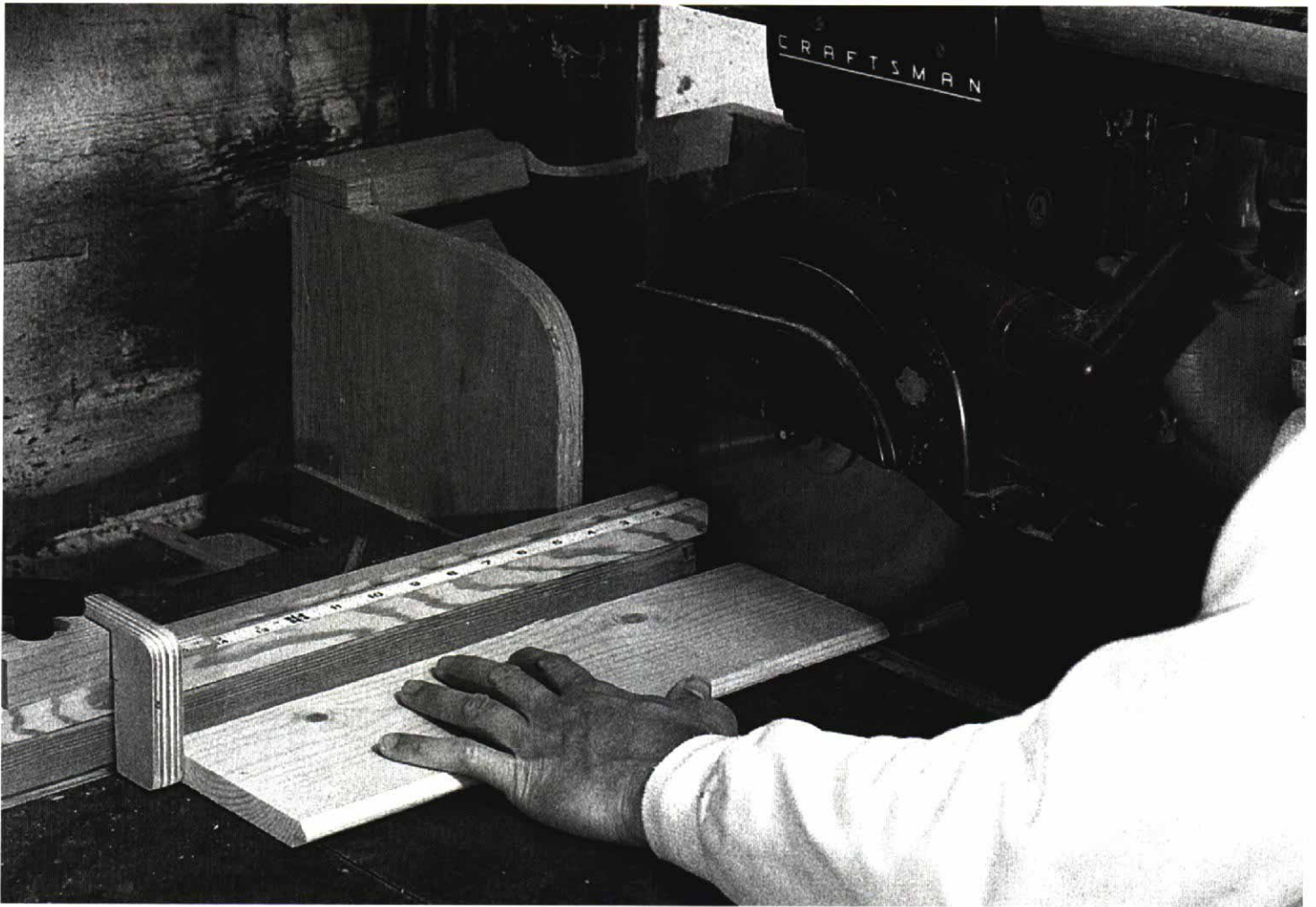


A Stop for Every Jig

Simple, versatile stops are crucial to accurate machining

by Sander Nagyszalanczy



Setting a crosscut is a breeze with a flip-down stop. The cursor's cross hair of the T-track-mounted flip stop lines up with the desired measurement on a self-adhesive measuring tape stuck on the fence.

