

Introduction



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Shortly after assuming his duties as our new project builder, Chuck Hedlund made it a priority to flatten the benchtops in the WOOD® magazine shop. Why the rush? According to Chuck, "I find a flat work surface essential to assembling square boxes, flat panels, or four-legged projects that don't rock. I can't work on a benchtop that's not true." So, we've asked Chuck to show us the best way to level a troublesome benchtop. Here's how he does it.

Note: These procedures work for any solid-wood top that's at least 1" thick. We recommend you flatten your benchtop if it's uneven by more than 1/32". (You can check for flatness by moving a straightedge across your benchtop.) Do not try these flattening steps on laminated tops made of plywood, particleboard, hardboard or similar materials.



Can this benchtop be saved?
Absolutely.

To show you how this technique works, we searched for a bench badly in need of flattening. We found a doozie in the workshop of John Hetherington, one of our photographers. As you can see in photo A, left, this turn-of-the-century bench had a warped, irregular surface that was out of flat by more than 1/2". The bench was a great-looking antique, but John wanted to restore its usefulness as a woodworking tool. Although the flattening process that we'll describe here bared new wood on the benchtop, John restored the antique-patina look by rubbing in a combination of stains afterwards.



Prior to flattening the benchtop, we made any necessary repairs to the base and the workbench top.

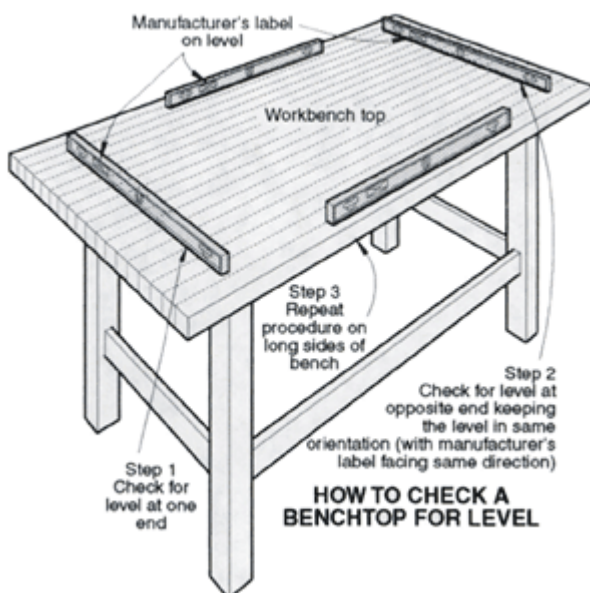
+ ENLARGE IMAGE

Start by preparing the bench Before you flatten the bench, you need to make any necessary repairs. As shown in photo B, *right*, our sample bench had delaminated edge boards that required our attention. You may have to remove the top and retighten, reglue, or reinforce the joints in the base to make it solid and rack-free.

