



7. ANTENNAS – NR6H

Chapter 7 Part 2 of 2

ARRL General Class Sections 7.3, 7.4, 7.5

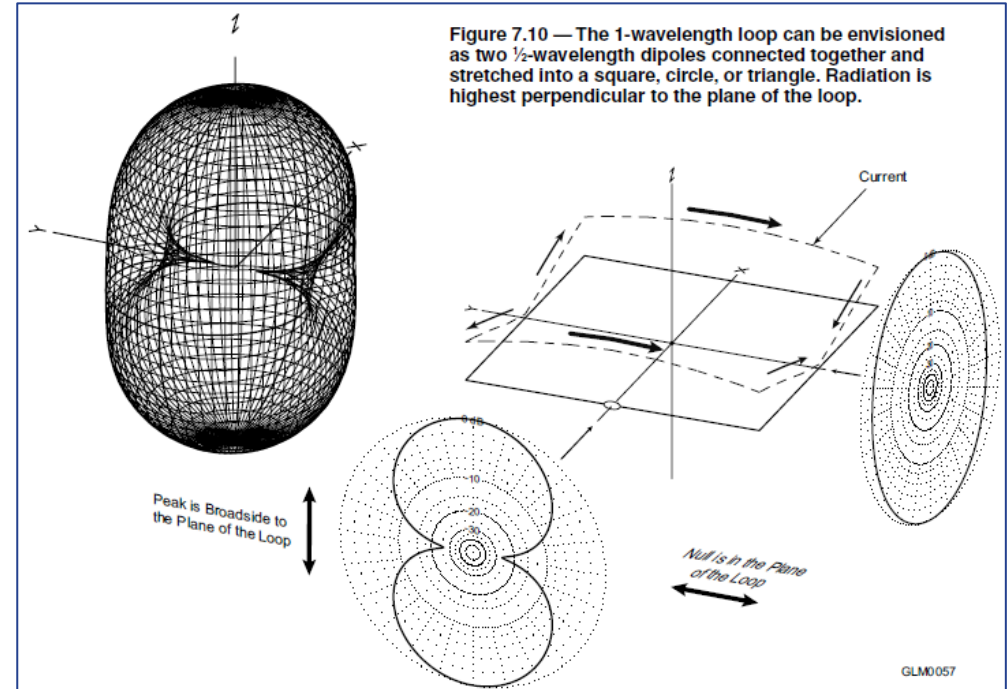
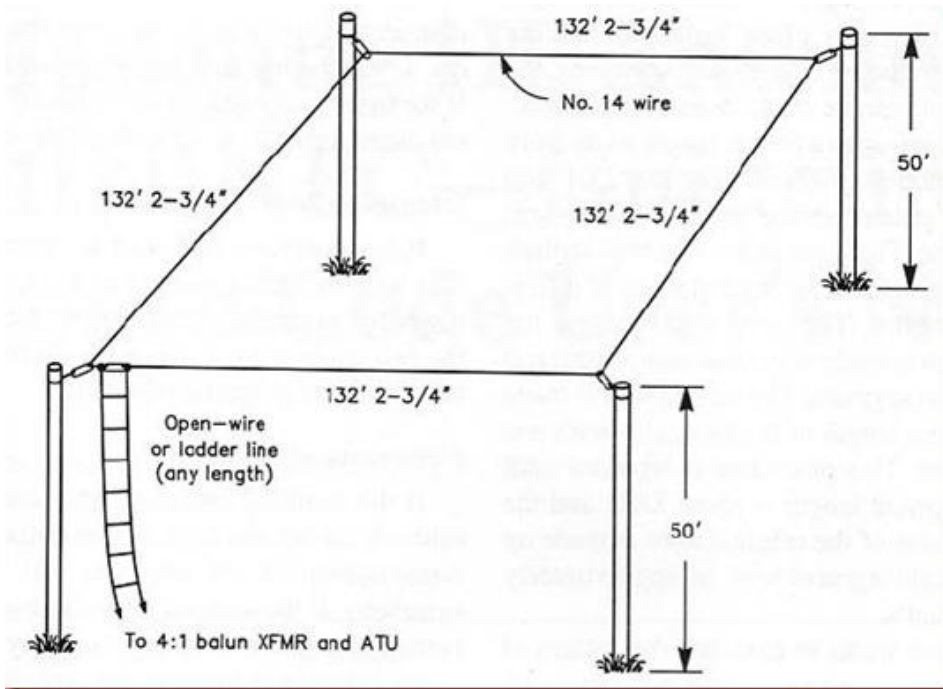




