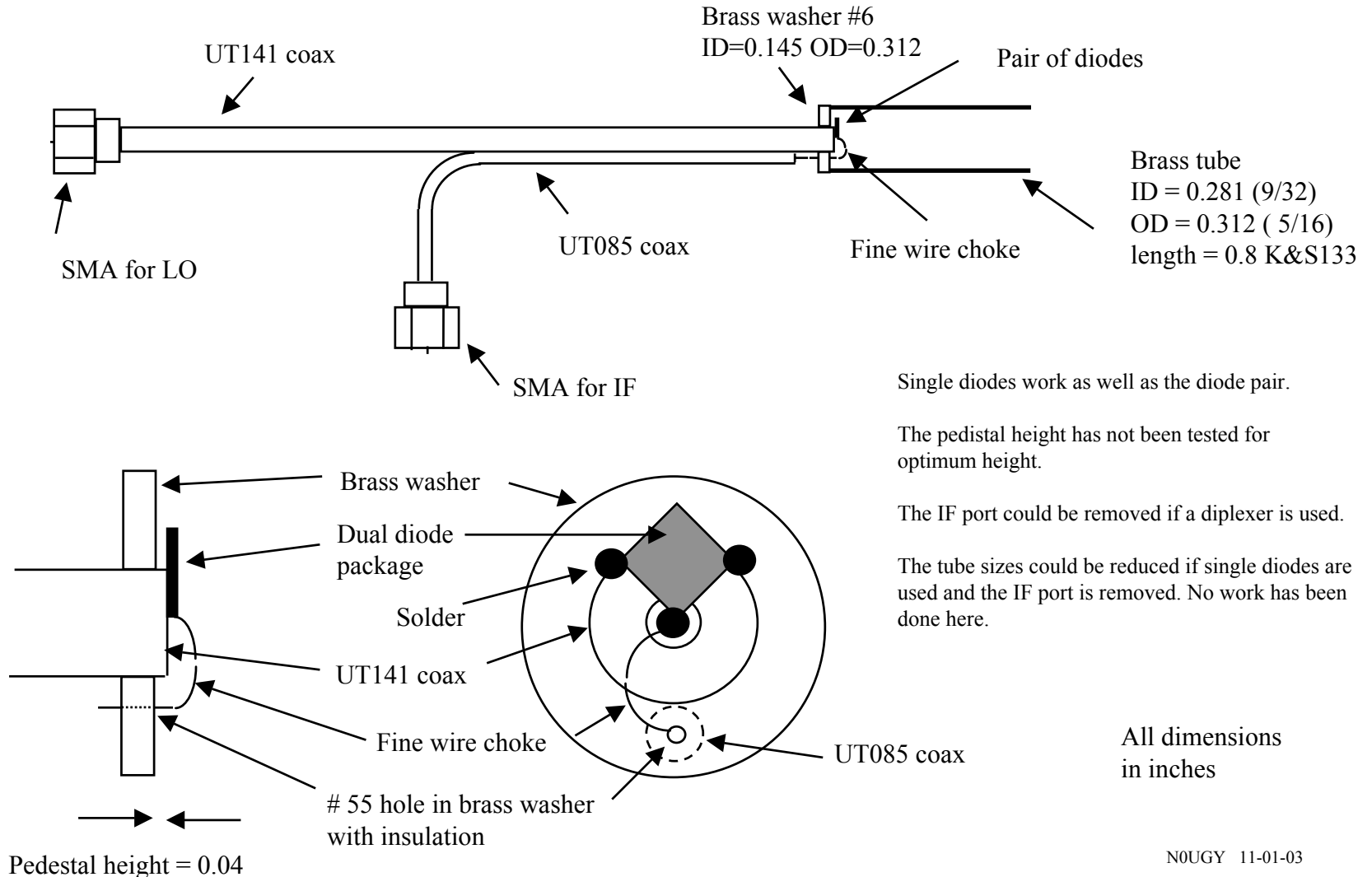


47 GHz Waveguide Harmonic Mixer

These slides present an evolution of harmonic mixer construction ideas. The first slides depict the first harmonic mixer construction details and the later slides depict the most current construction ideas. The later harmonic mixers are considered easier to build and possibly with better performance.

