Chrysalises Manual #2

Machining Ferrules

for Grover Tuning Gears: #V97-18NA

Chrysalis II

Long Ferrules

Ferrule Dimensions

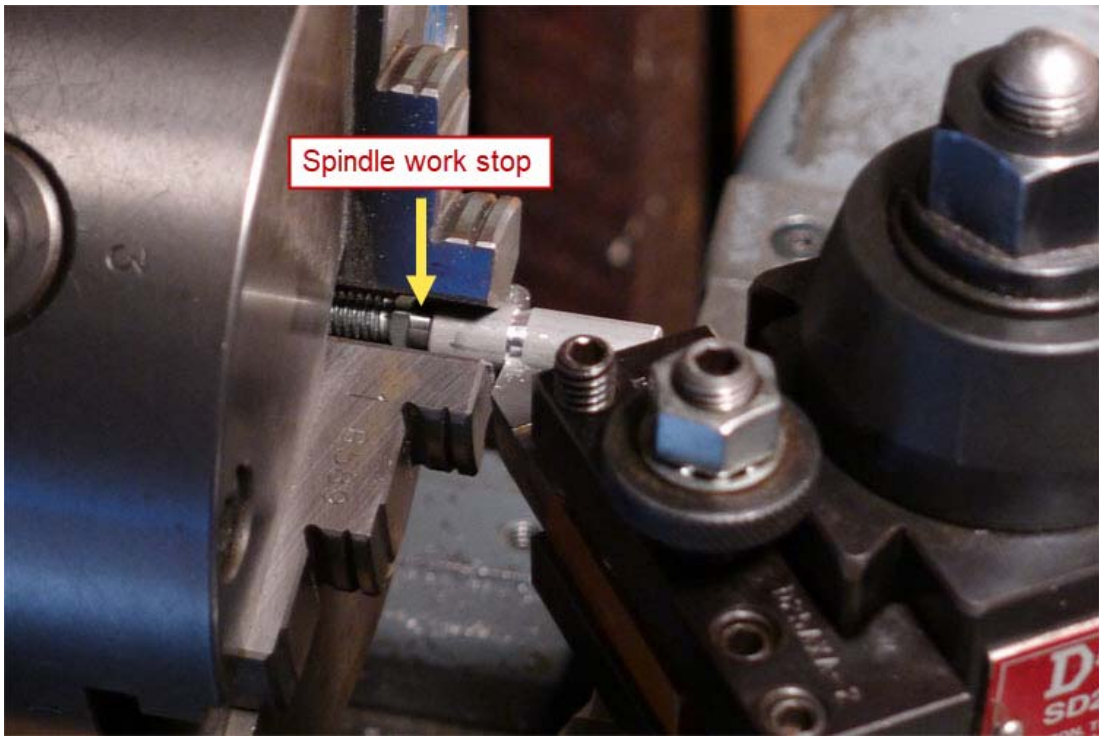
Head Length: 0.063 in. (1/16 in.)
Head Diameter: 0.375 in. (3/8 in.)
Body Length: 0.625 in. (5/8 in.)
Body Diameter: 0.333 in. ± 0.001 in.

Depending on the plywood material, chose a diameter for the holes that provides a substantial press fit for the ferrules.

