Cavities & Duplexers

w6nbc.com/slides

BOTH duplexers and diplexers are often both incorrectly called DUPLEXERS

But there is a distinction

IN HAM PRACTICE

2 RF devices same time one antenna

Diplexer – Same devices

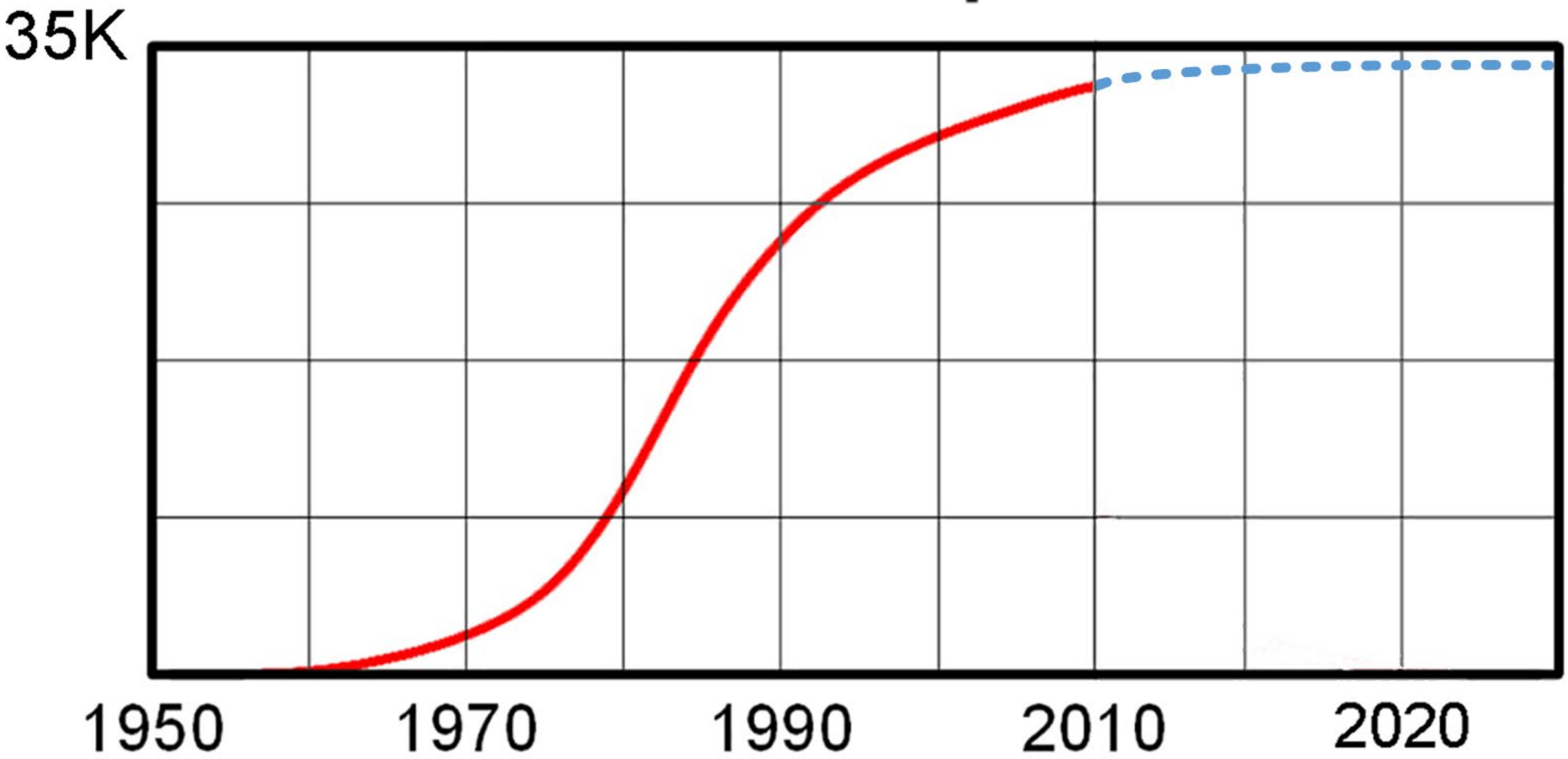
2 TX's or 2 RX's

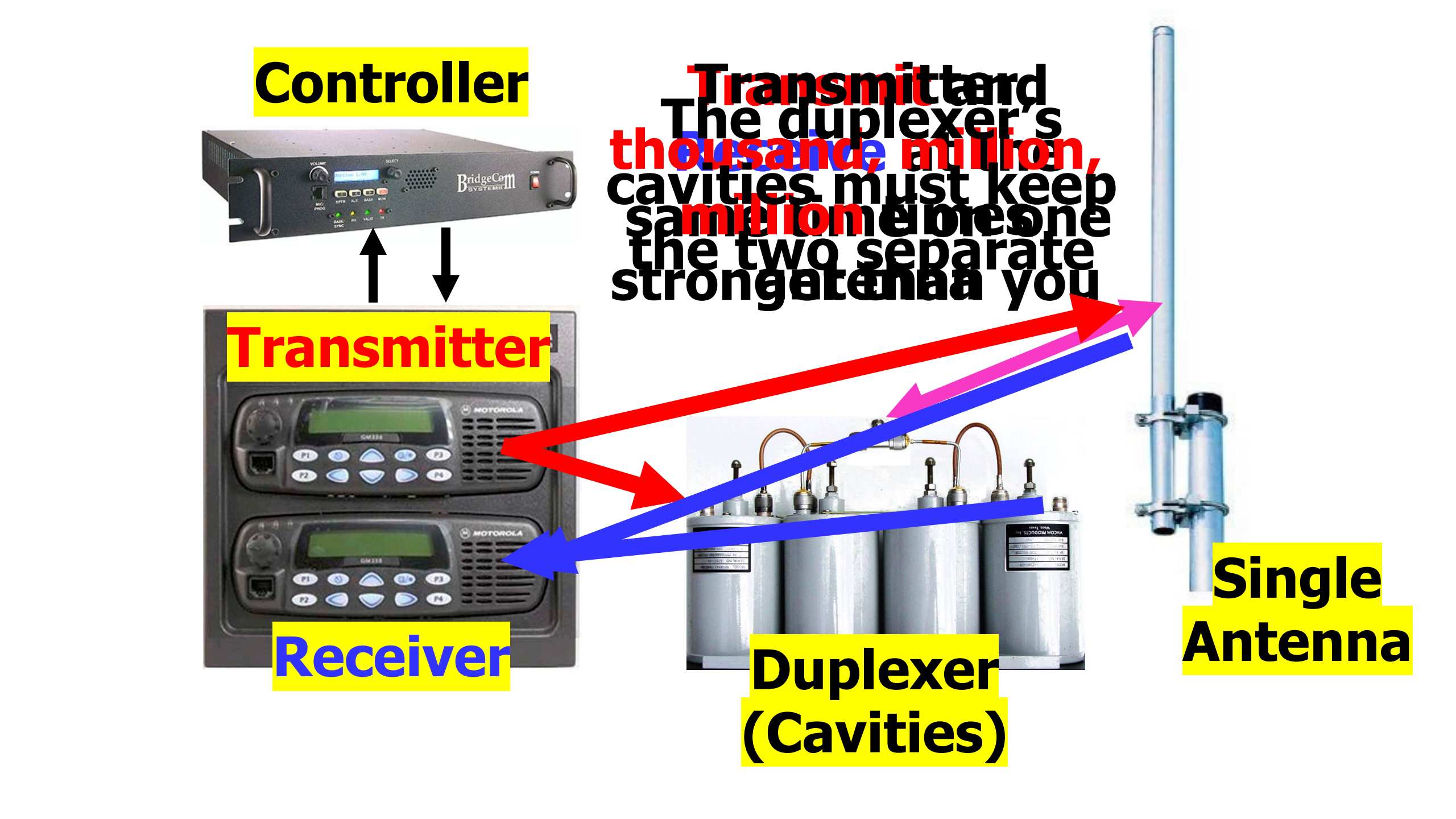
Duplexer – Different devices

1 TX & 1 RX

All Hams
Familiar With
FM Voice Repeaters

US FM Voice Repeaters




Controller
Transmitter
Receiver
Duplexer
(Cavities)
Single
Antenna

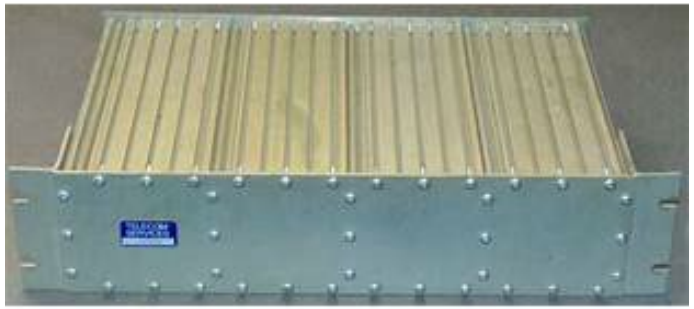
Watts	Volts	dBm
0.000000000000001	0.00000022	**-120**
0.000000000000010	0.00000071	-110
0.000000000000100	0.0000022	-100
0.000000000001	0.0000071	-90
0.000000000010	0.000022	-80
0.000000000100	0.000071	-70
0.000000001	0.00022	-60
0.000000010	0.00071	-50
0.000000100	0.0022	-40
0.000001	0.0071	-30
0.000010	0.022	-20
0.000100	0.071	-10
0.001	0.22	**0**
0.010	0.71	10
0.100	2.2	20
1	7.1	30
10	22	40
100	71	**50**

