

A shoulder plane's sides and sole are milled perfectly square so it can shoot along the face of a tenon to true up the shoulder. Its top edge is contoured to provide finger grips when used on large tenons. Made to refine rather than create joints, a shoulder plane is a precision tool.

Shoulder Plane

Unmatched for precise trimming in 90° corners

by Maurice Fraser

It's hard to imagine life without a trusty shoulder plane. When you need to trim a tenon's end-grain shoulder, fine-tune a rabbet joint or smooth flush up to an obstruction, you can rely on the control and finesse of a shoulder plane. While its cousin, the rabbet plane, efficiently cuts joints, the shoulder plane was born to refine or correct existing ones: The joint is its shooting board. If things always went perfectly, correctives wouldn't be needed. But erring, reportedly, is human, and that's when these tools can be "divine."

Shoulder planes probably didn't appear much before the mid-1800s. They are likely a product of the burgeoning of metal technology during the Industrial Revolution, when metal sheathing was applied to wooden objects, from handplanes to ships. Metal tools have several obvious advantages over wooden ones, including dimensional stability and the wear resistance of contact surfaces. A more subtle point is how metal elevated the plane body from a mere blade holder to a major contributor to the finesse of cut. The shoulder plane is a prime example—a classic wooden rabbet plane that was not simply ironclad but transformed into something quite new.

Before the Industrial Revolution, worn, wide-mouth wooden planes were a fact of life. Toolmakers could shrink mouth openings by flipping the blade, bevel upward, and thereby eliminate the gap between the mouth's rear lip and the blade's cutting edge. But this combined the blade's 30° bevel with the plane's 45° blade-seating

angle, resulting in an unworkable 75° total cutting angle. A 15° blade-seating angle would compensate, but would result in a very thin sole behind the mouth. Such a thin sole, impossibly fragile in wood, *was* possible in metal. The new mouth, narrower by more than 300%, not only supports the cutting edge better, but makes the cutting action almost integral with the sole itself, as though a sharp rear lip of the mouth were cutting. These durable, hair-fine mouths (see the left photo on the facing page) promised a way to refine planing, parallel to that offered by the then new-fangled cap iron. Other finessing tools evolved this way as well: the miter plane, chariot, thumb and small miter block (today's block plane). But only the shoulder, from out of the rabbet plane's body, carried this genetic trait: It could work into corners.

Shoulder or rabbet?—Today, books and catalogs, as well as their readers, confuse shoulder planes with rabbet planes. That's understandable: Simple rabbet planes are near look-alikes of shoulder planes. Both are slim, unhandled and have blades, at full body width, coming through the plane's sides. Besides, manufacturers love to blur terminology to make the buyer think he is getting both in one.

The right photo on the facing page compares shoulder planes to rabbet and dado planes. Because they're designed to cut joints, "complete" rabbet planes have fences, depth gauges, cross-grain

scoring spurs and handles. Shoulder planes, meant for trimming, don't need these accessories. Rabbet planes, for good chip clearance, are big mouthed; shoulder planes conversely are soft-spoken. Both cut at the same 45°-50° angle, but shoulder planes do so with their bevel up and a low 15°-20° seating angle (see the drawing detail on the next page). Add to this that the tops of shoulder planes have curves, to provide a grip when shooting along a large tenon, and they are always metal bodied (some with wooden cores). Rabbet-plane bodies are either all wood (old style) or all metal.

There's a third species, I'll call a trim-rabbet plane, that might be an intermediate stage from wooden rabbet to shoulder plane. It has a steel body with a wooden core and its blade bevel is up, but it has a steep 58° cutting angle. In effect, it's a high-angle shoulder plane, good for highly figured long grain and cross-grain in rabbets, but cranky on endgrain.

Uses of the shoulder plane—One of the principal uses of the shoulder plane is correcting tenon shoulders that have been cut high, round or canted. When doing so, clamp the work horizontally and rest the plane's side on the tenon's face, as shown in the photo on the facing page. Begin by pressing the nose of the plane onto the work surface, to avoid tilting the plane during the first inch of the cut. In addition, tenon faces can be planed cross-grain if minor corrections are necessary.

There's also a subspecies of shoulder planes, bullnose planes, that add considerable versatility. They are easy to grip in one hand, and their bobbed nose lets them work almost smack up to a wall. Other than their small size and nose, they are identical in design and performance to shoulder planes.

