel or from Jacques Coulombe] Available in three sizes of hook and with several shaft options, these tools have an open hook that pro-

vides a shear cutting edge in line with the horizontal axis of the shaft. When cutting well, it can remove a lot of wood quickly and efficiently. It cuts best for me using a pulling stroke while using the upper edge. I find them touchy to orient for a controlled cut, particularly when used blind within a hollow form, and limited to fairly straight, open forms as there is no swan necked version. In the past there were problems with tip breakage, though this has been reduced since the hook tips are now made of D2 steel (a high-carbon, high-chromium tool steel also used for the Exocet cutters, possessing extremely high wear resistant properties). The hook shape is difficult to sharpen, and must be done with round diamond hones and burrs, by hand or with a Dremel style grinder. Some people swear by hook tools, but I am not one of them. They are not commonly available, and are difficult to order, even from Martel's own website.

Kelton Hook Tool: [Available from a limited range of Kelton suppliers including The Wood-Tradesman and Cutting Edge Tools] Listed by Kelton as available in three sizes of HSS hook tip (1/2, 5/8 & 3/4) with two lengths of unhandled shaft (10 inches long of 1/2 diameter and 20 inches long of 3/4 inch diameter). The 5/8 and 3/4 inch hooks can also be used in the 17 inch Kelton Shear Scraper shaft (see Shear Scraping section below for a description of this shaft). I have only seen the tool offered, and have used, the 5/8 inch hook with a 10 inch shaft, which limits its use for deep hollowing. In principle, I like this tool. It is ruggedly built (much more so than the Martel), is designed for a clean shear cutting action, is capable of finer or aggressive cuts, and will not clog. Yet after a couple of years of attempts, I still can not get the hang of this tool. Other turners I respect find it easy to use and very effective. More so than with most tools, I recommend that interested turners try this tool before purchase. Like all tools of a complex hook shape, it is more difficult to sharpen, which is best done with a diamond rod or Dremel tool.

Seahorse Custom Fabrication Heavy Duty Turning Tool: [Available direct from Sea Horse Custom Fabrication]. This is a one inch diameter steel bar which is 22 inches long and can be combined with a 12 inch steel extension. One end of the primary bar is necked down to 3/4 inches (the extension remains at 1 inch); the other end will accept a 1/2 inch diameter tool bit retained with set screws. Seahorse also produces a large heavy duty unguarded hook tool cutter to fit this bar, which is why I list it with the cutting tools. I have not used this tool, but have met the maker and am impressed with his capabilities to offer reasonably priced, custom modifications to meet individual turner's needs.

Berger Viking: [Several sources including Packard Woodworks and Craft Supplies] I suppose people could argue whether this is more of a cutting or a scraping tool, but I find it to perform most like a cutting tool. As Berger puts it, his tip shape "has strong links with the hook tools, but, because of its unique shape it is much less aggressive and with its small radius at the tip it has the ability of creating sharp clean corners." Unguarded, but does not tend to catch in my hands. The Viking can be used for both fine and aggressive cuts. Straight shafts only. The standard version comes with a 7/16 diameter, 11 inch long, unhandled, stainless steel shaft fitted with a 5/16 inch M2 high speed steel tip. The same tip can be purchased with the 3/4 inch diameter, 18 inch long Viking shaft that will fit in an armbrace. I like these tools. I find they provide good clean cuts and are excellent for making straight sides or flat bottoms, and the transition in between. Not, at least in my hands, very good for deeply rounded forms.

Dennis Stewart: A 1/4 inch gouge cutter placed in the Stewart Insider Tool for Omni Shafts or Holder for Bottom Hooker. Small mini gouge used with other Stewart Components (see scraping tools for description of complete Stewart System). Craft Supplies, Packard and other sources used to carry these, but fewer Stewart tools are shown in recent catalogs. I have never been able to get the hang of this tool. I find it clogs very quickly (it has essentially no flute length in use), is almost impossible to orient for a gouge cut during blind hollowing, wears quickly and burns easily when sharpening.

