

1:4 GUANELLA CURRENT BALUN - HF

1:4 Guanella Current Balun for HF and MF bands. (0.3MHz - 30MHz).

Requiring a balun to feed a balanced feed line from an un-balanced T-Match tuner, a 1:4 Guanella Current balun design using a single FT240-43 ferrite toroid core was selected. An impedance transformation balun is required due to variations in impedances that are nearly always on the higher side of the nominal 50 ohms when feeding a multi-band balanced antenna system. The balun may be required to step up the feed impedance presented at the T-Match tuner to improve the matching range.

Construction:

The 1:4 current balun consists of two double bifilar windings of 11.5 turns each, wound evenly spaced around the FT240-43 ferrite toroid core, as shown in figure 2.

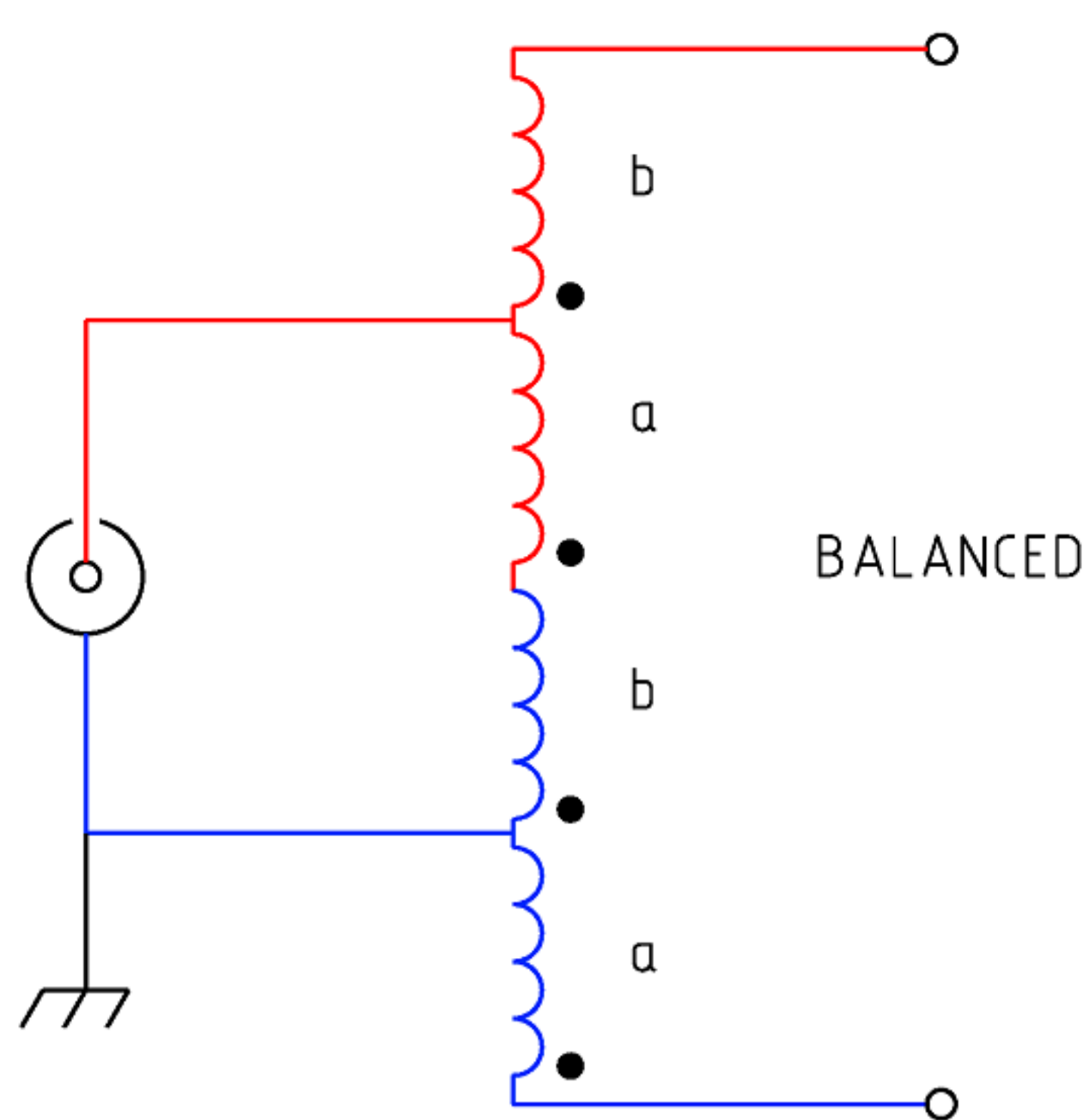


Figure 1 Schematic of the 1:4 Guanella Current balun.