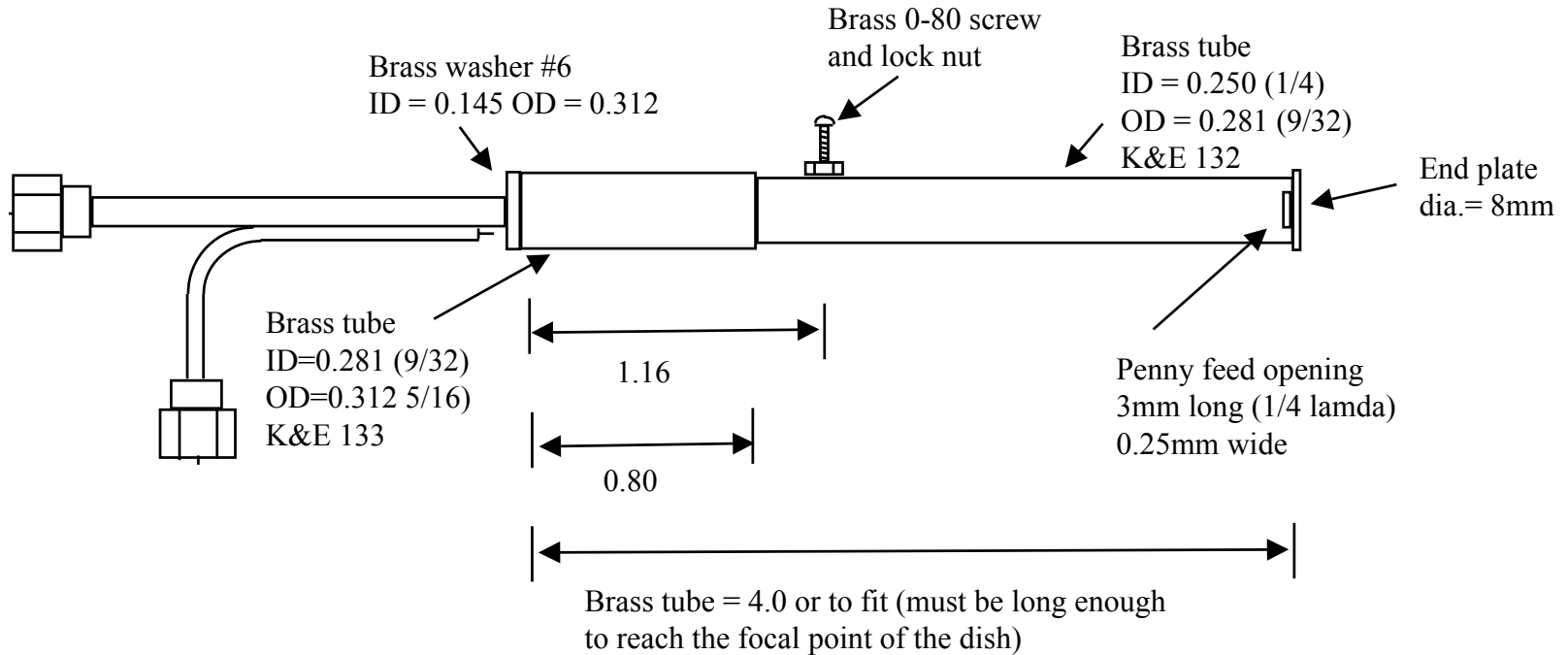
47 GHz Waveguide Harmonic Mixer

(detail construction of mixer in waveguide)



47 GHz Waveguide Harmonic Mixer

(detail construction of waveguide and penny feed)



The placement of the brass screw is important. This placement is good and there may be other positions that are as good or better. This placement is the best of the ones I tried. The screw can be tuned for best gain. About a mm depth is good.

Other tube sizes and telescoping tubes with the tube size at the penny feed at an ID=0.188 inches have not worked as well as this single tube.

