12 Uses of HF Trifilair L

By G8MNY (Updated Apr 15)
(8 Bit ASCII graphics use code page 437 or 850, Terminal Font)

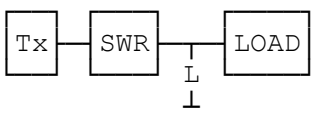
A suitable RF ferrite ring or rod wound with 3 identical windings is quite versatile, here we consider them for Tx Aerial use, but they are also used in Detectors & Mixers.

The amount of ferrite in the core & material at a given frequency determines the power handling. Core saturation shows up as SWR change at high power & core heating after some time. The inductance is the square of the number of turns, so increase it by 40% doubles the inductance! Maximum efficient is when the core nearly saturates at full power at the lowest frequency. Both ferrite & copper losses increase with frequency, but an unsaturated ferrite core coil has much lower loss than an air cored one, due to the 10-100x less wire needed.

TURNS & WIRE LENGTH

To work well at low frequencies the inductance reactance must be much greater than 50Û to the Tx, but to work well at high frequencies the total wire length must be much less than a 1/4 wave! These 2 opposing parameters will limit the number of bands a single choke can be used on!

To test your core is OK for all HF bands & powers, do the following tests..



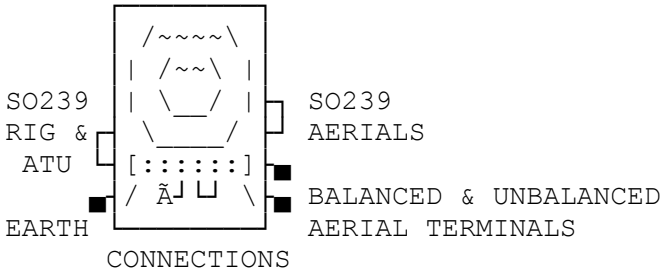
Use short connecting leads to "T" in the inductor to a good dummy load.

a) On low power, test how many turns are needed on the lowest band (1.8MHz) so that the SWR is better than 1.3:1.
b) Now repeat that test at full power (400W), does the SWR change? Does the core heat up? If it does either of these put on more turns, or double the core size.
c) On low power, do the test on the highest band (30MHz), SWR should still be good.
d) Now are 3 of these windings in series longer than 1/8 wavelength at the highest frequency? If it is it will not work at that frequency! If shorter then wire up as in 10/ below & terminate with good RF 450R e.g. 3x 150R (used in // are they a good 50Û?). Test on the highest band again at powers suitable for your 450R load. SWR still OK?

If your inductor passes these test, you have one suitable for all bands & powers provided the aerial impedance is sensible!

HOUSING

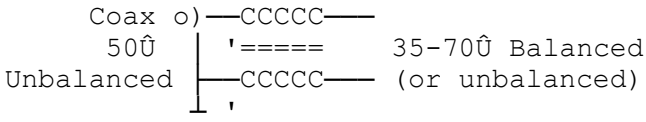
Put the coil into a box with 2x SO239 & screw up wire terminals & earth post as close to the 6 way connection terminal block. And leave the leads just long enough to go to all options.



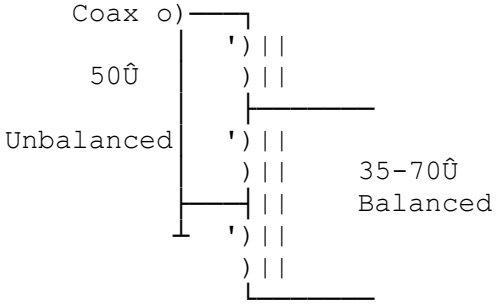
Connect the 6 leads of the 3 windings to the 6 way connector block & wire up as needed. (different colour wires/sleeves?)

THE 12 USES ARE...
(The ' indicates the start or one end of the windings)

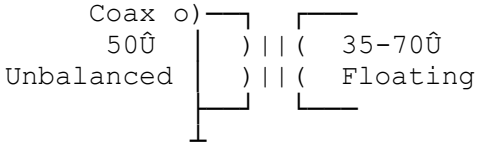
1/ 1;1 Choke Balun. (uses 2 windings, work when there is an RF earth!)
Core handles only 25% of the total power!



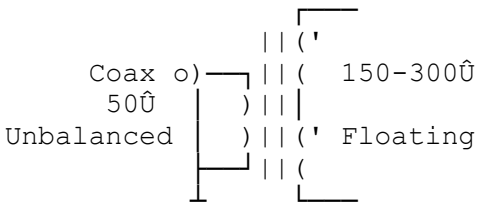
2/ 1:1 Transfomer Balun (works OK with high Z RF earths!)
Core handles only 50% of the power



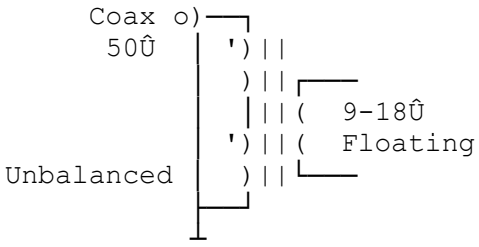
3/ 1:1 Isolation Transformer. (uses 2 windings)
The inter-winding capacitance affects RF isolation.
Core handles 100% of the total power!



