

Northwest Woodworkers Association

THE SAWDUST NEWS



October 2016

<http://www.nwwoodworkers.org>

An association for woodworkers of all skill levels to share their common interest

The Next Meeting

Date: **Thursday, December 1, 2016** at 6:30 PM

Location: **Rockler Woodworking - Northgate**

832 NE Northgate Way
Seattle, WA 98125

Program Highlight: **White Elephant Gift Exchange**

Mark Martinez will be facilitator for this fun meeting.

He will be providing more information about the meeting in an upcoming email.

There will be no meeting in the month of November

October 2016 Meeting Highlights

Meeting Notes by Jan Erickson

Newsletter Photos by Scott Wilson

The **October 2016** meeting of the **Northwest Woodworkers Association** was held on **Thursday, October 27, 2016** at **Woodcraft Supply**. Fifteen members and two guests were present.

We want to express our appreciation to **Ron and Michelle Hall** and the **Woodcraft Supply** staff for providing a wonderful venue for this meeting. We really appreciate your long standing support of the **Association**.



Upcoming Events

The **Steering Committee** will be meeting in the near future to determine the program schedule and events for **2017**. We welcome input and suggestions from all of our members. Please contact any of the **Steering Committee** members with your ideas and requests. Please be proactive and help us select meaningful program content, group tour ideas, and presentations. We want our meetings to be meaningful to our members. All input is welcome.

Remember: There will be no meeting in the month of November!

Show 'N' Tell



Charlie Culler, one of our longtime members who is always ready to try new equipment, methods, and techniques, showed us some of his projects currently in work.

He noted that he is currently working on a chess set, which will have scroll sawed 3D game pieces using a variety of different hardwoods, including **Padauk, Zebrawood, Walnut**, and others. To tantalize us, he brought along some samples of his 3D scroll sawed pieces. **Charlie** showed how he had milled one of them, made from **Padauk**, by applying his pattern to adjacent faces of his blank. He noted that using a #5 skip tooth blade produced a very smooth finish to the piece, requiring minimal additional smoothing.

He explained that the 3D scroll sawing technique involves sawing the blank to the pattern on one face, reattaching the cutoffs with tape, and rotating the blank to an adjacent face and resawing again to the pattern on that face. After removing all the cutoffs, a marvelous, 3D shape emerged! Wow, **Charlie**, almost looks like magic! Great job! We are looking forward to seeing the whole set of pieces – and the accompanying chess board, which no doubt will also be one of your high quality creations!

Charlie also brought along a scroll sawed goldfish, which he intends to use for an intarsia project, a shop-made clamp for securing his blanks during his 3D scroll sawing operations, and some other scroll sawed works in progress.





Our Secretary, **Jan Erickson**, showed us some delightful, rustic band sawed boxes she had made. She explained that she had been given a 5" diameter hardwood (?) tree branch which had very interesting bark texture and branch buds that gave the surface unique, curious shapes.

Pondering possible uses for the wood, **Jan** decided to make some band sawed boxes, using the unusual bark features as highlights for the drawer faces. As can be seen in the photo below, she successfully created some truly unique pieces, which she named in accordance with the shapes and surface features of the bark: **The Bear**, **The Fish**, and **The Yoda**. The leather thong drawer pulls really topped off the rustic theme. Very cleverly done, **Jan**! You superbly utilized the natural features of the wood to craft some fantastic rustic creations!



Program Highlight –

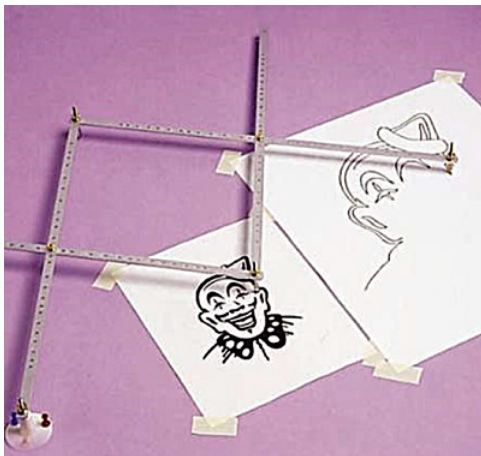
Building and Using a Router Pantograph

A Joint Presentation by Herb Stoops & Paul Stoops



Paul Stoops began the presentation explaining that about a year ago he was making a jewelry box for his daughter and wanted to engrave her name on the box. However, not having access to one of the latest and greatest CNC engraving machines [and no space in his shop to put one.....:-(] and no skills in carving, he was exploring alternative methods and ran across a fascinating design for a router pantograph on Matthias Wandel’s website, **Woodgears.ca**. (<https://woodgears.ca/pantograph/>), which looked like it would work for this application.