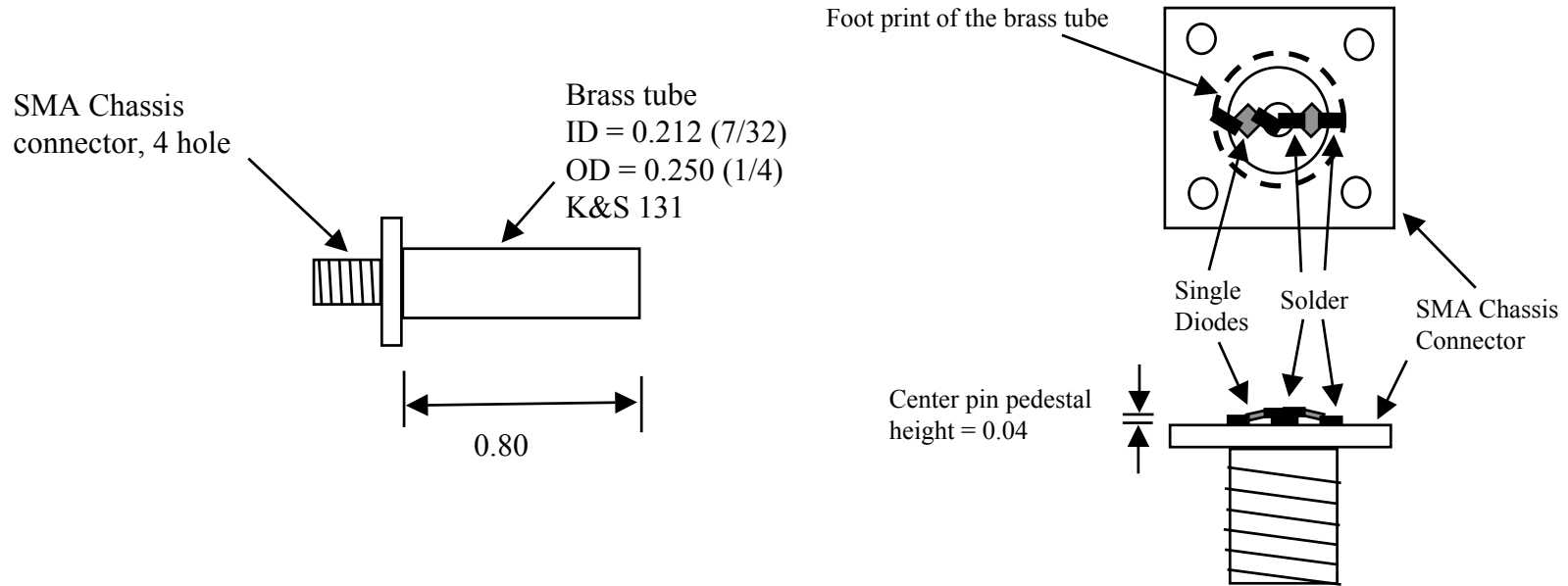
The long tube with the penny feed is to fit all the way to the brass washer.

The dimensions of the penny feed has been fashioned to a very deep 8 inch dish with an $f/D = 0.22$.

All dimensions
in inches

47 GHz Waveguide Harmonic Mixer , #2

(detail construction of the mixer)



