

## TIP 99 — Using a Headstock for Indexing Parts/Shuky Levy

### About the Indexing Headstock Mounting Plate

This project tip was sent to us by Shuky Levy from Israel. It is useful for those who use a sherline lathe and/or a milling machine and have an extra headstock, but do not have a rotary table with a right angle attachment. Shuky machined a headstock mounting plate and brackets to use for indexing parts on a milling table or lathe.

### Headstock Mounting Plate—Version 1

Figure 1 shows the dimensions of the headstock mounting plate.

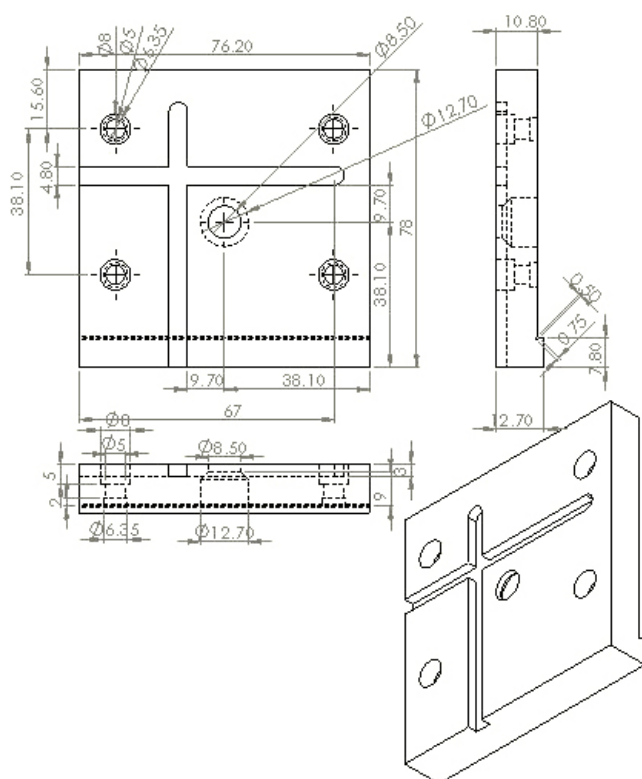


FIGURE 1—Dimensions for the small headstock mounting plate.

1. For this plate we need:
  - A. A headstock riser block (P/N 1297) (for use on the lathe).
  - B. A riser pivot pin (P/N 12990) and its screw (P/N 12980).
  - C. Four T-nuts (Sherline standard (P/N 3056) pack of ten) with four 10-32 x 1/4 socket head cap screws (SHCS).
  - D. Precision ground head key (P/N 40260).

2. Take a 78 x 76.2mm x 1/2" (or 13mm) thick plate and reduce the thickness to 10.80 mm, leaving a stage of 7.80 mm in the front bottom side of plate. This measurement for 10.80mm is so that the surface of the plate will be flush with the headstock riser block (on the lathe mounting method).
3. Drill four two-sided counterbore holes for the T-nuts and screws with 1.50" distance between the centers of the holes (to be matched with T-slots on the milling table and the lathe crossslide).
4. Drill and bore a hole with a countersink from the bottom side of the plate for the pivot pin, and mill the two crossing slots for the head key (see measurements in Figure 1).

### Mounting Brackets

Make the two locking brackets (as shown in Figures 2 and 3).

