

9:1 VOLTAGE UNUN, Version 3

1:9 voltage unun using a FT140-43 Ferrite Toroid Core for 1.0MHz to 60MHz.

For use with a quick and easy multi-band antenna deployment for portable and camping operations a simple long wire antenna with an earth plus counterpoise arrangement with a 9:1 voltage unun is popular. Requiring a unun to feed a long wire antenna mostly with a tuner a 9:1 voltage unun design using a FT140-43 ferrite toroid core was selected.

The 1:9 unun is connect to an un-balanced feed line and to an un-balanced antenna with an impedance step up from typically 50ohms to 450ohms, the 1:9 Voltage unun is design using a FT140-43 Ferrite Toroid Core. It is recommended that a choking balun be included for un-balanced feed line connection.

Similar to the version 2 unun the new version has achieved much improved transformation efficiency over a greater band-width. The improved transformation efficiency over a greater band-width is primarily due the the evenly spaced windings around the core.

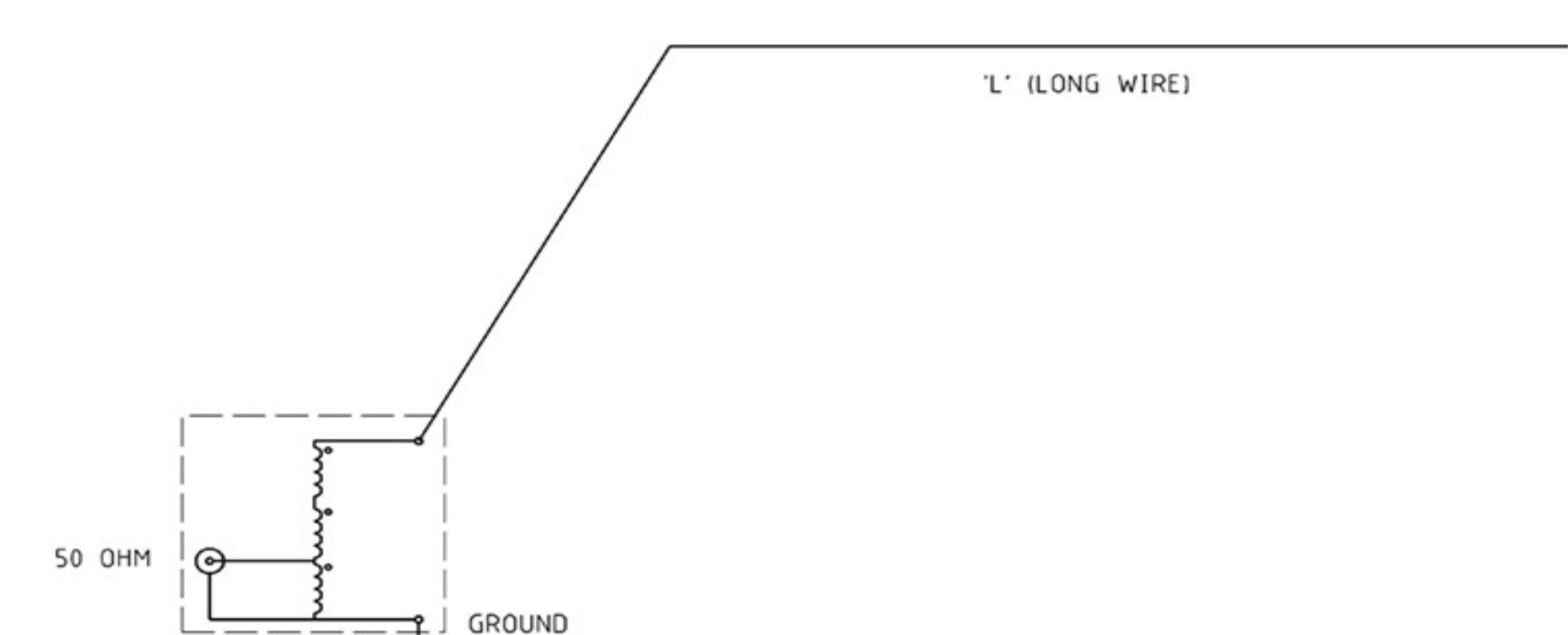


Figure 1 Typical 9:1 voltage unun and long wire antenna configuration.