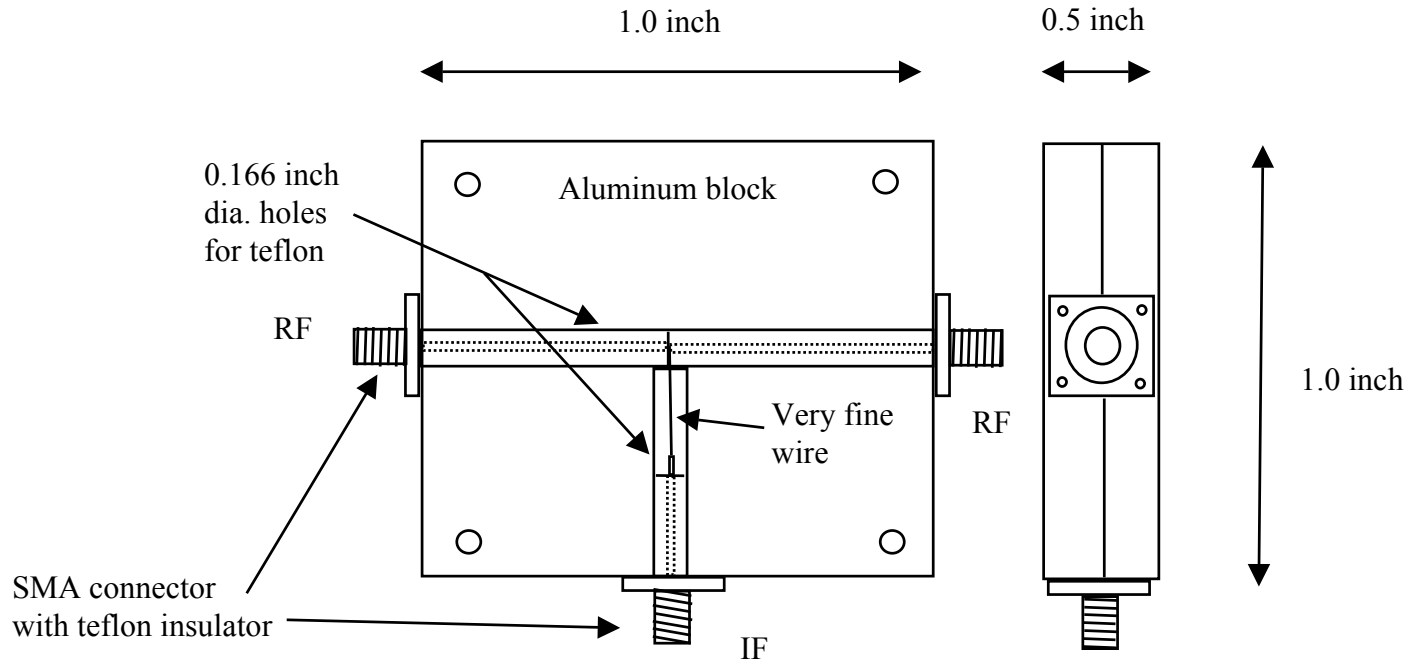
The SMA chassis mount connector is the mechanical piece on which all other pieces are attached. The diodes are soldered to the flat plate before the brass tube is attached.

The pedestal height is arbitrary and may not be optimal. Best height is tbd.

All dimensions
in inches

24 GHz Diplexer

(detail of construction)



The aluminum block is in two 0.25 inch halves bolted together to make the 0.50 inch block.