Your Signal in

dBm reference

Repeater's Signal out

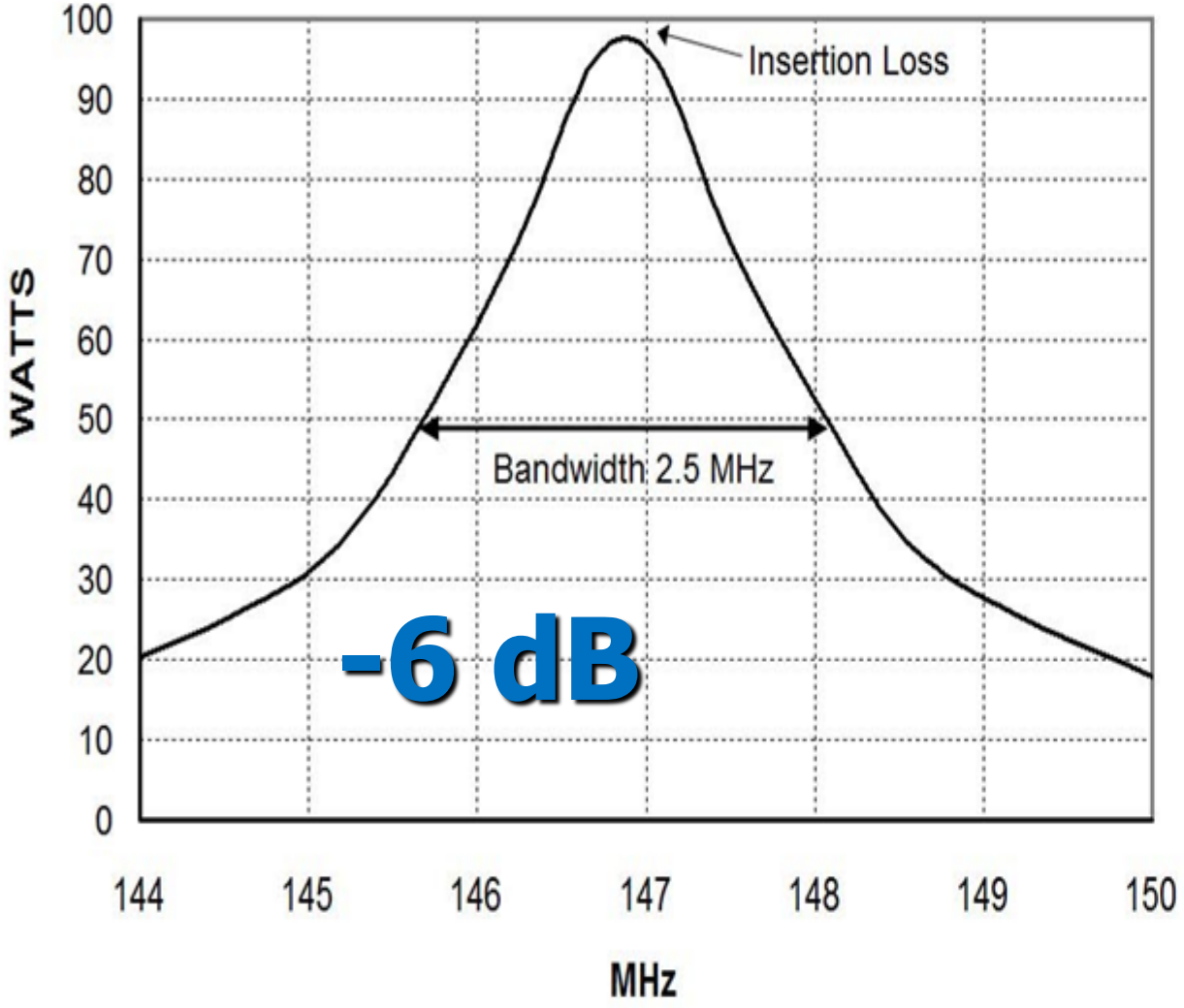
The Duplexer



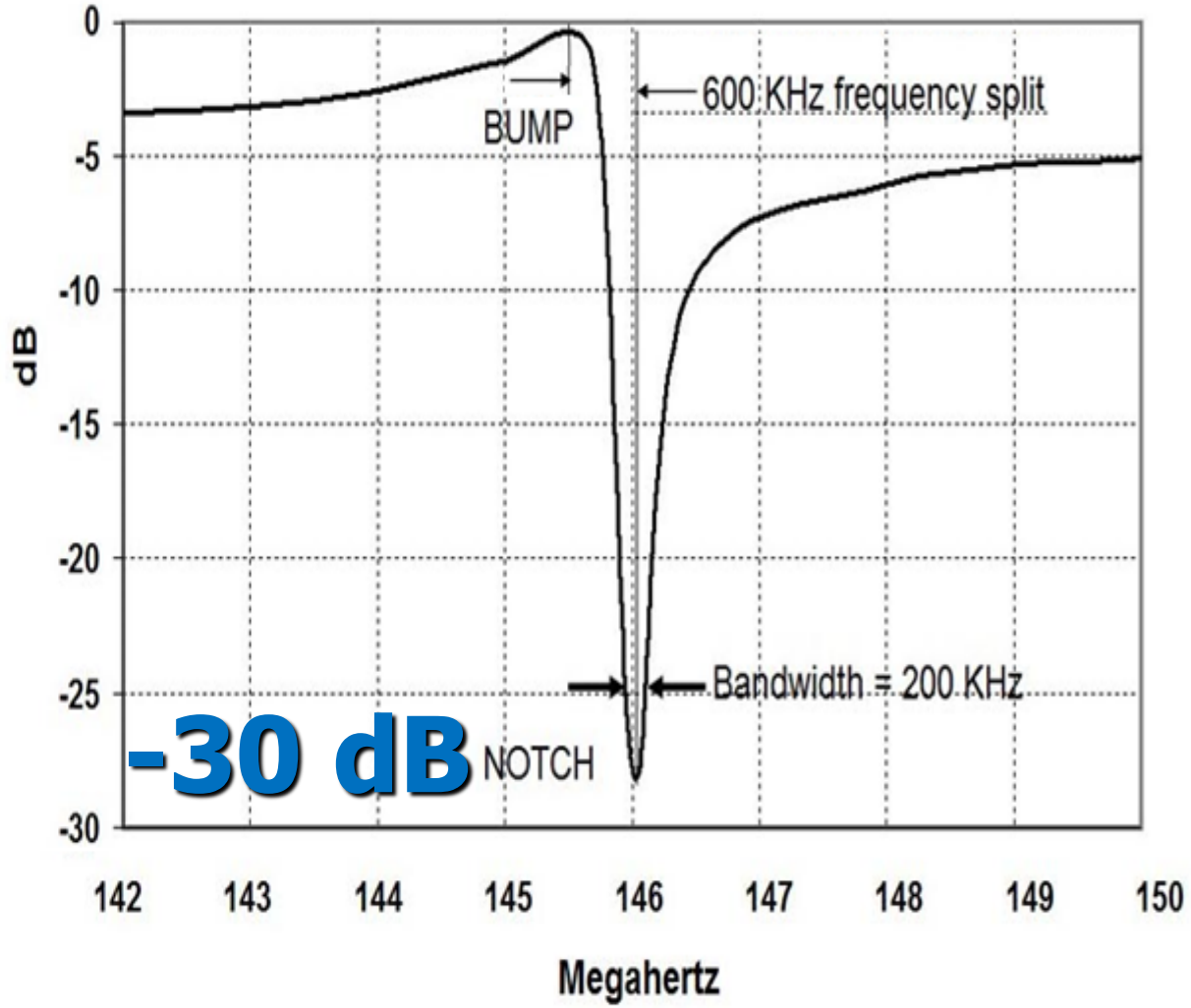
Filters

Eliminate Interference

Bandpass



Notch (suck-out)



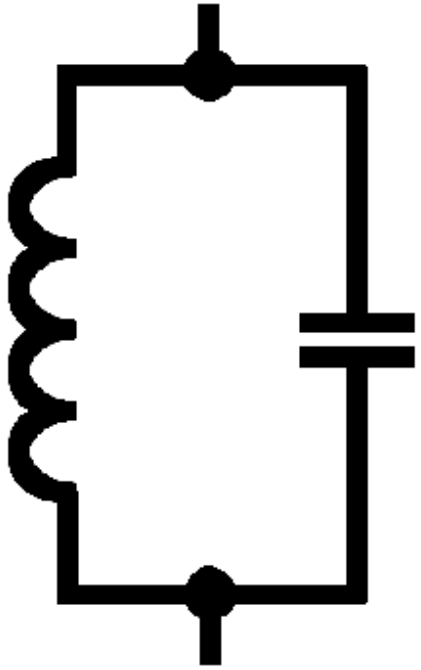