Section 7.3

Loop Antennas

Large loops radiates most perpendicular to the plane

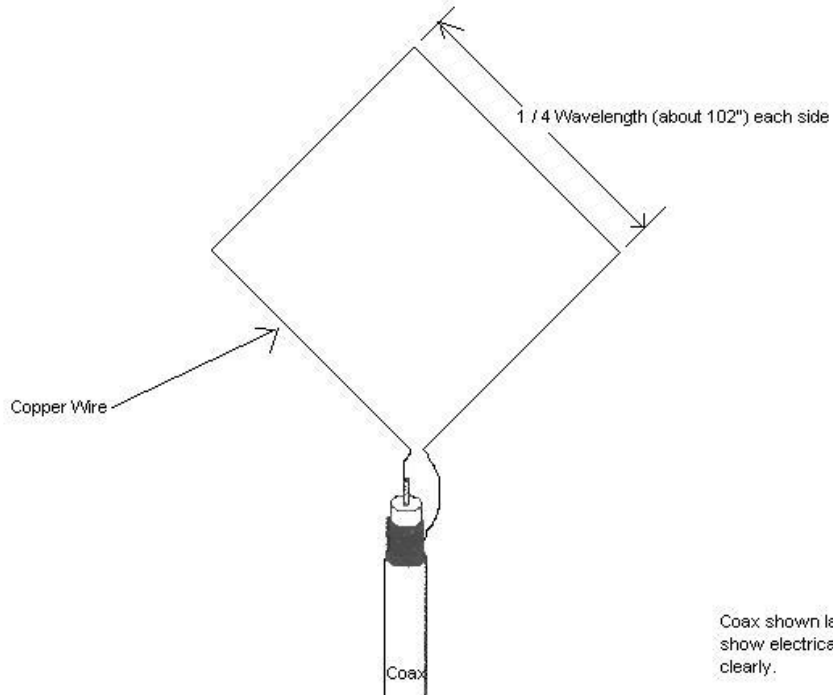




Quad and Delta Loop Beams

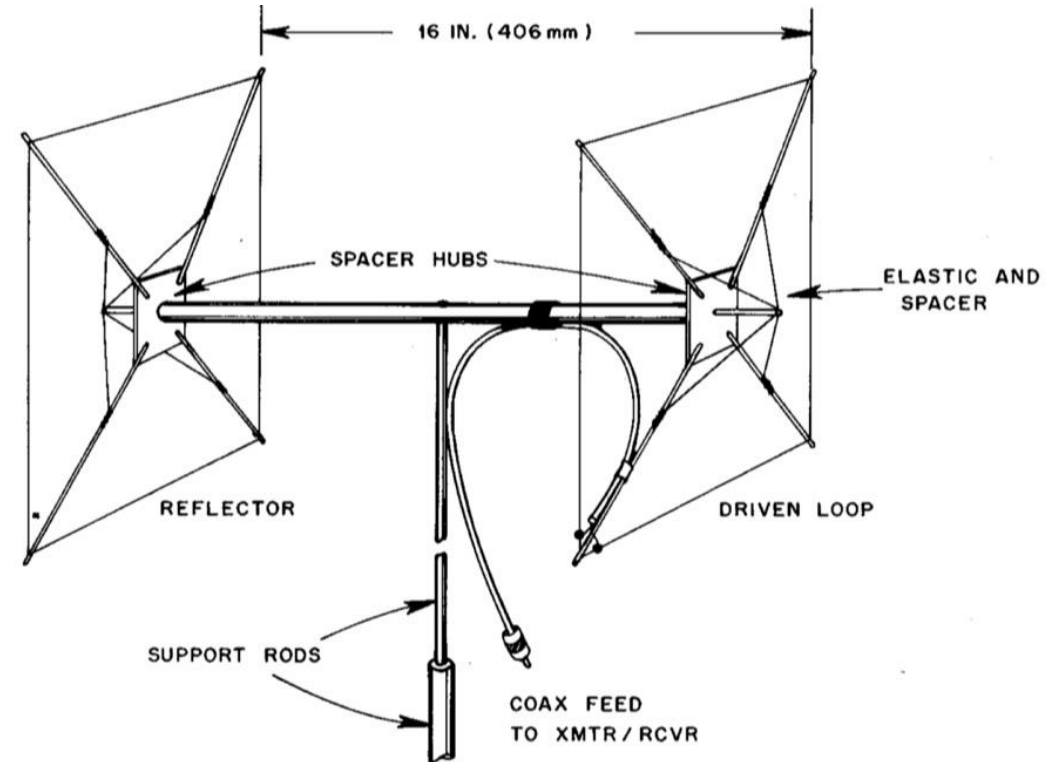
Vertical Quad loop

Electrical Makeup of Quad Loop



Coax shown larger scale to show electrical connection clearly.