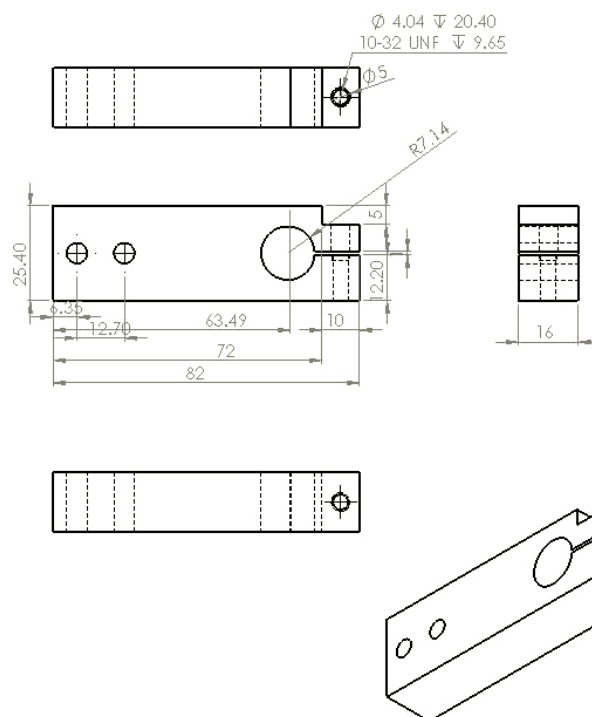
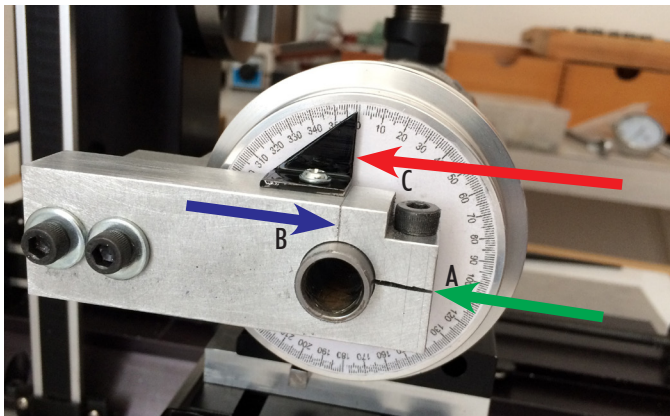


FIGURE 2—Dimensions for the spindle locking bracket No. 1.

1. After drilling and boring the spindle hole in bracket No. 1:
  - A. Scratch a line parallel to the bottom from center of spindle hole to near edge to mark the cut to be made (see Picture 1-A).

- B. Scratch a line parallel to the side from center of spindle hole to top edge for angle scale disk pointer (see Picture 1-B).
- C. For the pointer, use a ½" right angle thin aluminum profile (see Picture 1-C).



PICTURE 1—Spindle locking bracket.

A: The green arrow shows the cut to be made for the locking screw.  
 B: The blue arrow shows the scribed line for aligning the pointer.  
 C: The red arrow shows the index pointer mounted on the spindle locking bracket.

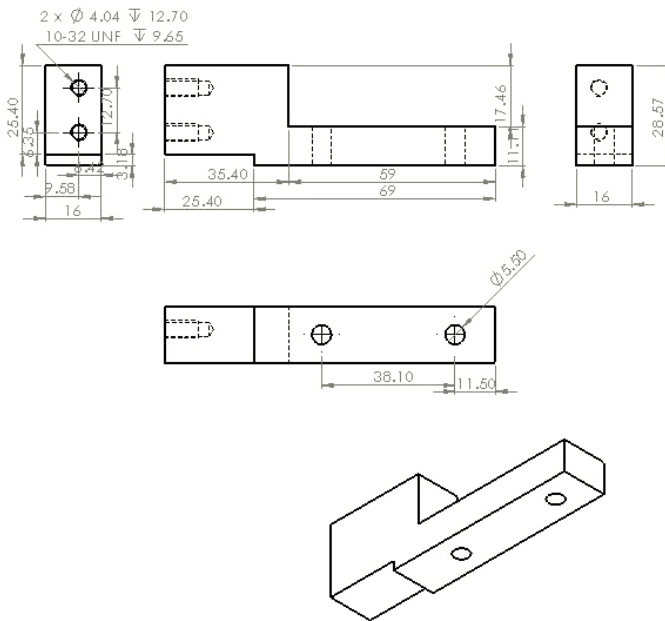


FIGURE 3—Dimensions for the small headstock mounting plate bracket No. 2.

2. Drill the holes (on Bracket 2) connecting it to Bracket 1.
  - A. Install Bracket 2 on the headstock (in place of the motor bracket).
  - B. Install Bracket 1 on the spindle and lock the spindle locking screw.
  - C. Align Bracket 1 perpendicular to Bracket 2.

