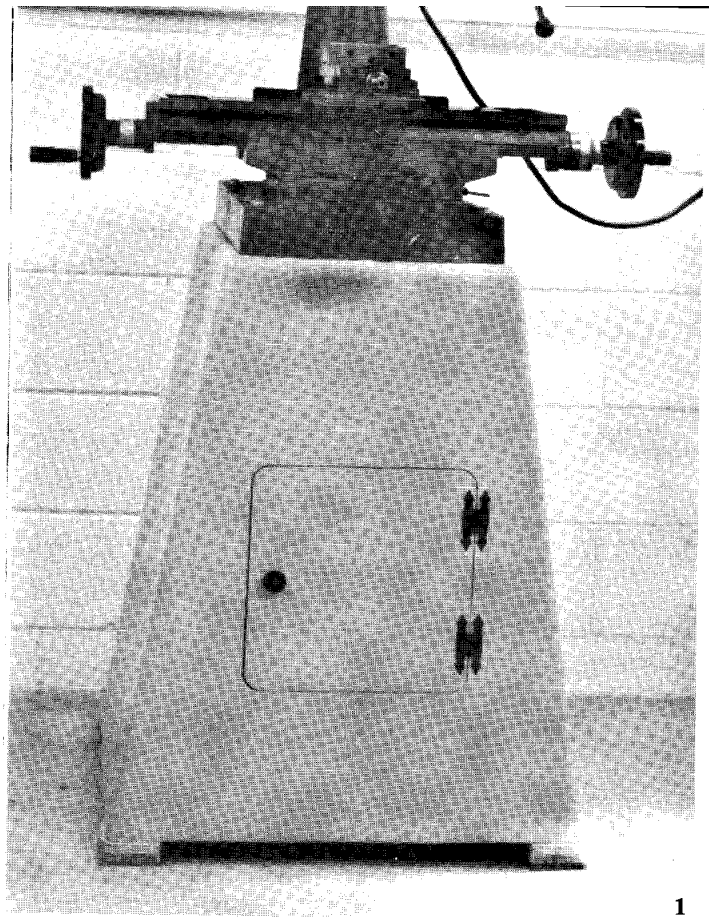

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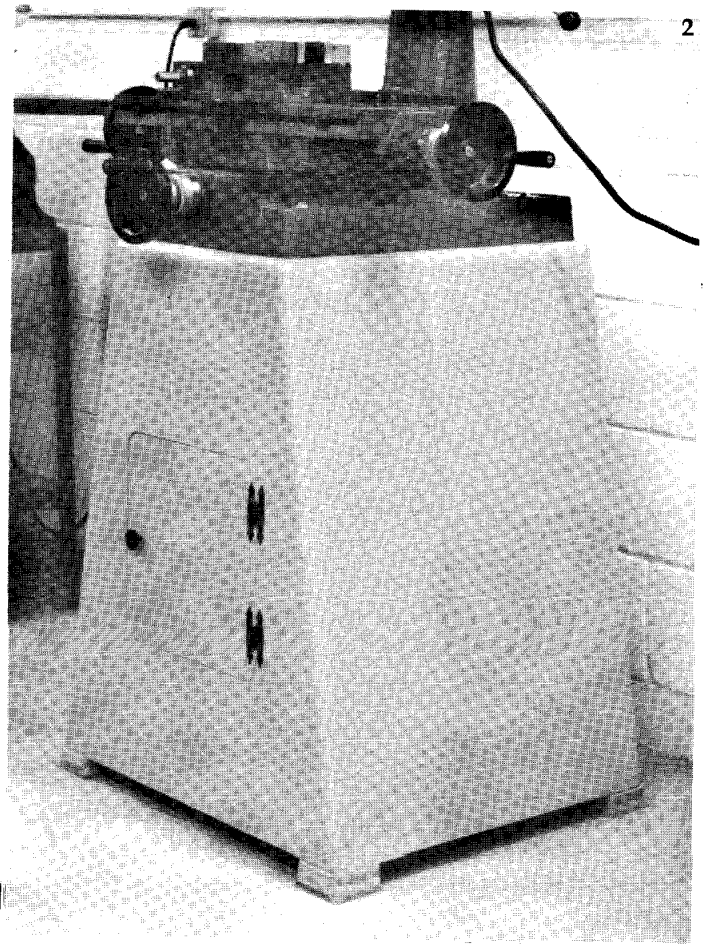