C.I.Fall Hook and Ring Tools: [To my knowledge, only available from European suppliers] These are tools from a Swedish company that lacks distribution in the North American market. I mention them because they provide a wide range of hook, ring, and an innovative "C" cutting tool (an open ring in sizes up to 30mm that they call an adjustable Turning Eye) that are intended for deep hollowing as well as shallower endgrain work. They also have disk scrapers and carbide tipped tools that

are of use to the hollow form turner. It is possible to order these tools from overseas sources like Haus Steinert and direct from the manufacturer, though I hope they will become of some interest to a North American distributor.

Scraping Tools.

In general, for green wood, I do not find scraping tools to offer the quality of cut found on the cutting tools, and to be more slow and tedious when hogging out anything but small forms. To compensate for this, these tools are often used at higher rotational speeds, though these higher speeds have the disadvantage of increasing the potential for centrifugal distortion, disintegration of the form, and greater force if the turning should dismount. Still, scraping tools can work very well, particularly on dry wood, such as segmented/constructed forms. Because they come in such a wide range of styles, these tools can handle a wide variety of cuts (e.g, severe undercuts and cuts within very narrow and/or small forms); few hollow form turners operate without at least one scraping tool, and for many, it is the only type of hollowing tool they choose to use.

Kelton Hollowers: [Woodcraft, Lee Valley, Craft Supplies and The Cutting Edge] These are some of my favorite scraping tools. They come in a set of three different shapes in a range of four different sizes (5/16, 1/2, 5/8, 3/4). They all leave a pretty good surface and are fairly forgiving if used in a shear scraping orientation. These have relatively big tips and can remove more wood than most scraping tools of similar shaft size. The shapes are sized just about perfectly to go from opening up the form to final cutting under a rim. I often use the most angled tool to get into areas I can not reach with a cutting tool. I like these a lot and find them a great compliment to cutting tools like the Proformes and Munro. (See my full length article on using these tools at <http://www.fholder.com/Woodturning/lyn.html>).

Sorby Multitool: [Virtually every woodturning supplier] An good introductory tool that combines an asymmetrical tear drop shaped shear scraper tip with two 3/16 cobalt steel hollowing cutters in an innovative shaft that is flat on one side and rounded on the other. Overall length of the tool is 19 inches with the handle making up about 12 inches of that. Limited to small to small/medium forms, its rotating head will allow for undercuts and the flat on the shaft will help resist torsional forces. The flat surface on the shaft is also helpful to the beginner, in that it helps insure the generally preferred 9 o'clock orientation of the cutting tip to the interior of the turning. The tool also is good for cleaning up the bottom of smaller forms. Given its fairly inexpensive price and great ver-

[Continued on Next Page.]



satility, it is well worth having one. Sorby has added a very similar tool, except for a swan neck, that they call the Hollowmaster. The latter lacks the range of uses of its senior bother, being limited to internal use only as a result of its curved shaft, but at 24 inches overall length it will reach slightly deeper than the straight version. Some will find both of these tools more comfortable to use by twisting off the wooden handle which reveals a round 1/2 inch tang that can be fitted into a longer, thicker steel handle.

Ellsworth Hollowing Tools: [Available from Craft supplies and via Ellsworth's own website] These were some of the first commercially available hollowing tools, from the master who made hollow forms a major art form. They are only available unhandled with 9/16 inch diameter straight shafts, one with a 1/4 inch square cutting tip mounted in line with the linear axis of the shaft, the other with a 3/16 inch square tip mounted at 45 degrees to the linear axis. The tips of cobalt HSS are retained in the shafts with cyanoacrylate glue, and can be removed for replacement by heating the mounting area with a torch. This poses a problem, as the small tips cannot be removed for easy sharpening, but instead the entire tool must be manipulated at the grinder. These are inexpensive tools, and probably the cheapest thing you will ever be able to own made by Ellsworth himself. That may be their greatest claim to fame, as otherwise I believe they are superseded by other designs, such as the Stewart style systems and Jordan Hollowers described below.

