

10 GHz SLOT ANTENNA

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THEORY

A slot exactly on the centerline of a waveguide doesn't radiate. This is how Slotted-Lines can probe a waveguide for measuring power and reflected waves. However, a slot off the centerline will radiate. The farther off the centerline, the more it will radiate. So this slot antenna has its own built-in power divider by controlling how far each slot is off the center.

A vertical slot leaks a horizontal wave. So a horizontally polarized antenna has vertical slots.

A slot antenna approximates a dipole antenna only if the slot is in an infinite sheet of metal. The side wings are not absolutely necessary for the function of the antenna. With larger wings the 1.5 dB of gain ripple would be reduced. If you use smaller or even no wings, you will just end up with a more lumpy pattern.

CONSTRUCTION

For an omnidirectional pattern you need slots in both faces of the antenna. The front and back slots line up. That means when you drill 1/16-inch holes in the waveguide to form the slots, just push the drill all the way through both sides.

The easiest way to solder on the side wings is with a large 200+ watt soldering iron, or by using a soldering tip on a propane torch.

The end of the WR-90 waveguide is sealed by soldering a 0.5 by 1.0 inch piece of metal over the open end.

USE

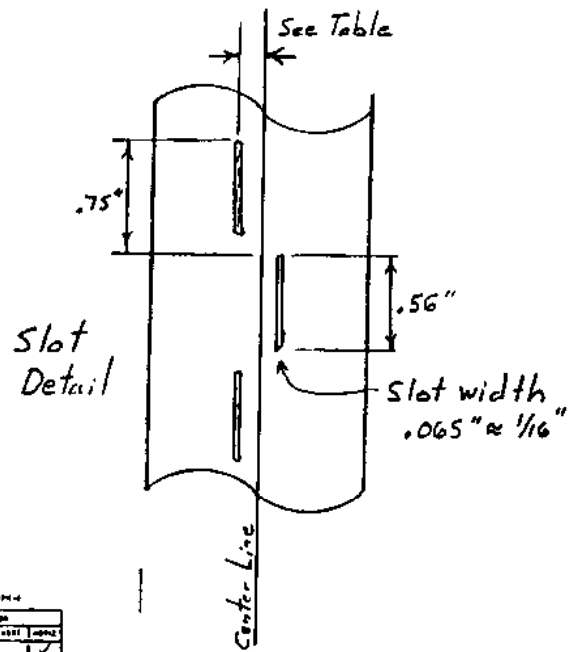
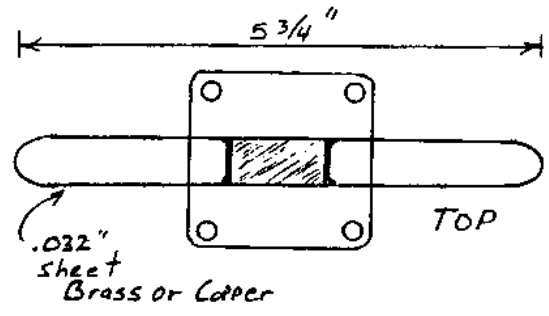
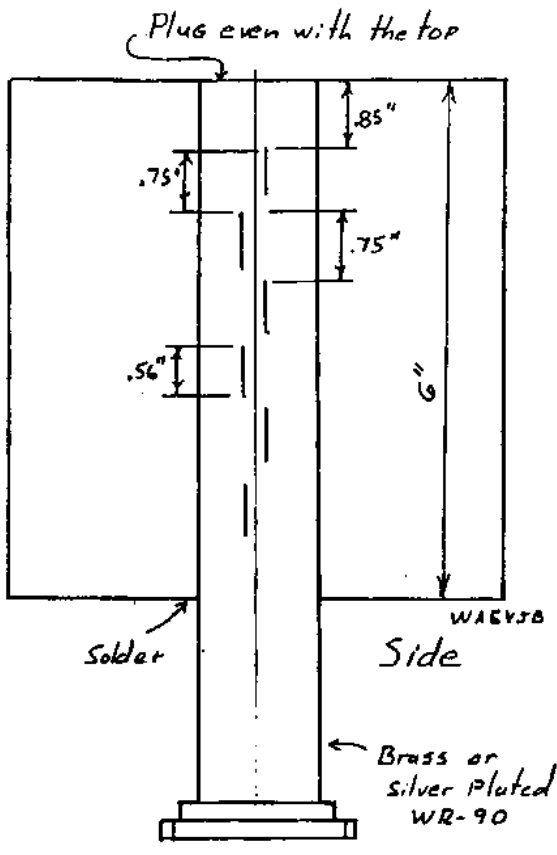
In beacon use the antenna was mounted upside down. This kept dead bugs and dirt out of the DRO Oscillator. In mobile use the antenna was fed with flexible waveguide. Again a vertical slot radiates a horizontal wave so the vertical waveguide is a horizontally polarized antenna.