Type	Impedance transformation
Ratio	1:4
Frequency Range	1.5 - 30MHz
Core Used	FT240-43 Ferrite Toroid Core
Number of turns	a = 11.5 tuns plus b = 11.5 turns
SWR	1.2:1 or less. Ref: Figure 3

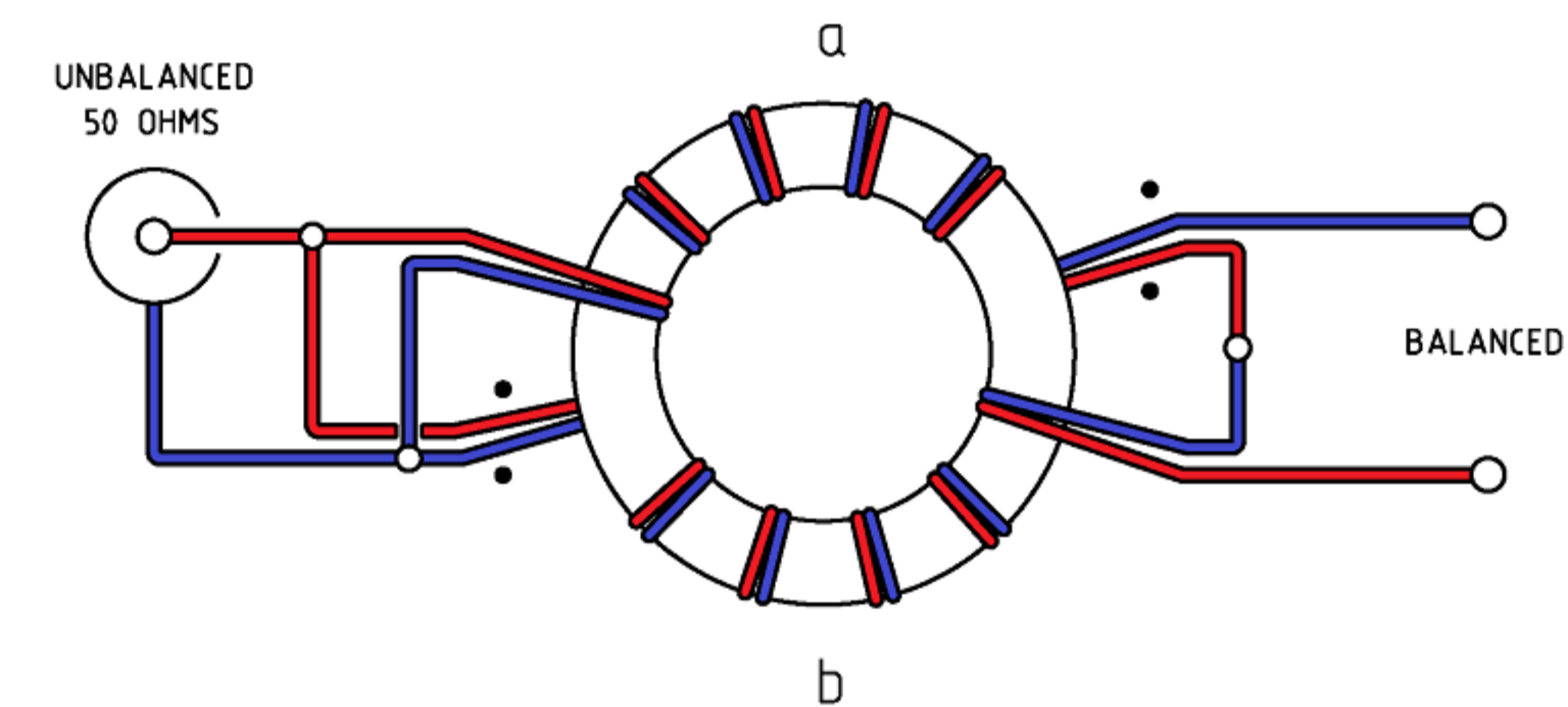


Figure 2 Wiring of the 1:4 Guanella Current balun.

Note this drawing shows winding connections and not the number of turns required. See article for details.

Parts list.

- 1 x FT240-43 ferrite toroid core.
- 4 x 800mm of PTFE silver plated copper wire, 1.0mm, AWG 18, WHITE

Testing

The AIM 4170C antenna analyser recorded the impedance transformation efficiency of the balun over a frequency range from 1.0 MHz to 30 MHz.