Ferrule material for Chrysalis I and II

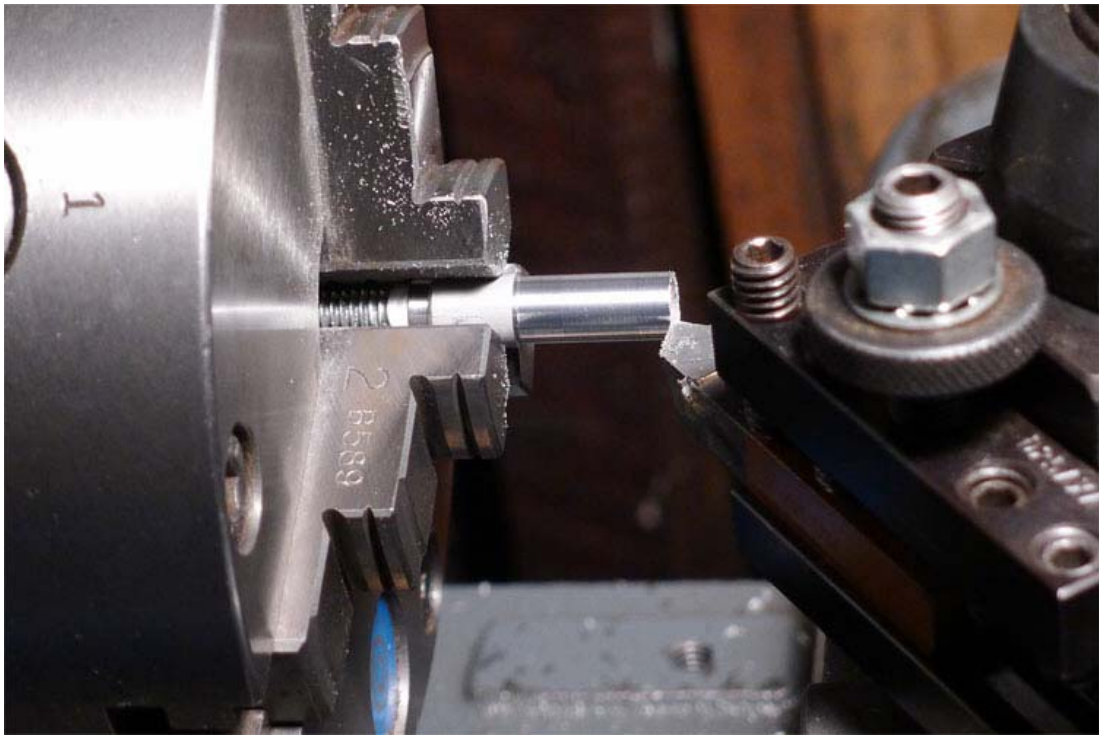
Aluminum Tube: 6061-T6, 3/8 OD × 0.058 Wall × 0.259 ID
Seller: Tube Service Co.

1. Rough cut the ferrules to length. Then, square one end of the tube piece so it seats tightly against a spindle work stop inside the lathe chuck.