Vertical Quad Beam





Small Loops

When circumference is less than $1/3\lambda$, current become uniform all around the loop.

Pattern has sharp nulls broadside to the plane of the loop!

High Q – very narrow band. Needs tuning.

Good for direction finding





Halo Antennas

$1/2 \lambda$ circumference

Not a continuous loop – has small gap

Basically a bent dipole..

Omnidirectional in the plane of the halo





Section 7.4

Specialized Antennas

“Random” wire antenna

Need to AVOID resonance →

Require tuner

May cause significant RF in the shack

Frequency MHz	1/2 Wave	2nd Multiple	3rd Multiple	4th Multiple
1.9	246	492	738	984
3.8	123	246	369	492
7.2	65	130	195	260
10.1	46	92	138	184
14.2	33	66	99	132
18.1	26	52	78	104
21.3	22	44	66	88
24.9	19	38	57	76
28.5	16	32	48	64

Acceptable lengths (ft):

29 35.5 41 58 71 84 107 119 148 203 347 407 423



Specialized antennas

Trapped antenna

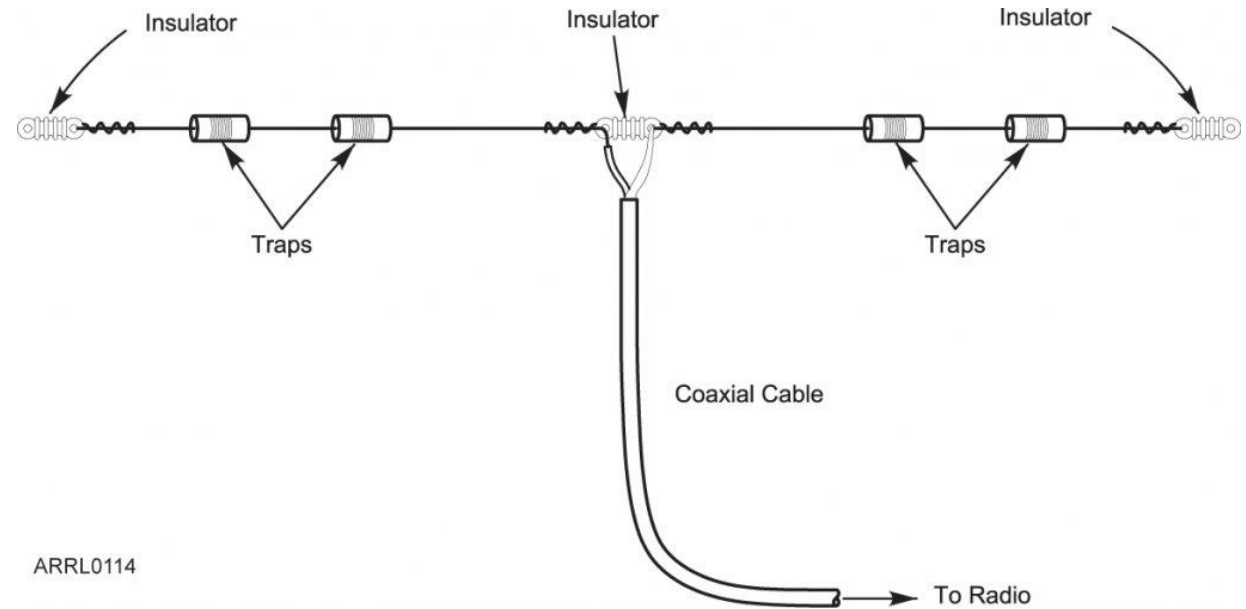
Each trap pair blocks a specific frequency

The Good:

- One antenna, multiple bands
- Resonant – no tuner

The Bad:

- Traps adds loss
- Generates spurs/harmonics





Specialized antennas

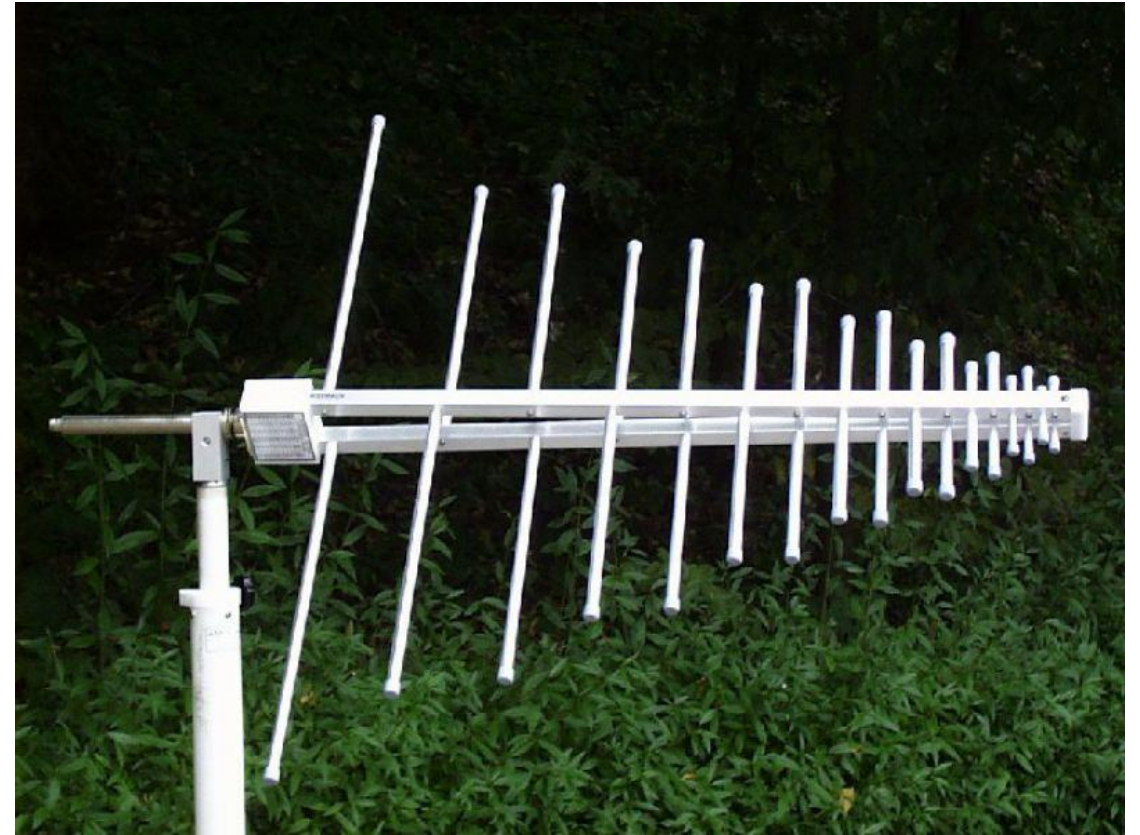
Log-Periodic antenna

All driven elements

Length and spacing changes logarithmically along the beam

