

## WHAT BALUNS DO:

**I1** and **I2** are the differential current flowing within the transmission line, between the transmitter and the antenna.

They are normally equal at each and every point along the transmission line, but they are 180 degrees out of phase. In other words, there is always a **BALANCE** at any and every point along the line.

**I4** and **I5** are the RF current flowing in the antenna. Since RF current is alternating current, sometimes **I5** flows from the antenna to the transmitter and **I4** flows from the TX to the ANT. Sometimes (as pictured here) it's the other way around.

**I4** always equals **I5** and hopefully **I4=I1** and **I5=I2** regardless of which direction current happens to be flowing in. If so, our world is in balance and all is wonderful! If not . . . HOUSTON WE HAVE A PROBLEM!

With RF we have **Skin Effect**. The RF current flows on the surface of the conductors. The shield has 2 surfaces: inner and outer. Normally the RF current should flow only inside of the coax.

Because there is a change over from unbalanced to something like a balance (i.e. the antenna), the point marked "X" creates a potential for an imbalance in the differential current.

When **I5** is flowing from the ANT to the TX, at point X it meets both surfaces of the shield. **This is dangerous!** Some of the current will want to flow on the inside surface (**I2**), but some will want to flow on the outside surface (**I3**).

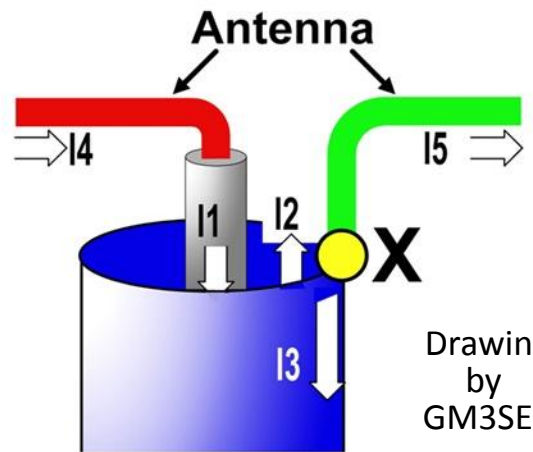
**CURRENT FLOWING ON THE OUTSIDE IS CALLED "COMMON MODE CURRENT" AND IS BAD.**

To prevent common mode current (**I3**) from flowing, we use an RF Choke which only chokes **I3**. It has no effect on **I1** or **I2**. If **I5** cannot flow on **I3**, all of its current is forced to flow on **I2** (where it belongs).

**THIS KEEPS ALL CURRENTS "IN BALANCE" (which is what we want).**

There is a special name for an RF Choke that is used at the junction of a balance with an unbalance: "**BALUN**". It's just a name. It's job is to choke the RF current attempting to flow on **I3**.

**I have no idea why it was named a balun instead of just calling it a choke!**



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