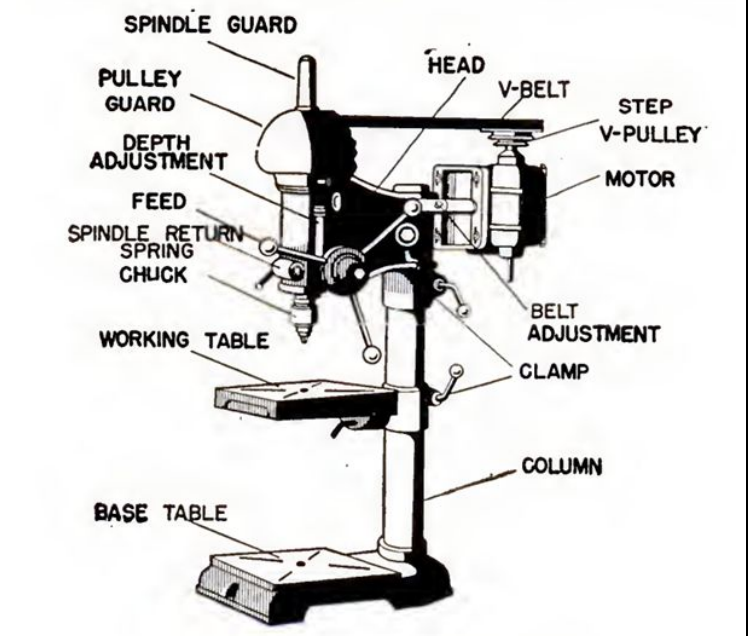
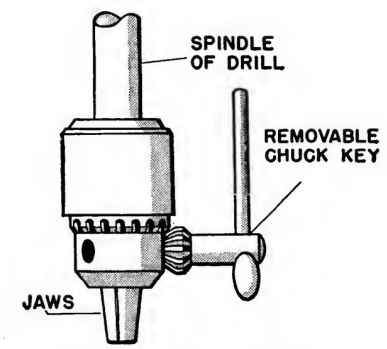
DRILL PRESS GUIDE

Safety Rules

1. Wear proper personal protection equipment (safety glasses)
2. Keep loose clothing, hair, and jewelry away from the drill bit
3. Do not bypass any safety devices
4. Secure the table prior to using the drill press
5. Secure the piece to the table if a large drill bit is being used or if the size of the piece precludes keeping hands a safe distance from the drill bit.
6. If something is broken or breaks, notify one of the wood shop leads at (woodshop@sparkmakerspace.org).





Drill Press Summary

1. Tool location in shop
2. Possible uses for tool
    a. Good for:
        i. Drilling holes (1/16” - 1”)
    b. OK for:
        i. Large diameter holes (>1”)
        ii. Buffing and sanding
    c. Bad for:

        i. Milling
3. Parts of a drill press (refer to diagram)
4. Important variables:
    a. Spindle speed
    b. Bit type
    c. Bit diameter
5. Important setup steps:
    a. Drilling plan
    b. Check spindle travel
        i. Adjust the bed height as needed
    c. Center punch
    d. Securing workpiece
        i. Table top vice
        ii. Clamp
6. Operational guidance
    a. Applying even bit pressure
    b. Removing shavings during cut
7. Cleanup

Instructions for Use

Before Use

1. Wear personal protective equipment
    a. Wear safety glasses
    b. No gloves may be worn while operating the drill press
    c. Long hair must be tied back
    d. Loose sleeves should be rolled above the elbow
2. Determine appropriate drill bit
    a. Twist drills:
        i. Most common drill bits
        ii. Depending on tip, good for wood, plastics, or metal
        iii. Can be used for blind or through holes
        iv. Generally available from 1/16” through 1/2"
            1. Larger sizes available but increasingly expensive
    b. Forstner:
        i. Good for wood, OK in plastics
        ii. Good for clean, precise, large diameter (>3/8”) holes
        iii. Good for flat-bottomed holes
    c. Spade bits:
        i. Good for wood, OK for some plastics
        ii. Good for larger diameter (>1/2”) holes, but leaves rougher finish than Forstner
        iii. Can make blind holes
    d. Hole saws
        i. Good for wood, ok for plastics, some work on metals
        ii. Hole must be through material, and material thickness is limited
        iii. Available from approximately 1” through 4”
    e. See reference charts or talk to a Woodshop Lead for specific applications
3. Check the height of the drill press table. The table should be low enough to allow the work piece to be mounted and to change drill bits but high enough for the spindle travel to make the desired hole depth.
    a. Loosen the table clamp from the column by loosening the table clamp handle behind the column
    b. Raise or lower the table by turning the raising handle to actuate the rack and pinion gear
    c. Rotate the table radially around the column as needed.
    d. Tighten the table clamp handle to secure the table position.
4. Orient the table so that the spindle creates the desired hole angle. The drill press should be oriented with the spindle travel perpendicular to the table in its baseline configuration. The alignment pin can only be inserted when the table is perpendicular, so verifying the presence of the pin is a good visual check.