Shoulder and bullnose planes excel at fine-tuning frame rabbets, where panels or glass can't be trimmed; softening tongue or groove corners; and paring (or thinning) tongues to ease insertion, especially with breadboarded tabletops. Correcting lap or halved joints, or dados, with "petite" models is a snap. They're indispensable for cleanup in tight areas, like lap dovetails behind lipped drawer fronts, tablesawn raised-panel bevels or tool-torn quirks on moldings and rule joints. And, no other handtool forms knuckle-joint "necks" or secret dovetail miters as precisely.

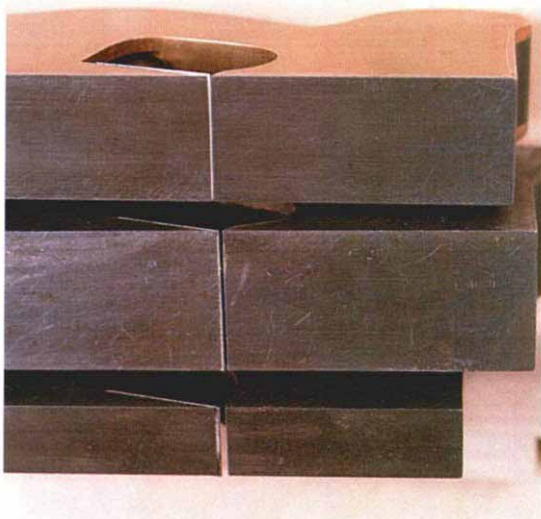
Grinding and setting the blade—The cutting edge of a shoulder-plane blade must be kept perfectly square with the blade (and plane) sides when it's sharpened. Other plane blades correct easily, with lateral adjustment, but any corrective tilting here will make it impossible to set the blade so it protrudes equally from each side of the plane body. You have to grind the cutting edge perfectly. Even the smallest discrepancy in blade-corner depth can spoil joints.

After grinding a 25° bevel on the cutting edge, insert the blade into the plane body so it protrudes equally from both sides. Inspect the barely emerging cutting edge. If it's not square, scribe a pencil line behind the blade's edge, bearing against the rear lip for reference. Then, regrind to this line. Persistent small errors can be honed off on a medium-grit stone, using greater hand pressure at the appropriate corner.

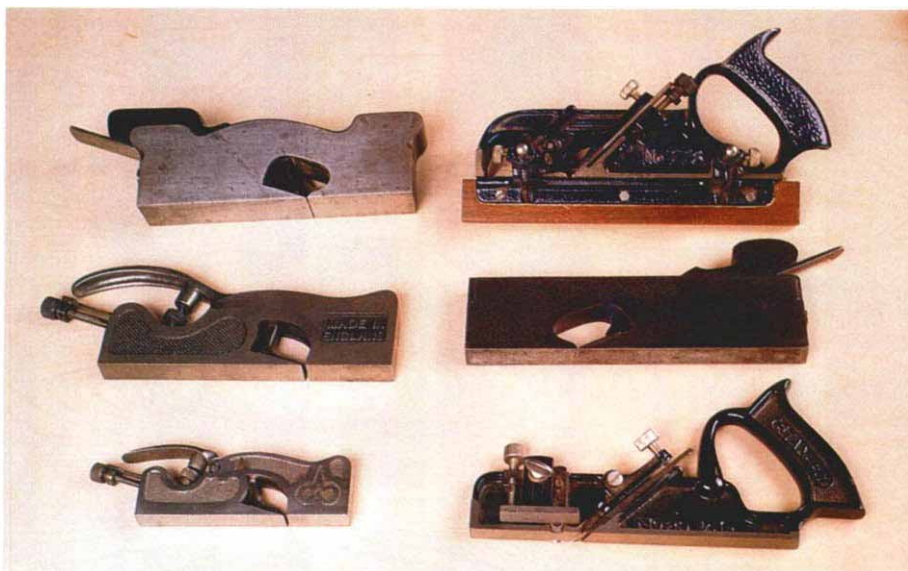
Next, remove the burr and hone in a 5° second bevel, either a traditional full one, with a medium stone, or a microbevel, with a hard Arkansas or its equivalent. (Both styles total 30°) I prefer the latter, because the microbevel can easily be removed by honing to the 25° bevel and started anew, as opposed to retaining and enlarging it with each honing. With this method, you can rehone easily for a long time and postpone the need for the perfect regrinding of the primary bevel. Some prefer honing a single 30° bevel.