D. Use a transfer punch to mark the holes to be drilled on Bracket 2.

3. Figure 4 shows the exploded view of the spindle lock and motor mount brackets attached to the headstock.

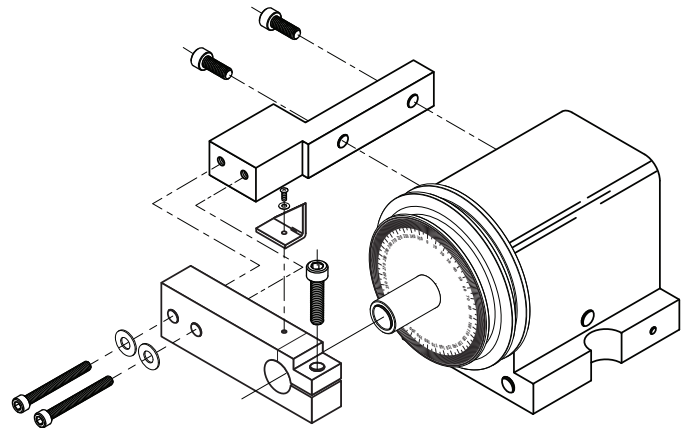
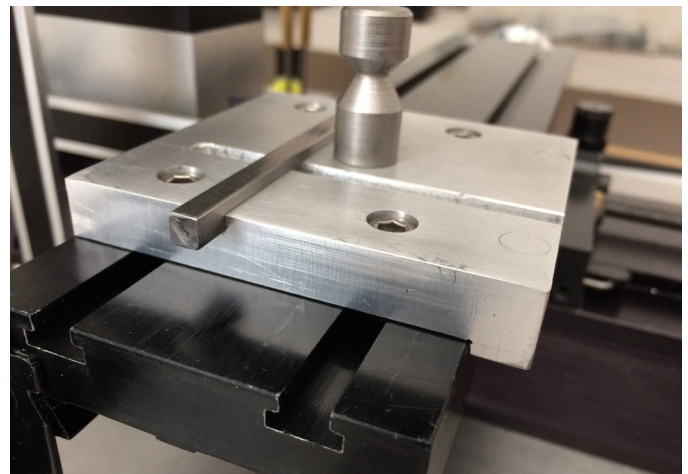


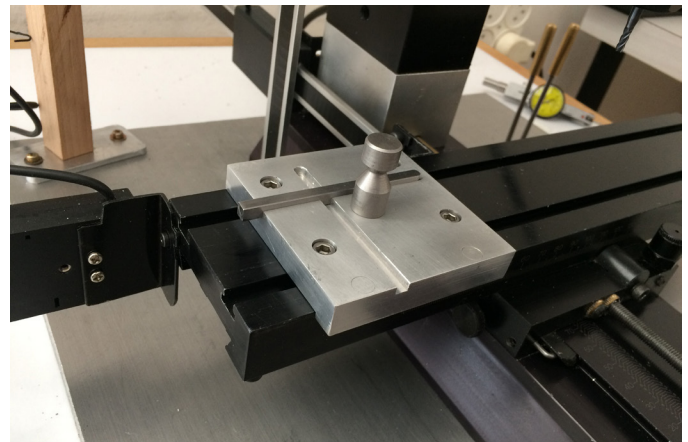
FIGURE 4—Exploded view.

### Mounting on a Milling Table

Pictures 2 and 3 show the headstock mounting plate attached to the mill table.