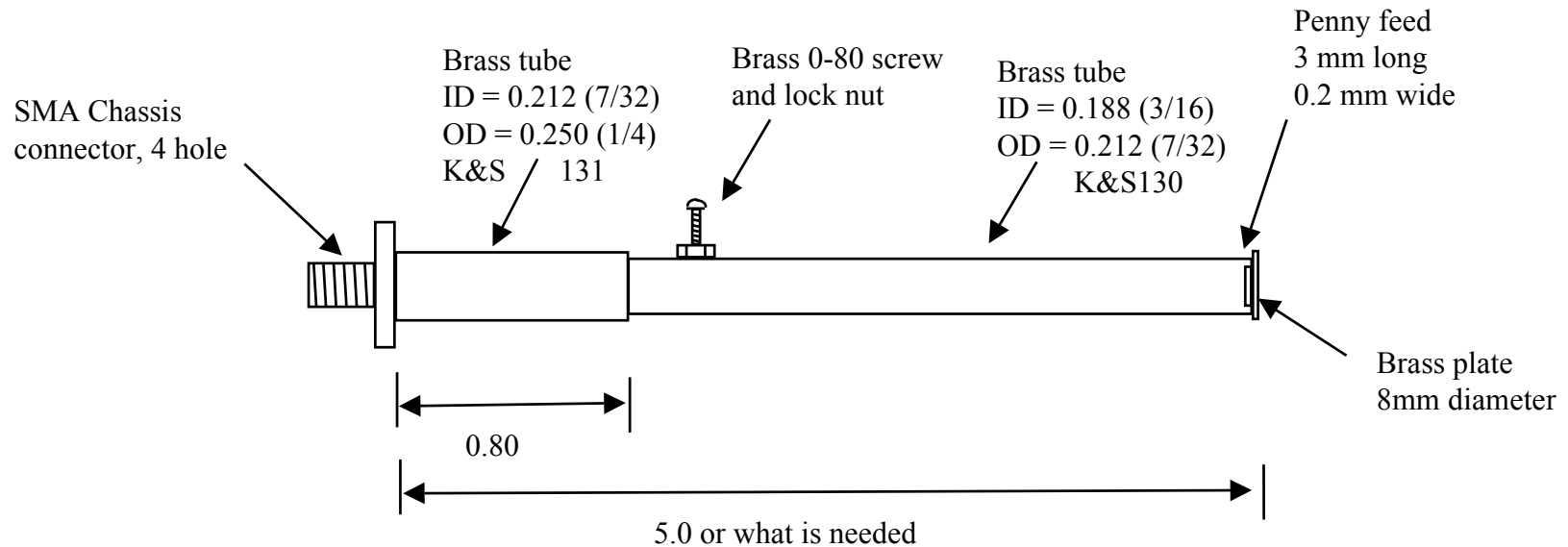
The teflon completely covers the entire center wire on the RF port connectors and is only partially covering the center wire on the IF port connector. The RF center wires are soldered together via a small gap cut in the teflon. There is a piece of teflon that is put in place over the center wire at the junction after the pieces have been soldered together.

The length of the fine wire is probably important and may affect the RF VSWR and maybe the IF signal level. No work has been done here to optimize this part of the circuit.

All dimensions
in inches

47 GHz Waveguide Harmonic Mixer , #2

(detail construction of the tube with the penny feed)



The length of the long tube is determined by the distance from the dish feed point to a suitable place behind the dish to locate the harmonic mixer. The long tube extends all the way inside the tube attached to the harmonic mixer.

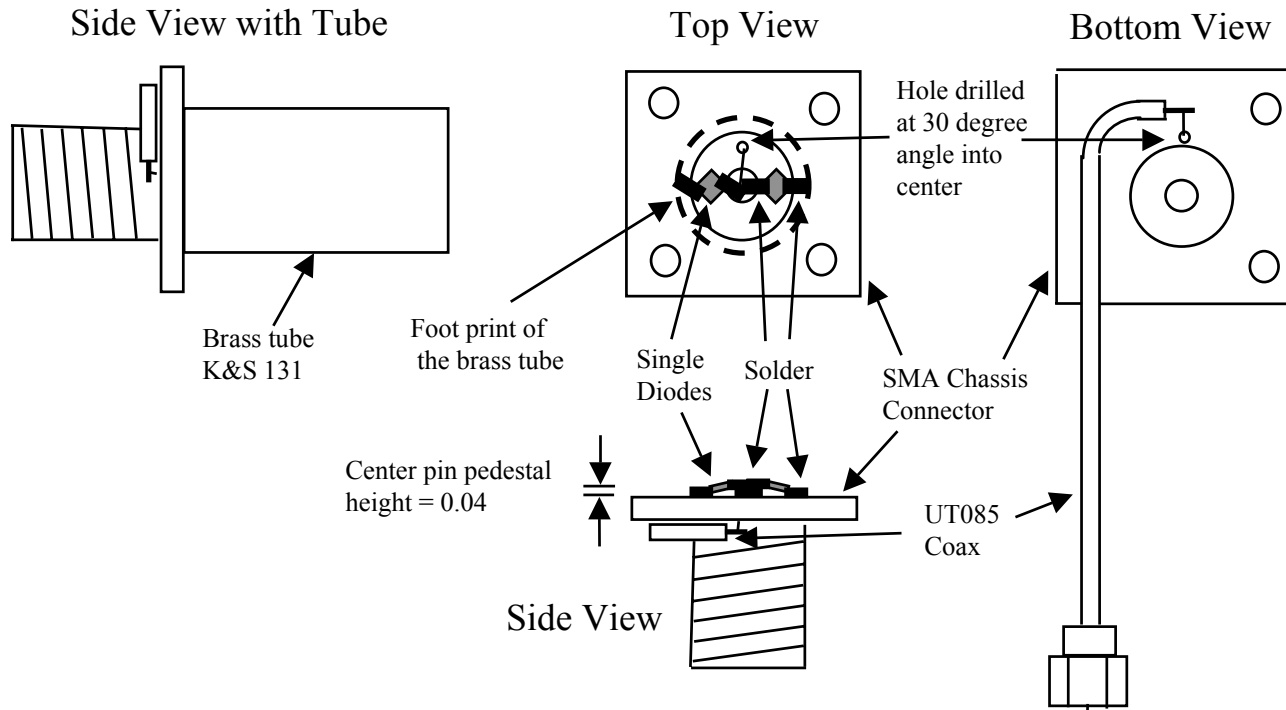
The placement of the 0-80 screw does not seem to be critical. The screw should be placed perpendicular to the axis of the penny feed.

