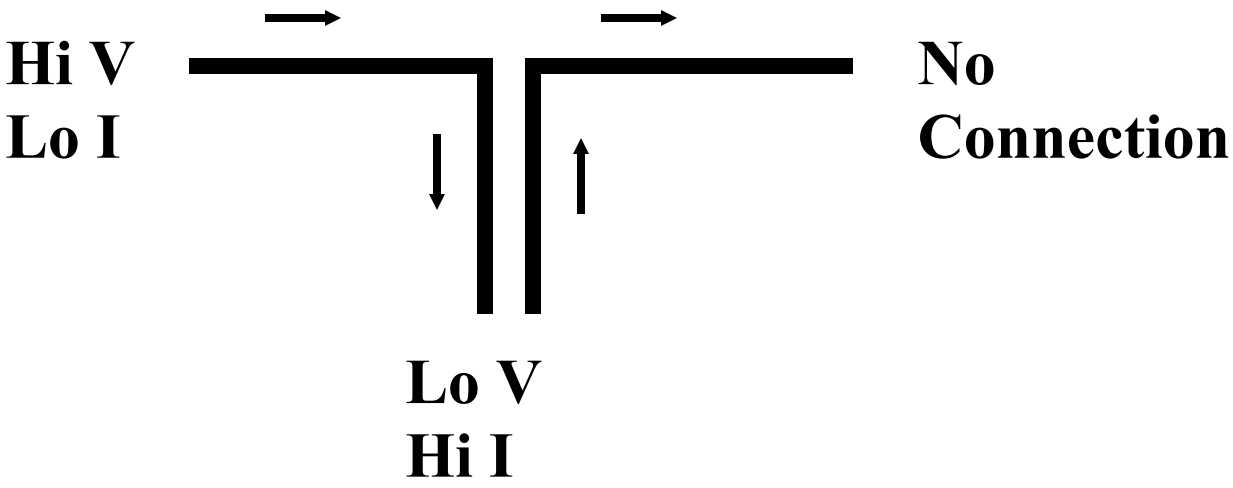
Choke Baluns

I. Antenna Radiation



Impedance = V/I ➔ Low

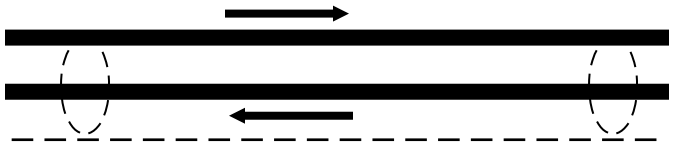
Current Flowing in a wire ➔

Magnetic Field Around Wire ➔

Radiation from Wire

Field = Radiation

II. Transmission Line

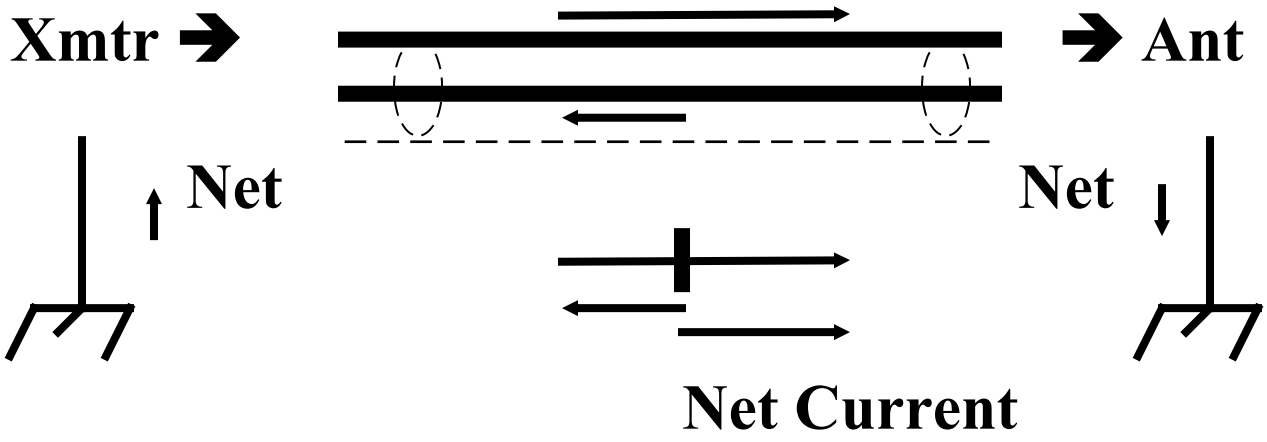
Xmtr ➔  **➔ Ant**

Opposing Currents ➔ Opposing (cancelling) Fields

➔ No Radiation from Feedline (Regardless of SWR)