So, the first question that comes to mind is, “**What in the world is a pantograph, anyway?**” Well, to paraphrase a dictionary definition, a pantograph is a device that consists of connected links, configured as a parallelogram, usually used for enlarging or reducing an image. Typically, one of the links is attached to a fixed pivot, with other link connections holding either a stylus for tracing the original image and a pen or other device for producing an identical copy with a proportionally larger or smaller size. The ratio of the lengths of the links in the parallelogram determine the proportional size of the copy.

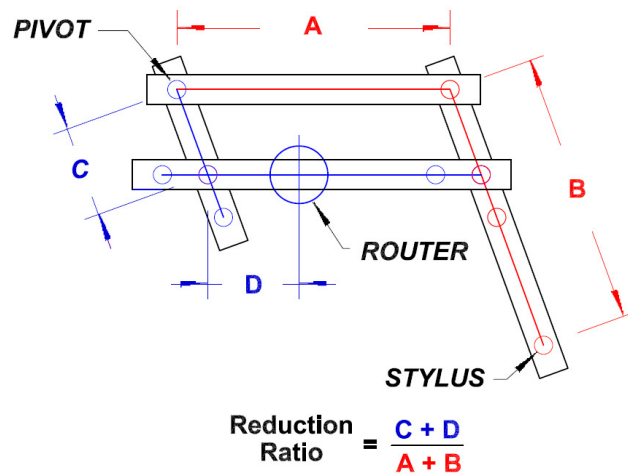


This photo shows a typical drawing pantograph. As you can see, the links of the pantograph form a parallelogram, with the **fixed pivot** on the lower left, the **tracing stylus** in the center, and the **drawing pen** on the right. Multiple pivot pin holes in the links provide a wide range of options of **enlargement** (or **reduction**) of the original image. The pantograph shown in the photo is configured to produce an **enlarged** copy. Note that if the **stylus** and the **pen** positions were reversed, the pantograph would produce a **reduced** copy (i.e tracing a **larger** image on the right with a stylus would produce a **smaller** copy at the middle position).

One of the confusing terms used in discussing pantographs is the word “**reduction**” or “**reduction ratio**”. One might hear the term “**1/3 reduction**”. Sounds innocent enough, but it appears to have two very different possible meanings. Does it mean that the **copy** will be 1/3 **smaller** than the **original**..... or does it mean that the **copy** will be 1/3 the **size** of the original?

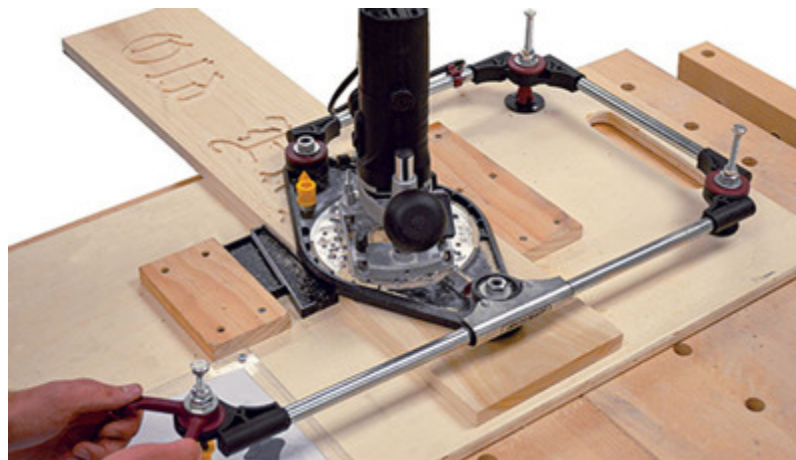
The answer is that the copy will be 1/3 the size of the original in all directions.

As shown below, the amount of reduction (or enlargement) is determined by the ratio of the lengths of the links of the pantograph.



PANTOGRAPH REDUCTION RATIO

An online search for pantographs revealed that in addition to drawing pantographs, other configurations are commercially available. The model shown below, marketed by **Milescraft**, is configured to mount a fixed base router and is intended for such applications as sign making.



However, after evaluating Matthias Wandel's **Woodgears.ca** router pantograph design, **Paul** decided to build one, instead of purchasing a commercial model, intrigued by the challenge of making the tool. And since he had sufficient material on hand, he built a second pantograph for **Herb Stoops**, hoping to add a different twist to his extensive arsenal of tools.



