

# \$5 Router

If you can't afford a vintage or new one, build your own using a block of wood, an Allen wrench and a thumbscrew.

Here is a real-life shop problem: The project calls for a shallow slot, or dado, in the middle of a board. Defining the edges using a wide chisel is a first step. But determining the best way to remove the waste is a challenge. The chisel could do it, although gauging the depth accurately would take patience. Using my electric router would solve that problem, yet experience tells me that freehand use of this power tool can lead to stray excursions into surrounding margins. So fence guides would need to be set.

This situation calls for a router plane. An uncommon plane that looks different, it most often elicits the question, "What does it do?" Now you know – it levels dados and hinge gains. Its right-angle blade will allow you to make a flat cut of an accurate depth.

## Router Plane History & Use

Router planes have been made with metal bodies by Stanley and other manufacturers for more than 100 years. You can find examples in tool catalogs or flea markets today. Like other planes,

earlier router planes were made with a wood body to hold the right-angle cutter. To

save money I chose to build mine using a common, historical wood shape. If you prefer to purchase one instead, E.C. Emmerich (E.C.E.), the same firm that makes the line of Primus planes, sells router planes with a wood body. The 20-S comes with three cutters (call 800-724-7758 or visit [ecemmerich.com](http://ecemmerich.com)).

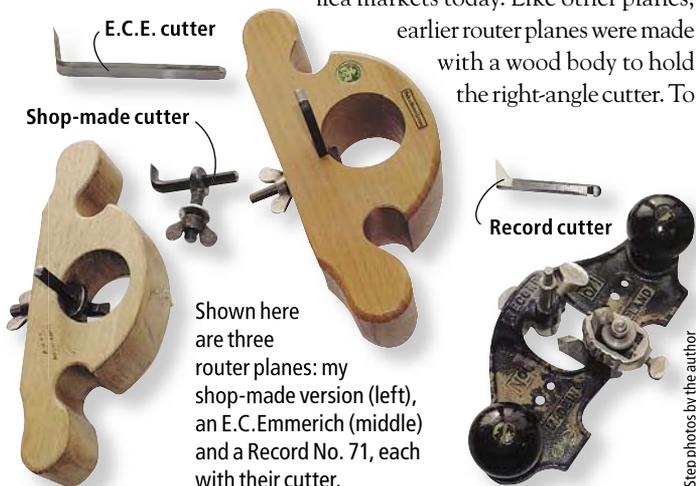
One colloquial name for this tool is "Granny Tooth" plane. It is not at all hard to use. Adjust it to depth and use it in a series of short, choppy push strokes. Just as with power routers, your application may call for more than one setting to achieve the desired depth. In any event, define the edges of the dado with a wide chisel. I find it helps to use the chisel to remove a little waste at the end of the slot so that my final strokes with the router do not split out wood beyond the desired end. Use it once and you will be convinced of the utility of this odd-looking plane. Make your own and you have the added satisfaction of toolmaking as well as tool use, something that was very much part of becoming a woodworker in times past.

## Collecting Your Materials

When I set out to make my plane, the challenge was to make the right-angle cutter and the specialty holder to attach it to the wood body. Both these parts were special forgings and castings, processes not familiar to me. The solution to the right-angle cutter is adapting a  $\frac{5}{16}$ " Allen wrench. The holder is made from a  $\frac{3}{8}$ " malleable iron thumbscrew with a washer and a wing nut. The beauty of this is that they are available from Reid Supply Co. by mail and the parts cost less than \$5.

by John Wilson

*John currently operates The Home Shop in Charlotte, Michigan, where he teaches classes and sells Shaker box supplies.*



Shown here are three router planes: my shop-made version (left), an E.C. Emmerich (middle) and a Record No. 71, each with their cutter.

Step photos by the author

# Plane

Start by ordering the hardware.

I suggest buying two sets to make the most of shipping costs. Plus an extra part gives you a backup in case you make a mistake, or it allows you to build a second plane if you don't. Also, order a slim file for the hexagonal hole.

The wood for the plane body is made from any of a variety of hardwood. You need a piece  $1\frac{1}{2}$ " x  $3\frac{3}{4}$ " x 10".

The toolmakers at E.C.E. use red beech, hornbeam, pear or lignum vitae.

In Japan, toolmakers often use a dense oak. My preference for wood that's available locally is white oak or hard maple. You may find something already on hand in your shop.

## Making Your Plane

Draw the pattern for the plane on your wood block. Three hole sizes are required:  $\frac{3}{8}$ " diameter, 1" diameter, and 2" diameter. If you don't have a 2" drill bit, this can be cut using a scroll saw or a hand coping saw. The two 1" holes are merely to give a smooth curved hand hold, and can be sawn instead. The  $\frac{3}{8}$ " hole for the thumbscrew is drilled  $\frac{1}{2}$ " from the top surface, centering on the 2" hole opening.

