

## Turning a Detachable Key Ring

### Supplies Needed

- 7mm Drill Bit
- 1/2" x 1/2" x 2 1/2" Blank
- Pen Mandrel
- Set of Bushings
- Glue (Thick CA or Epoxy)
- Sandpaper/Finish
- Drill or Drill Press
- Barrel Trimmer/Disc Sander
- Pen Press or Clamp
- Eye and Ear Protection

### Cutting and Drilling the Pen Blank

1. Cut the blank 1/4" longer than the brass tube.
2. Using a drill press with the blank secured in a vise or clamp, drill a hole through the center of the blank stopping an 1/8" short of the bit exiting the blank. Drill at 2,000–3,000 rpm backing the drill bit partially out of the hole every 1/2" to clear chips. When using larger bits or drilling plastics drill at 250–500 rpm.
3. Trim away a small amount of wood from the end of the blank to expose the hole. The blank should be slightly longer than the brass tube. This technique prevents cracking caused when the bit exits the blank.

### Gluing the Brass Tube Into the Blanks

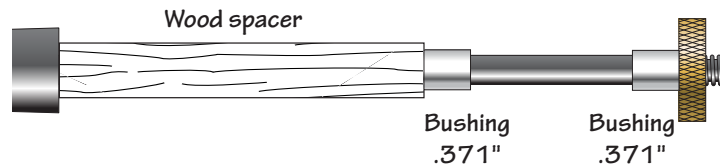
1. Lightly scuff the exterior of the brass tube with 220 grit sand paper to prepare it for gluing.
2. For a fast bond, use thick cyanoacrylate adhesive (super glue) or 5 minute epoxy. For additional working time and more thorough bond, use expanding polyurethane (Gorilla or Sumo Glue). Apply a thin layer of glue to the tube and inside the wood blank. Insert the tube into the blank rotating it as you go to spread the glue evenly. Position the brass tube in the blank so that the wood extends beyond the tube on both ends to allow for trimming.

### Trimming/Truing the Blank

1. Square the ends of the wood blank with the tube using either a barrel trimmer or disc sander. This step is critical for the Key Ring components to fit together properly. **Do Not** trim the brass tube as this may result in an improper fit when the project is assembled.

### Mandrel Setup and Turning

1. Place the bushings and blank (not shown) on the pen mandrel, using a wooden spacer for proper fit.



2. Advance a 60° revolving cone center into the dimpled end of the mandrel and tighten using light pressure. **Do Not** over tighten the tailstock or mandrel nut as this may cause the mandrel to flex resulting in off-center barrels.
3. Turn the blank to the desired shape leaving the blank slightly larger than the bushings.
4. Sand the blank using progressively finer grits of sand paper, then apply your favorite finish.

### Assemble the Parts

Layout the parts as shown. Use a vise or clamp with wood or plastic jaws to prevent damaging parts during assembly.

1. Press the plunger coupler into one end of the brass tube.
2. Press the end cap into the opposite end of the brass tube.
3. Depress the plunger assembly and slide it into the plunger coupler.
4. Pry open the rings and slide them through the plunger and end cap holes.

