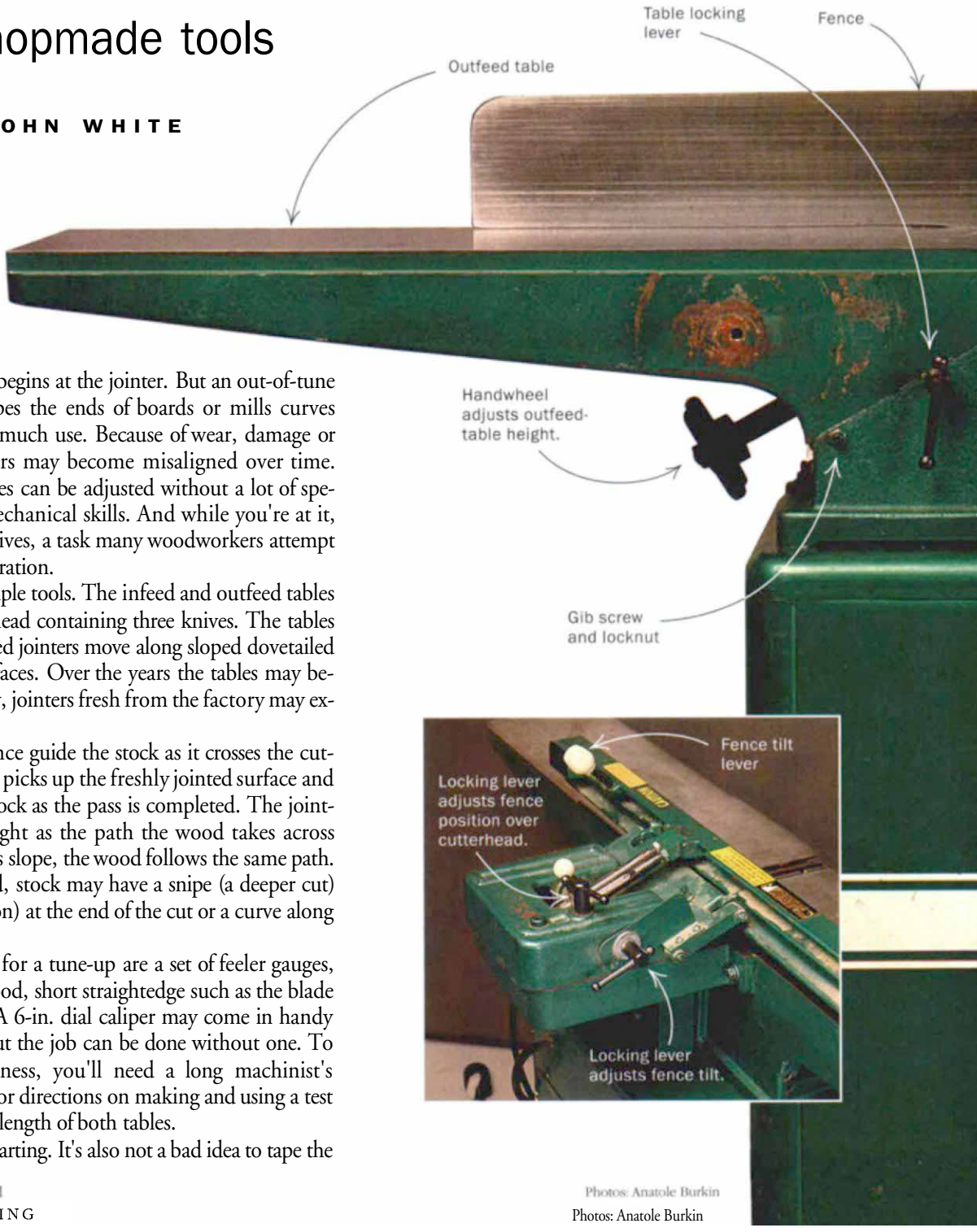
Jointer

Table realignment and knife adjustments made easy using shopmade tools

BY JOHN WHITE



Photos: Anatole Burkin

Truing rough stock begins at the jointer. But an out-of-tune machine that snipes the ends of boards or mills curves into stock isn't of much use. Because of wear, damage or imperfect castings, jointers may become misaligned over time. Fortunately, most machines can be adjusted without a lot of specialized equipment- or mechanical skills. And while you're at it, consider replacing dull knives, a task many woodworkers attempt only in moments of desperation.