Most things that we do in our everyday lives have limits: the maximum speed you're supposed to travel on the highway; the minimum age you must be to buy a bottle of liquor; the most books you can check out of a library at one time. The world of woodworking is no different, except we call the limits *measurements*. We strive to maintain the exactness of measurements to make parts fit more precisely together, so the joinery will be strong and look

clean. Some measurements are set on our machines, such as the depth of cut of a tablesaw or handplane, and some must be regulated by eye, as when chiseling down to a pencil line. But we regulate a great many limits—measurements for the length or width of parts, depth of grooves and holes—by using stops on our jigs and in conjunction with our tools.

Regulating the distance between the end of a part and the point where it's cut to length or machined is a basic function of

stop devices. As with other types of jigs and shopmade setups, there are many different kinds of stops to choose from, each appropriate for a particular range of tools and applications. The simplest stops are merely wooden blocks, clamped or screwed to the machine, jig or the work itself. More ingenious stops revolve to adjust or change position. The right stop can increase the accuracy of an operation, as well as save time when making repeat cuts because parts need not be marked individually. This is why production shops can't do without the use of stops.

Length stops

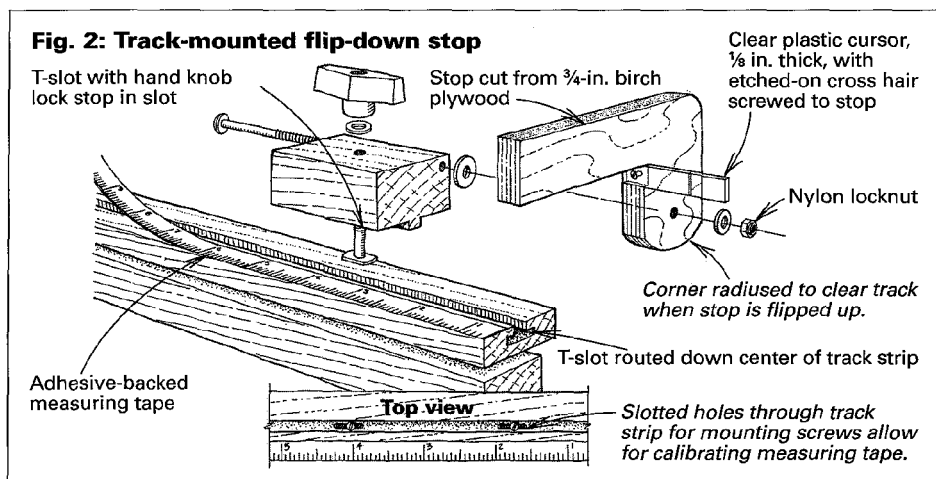
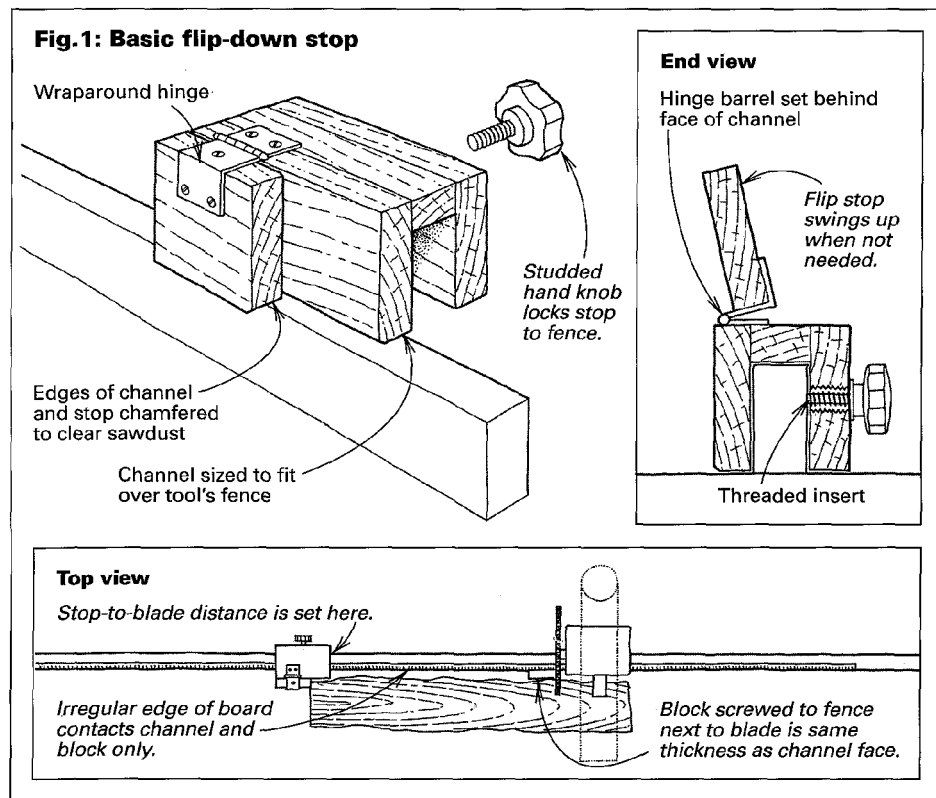
Length stops are used mostly for crosscutting or shaping across the width of stock, but they are easily adapted to work with other machines in a variety of applications. Length stops are commonly used on table-saws, radial-arm saws, sliding-compound-miter saws and both powered miter saws and nonpowered (handsaw) miter boxes. Length stops are also welcome additions to fences used with miter gauges, drill presses, mortising machines, sliding cross-cut boxes and other sliding carriage jigs.