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A Mill-Drill Stand

by Lawrence J. Dullum

Photos by Author

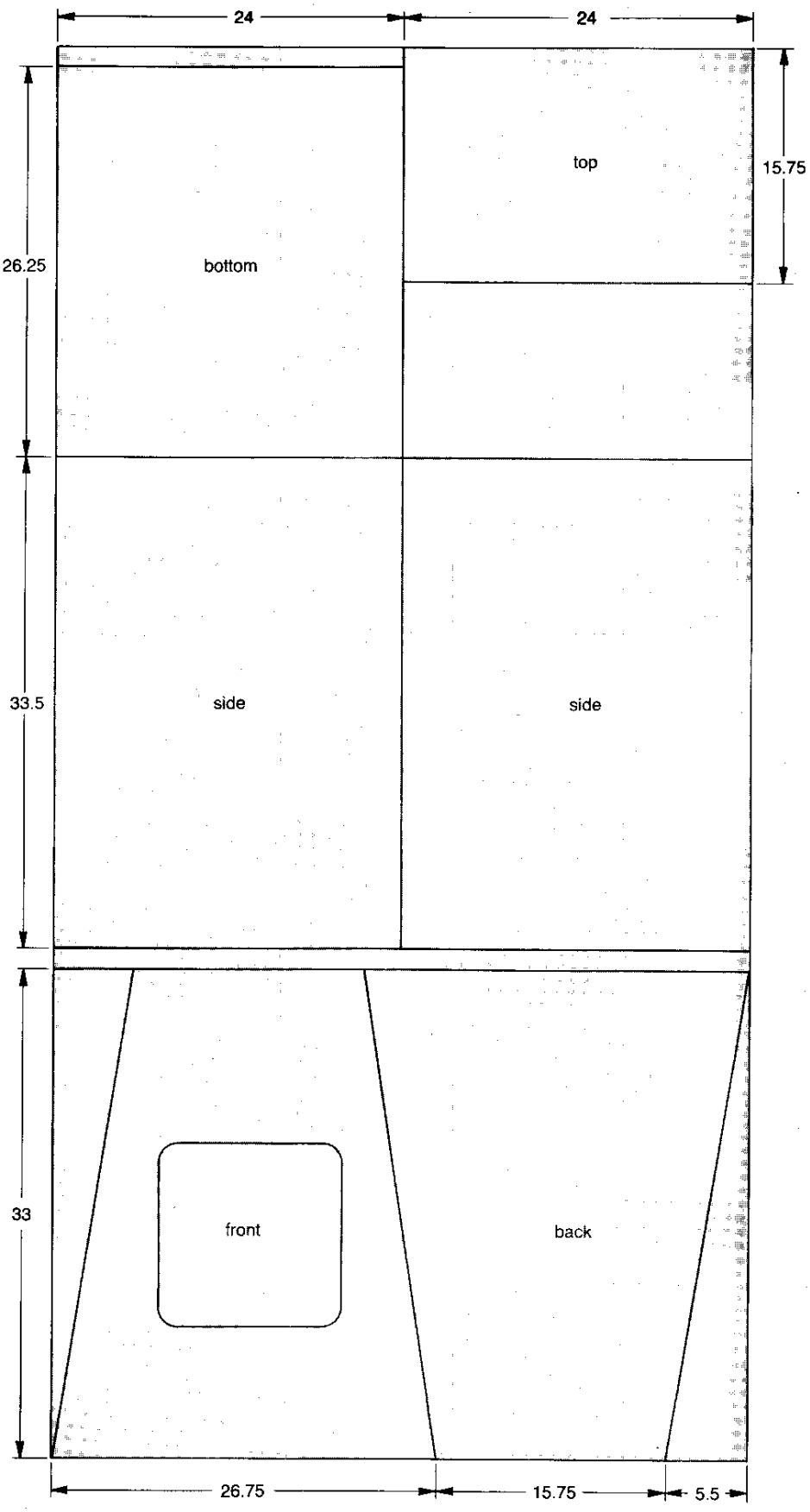
The availability of the moderately priced "mill-drills" from Taiwan has been a great boon to many of us who heretofore had to rely upon lathe milling attachments, hand cutting and filing, or just plain wishful thinking about projects and jobs we could not hope to accomplish. I purchased one of these machines four years ago from a local surplus merchandiser to replace a small, lightweight, homebuilt vertical mill. The improvement in capacity still astonishes me.