Insert the sharpened blade diagonally into the oblong entry opening with care, to avoid nicking it on the plane's interior. When the blade appears in the mouth, guide it to rest with the left hand. For endgrain or difficult figured grain, the front lip of an adjustable mouth should be set between $\frac{1}{100}$ in. and a full $\frac{1}{64}$ in. from the cutting edge. On most hardwoods, between $\frac{1}{64}$ in. and $\frac{1}{32}$ in. will probably allow sweet, clog-free shearing. The depth of cut should be just enough to produce a continuous shaving. Sawdust means too light a cut; an opaque chip, too heavy. On some planes, the final tightening of the hold-down lever or wedge gives a microadjustment toward a fuller cut. If so, learn to compensate.

Choosing a shoulder plane—Let me share some hard-earned prejudices. First, large, heavy shoulder planes offer more delicate control and refinement of cut than the smaller versions—even on small work. Their length lends linear accuracy; their mass acts as a

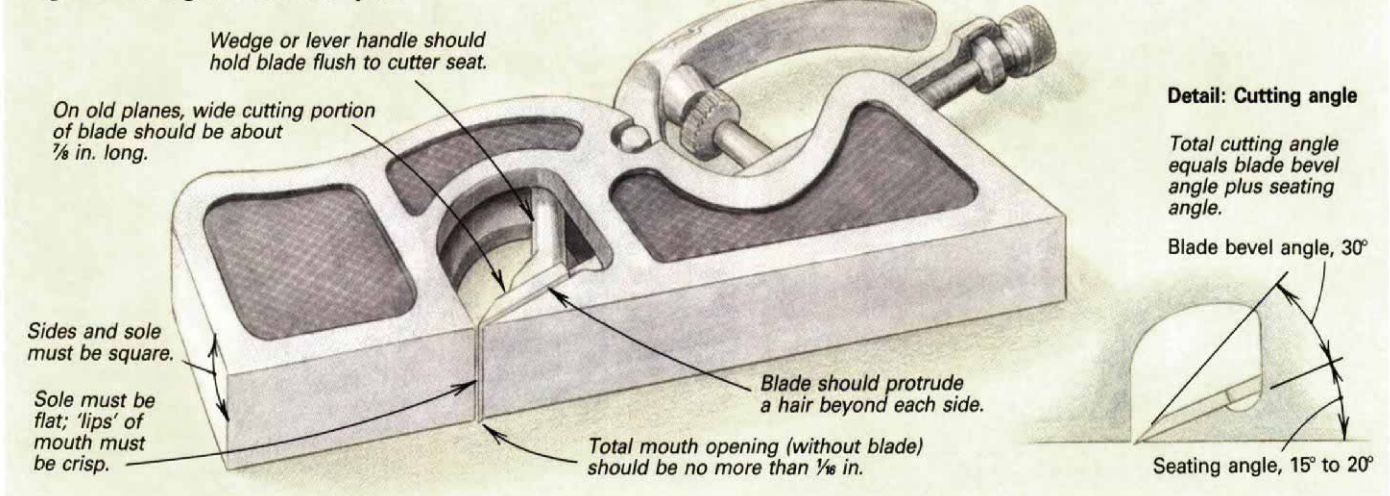


A fine mouth opening is a sign of quality. The Norris (top) has a minute cutting aperture of .010 in.; the Mathieson (middle), an acceptable .025 in.; and the Record #042 (bottom), a marginal .051 in.



The rabbet plane (right, top) and dado plane (right, bottom) have fences and depth gauges for cutting joints. Shoulder planes (left), for trimming joints, never do. They have fine mouths, with their blade bevel up. The trim-rabbet plane (right, center) has a steeper cutting angle than shoulder planes and a straight top.

Fig. 1: Checking out a shoulder plane



shock absorber for cut resistance; their weight seats you into the cut, adding momentum; and their high profile adds a welcome reference surface, especially when working the plane on its side. On narrow ledges, if most of a wide plane hangs over empty space, there's no harm, so long as your fingers feel in control.

Second, if the big tool perches on the workpiece like a horse on a high chair, then it's time to reach for the junior size. Although small planes sometimes chatter and deflect on hardwoods, they will compensate: They are pocketable, will follow slightly bowed surfaces, cut in confined places and work easily in one hand.