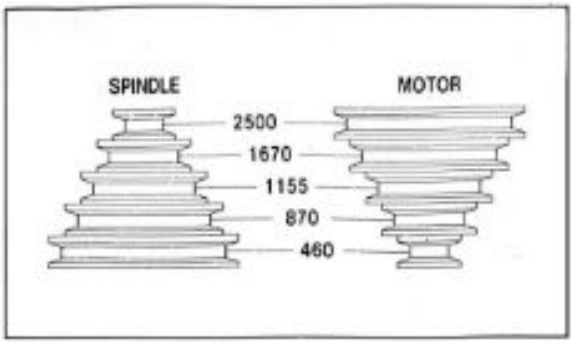
    a. If an angled hole is desired, remove the alignment pin. Removing the alignment nut can assist in removing the pin.
    b. Loosen the table locking bolt and turn the table to the desired angle. Tighten the locking bolt.
5. Check the spindle speed setting. Higher speeds will be desired for drilling small holes while slower speeds will be desired for drilling larger holes (see Table 1).
    a. Unplug the drill press
    b. Open the belt cover on top of the press
    c. Loosen the tension lock knob holding the motor in position (right side, rear)
    d. Pull the tensioning lever forward to loosen the belt.
    e. Shift the belt to the desired set of pulleys that produce the desired speed (see diagram on next page).
    f. The two pulleys selected should be at the same height to prevent the belt from jumping off of the pulleys.
    g. Push the tension lever towards the rear to tension the best.
    h. Set the tension by tightening the knob to secure the motor position
4. Verify that the drill chuck is securely mounted in the spindle
    a. The drill chuck has a Morse taper that is press fit into the spindle.
5. Use a center punch to mark the location of the center of hole to be drilled.
6. Mount the drill bit in the chuck
    a. The drill chuck has a key which is secured to the machine by a tether.
    b. The outer housing of the chuck will rotate to open and close the jaws
    c. Twist the outer housing of the chuck to hold the drill bit in place
    d. Use the key to turn the teeth on the outer housing to fully secure the bit.
7. Secure the workpiece to the press table. This is particularly important for larger drill bits.
    a. If a through hole is being drilled, to protect the press table and the drill bit:
        i. The drill bit should pass through the hole in the middle of the press table, OR
        ii. Scrap wood should be placed between the bottom of the workpiece and the press table
    b. Large pieces can be secured directly to the table with clamps.
    c. Small pieces can be secured with the portable vice.The vice should then be secured to the table with clamps.
8. Drilling the desired hole
    a. If a large twist drill bit is to be used for the final hole diameter, a pilot hole can help maintain an accurate position.
    b. Forstner bits do not need a pilot hole.

Useful Tables

Table 1: Drill Speed Chart

Twist Drill Bit Size (in)	Softwood Speed (rpm)	Hardwood Speed (rpm)
1/16” - 3/16”	3000	3000
1/4” - 3/8”	3000	1500
7/16“ - 5/8“	1500	750
11/16” - 1”	750	500

Source: “Wood Magazine’s Drill Press Speed Chart”



During Use

1. Drill the workpiece
    a. A twist bit can often make a hole in a single pass
    b. Forstner bits need to make gradual cuts. After making a partial cut, the forstner bit is backed out of the piece to remove shavings. The forstner bit is plunged back into the workpiece to continue the cut.
    c. Hole saws and spade bits do not remove shaving from the hole, similar to a forstner bit. Gradual cuts should also be made with these bits where the shavings are removed from the piece after each pass.

After Use

1. Unclamp the workpiece from the table.
2. Remove the vice, if used.
3. Unchuck the drill bit and return it to the correct storage.
4. Return the table to perpendicular
    a. Loosen the table locking bolt, and return the table to the perpendicular orientation.
    b. Replace the alignment bolt and nut
    c. Tighten the table locking bolt.
5. Return the tool to the baseline configuration (see Baseline Configuration Identification).
6. Clean up the sawdust around the tool.

Baseline Configuration Identification

1. Remove bit from chuck
2. Spindle speed set to its lowest setting.
3. Table perpendicular to spindle.

Drill Press Competencies

Trained User Competencies

Setup

- Table Height Adjustments
- Spindle Speed Adjustments
- Bit Identification (Twist, Forstner, Spade, Hole, etc)

Operations

- Securing a Bit in the Chuck
- Securing Workpiece
- Drilling Hole

Maintenance and Care

- Cleanup of Machine and Surrounding Space

Advanced User Competencies

Setup

- Table Angle Change and Reset
- Reseating Morse Taper

Maintenance

- Table Cleaning and Waxing
- Belt Replacement