While the stops described here are shop-built, there are several high-quality, commercially produced stop devices on the market, such as the FastTrack stop system components including the micro-adjusting FastStop (available from Garrett Wade, 161 Avenue of the Americas, New York, N.Y. 10013; 800-221-2942). Also, the ProScale digital readout (available from Accurate Technologies, 11533 N.E. 118th St., Suite 220, Kirkland, Wash. 98034; 800-233-0580) can be added to many of the shopmade stops described below.

Adjustable flip-down stops

Probably the most useful kinds of stops for basic crosscutting applications are adjustable flip-down stops. A flip-down stop is more useful than a simple stop block clamped to the fence because it quickly flips out of the way when it's not needed. This allows one end of the workpiece (a frame member or molding) to be squared with the stop flipped up. The part is then rotated end for end, and the stop (set and locked in the desired location) is flipped down to cut the part to final length. The two basic types of flip-down stops presented are illustrated as applied to a radial-arm or other crosscutting saw; however, they can be used as adjustable length stops on many other machines as well.

Basic flip-down stop—The flip-down stop shown in figure 1 will work with just

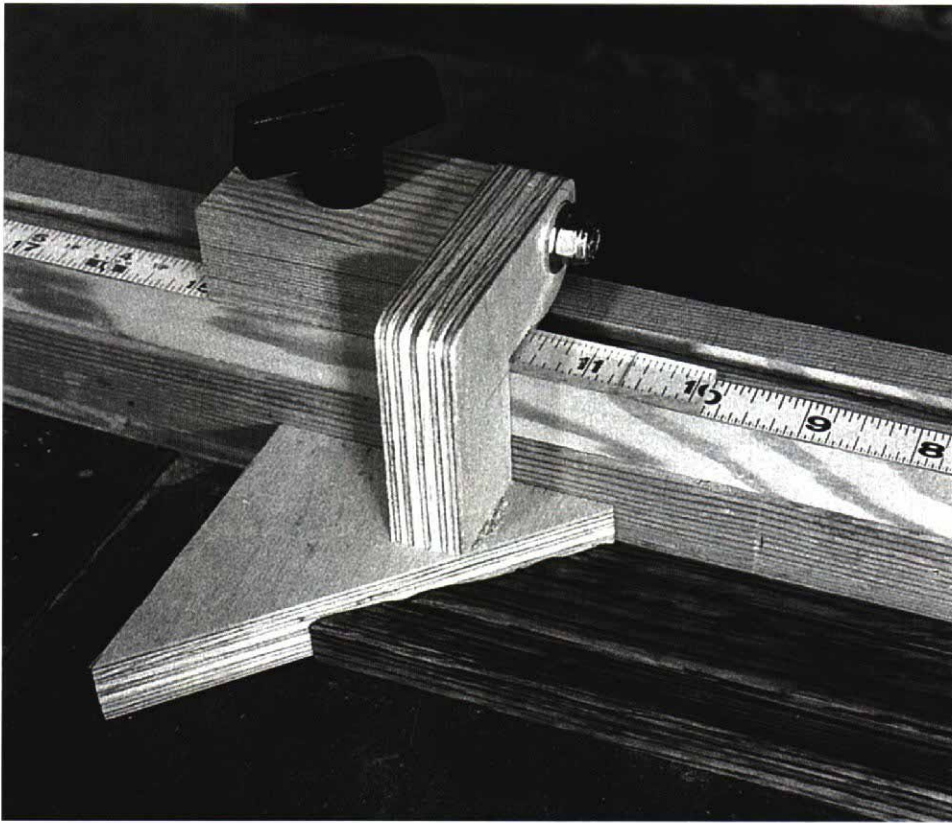


about any wood or metal crosscutting fence, and the stop can be set to any measurement, limited only by the length of the machine's fence. The channel-shaped body of the stop should be about 6 in. to 8 in. long and sized to fit not too snugly over the fence. A threaded insert driven into the back of the channel takes a studded hand knob, which locks the stop to the fence. The flip stop itself attaches to the channel with a wraparound-style cabinet hinge, located so the hinge barrel is behind the front face of the channel (see the end view in figure 1 above). This keeps the flip stop completely out of the way when it's up. The edge of the channel face and corner of the stop are chamfered to keep

sawdust from misaligning the workpiece.

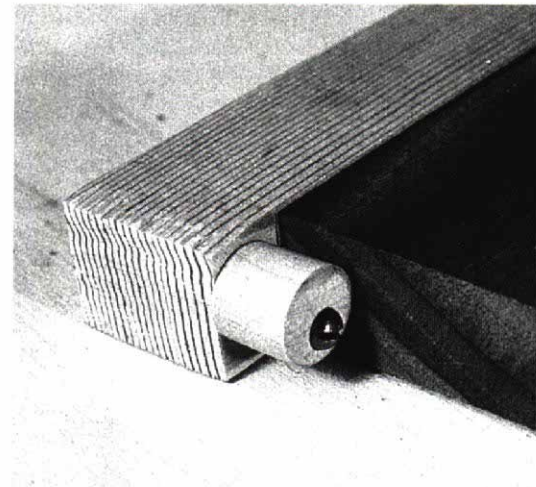
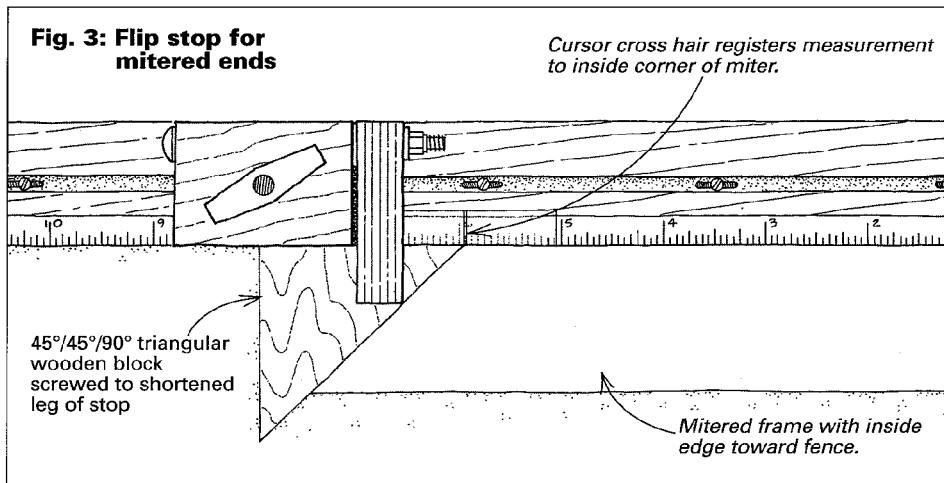
In use, the stock to be cut doesn't actually contact the machine's fence; one end bears against the face of the channel while the other bears on a short block the same thickness as the channel that is screwed to the fence next to the blade (see the top view in figure 1).

