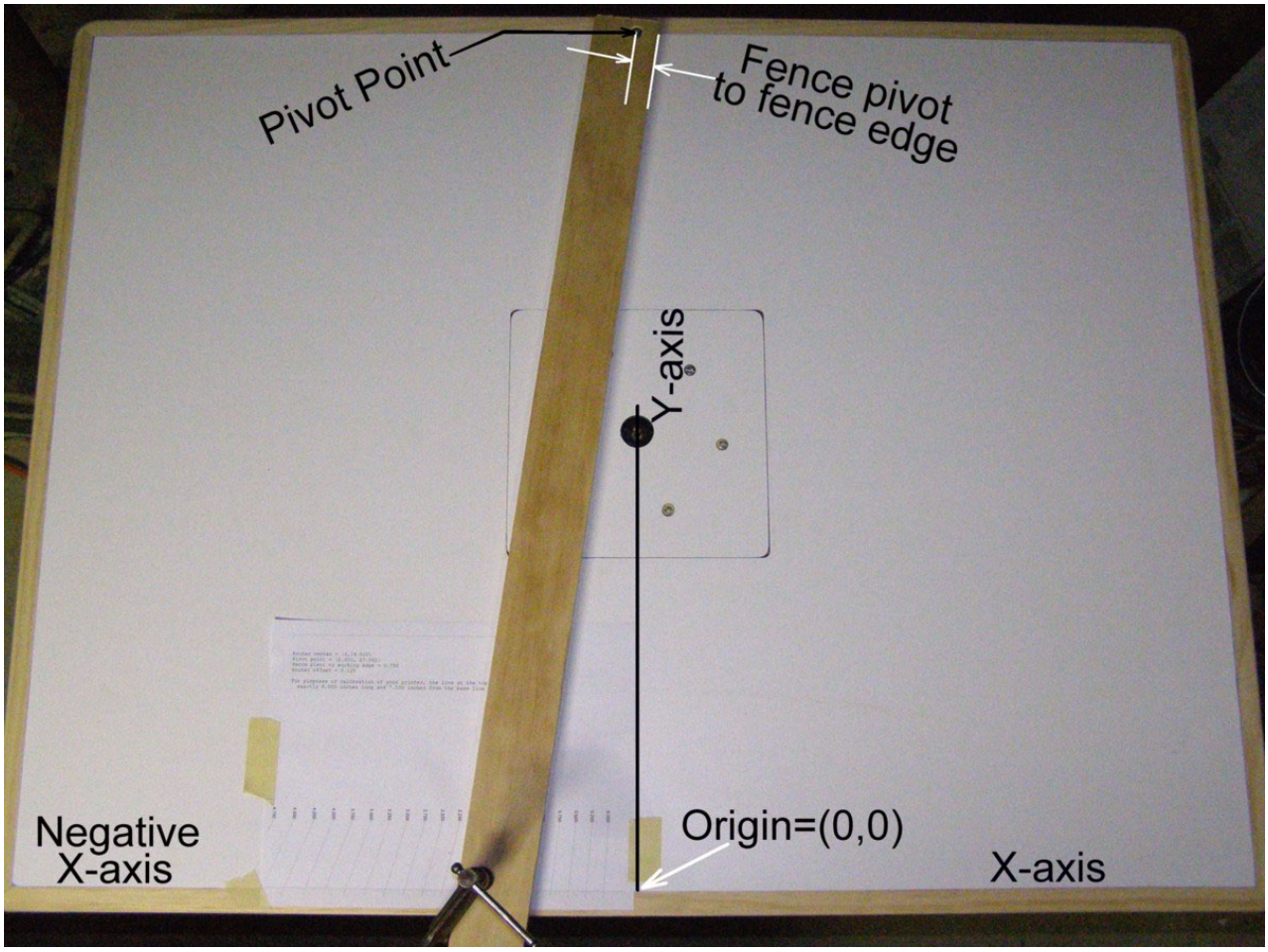
Router Table Pivoting Fence

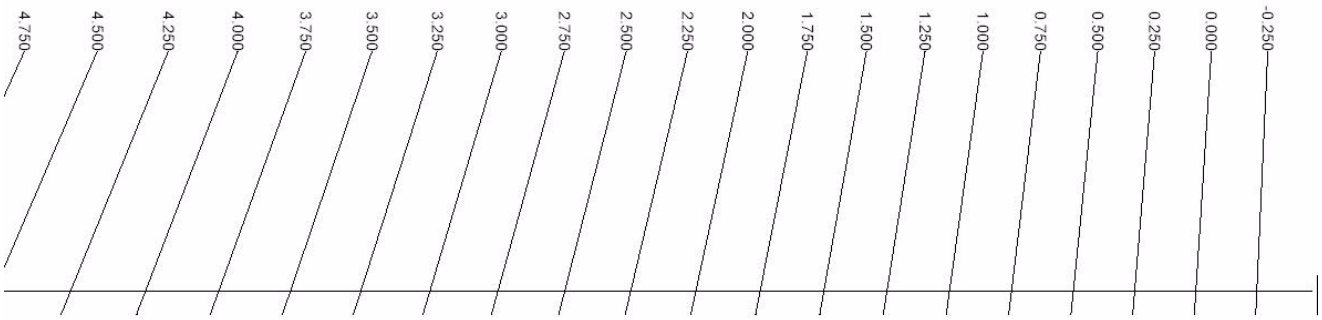
For many router table applications, a fence is used to position the work a known distance from the router bit. The simplest fence is a straight piece of material that is clamped at two ends. The location of the fence is usually determined by direct observation, gauge blocks, or a tape measure. But for some operations, like cutting box joint fingers, a more controlable method is needed.

The method shown here provides that precision without abandoning the simpliticy of a fence that pivots from one end. Here is the setup:



The pivot point for the fence is a pin in the table top. The other end of the fence is clamped at the front edge of the table.

Although this setup is physically very simple, it presents a problem for adjustments to known distances. The distance from the fence to the router bit does not relate in a simple manner with the places where the fence intersects the X-axis (an artibrary line at the front edge of the router table). This problem has been solved by the development of a software program called RouterScale that is available as a free download from our website. The program takes the measurements from your router table and then prints a custom scale for your router table that looks something like this:



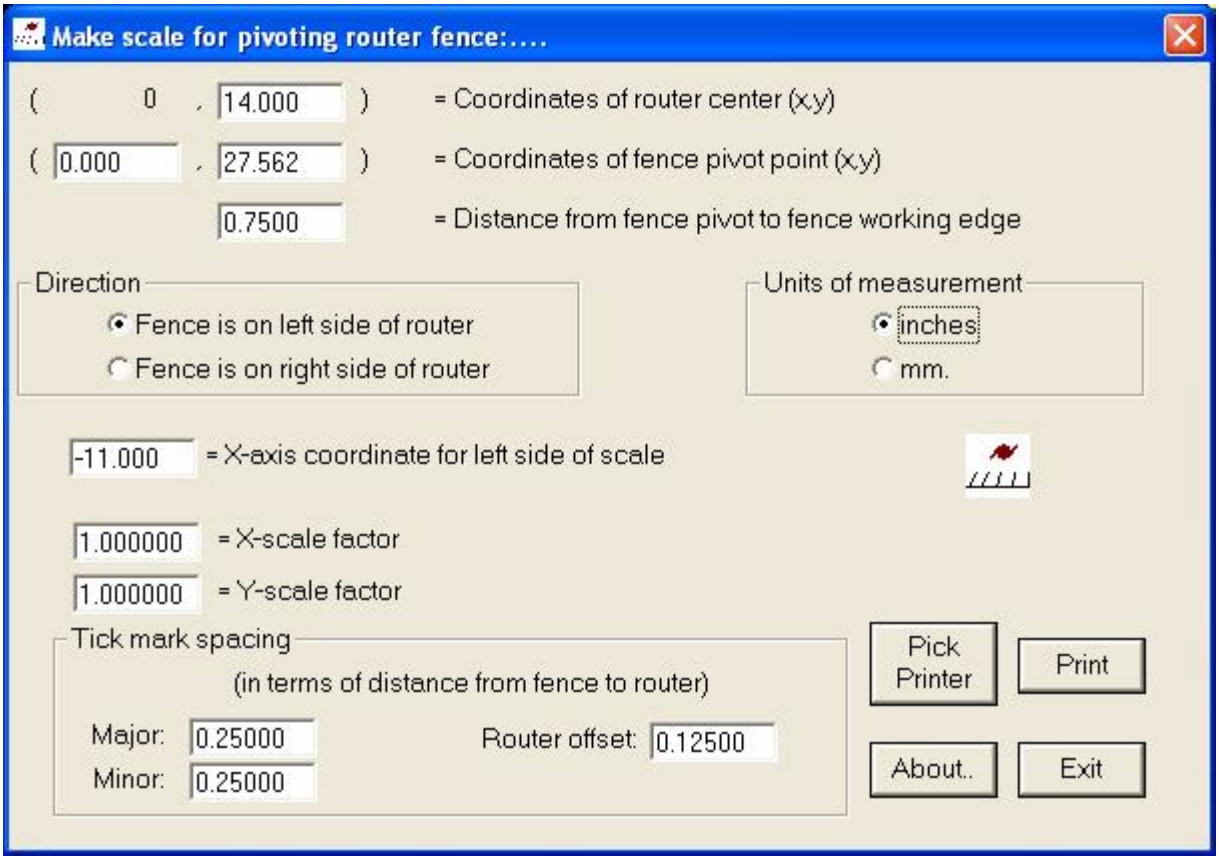
The paper scale can be taped to the router table. Then the fence can be aligned with any of the tick marks to achieve the router spacings printed at the end of the tick mark. If the pivot point is twice as far from the X-axis as the router is, for example, then the paper scale will provide a two-to-one advantage in resolution in setting the distance from the fence to the router bit. Notice that the tick marks are closer together at the right side of the scale and further apart at the left end. This is a consequence of the fence angle changing for different settings of the fence. Those angles are calculated exactly by the RouterScale software so that the paper scale ends up providing quick and precise control over fence location. The tick marks labeled with negative numbers represent settings where the router is hitting the (sacrificial) fence. The rest of this document describes how to use the RouterScale software and how to use the printed scale to do precise routing.

The Coordinate System

The RouterScale software assumes a coordinate system as shown on the picture on page 1. The X-axis is a line at the front of the router table where you intend to apply the printed scale. In the example shown in the picture, I chose to use the edge of the laminate top where it meets the wood banding. But you can chose whatever line is convenient. The right side of the X-axis has the positive coordinates and the left side has negative coordinates. The origin (where the X-coordinate is zero) must be directly in line with the center of the router bit. The Y-axis extends from this origin, perpendicular to the X-axis, and directly through the center of the router bit. Use a carpenter's square or other device to find this origin point on your table. The coordinate system may be in either inches or mm. There is a place in the RouterScale software to indicate which system of units you are using.

RouterScale Data Entry

When you run the RouterScale software, you will see the following display:



After entering the parameters that describe your router table, you can click on the **Print** button and print a paper scale that can be used on your table. Here is an explanation of all the parameters involved:

Coordinates of router center (x,y)

The X-coordinate is always 0 because we defined our coordinate system so that the center of the router bit is directly on the Y-axis. The only number you have to enter is the Y-coordinate, which is how far the router center is from the X-axis.

Coordinates of fence pivot point (x,y)

Use a carpenter's square to drop a perpendicular line from the center of the fence pivot point to X-axis. Then measure how far that point on the X-axis is from the origin (0,0). That is the X-coordinate of the pivot point. If the point is to the left of the origin, enter the distance as a negative number. If it to the right of the origin, enter the distance as a positive number. The Y-coordinate is the distance from the X-axis. In the example shown above, the X-coordinate is 0. This just means the pivot point just happens to be in a direct line with the router bit, but the method will work just as well if the pivot point is elsewhere.