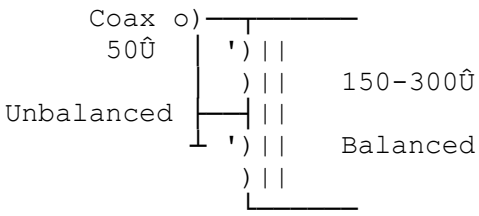
4/ 1:2 Isolation Transformer. 1:4 Z
The inter-winding capacitance affects RF isolation.
Core handles 100% of the total power!



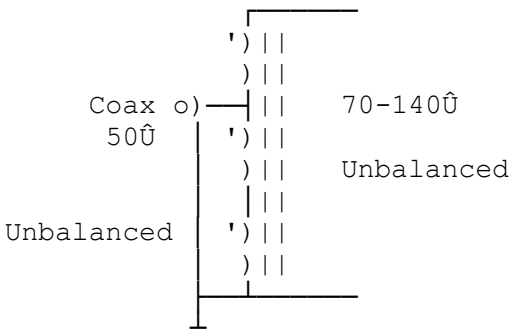
5/ 2:1 Isolation Transformer. 4;1 Z
The inter-winding capacitance affects RF isolation.
Core handles 100% of the total power!



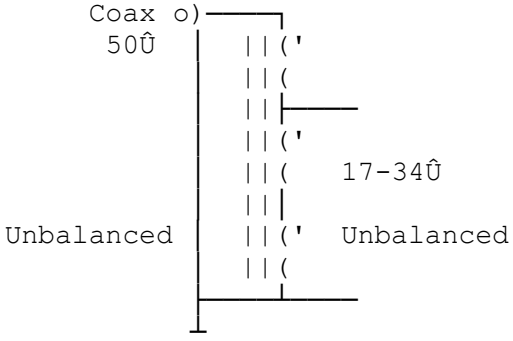
6/ 1:2 Balun Transformer. 1:4 Z (uses 2 windings)
Core handles 50% of the total power!



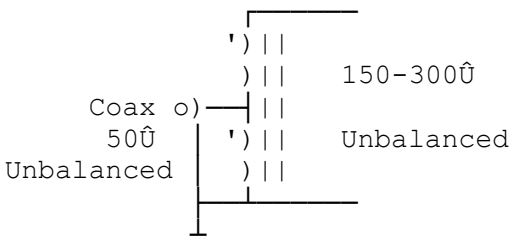
7/ 2:3 Auto Transformer. 1:2 Z UnUn
Core handles 33% of the total power!



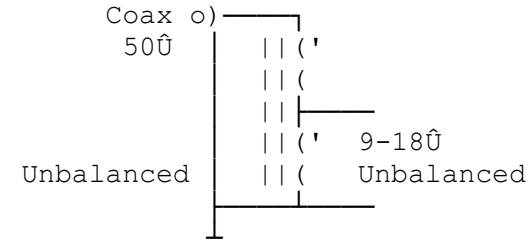
8/ 3:2 Auto Transformer. 2:1 Z UnUn
Core handles 33% of the total power!



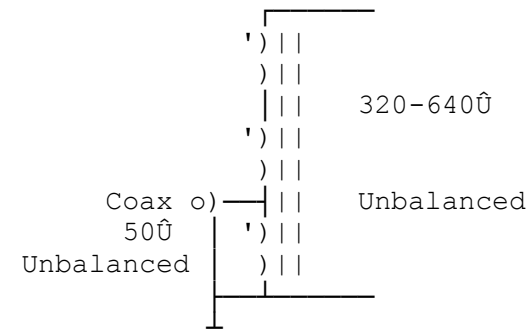
9/ 1:2 Auto Transformer. 1:4 Z (uses 2 windings)
Core handles 50% of the total power!



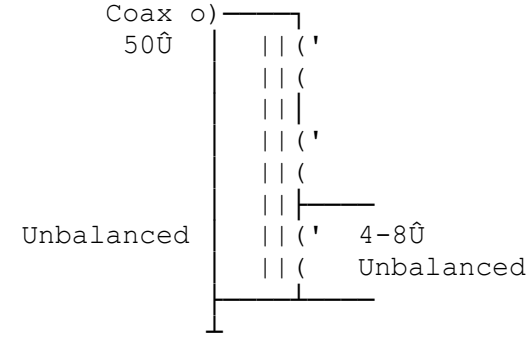
10/ 2:1 Auto Transformer. 4:1 Z UnUn (uses 2 windings)
Core handles 50% of the total power!



11/ 1:3 Auto Transformer. 1:9 Z UnUn
Core handles 66% of the total power!



12/ 3:1 Auto Transformer. 9:1 Z UnUn
Core handles 66% of the total power!



See my Tech Bul "Understanding Transformers".

Why Don't U send an interesting bul?

73 De John, G8MNY @ GB7CIP