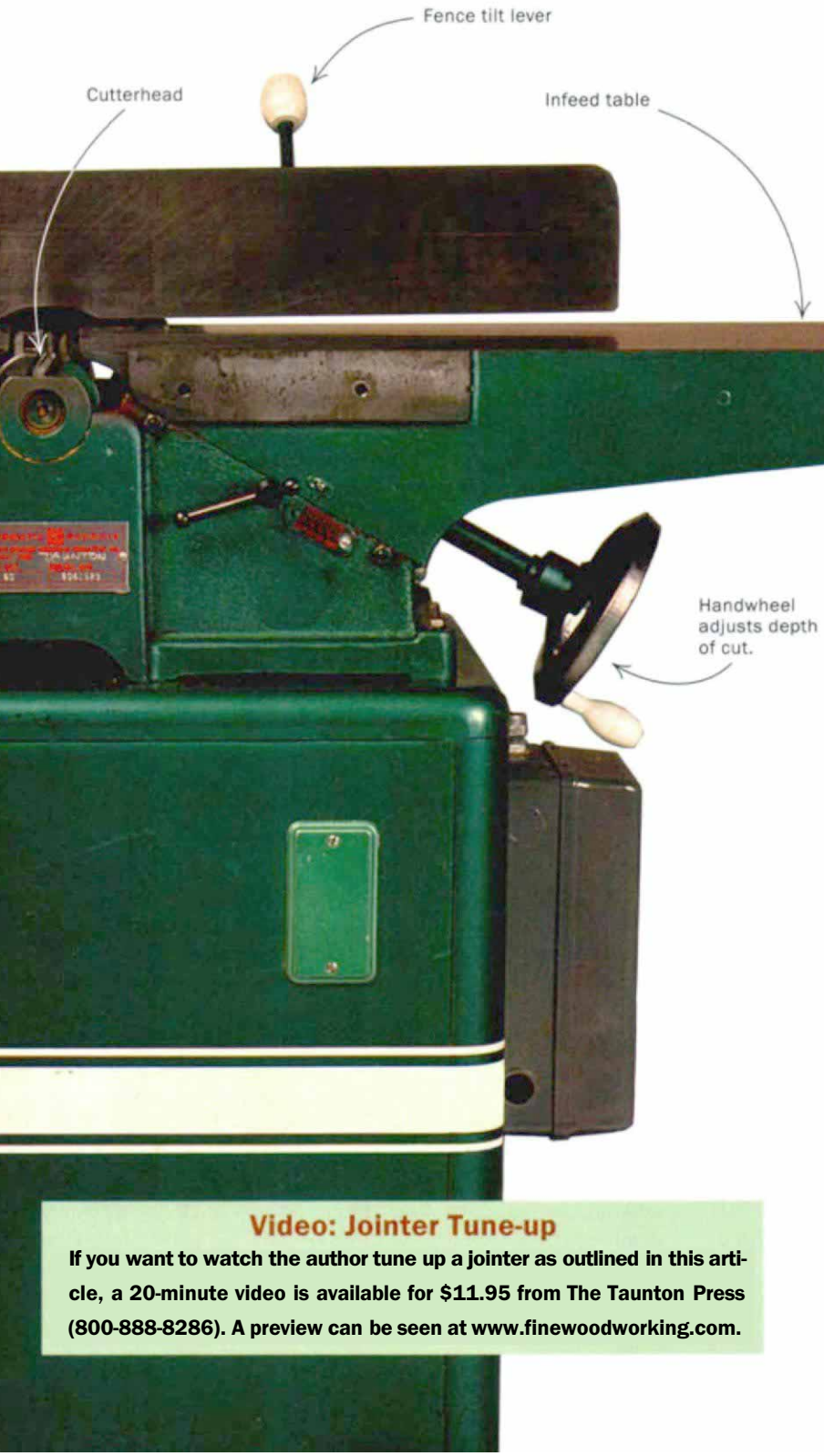
Jointers are relatively simple tools. The infeed and outfeed tables flank a cylindrical cutterhead containing three knives. The tables on most small and midsized jointers move along sloped dovetailed ways, which are wear surfaces. Over the years the tables may begin to droop. Occasionally, jointers fresh from the factory may exhibit these bad traits, too.