Third, two extreme sizes do more than one middling. In the mid-range are Stanley's #93 (6½ in. long) and Clifton's 3-in-1 plane (6 in. long). The latter has interchangeable noses to go from shoulder to bullnose plane, or it can drop its nose to become a chisel rabbit plane. These well-made planes work satisfactorily, but they lack the authority of larger planes and the maneuverability of smaller planes.

The chart on the facing page lists models currently being made and available through many large mail-order tool companies and local suppliers. Of these, the most versatile package consists of Record's massive but refined #073 (mouth and blade adjustment) partnered by the compact Stanley #92, plus Stanley's #90 bullnose for small or enclosed work (see photo below)-David and Goliath, plus a mascot, on the same team.

Shopping for a classic or a bargain-The tools mentioned earlier are currently made...and are good. But, a working antique *might* be better, especially cheaper. Antique tool dealers and auctions are worth a look, but you must be knowledgeable about the types and merits of the planes you'll find.

The photo below, left, shows three shoulder planes and their bullnose counterparts. Each represents one of three basic categories, based on when, where and how they were made. The best shoulder planes are the original British models: simple, solid and elegant. They were hand-assembled, from Victorian times until World War II, by firms like Slater, Spiers, Mathieson and Norris. The tool's dove-tailed steel shell houses a rosewood core and wedge, which sandwich a stout Sheffield blade that is adjusted manually by sight and touch. It takes a little practice, but once set, requires little readjustment. These tools are still available, but you'll pay in the range of \$150 for a workable tool to \$600 for a fancy bronze and ebony model in mint condition. What you get in return is buttery planing-the legacy of a standard of workmanship now, sadly, historical.

A second category of shoulder plane, the all-metal, screw-adjusted, 20th-century British variant, was pioneered (circa 1900-1930s) by Preston. Originally semi-mass produced but hand-fitted, their hollow iron castings were heavy and well machined, though campy-ornate. In the 1930s, the line was continued by Record, who added an adjustable mouth to the large sizes. There was some post-war decline of quality, the only plus being the elimination of Preston's glitzy nickel plating, which wears badly. Record also deleted many models, a few of which have been reissued recently by the Clifton firm. These tools have proportions and profiles roughly similar to the historic type (Norris, et al.) and at best, can work...oh, nearly as well. And, with their blade-adjusting screw, they *are* user-friendlier. In price (\$50 to \$120), as in quality, they stand in the middle ground between the Norris type and the current U.S.-designed tools.

The third version of the shoulder plane, the 20th-century American all-metal one, is Stanley's. They've manufactured the #92 and #93 models since 1902, avoiding the term "shoulder plane" in their literature and calling them instead "cabinetmaker's rabbit planes." Lighter, shorter and lower slung than analogous English versions, they trade off some mellowness and alignability for compactness and versatility. They are wickedly adjustable—far exceeding Norris' and Preston's—by screw action. You can change mouth width or blade depth, or drop the nose for close-up (chisel-planing) cuts. The machining quality is as good as ever, despite their auto-bumper nickel plating.

Regardless of class, shoulder planes are finicky. Roughly made (new) or roughly used (old) planes are rarely fine-tunable and



The chronology of shoulder and bullnose planes. Top to bottom: (19th- to mid-20th-century British), bronze and ebony Norrises; (20th-century British), Record #042, with depth adjustment, and Preston bullnose; and (20th-century American), Stanley #92, with adjustable blade and mouth, and Stanley #90 bullnose.