The Stewart System: [Available from Packard and Craft Supplies] This has long been the most comprehensive system of hollowing tools out there. Long shafts, short shafts, swan necked shafts, outrigger shafts, small shafts, extra thick 7/8 inch shafts, an extensive variety of tips, and three different handles (including the great armbrace). Unfortunately, it is getting harder to find the complete range of components displayed in the catalogs of suppliers. For many years, it was the hollowing system, and some continue to believe it remains so. Very expensive if you get everything, but there is little reason to do so. Principally a scraper system (with the exception listed in cutting tools above), that includes 1/8, 3/16 and 1/4 inch cutter tips, as well as tear drop shaped scrapers, among others. The tool bit cutters require some technique and careful positioning to obtain a clean cut and it requires some skill to avoid the possibility of catches, though no more so than other tools using similar cutters. I find I use some part of this system (or its more recent clones) on virtually everything I make, but virtually never as the primary tool. The System also has optional accessories like a chatter tool, and the Slicer for coring bowls and use as a heavy duty parting tool.

The Sorby RS-2000 system: [Widely available, including Packard Woodworks, Craft Supplies and The Cutting Edge] This is a licensed version of the basic Stewart tools. The Sorby armbrace is cheaper, but not quite as comfortable to use as the Stewart original, unless you replace the rubber hand grips with foam aftermarket items. Sorby also offers a side handle (approximately 5-1/2 inches) that can be used with any 3/4 inch shaft. I have had this handle for several years, but find I never use it. There is also a 3/4 inch socket pistol grip handle. The Sorby system includes a Hooker like shaft and a Sorby version of the Slicer blade. Some accessories for this system can be obtained from The Tool Post in Britain, that are not available from the U.S. suppliers. See my review of the Scorpion System at <http://www.fholder.com/Woodturning/lyn.html> for a comparison of the Sorby components to the Stewart and Scorpion components.

The Don Pencil Scorpion: [Lee Valley and direct from Don Pencil's web site] A system quite similar to the Stewart, but with some unique variations. While the Sorby and Stewart armbraces are dimensionally the same, the new Scorpion can be configured to be similar or a bit different. With the Scorpion, one can choose between two forearm lengths (6.75 and 8.75), interchange between them, and even remove the forearm section to achieve a pistol grip only. For many, this will offer some much appreciated versatility, particularly if you include the optional but inexpensive set of four shaft adaptors which will allow you to mount shafts from 3/8 to 3/4 inches in diameter. I find the shorter shank works well for me and allows a slightly better fit than either the Sorby or the Stewart. The Scorpion system includes a tool very similar to the Stewart Omnitoole. It differs somewhat in that a short distance back from the end of the shaft it is cross drilled so a 3/16 inch round cutting bit can be mounted to extend at an angle straight out from the side of the tool shaft. This small tip is quite useful for the transition between initial opening up of a hollow form and later work with a curved shaft. The tool also comes with a curved shaft that is slightly longer than the standard Stewart Hooker. It has a very similar but not identical curvature. One thing I particularly like is that its shaft end is ground to accept bit and scraper holders from either the top or the bottom. This allows one greater choice of how and what tips can be attached and offers the unique opportunity to simply rotate the tool 180 degrees in the armbrace or a handle and change the tool from inboard to outboard use. As I see it, this is a major advantage in favor of the Scorpion, and allows it to fill the role of three different versions of the Stewart Hooker: the standard, the Bottom Hooker and the Outboard Hooker. All in all, I see the

Scorpion as a positive refinement and evolution beyond its Stewart/Sorby predecessors, that also happens to be a very good value. (see my full length review of this tool at <http://www.fholder.com/Woodturning/lyn.html>)