Construction

The 1:9 voltage balun has 5 turns wound evenly spaced around the FT140-43 Ferrite Toroid Core. The attention to evenly spaced winding significantly improved the efficiency and bandwidth of this balun compared with the version 1 unun.

The toroidal core was wrapped in overlapping layers of PVC electrical tape to protect the enamelled copper wire from insulation puncture from abrasion with the toroid core and to prevent the windings from slipping so as to maintain the winding spacing.

The length of enamelled copper wire per winding for the FT140-43 ferrite toroid core is determined by length per winding plus tails = 350mm

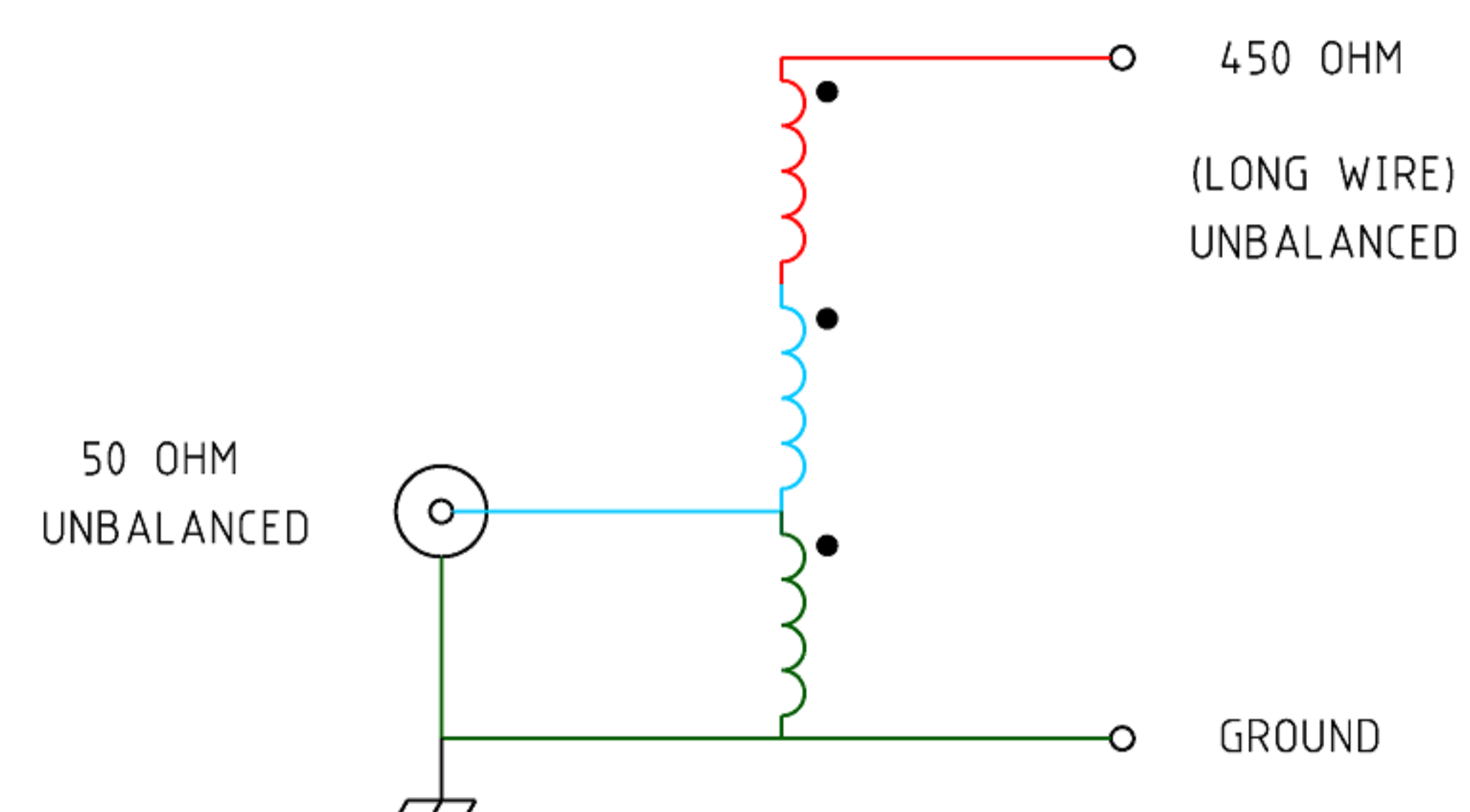


Figure 2 Schematic of the 9:1 voltage unun. Typically unbalanced = 50/75 ohms too unbalanced = 450/675 ohms.

