

Build an All Band HF Air Core 1:1 Choke Balun THE "UGLY BALUN"

A balun's purpose is to allow connecting a BALANCED load (e.g., a dipole or driven element) to an UNBALANCED line such as coax which is not balanced, thus the name, Balun. The 1:1 choke "balun" is not actually a balun. It's function is to help eliminate rf currents from flowing on the outside of coaxial cable using the principle of choke action.

In transmitting antennas, this is accomplished by presenting a high impedance (resistance), to RF currents flowing outside the coax shield. This forces currents in each side of a driven elements to be equal. This is especially important in beam antennas because it prevents distortion of the beam's pattern caused by unequal currents in the driver(s). In a simple dipole, the balun (choke), assures that the dipole, and not the feed line, is doing the radiating!

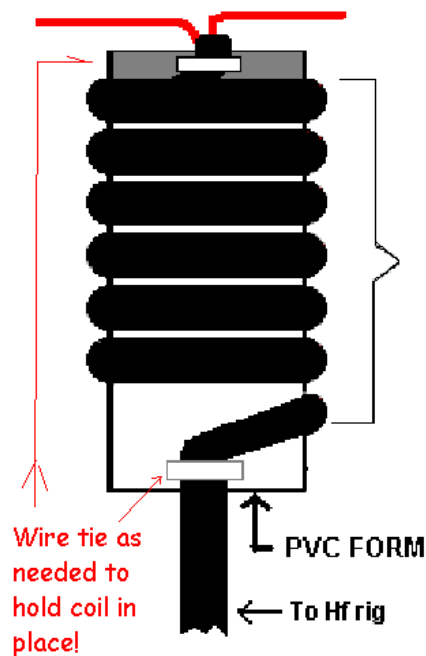
When you connect center fed antennas, like dipoles, V's, triangles, yagis, rhombics, loops and so on, to coaxial cable, unless care is taken, it is not difficult to end up with **feeder radiation**. Not only can the loss in power be quite significant, but the radiation characteristics of the antenna system will also be seriously compromised.

In laymen's terms, it won't be what you are expecting from the pattern of your antenna.

As the feedline becomes part of the antenna, currents can flow from the line into the mains and on TV cables, metal masts and yagi booms, causing a variety of EMI problems that can be very difficult to trace. Frequently these problems are simply due to unbalance - and the solution is the humble air choke.

If an antenna system is fed at center with a parallel conductor line (provided that correct installation procedures are followed) balance will be maintained, USING A BALUN, with currents in equal and opposite phase canceling each other out.

When the connection is to a coaxial cable, WITHOUT A BALUN, this cannot occur because currents flowing inside the cable from the connection to the inner conductor are separated from those flowing on the outside from the connection to the shield, and the result is unbalance causing feeder radiation. However, if the two electrical circuit elements (antenna and coaxial cable) are coupled using a balun, balance will be maintained. Enter.....The Ugly Balun!.....



This is the basic construction drawing for the 1:1 Choke Balun for 160 thru 10 meters using one continuous length to the rig starting at the antenna attachment points. Depending on your use, coax connectors can be added or other connectors can be made for different types of antennas. Balun should be located AT the feed point of the antenna or very close. Drawing is not to scale and is only showing one method of winding the coax on a PVC form. The important part of the drawing is the 18 to 21 feet of coax close wound on the form. The number of coils is not important....just the length! Don't wind your coax tight enough to crush the internal insulation.

N4UJW

An Inexpensive, High-Performance, Ugly 50 ohm Balun

"Building a no-grief 1.8MHz to 30MHz 50ohm-balun is easy.!"

"No costly ferrite-cores are needed, just a short length of 3 to 5 inch size plastic pipe, about 25 feet of 50ohm coax plus some nylon cable ties.

Solid-dielectric coax is best for this application because foam-dielectric has a tendency to allow a change in the conductor to conductor spacing over a period of time if it is bent into a tight circle. This can eventually result in voltage breakdown of the internal insulation.

The required length of the plastic pipe depends on the diameter and length of the coax used and the diameter of the pipe. For RG-213/U coax, about one foot of 5 inch size pipe is needed for a 1.8MHz to 30MHz balun. For 3.5MHz to 30MHz coverage, about 18 to 21 feet of coax is needed. This length of coax is also adequate for most applications on 1.8MHz.

18 to 21 feet **should** cover all of 160 through 10 meters.

The number of turns is not critical because the inductance depends more on the length of the wire (coax) than on the number of turns, which will vary depending on the diameter of the plastic pipe that is used.