The infeed table and fence guide the stock as it crosses the cutterhead. The outfeed table picks up the freshly jointed surface and guides and supports the stock as the pass is completed. The jointed surface is only as straight as the path the wood takes across the cutterhead. If the tables slope, the wood follows the same path. If the tables are misaligned, stock may have a snipe (a deeper cut) or a hump (an uncut section) at the end of the cut or a curve along its length.

The basic tools required for a tune-up are a set of feeler gauges, a small try-square and a good, short straightedge such as the blade of a combination square. A 6-in. dial caliper may come in handy for gauging shim stock, but the job can be done without one. To check the tables for flatness, you'll need a long machinist's straightedge or a test bar (for directions on making and using a test bar, see p. 41) to span the length of both tables.

Unplug the tool before starting. It's also not a bad idea to tape the

Tune-up



FOUR-STEP PROGRAM

1 ADJUST THE GIBS

Gibs are located inside the dovetailed ways and do not have to be removed (shown here only for clarity). To ensure the tables move smoothly, tighten the gib screws to remove excessive play.

2 LEVEL THE TABLES

Use a *straightedge (commercial or shopmade) to check that tables are in the same plane. Metal shims can be inserted along the dovetailed ways to correct for tilt.*

3 SQUARE THE FENCE

If the cast-iron fence is warped, attach a piece of plywood or MDF to the fence and shim it flat and square.

4 SET THE KNIVES

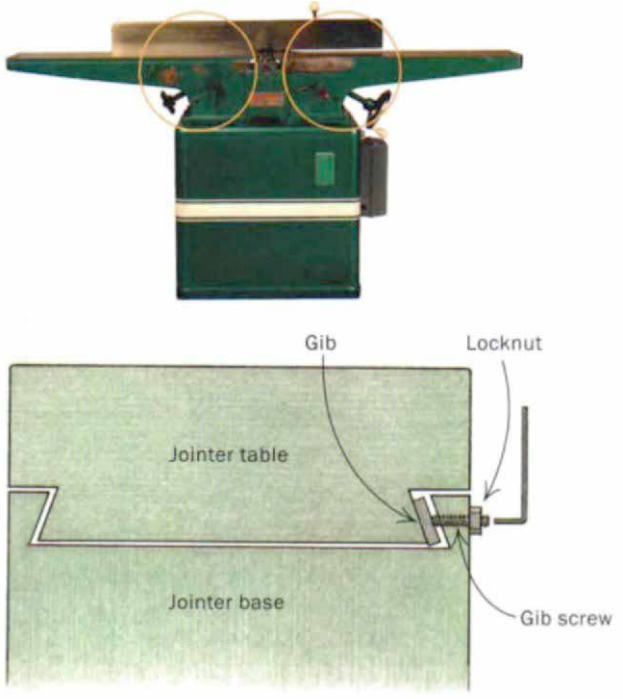
Knives must be parallel to the tables and set to the correct height. Shopmade magnetic holders can assist with the installation.

Video: Jointer Tune-up

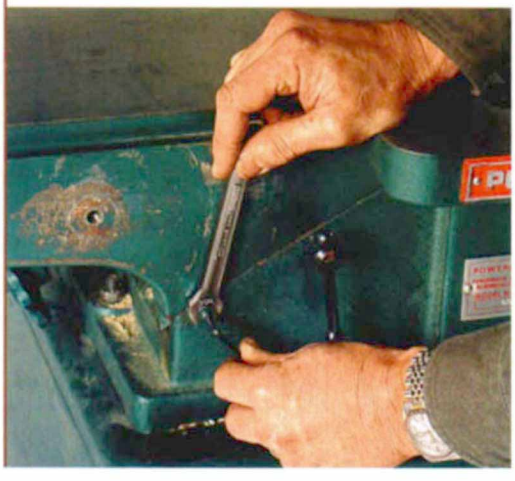
If you want to watch the author tune up a jointer as outlined in this article, a 20-minute video is available for $11.95 from The Taunton Press (800-888-8286). A preview can be seen at www.finewoodworking.com.

ADJUSTING THE GIBS

Over time the dovetailed ways may wear and cause one or both tables to go out of alignment. Tightening the gib screws removes slack and may correct the problem.



