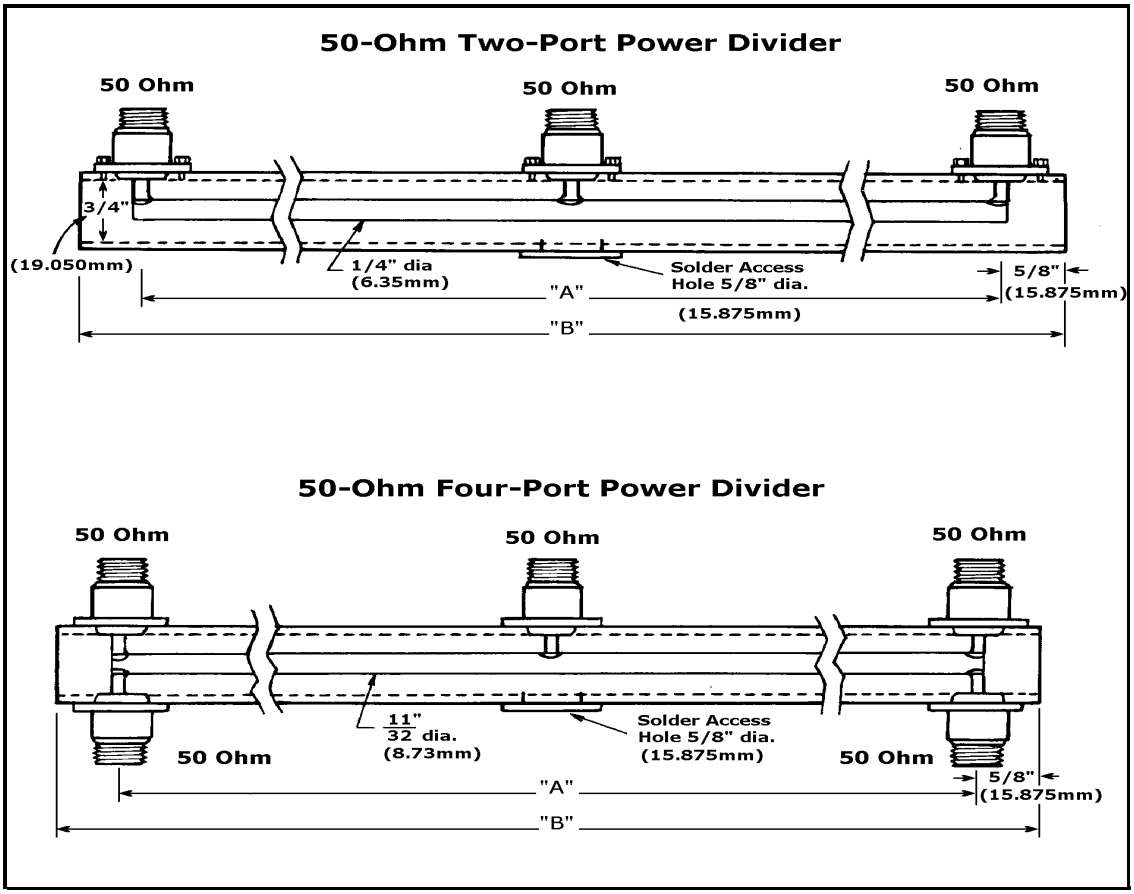
Power Dividers

50 Ohm – Power Dividers QST October 1973 pg 97



Mhz	Dimension A	Dimension B	Dimension A	Dimension B
144	41.00"	42.25"	1041.4mm	1073.2mm
220	26.84"	28.09"	681.7mm	713.5mm
432	13.67"	14.92"	347.2mm	378.9mm
903	6.54	7.79"	166.1mm	197.8mm
1296	4.55"	5.81"	115.7mm	147.59mm
2304	2.56"	3.81"	65.1mm	96.8mm