This arrangement allows you to cut stock that's bowed and won't set stably against the straight fence. The block near the blade also supports the workpiece near the cut to prevent tearout. To use this stop with a stick-on measuring tape, offset the tape's position, so the blade-to-stop distance can be set by aligning the end of the channel with the desired measurement.



Measuring miters is easy with a dedicated stop. This flip stop (left) has been fitted with a 45° block for mitered ends. The stop's cursor shows the distance between the inside corner of the miter and the miter created when the member is cut.

Eccentric stop offers micro adjustments (below). Fine adjustments can be made by rotating the stop. The off-center hole makes the position of the stop shift slightly, and the screw locks it down.



Track-mounted flip-down stop—Another flip-down stop, as shown in the photo on p. 67, rides on and locks to a track strip. As shown in figure 2 on the facing page, this adjustable stop setup has four basic pieces: a track strip with measuring tape, a sliding block, an L-shaped stop, and a cross hair and a cursor that allow very accurate settings. The solid-wood track strip has a T-slot routed in the top edge and an adhesive-backed, stick-on measuring tape pressed on (see the top box on p. 71). Flat-head screws through slots routed in the center of the T-slot mount the track to the top of the tool's fence. These slots allow side-to-side adjustment for calibrating the strip's measuring tape to the blade.

The sliding block has a short tongue that loosely fits the T-slot. A vertical hole through the center of the block mounts the T-bolt and hand knob that lock the stop assembly to the track strip. Another hole drilled lengthwise through the block mounts the flip stop via a carriage bolt with a nylon locknut (a steel nut with a nylon insert that prevents the nut from turning).

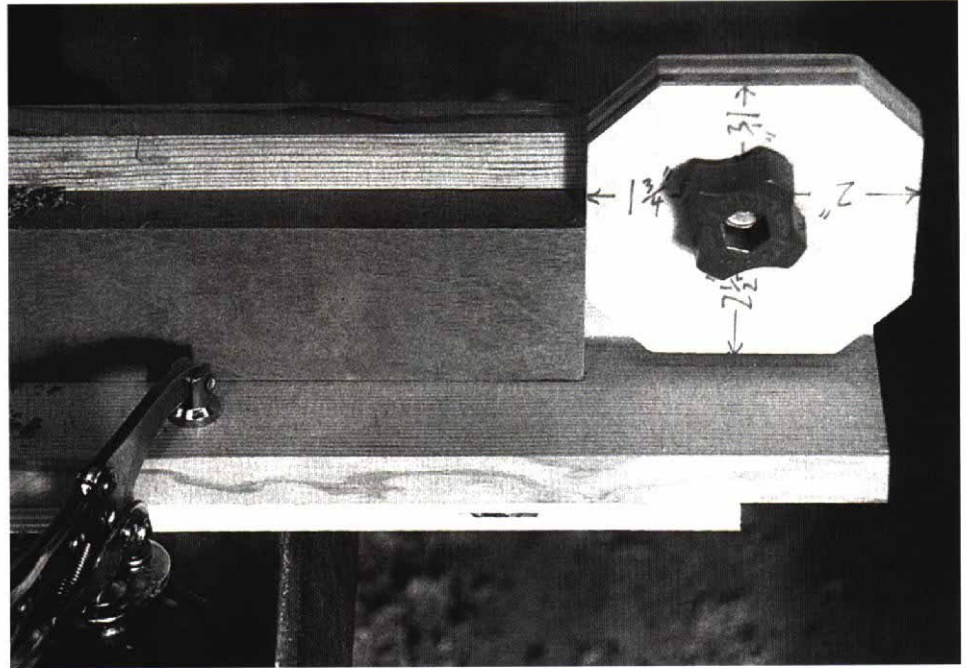
The stop itself is cut from 3/4-in. good-quality plywood, such as Baltic or Finnish birch, into an L-shape. A notch on the underside of the stop holds a clear plastic cursor, mounted with a small flat-head screw through a countersunk hole (for instructions on making a cursor, see the top box on p. 71). Mark and etch the cross hair