The evaluation of the balun's efficiency across the desired bandwidth (1.0 - 30 MHz) was conducted by testing the impedance seen from the unbalanced side to a resistive load applied to the balanced side of the balun using an AIM 4170C antenna analyser. The efficiency was found to be relatively consistent from below 1.0 MHz to above 30 MHz. The antenna analyser plot below shows a 200-ohm resistive load connected to the balanced side of the balun, with measurements taken at a nominal impedance of 50 ohms. As expected, this set-up presented an approximate 50-ohm load to the analyser and ideally resulted in a 1:1 SWR. The results are slightly higher than anticipated, but they demonstrate that the balun's 1:4 current transformation occurs reasonably efficiently from well below 1.0 MHz to beyond 30 MHz.

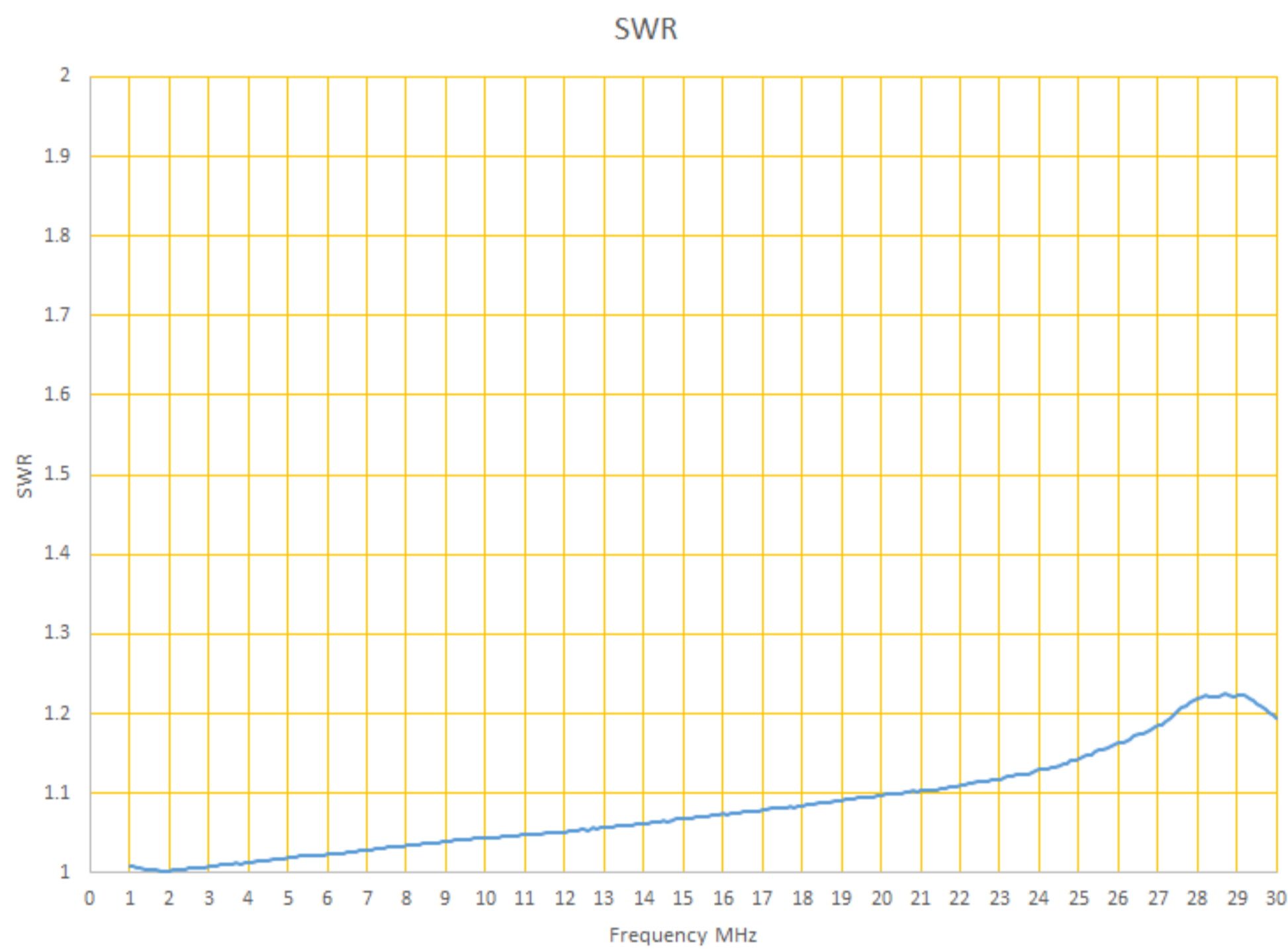


Figure 3 AIM 4170C antenna analyser plot viewing a 200ohm resistive load through the Guanella current balun. Note the 200ohm resistor appears as 50ohms due to the 1:4 balun ratio resulting in an ideal SWR of 1:1. This plot shows an SWR ranging from 1.0:1 to about 1.2:1