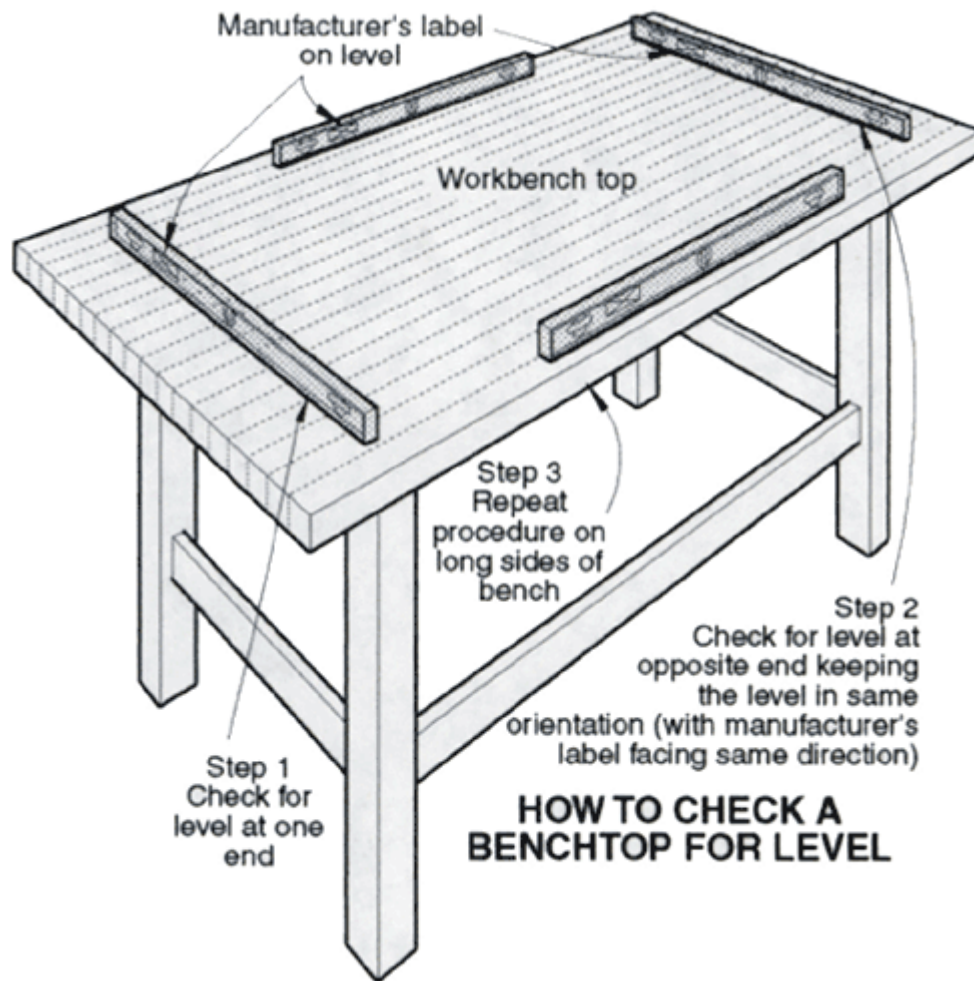
Since you will be routing into the top in the following steps, you need to remove any embedded metal fasteners (such as brads and staples). A metal sensor will aid your search, and save you from dulling or destroying a router bit.

Next, place the bench in the spot in your shop where you will be using it. Check the top for level, and add wood shims to the bottom of the base's legs as necessary (see the drawing *below*).

With the top as level as possible, attach the shims with adhesive or fasteners. Mark the position of each leg onto the floor so that you can always return the bench to its level location.



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Start by preparing the bench

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Now, make and attach the flattening jig With the jig shown in this article, you can slide a router over your benchtop to remove all the high areas and leave a flat surface. The router slides back and forth across the top in a *router carrier* that slides along a perfectly level and straight carrier guide on each side of the benchtop. These pieces are mounted to the bench with *carrier-guide supports*.

To mount the carrier guides and carrier-guide supports, follow the Setting Up the Carrier Guide drawing *below*. (You may find it necessary to remove one or more vises.) To make the carrier guides, joint one edge of a 2x4 and rip the opposite edge to give you a straight board with parallel edges.

After mounting the carrier guides, use a level to make sure that they are level along their length and level with each other. If the benchtop is twisted you may find it necessary to shim the carrier guides with thin pieces of wood or paperboard as shown in the Section View below. Use only as many shims as necessary.

Now, use another jointed board as long as the carrier guides to check them for straightness. If the carrier guides bowed during mounting, you will need to correct the situation with shims.

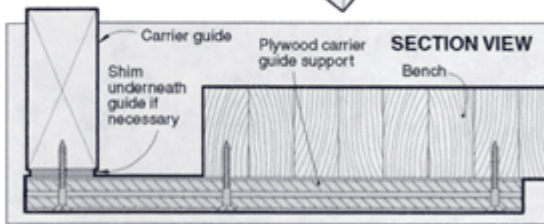
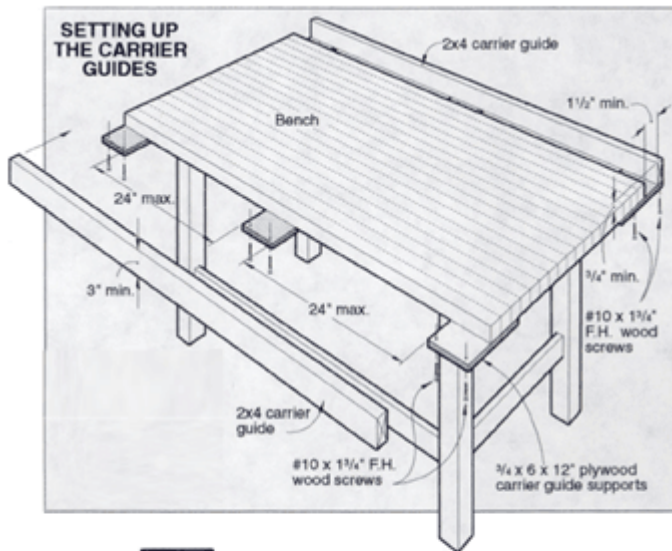
These leveling and shimming steps can prove time-consuming, but stick with them -- you'll be rewarded with a flat bench in the end. Finally, construct a router carrier according to the drawing on the *top of the next page*.



