9:1 VOLTAGE UNUN. Version 2

9:1 voltage unun using a L15 ferrite core.

With the view to establish a quick and easy multi-band antenna deployment for portable and camping operations a simple long wire antenna with an earth or earth plus counterpoise arrangement with a 9:1 voltage unun is one possible solution.
Requiring a unun to feed a long wire antenna ideally without a tuner a 9:1 voltage unun design using a L15 ferrite toroid core was selected.

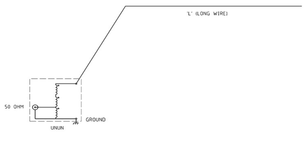

Figure 1 Typical 9:1 voltage unun and long wire antenna configuration.

Construction

1.25mm Enamelled copper wire was used in a triple bifilar winding of 4 turns wound evenly spaced around the L15 ferrite toroid core with the three individual windings wound close together.

The length of enamelled copper wire per winding for the L15 ferrite toroid core is determined by length per winding plus tails = 600mm

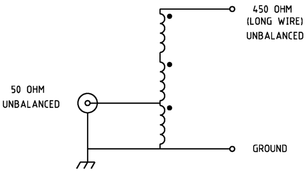

Figure 2 Schematic of the 9:1 voltage unun. Typically unbalanced = 50/75 ohms too unbalanced = 450/675 ohms.

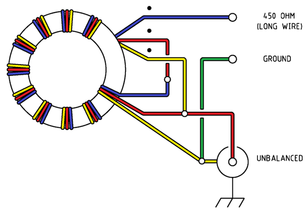

Figure 3 Wiring of the 9:1 voltage unun.
Note this drawing shows winding connections and not the number of turns required. See article for details.

Parts list.

- 1 x L15 ferrite toroid core. Jaycar Cat. No. LO-1238
- Pink heavy duty Teflon plumbers tape.
- About 3 x 400mm of 1.25mm Enamelled copper wire.
- Black and Green binding posts.
- SO-239 UHF chassis mount connector
- Sealed Polycarbonate Enclosures 82 x 80 x 55mm from Jaycar Cat. No. HB-6230. See Fig 3 for details

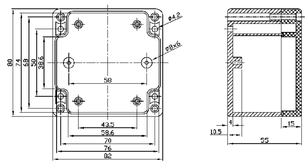

Figure 4 Sealed Polycarbonate Enclosures 82 x 80 x 55mm details

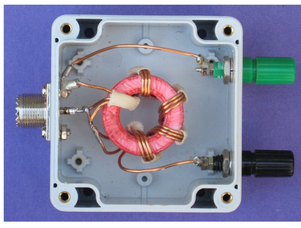

Photo 1 Completed core winding assembly. note fibre glass tube sections to hold winding groups together.

The evaluation of the efficiency of the unun over the desired bandwidth (1.8 - 30MHz) was carried out by testing the impedance that could be seen from transceiver side of the unun to a resistive load applied to the antenna side of the unun using an antenna analyser.

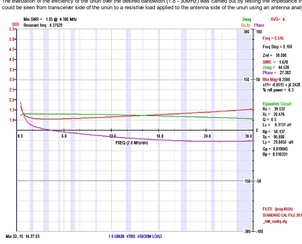

Figure 5 AIM 4170C antenna analyser plot viewing a 450ohm resistive load through the unun. Note the 450ohm resistor appears as 50ohms due to the 9:1 unun ratio resulting in an ideal SWR of 1:1.

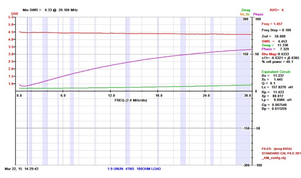

Figure 6 AIM 4170C antenna analyser plot viewing a 100ohm resistive load through the unun. Note the 100ohm resistor appears as 11.1ohms due to the 9:1 unun ratio resulting in an ideal SWR of 4.5:1.

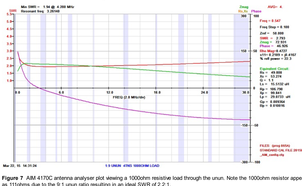

Figure 7 AIM 4170C antenna analyser plot viewing a 1000ohm resistive load through the unun. Note the 1000ohm resistor appears as 111ohms due to the 9:1 unun ratio resulting in an ideal SWR of 2.2:1.

AIM 4170C antenna analyser explanation;

SWR	Standing Wave Ratio.
Zmag	Total Impedance.
Theta	Phase angle between voltage and current.

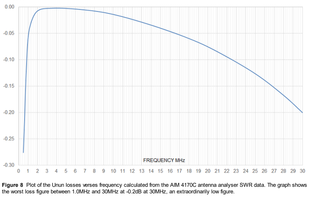

Figure 8 Plot of the Unun losses verses frequency calculated from the AIM 4170C antenna analyser SWR data. The graph shows the worst loss figure between 1.0MHz and 30MHz at -0.2dB at 30MHz, an extraordinarily low figure.

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 Reisert choking balun. (1.0MHz - 30MHz). FT240-43 Ferrite Toroid Core.
CHOKING 1:1 BALUN - HF BANDS Reisert 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 CURRENT 1:4 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 2 9:1 voltage unun using a FT140-43 ferrite core (0.5 - 60MHz).

References

Martin Ehrenfried G8JNJ experimentation with baluns and ununs see: http://g8jnj.webs.com/balunsandtuners.htm

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