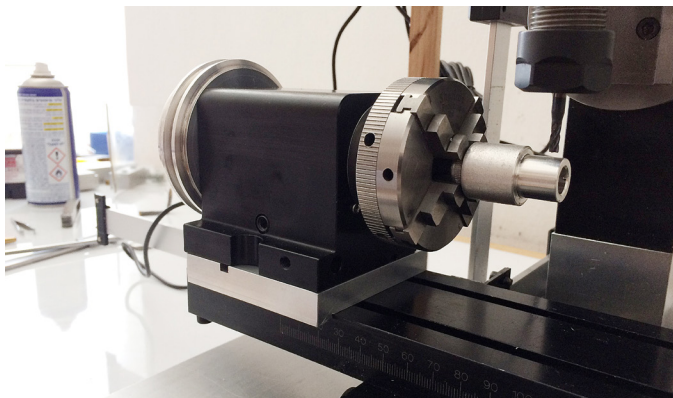
PICTURE 2



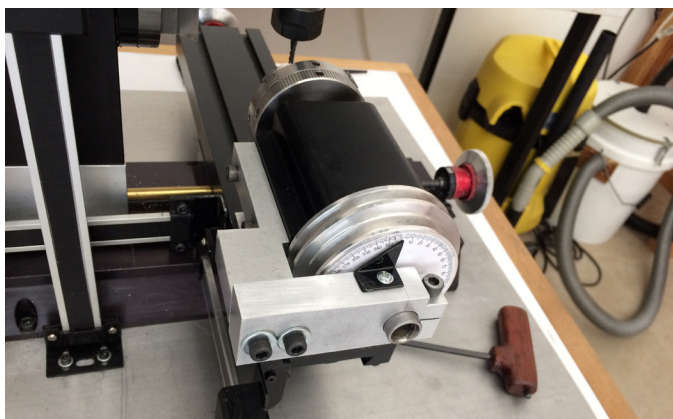
PICTURE 3



1. Remove the motor from its original bracket.
2. Glue the disk scale on the pulley wheel (see Figure 7 at the end of this document to print out a copy of the disk scale).
3. Install the two locking brackets on the headstock.
4. Install the mounting plate on the milling table in the desired location using the T-nuts and the 10-32 x 1/4 SHCS.
5. Install the headstock on the mounting plate.



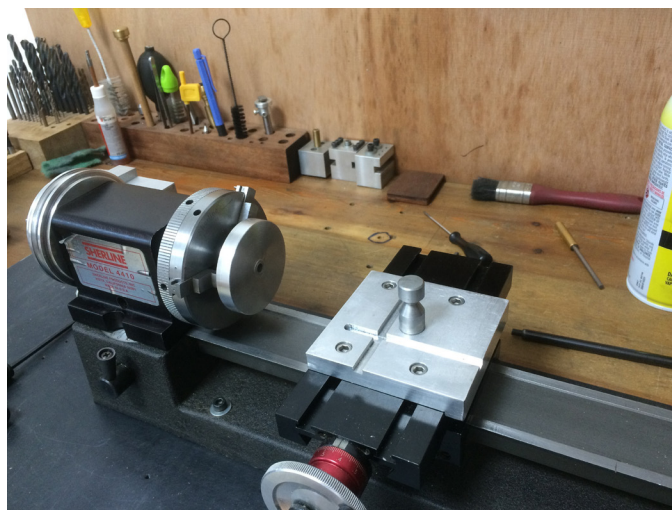
PICTURE 4—This photo shows the headstock mounted in place.



PICTURE 5—This pictures shows the spindle lock and motor mount brackets attached to the headstock.

### Mounting on a Lathe

1. Method 1:
  - A. Remove the motor and original bracket.
  - B. Glue the disk scale on the pulley wheel.
  - C. Install the two locking brackets on the headstock.
  - D. Install the headstock on the lathe bed.
  - E. Install the mounting plate on the crossslide.



PICTURE 6—The locking brackets are on the lathe bed headstock.

- F. Install the headstock on the mounting plate.



PICTURE 7—The motorized headstock mounted on the crossslide.



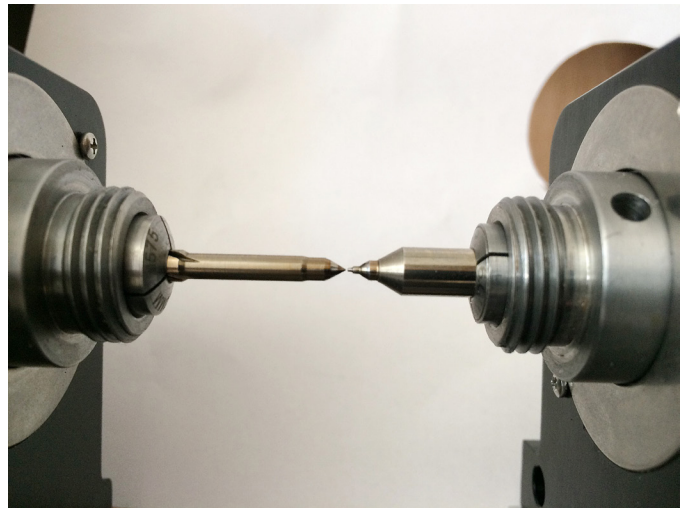
PICTURE 8—Another view of the headstock on the crossslide.

2. Method 2:
  - A. Install the mounting plate on the crossslide.
  - B. Install the second headstock with the motor on the mounting plate (with or without alignment key, as required).