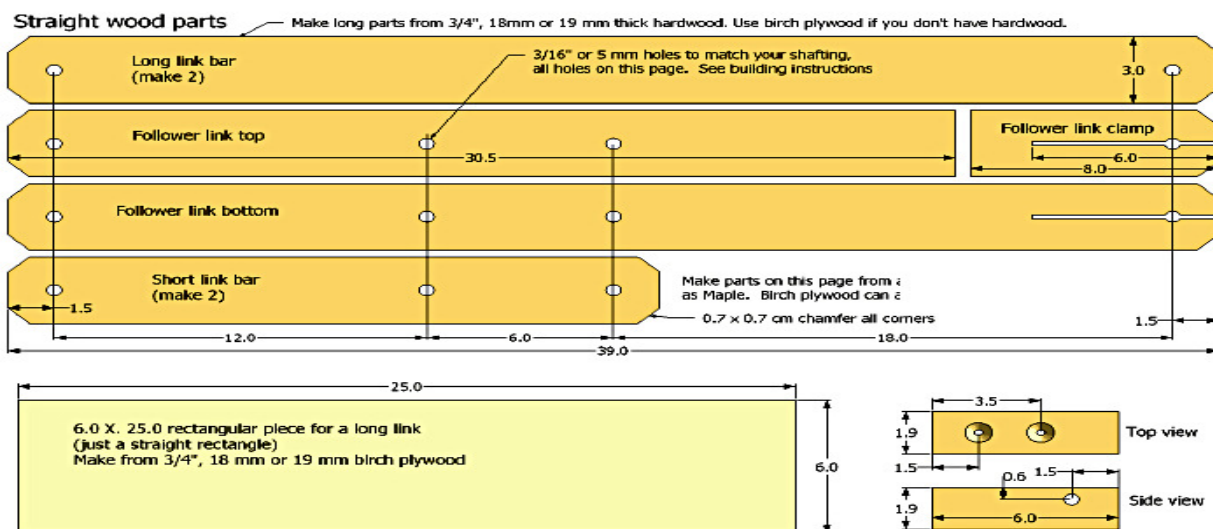
The **Woodgears.ca** router pantograph design appeared to be very simple to build with commonly available materials and shop equipment. Also, as illustrated on the website, the tool appeared to be ideally suited for lettering signs, a feature which was of interest for **Paul's** box engraving application.

So he purchased the downloadable plans for the princely sum of **\$12**, along with an additional **\$8** program called **Stencil**, which Matthias Wandel developed for enlarging fonts for producing sign making/letter templates.

Paul noted that these were very worthwhile investments. The package of information was very complete and included full size, dimensioned, printable drawings of the component parts of the pantograph, extensive, comprehensive, fabrication instructions, and excellent step-by-step photo documentation of the project.

Being a Canadian engineer, **Matthias Wandel**, prefers to develop his extensive gallery of projects using Metric measurements. However, **Paul** found that using a quality **\$2**, engraved, 12 inch-cm stainless steel rule from **Harbor Freight Tools**, working with the Metric measurements was a breeze. That said, converting them to Imperial measurements (fractions of an inch) would have been a nightmare, producing weird fractional numbers, so staying with the Metric measurements was definitely the best approach.

A copy of one of the drawings below shows the clear labelling and dimensioning typical of the drawings.



WOODGEARS ROUTER PANTOGRAPH LINKS

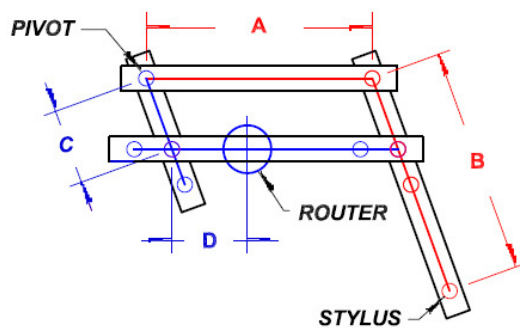
Note: Hole Spacing in Increments of 6.0 Cm

The **Woodgears.ca** router pantograph design is unique in that it utilizes a **hinged** fixed pivot mount, allowing motion in the **vertical** direction, enabling it to do **3D copying**. The **Woodgears.ca** website has some very interesting photo documentation showing the routing of a 3D shape.

The **Woodgears.ca** router pantograph is designed to accommodate smaller routers, like the **Bosch Colt** or other trim routers. The design package also included drawings for an alternate mount for a **Dremel** motor unit. **Paul** purchased a low cost **Harbor Freight** trim router for this application, easily adapting the dimensioned drawings to accommodate that tool. The pantograph built for **Herb** was similarly adapted to suit his **MLCS** trim router.