TEM: Transverse Electromagnetic Mode (Equal opposite currents with Cancelling fields)

III. Unbalanced Transmission Line



Common Mode

--- Net Current Flow in one Direction

➔ Transmission: single piece of wire

➔ Fields Don't cancel completely

➔ Net field around Transmission Line

➔ Transmission Line Radiates!

IV. Stopping Common Mode Current

1. **Want to choke off Common Mode (High Impedance)**
2. **Want to allow TEM to pass (Line Impedance)**

How???? Make a coil

Impedance = 6.3 (frequency) (inductance)

Make coil > 1000 ohms impedance

(old rule of thumb: 10x line impedance)

A coil works because of the field around the wire which affects neighboring turns. TEM has no "outside" field.

A Big Impedance inhibits current flow.

V. Brain Wave

1. TEM ➔ No Field ➔ No effect in Coil

2. Common Mode ➔ Coil ➔ Impedance

!!! Wind Coil with Transmission Line !!!

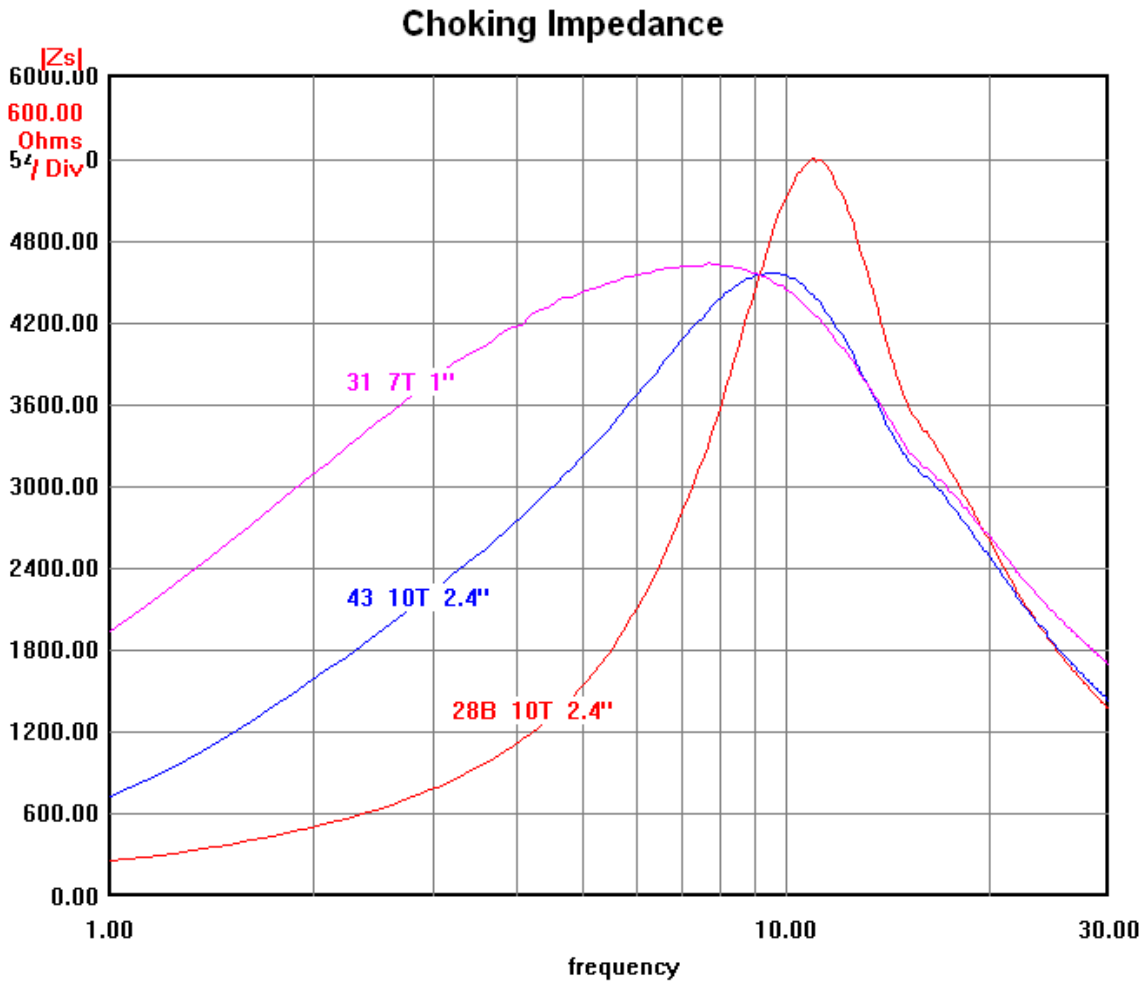
Use Ferrite with High Permeability to achieve a high impedance with a small number of turns.