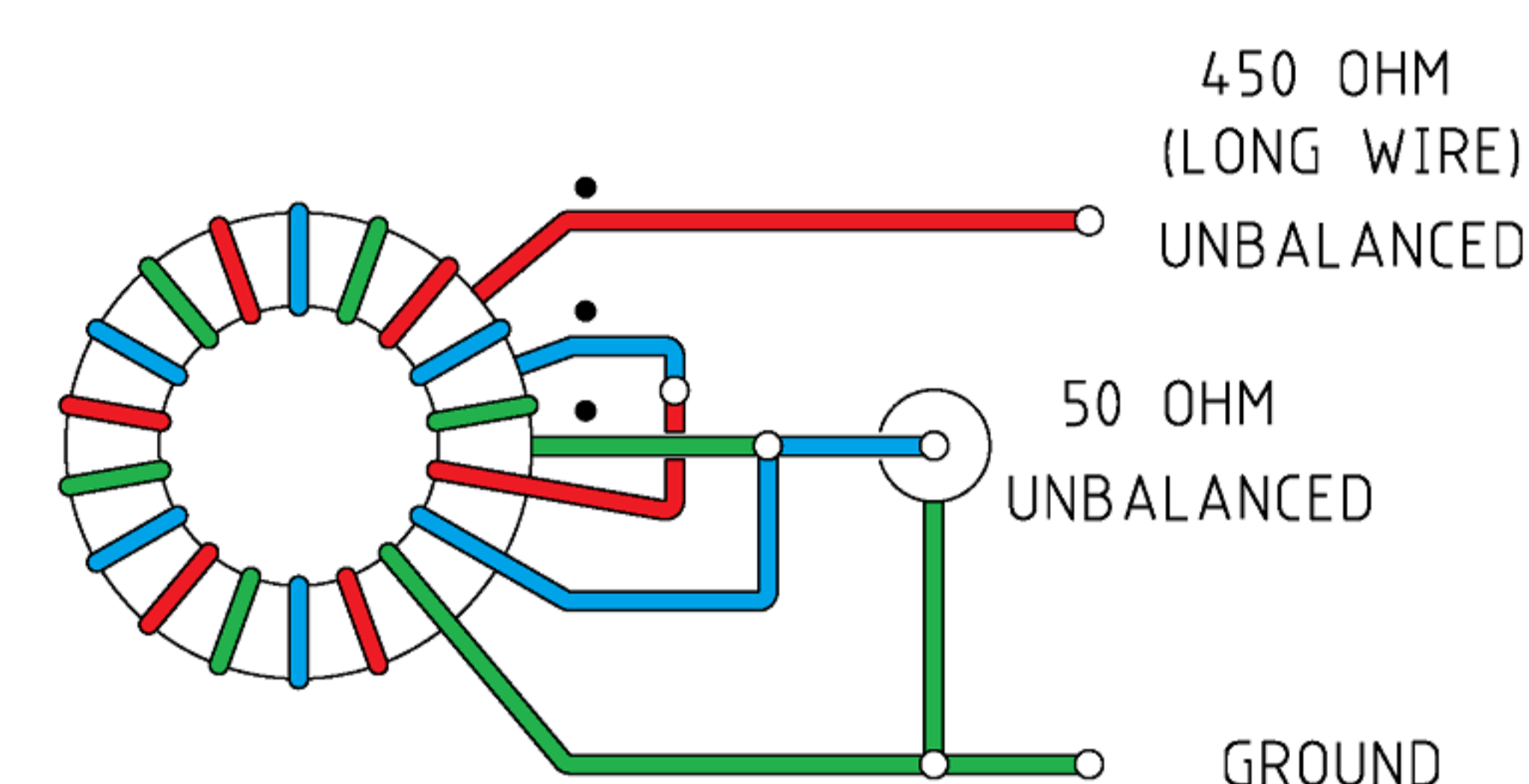


Figure 3 Wiring of the 9:1 voltage unun.