Wide/Multi band

Less gain / FB ratio than a Yagi





Specialized antennas

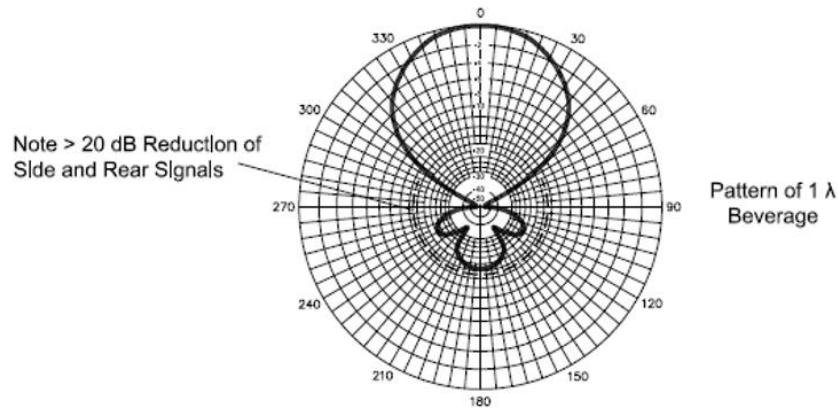
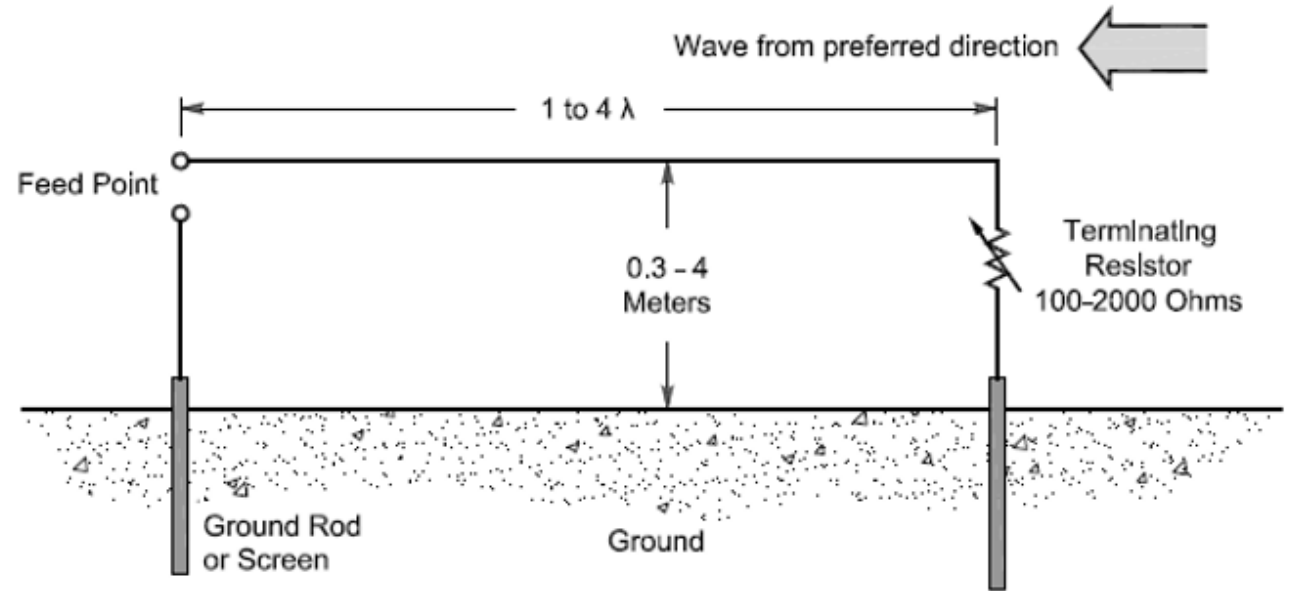
Beverage Antenna

