

Putting the Proper Crimp in Your Style

I am sure you have heard the saying, “I wish I had a dollar for every ...” Well, I wish I had a dollar for every bad coaxial connection I have run across the past 30 years!

Making a good coax connection takes a little practice and an eye for detail. Since an estimated 70 percent of video system service calls are connector-related, I’m sharing some tools and guidelines to help you make better installations.

Connections More Vital Than Ever

In the past, many of us who worked on CCTV could get by with a less-than-perfect crimped Bayonet-Neil-Concelman (BNC) connector. That was also when anything below 200MHz was considered high frequency.

Well, the bar has been substantially increased and high frequency is considered anything below 1,000MHz or 1GHz. Today, a flawed coax connection can severely reduce performance on digital systems like ThinNET (Ethernet) and high-end video like SDTV, DTV and HDTV.

A poorly installed CCTV BNC connector might have yielded a 1dB or less loss on a CCTV system. The same bad connector now can yield a 10dB loss on a > 1GHz system. That would mean that only about a third of the signal would get through the connection.

Knowing the 5 Connector Types

Here is a summary of the five types of connector types:

“N” connectors: “N” connectors were developed at Bell Laboratories soon after World War II. An old high performance coax connector, it has good VSWR and low loss through 11GHz.

BNC connectors: BNC connectors have a bayonet-lock interface. They were first developed for the U.S. Navy after WW II as a water-resistant, positive-locking, constant-impedance RF connector. They are good for use where there are numerous quick connections and are widely used in CCTV, radio, lab equipment and data networks.

BNC’s have a much lower cutoff frequency and higher loss than the “N” connector. They are commonly available in 50-ohm and 75-ohm versions and have a frequency range of up to 4GHz.

TNC connectors: TNC connectors are an improved version of the BNC with a threaded interface. Their frequency range is up to 11GHz.

SMA connectors: SMA, or miniature connectors, became available in the mid-1960s and are typically used with semi rigid, small-diameter, metal-jacketed cable. Their frequency range is up to 18GHz.

“F” connectors: “F” connectors were designed primarily for very low cost, high volume, 75-Ohm applica-



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BOB’S TIPS

- Properly match a connector’s impedance and size to the coax.
- Today’s higher frequency systems make proper connection crucial.
- Do no double crimp.
- Save time and headaches with the proper termination tools.

tions such as TV and CATV. In this connector, the center wire of the coax serves as the center conductor.

3 Factors Affect Connector Choice

There are several parameters to consider when selecting the correct coax connector hardware.

Cable diameter — Careful, RG-58 and RG-59 connectors can easily be mixed up. Crimping an RG-59 connector onto a RG-58 coax will result in a loose fitting. Conversely, the other way around and you will crush the cable and attenuate the signal.

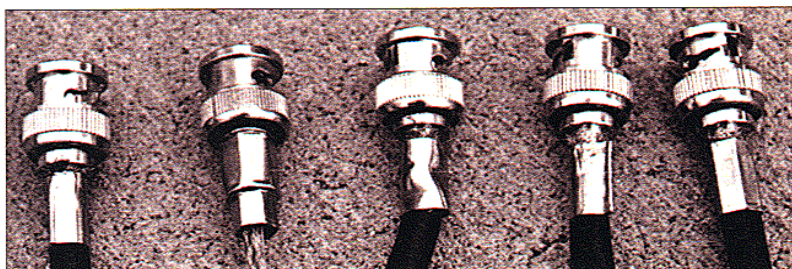
Frequency — Make sure to select a connector for the appropriate frequency range (*see the aforementioned frequency listings*).

Impedance match — Make sure that if you are using a 75-ohm coax, you select a 75-ohm connector. In the past, with CCTV (< 300MHz), one could often get by with a mismatch. However, with higher frequencies, you will get too much signal loss.

Defining Connection Techniques

Let’s review some coax connector configurations, which will save us expense and frustration. Most information is directed at the popular BNC and F-type connectors.