John Jordan Hollowers: [Available directly from Jordan's Web site] John offers a 3/4 in diameter, 20 inch straight shaft tool that appears much the same as the traditional 16 inch Stewart Omnitoole; a smaller 12 inch straight tool with a thinner 1/2 inch diameter shaft; a large 20 inch curved tool with a 3/4 inch diameter shaft; a medium 16 inch curved tool, again of 3/4 inch diameter; and a small 12 inch long curved tool with a 1/2 inch diameter shaft. All have replaceable tips that fit directly into the working end of the tool. The ends of the tool shafts are tapered, the inside of the curved shafts are greatly relieved, and the tip locking set screws sit flush or protrude only slightly, allowing the entire working end of the tool to be fitted through a mouth just barely larger than the root diameter of the shaft. This is just what one wants in a hollowing tool if the goal is to maintain as small a mouth as possible. These tools fill useful niches that existing tools do not occupy. The great amount of side relief on Jordan's larger curved shafts, as well as the well thought out curvatures, allow the tools to work over a larger range of positions, and thus snake into more internal areas, than would be expected of tools of similar shaft diameter. Both the large straight shaft and the large curved shaft are significantly longer than their counterparts in the Stewart/Sorby/Pencil lines. Despite the added length, I find the 3/4 inch shafts to be adequately rigid when used to take advantage of the longer extension capability. I like these tools a lot, and along with the Kelton Hollowers, these are my favorite scraping tools, though they lack the versatility of the Pencil version of the Hooker. The Kelton Hollowers have advantages in covering a wider range of sizes (of course it takes twelve shafts to do so) and having a tip that is more capable of being oriented for shear scraping; the Jordan tools have greater reach, have replaceable tips and allow one to purchase the tools individually rather than in sets. With respect to ring and hook style cutting tools, the Jordan tools are not as aggressive as most cutting tools in rapidly removing large quantities of material, and they are not as catch proof as the guarded cutting tools like the Proformes and Munro. Still, I suspect that many will not find them as troublesome or finicky to adjust as some guarded cutting tools, and of course,

John's tools will never clog. (see my full length review of these tools at <http://www.fholder.com/Woodturning/lyn.html>)

Sorby Texas Tools: [Available from Packard, and The Cutting Edge, among others] These are large tools of 38 inch overall length, including a 23 inch Ash handle. The 3/4 inch diameter shafts are available in both swan neck and straight versions, each capable of taking multiple tips including an asymmetrical tear drop scraper. If you prefer a wood handled tool, these are reasonably priced and adequate tools for hollowing moderate to large forms (say up to 14 inches deep). However, the wood handles do not provide the counterbalancing weight and ability to adjust for shaft exposure that comes with most steel handles. The wood handles, unless permanently removed, also preclude their use in torsionally restrained rigs. Not readily available in the US, Sorby does make a version of its Texan straight shaft (RS2008KT) that has a longer metal shaft with a molded rubber grip handle at the end. This version can be obtained via The ToolPost in England.

John Lea Toothpicks: [Available direct from Lea's website] John makes three straight, square shafted tools for hollowing. The smallest of them he calls the Delaware Toothpick, with a 3/8 inch cross section, 12 inch long shank and a 1/8 inch HSS insert. The middle size is the Arizona Toothpick. It has a 1/2 inch square, cold-rolled steel shank with an end-mounted 3/16 inch HSS square tool bit held in place with two set screws. The Arizona Toothpick is approximately 16 inches unhandled and 30 inches when fitted with his wooden handle. The Texas Toothpick is a larger, heavier version of the Arizona Toothpick, with a 3/4 inch square shank and a 1/4 inch HSS insert, again held by two set screws. This tool is 30 inches in length and comes with a dense foam grip. I have not used these, and generally am not that fond of square shafted tools, but these appear to be solid, practical tools at a good price.