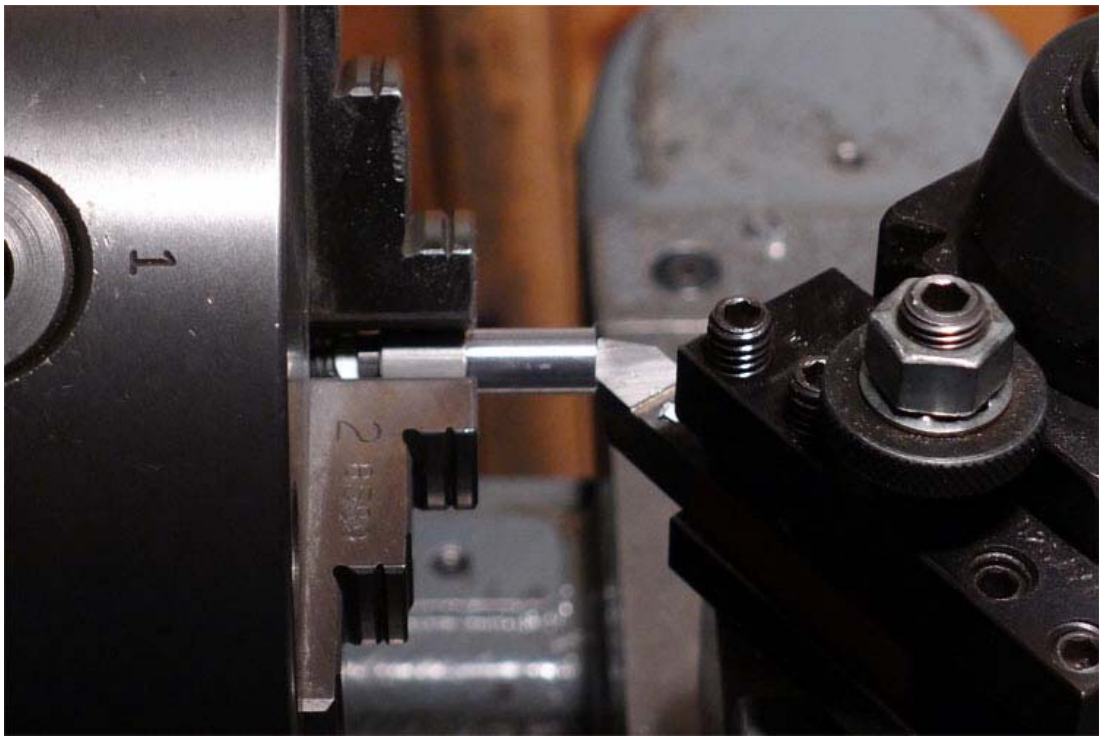


2. Set up a dial indicator to mark the exact location of the beginning of the body cut.

3. Align the cutter with a slight 90° back angle to ensure a square shoulder cut. Cut the body to the desired diameter.



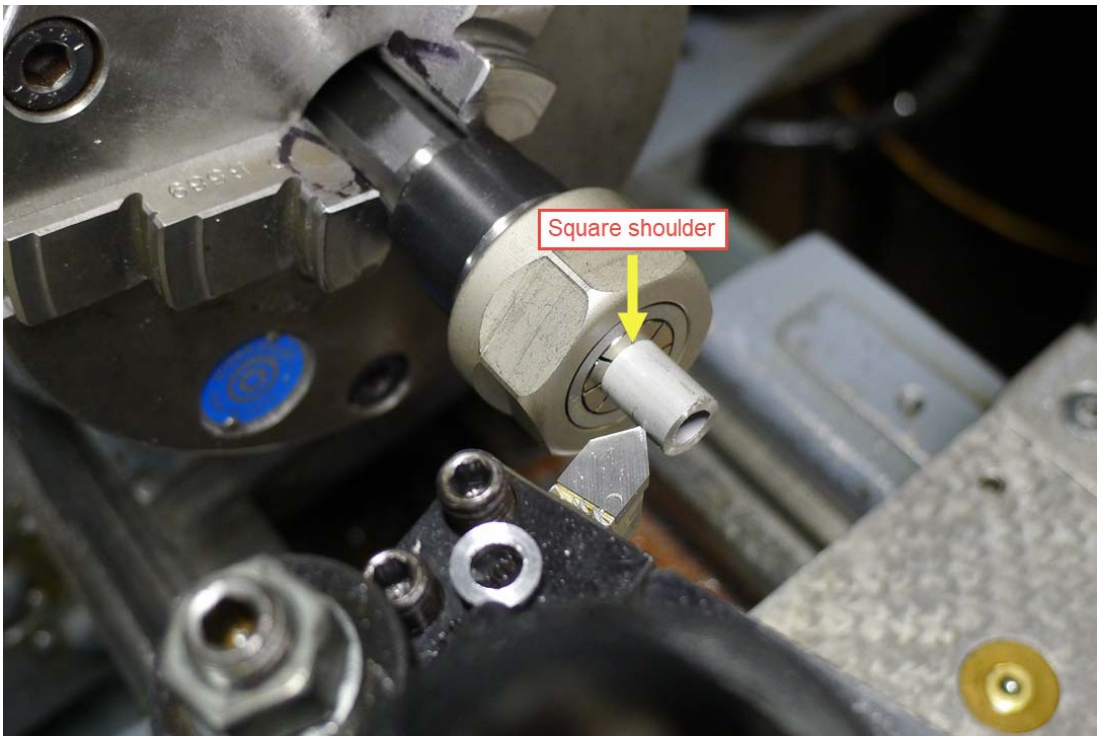
4. With the dial indicator, move the cutter a small distance toward the lathe chuck and cut the body of the ferrule to length.



