Instrumental technique

BNC connector

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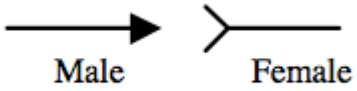
What is it?

The BNC (Bayonet Neill–Concelman) connector is a miniature quick connect/disconnect **electrical connector** used for **coaxial cable**.

Electrical connector:

It is an device used to join electrical terminations and create an electrical circuit. Electrical connectors consist of plugs (male-ended) and jacks (female-ended). There are hundreds of types of electrical connectors.

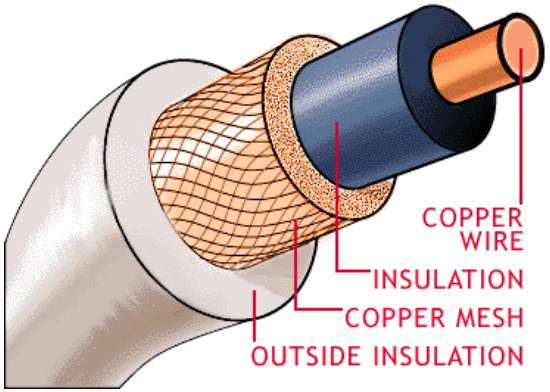


Electronic symbols for male-ended and female-ended connectors

Back of an audio power amplifier features a variety of electrical connectors

Coaxial cable:

Coaxial cable is a type of cable that has an inner conductor surrounded by a tubular insulating layer, surrounded by a tubular conducting shield. The term coaxial comes from the inner conductor and the outer shield sharing a geometric axis



Coaxial cable cutaway

Coaxial cable is used as a transmission line for **radio frequency** signals primarily used for audio and visual purposes.
Radio frequency (RF) is any of the electromagnetic wave frequencies that lie in the range extending from around 3 kHz to 300 GHz, which include those frequencies used for communications or radar signals.

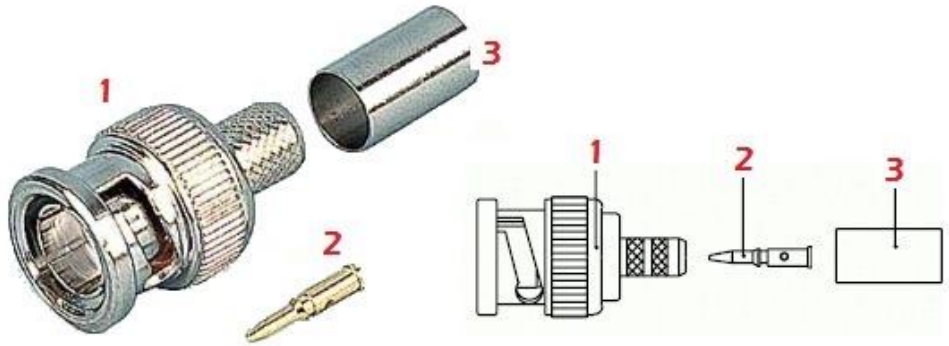
BNC Connector:

The Bayonet Neill-Concelman Connector (BNC connector) is a type of coaxial RF (Radio frequency) electrical connector that is used in place of coaxial connectors.
A BNC connector connects various radio frequencies up to 3GHz and voltages under 500V DC and are used in electronic architectures such as audio, video and networking.

Origin:

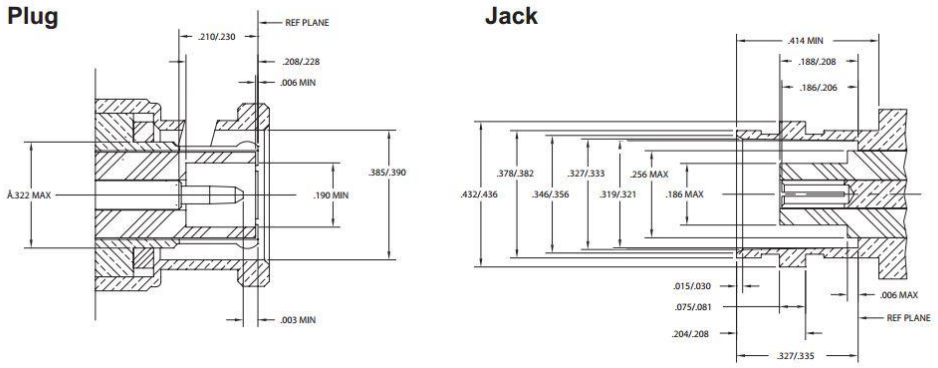
- The BNC connector got its name from its bayonet mount locking device and its inventors, Paul Neill of Bell Labs and Carl Concelman of Amphenol Corporation.
- The basis for the development of the BNC connector was largely the work of Octavio M. Salati, a graduate of the Moore School of Electrical Engineering of the University of Pennsylvania.
- In 1945, while working at Hazeltine Electronics Corporation, he filed a patent for a connector for coaxial cables that would minimize wave reflection/loss. The patent was granted in 1951.
- Its close-fitting connection uses a mount comparable to a knife (bayonet) that is attached onto the end of a rifle.