The coax is single-layer close-wound on the plastic pipe.

The first and last turns of the coax are secured to the plastic pipe with nylon cable ties passed through small holes drilled in the plastic pipe.

The coil winding must not be placed against a conductor.

The name of this simple but effective device is a choke-balun.

NOTE: Some people build choke-baluns, without a plastic coil-form, by scramble-winding the coax into a coil and taping it together. The problem with scramble-winding is that the first and last turns of the coax may touch each other. This creates two complications. The distributed-capacitance of the balun is increased and the RF-lossy vinyl jacket of the coax is subjected to a high RF-voltage. The single-layer winding on the plastic coil-form construction method solves these problems since it divides the RF-voltage and capacitance evenly across each turn of the balun"....AG6K

Credit for this article goes to AG6K, Rick Measures and was edited from a Pre-copy version of another article titled "A BALANCED - BALANCED ANTENNA TUNER" published in QST, February, 1990.

"Ugly Balun" photos, ideas and installations sent in by users!

Here are examples in the pictures below using cable ties on PVC pipe forms which work well also. Your choice! (Imagine the coil form is removed). Pictures are showing how to secure the coils together. Do not let the first and last coils touch!



Picture above courtesy of VE7AVV



Picture above courtesy of KC2NXV shows using 2 pvc couplers joined and glued using about 2 inches of 4 inch PVC pipe, so the couplers would adhere and be stronger.

More "Ugly Balun" ideas from DAVE THOMAS, M3RUH BELOW:



The Dave Thomas, MW3RUH BOTTLE SPECIAL!



Dave uses a plastic drink bottle as a form. He installs an S0-239 in the bottle cap and antenna connectors on the other end!
NICE TIP DAVE!



Photos courtesy Bill, KI4PCB, using 4" PVC FORM
Notice the screw terminal block used for connections



KI4PCB "Ugly Balun" on the air!



The N7ATA "Ugly Balun in Real Life"...thanks Dan!



Courtesy of G4APL (see info below)



Courtesy of G4APL (See info below)



Courtesy of G4APL.

(Air choke used on Mosley Mustang Mark3 3 element 10,15, 20 metre trapped Yagi)



G4APL Ugly Choke Balun inline with the GB7CIP Pactor Trapped HF Ground Plane

Another Ugly Choke Balun by G4APL

Paul, G4APL, has brought together some excellent examples on how to construct and build Choke Balun in the pictures above and the information below to share with us:

Paul decided to build two or three of them, depending on what material could be found in the shed.

The idea was to add a balun to the HF beam, a Mosley Mustang Mark3 3 element 10,15, 20 metre trapped yagi. This is fed with co-ax and has the Mosley earth strapped at the feed point. The beam has been adjusted for the low end of the HF (High Frequency) bands.

Paul had used a commercial balun in the 1970's before and burnt this one out. It was supposed to be rated to 1 kilowatt pep. (peak envelope power).

Using the information material from the instructions for the "Ugly Balun" above, it was time to see what was in the shed.

A short length of 4 inch drain pipe was located that was left over from the 90 foot of drain pipe laid underground that carries the RF cables. Also found a 2 inch piece of down pipe.

Materials: HF Beam Balun

12 inches length of 4inch diameter PVC drain pile

cable ties

18 foot of RG58

two suitable cable plugs

Having got all the required tools out, it Paul and hour to build the Ugly Choke Balun as pictured above.

The HF Balun is attached vertically to the Stub Mast at the Mosley Mustang Mark3 beam

Paul was very surprised with the results. Testing the aerial and Balun with 250 Watts the standing wave was surprisingly good.

Never seen this beam produce these results before!

14.005MHz to 14.150MHz 1.1:1

14.200MHz 1.2:1

14.250MHz 1.4:1

14.300MHz 1.9:1

21.005MHz to 21.300 1.1:1

21.400MHz 1.2:1

28.005MHz – 28:400MHz 1.1:1

28.500MHz 1.2:1

Now to do some dxing and see how the aerial performs.
Hope the above is of use to you.....73 Paul G4APL

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More from ZL1ALZ, JOHN from New Zealand!
"Ugly Balun" construction used on a 40 meter vertical!





Closeup of the ZL1ALZ "Ugly Balun"



The VE2ITZ Balun with Sloper Antenna!

Excellent results!

Never had such an easy time at tuning the sloper antennas with the "Ugly Balun"!
By the way; the balun consists of 20 feet of coax wound around a 2 and a half inch diameter plastic bottle. I then proceeded to put gaffer tape to hold it in place.