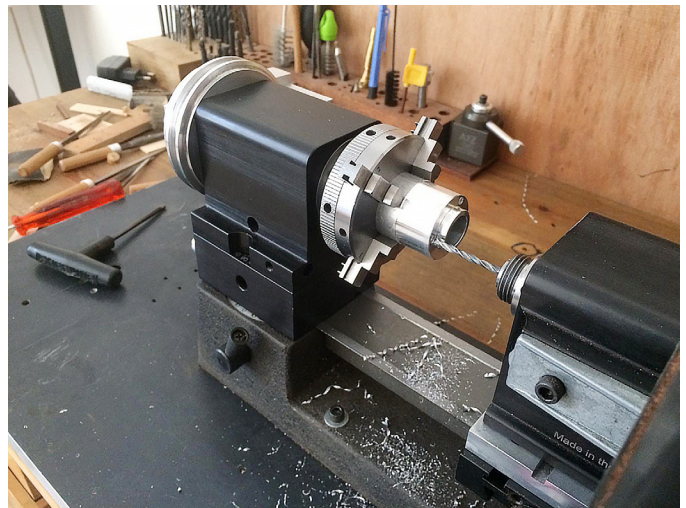
PICTURE 9



PICTURE 12



PICTURE 10—The crossslide headstock is mounted on an angle. The alignment key has been removed in this setup.



PICTURE 13— The application is drilling 3 holes at a 120° pattern (it does require usage of two headstocks).



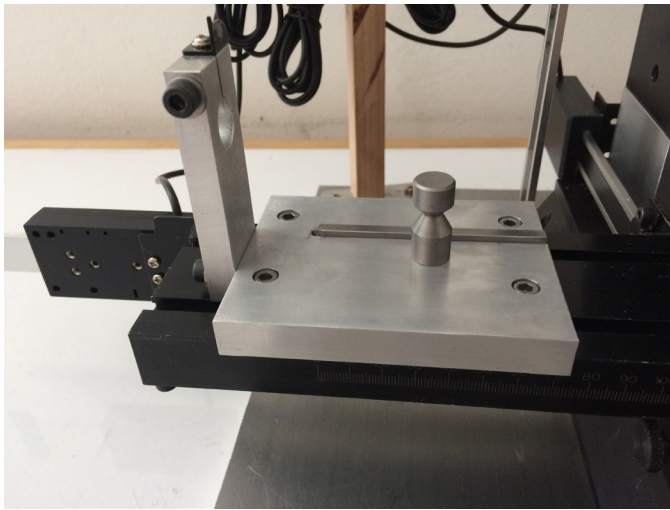
PICTURE 11—Another view of the angled crossslide headstock.



PICTURE 14— This application is doable on a lathe instead of using a rotary table and a right angle attachment on a milling machine.

## Headstock Mounting Plate—Version 2

This plate is simpler and is used only on a milling machine.



PICTURE 15

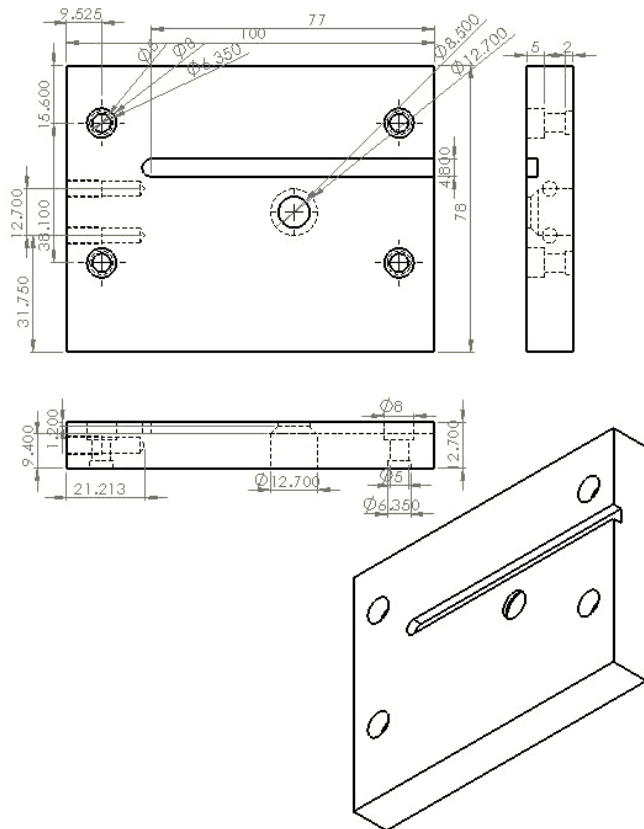


FIGURE 5—Dimensions for the small mill headstock mounting plate.