This router pantograph is designed to provide two different reduction ratios: **1/3 reduction**, and **1/2 reduction**. Matthias Wandel notes on his website that the router pantograph is **not** designed to produce **enlarged** copies, explaining that the forces that would be applied to the pantograph links would be excessive for such an application.

As mentioned previously, the **reduction ratio** is determined by the **lengths of the links** of the pantograph parallelogram configuration. As can be seen in the following illustration, the reduction ratio is altered by changing the **position** of the link containing the router mount.

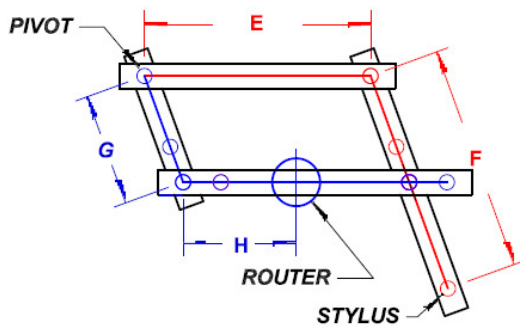


$$\text{Reduction Ratio} = \frac{C + D}{A + B}$$

A	B	C	D
36	36	12	12

$$\text{Reduction Ratio} = \frac{C + D}{A + B}$$

$$\begin{aligned} \text{Reduction Ratio} &= \frac{12 + 12}{36 + 36} \\ &= \frac{24}{72} = \frac{1}{3} \end{aligned}$$



$$\text{Reduction Ratio} = \frac{G + H}{E + F}$$

E	F	G	H
36	36	18	18

$$\text{Reduction Ratio} = \frac{G + H}{E + F}$$

$$\begin{aligned} \text{Reduction Ratio} &= \frac{18 + 18}{36 + 36} \\ &= \frac{36}{72} = \frac{1}{2} \end{aligned}$$

Note: All dimensions in Cm

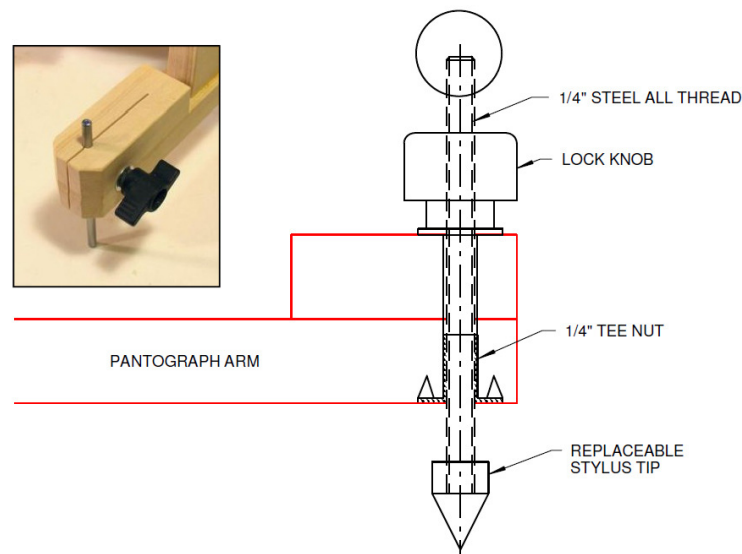
WOODGEARS PANTOGRAPH REDUCTION RATIOS

Although at first glance it might seem limiting, there is one positive note to this tool being applicable in only the **reduction** mode: the **original** image or template shape must be made

either **3X** the **desired copy size** for the **1/3 reduction mode**, or **2X** for the **1/2 reduction mode**. The benefits of starting with an **enlarged** original are that 1) they are easier to fabricate and work with, especially if they contain fine detail, and 2) small discrepancies in the shape or smoothness of the outlines in the original image or template are **reduced** by a factor of 2 or 3 on the copy, making them much less noticeable.

Never one to build something exactly per someone else's plans without doing some re-engineering, **Paul** made a couple of minor design changes that he felt improved the usability of the **Woodgears.ca** design.

First, he revised the Stylus mounting arrangement to enable repeatable, measurable changes in the Stylus position. This is important because the depth of cut of the router bit depends directly upon the position of the Stylus tip. Changing the Stylus mounting arrangement from a simple pinch clamp design to a screw thread/locking knob design allows the Stylus and router bit tip to be set to an initial zero reference position (where the Stylus and router bit tip rest on the material surface) and adjusted by turning the Stylus adjustment knob a predetermined number of turns (1 turn raises or lowers the Stylus tip by 0.05") to the desired cutting depth. In actuality, the cutting depth change is a little less than the movement of the Stylus tip because the router is mounted closer to the fixed pivot point. However, between routing operations, cutting depths can be repeated by resetting the Stylus tip based upon the predetermined number of turns of the Stylus knob from the zero reference position.