You need not disassemble a *jointer to* do a tune-up. The *narrow, flat bar is a gib, which takes up wear in the dovetailed ways of the infeed and outfeed tables.*



The outfeed and infeed tables* have one *gib each with two or three adjusting screws. *Loosen the locknut and snug up the Allen-head screw to take up any slop. Tighten the screw nearest the cutterhead a tad more than the bottom one.*

edges of the knives to protect both you and the knives. It's all too easy to brush a finger or tool across their exposed edges.

Remove excess play from the tables

Each table has an adjustable gib to take up play as the dovetailed ways wear (see the drawing at left). Loose gibs can cause the tables to be out of line with one another. The gibs bear firmly against the dovetailed ways but must slide smoothly. When new, gibs are coated with grease. Over time the grease wears off. A regular shot of penetrating lubricant will keep things moving smoothly.

Each gib has a pair of gib screws that can be adjusted to take up play as the dovetailed ways wear. The screw nearest the cutterhead has to resist the lifting force caused by the weight of the table's overhang, and it should be adjusted tighter than the lower screw. The third screw on many machines has a handle that serves as a locking mechanism.

Start by backing off the locking lever and the locknuts on the gib screws. Then tighten all screws equally until the table is just locked in place, then back off each of the screws about a quarter-turn. At this point the tables should move with little resistance. Now slowly turn the gib screw nearest the cutterhead while moving the table up and down using the adjusting knob or lever. When the screw is properly adjusted, moving the table should require only moderate effort. Once this adjustment feels right, hold the screw against turning and tighten the locknut. Check and readjust, if needed.

Repeat the procedure with the lower gib screw, but apply slightly less pressure. If your machine has a center screw with a locknut, adjust it last and with only light pressure. Getting the gibs adjusted just right is a matter of both technique and feel, much like tuning a musical instrument. If you're lucky, the tables will now be aligned in a flat plane within 0.005 in. or less. Check them using the test bar or a long straightedge. If you have an older jointer, chances are that more will need to be done.

Tables can be shimmed level

Begin by removing the fence. Place a short straightedge across the cutterhead gap and lift both tables until they clear the knives and are in the same plane. Lock them in place. Lay a long straightedge or test bar across both tables. Use feeler gauges to measure any gaps (see the left photo on the facing page).

On an older machine it's a good bet that the tables are sagging. To fix it, place thin metal shims along the dovetailed ways to shift one table into alignment with the other (see the right photos on the facing page). Flat shim stock may be purchased from machine-shop suppliers. Hobby shops also sell thin pieces of sheet brass and aluminum. Aluminum soda cans will also work; they are about 0.005 in. thick. Use a feeler gauge to measure how much the outfeed table is out at the far end. If you measure more than 0.005 in., the table should be shimmed. Anything less than that is probably not worth bothering with for the simple fact that you won't be able to find shim stock thin enough to make the fix.

Shimming is a trial-and-error process. As a rough guide, if your table is out by 0.006 in., start by cutting two pieces of 0.002-in.-thick shim stock that measures about 1 in. by 2 in. and apply a light coat of grease on them. To place the shims, back off the outfeed table's gib screws a turn, lift up on the low edge of the table and slip the shims into place on the lower end of the dovetailed ways. Once the shims are in, adjust the gib screws again. Then realign

Drawings, except where noted: Vince Babak

LEVELING THE TABLES WITH A SHOPMADE TEST BAR

I had hoped that a builder's level would be adequate for tuning up a jointer's tables, but I found it unfit for the task. Machinists use precision straightedges that are meant for just such applications, but at $200 for a 4-ft. version, woodworkers would have a hard time justifying such a purchase.

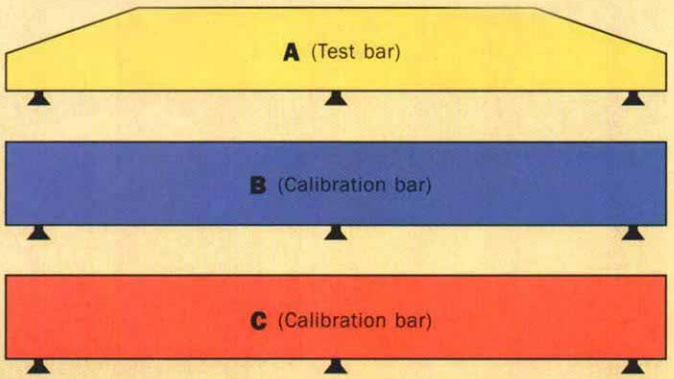
In search of a shopmade solution, I adapted a machinist's technique for creating precision squares. Technically, the resulting tool isn't a straightedge, because only the three slightly proud screws along one edge are in line. It is more properly called a test bar.

