Baluns/Ununs, Toroids And Building Your Balun

Dale Tongue (AC7NP)

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What is the purpose of a balun?

- It will effectively isolate feedline from an antenna
- A balun is a device used to balance unbalanced systems.
- An example of an unbalanced system:
  - Coax cable – Not all the energy is radiated and can travel down the sheath
- An example of the balanced system would be the wires on the dipole
  - Both radiators of dipole cut the same length
  - Twin Lead feedline

Two main types of windings:

- Guanella
  - The Guanella Current balun is a low loss, broadband balun that will ideally choke off common mode currents
- Rathroff
  - Voltage balun: allows some common-mode current to stand on the feedline and radiate

What we want to do

- Create an unrestricted flow of signal/power one way to the antenna and restrict/impede signal coming back down the coax and/or into the shack
  - Any examples of this happening to your shack now or in the past?
- In cases of using coax as a counterpoise, stop RF before getting into the shack
  - Anybody get a shock/burn from the Mic's when touching their lip?

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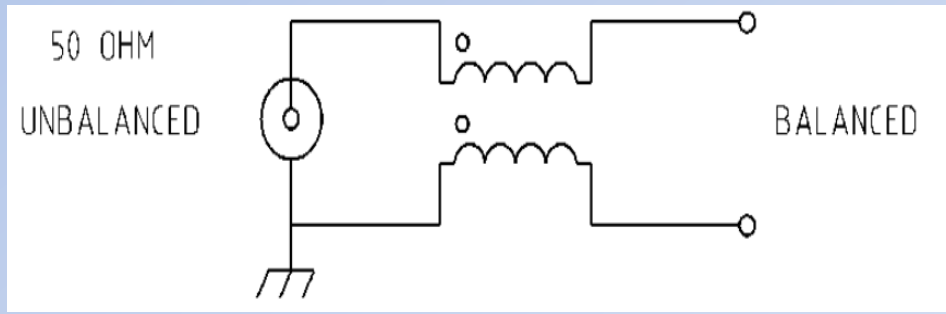
Vector Math on the 1:1 balun/unun