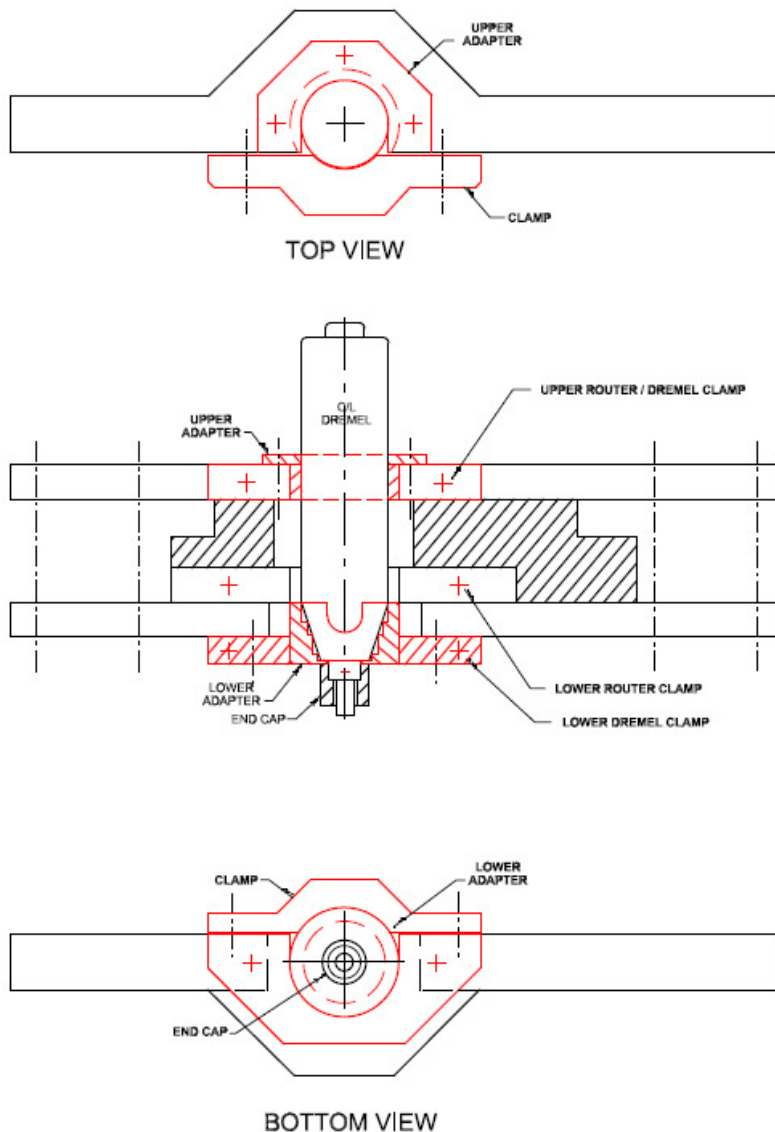


SCREW ADJUSTABLE STYLUS

The second change involved a simplifying the router mount to adapt a **Dremel** router motor. The original **Woodgears.ca** design required the fabrication of complete separate set of links to mount the **Dremel** motor unit.

However, since the **Dremel** motor unit is smaller in diameter than the trim router motor, **Paul** designed a pair of simple adapters with an internal bore configuration tailored to the **Dremel** motor unit, and an external diameter to match the trim router. An additional clamp position was

also added to accommodate the shorter **Dremel** motor unit. These simple adapters made it very easy to change between a trim router and a **Dremel** motor unit for different applications.

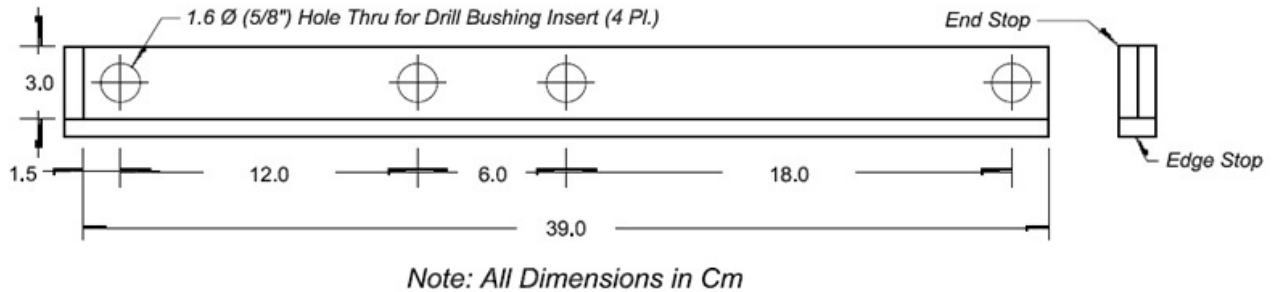


DREMEL MOUNT INSERT

A third design change was to incorporate hanger bolts and lock knobs to secure the clamps that hold the router (or **Dremel** motor) in place in lieu of screws.

