

1. Cut a piece of 5/8" diameter cold rolled round stock to 6" on the band saw. Be sure the coolant is running. Chuck the piece in the headstock with 3/4" sticking out. Using the HSS cutting tool and the universal tool holder face one end of the work and then flip and face the other end. Center drill this end with a #3 to #5 center drill. Loosen the 3 jaw chuck and extend the piece out so that 3/4" is inside the jaws and the rest is hanging out. Insert the live center in the tailstock and tighten on the right side of the work. Using the hermaphrodite calipers, mark out a line over 4 1/2" inches from the right side. This is our stop point for turning the major diameter.  
**Check point #1** \_\_\_\_\_
2. Using the HSS tool and the universal tool holder set the machine to turn. You want the long feed set to move toward the headstock and the gearbox set as close to .005" per revolution as possible. You are starting at 5/8" diameter. **What is that in decimal?**  
\_\_\_\_\_ You need to turn the major diameter to .500" taking no more than .020" off in one pass. **How many passes will this take?**  
**Check point #2** \_\_\_\_\_ Turn down the diameter, taking measurements with the micrometer along the way to ensure that you don't cut too much. The last few passes should be .005" to .010" each. When you are within +/- .005" file any rough spots smooth. Die the entire section with Dyken and spin until dry. Use the hermaphrodite calipers to mark off the sections according to the plan. Set the machine in a low rpm or back gears if possible and set up the knurling tool on the universal tool holder.  
**Check point #3** \_\_\_\_\_
3. Start the knurl on section B to check for proper alignment. Once alignment is obtained, continue the knurl across section C, stopping at the 4" mark. Check the knurl, if it needs to go deeper, set the machine to reverse and run back to the start of the knurl. Repeat until satisfied. Remove knurler and clean out the wheels. Take the machine out of back gears and set up the HSS tool to turn.  
**Check point #4** \_\_\_\_\_
4. Starting between section A and B at the 1/2" mark, turn down section B to a diameter of .311". Stop the tool about .010" before the 1 1/2" line on every pass and when you have reached the desired diameter, cut in the extra .010" to square up the shoulder. Be sure to use your micrometer to check yourself every 1 to 2 passes. This diameter must be within +/- .002". File any rough edges smooth.  
**Check point #5** \_\_\_\_\_
5. Set the compound rest to cut a 10 degree chamfer on the end of section E. This may be 10 degrees or 80 degrees depending on the lathe you are using. Once the compound rest is set, re-square the tool post to the work. Set the cross feed up so that the tool touches off in the middle of section E. Cut in using the compound rest until you come to the 4 1/2" mark then back the compound rest out, move the cross feed in to touch again and feed the compound rest in again until you reach the 4 5/16" line and the section is tapered.  
**Check point #6** \_\_\_\_\_
6. Finally, part off at the end of section E. Use back gears and cutting oil. Just before the piece cuts through, relieve pressure on the live center slightly so that the piece will fall. Set the work up in a vice with soft jaws and using a hacksaw, saw off section A. File both ends smooth and square so that they stand on the ways of the lathe without falling. See instructor about finishing and heat treating.

Major dia. \_\_\_\_\_ +/- \_\_\_\_\_ Minor dia. \_\_\_\_\_ +/- \_\_\_\_\_ Lengths \_\_\_\_\_ +/- \_\_\_\_\_

FINAL GRADE \_\_\_\_\_ +/- \_\_\_\_\_