Distance from fence pivot to working edge

Enter the distance from the edge that work slides against to the center of the pivot point in the fence.

Direction (left or right side of router)

Select the correct option based on whether the fence will be located on the left or the right side of the router bit.

Units

Select inches or mm.

X-axis coordinate for left side of scale

Enter the X-coordinate of where you expect to apply the template to the table. By printing several templates with different starting points it is possible to create a template that is longer than a single piece of paper. For single-sheet scales, you could use -11.0 (inches) if the fence is on the left side of the router and -1.0 if the fence is on the right. This is a non-critical parameter, so just approximate where the scale will be.

X and Y scale factors

These entries should almost always be left at their default values of 1.000000. If you enter something a little different for either parameter, then that factor will be applied to all dimensions in the printout. The only time you would want to use these parameters is if your printer does not measure out X and Y distances correctly. To aid in checking your printer's scaling, every printout from RouterScale contains a calibration line that you can check with a ruler.

Tick mark spacing

The printed scale contains tick marks that indicate the distance from the fence to the edge of the router bit. This is the distance to the router center minus the Router offset described below. The most useful setting for these tick marks would be where they coincide exactly with the distances you want to have in your work. For example, a spacing of 0.250 will make it easy to cut slots every 0.250 for box joints. If the box joints turn out too tight, then just print another template with a smaller tick mark spacing.

Tick marks are defined as major and minor. The major tick marks are labeled. The minor tick marks are not labeled, and are slightly shorter than the major tick marks. If you just want labeled tick marks, then set the major and minor tick mark spacing to the same number.

Router offset

This is usually just half the diameter of the router bit. The router offset is used to establish the starting point for the tick marks and their labels. Using a different router offset that is not necessarily half the bit diameter can be a convenient way to offset box joint fingers.

Pick printer

Normally the RouterScale software prints to your default printer. If you have several printers, then you can use this button to select a different printer.

Print

Click on this button after all data has been entered to make the printout. Whenever you print, the values that you entered also stored on your computer so that they will be loaded as defaults the next time you run RouterScale.

About

Click on this button to get contact information and version information.

Exit

Click on this button to close the program.

Program Limitations

RouterScale only works on Windows 98/2000/NT/XP/Vista. It does not work on a Mac or on Linux.

RouterScale only works with letter-sized paper. It does not generate scales longer than that. You can use legal-size paper, but the program will just leave the extra space blank.

Making Box Joints

The application that prompted the development of this software is making box joints. Using a nominal 0.250 inch diameter router bit, ideally slots could be routed at .250, .750, 1.250, 1.750, etc. This would leave just the right amount of wood between slots so that those fingers would exactly fit in the corresponding slots on the adjoining face. But due to variations in the way a particular bit cuts a particular kind of wood, it is possible that this spacing is not optimal. Perhaps more play is needed to align the parts or to allow for glue. Or maybe the joints come out too loose. By using trial-and-error, slight variations in spacing can be made until the joints fit just right. For example, an old worn 0.250 inch bit using 0.250 inch spacing was found to produce box joints that were too tight in oak. After some experimentation, a 0.241 spacing was found to be optimal. Here is how the precise quarter inch box joints turned out:

Downloading and Installing RouterScale

The RouterScale program is packaged along with this document in a file called RouterScale.zip. Within that ZIP file there is this document and the executable program, RouScale.exe. There is no "installation program" to do the installation. Instead you just copy the RouScale.exe file to somewhere on your hard disk. Then to run the program, you just find the RouScale.exe file and double click on it. You can also create your own shortcut to the program from your desktop. If there is enough interest, we may someday package the program in a formal installer that will do all this automatically, but for now the process is manual. The software may be downloaded from this web page:

`www.tunelab-world.com/router.html`

RouterScale was developed by

Real-Time Specialties
6384 Crane Road
Ypsilanti, MI 48197
(734) 434-2412

e-mail: `info@tunelab-world.com`