after the track strip has been installed and calibrated. If you do a lot of dado work or change blades often, additional cross hairs can be added to the cursor to be used with those blades.

To adjust the stop for different-thickness sawblades, you can reposition the track strip, or remove the flip stop from its bolt and add shims (I make these from aluminum beer cans with a leather punch) as necessary. You can also make up different stop assemblies, each with a cursor marked to work with different sawblades, molding heads or dado-blade thicknesses.

Multiple flip stops—Because unused flip stops can be set to desired measurements

Rotating stop handles multiple measurements. This rotating stop allows you to choose one of four stop positions. When used on a drill-press fence, as shown here, it can set distances between closely spaced holes.



and then flipped out of the way, several flip stops can be set up along the length of the fence. This would be an advantage if, say, you had to cut all the face-frame components for an entire kitchen to length; stops could be set at all the standard measurements and flipped down whenever needed during cutout. Because flip stops are fairly easy to make, you may wish to make a half-dozen or more at one time. Cut stock for the channels (simple version) or sliding blocks (T-track version) as you would a length of molding; then slice off individual blocks.

Flip stop for mitered ends—Either flip stop described above can be modified to handle boards with mitered ends. If wide picture-frame molding is mitered and the width of a standard stop doesn't catch the tip of the miter, make the face of the stop wider. Alternatively, when making picture frames, it's sometimes desirable to measure distances relative to the inside edge of the frame molding. A shortened flip stop with a 45° triangular block screwed on takes care of this situation, as shown in figure 3 on p. 69. A longer cursor must be fitted and etched to register the position the inside edge of the molding butts up to, as shown in the top photo on p. 69.

Eccentric end stop

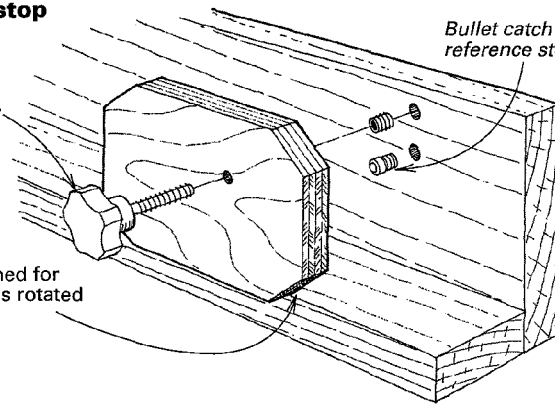
Sometimes you need to position a work-piece along a fence in a fixed position, but in a way that allows some fine-tuning. A simple stop that provides a firm stop, yet provides for a limited amount of adjustment is the eccentric end stop, as shown in

Fig. 4: Rotating stop

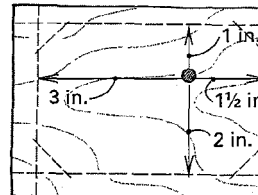
Studded hand screw set in threaded insert locks position of stop.