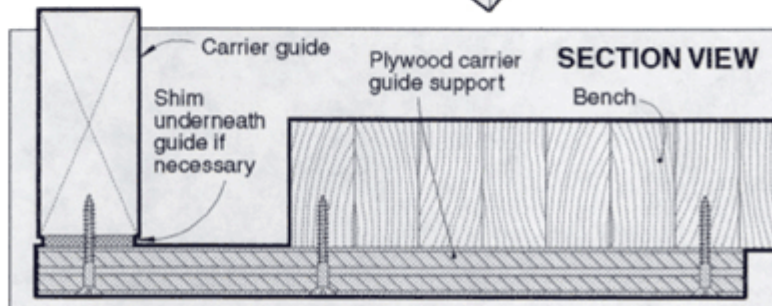
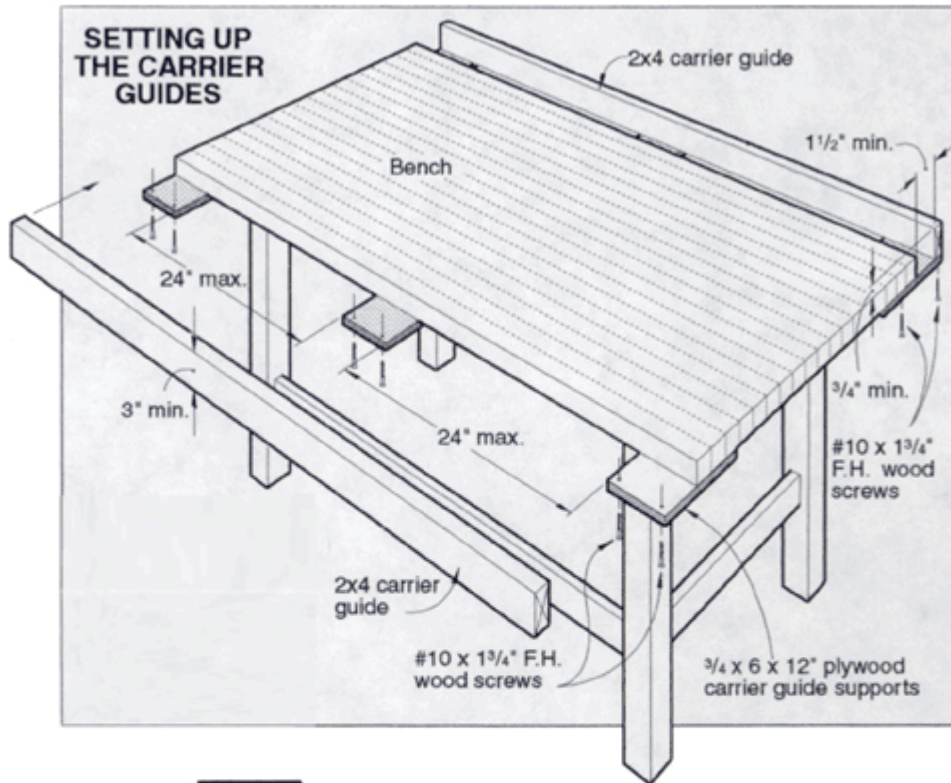
Slide a straightedge along the carrier guides, and use a tape measure to find the low spot on the benchtop.

It's time to rev up the router and start flattening To adjust your router's straight bit for the correct cutting depth, use a straightedge and tape measure as shown in *photo C* to find the lowest spot on the bench. Then, place the router carrier onto the carrier supports so its slot centers over the low spot. Mount a 1"-to 1 1/2"-diameter straight bit in your router, place the router into the router carrier (directly above the low spot), and set the bit for a paper-thin cut. You must securely tighten the router bit into its collet, and the router motor housing to the base, to eliminate any possibility of the cutting depth changing during the following steps.