Type	UnUn Voltage
Ratio	1:9
Frequency Range	1.0 - 60MHz
Core Used	FT140-43 Ferrite Toroid Core
Number of turns	5 x 3 Evenly spaced.
SWR	Low 1:1.06 (5.1MHz) High 1:1.7 (60.0MHz)
PEP Power Handling	Approximately 100W



Photo 1 Completed core winding assembly. note fibre glass tube sections to hold winding groups together.

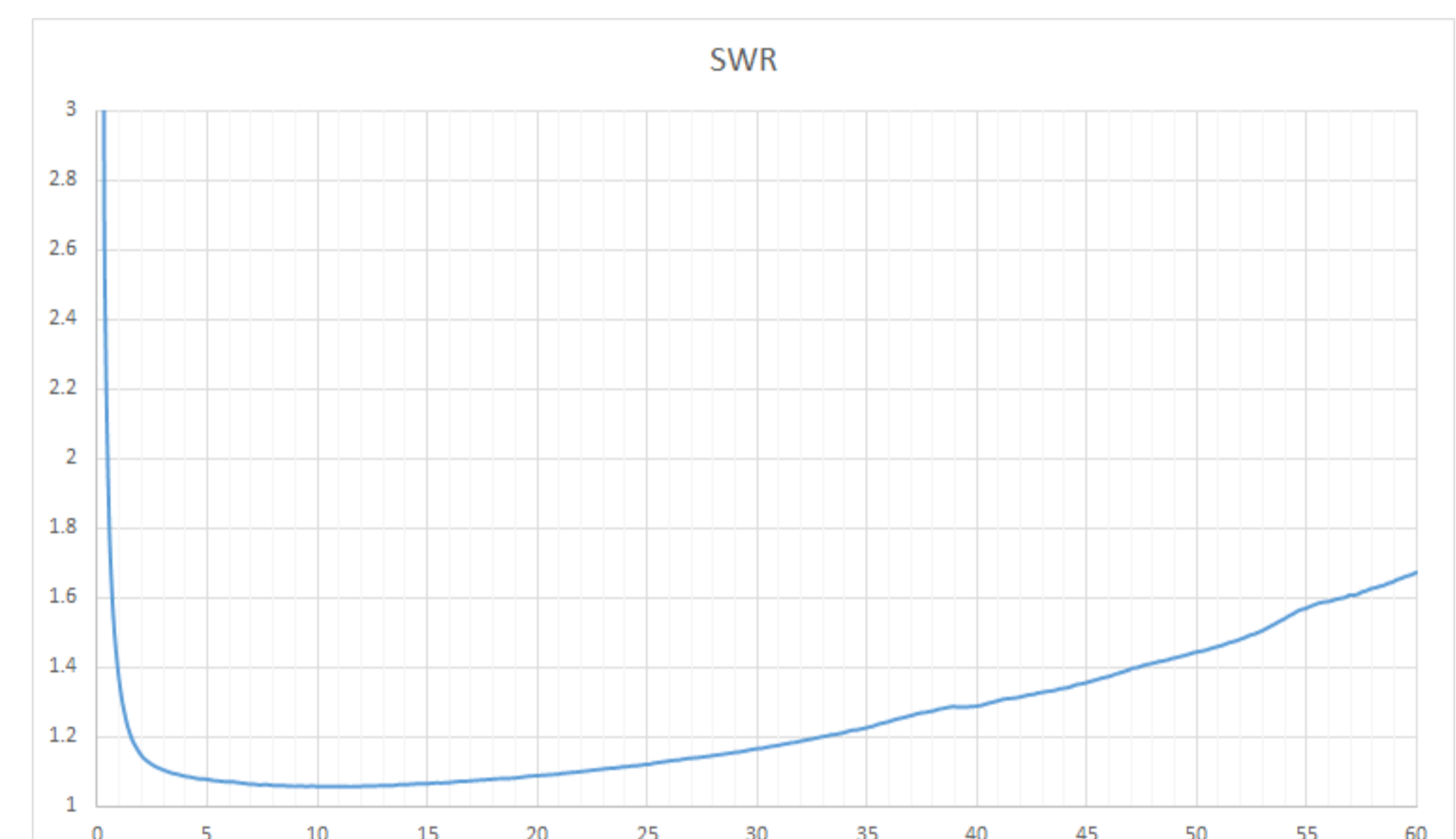


Figure 3 SWR. The AIM 4170C antenna analyser graph viewing a 450ohm resistive load through the voltage balun from 0.1MHz to 60MHz. Note the 450ohm resistor appears as 50ohms due to the 1:9 unun ratio resulting in an ideal SWR of 1:1. The SWR is shown to be consistently low for all Amateur radio bands with a high of just over 1:1.65 for the 6m band.