Corners of stop trimmed for clearance when stop is rotated

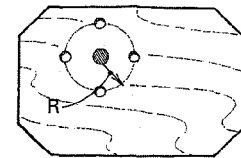
Bullet catch and strikes reference stop positions.



Stop layout



A hole is drilled through a plywood square; lines are marked for trimming piece, so each edge is a different distance from hole.



Both sides of stop have four indentations drilled with countersink at same radius (R) from hole; these holes act as detents.

the bottom photo on p. 69. I use these as end stops on the pivot arms of my router-plate joinery setup, and they are extremely quick to make. First cut a short length of dowel with a diameter that suits the application. For a small jig, a 1/2-in.-dia. dowel is about right; for larger jigs, or to yield a greater amount of adjustability, use a 1-in., 1 1/2-in. or larger diameter dowel. Now drill a hole through the dowel lengthwise that's equidistant between the center and edge. A wood screw through this offset hole

mounts the stop to the jig. To make fine adjustments to the stop's position, loosen the screw and rotate the dowel; then lock it in place. You can employ this same principle with even larger stops: Drill an off-center hole in a sawn-out plywood disc, and screw it down where an adjustable stop is needed.

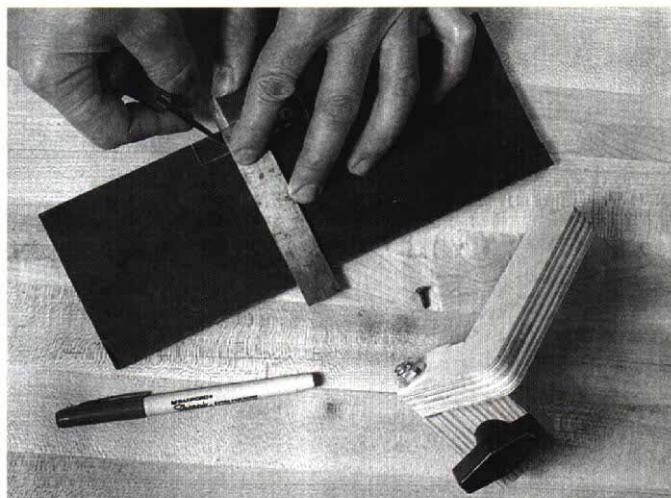
Rotating stop

Sometimes you need to cut, rout or drill two, three or four grooves, shapes or holes

Cursors and stick-on metal rules improve accuracy

Thin metal rules with a pressure-sensitive peel-and-stick backing provide a convenient way to add an adjustment scale to any fence or adjustable jig component. Scales are available that read both right to left and left to right (available from Highland Hardware; 800-241-6748). Reading the position of the movable part can be done by simply mounting the scale underneath the part or by adding a fine cross-hair cursor to the moving part.

To make a cursor, start with a piece of clear plastic. Make a test cut with the cursor installed on the jig to determine the cross hair's exact location. Then etch the cross hair on the down-facing side of the plastic using a scratch awl and a try square (see the photo at right). Color in the cross hair with a thin-point permanent marker pen, applied judiciously, to make it easier to see. If you're using a stop fitted with a cursor on a radial-arm saw that uses dado blades or sawblades of various thicknesses, you can etch additional cross hairs on the cursor; position them so they will represent the location of the cuts produced by those blades.—S.N.



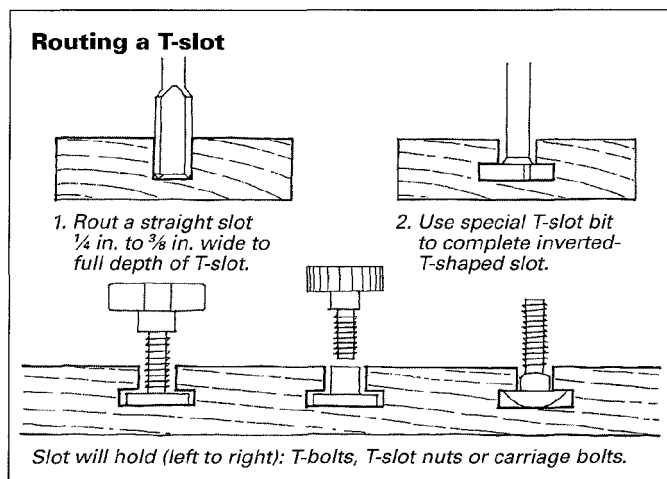
Etched cursors are easy to make. A thin line etched with a scratch awl onto a piece of clear plastic makes the cross hair for a cursor that mounts to a flip stop used on a cutoff saw. Permanent marker on the etched line makes it easier to see.

