A Matching Technique Using 50 & 75 Ohm Cables

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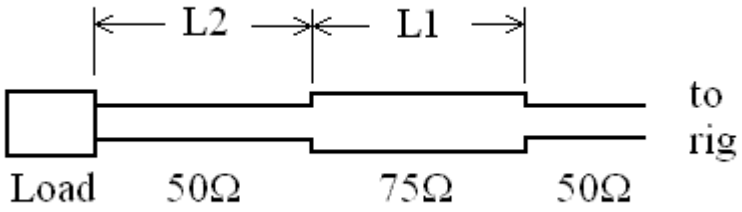
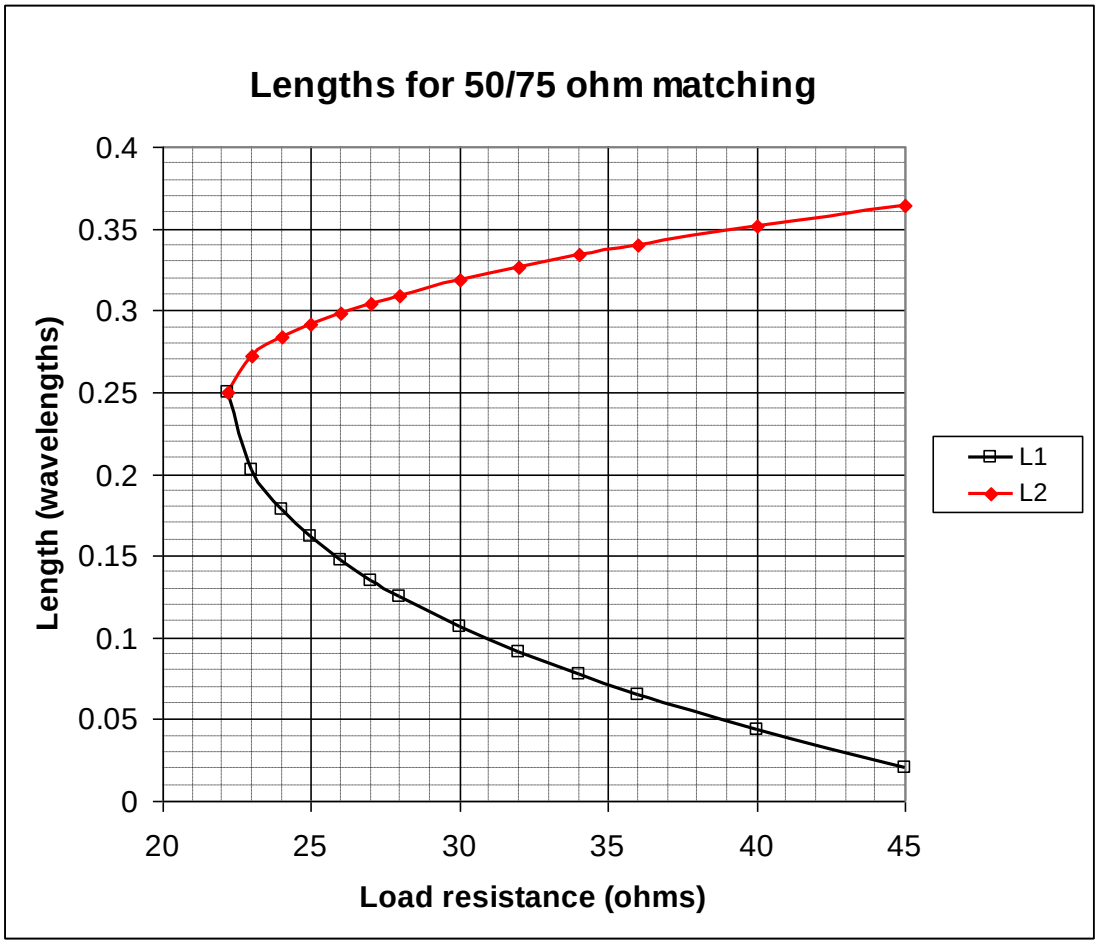
The following shows how to use sections of 50 and 75 ohm cables in series to match resistive loads of less than 50 ohms to a 50 ohm transmission line. This can be useful particularly for feeding vertical and Yagi antennas. The general configuration is shown in the following figure.



A section of 75 ohm line is inserted in the 50 ohm line to the antenna. For load impedance between 22.2 and 45 ohms the required lengths to give a perfect match are given by the following curves. A perfect match is not possible for loads under 22.2 ohms.



For example let's say we want to match a Yagi which has an input impedance of 25 ohms (with no reactance) at 50.150 MHz, using sections of RG-58C/U (50 ohms) and RG-59B/U (75 ohms). From the chart the lengths needed are

$L1 = 0.161\ \lambda$
$L2 = 0.291\ \lambda$.

Since the wavelength at this frequency is 5.98 m and both of these cables have velocity factors of 66%, the actual cable lengths required will be

L1 = 63.5 cm (25.0 inches)
L2 = 114.8 cm (45.2 inches).

If it is desired to use a balun at the load, a portion of the cable, including the matching sections L1 and L2, may be coiled up to create a choke, or ferrite beads can be slipped over the load end of L2 to create a W2DU-type balun.