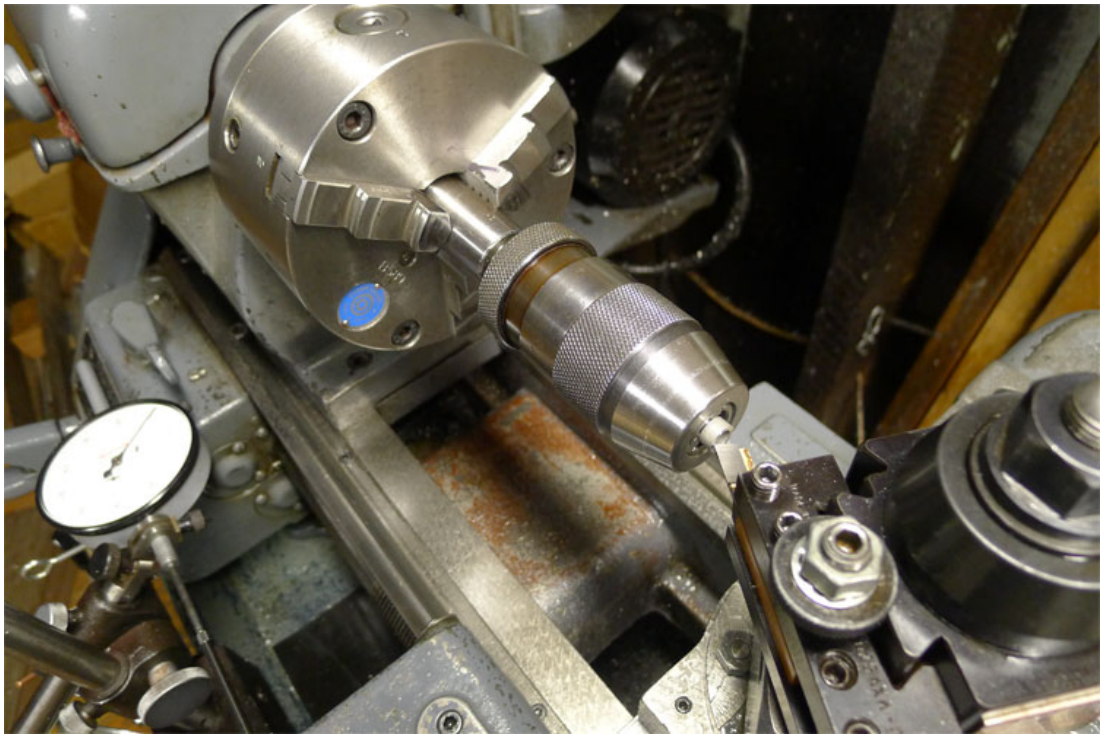
5. On a drill press, deburr the body hole by hand-feeding the ferrule into a slowly rotating countersink.