Active

Passive

Only Passive Filters can handle transmitter power

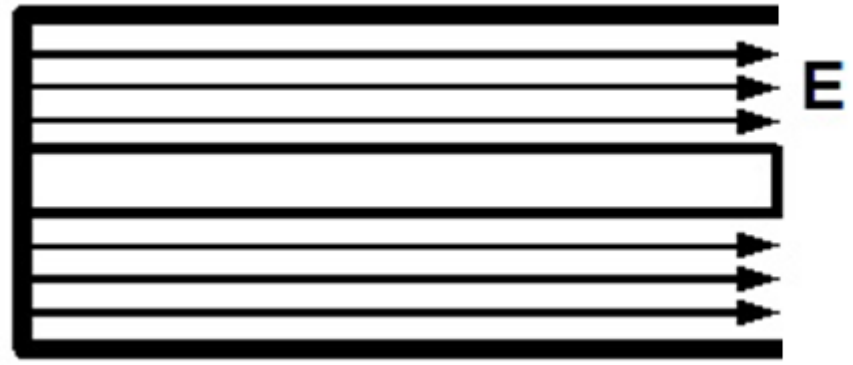
For Filtering
Small Signals we use
Coils and Capacitors

For Filtering Power we use Shorted 1/2 Wavelength Resonant Cavities (Bottles, Cans)