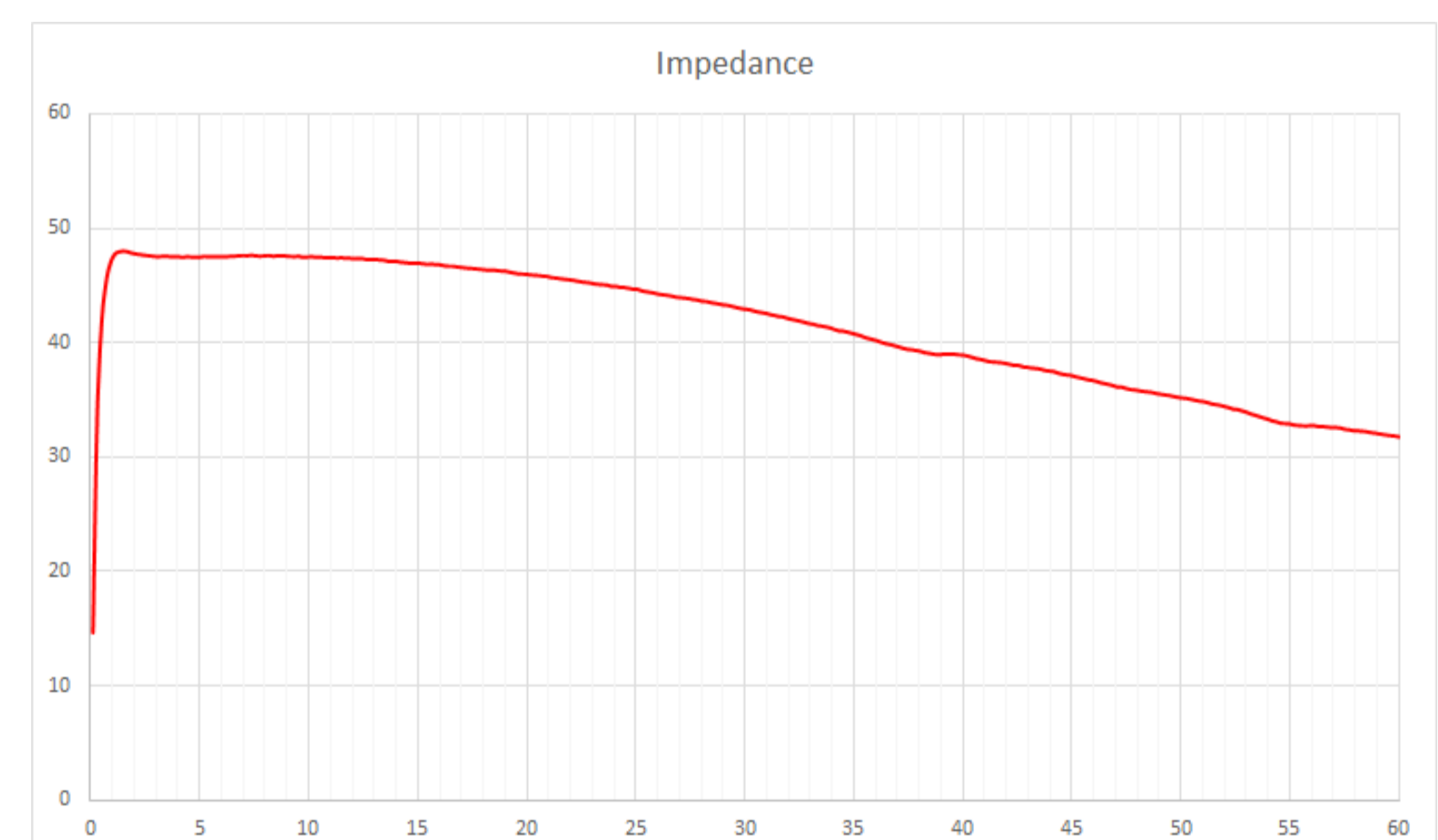


Figure 4 The AIM 4170C antenna analyser graph viewing a 450ohm resistive load through the voltage balun from 0.1MHz to 60MHz. Note the 450ohm resistor should ideally appears as 50ohms due to the 1:9 balun ratio.