The 47 GHz energy will not multimode in 0.188 inch circular waveguide.

All dimensions
in inches

47 GHz Waveguide Harmonic Mixer , #3

(detail construction of the mixer with IF port)



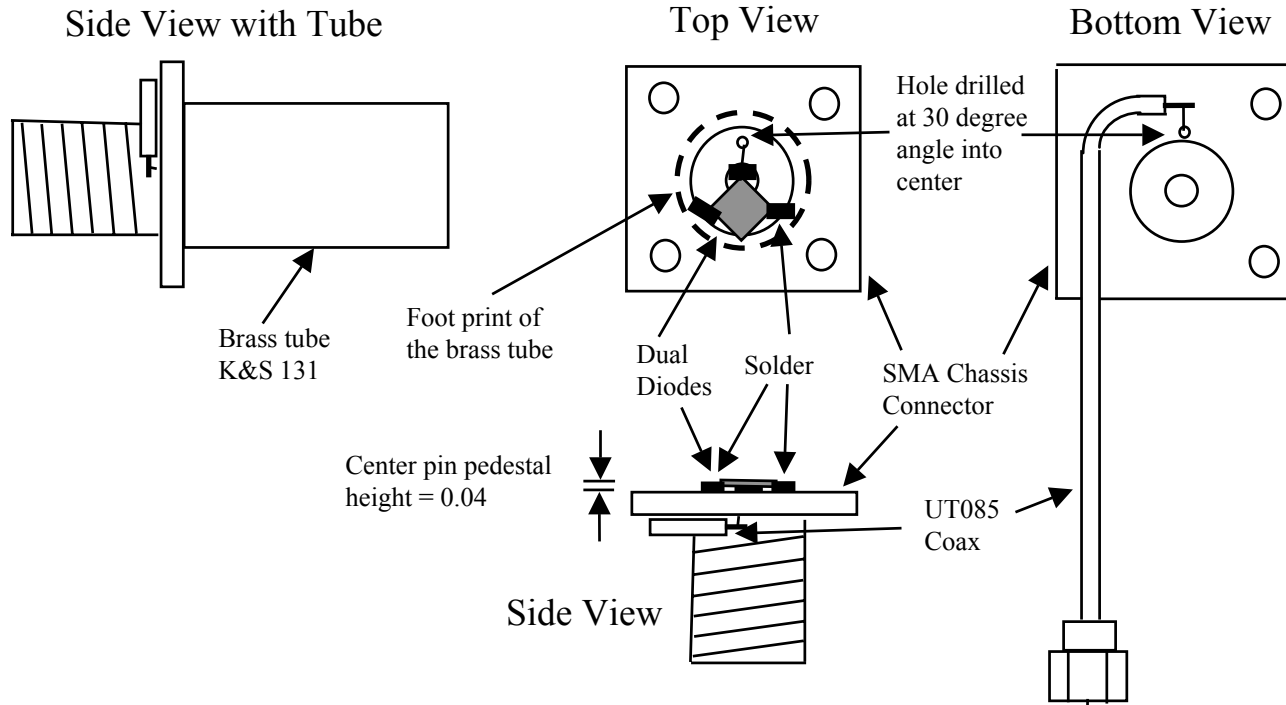
The SMA chassis mount connector is the mechanical piece on which all other pieces are attached. The hole for the IF signal is drilled on a 40 degree angle from the top sidedown and toward the center pin so that the hole is well inside the perimeter of the brass tube when it is attached.