SMALL SIGNAL

Coils and Capacitors

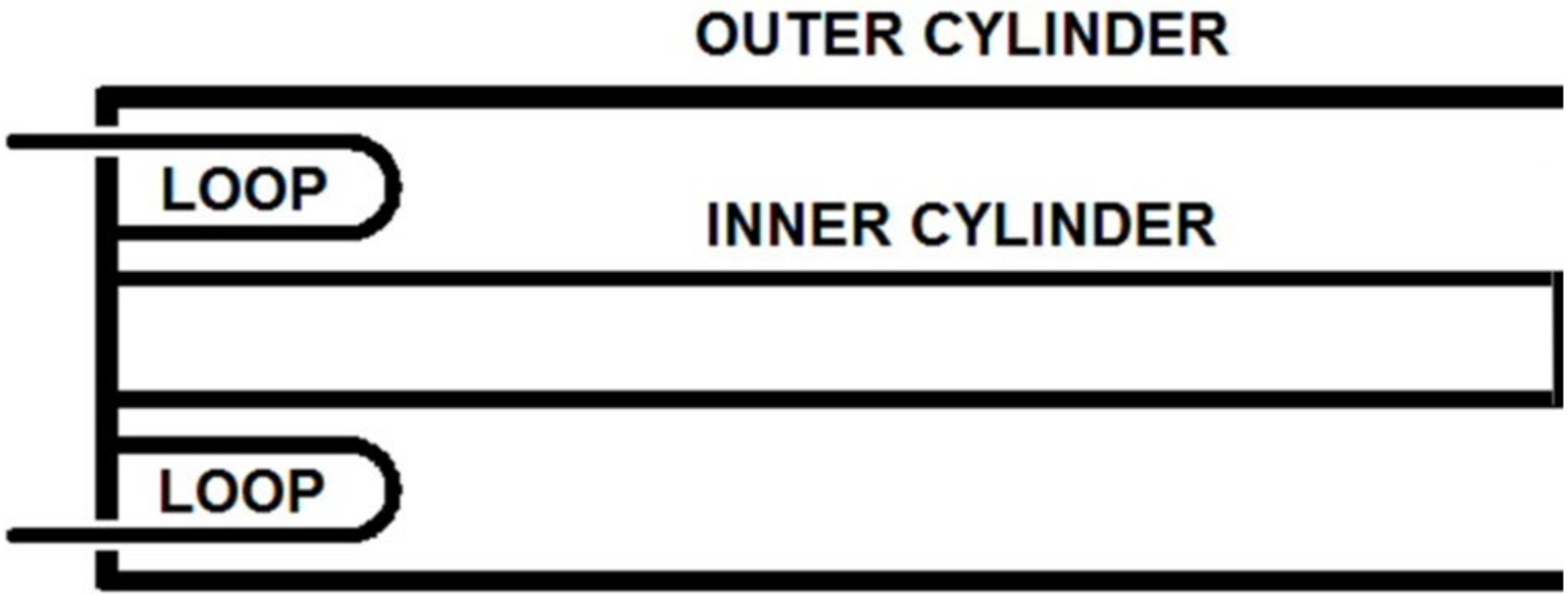


POWER

Shorted λ/4 Coaxial Line

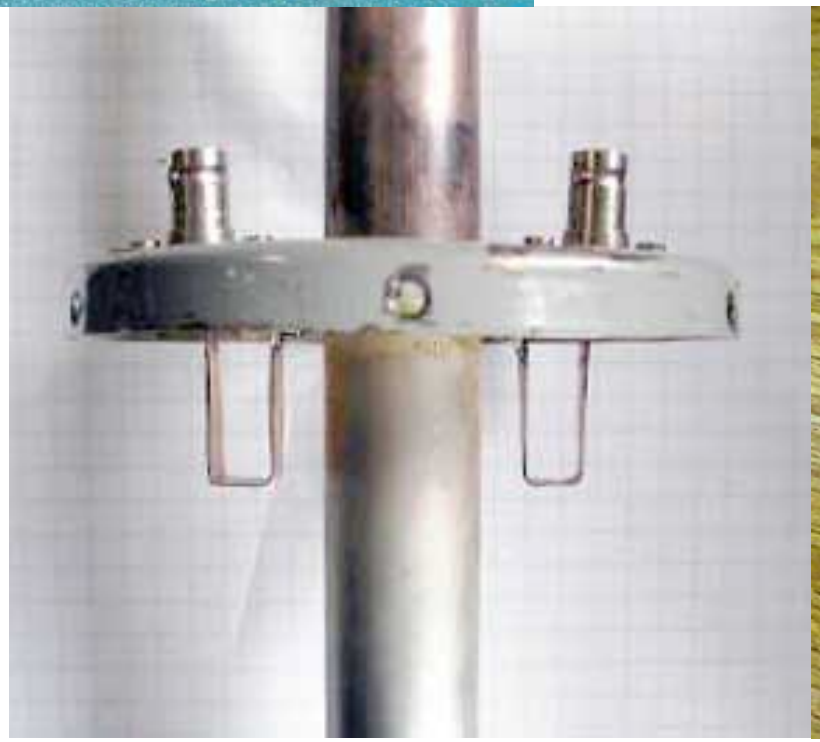
Making a Cavity Into a Filter

Series Through Cavity

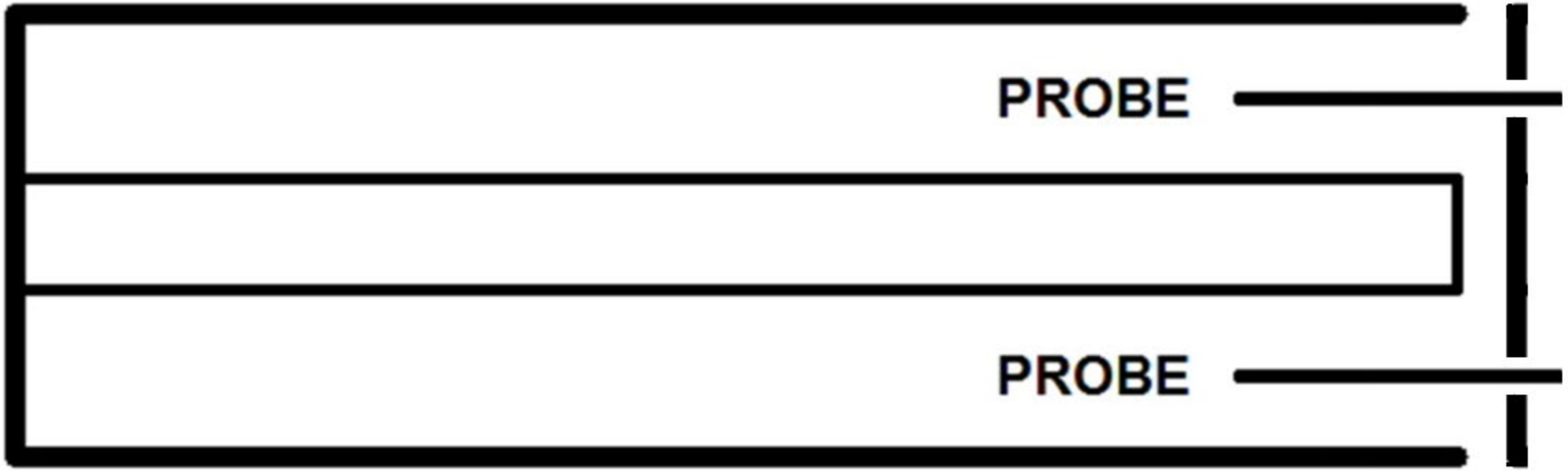