You'll need three bars of the same length and spacing of screws. The screws are adjusted by laying pairs of the bars flat with the screw heads touching. With each pairing, the height of the center screws is adjusted until all three sets of screws touch without either a gap or rocking. This process is repeated several times with different pairings of the bars until all three mate in any combination. When this is achieved, the laws of geometry dictate that the screw heads on each bar lie in a perfectly straight line.

MAKING A TEST BAR

1. Rip three pieces of ¾-in. MDF, each about 5 in. wide and as long as your jointer.

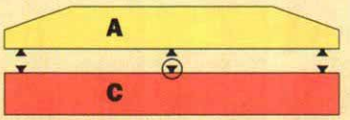
2. Slope the ends of one board (A) to reduce its weight; it will become the test bar.



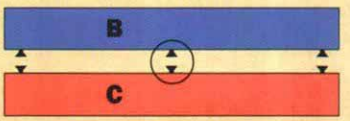
3. Next, predrill the edges of each board and attach three fine-thread, 1¼-in. drywall screws. Place two screws at the far end and one near the center of each board. File the head of each screw to remove any burrs. Adjust them all so that ¼ in. of screw is exposed.

ADJUSTING A TEST BAR

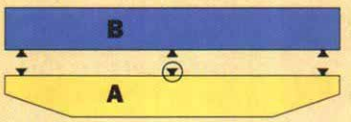
1. Align board A against board B. Adjust only the center screw on board B until all six screws touch.



2. Place board C against board A. Adjust only the center screw of board C until all six screws touch.



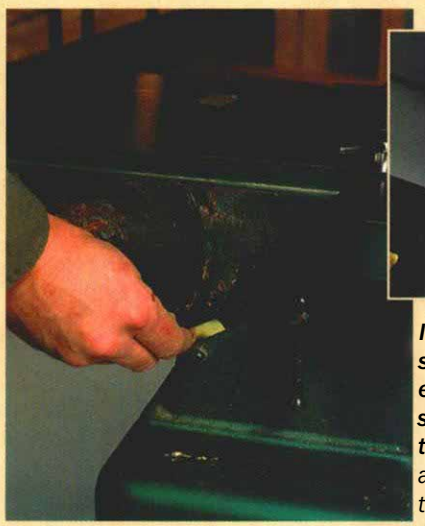
3. Place board B against board C. Adjust both center screws an equal amount (in or out) until all six screws touch.

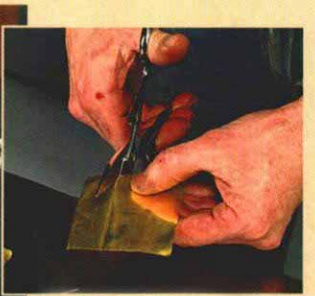


4. Again place board B against board A, but this time adjust only the center screw of board A. Repeat steps 2 to 4 until no more adjustments are needed,

USING A TEST BAR

Use the test bar and feeler gauges to check the tables for flatness. *Tables may sag over time. New machines, however, may be out of adjustment, too.*

