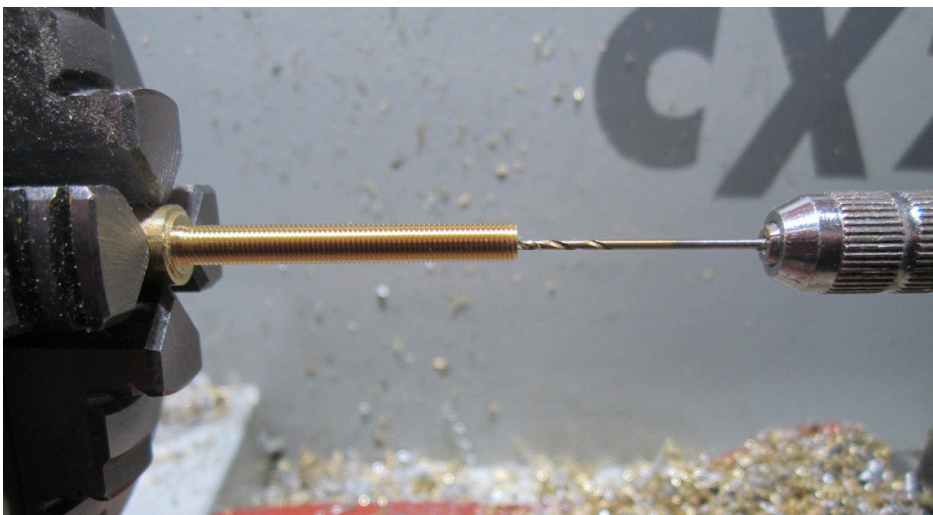


Many of the engines I'm using for control line flying originally had R/C throttle carbs. I've removed the unnecessary carb parts, locked the barrel, and sealed the air bleed hole. Most have the same style of needle valve assembly shown here.



Replacement needle valve assemblies have not been available for years. By making the nozzle I could then use salvaged parts from broken units. The original components have metric threads so an M4 x 0.5 adjustable die and matching tap are required along with a #60 (or 1mm) twist drill and a number drill size that matches the OS needle OD. And of course, a lathe.

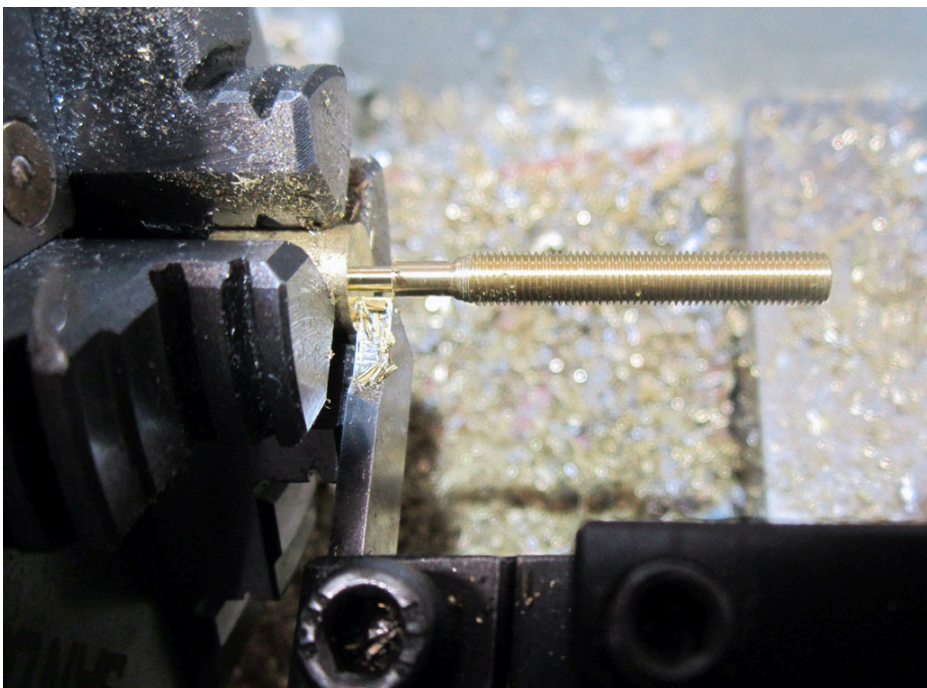
Use 4 mm OD brass alloy 360. I didn't have 4mm on hand so I reduced larger stock to dimension. When free machining the nozzle OD it took many very light cuts to ensure accuracy. Next was to thread the nozzle with the M4 x 0.5 die. An adjustable die can be opened slightly to ease the first cut on the stock. Make a pass or two with the die but don't cut the threads full depth just yet.



Using an original OS nozzle, I determined the valve seat is located at the inner most side (carb body side) of the fuel inlet collar. Next is to bore the new nozzle to that dimension with a number drill size slightly smaller than the OS needle OD. In my case the OS needle OD is .063 (#52). Use a centre drill to start and then continue with a #55.

Now switch to the #60 (or 1mm) twist drill and continue drilling the remaining length of the nozzle. The point left from the #55 drill will centre the #60. This change in diameter forms the valve seat. Drill slowly and back the drill out often to clear away the chips.
(Note: in the photo the #60 drill is misaligned because the chuck's not yet tightened.)

Time to fit the salvaged needle wire/body. The needle wire probably won't smoothly slide into the nozzle. It's desirable that the needle wire be a close fit into the nozzle. That's why the hole was drilled undersize with a #55. Use a piece of music wire that matches the needle wire OD and make a reamer. There's how-to info on internet so I won't go into details. Ream the nozzle to the face of the needle valve seat. Now thread the salvaged needle body onto the nozzle. Since the nozzle threads were not fully cut it may be tight. If it doesn't thread on smoothly make another pass over the nozzle with the die. Keep checking the fit. A snug fit prevents air from leaking past the needle wire/body.



The nose end of the nozzle is shaped to match the original dimensions and then parted off from the brass stock.



A fuel inlet collar is machined to the original part dimensions and tapped for M4 x 0.5 thread.

The collar is positioned on the nozzle to match the original and the position marked.



Wrap the collar position with a piece of masking tape. Use a grease pencil and work the material into the threads on both sides of the taped up section. This forms a barrier to prevent the solder from flowing outward. Remove the tape, apply flux, and tin the exposed nozzle area. 60/40 solder works fine. Wipe away any excess solder while it's still hot. Clean off the wax and flux residue.

Open up the die and run it over the tinned section. Trial fit the fuel inlet collar and adjust the die until the collar is a snug fit on the tinned section. Thoroughly clean the threaded areas of both parts and assemble. I used a small gas torch to heat the collar and when hot enough, the solder on the tinned area flowed into the collar threads.



Last step is drilling into the collar and nozzle to fit a fuel inlet barb. I made a new fuel barb from 1/8" brass stock.



The finished nozzle.

An option for making the nozzle is to machine the nozzle stem and collar as a single part like the OS item. Next time...