Building and assembling the parts for the **Woodgears.ca** router pantograph was very straightforward. Most of the work was done on the table saw and drill press. Hard maple and Baltic Birch plywood were used for the wooden component parts. Brass rod was used in place of the steel rod in the **Woodgears.ca** plan. **Paul** noted that an excellent source for metal products in the Seattle area is **Online Metals**, located on the Ship Canal just east of the Ballard Bridge. (<http://www.onlinemetals.com>)

As was noted previously, the pantograph arms have a series of pivot holes at specific locations critical to the operation of the pantograph. In addition, there are both upper and lower links to each arm, requiring accurately positioned and **matched** hole locations. To maximize the accuracy of the hole locations, **Paul** built a simple drill jig for locating the holes, which included stops to index the position of the pantograph links. All of the links were drilled with this jig



PANTOGRAPH LINK DRILL JIG

When fabricating the jig, he employed a couple of unique products from **Lee Valley Tools**.

To aid in accurately locating the holes for installing the inserts in the drill jig, a nicely crafted tooling accessory set proved invaluable.



Veritas Optical Center Punch

<http://www.leevalley.com/US/wood/page.aspx?p=45502&cat=1,180,42311>

This precision tooling accessory set consists of a Magnifying Post, a Guide Base, and a hardened Center Punch. The Magnifying Post is a Lucite device having a precision set of crosshairs etched into its lower end, and a polished lens on top which gathers light and provides **8X** optical magnification. In use, the Magnifying Post is installed in the Guide Base and centered over the desired hole centerline location on the part. The light gathering ability of the enlarged upper end of the Magnifying Post illuminates the surface of the part, providing ease of viewing. Once the Guide Base is located over the marked hole location on the part, the Magnifying Post is replaced by the Center Punch and lightly tapped with a hammer to center punch the hole location for drilling. In addition, **Paul** found that the Magnifying Post exactly fit a 5/16" drill bushing, allowing this tool to be used directly with his drill jig. Though a little pricey, he said that this Optical Center Punch set is a fantastic tool to have in one's arsenal for all kinds of applications requiring accurate hole location.

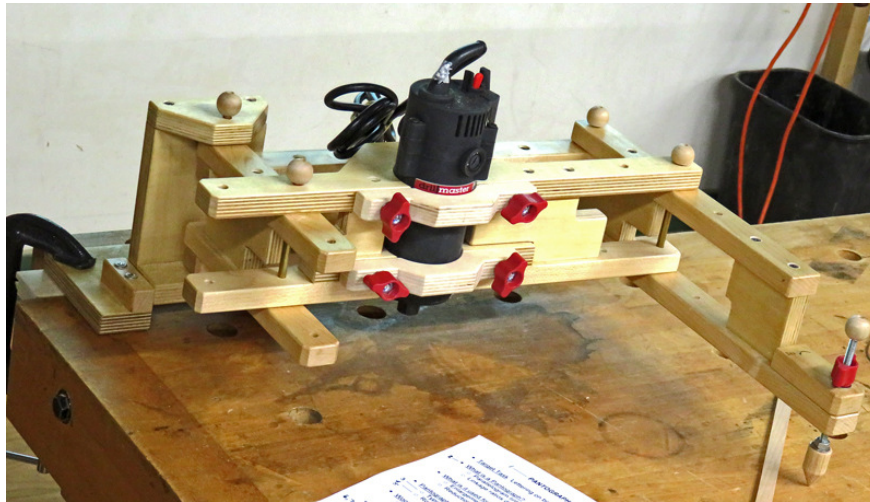
The other useful **Lee Valley Tool** accessories were precision drill bushings and threaded inserts. The serrated bushings press fit into a 5/8" diameter hole in 3/4" or 18mm stock. The precision drill bushings are heat treated steel and come in several Imperial and Metric sizes. Both the inserts and bushings are totally reusable and are very useful in the shop for a variety of projects in both wood and metal.



Veritas Drill Bushings and Inserts

<http://www.leevalley.com/US/wood/page.aspx?p=40089&cat=1,180,40089>

After assembly and a coat of clear spray lacquer, **Paul's** finished router pantograph, with the low cost **Harbor Freight** trim router installed, is shown in the photo below. The craft store wooden balls on the ends of the pivot rods make it easier to install/remove them. Note that the pantograph is configured for a **1/3 reduction**.