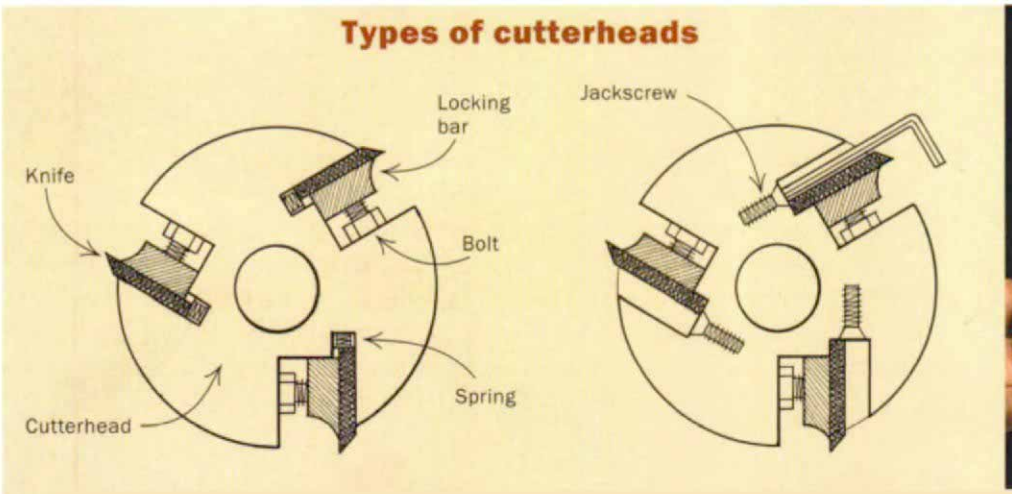




If the outfeed table sags, insert shims on each side of the lower section of the dovetailed ways. *If the tables are dished (low in the center), shim the dovetailed ways near the cutterhead.*

Drawings, this page: Michael Pekovich

SETTING THE KNIVES



Some cutterheads use springs to adjust knives up or down. A clean shop floor will help ensure that you can track down an AWOL spring that will inevitably roll off the table.

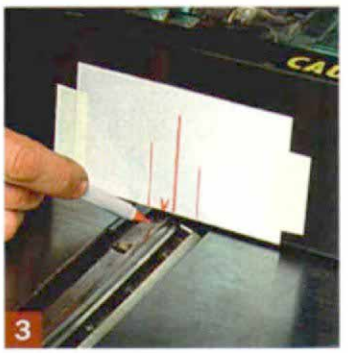
Some cutterheads use jackscrews to adjust knives up or down. The jackscrews fit into holes bored into the cutterhead slot.

Replaceable, double-sided knives make life easy. *Aftermarket kits such as this one made by Esta are available to fit most jointers.*

REMOVING THE KNIVES

First find top dead center of the cutterhead: Slide a flat block of wood with a projecting screw head until the screw butts up against the cutterhead.

Mark this spot on the fence. Then do the same on the other side.



Using a ruler, split the distance between the marks to locate top dead center. Place another mark to indicate where the cutterhead slot lines up.

Align a knife to top dead center and wedge the cutterhead in place. Loosen the locking bar bolts and replace one knife at a time.

both tables flat to one another and check for flatness using the long test bar or straightedge. The process may have to be repeated a few times.

Jointer tables may be tilted the other way and be dished. Follow the same procedure but place shims at the *upper* ends of the dovetailed ways on the outfeed table. If you notice that the table is twisted, add thicker shims on the low side. Some small jointers may have a fixed outfeed table, in which case you have no choice but to shim the infeed table. Because the infeed table is adjusted frequently, shims may shift position or tear.

The fix for a crooked fence

A small crown or dip over the length of the fence is tolerable as long as the fence remains vertical to the tables. A twist or wind, however, will give you fits, because it will cause stock to rotate as it passes by. To correct the problem, drill holes in the soft, cast-iron fence and attach a piece of cabinet-grade plywood or medium-density fiberboard (MDF) and shim it flat. Once the fence is mounted back on the jointer, square it up and take a test pass with a board that has a flat face. Check the resulting edge with a square, being sure to place the square against the board surface that ran along the fence. Adjust the fence stop as needed to get a square edge on the board.

Sometimes you have to replace a jointer's knives

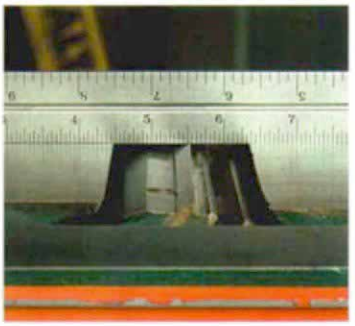
Nobody seems to enjoy replacing jointer knives. That's because it's difficult to keep the knives in alignment when tightening the bolts that are threaded into the lock bars (also called gibs). Patience is required, no doubt about it. Magnetic knife holders, either commercially bought or shopmade, can help.