1. For this plate we need:
  - A. A riser pivot pin (P/N 12990) and its screw (P/N 12980).
  - B. Four T-nuts (Sherline standard (P/N 3056) pack of ten) with four 10-32 x 1/4 socket head cap

screws (SHCS).

C. Precision ground head key (P/N 40260).

2. Take a 100 x 78mm x 1/2" or 13mm plate.
  - A. Drill and bore a countersink hole for the pivot pin on the bottom side (see measurements in drawing).
  - B. Drill four holes, counterbore both sides of the holes for T-nuts.
  - C. Mill a slot for headstock key (see measurements on drawing).

## Mounting Bracket

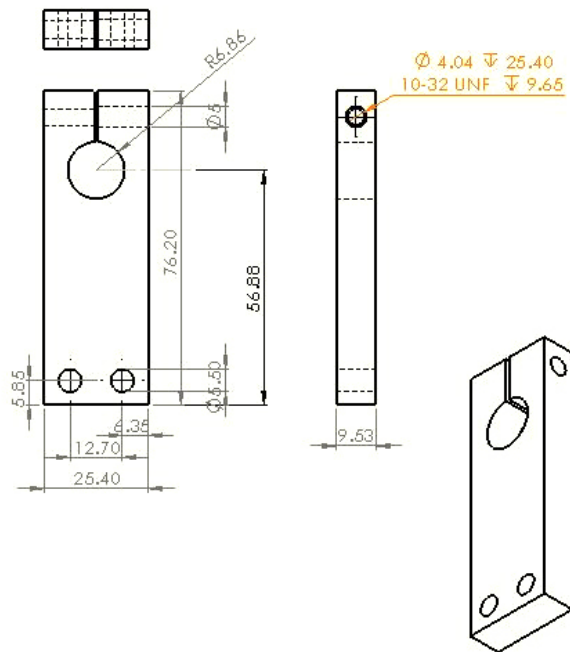
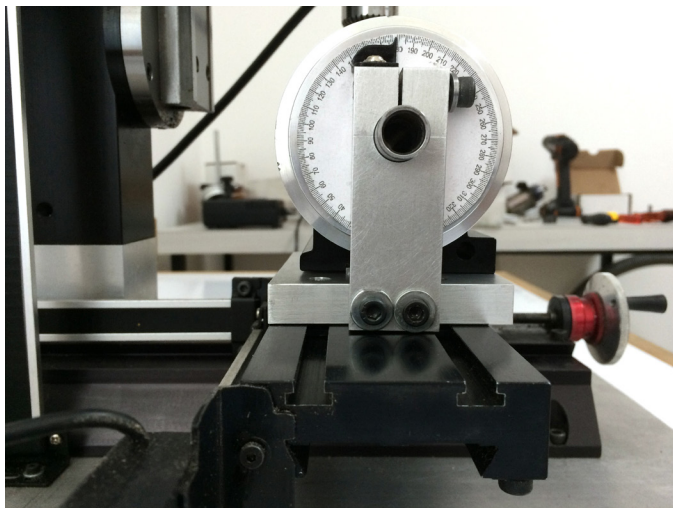


FIGURE 6—Dimensions for the mill headstock spindle locking bracket.

1. Take a 3/8" thick plate 76.2 x 25.4 mm (3" x 1")
  - A. Drill and bore a hole for spindle on center line (see measurements on drawing).
  - B. After drilling the hole and before removing the bracket, scratch a line to the top of the bracket to mark the center line for cutting the tightening cut slot.
4. Drill the tightening screw hole on the bracket.
  - A. Drill (using a 10-32 threading size drill) hole through the bracket.
  - B. Cut the tightening cut through the scratch line.
  - C. Thread the hole on one side up to the cut.
  - D. Drill the hole(5mm) on the other side up to the cut.