“Traveling Wave” Antenna

Receive @ long wavelengths

Rejects noise from back/sides

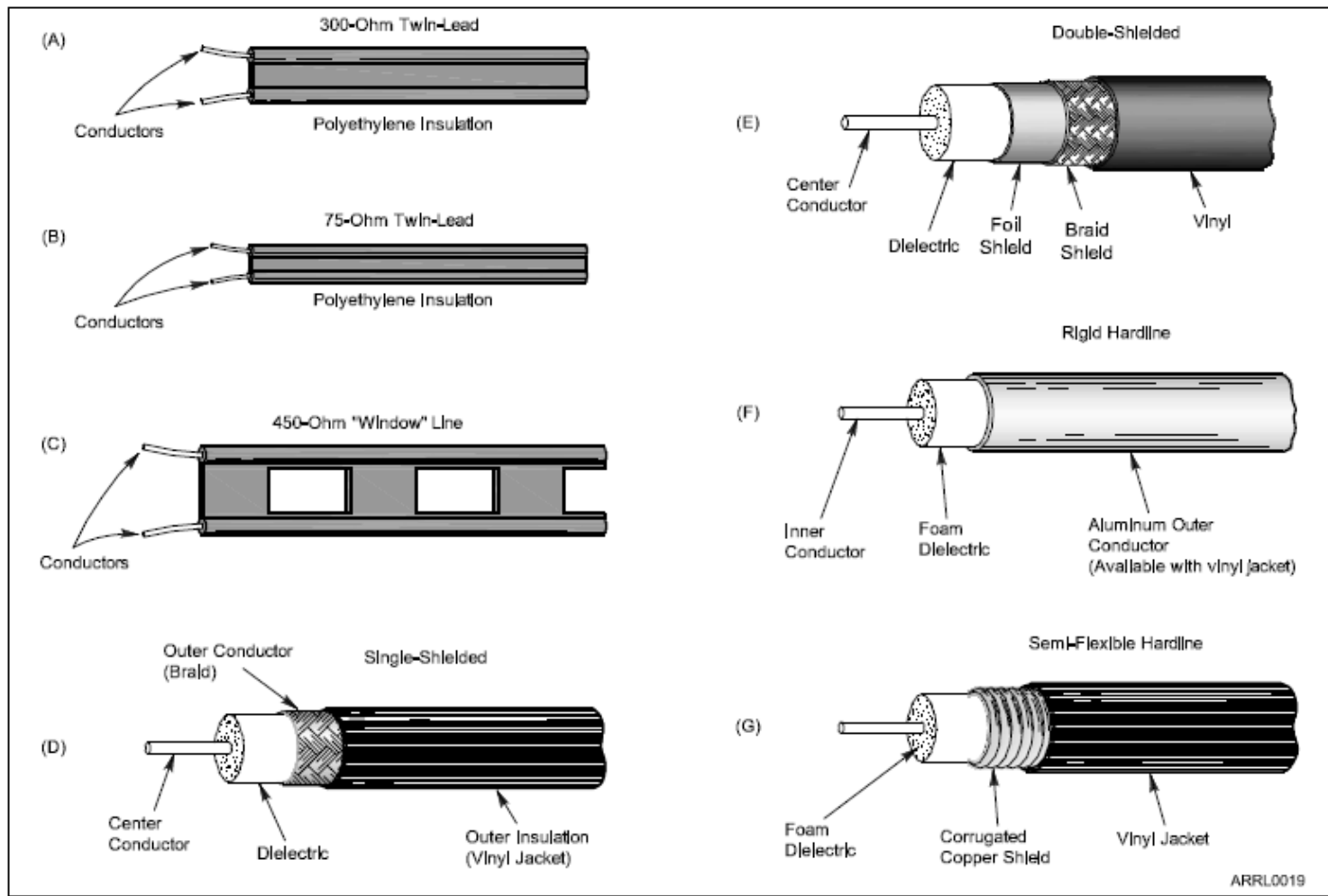
Improves Signal-to-Noise ratio





Section 7.5

Feed Lines





Ladder Line vs Window Line





Feed Line Loss

Coax Loss Chart dB per 100 Feet								
	RG-316	RG-58	RG-8X	LMR-240	RG-213	9913	LMR-400	Bury-Flex
3.5 MHz	1.5	.8	.65	.45	.3	.23	.2	.26
7 MHz	2.1	1.2	.85	.64	.5	.32	.3	.37
14 MHz	3.0	1.7	1.21	.91	.7	.46	.5	.53
28 MHz	4.2	2.4	1.74	1.29	1.00	.65	.7	.75
50 MHz	5.6	3.2	2.36	1.73	1.40	.88	.9	1.00
144 MHz	9.6	5.5	4.20	2.95	2.40	1.54	1.44	1.73
440 MHz	17	9.9	7.92	5.23	4.40	2.818	2.7	3.08
2400	41.4	24.8	22.80	12.65	12	7.48	6.6	7.63

www.qsradio.com

450 Ohm Window Line : 0.24dB/100ft @ 20 MHz



Forward & Reflected Power & SWR

Any impedance change will cause some power to be reflected

(V) SWR = (Voltage) Standing Wave Ratio

Ratio of max voltage to min voltage .. or ratio of impedance mismatch

- 50:50 = 1:1
- 100:50 = 2:1
- 200:50 = 4:1
- 10:50 = 5:1 (NOTE! SWR does not have a direction!)

SWR is always > 1

- 1:1 = 100% power transfer
- 2:1 = 89% power transfer (11% reflected)
- 3:1 = 75% power transfer (25% reflected)
- 4:1 = 64% power transfer (36% reflected)

