Yes, All My Coax Cables Are 75 Ohms (and everything works OK!)

CO2KK exposes some myths about using 75-ohm feedline with 50-ohm rigs and shows us how to build a "cotangent transformer," a simple matching device to make it all work.

By Arnie Coro, CO2KK*

How many times have you heard that 50-ohm cable is a must? Equipment instruction manuals, advice from the experts, and antenna handbooks all seem to agree that present-day amateur radio technology is all set for 50-ohm impedance devices *only*.

Of course, you probably haven't had the opportunity to actually *measure* your transceiver's real output impedance, with really professional instruments. But if you ever do, be ready for quite surprising numbers coming out of those dials! I'll give you a hint—the reading probably *won't* be 50 ohms.

The 50-Ohm Myth

But let's go back to the myth: "50-ohm cable or nothing!" Now, reading that last line, maybe your mind went to that tail end of low-loss, 75-ohm CATV cable that the technician at the local cable company offered just for the asking not too long ago. Or perhaps you remembered what you paid for the latest run of 50-ohm coax for your new 2-meter antenna, and you hurriedly compared it to what an equivalent run of 75-ohm TV-type cable would have cost. And maybe, you're now thinking how many newcomers to the hobby could get started at substantial savings by using lower cost 75-ohm TV cable for their rigs.

Keep thinking about possible sources of 75-ohm coaxial cable, and I'll happily show you how to use it in many applications, *without the slightest chance of damaging your transmitting equipment.*

No Difference on Receive

Thorough testing of 75-ohm coax used in place of 50-ohm cables for receiving applications shows practically *no detectable difference*, even at frequencies as high as 150 MHz. Try it yourself. Measure a length of 75-ohm cable to replace an equal length of 50-ohm coax, use the same type of connectors, arrange your setup so that you may switch cables easily, and watch your results.

If the 75-ohm cable has the same kind of dielectric and the shield or braid coverage is equivalent to that of the 50-ohm coax it replaces, signals from 100 kHz to 150 MHz will show practically no measurable difference.

I've conducted this experiment time and again to show my friends what actually happens. My test bed is a typical receiving setup for SWLing (shortwave listening), using a broadband Tilted Terminated Folded Dipole (TTFD) antenna covering 6 to 30 MHz. The antenna is located about 100 feet (approximately 30 meters) from the receiver.

Changing the 50-ohm coaxial cable for an equal length of 75-ohm cable, of the same average quality, produces no measurable difference on signals received.

For those really tough-to-convince guys, I use a very low power signal source located about 10 wavelengths away from the antenna. The solid-state, crystal-controlled 10-meter source is installed at my closest ham neighbor's shack (about a city block away) so I can run the tests around 28.5 MHz with the 10-meter band closed and have a very stable signal at the receiving antenna. Again, changing from the 50-ohm RG-213 to a 75-ohm RG-11/U makes no difference on any of the receivers I've tried.

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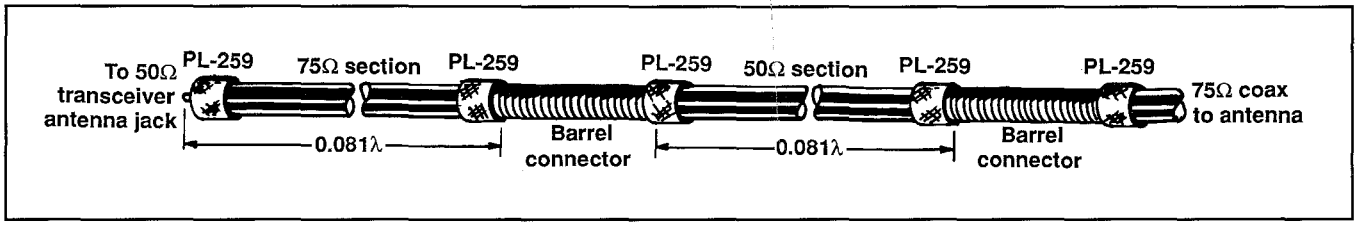

Figure 1. The cotangent transformer. Two .081-wavelength pieces of coax, one 50-ohm and the other 75-ohm, connected as shown, allow you to use lower-cost 75-ohm feedline with no loss in signal strength.