John Lea Cross-Tip Tools: [Available direct at the Lea web site] Lea offers these two square shanked tools with a straight tip that can be mounted at either of two different fixed angles (10 and 33 degrees) crosswise to the linear axis of the shaft. The unique thing about these tools is that they have a separate rectangular section that fits to the main shaft, which can be moved anywhere along its length, then fixed in place by a thumbscrew. This serves as

[Continued on Page 8]

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Hollowing Tools Continued from Page 7

an adjustable stabilizer that will have some effect on reducing the torsional forces generated by the off axis tips. The stabilizer looks only minimally effectual to my eyes, but Lea reports that the effect is actually substantial because the stabilizer (i.e. the fulcrum) is wider than how far the tool bit extends off axis (in this case the lever) and thus the generated torque is neutralized. The smaller version has a 5/8 inch square shaft, while the larger has a 3/4 inch shaft with a proportionally larger stabilizer. I have not tried these tools, but as I have commented often, I am not fond of square sided tools for hollowing through small mouths, as the corners can cause considerable damage if bumped against the mouth. Nor do I look forward to regular adjustment of the stabilizer as hollowing progresses (though if use of this tool is mostly restricted to hollowing where a straight tool can not go, the need for adjustment will be minimized). The square shafts do look to be easily adapted to a gated restraint system (for example, you could likely easily modify a Donald Derry gate-see the section of Torsionally Restrained Systems) and these tools could prove to be an inexpensive means to have both torsionally restrained and free hand capabilities.

John Lea Magnum Crook Tool: [No longer offered via the Lea web site, though I imagine a special order might be possible] This tool uses a 5/8 inch square cold-rolled steel shaft, 16-20 inches long, that is bent in a near hemispherical shape at one end, keeping the cutting tip on the horizontal axis. It used a 1/4 inch scraping tip, made of high speed steel fitted directly into the end of the tool and held by top mounted set screw, and was available with or without a handle. Lea has discontinued production of this tool, feeling the learning curve for its mastery was too great for the turner new to hollowing.

Øland tools: These tools have been around for a long time, but have had limited following, even though Highland Hardware has stocked and promoted them in their catalog. They are like many other tools in that their primary tool places a 3/16 or 1/4 inch square M2 high speed steel bit into the end of a steel rod, holding it in place with set screws. There is also a head that mounts a 3/16 inch square tool bit at a 30 degrees angle to the linear axis of the shaft. For final finishing, they also offer a round disc of M42 high speed steel. All the tool shafts are fitted with a hardwood handle, the 3/16 inch tool being 12 inches long, while the 1/4 inch tool (and also the angled head) come as an 18 inch long tool. These are adequate tools, but limited by their straight shafts and lack of accessories. In addition to Highland Hardware, they can be found at the Øland web site.

The Glaser Boring Bars: [Available from Cutting Edge Tools and by special order from John Jordan and Packard Woodworks] Jerry Glaser offers two styles of boring bars. I have used his large one on a big Nichols lathe and it is a near six foot, lead shot filled monster. Frankly, I think this large one has been superceded by restrained boring bar systems. The smaller one is 33 inches in overall length, with 20 of those inches being a red anodized, lead shot filled, Glaser aluminum handle. The shaft is composed of two sections, a 3/4 inch diameter steel primary shaft to which is fitted a 2-1/4 inch long, 3/4 inch diameter articulating stainless steel arm. This shaft assembly offers approximately 13 inches of working length when used alone, or 11 inches of working length when the tool is configured as intended with a large 1-3/4 inch diameter, 5-1/2 inch long steel cylinder which solidly clamps to the shaft just forward of the handle. This steel cylinder normally extends down from the shaft and serves as both a secondary handle and as a mass stabilizer counteracting jerking and vibration. When hung downward its weight also helps to keep the tool held in constant rotational position and thus helps maintain the tip in proper alignment within the hollow vessel. If one desires, it can be moved anywhere along the shaft or rotated to another position; regardless of position, it can serve as a visual indicator of the rotational position of the tip with respect to both the overall tool and the inside of the vessel. This stabilizer can easily be transferred to other tools with 3/4 inch shafts (say the large Jordan curved tool, or a Stewart Omnitool), providing them with the same benefits. Jerry now provides two versions of the stainless arm, one of which is mounted with a 3/16 inch square T-15 cobalt steel tool bit (a more expensive Tantung G tip is optionally available for dealing with very abrasive woods). This tip can be oriented within the end of the arm anywhere from inline with the linear axis to beyond 90 degrees to it. Together with the articulating head section, this allows a fair amount of control over positioning of the tip with respect to the wood, allowing one to maneuver into areas a single straight shaft, even with an angled tip, can not achieve. To reduce torsional forces, it is best to set the combined arm and tip position so that the cutting area of the tip remains on the linear axis of the tool, though one can violate this principal to the extent one is willing to use muscle and technique to control increased rotational forces. Glaser is now offering a second optional arm to which is fitted a flat one inch diameter, 3/16ths inch thick scraper disk made of CPM 15V hardened to about 62 Rc.. This scraper disk has one side that is ground back to create a 5/8 of an inch straight side, with the rest of con-