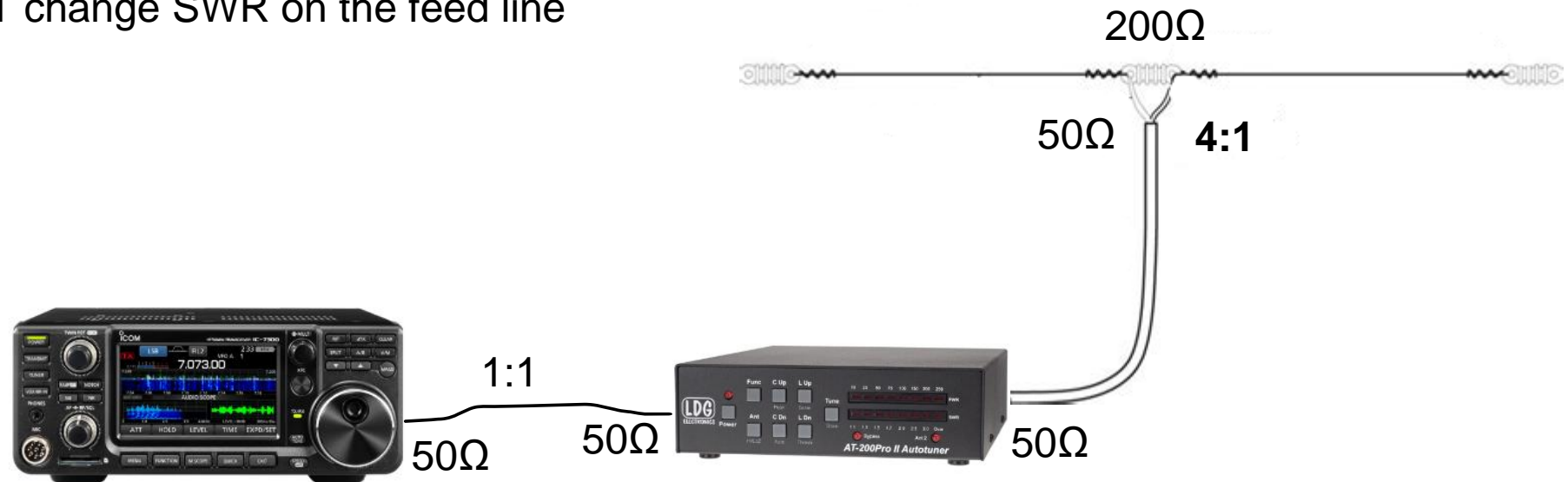


Impedance matching

Antenna Tuner, a.k.a. Transmatch, Impedance Matcher, Antenna Coupler...