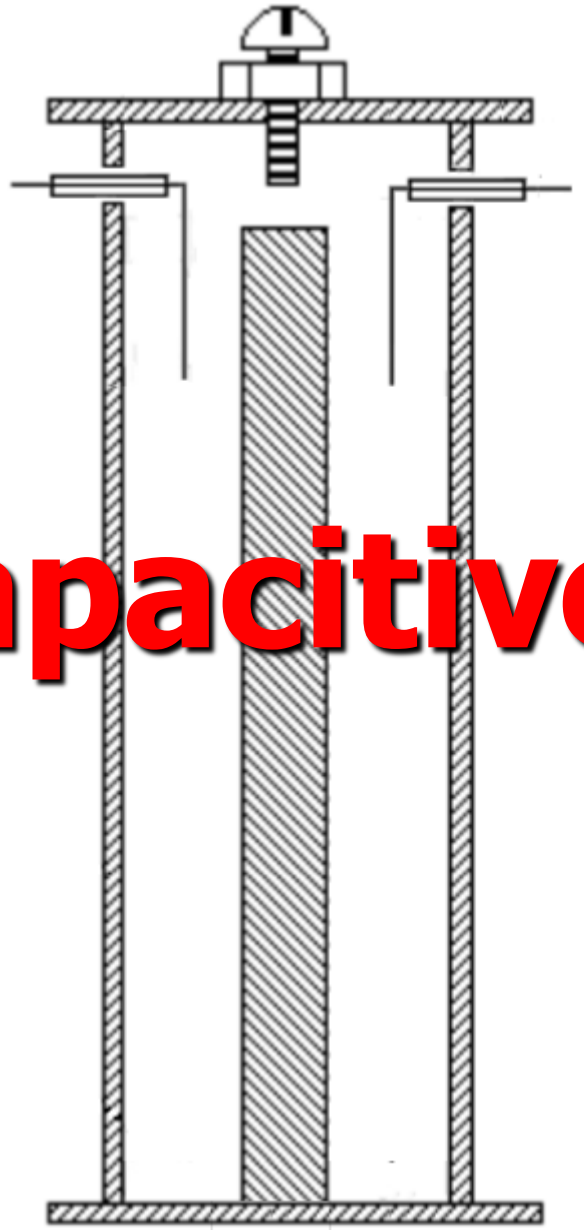
Magnetic Coupling Loops

BNC



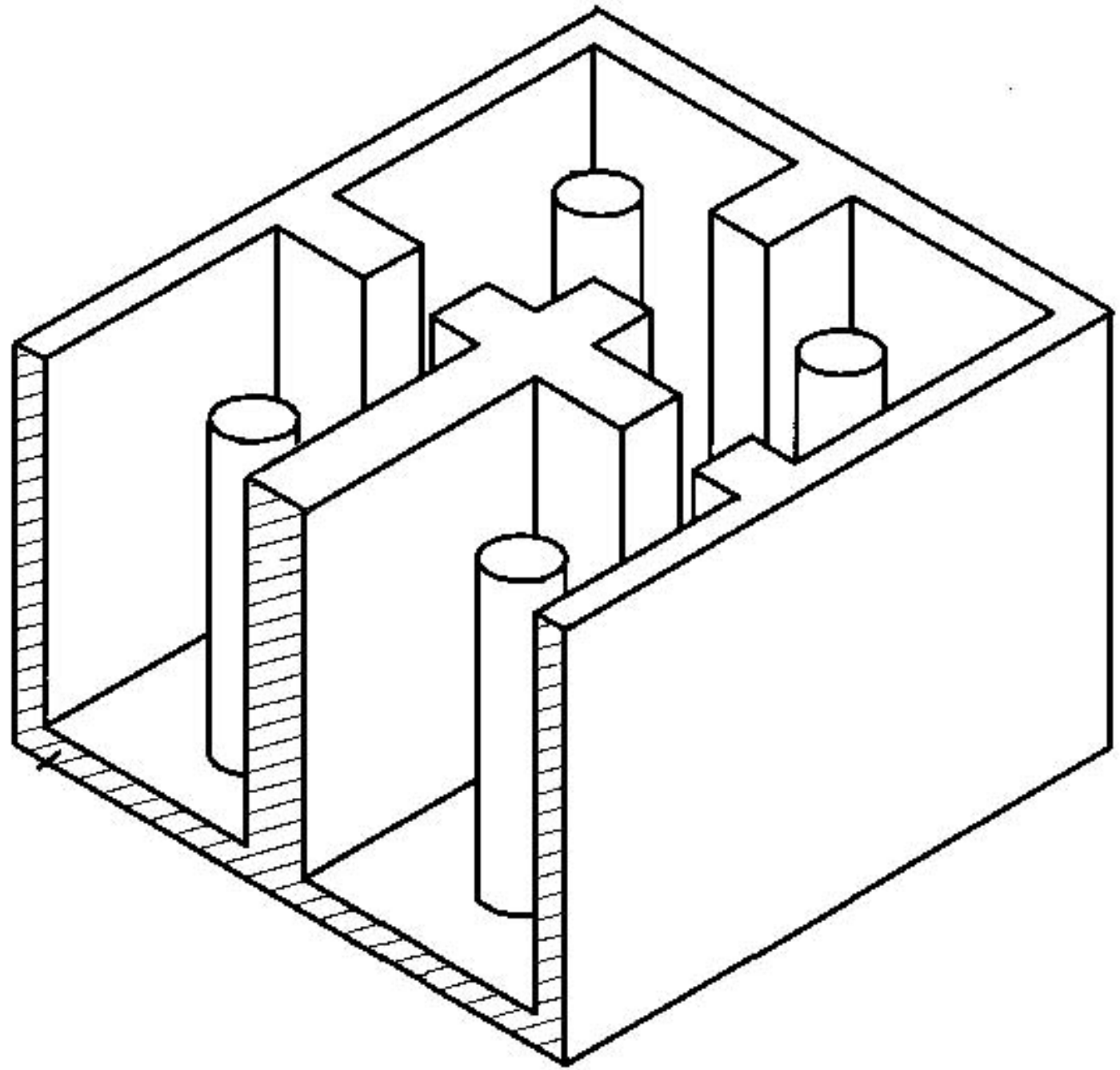
Capacitive Coupling Probes





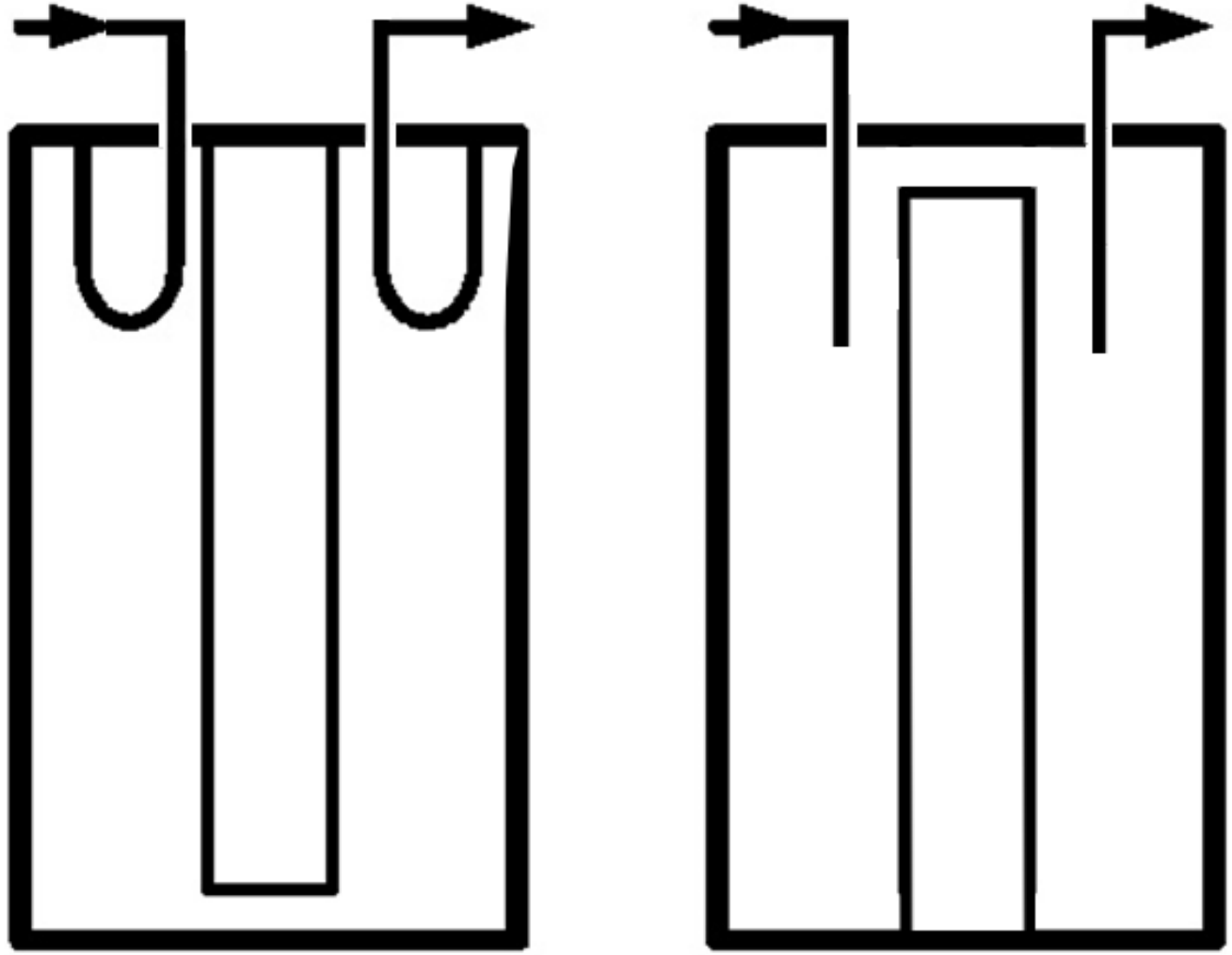
Capacitive Coupling Probes

Port Coupling