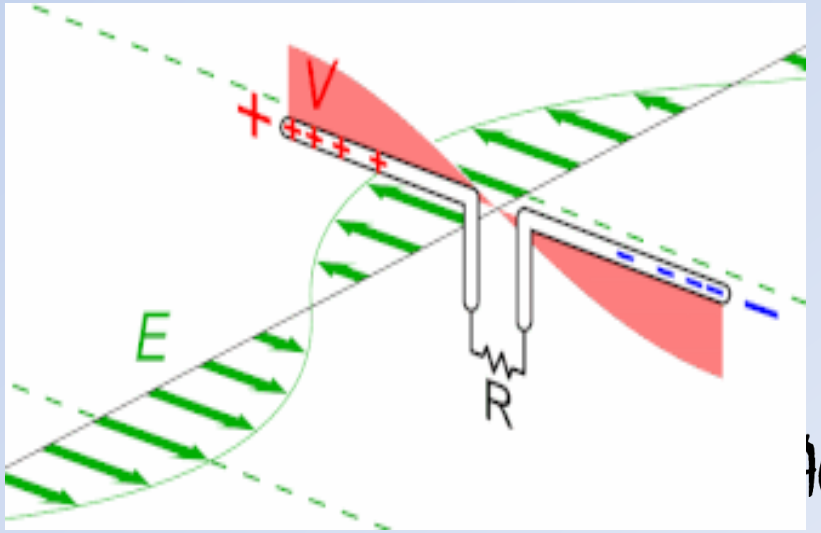
Current in one leg

X

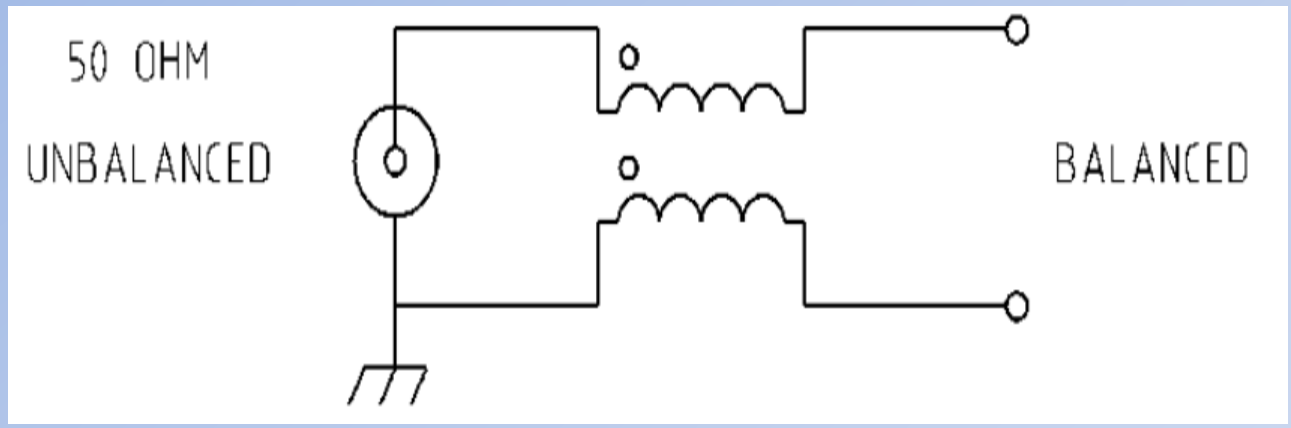
ZERO

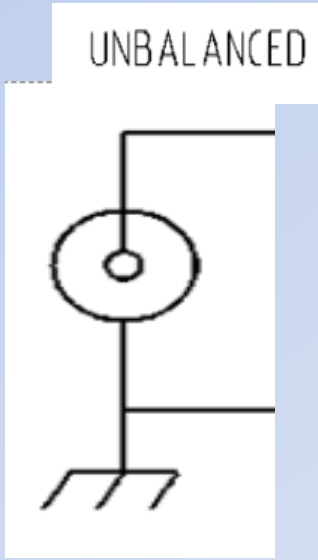
Y

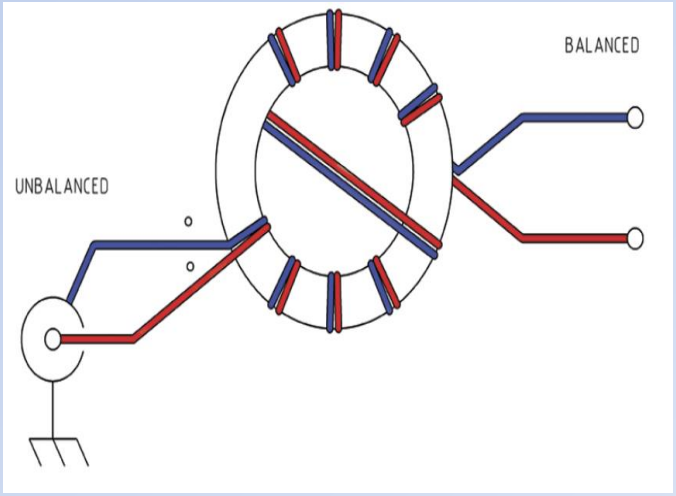
Current in the other leg



Balun/Unun project







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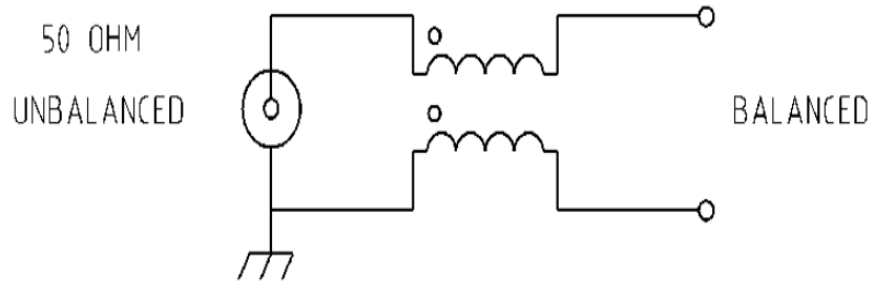
Toroid Configuration

- Test your toroid wind by installing an SO-239 on one end, terminating the end with the correct dummy load, and measuring the SWR.