BNC Connector Parts and Components Diagram:



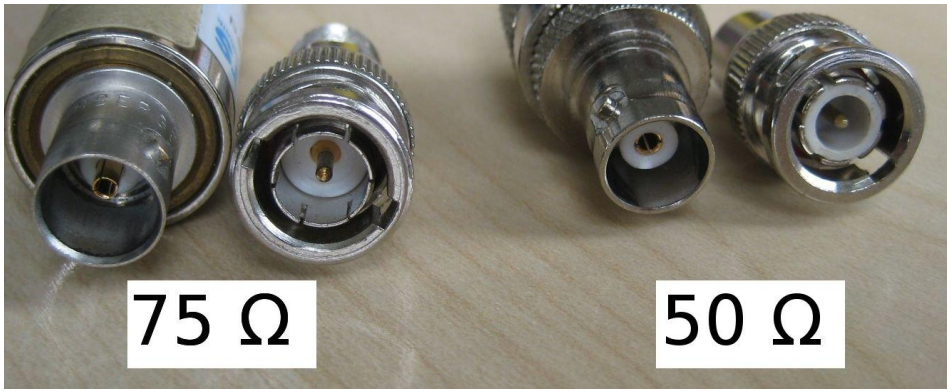
Schematic diagram of **BNC Connector Parts and Components**. 1. Connector Body; 2. Center Pin; 3. Crimp Sleeve.

BNC connector has a circular center conductor of the cable which is connected to the center and a metal tube which is connected to the outside of the cable. A rotating ring on the outside securing the cable connector via a bayonet mechanism and allows connection to any type BNC female connector. Mating is achieved with just a quarter turn of the coupling nut.



Interface Dimensions

Types:



BNC connectors: From left to right: 75 Ω female, 75 Ω male, 50 Ω female, 50 Ω male.

- BNC connectors are most commonly made in 50 and 75 ohm versions, matched for use with cables of the same characteristic impedance.
- The 75 ohm types can sometimes be recognized by the reduced or absent dielectric in the mating ends.
- The 50 ohm connectors are typically specified for use at frequencies up to 4 GHz and the 75 ohm version up to 2 GHz.
- Video (particularly HD video signals) and Telco central office applications primarily use 75 ohm BNC connectors, whereas 50 ohm connectors are used for data and RF.

Similar connectors:

SR connectors: It is a type of Russian made RF connector for coaxial cables. Their dimensions differ slightly from those of BNC. They are however generally interchangeable with them, sometimes with force applied.

TNC (Threaded Neill–Concelman: A threaded version of the BNC connector, known as the TNC connector (for Threaded Neill-Concelman) is also available. It has superior performance to the BNC connector at microwave frequencies.

Twin BNC: Twin BNC (also known as twinax) connectors use the same bayonet latching shell as an ordinary BNC connector but contain two independent contact points (one male and one female). They can operate up to 100 MHz and 100 volts.

Miniature connectors: BNC connectors are commonly used in electronics, but in some applications they are being replaced by miniature connectors.

Applications:

- The BNC was originally designed for military use and has gained wide acceptance in video and RF applications to 2 GHz.
- At higher frequencies, above 4 GHz, the slots may radiate signals and there are losses.

The BNC connector is used for signal connections such as:

- Antennas
- Telecom
- Automotive
- Computers/LANs
- Medical Equipment
- Satellite communications.
- Base Stations
- Cable Modems
- Instrumentation
- Mil-Aero

Typically the male connector is fitted to a cable, and the female to a panel on equipment. Cable connectors are often designed to be fitted by crimping using a special power or manual tool.

Thank you