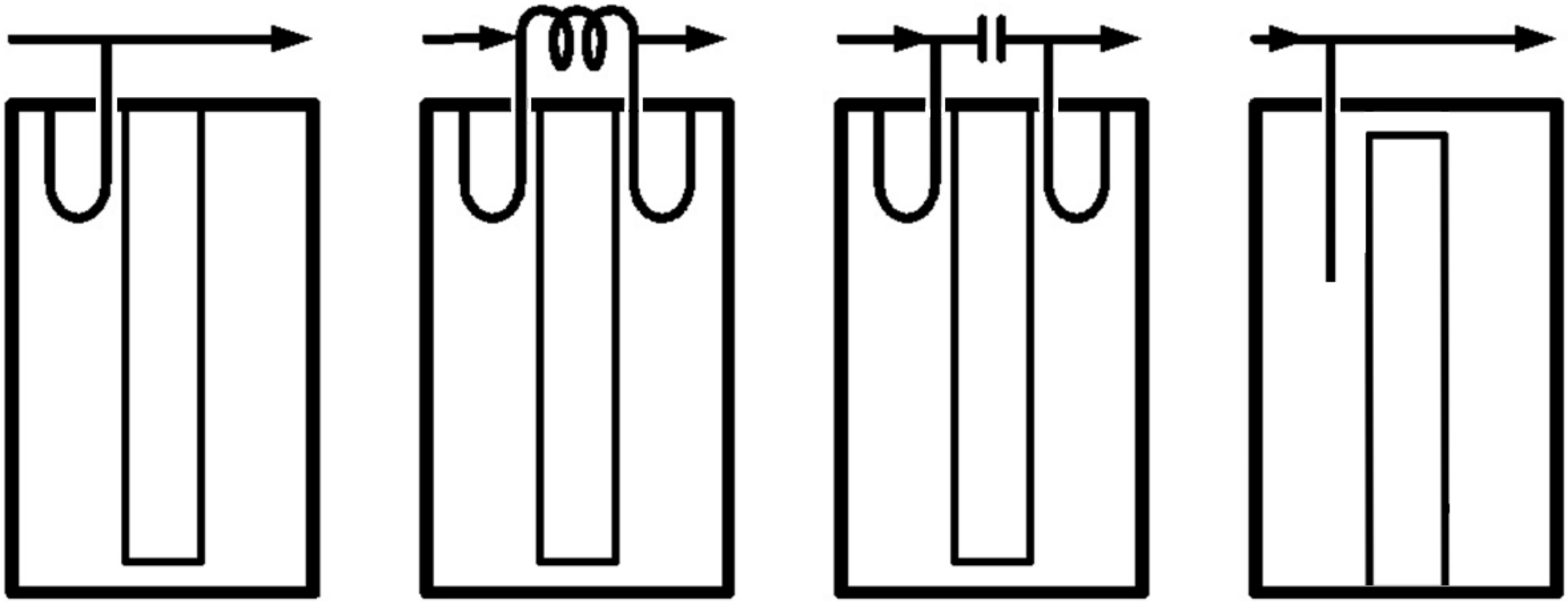


Making a B_P Cavity Into a B_R Cavity

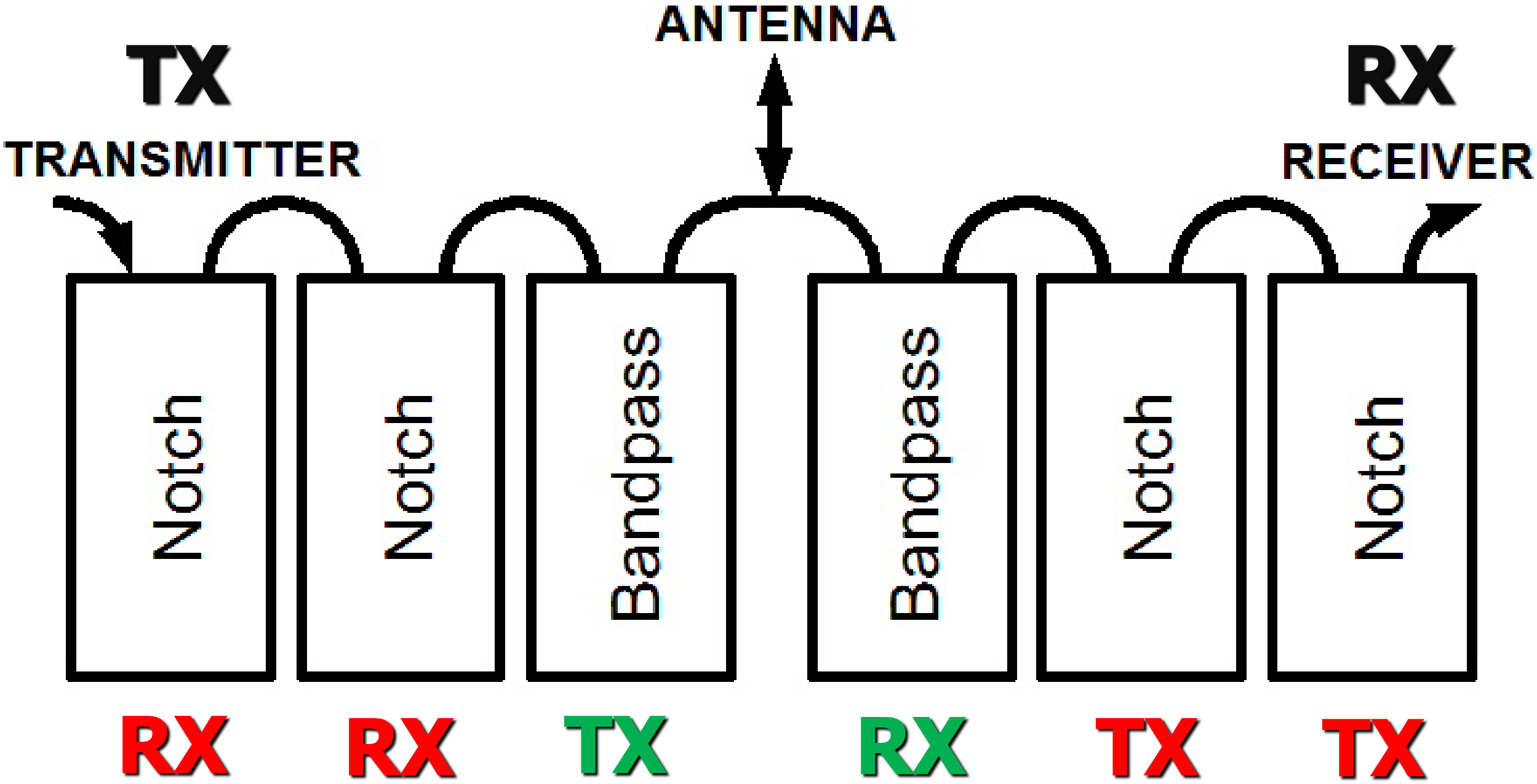
Bandpass B_p Series with Line



B_R (notch)
In Parallel with the Line

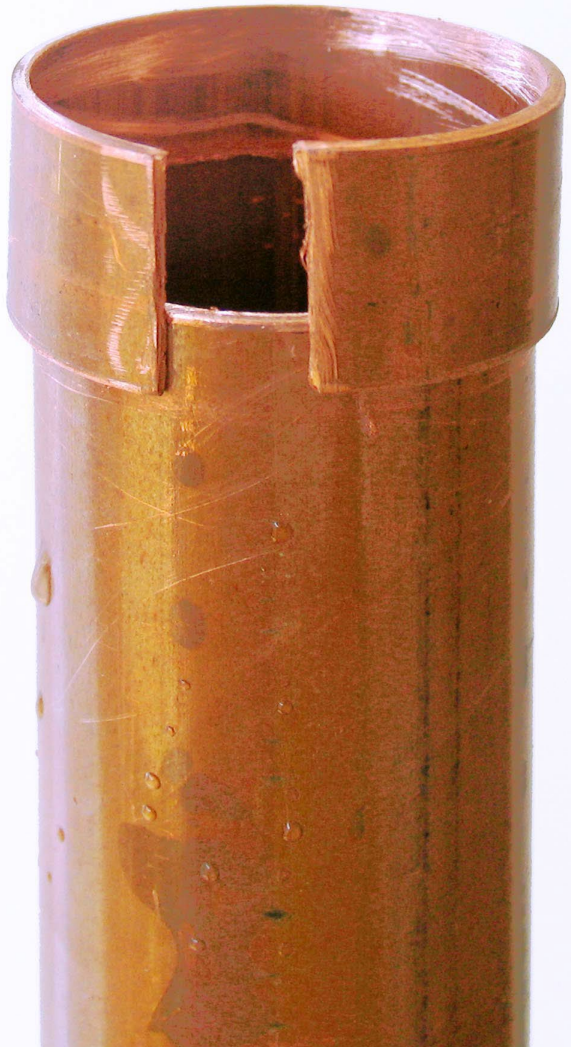