The UT085 is then attached to the connector body with solder. The diodes are soldered to the center pin and ground . The fine wire for the IF signal is attached passing through the hole lined with insulation. The brass tube is then attached.

All dimensions
in inches

47 GHz Waveguide Harmonic Mixer , #3

(detail construction with dual diode and with IF port)



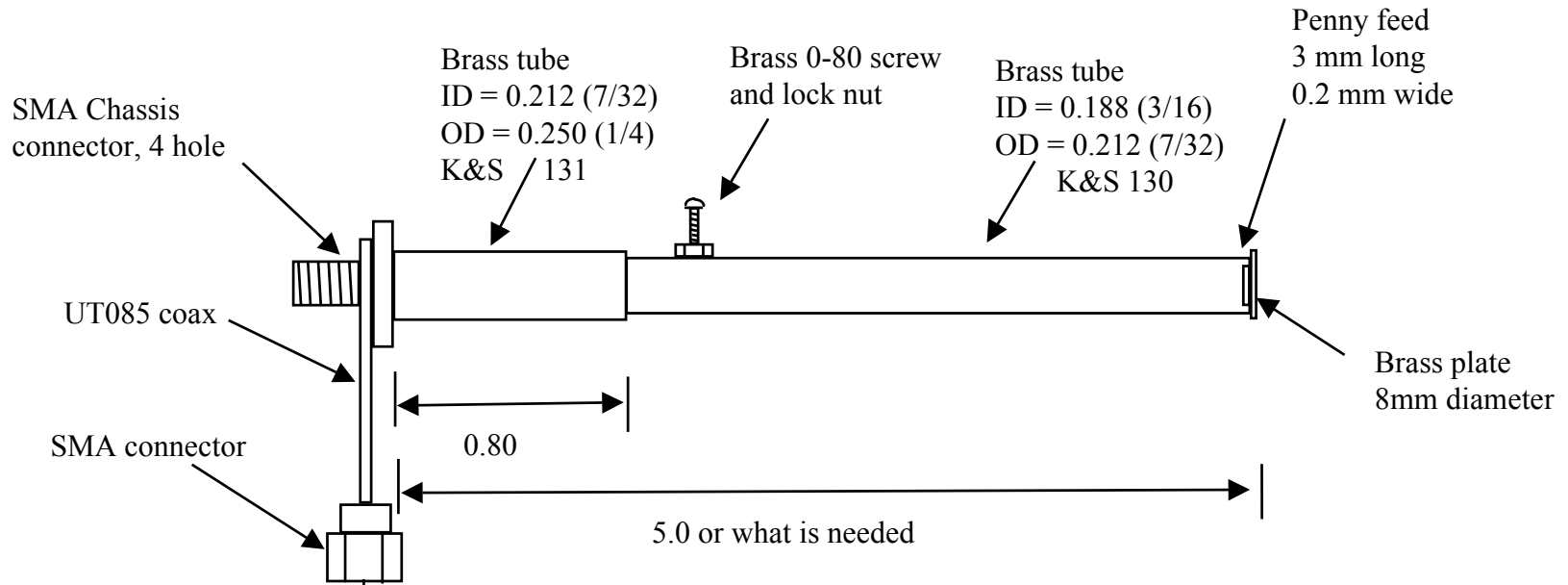
The SMA chassis mount connector is the mechanical piece on which all other pieces are attached. The hole for the IF signal is drilled on a 30 degree angle from the top sidedown and toward the center pin so that the hole is well inside the perimeter of the brass tube when it is attached.