Now cut the profile of the plane. Once the edges



Here is my shop-made router plane made from white oak with a  $\frac{5}{16}$ " Allen wrench and a  $\frac{3}{8}$ " thumbscrew, washer and wing nut.



Drill the  $\frac{3}{8}$ " hole for the thumbscrew. The larger 1"-diameter and 2"-diameter holes can be either drilled or sawn depending on your woodshop's drilling capabilities.



The plane body is sawn on the band saw.



Sand the plane body.



Round the edges with a trim router. The template for the layout of the body is on the bench.



Drill the thumbscrew with a  $\frac{5}{16}$ " drill, as shown here. Note that the position is  $\frac{1}{8}$ " closer to the thread side of the head.



Use a slim triangular file to make the hexagonal hole for the Allen wrench.

are sanded, round over all edges using a wood rasp, or an  $\frac{1}{8}$ " round-over bit in a router as shown in the photo above. Enlarging the  $\frac{3}{8}$ " hole to receive the thumbscrew is best done after making the hexagonal hole for the Allen wrench. At this time the thumbscrew will not quite fit into the middle hole, but it will later.

The thumbscrew now is drilled and filed to make a hexagonal hole for the Allen wrench. Start by drilling a  $\frac{5}{16}$ " hole in the malleable iron thumbscrew head. This hole wants to be  $\frac{1}{8}$ " closer to the threaded stem than the actual center. Do your drilling with the thumbscrew firmly clamped to avoid an accident. I find that

starting the  $\frac{5}{16}$ " hole by slightly angling the drill can achieve the desired location. However, once started, drill straight across so the Allen wrench will be held at right angles to the holder.

The hexagonal hole shape is achieved using a slim file similar to the smallest triangular file for sharpening hand saws or the square file in the supplies list. Orient the hex shape so that the cutter will face forward. The malleable iron files relatively easily. You want a tight fit, so keep testing for size as you file.

Now the holder and cutter (the thumbscrew and Allen wrench) are ready to be fitted to the plane body. A  $\frac{1}{4}$ " chisel will serve to enlarge the place where the  $\frac{3}{8}$ " hole comes into the center opening. You want the holder to recess sufficiently so the cutter is held

firmly against the wall of the center opening.

You are now ready to grind the cutter. The Allen wrench is already hardened and suitable for the plane blade. By having a small container of water handy to the grinding wheel you can keep the temperature from spoiling the tip of the blade. Both legs of the Allen wrench need to be shortened somewhat. Because this is hard steel, a hack saw will not work. Grind a V-groove from all sides until the waste end drops off.

Before grinding the cutter itself, study the cross-sectional drawing at right that shows the angles needed for an effective blade. Specifically, note the need for relief. In the words of the advertisement for stomach acid medicine, "How do you spell relief?" In cutting tools relief is spelled

## CLASSES

**The Home Shop**  
406 E. Broadway Hwy.  
Charlotte, MI 48813  
517-543-5325  
(9 a.m. to 5 p.m.)  
Monday – Friday EST)

John Wilson's toolmaking events cost \$90 and are on Saturdays. Visit [shakerovalbox.com](http://shakerovalbox.com) for a current schedule.

**Router Plane** – Jan. 14, 2006  
**Wood Block Plane** –  
Jan. 14, 2006  
**Wood Scrapers & Tool Sharpening** – Jan. 28, 2006  
Gil Chesbro teams up with Wilson for the following classes:  
**Spokeshave** – Feb. 11, 2006  
**Traditional Frame Saw** –  
Feb. 11, 2006



Here the blade and holder are ready to be fitted into the plane body.

out as: "Nothing touches the work surface behind the leading edge." To achieve this, the Allen wrench is ground flat on the bottom, with the angle rising steadily from the cutting edge to the back with about  $\frac{1}{8}$ " of rise. This will ensure that it will avoid skating off without being able to cut.

The top surface is ground last to give an approach angle of  $30^\circ$ . Both top and bottom grinding need to result in a cutting edge that lays flat to the work surface. This is a trial-and-error process that will take some fussing to get right. I prefer a belt sander for the finish work. It is an opportunity to use up a partially worn belt. The advantage of the belt sander for finish grinding is achieving a flat surface, good control, and a cool working surface while using water to dip the blade.

A tool is a problem-solving device. The most important part of any tool is your eye for knowing when and where to use it, and your hands to guide it to the solution. So put your new router plane to use right now. Clamp a scrap of 2 x 4 that's 1' long in your bench vise. Draw a slot 1" wide and 6" long. Now use a chisel to define the edges, and chip out a little waste at the stop end of the slot. Set your plane for  $\frac{1}{8}$ " deep, and go for it.