Making a T-slot track

One of the handiest methods of joining jig parts that must adjust is to use a T-track and T-bolt fasteners. A T-track is a useful way to mount fences, stops, hold-down clamps or to attach auxiliary tables and more. You can rout a T-slot into any solid wood, plywood or medium-density-fiberboard (MDF) surface with a special T-slot bit (available from Woodhaven; 800-344-6657 or The Woodworkers' Store; 800-279-4441). The Woodhaven bit requires a $\frac{1}{4}$ -in.- or $\frac{5}{16}$ -in.-dia. straight bit and cuts a T-slot best suited to $\frac{1}{4}$ -in.-dia. T-bolts or toilet bolts. The Woodworkers' Store T-slot bit needs a $\frac{3}{16}$ -in.- or $\frac{3}{8}$ -in.-dia. groove and is best for $\frac{5}{16}$ -in.-dia. T-bolts.

The T-track slot is cut in two passes. The first pass, with a straight bit, makes a plain groove as long as the desired track length. The second pass is taken with the special bit that cuts the T-slot at the bottom of the groove (see the drawing at right). For applications where a more durable slot is needed, The Woodworkers' Store offers a pressed-steel track that fits $\frac{5}{16}$ -in.-dia. T-bolts. The track, which comes in lengths of 40 in. and 60 in., can be cut with a hacksaw and is designed to be epoxied into a $\frac{13}{16}$ -in.-wide, $\frac{13}{32}$ -in.-deep slot.

To attach parts or devices to a T-track, use T-bolts or T-slot nuts that ride in the track. T-bolts are available in $\frac{1}{4}$ -in. and $\frac{5}{16}$ -in. sizes and a variety of lengths. Standard toilet bolts (found in hardware stores) can also be used but not in all T-tracks. T-bolts may be se-



cured with a regular nut, wing nut or hand knob. Standard carriage bolts can be used in T-tracks, but the depth of the T must be increased with the T-slot bit to clear the head. Carriage bolts can't take as much torque as T-bolts can without stripping the edges of the slot. T-slot nuts (available from Woodhaven) fit several different screw-thread sizes, from 10-24 to $\frac{3}{8}$ in. These are secured using a machine screw, a bolt or a studded hand screw. —S.N.

that are closely spaced but at a fixed distance from the end of the workpiece. A handy device for this is the rotating end stop, such as the one shown in the photo on the facing page. This stop mounts easily to any fence, carriage or table and can be rotated and locked in any of four positions. Each position provides a different spacing between the end of the workpiece and the cutter or bit you are using.

Make the stop by laying out a piece of plywood so that its four sides are each a

different distance from a single hole. Start with an oversized piece with a hole marked somewhere in the middle; then use a ruler and a square to mark how the piece must be trimmed (an example is shown in figure 4 on the facing page). A studded hand knob fits through the hole and into a threaded insert, which is driven into the fence itself.

To allow the fence-mounted stop to clear the jig's base when it is rotated (it's too big diagonally to clear), the corners can be cut

off, as on the stop in the photo on the facing page. The position of the rotating stop can be set manually, or detents can be fitted to reference each position. □

Sandor Nagyszalanczy builds custom furniture in Santa Cruz, Calif., and is a contributing editor to Fine Woodworking. This article was adapted from his new book, Woodshop Jigs and Fixtures, which is available from The Taunton Press, Newtown, Conn.; (800) 888-8286.