

4:1 VOLTAGE BALUN

4:1 Ruthroff voltage balun. Install July 2012.

Requiring a balun to feed a balanced feed line with an un-balanced T-Match network a 4:1 Ruthroff voltage balun design using a T200-2 Toroid core was selected. While the 4:1 ratio is often referred to for the interface between T-Match network and a balanced antenna system it will often not be the ideal choice when very low impedances are encountered. It is for this reason that I chose to not include the balun as an integral feature of the T-Match network, opting for the flexibility of an outboard balun and the ability to trial various baluns subject to the antenna system and impedances presented.

Construction

The T-200-2 powdered iron Toroid core was tightly rapped in a lay of overlapping PVC electrical tape to prevent the enamelled copper wire's insulation being damaged during winding and to offer some additional electrical insulation with core.

The double bifilar winding of 17 turns are wound evenly spaced around the toroid core with the two individual windings wound close together.

The length of enamelled copper wire per winding for the T-200-2 powdered iron toroid core is determined by length per winder = 50mm per turn plus 200mm tails

The exact number of turns is not critical but the numbers listed in the preceding table should yield good results. It is possible to exceed the power ratings listed above but the performance of the balun may be degraded during high SWR causing heating of the core.

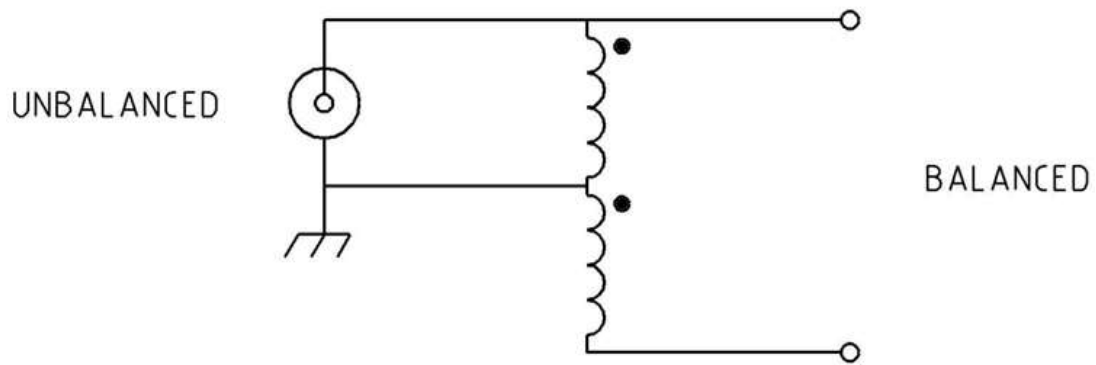


Figure 1 Schematic of the 4:1 Ruthroff voltage balun. Typically unbalanced = 50/75 ohms and balanced = 200/300 ohms.

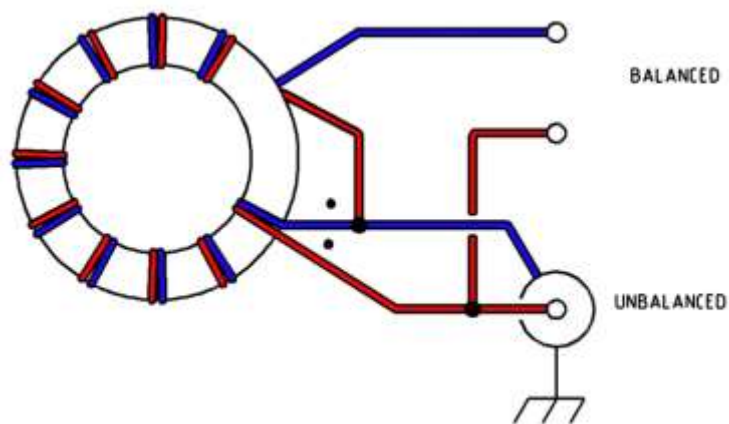


Figure 2 Wiring of the 4:1 Ruthroff voltage balun. Note this drawing shows winding connections and not the number of turns required. See table

TOROID	NUMBER OF TURNS	POWER RATING
T80-2	25	60 Watts
T106-2	16	100 Watts
T130-2	18	150 Watts
T157-2	16	250 Watts
T200-2	17	400 Watts
T200A-2	13	400 Watts
T400-2	14	1000 Watts

Table 1 lists alternative toroid core with winding suggestions.

Parts list.

- T-200-2 powdered iron toroid core from [Amidon](#)
- About 600mm of 1.25mm Enamelled copper wire.
- Two black binding posts
- SO-239 UHF chassis mount connector
- Sealed Polycarbonate Enclosures 82 x 80 x 55mm from [Jaycar](#). See Fig 3 for details

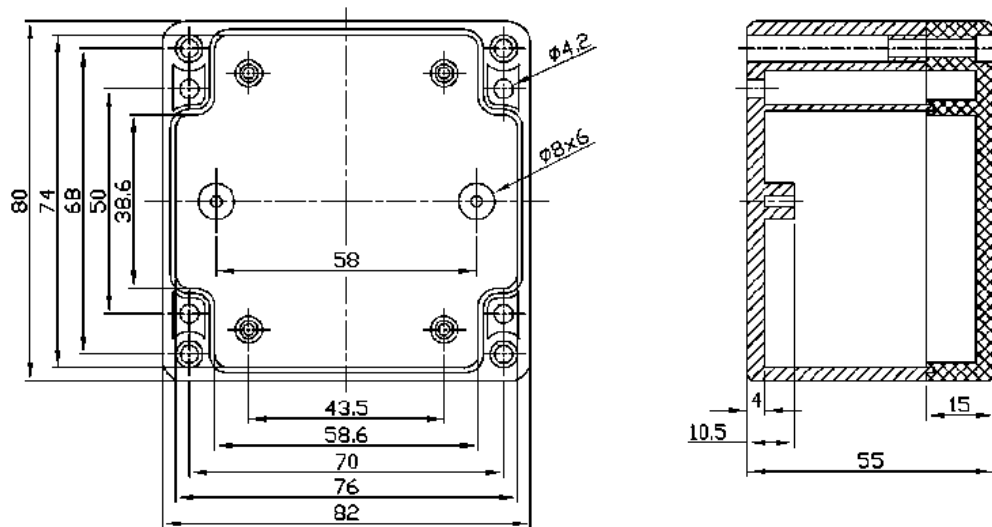


Figure 3 Sealed Polycarbonate Enclosures 82 x 80 x 55mm details



Photo 1 4:1 Ruthroff voltage balun assembled.