Ferrite: Big permeability ➔ Big Impedance

Not all Ferrites are created equal.
Impedance has
Resistance: heat loss
Reactance: lossless

Will my Ferrite blow out with heat?
1. Resistance = Heat
2. Common Mode Current: Causes Heat
Ferrite:

28B 2.4” diameter, 10 turns
#43 2.4” diameter, 10 turns
#31 1” diameter, 7 turns



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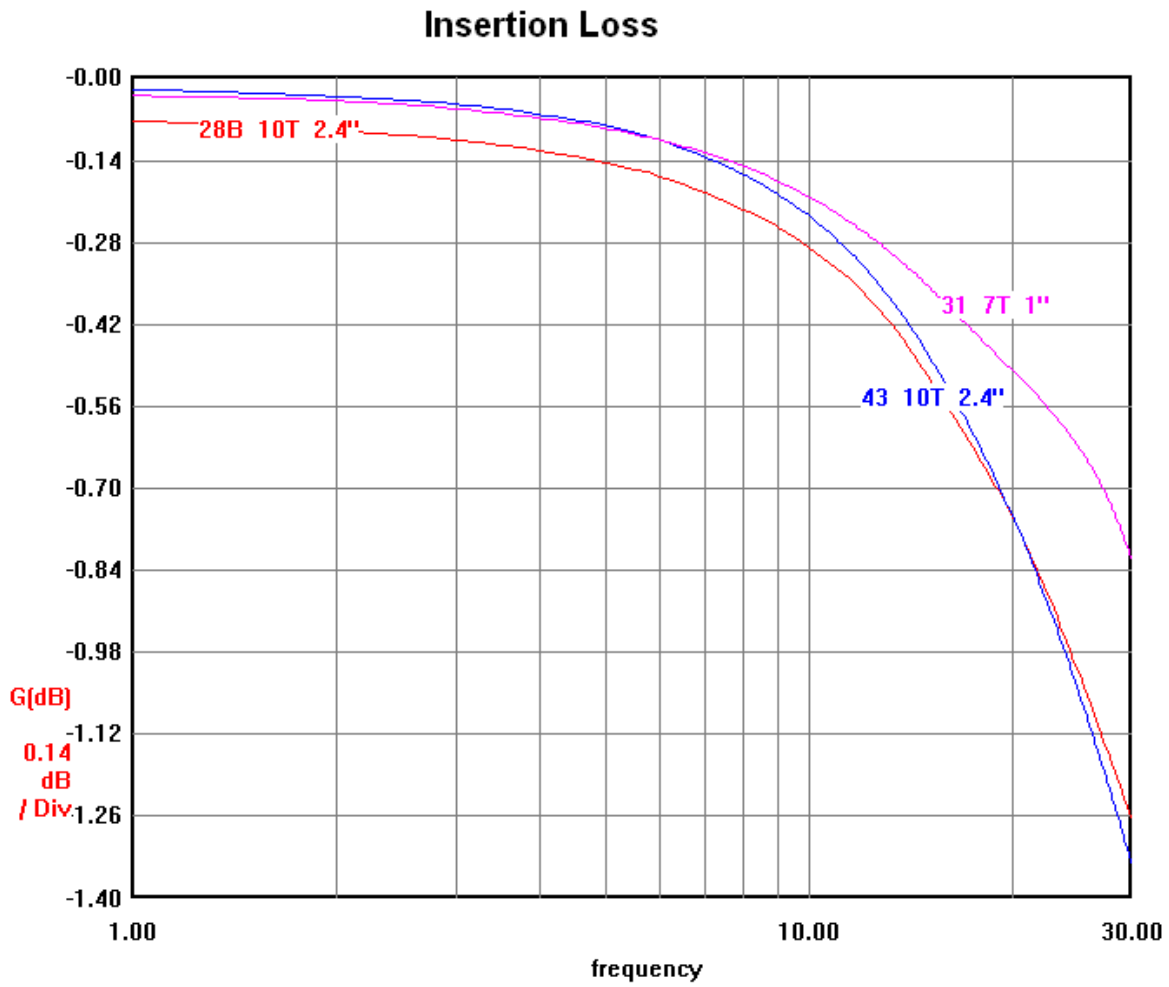