stant radius resulting in somewhat of a closed "C" shape. This scraper tip can perform both primary cutting chores and be used effectively for final smoothing inside the form. John Jordan shows the Glaser hollower in use in his hollowing video, and an article by Howard Lewin in Fine Woodworking also illustrates its use (FWW #154; a Web version is available at: <http://www.customwooddesign.com/articles-2.html>). More than with some tools, one's satisfaction with the small Glaser hollower will depend a lot on what type of forms one wishes to make. Despite its relatively large diameter shaft, its length limits the tool to hollowing only about 8 inches deep, a depth often managed by smaller 1/2 inch diameter tool shafts (which by being of smaller diameter, offer the potential for smaller mouths). The Glaser's straight shaft, even with the articulating head, makes it less suitable for squat rounded forms with deeply cut back shoulders inside a small mouth. If these limitations are of little individual importance (and for many this will be the case either because they have other hollowing tools to supplement the Glaser, or because of a preference for creating more open mouthed, medium sized vessels), the turner is rewarded with a hand held tool of exceptional civility and smoothness in operation. For those turners who are less physically robust, or those with arthritis or orthopedic injuries, the lead shot filling of the handle and the front stabilizer (particularly when used with a gated tool rest) makes for one of the most comfortable hollowing experiences you are apt to encounter in free hand hollowing because the usual minor and sometimes major shocks from the cutting tip are either damped out, or greatly reduced in both acceleration and amplitude. My greatest wish with respect to this system is that Jerry would make available an optional unhandled shaft that would allow one to transfer over the arm./cutter assembly and/or stabilizer to a longer shaft (say 18-20 inches) that could be mounted in an armbrace or torsionally restrained system. This would allow the advantages of his hollowing system to be extended to larger forms, and further enhance its value.

Behemoth Woodturning Tools: [Available direct via the Behemoth web

site] I am only familiar with this system from the information on their web site. It comes in three lengths (18, 24 and 36 inches), all of which are made up of 7/8 diameter tubing which is lead shot filled and is capped with a wooden handle. The shafts have 1/2 inch bores that will take a number of components offered by Behemoth, or any other tool of 1/2 inch outside diameter (say, for example, the 1/2 inch Jordan Hollowers). It is normally supplied with a bent shaft tip holder, a 3/16 inch cutting tool and a scraper blade. Swivel tip and straight tool holders are available to take 1/8, 3/16 or 1/4 inch square cutters. An adjustable side handle and an outrigger are available as options. All of the components are available for individual purchase, allowing them to be integrated into many existing hollowing systems.

Vermec Deep Hollowing Tools: [Available from Carroll's Woodcraft Supplies (Australia)]. This is a multi-tool hollowing system from Australia. The system includes a hard foam rubber covered, lead shot filled, metal handle; a swivel tip, 3/16 inch square bit scraper that from photos looks a lot like a longer version of the Sorby Multitool; and a beveled round scraping disk attached to a round shaft. The handle and shafts are made from stainless steel. The shafts are necked down to 12 mm to fit the matching bore of the handle (this is slightly less than 1/2 inch, making the handle unable to take most turning tools sold in North America, but a good fit for some of the P&N gouges). Vermec also makes a guarded disk cutter, that is mounted to either a straight shaft or a shaft that can be fitted with either one or two curved articulating section. These tools are in rather limited distribution, but I have read good things about them on an Australian woodturning website.