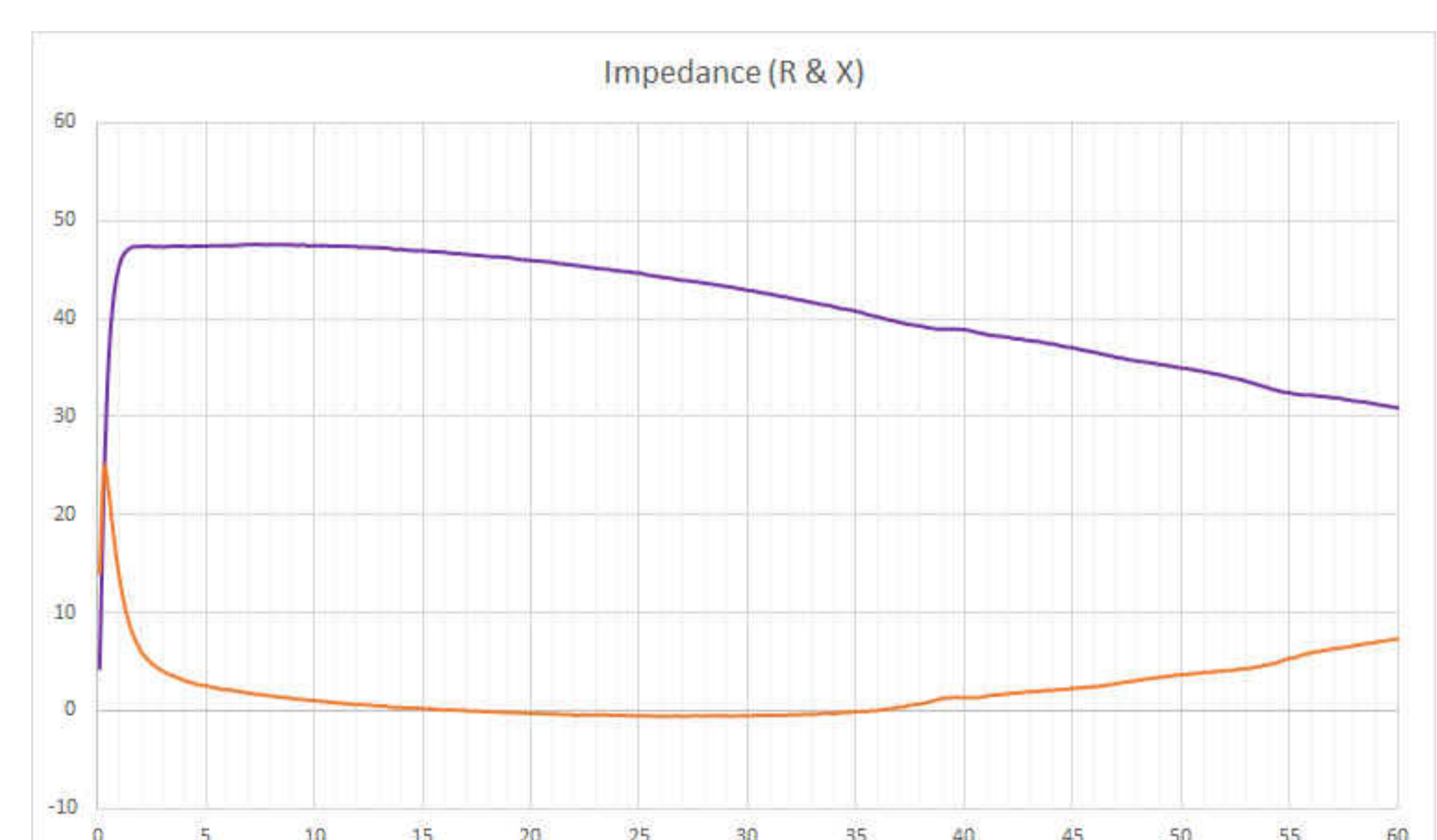


Figure 5 The AIM 4170C antenna analyser graph viewing a 450ohm resistive load through the voltage balun from 0.1MHz to 60MHz. Note the 450ohm resistor should ideally appears as 50ohms due to the 1:9 balun ratio. The impedance should ideally be R (Resistance) at 50 ohms and X (Reactance) near zero ohms. The Purple line shows the resistance component in ohms of the impedance and the Orange line shows the reactive component in ohms of the impedance. the + values for the reactance represent Inductive reactance and the negative values represent the Capacitive reactance.

Conclusion

The Version 2 1:9 voltage unun using a FT140-43 Ferrite Toroid Core represents a very efficient balun for a frequency range from 0.5MHz to 60MHz at a power level of 100W PEP.

Also see other baluns and ununs:

- [BALUN 1:1 CHOKE & 1:4 BALUN](#) HF ladder feed-line to coaxial cable combination choke and 1:4 balun. (0.1MHz - 30MHz).
- [BALUN 1:1 CHOKING](#) Choking balun for lower HF and MF bands. (200kHz - 10MHz).
- [CHOKING 1:1 BALUN - HF BANDS](#) Reinsert choking balun. (1.0MHz - 30MHz) FT240-43 Ferrite Toroid Core.
- [CHOKING 1:1 BALUN - HF BANDS](#) Reinsert choking balun. (1.5MHz - 30MHz) FT140-43 Ferrite Toroid Core.