The first order of business upon arriving home with my new treasure was to spend an entire afternoon and evening wrestling the 700 lb.-plus monster into the basement shop. The next job, only slightly less difficult, was to get it up onto a bench. Then came the fun of picking out the tooling to be purchased, and finally, finding out what the machine could actually do.

It doesn't take very long to discover that a "bench mill" really doesn't belong on a bench. In the first place, most benches are in no way up to the task. Mine is heavily constructed of 2 × 6s and bolts, yet provided a precarious perch indeed, shaking and vibrating from the combined forces of gravity and machining. In the second place, a bench attired with such a unit is utterly useless for any other purpose; swarf gets into everything, and much surface space beyond the machine is given up for the necessary working clearances.

So, a dedicated stand became an absolute necessity. Several options were weighed; purchasing a ready-made stand, building one of structural or sheet steel, and building one of wood. The latter course was chosen, and for the benefit of those who prefer wood (or, like myself, lack the inclination and wherewithal to build one out of steel), I will describe the process of constructing a rock-steady wooden stand at a cost approximately $50.

The concept is that of a completely enclosed box, constructed of ¾" plywood fastened to 2 × 2s at all edges. The plywood is not overlapped at the edges but is left open, and



PLYWOOD CUTTING DIAGRAM

the corner subsequently filled with stock ¾" quarter-round molding (Figure 1). This type of construction is fast and easy to do, very stiff and strong, attractive, and, in that it lacks sharp corners and edges, is "friendly" to the operator. In order to gain side-to-side stability, the stand was designed wider at the bottom than at the top. The top was laid out to fit the machine base, and the bottom edge of the front and back pieces was allowed to use up the remainder of the 4-foot width of the plywood in the layout (see the cutting diagram). The height was selected to give as high a table surface as possible while still allowing the headstock to be lifted off the top of the column in my shop. (I move the mill in pieces, only.) In addition, there was the desirability of getting the stand out of a single 4 × 8-foot sheet of plywood. My stand worked out to be 34.75"