So, the \$64 question is, **“How did it perform?”**. In limited testing, **Paul** noted that the tool performed up to expectations. The only anomaly that surfaced was that, due to the vibration of the router and the slight taper on the ends of the rods, some of the pivot rods tended to work themselves out of their holes. To prevent that, he drilled and tapped the ends of the pivot rods and installed small screws and washers – problem solved.

Testing the letter engraving capability by using a band sawed hardboard template created using the **Woodgears.ca Stencil** program, he successfully produced a test engraving – a forerunner of the real thing to be part of his unfinished jewelry box project. The lower case letters were about 1.25" high and approximately 0.025" deep.



Stay tuned..... **Paul** said he will report on the building of that jewelry box, including the router pantograph engraving, at a subsequent meeting. Results do look encouraging, though!



Herb Stoops provided a very informative second half of the presentation describing and demonstrating his experience with his **Woodgears.ca** router pantograph. His real time live demonstration at the end of his presentation was the highlight of the evening! In contrast to **Paul's** lettering application using a **fixed template**, **Herb's** interest was geared toward **free hand** routing, showing yet another application of this versatile tool.

Having done somewhat extensive experimentation and testing to learn how to use the pantograph and determine its performance limits, **Herb** brought along a number of plywood, veneered, and solid wood test samples illustrating free hand pantograph routing using printed patterns. Most of the samples were flat panels, but he also used this technique to enhance the top and side panels of some test boxes, further demonstrating the versatility of this tool. Note in the photo that many of the patterns were quite complex figures! Great examples of the diverse things this equipment can do! Well done, **Herb!**



Herb showed us a book of patterns that he downloaded from several online sources, noting that there are a wide variety available for free public use. Another possible source for interesting patterns and figures are coloring books, which offer a plethora of choices, many of which can be used as is or altered to suit the application.

He also shared some of his lessons learned about free hand routing from his experimentation. He said that one of the notable differences with free hand routing is that in most cases, you only have one chance to rout each line in a pattern – attempting to repeat a line or go back over it usually is unsuccessful because you can't exactly align the second attempt with the first. The second attempt usually widens the line, which becomes very noticeable visually. He also noted that once you start a line, you must keep moving clear to the end of the line. Stopping may produce a burned mark or a wide spot in the line, both of which are very noticeable in the finished pattern.

That said, he also learned that the easiest patterns to copy have a wide variety of shapes and short irregular lines, such as flowers, leaves, etc. which tend to hide any deviations from the original pattern. Also, the reduced size of the **copy** compared to the **original** image, minimizes the visibility of any errors or deviations from the original pattern.

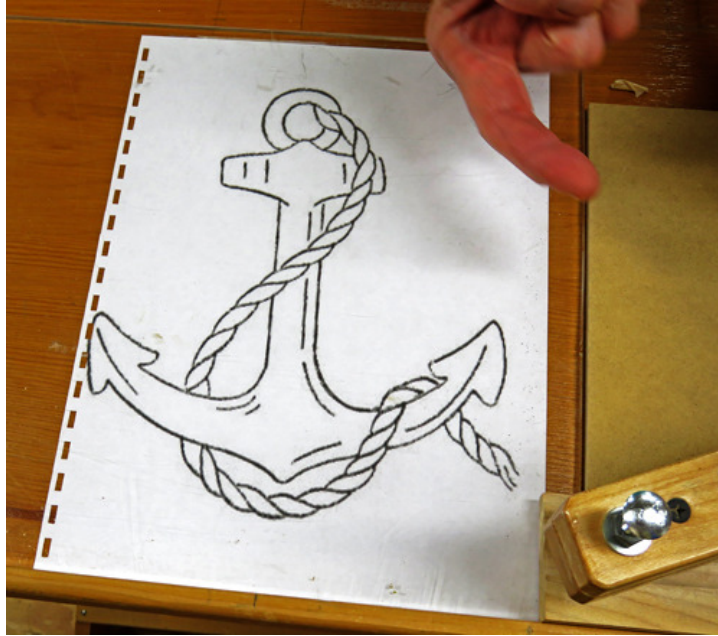
However, he verified that old saying, ***“Practice makes perfect!”*** surely applies to **free hand** routing, which at first seems somewhat daunting, but with practice becomes much more manageable. But isn't that also true of many of our manual woodworking operations, such as planing, manual dovetails and box joints, etc.?