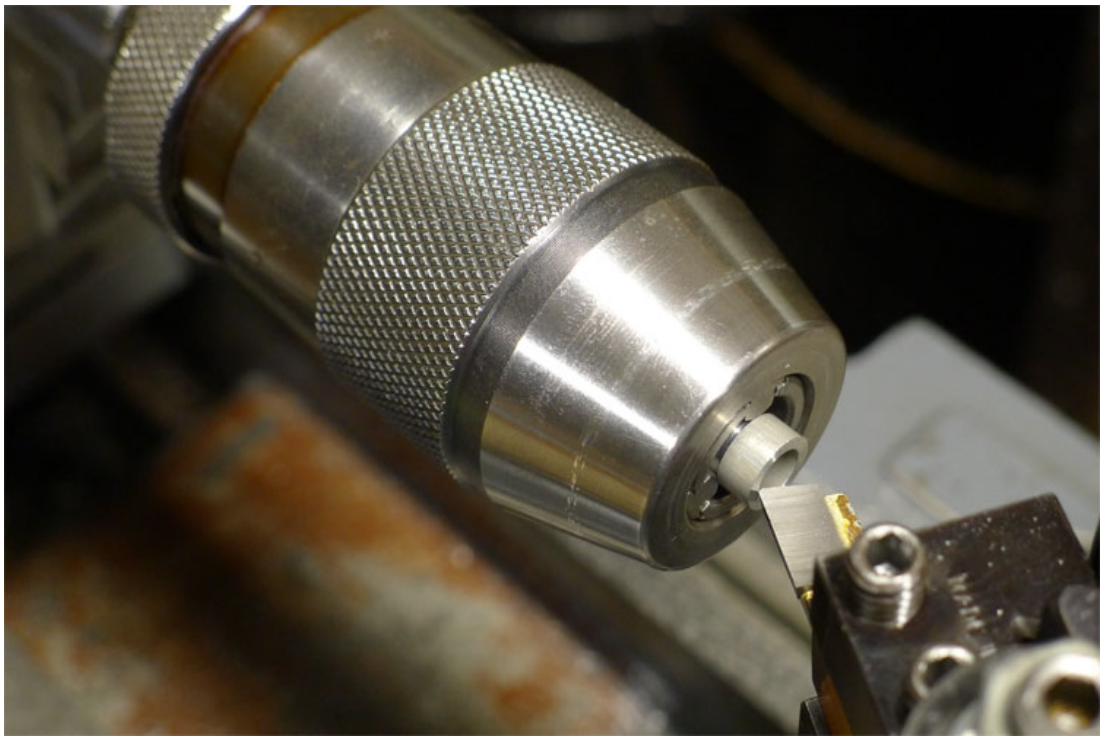
6. On the lathe, round over the outer edge of the body hole with a very fine single-cut file.

7. Mount a collet chuck into the lathe chuck and insert the body of a ferrule so that the square shoulder seats tightly against the collet. With the dial indicator, cut the ferrule head to length.



8. Insert a Morse taper extension into the lathe spindle and mount a keyless chuck. With the dial indicator, turn a very fine 0.002 in. finish cut on the head of the ferrule.





9. On a drill press, deburr the head hole by hand-feeding the ferrule into a slowly rotating countersink.

10. Place a ferrule into the keyless chuck so that the head extends slightly past the chuck. With 1000 wet/dry paper (no lubrication) polish the ferrule head. Rub blue plastic polishing compound into red piano understringing felt and polish the head. Do *not* round over the square shoulder. *Never* reduced the diameter of the head except by very lightly polishing it.

Chrysalis I

Short Ferrules

Ferrule Dimensions

Head Length: 0.188 in (3⁄16 in.)
Head Diameter: 0.375 in. (3⁄8 in.)
Body Length: 0.438 in. (7⁄16 in.)
Body Diameter: 0.336 $\pm$ 0.001 in.

Groove Width: 0.094 in.
Groove Diameter: 0.315 in.

Because of their relatively short lengths, I decided to epoxy all Chrysalis I ferrules into the soundboard/support ring holes. However, I also wanted a mechanical restraint to prevent the ferrule from being pulled out of their holes. So with an Iscar cutoff blade, I cut a 0.094 in. wide groove into some experimental ferrules. After I epoxied several ferrules into plywood holes and then hammered them out, I found small amounts of wood around the lower sharp edges of the grooves indicating that they act like barb-like obstacles against being pulled out.

(1) Machine a work stop from a M12 × 1.75 × 80 mm socket head set screw with a brass tip so that all the ferrules extend the same distance from the collet chuck.

(2) Lock the lathe saddle, and with a live center, cut the groove.

(3) Do not deburr or polish the newly cut sharp edges of the grooves.