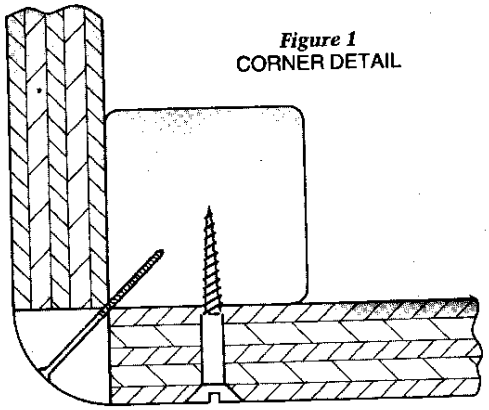


Figure 1
CORNER DETAIL

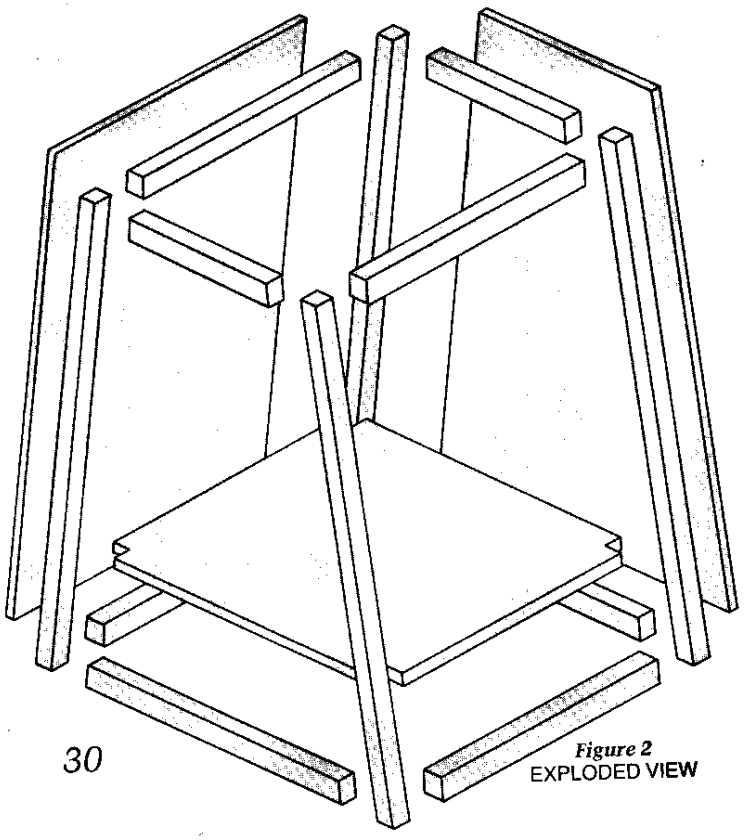


Figure 2
EXPLODED VIEW

high including the feet; the front and back pieces are 15.75" wide at the top and 26.75" wide at the bottom. The top, bottom, and sides are all 24" deep, and are cut to length to fit the front and back. An exploded view of the assembly is shown in Figure 2, with the front, top, feet, and one side omitted for clarity. The list of materials is as follows:

1 each	¾" × 4' × 8' fir plywood AC grade
2 each	2" × 2" × 8' fir
1 each	2" × 4" × 6' fir
1 each	½" × 3½" × 30" oak
18 feet	¾" quarter-round molding
1 each	8 oz. bottle white or yellow glue
10 dozen	1½" × no. 8 FH wood screws
As required	hinges, knob, latch, wood filler, paint, bolts, nails

If a good finish on the base is desired, I would suggest the plywood be closely examined and a better grade selected, if necessary. As often as not, the sale-priced plywood will be found to have quite a rough face, making a nice finish much harder to achieve and eating up the dollar savings in labor. Another suggestion for this project (or any other calling for the better part of a gross of wood screws) is to obtain two drill motors; set one up with the appropriate screwdriver bit, and the other with a combination drill-countersink for the screw size used. The ½" oak in the materials list will be cut up to make feet for the stand, and its shape is thus immaterial. I used a scrap piece from a staircase sideboard; if one were to opt for commercial leveling pads, this material would not be needed.

Start the project by cutting the front and back pieces, per the cutting diagram. Frame the inside faces of these two pieces on all four sides with 2 × 2" stock, using glue and screws on approximately 6" centers. Note that the 2 × 2s do not attach to each other anywhere in this project, but are fastened only to the plywood. This makes the construction much simpler, and has no effect on the strength. The 2 × 2s for the top edges of the front and back pieces must be gotten from the 2 × 4. Cut a 13" length of this stock, and slice it down the center to get two 2 × 2s. The upper face of the 2 × 2s on the bottom edges should be square with the face of the plywood; position the square corner of the 2 × 2s (there is usually only one) so as to get this condition. This square requirement also holds for the outside corners of the remaining three sides. To ensure this, clamp the assemblies together when the framing is finished, matching them as closely as possible, and plane the side and top edges until the plywood

and 2 × 2s are flush, true, even, and square. This is a bit of extra work, but it ensures a much easier fit-up and a square assembly.