Shear Scrapers:

I include this as a separate category as the dedicated models are not suitable for hollowing in general, but they are often desirable for cleaning up after other hollowing tools, particularly scrapers.

Sorby Multitool: [Available from most woodturning suppliers] Described earlier as a scraping style hollowing tool, it also comes with a good asymmetrical

[Continued on Page 9.]

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Hollowing Tools Continued from Page 8

teardrop shaped shear scraping tip that works well for medium forms that don't have deep overhangs. Works on both inside and outside of forms. My favorite shear scraper tip, that I often mount to other hollowing tools like the Hooker.

Stewart Shear Scrapers: [Available from Packard Woodworks and Craft Supplies] Used with the Hooker tool (also available for their straight shafts and pistol grip handle), the Stewart asymmetrical teardrop shear scrapers do a good job, but are smaller than the Sorby version. I usually substitute the Sorby scraper as it will bolt straight onto the standard Hooker shaft. Stewart also makes a miniature version of this scraper out of Tantung that can be helpful in smaller forms or those with areas of very tight radius.

Sorby 826H and 827 H shear scrapers: [May be difficult to find but usually can be ordered from The Cutting Edge or Highland Hardware] These are dedicated shear scrapers. They use a 3/8 inch across, four sided shaft which has replaceable tips with a fixed 45 degree angle. The flat sided shaft maintains the scrapers at the correct shear scraping orientation. Tips come in two versions (and are the only difference between the two identification numbers), a round for interior work and a radiused corner square for external. I like these a lot for small to medium forms and small boxes.

Woodcut Pro-Scraper Head. [Craft Supplies and direct from Woodcut]. Woodcut now offers a shear scraper head that replaces the Proforme cutting head at the end of the Woodcut shafts. The scrapers are a bit light duty as they are thinner than most, but you can substitute the thicker and larger Sorby or Stewart scrapers if you like. This scraper system works well and by being interchangeable with the Proforme head, you can count on being able to shear scrape anywhere you were able to cut with the Proforme. (see my full length review of this and the Kelton Shear Scraper tool at <http://www.fholder.com/Woodturning/lyn.html>).

Kelton Shear Scraper: [Available from multiple sources including Craft Supplies, Lee Valley and Woodcraft] Kelton makes two dedicated heavy duty shear scrapers that are most suitable for bowls and relatively open mouthed hollow forms such as vases. The larger version uses a 17 inch long shaft and is usually fitted with a 1 inch wide replaceable scraper tip that can be oriented to different angles. The smaller version uses a 7 inch long handle that is usually fitted with a 5/8 inch scraper tip. Both shafts are necked down to 5/8 inch diameter tangs for insertion into a steel handle. Shafts and tips can be interchanged according to user preference. The shafts are somewhat unique in that

they are rounded on one half of the circumference, but the other half has two flats angled at approximately 50 degrees to easily establish a shear scraping position. This is an excellent and very rigid scraper system which with the large shaft is great for long overhangs, though a bit big for most closed mouth hollow forms. (see my full length review of this and the Woodcut Pro-Scraper Head at <http://www.fholder.com/Woodturning/lyn.html>)

Crown Multi-tip Scraper: [Lee Valley, Woodcraft, Woodworker's Supply] I want to like this tool, if for no other reason than its very thick interchangeable tips. Those tips, at almost 1/4 inch thick, are impressive, but they have huge inner attachment holes that make it difficult to mount them on other tools. They come mated to a short flat-sided sharp edged shaft that doesn't allow the extension that would be required for the larger forms that the over 1 inch tips would be best used with, nor can the shaft be easily rotated to angle the tips for shear scraping. I think the average turner would be much better served by the Sorby Multitool for hollow forms, the Kelton Shear Scraper, or a couple of 3/8 inch thick fixed shape flat scrapers for bowl work. (see my review of this tool at <http://www.fholder.com/Woodturning/lyn.html>)

Hamlet Siragas Scrapers: [Available from Craft Supplies and Packard Woodworks, among others] Hamlet makes a range of six scrapers (available individually] for its Big Brother family of shafts and a short shaft, wooden handled tool called the Siragas Shear Scraper. Presumably, these tips will fit on some other tools, like Stewart style hookers and some of the Sorby straight shafts, though I can not say for sure as I have not used them. The shapes range from flat to round to pointed.