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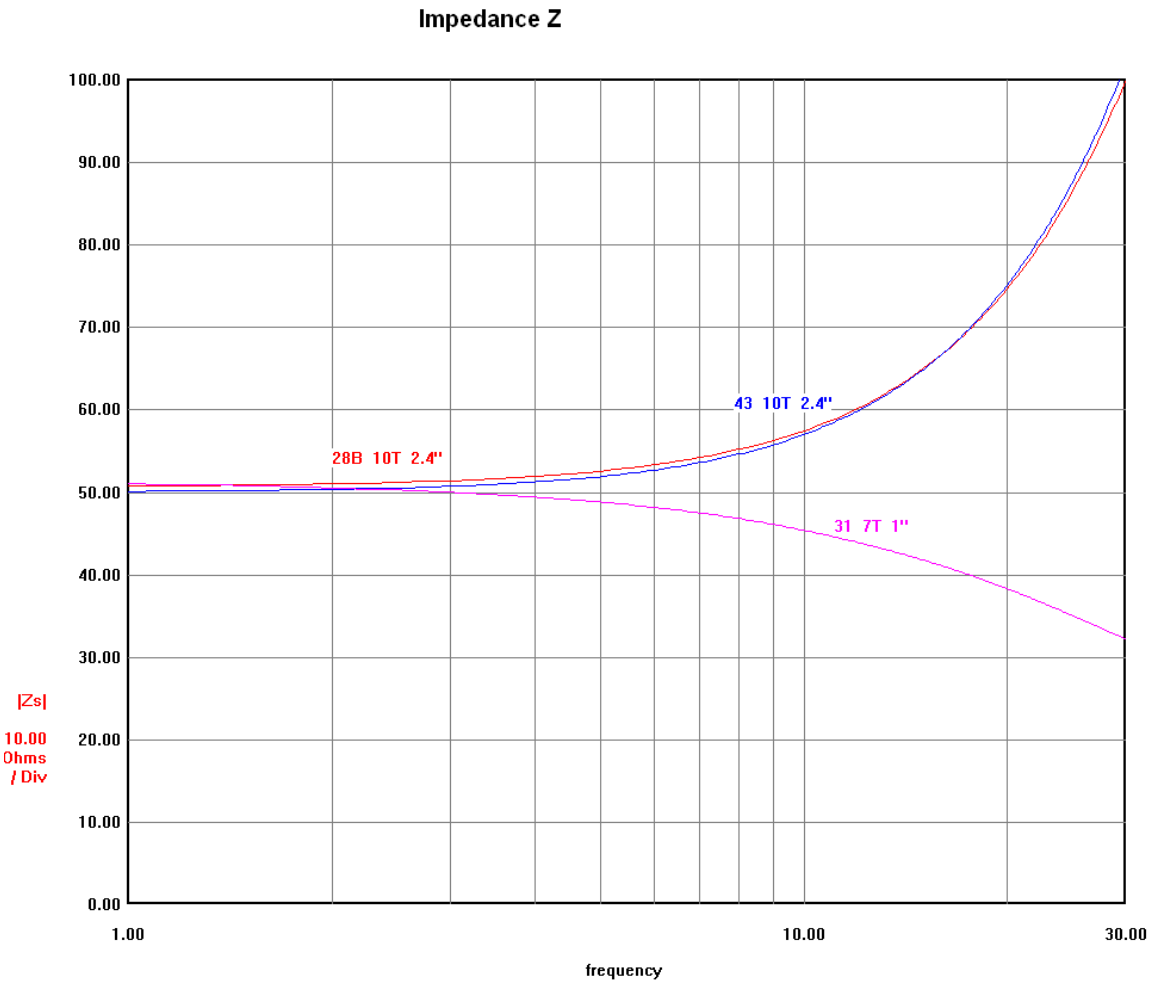