An access door may be cut into the front piece at this time. A 13 × 13" opening has proved adequate for storage of the dividing head, vise, and other odds and ends. The door was located 9" up from the bottom, in order to retain as much plywood in the corners as possible for stiffness. A piercing cut with a jigsaw will allow the cutout to be used as the door itself; put a 1½" radius on the corners, and the entire door can be cut in a single pass. I have found that the hollow-ground blades give a very smooth cut in plywood.

The next step involves cutting out the bottom piece, and assembling the front and back to it. As stated before, the bottom piece measures 24" front-to-back, to match the mill base casting. It fits inside the 2 × 2 framework on the end pieces. Cut the side edges at 9½° to match the side angle, taking the width dimension from the ends themselves (approximately 26¼"). Notch the corners to clear the side frame 2 × 2s, and fasten the bottom to the end assemblies with screws and glue.

To get the special shaped 2 × 2s for the top and bottom edges on the side, set up the band or table saw to cut a 9½° angle and adjust the fence to cut through the longitudinal axis of the 2 × 4 (Figure 3). Cutting the remaining 2 × 4 stock should give two identical 2 × 2s with one angled edge. Fit a length of this under both side edges of the bottom panel, and when glued and screwed down, plane the resultant edge flat and even with the front and back side edges.

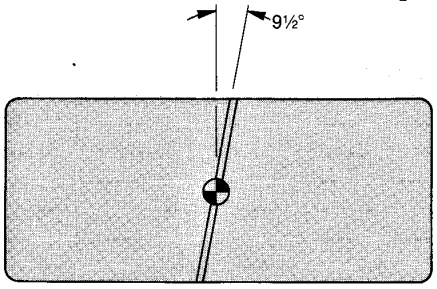


Figure 3
SIDE 2 × 2 CUTTING DIAGRAM

Next come the sides; these are likewise 24" wide, and approximately 33½" long – take the actual measurement from the ends. Do not forget to cut the top and bottom edges at 9½°, and to make the cuts parallel on these pieces, rather than tapering inward as was done on the bottom panel. Before fastening on the sides, check the bottom cross-corner with a straightedge. Shim it off the floor to get it flat, if necessary – as once the sides are on, any warp in the box will be there forever. Following attachment of the sides, fit and fasten pieces of the special 2 × 2 to the inside of the top edges.

Before attaching the top panel, it would be advantageous to nail and glue the quarter round moldings into the side corners. This will allow the entire top framework to be trued up at one time. After fastening down the top, apply the remainder of the quarter round, and then blend all edges smooth with a sander. Some sort of feet are necessary, if for no other reason than to provide space for the prybar needed to get shims under the corners. There seems to be no such thing as a level section of floor in the average shop; at least, there won't be where you want to place the machine. I made mine by cross-laminating 3½" square pieces of ½" oak, and attaching with long screws.

Some time ago, *The Home Shop Machinist* carried a suggestion of painting machines and stands in bright colors, rather than the usual battleship gray. It was stated that this would lighten up an otherwise dull shop. I tried this, picking a canary yellow enamel for my stand, and I can attest that it certainly adds a bit of panache. In order to get a smooth, professional finish, some additional surface preparation will be necessary. The first step is to cover all the screw heads and fill any large gaps. An auto body patching epoxy is suggested here, as it sticks better than wood putty and does not shrink. Apply this stuff as flush as possible with a putty knife; when it sets, a file is required to cut off the excess. The second step is to fill the wood grain with a paste filler. (This is where the choice of a better grade of plywood will be appreciated.) I applied the filler with a wide-bladed plastering knife, and dispensed with the recommended step of burlap wiping. Following a final sanding to remove residual lumps and ridges of filler, the base can be given two coats of paint and bolted to the mill. The final step is to hang the door and fit the knob and latch.

This design concept can, with modification, be applied to any machine. I built a stand for my lathe many years ago based upon these same principles, fitting it with drawers, shelves, and doors. It holds a marvelous variety of attachments, jigs, and junk. Adapt the concept to your needs; you will be well satisfied with the results.