50 - Ohm Power Dividers

Described here and in the accompanying drawings are two- and four-port power dividers for 144-, 220-, and 432-Mhz bands designed by Don Hilliard, W0EYE. Don stresses that the design information should be exactly followed to prevent performance degrading. The two-port model uses a 1 inch square, 1/8 inch thick aluminum outer conductor and a 1/4 inch diameter round brass or copper tube for the inner conductor. The four-port model uses the same outer conductor as the two-port model, but the inner conductor uses a brass or copper round tube, 11/32 inch O.D. All connectors are UG56A/U mounted in 5/8 inch holes with No. 4-40 screws, 1/4 inch long. Mounting screw holes are drilled with a No. 43 drill, taped for the 4-40 thread. The ends and solder access holes should be covered with 1 x 1 x 1/32 inch aluminum plates held in place with RTV sealant after assembly is completed. ***(I used JB WELD as a sealant, W7CQ)***

The rf handling capacity of the power divider is limited by the type - N connectors, but nevertheless is in excess of the legal amateur limits, being two kilowatts or better at 432 MHz.

Bandwidth of the devices is more than sufficient to cover the entire band of the design with less than 1.24 : 1 VSWR ***from QST - October 1973 page***

Formulas:

If you want to build for a different frequency use this formula for a half wave:

Dimension "A" (in inches) = 492 / Frequency (in MHz) * 12

EXAMPLE for 2 meters: 492 / 144 * 12 = 41 inches

Add 1.25 inches to Dimension "A" to get dimension B

(Dimension "A" is critical in length but dimension B is not. It just needs to be long enough so the center of the coax connecter matches the end of the center connector) (extra length is not a problem, the 1.25 " is the correct length for a type "N" connectors.

(If you want metric Millimeters multiply these numbers by 25.4)

Impedance Matching 1/4 wave Transformer

$Z=\text{Square Root } Z_1 * Z_2$

Z = Impedance 1/4 wave Transformer

Z1 = Feedline Impedance

Z1 Example is 50ohm feed line to divider

Z2 = Antenna's combined Impedance

Z2 Example below for four 50 ohm antennas is 50 / 4 = 12.5 ohms

EXAMPLE Multiply **50 X 12.5 = 625** and then take the square root of **625** which is **25** and the units are **ohms**.

So you need a 25 ohm 1/4 wave transformer.

Impedance of Square Tubing with Round center tube

$Z=138\log(1.08 * D/d)$

Z = Impedance

D = Inside dimensions of Square tube

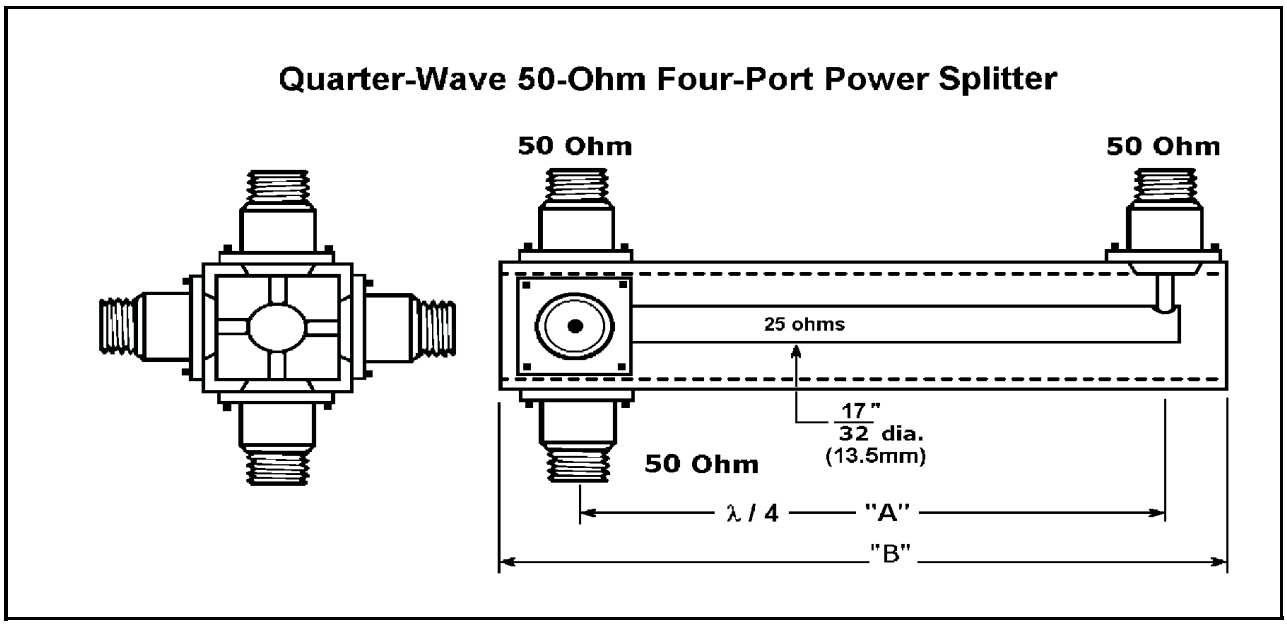
D =.75" (for 1" square aluminum tubing with 1/8" walls)