First find top dead center—Before replacing the knives, top dead center (TDC) of the cutterhead must be located (see photos 1-4 above). TDC is a point directly above the centerline of the cut-

Drawings, this page: Vince Babak

REPLACING THE KNIVES

On *many* jointers, the outfeed table should be about 0.015 in. above the cutterhead.



On others (see your manual), set the outfeed table so that it is level with a knife (at top dead center) when about 1/32 in. of metal behind the bevel is exposed.

Bar magnets (available from hardware or electronics stores) glued to a block of wood (do this on a level surface) with silicone adhesive make a decent knife holder/straightedge. Tighten the bolts on the locking bar so that each knife (at top dead center) is level with the outfeed table.

terhead. When a knife's edge is at TDC, it is at the high point of its arc, the ideal spot to align it level with the outfeed table.

Remove one knife at a time—Rotate the cutterhead until the edge of one knife is at TDC. Lock the cutterhead in place with a softwood wedge against the infeed table. Remove the knife and clean all of the parts, including the slot, of sawdust and pitch. Smooth the face of the locking bar and bolts with emery cloth or a stone to remove burrs, which may cause the knife to creep when tightened. It's important to remove and replace only one knife at a time to avoid distorting the cutterhead.

I do a lot of sharpening, but jointer knives take a lot of time and equipment to do well. I keep an extra set of knives on hand and send the old ones out to be resharpened after swapping them.

Adjust the knives—Cutterheads and knives come in various configurations (see the drawings on the facing page). Some cutterheads have springs beneath the knives. Better machines may have jackscrews in place of springs. Consider yourself lucky if you own a jointer with a cutterhead that accepts disposable knives, such as those made by Esta (800-557-8092). With these, no depth adjustments need be made after the initial setup (see the top photo on the facing page).

Jackscrews allow the height of knives to be adjusted easily. Each knife rests on a pair of jackscrews that are set inside a hole in the cutterhead slot. Wedge the cutterhead at TDC, remove the first knife, install a fresh one and snug up the bolts, leaving just enough slack for the knife to be moved without slop. Unless the owner's manual says differently, adjust the jackscrews until about 1/32 in. of the back of the knife (measured below the bevel) protrudes above the cutterhead slot (see the top photo, near left).

Next, lay a short straightedge on the fence side of the outfeed table and extend it over the knife. Adjust the outfeed table until the knife just grazes the straightedge. Then place the straightedge along the rabbeting side of the outfeed table and adjust the other jackscrew, if necessary, to bring the knife into line. Rock the cutterhead back and forth; the knife should just kiss the straightedge. Tighten the bolts in progression to avoid warping the cutterhead, and check the setting again. Repeat for the other knives without changing the outfeed-table height.

On some machines the back edge of the cutterhead slot may be machined away so you cannot accurately measure from the back bevel of the knife to set the cutterhead height relative to the outfeed table. Instead, you have to set the outfeed table with a straightedge and feeler gauge 0.015 in. above the cutterhead (see the top photo, far left). Make the measurement along the smooth surface of the cutterhead midway between slots.

On a cutterhead with springs instead of jackscrews, align a knife to TDC and wedge the cutterhead in place. Replace the dull knife, pressing it down against the springs. Snug up the bolts, leaving enough slack so that the knife may be moved but without slop. Place a pair of shopmade or commercial magnetic knife holders over the knife, which will lift it to the height of the outfeed table (see the bottom photo at left). Lower the outfeed table until the back edge of the bevel on the knife drops below the outside surface of the cutterhead, then raise the table until the bevel and about 1/32 in. of the back edge of the knife protrude above the cutterhead. (Be sure to check your owner's manual on this matter.) Tighten the bolts in progression. Repeat for the other knives.

Make a test cut—Before powering up the machine, double-check all of the bolts and screws that were adjusted. Then be sure to remove all tools from the machine. Spin the cutterhead one more time by hand to make sure that it moves freely and that no stray tools or parts have fallen into the slots.

Set the machine for a shallow pass and joint the edge of a reasonably straight board. If the end of the cut is deeper (snipe), raise the outfeed table slightly. If there's a hump of excess material left behind, lower the outfeed table. A lot of chatter marks mean one knife is slightly higher than the rest, Recheck the height of the knives. Aside from occasional knife replacement, the full tune-up may not have to be repeated for years and years to come. □

John White is a woodworker and machinist who maintains the Fine Woodworking *workshop.*