| Models currently made | | | | | |
|---------------------------|---|-------------------|-------------------------|---------------|--|
| Tool model and type | Dimensions W x L | Mouth adjustment | Convert to chisel plane | Approx. price | Comments |
| Shoulder plane: | | | | | |
| Record #073 | 1¼ by 8½ | Yes | No | \$94-\$99 | <i>The last large classic shoulder plane still made.</i> |
| Clifton #420 | ¾ by 8 | No | No | \$100 | <i>As above, but less massive. Specialized for shooting narrow ledges. Medium mouth. Remake of Record #042.</i> |
| Clifton #410 | 5/8* by 5¾ * some are 11/16 in. wide | No | No | \$98-\$100 | <i>The smallest shoulder plane now made. Handy. Good partner to large plane. Proper mouth. Remake of a classic.</i> |
| Stanley #93 | 1 by 6½ | Yes | Yes | \$57-\$60 | <i>Middle member of Stanley's original trio: #92, #93, #94. Useful. Well made and designed. Curious size.</i> |
| Stanley #92 | ¾ by 5½ | Yes | Yes | \$49-\$52 | <i>Smaller version of #93. Size close to Clifton #410 with added versatility if needed. Good partner to a large plane.</i> |
| Bullnose plane: | | | | | |
| Record #077 | 1½ by 4 | Shims to 4 widths | Yes | \$52-\$55 | <i>Fine appearance. Good Weight. Nose section a bit thick.</i> |
| Stanley #90 | 1 by 4 | Yes | Yes | \$46-\$49 | <i>Despite glitzy look, a good tool. Better mouth adjustment than #077. Thin nose section cuts closer to obstructions.</i> |
| Stanley #75 | 1¾ by 4 | Yes | Yes | \$25 | <i>Remake of Stanley's 1879 "el cheapo." Poorly machined; still no bargain.</i> |
| Clifton #400 | ¾ by 3¼ | No | No | \$70 | <i>Remake of Preston. Wedged blade. Narrowest bullnose available.</i> |
| Combination plane: | | | | | |
| Clifton "3 in 1" | Shoulder: 1½ by 6 Bullnose: 1½ by 4¾ | Shims to 4 widths | Yes | \$110-\$115 | <i>Ingenious idea, but clumsy in hand. Pricier and less useful than set of Stanley #92 and #90, but more compact.</i> |

should be avoided. Features to watch for are shown in figure 1 on the facing page and listed below:

1. Fine mouth openings are essential for precise work. On fixed-mouth planes, total mouth width should be no more than 1/16 in. (3/64 in. or less is ideal) and equal all across. Any filing of "lips" to straightness will widen the mouth—a cure worse than the disease. Test adjustable mouths to see if they close parallel and all the way to the blade's edge (zero opening). A skewed front lip can be filed straight. A skewed rear lip, filed back, loses its thin support at/under the cutting edge and is worse off. Better leave it alone.

2. The sole must be machined flat in length and width and not reflect a wavy shine when turned slowly under a light. The mouth must be a crisp slot and not round inwards like lips sucked in. If the sole is slightly out of flat, rub it on wetted 150-, then 220-grit wet-or-dry abrasive paper supported by a thick glass plate. If flaws are great, don't buy it. Skilled machining is expensive, with the risk of mouth-widening or distortion.

3. Sides and sole must be perpendicular to each other. Check this with a good square. Some unscrupulous old-tool dealers grind out pitting and patina...and alignment! Never be suckered into buying these shiny but functionally dead tools.

4. The blade should protrude just a hair beyond each side. It must never be narrower than the body. A blade flush with or narrower than the sides will leave a series of steps with each pass, instead of a single, clean corner. Nowadays, shoulder-plane blades

often come too wide for their bodies: Remove the blade and file its edges until they protrude between 1/100 in. to a scant 1/64 in. on each side. If you find a shiny old tool with an over-width blade, beware: Likely the plane body got narrowed (and distorted) by ruinous "cleaning." Original owners rarely left blades too "full."

5. On old tools, the wide, cutting portion of blades should be at least 7/8 in. long (after nick removal on edges and corners). On wedged models, the blade stem should protrude back beyond the wedge for easy malleting. Avoid pitted blade backs: Flattening is tedious and unremoved pits eventually become gaps in the edge. If a lightly pitted blade back is the worse flaw on an otherwise desirable tool, you might level it on a coarse-grit, polka-dot diamond stone. Out-of-true water stones are fatal here.

6. Blades should be held flush to the cutter seat by the clamp, lever handle or wedge. Be wary of replaced wedges. Fine, continuous wedge fit is essential for a solid blade hold-down. Realistically, a cobweb-thin glimmer of light under the blade, though undesirable, is less of a problem with thick-bladed, wedged, old models (with a generous contact area around a rigid blade) than with newer models with thin blades and scanty hold-down levers. So, look a gift shoulder plane in the mouth—a sound one is a boon to craftsman and woodbutcher alike. □

Maurice Fraser teaches woodworking at the Craft Students' League in the Y.W.C.A. at 53rd and Lexington Ave., New York City, NY.