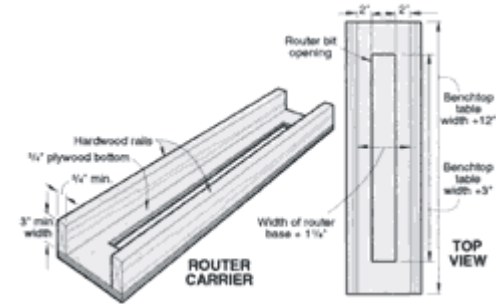
Next, use four clamps to secure the router carrier to the carrier guides at either end of the bench. Make a full cut across the width of the bench by first running the router away from you and along the left hardwood side of the router carrier. Then, make a return cut toward you along the right side of the router carrier. Without moving the router carrier, repeat these router passes once or twice so the bit cuts to its full depth. As you move the router, remember to place minimal downward pressure on it to avoid bowing the router carrier.



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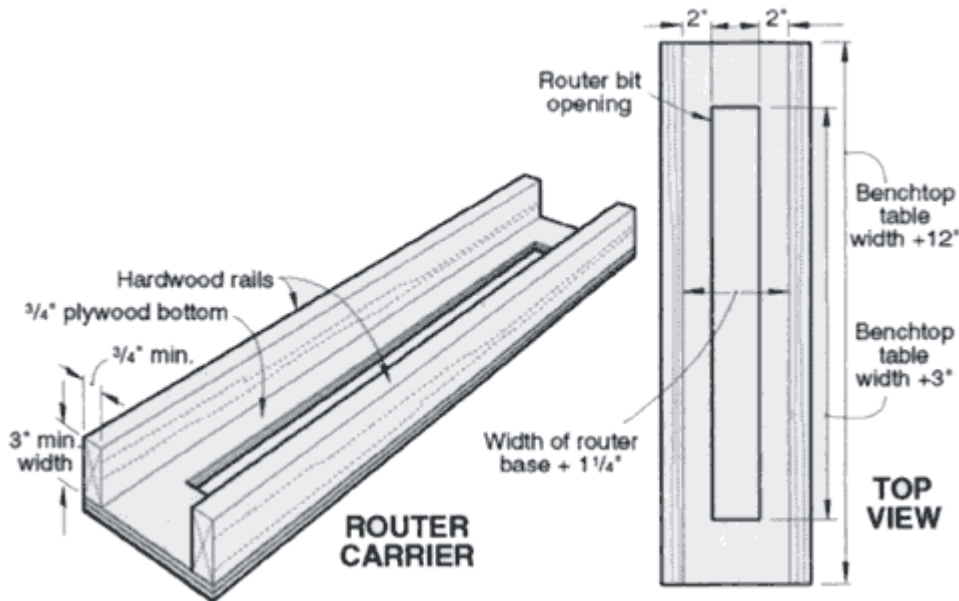


Final Touches



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Final Touches

Repeat this procedure at three evenly spaced locations along the length of the bench as shown in photo E, *below*. These cuts confirm that you adjusted the router bit to the correct depth. Adjust the bit for a deeper cut if it passes over any areas without removing stock. If the router bogs down during these cuts, switch to a smaller bit or a more-powerful router.

Now, measure the width of any of your four router cuts. Subtract 1/4" from your measurement and use this figure to space out marks along the length of each carrier guide. For instance, our router cuts were 2 1/4" wide, so we made marks every 2". Use these marks in the following step to guide your placement of the router carrier so your cuts overlap by 1/4".

Next, flatten the entire top by starting at either end of the bench and making router passes in increments along its length. For consistently deep cuts you must clamp the router carrier for each router cut. You can speed things along by having a helper reposition and reclamp one end of the router carrier while you clamp the other end and operate the router.

As you approach each of your initial, spaced-apart cuts, check to see that your cutting depth has not changed. If it changes, the bit or motor housing is slipping up or down, and you will need to fix the problem. In working on the benchtop shown here, we were tripped up by the brand-new router we were using. Factory lubrication open the outside of the motor housing was causing the housing to slip, even though we tightened the base securely. So, we cleaned the motor housing and base with mineral spirits, then started the routing process over again. Another lesson learned the hard way!

The final touches No matter how careful you were to clamp the router carrier and put minimum

downward force on the router, you will still wind up with fine ridges where one router pass meets the other. Fortunately, you can quickly smooth away these ridges while keeping your bench flat.

As shown in the photo F, *below*, we lowered the ridges with a cabinet scraper and followed this with a light sanding using a random-orbit sander. Be careful to remove the ridges and no more.

Written by Bill Krier with Chuck Hedlund **Photographs:** John Hetherington **Illustrations:** Kim Downing



E: Make four evenly spaced cuts across the benchtop to test the cutting depth of the router bit.

F: A cabinet scraper and random-orbit sander help make quick work of the tiny ridges on the benchtop.

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