Bob's TechTalk #10
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Coaxial Connectors (Part III):

SMA, MCX, MCXX, C, HN & SC Connectors

Last month we looked at BNC and RCA Phono connectors; both are popular in the amateur environment. This month we'll look at some less popular connectors that hams sometimes use in projects. These are all constant impedance connectors unless noted.

SMA Connector (also SMB and SMC):

Impedance: The SMA connector is 50 ohms. The SMB and SMC are available in both 50 and 75 ohms.

Size: Sub-miniature, 2 of 5. Quite rugged for its size.

Voltage Handling: 335V peak.

Frequency Range: Up to 18GHz (SMA), 4 GHz – with low SWR, usable to 10 GHz (SMB and SMC).

Cost: Typically 3 of 5. Commercial versions are available.

Weather Handling: Weatherproof SMA connectors are available. SMB and SMC are not specified as weatherproof.

The SMA connector and its derivatives were first developed in the 1960's. SM is an acronym for Sub-Miniature; the letter following designates the version. SM versions of connectors may be used for interconnecting miniature microwave modules. Many of the connectors are designed to fit small rigid coaxial lines. Others fit thin flexible coax such as RG-174. SMA connectors are available to fit coax up to RG-58 sized cable. The connectors are small and some versions can operate to as high as 18 GHz. As ham equipment has become smaller, the SMA connector (which is the most popular of the three versions) has begun to show up on miniature ham equipment. The antenna connector on the Yaesu VX-1R is an SMA connector. The SMA connector also is often used in UHF and microwave home construction projects and commercial equipment.

The connectors differ in size and mating technique. The SMA has 1/4–36 threads. The SMB is smaller than the 'A' version and has snap together mating. The SMC is also smaller than the SMA and utilizes 10–32 threads. Connection to cable is by hex crimp with the pin usually being soldered. Numerous circuit board mounted connectors are also available.

MCX and MMCX Connectors:

The Tiny Male MMCX Connector

The SMA series of connectors are small, and the MCX and MMCX connectors are even smaller. The MCX developed in the 1980's is

about 30% smaller than the SMB and the MMCX developed in the 1990's is even smaller (The outside of the mating male shield of the MMCX is only 0.094" in diameter).

Impedance: The MCX is available in 50 and 75 ohms. The MMCX is available in 50 ohms only.

Size: Sub-sub-miniature, 1 of 5. The MCX uses the same pin and insulator dimensions as the SMB but the outside diameter of the mating plug is only 0.140". The MMCX is even smaller.

Voltage Handling: 335V rms. (MCX), 170V rms. (MMCX).

Frequency Range: DC to 6 GHz at low SWR.

Cost: Typically 4 of 5. Prices are dropping. Cost of "between series" adapters is still quite high.

Weather Handling: None.

The MCX and MMCX connectors are quite new. I would not have included these models except that the MMCX is used on the new Motorola M12 GPS receiver, and while at a recent electronic show I found that these connectors are quickly becoming popular. Installation is by hex crimp with the tiny pin being soldered. I found that the best way to solder the pin is to drill a tiny hole in a reasonably large piece of wood and press the pin snugly into the hole before attempting the soldering. Even the use of self-locking tweezers seems clumsy when attempting to solder such a tiny pin to the coax.

C, HN and SC Coaxial Connectors:

Top–(L to R) : Male C, HN and SC to 'Female N' Adapters
Bottom–(L to R) : Female C, HN and SC to 'Male N' Adapters

The C, HN and SC connectors are on the other side of the size scale. These are not connectors commonly used by hams; however, they are often encountered on surplus military radio equipment and antennas. The usual solution for the ham is to purchase an adapter to convert them to the more popular 'N' connector.

Impedance: All are 50 ohms constant impedance.

Size: Large, 5 of 5

Voltage Handling: 1500V ('C' and 'HN'), 1000V ('SC'). Easily handles the legal limit.

Frequency Range: Up to 11GHz (C and SC), 4 GHz (HN).

Cost: Typically 5 of 5. Connectors are available at specialty connector vendors. Adapters are sometimes available surplus.

Weather Handling: Weatherproof.

Unless you're building a broadcast station, stick with the 'N' connector instead!

Conclusion:

Over the past three issues we've covered many of the RF coaxial connectors hams might encounter. There are lots more that are out there. The TV 'F' connector is one. It's cheap, common and easy to install. If you have a need for some low power 75 ohm connectors it's a good choice. Very inexpensive crimp tools are available at Radio Shack and other stores. (My advice is to skip the very cheapest models.)

Next month we're going back to the basics – Ohms Law. This is the heart of all everything electrical, and it's easy to understand – if you try. While Ohms law is a mathematical equation, it about as simple of one as you'll ever find in science; and we'll try to keep it that simple. Join us in learning how to determine the voltage, current and resistance values in basic circuits.

73, from AF6C

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