

Steve Uhrig, SWS Security

Once upon a midnight dreary, blitz pondered, weak and weary:

- > Does anyone have the specs on this stuff? I know it's 50 ohms, but I'm in
- > need of the velocity factor, as I'm going to use it for making a wi-fi
- > collinear antenna and need to do some precision cutting.

Velocity factor is a dynamic thing.

Even on new coax it can be off 3%.

It will be different with spooled coax than from un-spooled coax.

It changes with age.

It changes with temperature and humidity.

It changes with the phase of the moon.

Only way to know velocity factor for sure is to lay out a measured length, the longer the better, with maybe 100 feet being minimum and 300-400 feet being much better. Un-spooled, not on spool. Measure carefully with a tape several times and get a precise length.

Then connect a TDR to one end and diddle the velocity factor until the TDR reads the measured length of the cable.

Repeat from opposite end of cable, and average the two velocity factors. They will not be the same but they should be close.

For precision work, empirical measurement is the only thing to do I can think of. Published velocity factors are guidelines only, and valid for new coax only.

Lease or borrow a TDR if you don't have one. Worth every penny. I prefer Riser-Bond www.riserbond.com. They have good tutorials too. Buy used. Any model will work.

I have an unused buried cable between my house and shop next door, which is measured precisely at 250 feet. It's that jelly filled telco cable. When we trenched one time between the buildings, I buried the cable. I use that known 250 feet to check calibration of my own TDRs.

Short story:

Some years ago my crew and I were installing a UHF comms system in New Delhi, India, on a government contract. 3 close spaced repeaters on a single TX and RX antennas using TX/RX combiners and multicouplers.

I couldn't get decent performance out of the combiners.

My test equipment said the antenna itself, feedline and all the repeaters were fine. Everything pointed to the combiners.

Hundreds of dollars in Sprint's pocket on the phone with TX/RX and their marvelous, incredibly patient competent tech support all comes back to problems with the coax interconnect harness on the cavities which I had built on site because their bureaucracy couldn't give us our third frequency enough in advance to prep everything stateside.

I've got brand new Belden coax, proper connectors, proper tools, patience and experience, and I can't make it work.

I must have rebuilt the bloody harnesses 3 times. Same results. Working from the Belden data sheet for calculating the lengths based on velocity factor. Critical at UHF, especially with our close spaced freqs. I am down to my last precious set of Amphenol connectors, and I had brought plenty of spares.

No luck. Clock is ticking, customer giving me the hairy eyeball and I am embarrassed. And as much as I love India and her people, you can set your watch by the start of the monsoon season in March, and I long ago learned to be out of the country before monsoon season starts, not on a roof doing antenna work. Too hot and humid to wear scuba gear during monsoon season, and you pretty near need that if you're working outside as we were.

Costing me USD \$2000 per day to keep my crew over there, and I can't get a good harness. TX/RX very patient, God bless them, and they will get all of my business for the rest of my life. Can't say enough good about them.

Finally an idea bubbles to the surface.

I call Belden. Rather, I try to call Belden. On hold at \$2/minute. Wind my way through to engineering. Explain my plight. They're rather competent, but somewhat cold shouldered, treat me like an idiot and hard to get through to them (this was 10+ years ago; don't know the current situation with them but I still respect the quality of their product). I am not an idiot. I know how to measure and install N connectors properly. I need help. I suspect their product.

Their product can't be the problem. Must be my workmanship.

Sprint will post good quarterly revenues this time with the money I am spending with them on long distance from Delhi to the USA, and only occasionally can I get a call through without waiting for a clear line.

Finally Belden condescends to check.

Gee. They find a problem with their product.

There is a misprint in their data sheet on velocity factor. It's .68 for

that particular double shielded coax, not .86 as listed in their data sheet (or vice versa; I forget)

I recalculate using the correct velocity factor and build yet another harness and things work perfectly first try. We're wrapped up in just a few hours.

Two days later we're packed and on our way home, which is a 20 hour plane ride BTW.

And now I measure velocity factors for critical applications. I don't trust data sheets. Nor will I ever use any other than known fresh coax from a reputable supplier. I've had perfect satisfaction with Joel at RF Connection www.therfc.com here in MD if anyone cares.

That misprint cost me ten thousand bucks.

Belden says 'sorry about that'.

And the kid learns a lesson.

Steve

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"In God we trust, all others we monitor"