d = Outside Diameter of Round center tube

d = 17/32" or 0.53125" (round brass or copper center tube for 25 ohm transformer)

EXAMPLE Z = 138 log (1.08 * (0.75 **/ 0.53125)) = 25.2796 ohms to make the 1/4 wave Transformer**

Hint: let **GOOGLE SEARCH** help with the math. Cut and past the yellow from above into Google Search and you will get the math answer. The 0.53125 is the od size of the in17/32 tube in this equation. Then exchange the 0.53125 with the od diameter of your inside tube and find the coaxial impedance for a different size center tube. They do the math for you.



Quarter Wave Table

Mhz	Dimension A	Dimension B	Dimension A	Dimension B
144	20.50"	21.75"	520.7mm	552.5mm
220	13.42"	14.27"	340.8mm	362.5mm
432	6.835"	8.085"	173.6mm	205.4mm
903	3.27"	4.52"	83.0mm	114.8mm
1296	2.28"	3.53"	57.9mm	89.6mm

A two port 1/4 wave divider would take a 35.35 ohm transformer. Close would be 7/16" tubing for 36.9ohms

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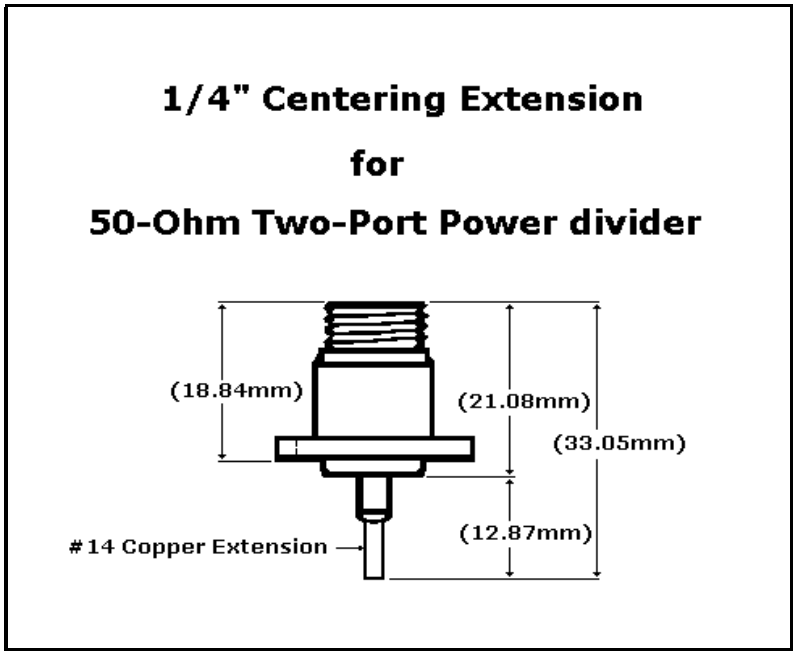

If you drill a hole through one side of the brass 1/4 center conductor, the above N connector with a #14 copper wire extension will drop thru the hole and center the tube inside the 1 inch square outer conductor. This makes soldering the center connector much easier. *W7CQ*

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