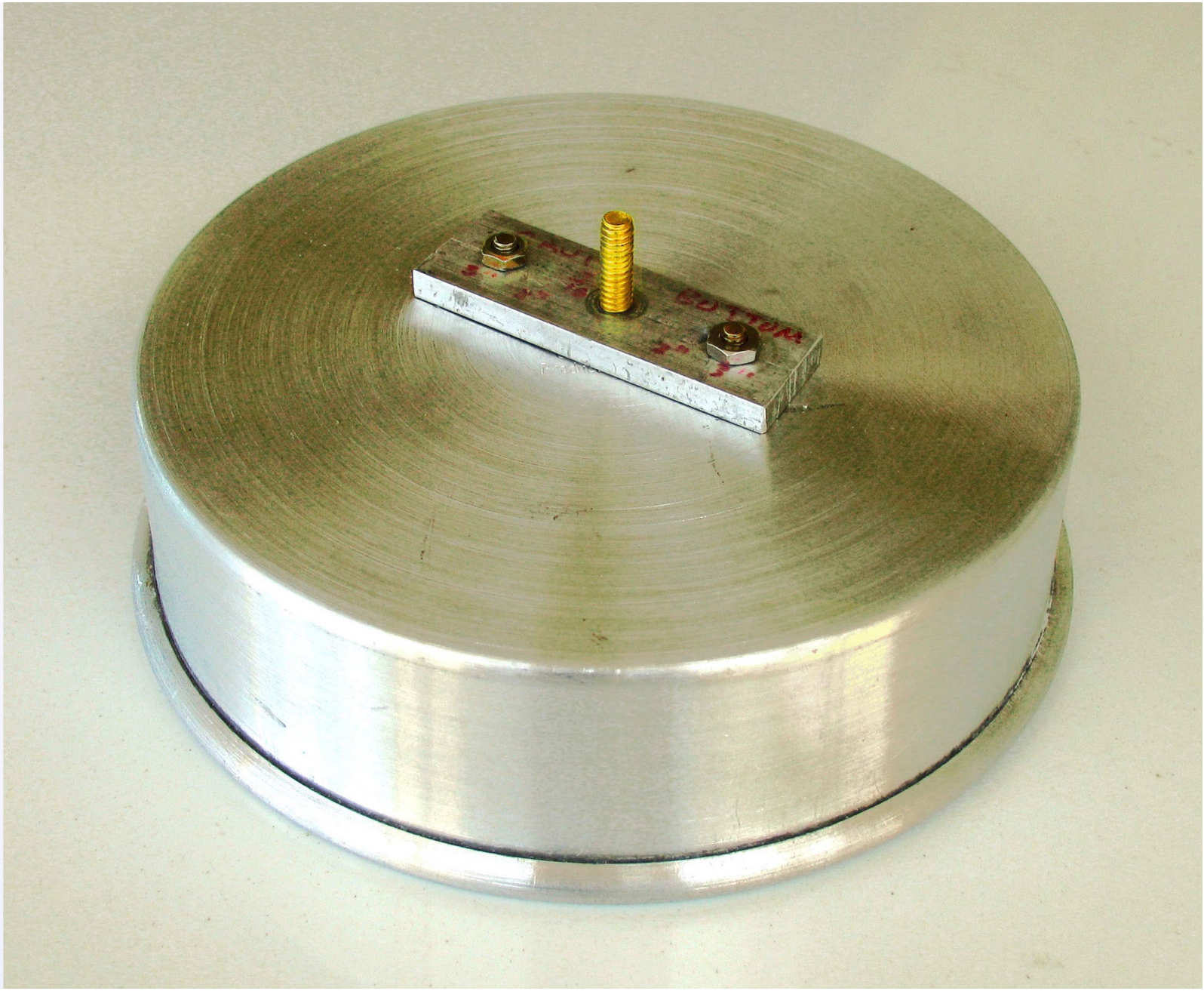
Cavitiy Types In a Duplexer


ANTENNA
TX
TRANSMITTER
RX
RECEIVER
Notch
Notch
Bandpass
Bandpass
Notch
Notch
RX
RX
TX
RX
TX
TX

Home-Brew Example

3.6 to 1 ratio




BOTTOM

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