

Tuning a Hand Plane



In today's culture of instant gratification and disposable everything, most of us are conditioned to expect the stuff we buy to just work right out of the box. Even the caveat "some assembly required" is printed on the packaging of many items, just to make sure there is no misunderstanding. Published reviews of shop tools invariably dedicate an entire section to the experience of unpacking, cleaning, and setting up the tool for use, before the subject of functionality is even broached. Whether a realistic expectation or not, once a tool is put together, most people want no further inconvenience beyond plugging it in and turning it on.

It's no surprise that so many 'modern' woodworkers, especially those used to plug-and-play electric tools, eschew anything that requires sharpening, let alone tuning and fettling to make it work properly. But the fact is, whether 100 years old or brand spanking new, virtually all hand planes benefit from some degree of tuning to bring them to their full potential. Fortunately, this is not a difficult proposition, and actually aids in better understanding how the tool functions and how to get the most out of it.

Below are the basic steps for setting up and tuning a hand plane for use. Since there are so many variations of planes, both new and used, I'm purposefully keeping it fairly generic, so some interpretation may be necessary when applying the concepts to the tool in front of you. But don't worry, there are no tool police surveilling workshops and garages. Feel free to skip a step if you don't think it's relevant or needed.

Step 1 – One Righteous Sole

I'm not a stickler when it comes to flattening the sole of a plane. After owning hundreds and using dozens over the years, it's fairly rare to come across a plane with a sole so warped, cupped, or bowed that it's unusable. If you happen upon one that is unusable, my advice is to return it, sell it, or throw it away. The only possible exceptions are block planes, which are pretty easy to flatten due to their smaller size. Bench planes are far more difficult, especially the larger ones. You can take them to a machine shop and have them milled or lapped flat, but forget trying to flatten them yourself with sandpaper unless the problem is very minor.



Good luck trying to lap this 22" bad boy!

If you do decide to lap your plane's sole flat, you'll need a dead flat substrate.

The cast iron bed of a table saw or jointer works well, or if you don't have one of those available and want to keep it on the cheap, a piece of 12" x 12" or larger [granite surface plate](#) or a marble tile from your home center will work for block planes, and typically costs less than \$5.00. Just make sure you retract the blade and tension the lever cap as you would in actual use. This puts the correct stress on the plane body. I start with 60 grit and progress up to about 320. Removing high spots (convexity) is more critical than low spots (concavity). Keep in mind that you don't even need the entire sole dead flat. As long as you have smooth contact at the toe, around the mouth, and at the heel, the plane will work just fine.

Vintage planes often have raised dings, especially along the edges, toe or heel. A flat mill file makes very quick work of these minor problems. Finally, some woodworkers file a very small 45 degree chamfer along each edge of the sole.

This is completely optional, but helps prevent inadvertent gouges when using the plane should you tip it slightly. I've seen some Stanley planes from the mid 20th century that appear to have been made that way at the factory.

Step 2 – Flat Frogs Make Better Mates

Bench planes have removable frogs. Block planes do not. However, the function of the frog is the same – it provides a secure base to support the iron. In order for the plane to shave wood correctly, there must not be any movement (wobble, play, rocking, etc.) to the iron. It must be firmly seated against the frog, so the face of the frog must be as flat as possible.

On your bench plane, unscrew and remove the frog and all of its hardware, including the lever cap bolt on the front and the adjustment plate and screw on the rear. Taking care not to damage the tip of the yoke that engages the iron and cap/iron, carefully sand the face surface of the frog until it is as flat as possible. I use the edge of my granite block for this, and change direction often to ensure I get a surface as flat as possible. No need to obsess over it, you just need the iron to seat firmly against it. While your at it, touch up the mating surfaces on the bottom of the frog where it attaches to the plane base. Also take a moment

to touch up the mating surfaces on the plane body too. You want the frog to seat as firmly as possible to the body.



