

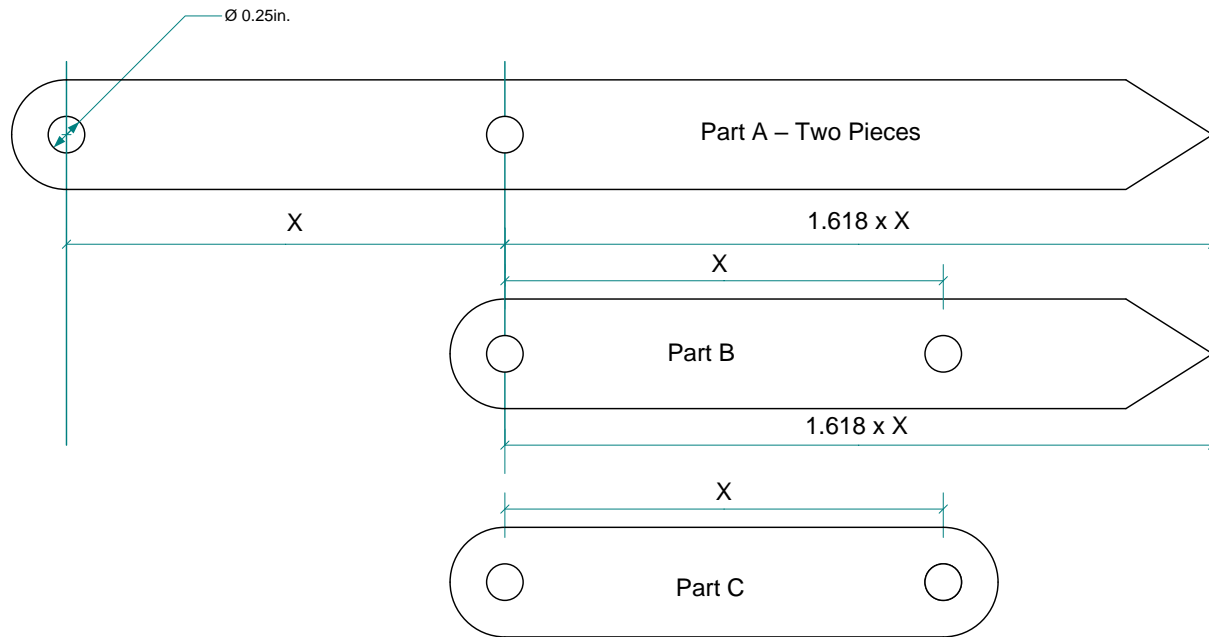
## “Golden Ratio” Calipers (Phi Calipers)

Mathematically, the ‘golden ratio’ is the ratio of two lengths, L1 and L2, where:



$$\text{and } \frac{L_2}{L_1} = \frac{L_1 + L_2}{L_2}$$

When this condition is met, the ratio of the two lengths,  $L_2/L_1$  is 1.618. A  $\Phi$  caliper is a tool that divides a physical length into segments that have this ratio.



Calipers consist of four pieces, two of which are identical.

Start with four strips of material. Each strip should be about  $1/8 - 3/16$ " thick and  $5/8 - 3/4$ " wide. The length of these strips depends on the intended size of the final caliper. The design shown here is based on the principle of a ‘base dimension’, designated X (in either inches or mm). The approximate starting length of the four strips of material should be  $(2.618 X + 3/4)$ ". For example, objective is a caliper that is about 8" long, the base dimension, X, would be 3", and the starting length of the four strips would be about  $8 \frac{1}{2}$ ".

1. After milling the four strips, tape them together, and shape the pointed end
2. Drill a  $1/4$ " hole (the center hole) exactly  $1.618 X$  from the tip of the pointed end
3. Drill a second  $1/4$ " hole  $X$ " away from the center hole.
4. Shape the rounded end of the strips around that second hole
5. Remove the tape, and set aside two of the strips. These are ‘Part A’ and are ready for sanding and finishing. The two remaining strips will become parts B and C.
6. Tape parts B and C together. Drill a third  $1/4$ " hole exactly  $X$  away from the center hole in the direction of the point, then remove the tape.
7. On Part B, cut off the rounded end, and round over the cut end around the center hole.
8. On Part C, cut off the pointed end, and round over the cut end.
9. Sand all four parts, and apply the desired finish.
10. Assemble the caliper using  $1/4$ " “Chicago screws” (aka ‘binder posts’). Place a nylon or polyethylene washer between the parts to facilitate smooth rotation. If you can’t find Chicago screws, you can use ordinary machine screws and nuts.