- Past windings looked really flat and trying to re-engineer more windings, it wasn't as flat as I remember.

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Bands/SWR

	160	80	40	20	17	15	10	6
1.7mm wire	1	1.1	1.3	1.6	1.7	1.9	2.2	2.9
1.1 mm wire	1	1.1	1.3	1.5	1.6	1.7	1.9	2.1
	1	1.1	1.3	1.6	1.7	1.8	2	2.3
	1	1.1	1.3	1.6	1.7	1.7	2	2.3
	1	1.2	1.4	1.7	1.9	2.1	2.4	3
	1	1.1	1.3	1.6	1.7	1.9	2	2.5
	1	1.1	1.3	1.7	1.9	2	2.4	3.1
	1	1.1	1.3	1.6	1.7	1.8	2.1	2.5
	1	1.1	1.3	1.6	1.7	1.8	2.1	2.5
	1	1.1	1.3	1.6	1.7	1.8	2	2.3
	1.2	1.2	1.3	1.8	2.1	2.4	3	5
	1.2	1.2	1.2	1.3	1.4	1.5	1.7	2.4
	1.2	1.2	1.2	1.6	1.8	2	2.4	3.6
	1.2	1.3	1.3	1.5	1.6	1.7	2	3
	1.2	1.2	1.1	1.4	1.5	1.6	1.8	2.5
	1	1.1	1.3	1.7	1.8	2	2.4	3
	1	1.1	1.3	1.6	1.8	1.9	2.1	2.7
Avg SWR	1.1	1.14375	1.28125	1.5875	1.725	1.85625	2.14375	2.8

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Antenna Z

- The last slide showed?
- Some bands had increased SWR
- Measurements made with 50 ohm load
- SWR “could” be because of a Z change due to freq, the inductors, and the toroid itself.
- If a band wet to 36 ohms, can you get a 1:1 match?

Balun Assembly

- Parts:
- One SO-239
- 4 Screws for the S0-239
- Wound toroid
- End cap
- Bell cap
- 2 eyebolts for wire elements
- 1 eyebolt for support
- Hot glue to secure the toroid
- PVC glue to slip the joints together

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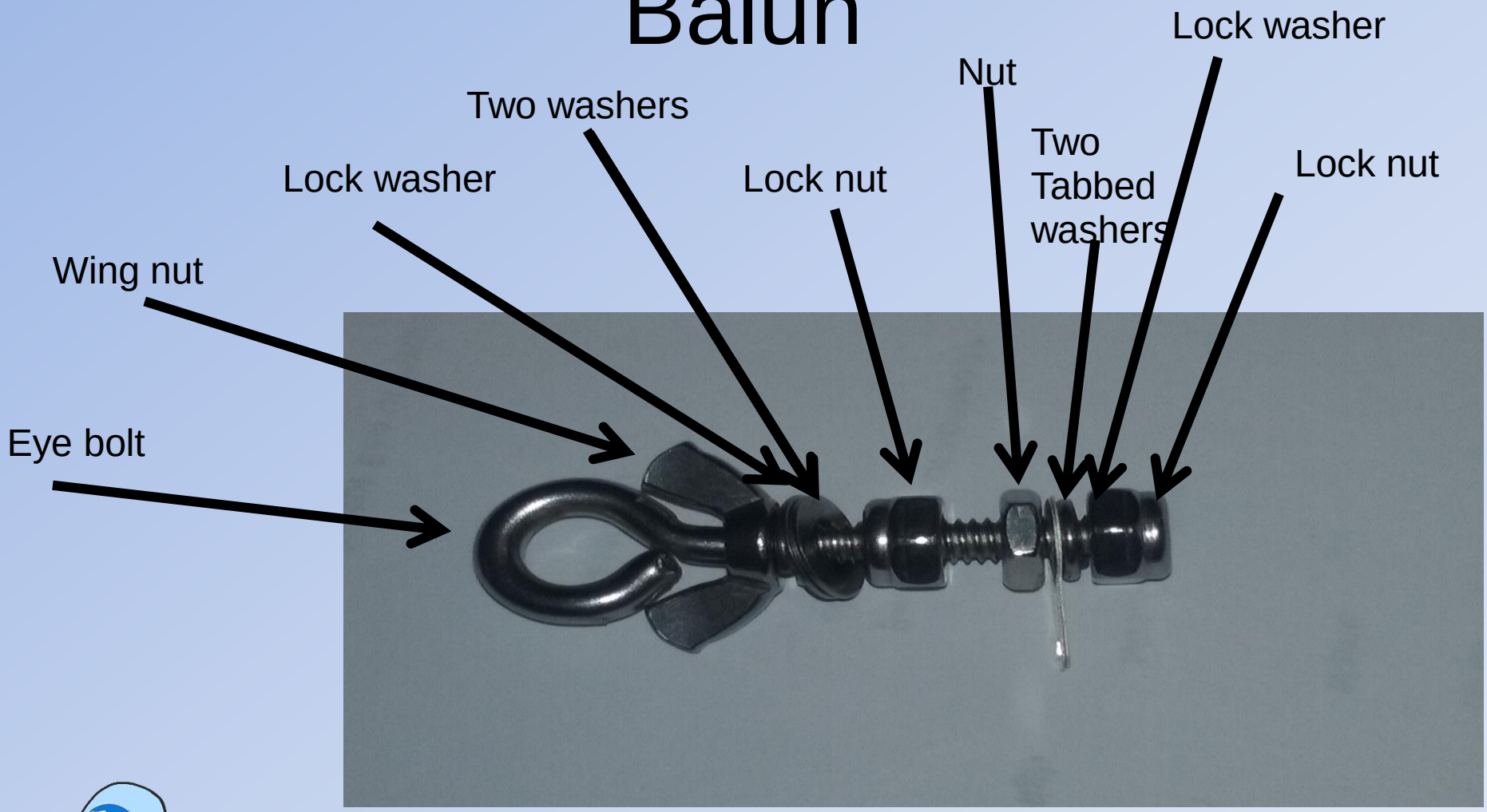
Antenna Support Config for Balun