Jamieson Scraper Cutter: [Available from Craft Supplies and The Cutting Edge]. This is another of the ubiquitous asymmetrical teardrop shaped scraper cutters, in this case offered by Jamieson to fit his deep hollowing boring bars. It should also fit most other hollowing tools, like the Stewart style Hookers and the Sorby Multitool.

What I Use:

This is the end of the first of several articles in a comprehensive survey of hollowing tools. I have been candid about my likes and dislikes of these full sized, hand held, hollowing tools, but due to the sheer extent of tools available, most have been only briefly described and discussed here. There is much more I have said on several of the tools (BCT Supercut, Crown Beaver, Kelton Hollowers, Munro, Proforme, Scorpionm, among others) and I refer you to the full length articles which originally appeared in More Woodturning, many of

which are now available in updated and revised versions at the website Fred Holder has graciously provided for them. As always, these articles reflect my judgments and experiences, based on the kinds of forms I most like to make, and the techniques I am most comfortable using. Other turners with different needs, different woods, or different technique may evaluate things differently.

With these thoughts in mind, this section will close with a list of those full sized, hand held tools I most regularly choose when creating small to large hollow forms (in approximate order of use).

Don Pencil Scorpion Armbrace (used to hold almost everything)

Woodcut Proforme, Canted Shaft
John Jordan Hollowers (all sizes and shapes)

Don Pencil Scorpion Curved Shaft (particularly with teardrop shear scraper tip)

Kelton Hollowers (all sizes from 5/16 to 3/4, but especially the 1/2)

Munro Hollowers (both articulating and fixed head versions)

Woodcut Deep Bore Handle (lead shot filled) - primarily for deep sculptures and vases

BestWoodTools, modified pin reat with shop made Phil Iron's style Delrin gates.

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Mini-lathe shop-built hollowing rig w/laser



Home built hollowing rig with laser for a mini-lathe.

by Al Crandall

This is a shop made hollowing system with a laser guide which I designed and built for my Jet mini lathe. It is constructed from 1/2" black water pipe, a couple of galvanized 1/4" pipe nipples, some nuts and bolts, and some scrap 1/2" baltic birch plywood. The assembly has a rib supported plywood bed extension bolted to the end of the lathe upon which rides a pivoting plywood plate.

This plate supports the two bars which constrain the boring bar extension and its outrigger. The boring bar is a 5/8 x 10" long hex head bolt from the shelves at Lowe's and is screwed 2" into the end of the black pipe and further held by a nut welded to the top of the pipe with a 1/4-20 set screw for a grub.

The working end has holes at 0 and 45 degrees for the insertion of a 3/16 square tool bit and a 1/4-20 set screw at the intersection of these two holes holds the bit in place.

The Jameison style anti-torque system has the 1/4" pipe nipples tapped in each end for 5/16-18 hex head bolts.

The black pipe bars are drilled two places each so that the 1/4" nipples are a tight fit into the side of the pipe. A 5/16 hole exits the other side of the pipe and when a bolt is inserted and tightened in the four holes, the assembly becomes quite rigid. I was asked why I didn't just weld the assembly together. My answer is that, like most of the jigs which I make and show to others, I try to minimize the amount of complicated machining involved. A lot of people don't have access to welders, but they could still build this system with a marginally equipped shop.

The constraining bars are separated by a 3/8 carriage bolt and three nuts on each end. They are mounted using two pieces of hard maple which have a vee groove cut into each. Through trial and error I machined the vee on my table saw so that they would firmly grasp the lower pipe when screwed together, and then trimmed the width so that the pipe was proud of the top of the wood and the wood didn't

[Continued on Page 16]