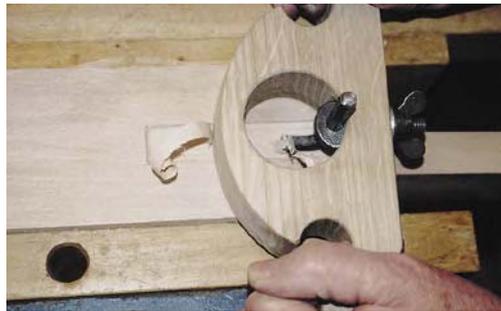
A wood plane with its special cutter and holder is in your hands to make it work. It's a valuable new tool for less than \$5. **PW**



Carve the recess for the head of the thumbscrew as shown here.



Grind the cutter to a  $30^\circ$  angle. Grinding manufacturers don't recommend side grinding but I've always felt safe.



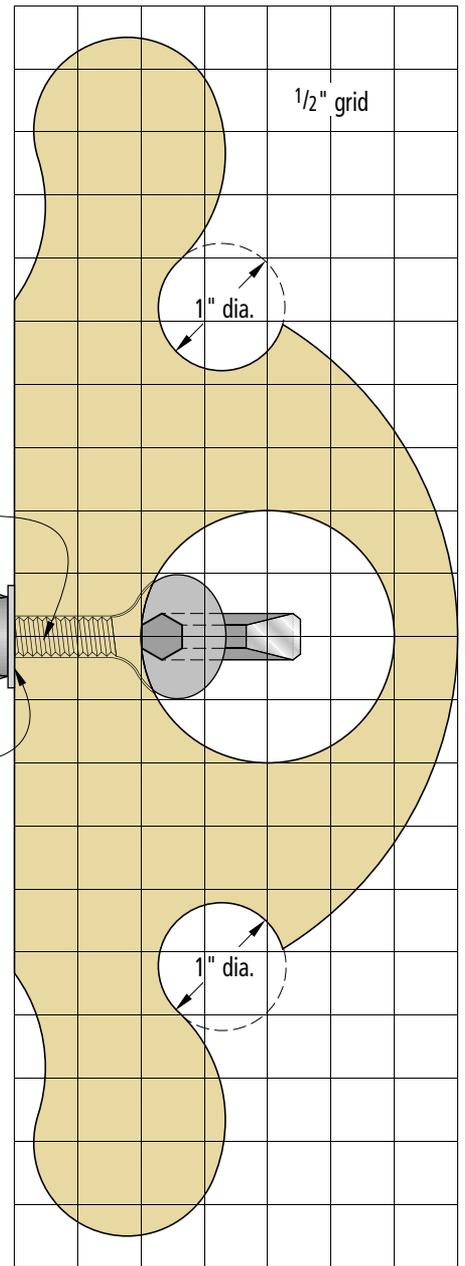
Be sure to give your router plane a trial run as soon as you're done sharpening the iron.

## SUPPLIES

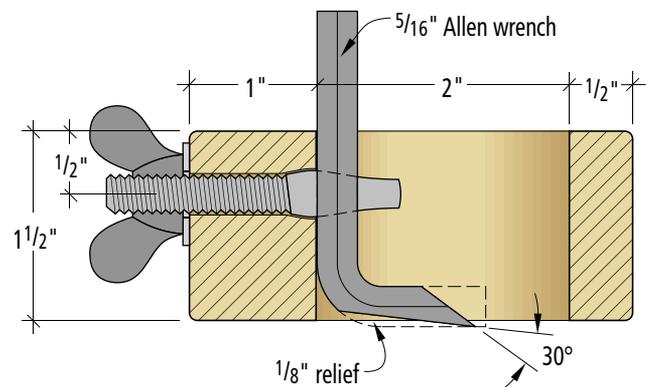
**Reid Tool Supply Co.**  
800-253-0421 or  
reidtool.com

- 1 •  $\frac{5}{16}$ " hex key (Allen wrench)  
#AHK-28, \$0.58
- 1 •  $\frac{3}{8}$ " malleable iron thumbscrew,  $1\frac{1}{2}$ " long  
#MIT-23, \$2.15
- 1 •  $\frac{3}{8}$ " malleable iron thumb (wing) nut  
#MIN-4, \$1.35
- 1 •  $\frac{5}{16}$ " flat washer  
#HHW-0100, \$0.07
- 1 • 4" square file,  $\frac{5}{32}$ "  
#GRO-32-414, \$5.15

Prices correct at time of publication.



## Plan



## Section