The UT085 is then attached to the connector body with solder. The diodes are soldered to the center pin and ground. The fine wire for the IF signal is attached passing through the hole lined with insulation. The brass tube is then attached.

All dimensions
in inches

47 GHz Waveguide Harmonic Mixer , #3

(detail construction of the tube with the penny feed)



The length of the long tube is determined by the distance from the dish feed point to a suitable place behind the dish to locate the harmonic mixer. The long tube extends all the way inside the tube attached to the harmonic mixer.

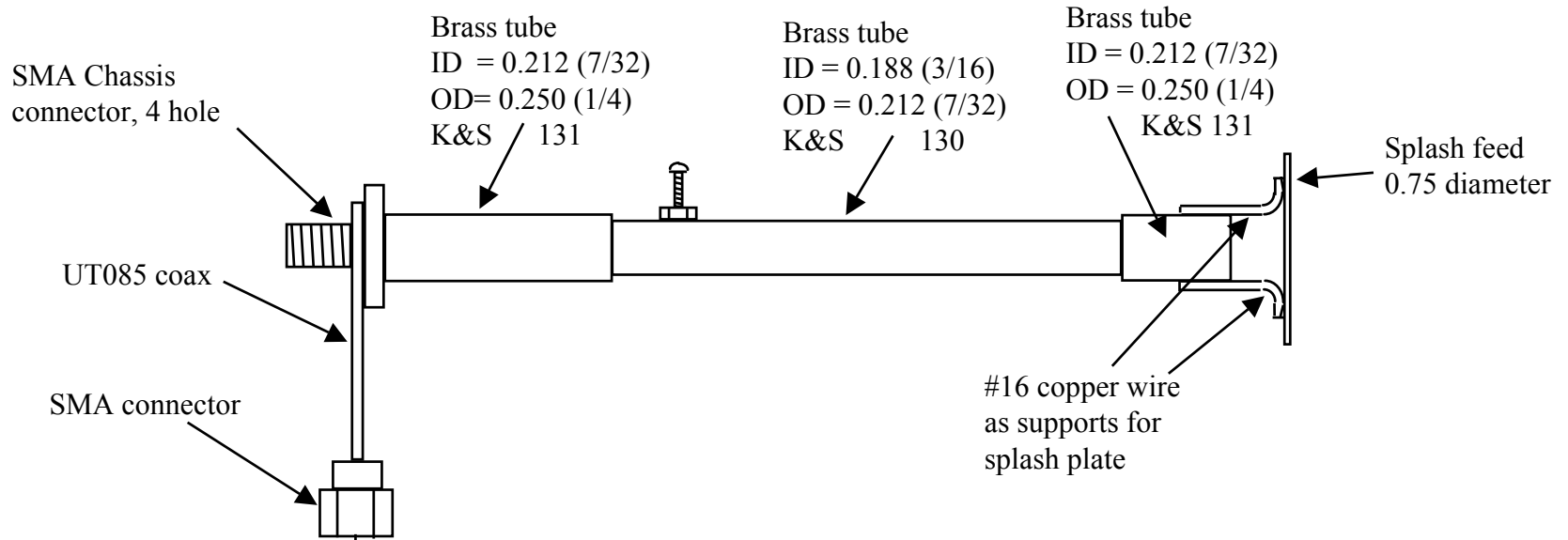
The placement of the 0-80 screw does not seem to be critical. The screw should be placed perpendicular to the axis of the penny feed.

The 47 GHz energy will not multimode in 0.188 inch ID circular waveguide.

All dimensions
in inches

47 GHz Waveguide Harmonic Mixer , #3

(detail construction of the tube with the splash feed)



The opening between the splash plate and brass tube is adjustable.

The splash plate is being studied by W6HCC.

All dimensions
in inches