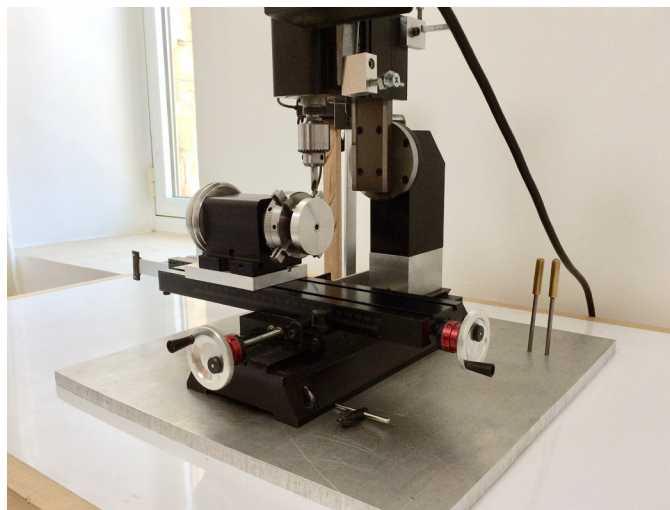
5. Drill two 5mm holes on bottom side of bracket.
6. Drill matching holes on the plate.
  - A. Assemble the headstock to the plate with the key and the pivot pin.
  - B. Assemble the locking bracket on spindle and tighten the bracket to the spindle aligning the bracket at a right angle to the mounting plate.
  - C. Transfer the two “center holes” with a punch from the bracket to the mounting plate.
  - D. Drill and thread the two 10-32 holes on the plate.
  - E. Ensure that the bottom side of the bracket is at least 0.5mm above the bottom side of the plate.
  - F. For the pointer use a ½" right angle thin aluminum profile (see Picture 16).



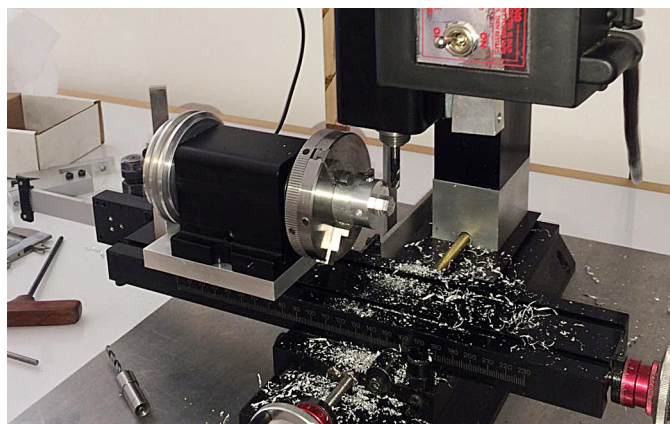
PICTURE 16

#### Mounting:

1. Assemble just the plate on milling table in desirable place with four screws and T-nuts.
2. Assemble the headstock on the plate
3. Glue the dividing scale disk on the pulley
4. Assemble the bracket on the spindle
5. Close and tighten the two 10-32 screws to the plate.



PICTURE 17



PICTURE 18— This setup was used to drill four right-angled 4mm holes on the O.D of the part.

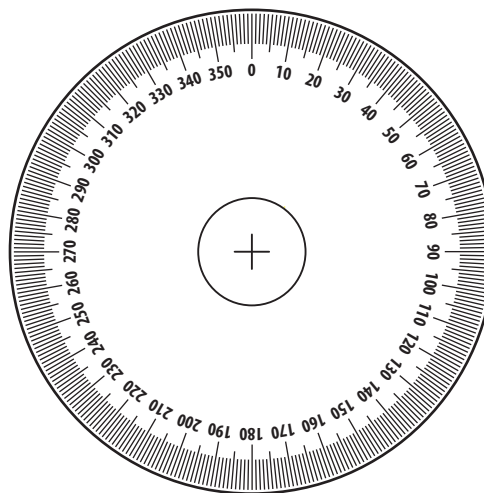


FIGURE 7—Print this scale out at 100% (do NOT print to fit), and glue it onto the pulley wheel. You can then use it to manually index your part for machining. Be sure to tighten down the screw on your spindle lock before any milling or turning.