Solder — This configuration is often considered the most labor-in-

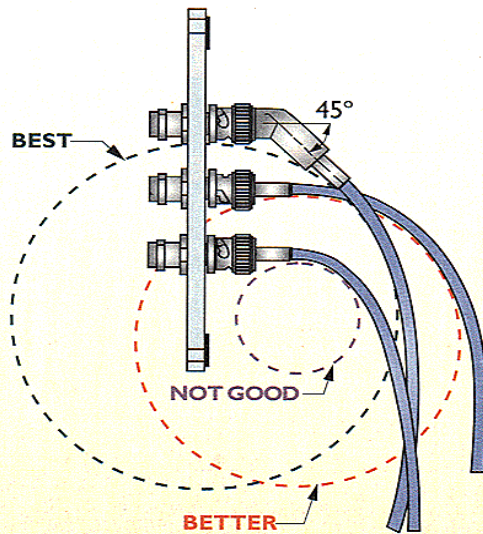


This lineup depicts several examples of poor coaxial crimps. A flawed coax connection can severely reduce performance, especially on today’s more precise digital systems.

Tech Talk

With Bob Dolph

The Advantages of Angled Coax Connectors



Using 45° coax connectors results in a reduction of cable stress and an increase in equipment airflow.

Illustration Courtesy of Trompeter Electronics Inc.

tensive because the connector's center pin, often referred to as the "tit," is soldered. It is also one of the most reliable connections. The only main tool is low-wattage solder iron.

TIP: Avoid cold solder joints and observe flow through the tit observation hole.

Crimp-on—This method has always been the workhorse of the industry. Avoid a bad crimp (*see photo on other page*). Practice your technique. Careful selection of the crimping tool is needed. A properly crimped connector will be slightly flared at the mouth. This is called the *bellmouth* condition and helps relieve stress on the coax. If you are precutting for very large commercial jobs, look at the Trompeter CTB-1.

TIP: Avoid double crimping, especially on the tit; this is known as "flagging." Use a ratchet crimper and select the correct crimping die; don't crimp with your needle-nose pliers.

Compression — This one is sometimes referred to as a Snap-N-Seal

(SNS) or LRC. It is popular since it presses the connector vertically onto the cable without distorting the cable shield and waveguide cavity; as is the case with the crimp-on method. SNS

connectors are supplied with lubricated compression O-rings that allow for a good, weather-tight connection.

TIP: Be sure to press the coax firmly against the connector.

Twist-on -- This technique is not a favorite of the pros. These connections are notorious for coming loose and bad signal transmission. However, they work fairly well if a few rules are followed.

Make sure to use ones that have screw-on center pins. Only use this method with a solid core coax. Don't use it if the connector will be removed frequently or if it involves portable cameras.

TIP: Use a connector wrench to twist down tightly on the coax.

Many of the above connector types come in one-, two- and three-piece configurations. Professionals prefer the three-piece assemblies.

Bring the Right Tools to the Table

Let's review some of the most essential tools for making optimal coax connections.

Coax stripper — This tool is a spinning razor-type cutter for stripping the coax jacket.

TIP: Be careful not to nick the shield braiding. For large commercial jobs, try

the Port-a-Strip power hand stripper.

Cable cutter — Be sure this hand tool has a curved blade so as not to deform the coax cavity.

Tester — Some of these devices can be used to test for shorts, while some can be used to test for center conductor depth.

Shield depth gauge — This is handy for testing various shield depth configurations on multishield coaxial cables.

Coax wrenches — Use this tool for tightening down connector bodies.

How to Approach Larger Systems

On large systems, there are some extra considerations. In my March "Tech Talk," I discussed equipment airflow considerations. Terminating large numbers of coax cable can drastically reduce this equipment airflow and cooling, thereby reducing the life of high-end equipment such as DVRs and RAIDs.

Additionally, tight looping and bending of coaxial at the equipment connections can put stress on the cables, which can drastically affect signal transmission over a period of time. Using 45° coax connectors can drastically reduce both of these potential trouble conditions (*see diagram above*).

TIP: The bending diameter of a coaxial cable should not be less than 10 times the diameter of the cable. That would be less than a 2 1/2-inch diameter bend for RG-59/U and a 4-inch bend for RG-11/U.

Overall, remember that using quality parts and tools in your video installations will make your customers happy and your life easier. Remember the words of CCTV guru and LT.C. Training Center President Charlie Pierce, "Cheat the system and end up cheated."