Lap frog face on edge of stone to protect yoke

On vintage planes, thoroughly clean all the threads of the screws and bolts to remove any crud or rust, and apply a little light oil before reassembly. This is particularly important for the large brass adjustment knob, which needs to turn freely along the full length of its bolt.

On your block plane, the frog is not removable, so you only need to touch up the seat with a firm sanding block to ensure it is flat. Since the flat sloped area behind the mouth on the plane's base provides much of the forward support for the iron, it needs to be flat too. Unfortunately, it's hard to get to, and since you *don't* want to enlarge the mouth *at all*, just a touch using a small piece of angled wood with fine sandpaper wrapped around it is about as far as you want to take it. Thankfully, this is all that is usually needed to remove old crud. A [Dremel](#) or quality [flexible shaft tool](#) with a wire wheel brush will also work if the problem is limited to dirt and light corrosion. Finally, as on the bench plane, clean the threads on all the hardware and add a little light oil to help retard moisture and rust.

Step 3 – Chip Breakers, not Deal Breakers

On bench planes, the chip breaker, more accurately referred to as the Cap Iron, serves three important purposes. 1. It adds rigidity to the iron (blade). 2. It provides a small opening through which the depth adjustment mechanism engages the iron. 3. It helps 'break' the shavings as they rise off the cutting edge of the iron, thus preventing them from jamming up the throat of the plane.

Most cap irons, even on new planes, benefit from a little tuning to make them more efficient. The leading contact edge, where it rests upon the edge of the iron, needs to be completely flat so that no light (or shavings) can pass between the two. This is a simple matter of a couple of passes on a sharpening stone. I use my 1000 grit stone as anything higher is overkill. If you don't have one, use whatever comparable sharpening media you have available. Ideally, you should undercut it slightly, so just the front edge makes initial contact. As you tighten the cap iron against the iron, it will flatten out some. The idea is to make it

completely flush so that fine shavings do not slip in between the cap iron and iron.



Cap iron with polished arch

The other tuning point on the cap iron is its forward arch. For lowered resistance and smooth chip passage, this arch should be polished. You can do this by hand using your sharpening stone or sandpaper. Again, 1000 grit or thereabouts is enough. Smoother is better, and there's no downside to over-polishing other than the time it takes. Once complete, you may need to remove any burr that has formed along the front edge. I run mine edgewise (like cutting with a knife) down a piece of scrap wood.

Note that block planes do not have cap irons.

Step 4 – Pop a Lever Cap on that Sucka

While appearances and designs vary greatly, all planes have some sort of lever cap. The lever cap provides the tension that holds the iron in place. There's not really a whole lot that needs to be done to the lever cap. Just ensure that the contact edge on its back side is reasonably flat, so it makes flush contact with the cap iron on which it sits. Wood shavings will find their way through the tiniest of gaps. If you're obsessive, you can polish the forward arch a little just as you did with the cap iron. You might also add a drop of oil to the working joints to ensure smooth operation.



Bench plane and block plane lever caps

On block planes, since there is no cap iron, the lever cap plays a more important role. Take a fine file to the back side and remove any rough spots, giving close attention to the leading contact edge. This is most important on block planes with cast iron hooded style lever caps, such as the old Stanley 9-1/2. The back sides of these caps are notoriously rough and unfortunately japanned. You don't need to remove all the japanning, but you do want to get a smooth line of contact down front where it touches the iron. File it smooth and give it a couple of swipes across your 1000 grit stone. I like to touch up the top front edge as well, but this isn't critical.

Step 5 – I Pity the Fool Who Don't Sharpen His Tool!

The simply fact is, even with brand new planes, the irons require final honing before use. This is not due to some lack of attention on the part of manufacturers. Irons are provided this way on purpose, since the manufacturer has no way of knowing what you will be using the plane for, and subsequently how the iron would need to be honed. If you do nothing else in the way of tuning your plane, at least take the time to properly sharpen it. Do not skip this step! Sharpen the iron. Again, *sharpen* the iron! Sharpen it!