- [CHOKING 1:1 BALUN - LOW VHF BAND](#) Choking balun. (10MHz - 60MHz) FT140-43 Ferrite Toroid Core.
- [BALUN 1:1 CURRENT](#) 1:1 Guanella Current balun using a L15 ferrite core (1.8 - 30MHz).
- [BALUN 1:4 SINGLE CORE CURRENT](#) 1:4 Guanella Current Balun, single FT240-43 ferrite toroid cores. (0.3MHz - 30MHz).
- [BALUN 1:1 VOLTAGE 1:1](#) Ruthroff voltage balun using a T200-2 powdered iron toroid core (1.8 - 30MHz).
- [BALUN 4:1 VOLTAGE 4:1](#) Ruthroff voltage balun using a T200-2 powdered iron toroid core (1.8 - 30MHz).
- [BALUN 6:1 VOLTAGE - VERSION 1](#) 6:1 Voltage balun using a L15 ferrite toroid core (1.8 - 30MHz).
- [BALUN 6:1 VOLTAGE - VERSION 2](#) 6:1 Voltage balun using a FT140-43 Ferrite Toroid Core (1.8 - 30MHz).
- [BALUN 9:1 VOLTAGE - VERSION 1](#) 9:1 Voltage balun using a L15 ferrite toroid core (1.8 - 30MHz).
- [BALUN 9:1 VOLTAGE - VERSION 2](#) 9:1 Voltage balun using a FT140-43 Ferrite Toroid Core (0.5 - 60MHz).
- [UNUN 9:1 VOLTAGE 9:1](#) voltage unun using a T200-2 powdered iron toroid core (1.8 - 30MHz).
- [UNUN 9:1 VOLTAGE VERSION 2](#) 9:1 voltage unun using a L15 ferrite core (1.8 - 30MHz).
- [UNUN 9:1 VOLTAGE VERSION 3](#) 9:1 voltage unun using a FT140-43 ferrite core (0.5 - 60MHz).

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