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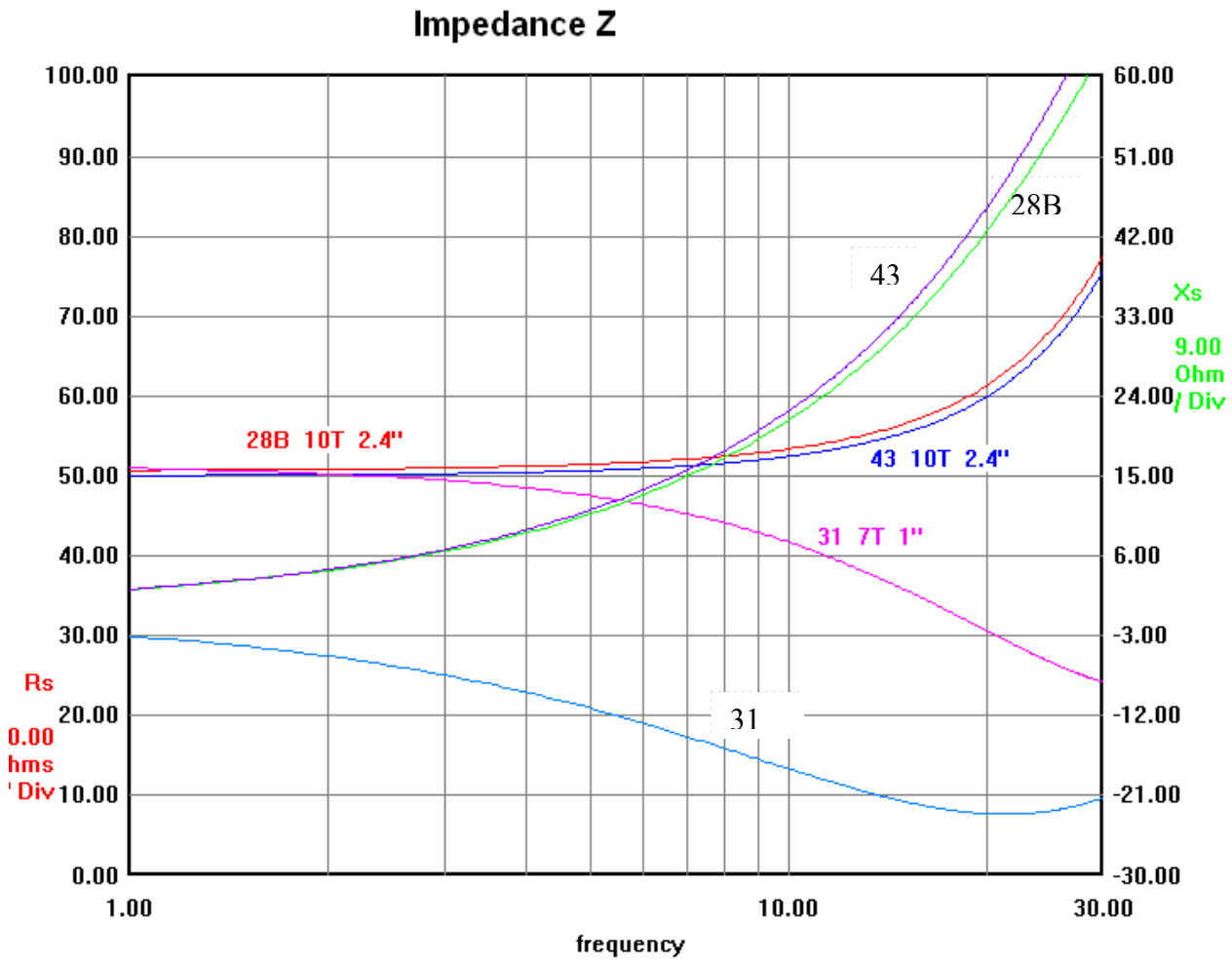
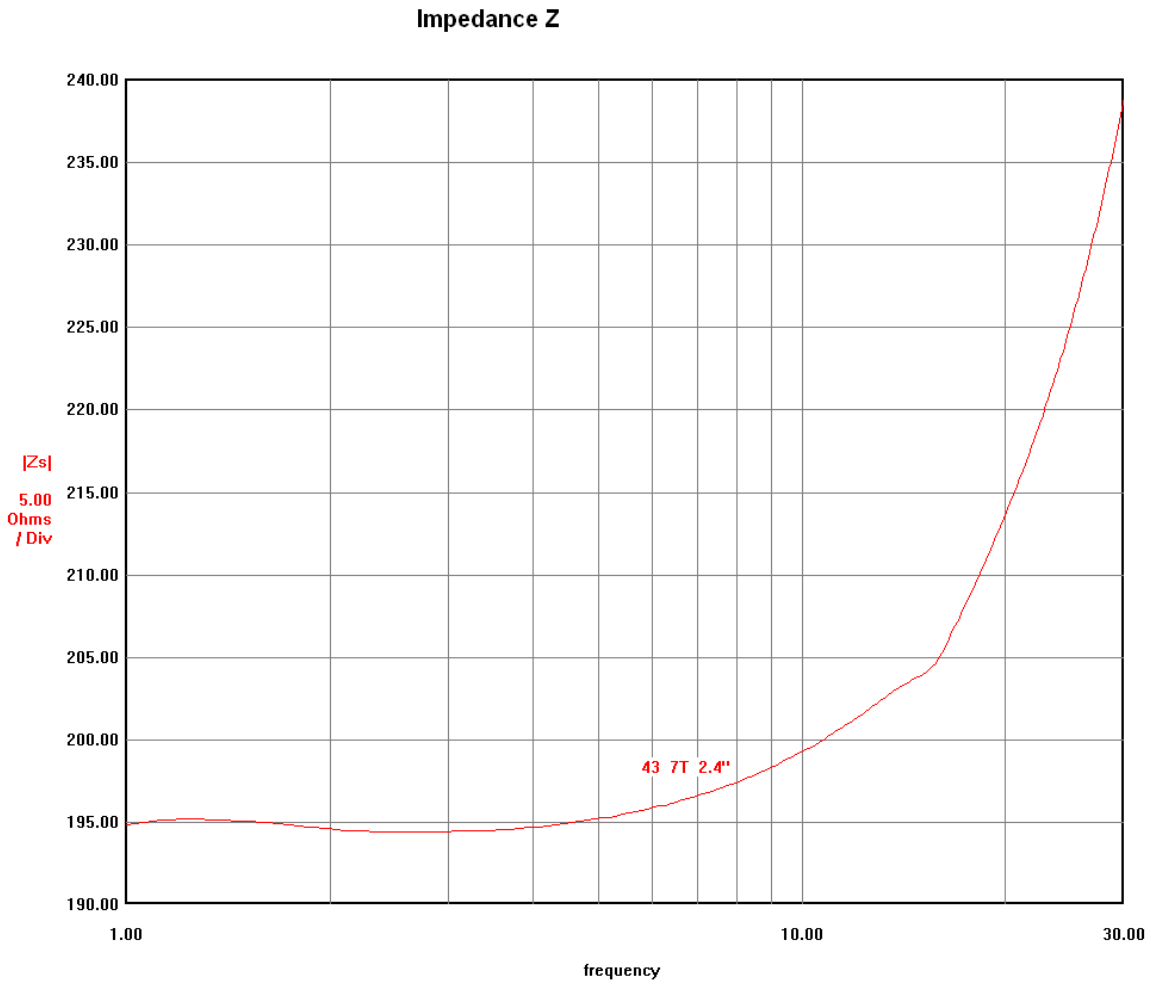


Ferrite:

#43 2.4” diameter, 7 turns, 2:1 Transformer

4:1 Impedance transformer (4x 50 = 200)



Left to Right:

1. **Choke Balun: 10 T bifilar 14ga on 2.4" Ferrite**
2. **Choke Balun: 7T bifilar 20ga on 1" Ferrite**
3. **4:1 Transformer: 7T bifilar 14ga on 2.4" Ferrite**

Mouser prices: 1/3/2011

1. **263102002 1" #31 Ferrite** **1@$1.90** **10@$1.69**
2. **2631803802 2.4" #31 Ferrite** **1@$7.00** **10@$5.64**
3. **2643803802 2.4" #43 Ferrite** **1@$3.83** **10@$3.55**
4. **4.**