The antenna can be recalculated for other bands, such as using WR-137 for a 5760-MHz antenna. Or the vertical distance between slots recalculated from the Waveguide Velocity Factor Formula and WR-112, WR-75, or even WR-62 used as a 10-GHz antenna.

The six slot antenna shown had an SWR of less than 2 to 1 over the entire 10-GHz ham band. This is a very broadbanded antenna.

Number of Slots per face	2	3	4	5	6*	8	10	12
Distance between center lines of the waveguide and the slots	.14"	.11"	.095"	.085"	.075"	.065"	.06"	.055"

* Shown in sketch



POLAR RECORDING GRAPH - R

POLARIZATION				
TYPE	ANGLE	REF	UNIT	SCALE
				✓

ANGLE

RECORDING FREQUENCY

ELEVATION (OR TILT) ANGLE

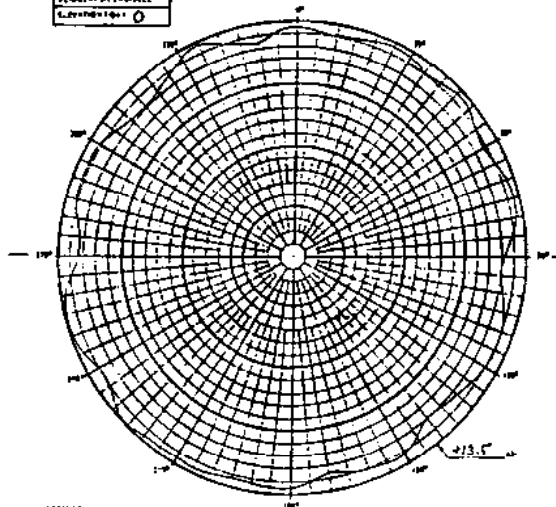
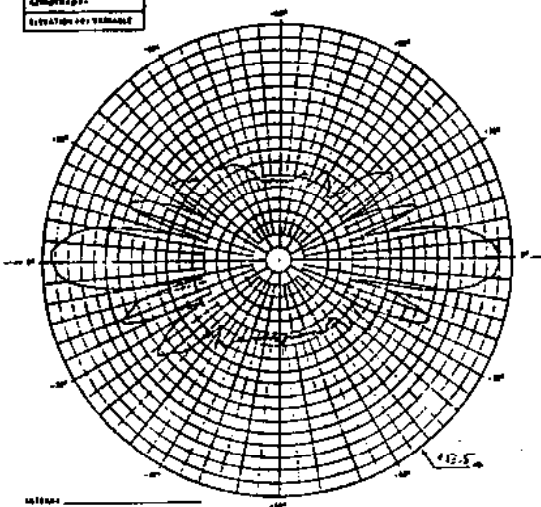
POLAR RECORDING GRAPH - R

POLARIZATION				
TYPE	ANGLE	REF	UNIT	SCALE
				✓

ANGLE

RECORDING FREQUENCY

ELEVATION (OR TILT) ANGLE



DATE: 9-21-47

RECORDING FREQUENCY: 10.25 GHz

DATE: 9-22-47

RECORDING FREQUENCY: 10.25 GHz