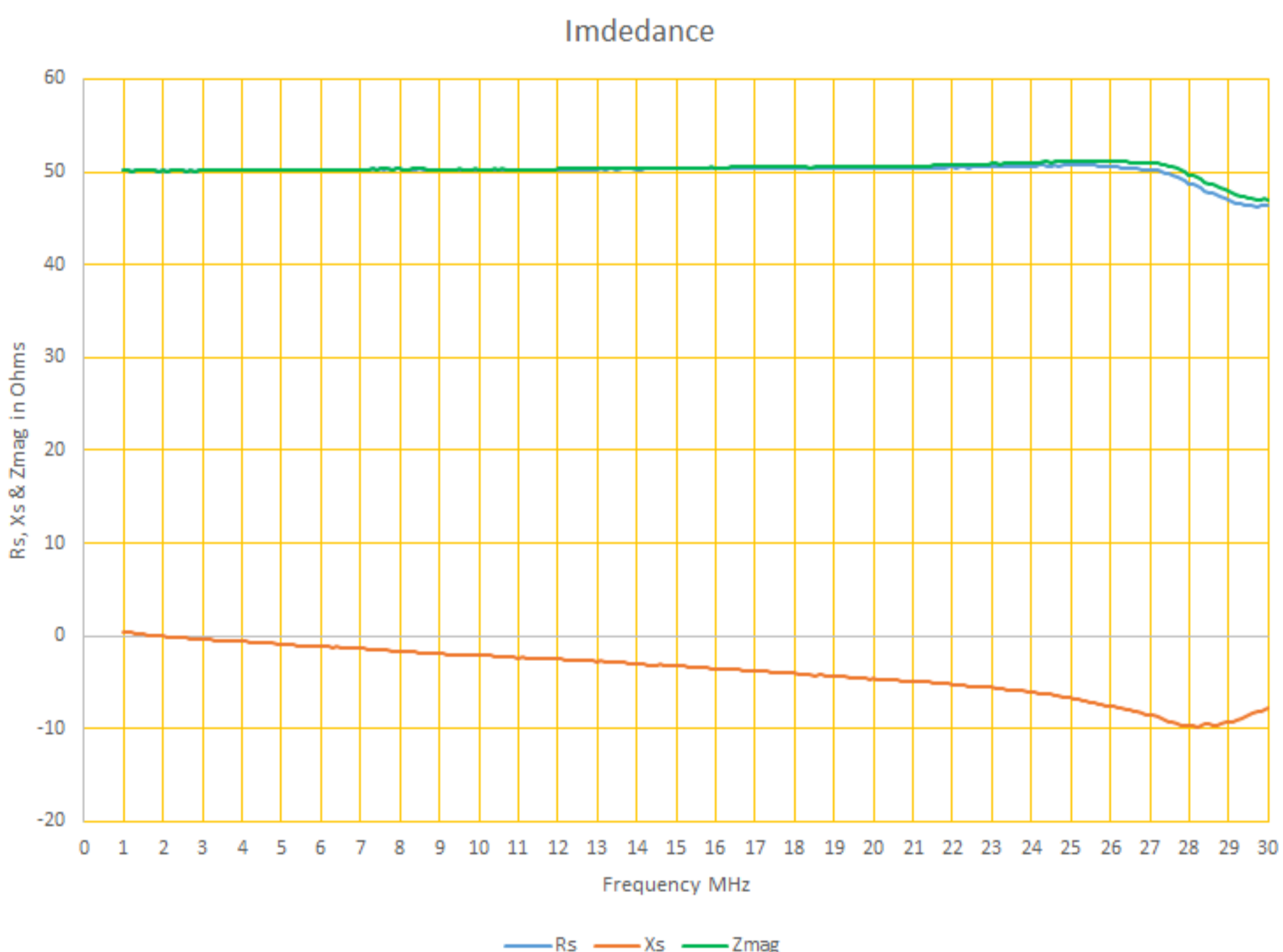


Figure 4 AIM 4170C antenna analyser plot viewing a 200ohm resistive load through the Guanella current balun. Note the 200ohm resistor appears as 50ohms due to the 1:4 balun ratio. The Rs (Resistive load) tracks closely with Zmag as would be hoped with the Xs (Reactive load) being relatively low.

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 T-200-2 powdered iron toroid core (1.8 - 30MHz).
- [BALUN 4:1 VOLTAGE](#) 4:1 Ruthroff voltage balun using a T-200-2 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 T-200-2 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).

[TOP OF PAGE](#)