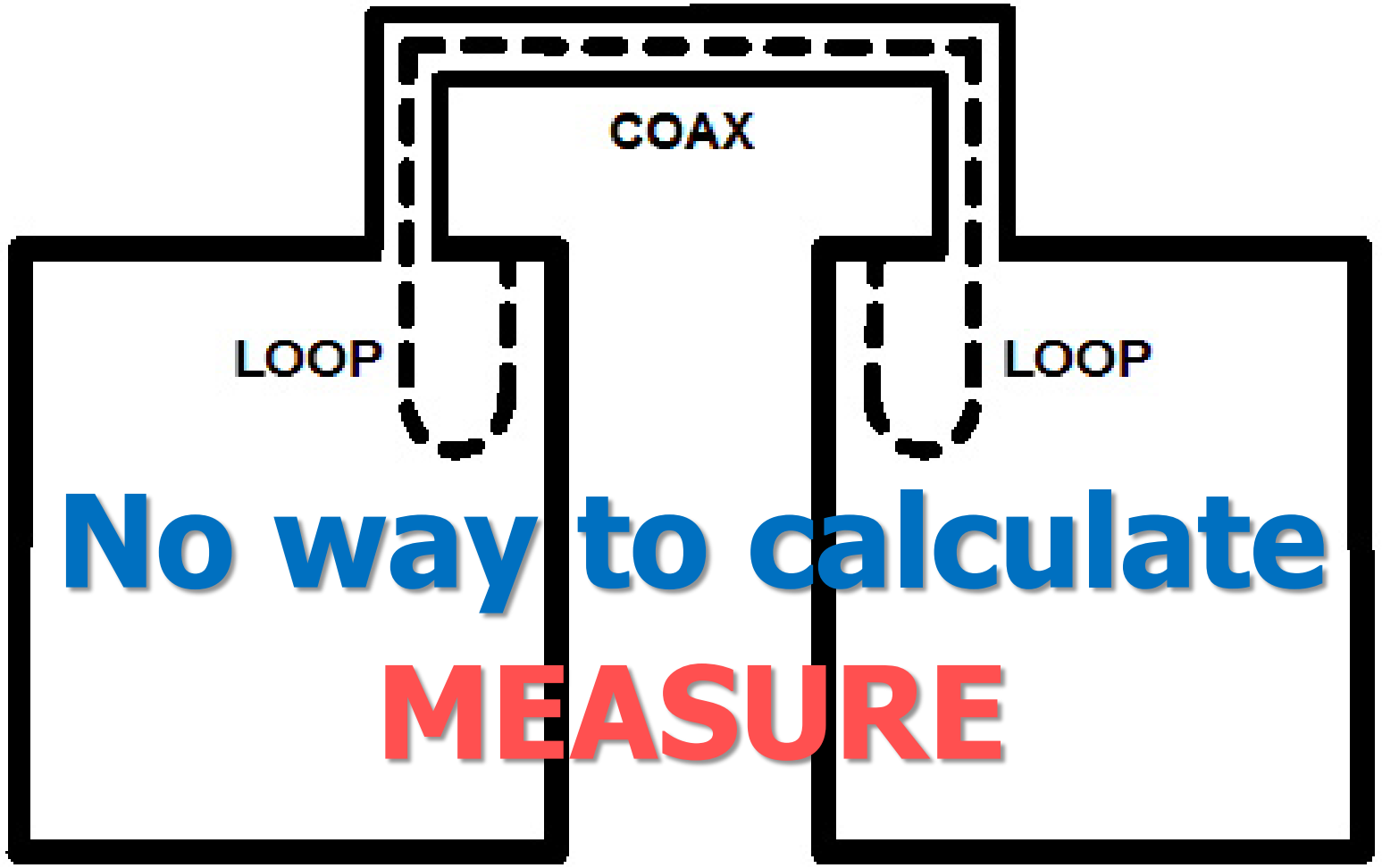
Inter-Cavity Coax

Retuning Commercial Duplexers

---→ Total = Half Wavelength



No way to calculate

MEASURE

Small Increments to λ/2

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