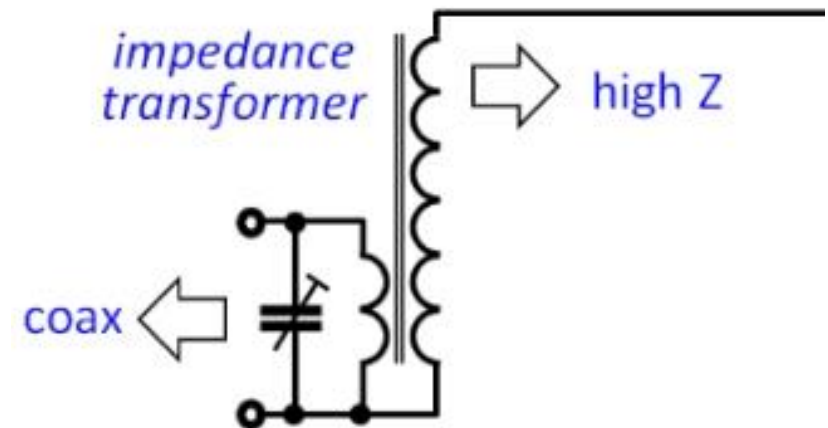
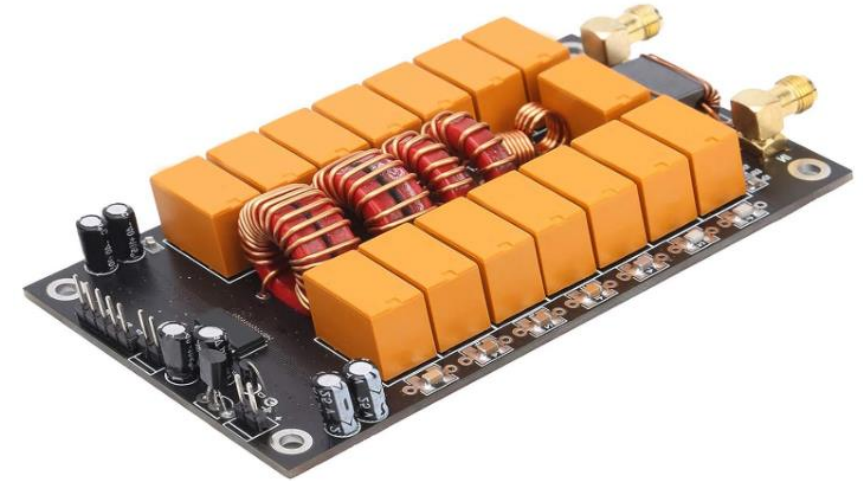
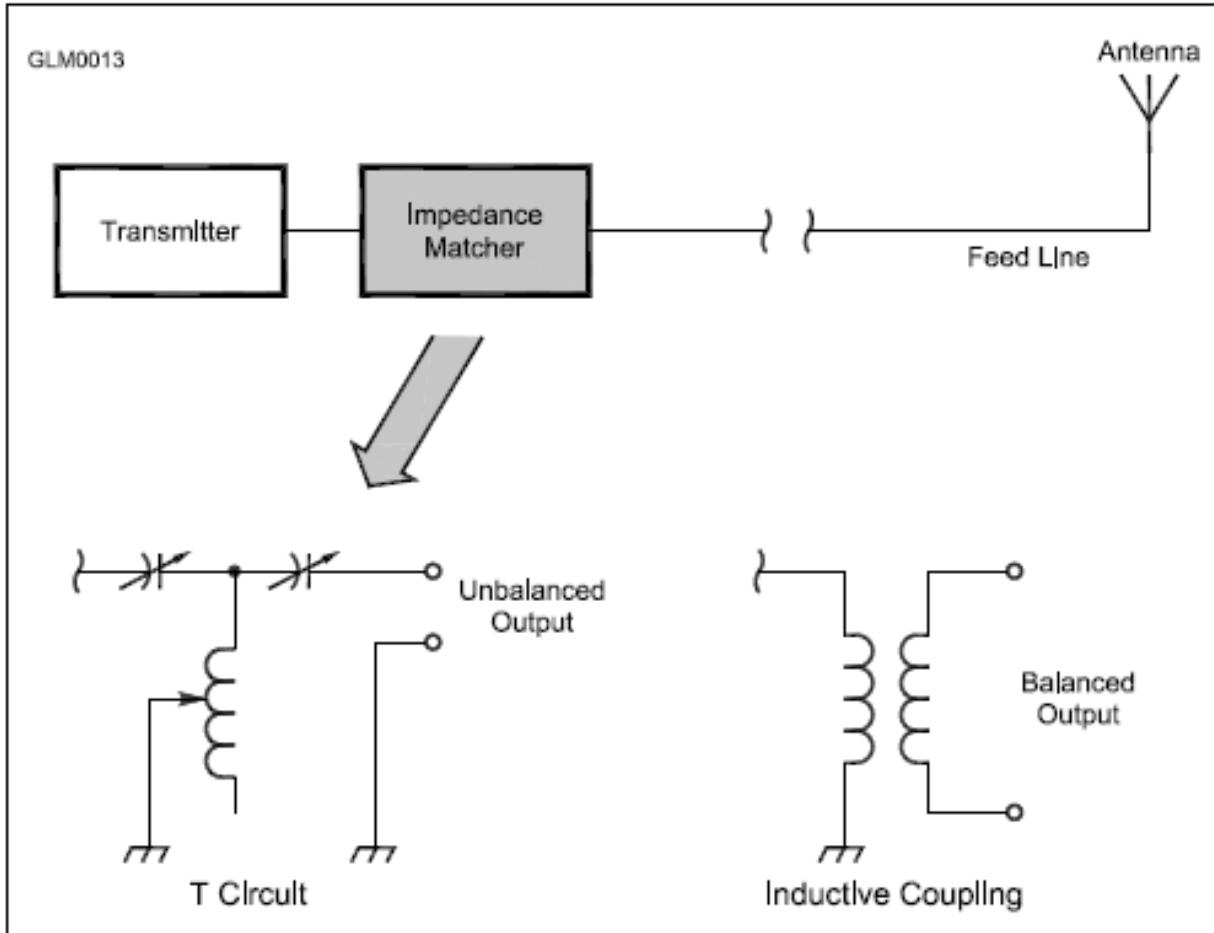
Improves power transfer to the feed line

- Does NOT "tune" the antenna
- Does NOT change SWR on the feed line





Impedance matching





QUESTIONS?

ONLINE EXAM REVIEW AND PRACTICE QUESTIONS:

<http://www.arrl.org/examreview>