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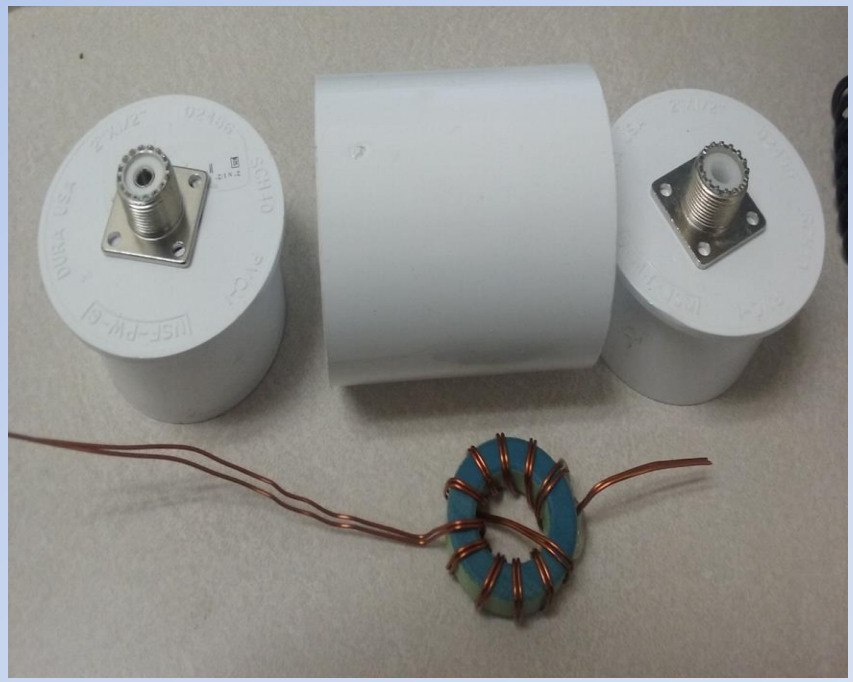
UnUn Assembly

- One PVC joint
- Two end caps
- Two SO-239's
- 8 screws
- One wound 1:1 toroid
- PVC glue to slip the joints together



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Git Er Done

- Let's wind our projects and put it all together.
- We'll wind, and then measure.
- Once we get it wound, we'll put it in the housing and glue it up for weatherproofing.

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