Basic sharpening setup using a waterstone

Since sharpening is such an expansive topic in and of itself, I will leave the specific details for other posts. What you need to know in the context of tuning, however, is that any plane, new or old, requires initial sharpening and honing. At a minimum, new plane irons need to have their un-beveled side honed flat and polished to at least 4000 grit and preferably 8000 grit. You don't need to fuss with the entire surface; just the first 1/8" to 1/4" along the cutting edge will do. You also need to put a final honing on the bevel edge itself. It may look sharp, but it needs to be honed, again, to at least 8000 grit. The goal is to get your cutting edge to as close as possible to a zero degree radius.

Sharpening is too often the deal breaker that dissuades woodworkers from trying hand tools. This is unfortunate, for it requires little monetary investment to get started, is not particularly difficult to learn, and can be accomplished rather quickly with surprisingly good results. For detailed information on sharpening, I recommend investing in one of the outstanding books on the subject by [Ron Hock](#)

or [Leonard Lee](#). Chris Schwarz has also written a number of fantastic articles on sharpening plane irons. Sharpen the iron. Again, *sharpen* the iron! Sharpen it!

Step 6 – Final Adjustments

Now that you've finished tuning and sharpening your plane, it's time to put it all back together and adjust it for use. Hopefully, you have a better understanding of what each part does and how they all function together. This will make adjusting it *for* use, and while *in* use, more intuitive and fluid.

A few points of consideration...

While the frog's position on bench planes is adjustable, meaning you can shift it forward to decrease the size of the mouth opening or backward to increase the size of the opening, it needs to be firmly attached in whatever position you decide so that it doesn't move when in use. In other words, to adjust its position, you will have to loosen the screws that attach it to the base. Without getting into detail, use a larger mouth opening for thicker cuts, and a smaller mouth opening for fine shavings. Set the position of the frog where you want it and screw it down tight, understanding you may need to do this a couple of times before you get to just the right position.

The cap iron should be firmly screwed to the iron, leaving just a tiny edge of the iron protruding forward. This should generally be as small as possible – 1/64" for fine shavings to 1/16" or more for heavier cuts, depending on the amount of camber on the iron. The iron/cap iron in place, the lever cap bolt should be tightened just enough to hold the iron firmly so it doesn't slip in use, but not so tight that you can't adjust its depth of cut using the large brass or steel wheel at the rear of the frog. If that knob won't turn, the bolt holding the lever cap is too tight. This too, may take a couple of tries before you get the feel of it.

Holding the plane upside down, and looking down the sole at a low angle, lower the iron until it just begins to appear through the mouth – just a whisper. Note that it's not unusual for there to be quite a bit of slop in the wheel that lowers and raises the iron, as much as 1/2 to 3/4 of a turn. Just turn it until you begin to feel resistance. Make any lateral adjustments necessary using the lateral adjustment lever that extends from the top of the frog. Turn it upright and make a test pass on a piece of scrap wood. If the plane digs in, back off the depth just a bit. If it misses entirely, lower the iron a little. You will quickly get a feel for when it's 'right,' as evidenced by the rewarding 'thwack' sound a plane makes when it cuts a perfect curl.

On block planes, adjustments for use are a simple matter of properly tensioning the lever cap and setting the throat opening via the front adjustment plate (if the plane has one). The same principles apply that you use in adjusting your bench planes.

Tuning a hand plane is not a difficult endeavor. Once practiced, the whole process can be accomplished in about a half hour, even less depending on the tool.

Rather than view it as an unpleasant chore, I actually enjoy it, especially later in the evening when the dust has settled and the world is quiet. Pour yourself a

measure of Kentucky's best brown, put on your music of choice, and saddle up to your work bench.



Stanley no. 5 Jack Plane, c. 1940s
