

I7SWX COAXIAL-FED MULTIBAND “WINDOM” ANTENNA

Giancarlo Moda – I7SWX

This simple multiband antenna works on all HF bands from 3.5 to 30 MHz, including WARC bands other than 10.1 MHz. It is, in effect, an adaptation of the twin wire form of the 300 ohm antenna but fed with a coaxial cable, in this specific case, with an impedance of 75 ohm and a 4:1 balun adaptor, as shown in Figure 1.

This antenna was experimented in 1978 and has been in use till middle of 90s when, due to my last house move, I had not a suitable space to install it. It has been tested with power of up to 200W RF and the SWR at the transmitter is quite low, max around 2-2.5:1 at band edges.

The 4:1 transformer, in Fig. 1c, is made of PVC-insulated wire (eg. Black and red wire used for connecting loudspeakers to hi-fi amplifiers) connected as in Fig 1b. The winding can be of 10 to 12 turns, twin wire, wound over a ferrite rod, with a diameter around 10 - 12 mm, like the one used in the old transistor AM radio.

The transformer support can be made using a PCB, removed of the copper foil, after the soldering spots, B, X and C, have been cut. A solution using PVC material in different forms, flat panel, pipe, box is valid. It will be necessary, particularly for the panel, to have some kind of metal tags where wires can be soldered. The panel solution can also have at least two holes, on each side, to support the radiating wires, as in the drawing.

This antenna was published in RadCom, “Technical Topics”, March 1988; it is also reported in the RSGB books: “HF Antenna Collection” and “Antenna Topics”.

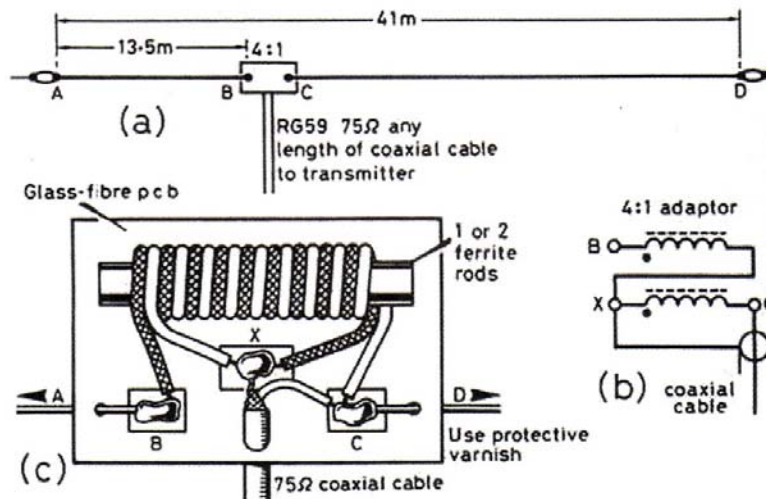


Fig 15. I7SWX's multiband antenna and 75/300Ω balun transformer

Figure 1 – I7SWX's multiband antenna and 75:200 ohm balun transformer.

When the antenna was designed, I used a 75 ohm flexible coax cable and the 4:1 balun adaptor was the right choice. Also I had a tube transmitter with a classic PI-network tuning unit. With today's solid state Pas and the standard 50 ohm coax cable, a more suitable 6:1 balun was necessary to match the antenna's 300 ohm feed point. In reality, the feed point impedance changes at each selected band, so probably the 4:1 adaptor may still valid. The 6:1 balun-adaptor is reported in Figure 2. The winding is done, this time, using three wires with PVC-insulation. A twin wire for loudspeakers connection can be used, with the addition of a third single wire, if possible of different

color as to facilitate the connections. The core is still the ferrite rod. In this case, the third winding has a center tap, to make a 6:1 impedance ratio. The third wire has to have a soldered wire at its center, before winding the turns. The rod can be covered with a PVC tape to avoid the CT joint goes in direct contact with the rod itself. Due to the CT joint the winding has to start from the center of rod and ending on both sides. The windings can be blocked onto the rod with straps. The connections have to be made like in Figure 2 [c] and [e]. The coaxial cable has to be connected as in Figure 2, with the screen to point “Y” and center wire to point “X”. This connection delivers a large and flat bandwidth, from 10 to 80 meters.

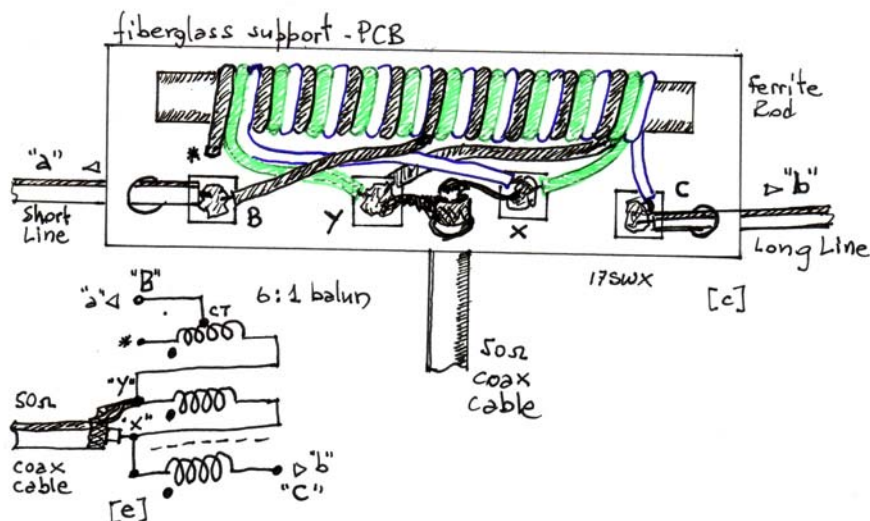


Figure 2 – 50:300 ohm balun-adaptor transformer.

The use of a ferrite rod, as transformer core, versus the classic toroid delivers a superior balun. The reason is very simple. The magnetic flux in the rod is not confined only in the ferric material but also on the “air”. The core of a toroid is formed only by the ferric material. It is not possible to have the core material saturation, for high power and also high SWR. There will be no overheating of the core and no subsequent damage of the core itself, like many ham have experienced with toroid transformers. For high power application, the wiring should be Teflon-insulated and the use of 2 or 3 ferrite rods is suggested. This may require the reduction of the number of turns if a reduced bandwidth is affecting the 10 meters band.

The use of insulated wires, for the I7SWX balun, is better than the classic magnet wires due to the high impedance of the transmission line formed, 100 to 150 ohm, permitting a better match to the high impedance of 300 ohm at the antenna feed point. Windings with magnet wire are OK to match 50-75 ohm coaxial cables to lower impedances.

The I7SWX Windom antenna has been assembled by many radio-amateurs in Europe, Russia, USA and other parts of the world. Some users have doubled the wires length and using it to operate down to the 160 meters band with very good results.

Giancarlo Moda, I7SWX – updated on Dec. 2003

I7swx@yahoo.com