Prior to starting his live demonstration, **Herb** showed us his pantograph router setup and noted some of the changes he made to accommodate free hand routing.

For convenience and portability, he mounted his router pantograph to an adjustable drawing/painting easel. He used an acrylic panel to cover the paper copy of his original pattern, protecting it from damage from the force of the tracing Stylus tip and providing a smooth tracing surface. He also used a locating template to position his test panels for routing. Note that his pantograph in the photo is configured for a **1/2 size reduction** and he is using his **MLCS trim router**. **Herb** also found that using a carriage bolt with a tapered shank and rounded end for a Stylus provided better visibility of the pattern lines.



For his real-time demonstration, **Herb** selected the image of a ship's anchor as a pattern.



Working carefully, he traced the pattern outline with the tapered Stylus. The router bit he used was a 1/4" diameter, **solid carbide**, sign making bit, with a **15°** included angle tip.



To improve his visibility of the work area, **Herb** frequently uses a **Carson Optical Pro Series MagniVisor Deluxe CP-60**. (<http://www.carson.com/products/magnivisor-deluxe-cp-60/>) This useful accessory comes with four different optical lens inserts, offering a variety of viewing magnifications, as well as an optional use LED light.

This photo shows the engraving operation in process. Note the auxiliary studs below the router – intended for use with a **Dremel** motor by moving the router body clamp to the lower position.



And now for the finished demo panel..... (drum roll here, please.....!)



Wow, **Herb**! What a great job! In my estimation, the routed copy actually looks **better** than the original pattern because the slight irregularities in the lines add a rustic appearance like a real ship's anchor would have after doing its work in the sea!

Thanks so much, **Herb**, for sharing your experience with your router pantograph and putting on this live demonstration for the meeting. I think all of the members were impressed with your skill in operating the router pantograph – you made it look easy, though I'm sure it wasn't, but instead reflects your dedicated efforts to master this technique. And in addition, I'll bet a lot of wheels were turning thinking of the potential a router pantograph might have in their own shops..... ! Great job! Great to see a craftsman at work!

Note from the Editor



To think it is almost Thanksgiving already! Where has this year 2016 gone?

But the shorter, cooler days, and sometimes the pitter patter of rain on the roof, reminds us that it is time to get back in the shop and finish up those Christmas ornaments and gifts we have been putting off while enjoying the nice Summer.

As I was thinking about this month's meeting, I was reminded of one of the great benefits of belonging to the **Northwest Woodworkers Association** and attending the meetings..... **sharing!**

I really enjoy coming to the meetings, anticipating the opportunity to learn about new woodworking products, tools, methods and techniques, hearing about other member's experiences, woodworking projects and problems needing solutions, and seeing first hand the finely crafted projects brought for our **Show'N'Tells** – all different aspects of **sharing**.

And last but not least, the opportunity to enjoy and learn from the programs presented by our members and guest speakers – additional aspects of **sharing**, both by the presenters and the membership. This month's program that **Herb** and **I** had the privilege to present, was a great blessing to **us**, giving us an opportunity to share some of the new things we have tried (and are still learning) in the hope that other members will be inspired to adventure into new woodworking territories and just maybe enhance their woodworking experiences and projects.

When asked to participate, sometimes our newer members say “**But I don't really have anything to share**”. But you know, that isn't really true. Have you ever considered that, in spite of our experience level today, **all of us started out as noobies!** And have you considered that asking a question is also an important aspect of **sharing?** Remember, **the only dumb question is the one that isn't asked.** Responding to a question, asked by a fellow woodworker, gives an opportunity for other members to **share** their experiences and problem solutions as well.

It wasn't that long ago that a lady, fairly new to the group, **bravely** stood up in front our group of grizzled old woodworkers and said, “**I'm new to woodworking, and I want to learn!**” And who was that? None other than our **Secretary, Jan Erickson**, who **shared** those delightful rustic band saw boxes at our meeting!! How we have been blessed to see the progress in **Jan's** woodworking skills and her inspiring desire to learn and improve! Thanks, **Jan**, for **sharing** and being an example and inspiration for all of us.

Sharing – isn't that an important part of belonging to our **Northwest Woodworking Association?** Are you making **your** contribution by **sharing?**

Wishing all of you the blessings of our upcoming holiday season.

Happy and Safe Woodworking,

Paul

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We appreciate the generous support provided by our NWWA sponsors, from providing member discounts on purchased items to providing state of the art venues for us to conduct our monthly meetings. Thank you, Sponsors!

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We encourage our members to contact any of the above individuals with questions, comments, or items that may be of interest to the membership.

In addition, please visit our website: <http://www.nwoodworkers.org>