Common audio & video connectors

There are many different connectors and wiring practices used in the audio world. There must be 50 different random audio connectors on the market today and many are designed for special markets. Those special connectors are most often used with multi-pair cables (there is no single standard for those) and for some applications where "standard" connectors are not suitable (for example miniature connector versions in very small equipment).

The most common connectors used are:

- **XLR**: An XLR is a quite larger (about 5cm long, and 2.5 cm diameter) with (generally) 3 conductor pins (or receptacles) in a triangular pattern shrouded by the cover. They are used on almost all pro audio equipment to carry balanced audio signals. XLR’s are most typically used in microphone circuits, and PA system cabling. The audio signals are transported as electrical signal between pins 2 and 3. Pin 1 is used for shield ground. The origin of the XLR connector was the Cannon X Series connector. It was fitting the demands of the audio community except for the missing latch. Cannon rearranged the pins and added a latch.

- **RCA (phono)**: The RCA type is the regular consumer type used for unbalanced audio. RCA is a light weight small coaxial connector, with a centre pole that sticks out a little further that the shield ring and is quite small. The signal goes between a center conductor and the shield or return side, which is usually referenced to the case or outer sleeve section. The signal carried in this connector is usually consumer line level. Practically all RCA connectors that are prone to noise problems, this is probably the number one source of bad connections. Typical consumer AV equipment (like VCRs), may have an audio source impedance of up to 5-20K Ohms, which can cause problems with long cables (high frequency roll-off and easy pickup of noise).

- **6.3 mm PHONE**: This is a connector type originally used for manual telephone patch panels. In the audio world this connector is used for patch panels, equipment interconnections, some microphone connections and headphone connections. The mono 6.3 mm PHONO plug carries unbalanced line level audio signals in audio equipment interconnections. In some applications, the same connector is also used for microphone level signals generated by microphones or instrument pickups (for example in electric guitars). In other applications the 6.3 mm phono connector is used to carry speaker signals (not very recommended practice).
6.3 mm TRS PHONE: Is the stereo version of 6.3 mm (1/4 inch) PHONO plug and is used to carry, depending on application, stereo headphone signals or balanced line level signals in equipment interconnections. The common ¼ inch stereo phone plug was originally designed by the Bell Telephone Company around 1880, for use on telephone switch boards. That is why it is called a phone plug.

3.5 mm PHONO: This is a miniature version of PHONO connector. 3.5 mm (1/8 inch) stereo PHONO plug/jack is commonly used in portable CD players, small radios and PC soundcards to carry stereo headphone signals or line level audio signals. In PC soundcards this connector is also used for mono electret microphone connections where the connector carries a microphone signal and microphone bias voltage.

2.5 mm PHONO: This is a very tiny version of PHONO plug. It is used in some applications to connect microphones to wireless transmitters or video cameras. The most commonly used version is mono version, but there is also a stereo version of this connector. The wiring of the connector can vary from equipment to equipment but is on same general line as other PHONO connectors.

BANTAM: This connector looks somewhat like a stereo PHONO jack which has a size between 6.3 mm and 3.5 mm PHONO jacks. This connector is used in some professional audio patch panel applications to carry balanced audio signals.

SPEAKON: The Neutrik NL4FC 4-Pole Speakon Connector is the most common speaker connector type used in professional audio. It is a very reliable connector to terminate speaker signals. All Speakon Connector contacts on both connectors are touch proof, so the connectors meet strict safety requirements. Speakons are designed for high-power use, are non-shorting and can handle 250V voltage and 20A continuous current, so they are more than adequate for even highest power audio systems.

DIN: “Din Connector” commonly refers to a member of a family of circular connectors that were initially standardized by DIN for analog audio signals. Some of these connectors have also been used in analog video applications and for digital interfaces such as MIDI or the IBM AT computer keyboard (later PS/2 connectors for keyboard and mouse are Mini-DIN connectors).
RF connectors

RF coax connectors are a system of coaxial cables and high frequency signals. They interface two units such as the antenna to a transmission line, a receiver or a transmitter. The proper choice of a coax connector will facilitate this interface. Coax connectors come in many impedances, sizes, shapes, and finishes in both female and male versions of each. There are thousands of models and variations, each with its advantages and disadvantages. Coax connectors are referred to by series designations. Each has its own important characteristics. The most popular RF coax connector series not in any particular order are UHF, N, BNC, TNC, SMA, 7-16 DIN and F. Here is a quick introduction to those connector types:

- **BNC connector**: is the most commonly used connector in video wiring. BNC connectors have a bayonet-lock interface which is suitable for uses where numerous quick connect/disconnect insertions are required. BNC connectors are for example used in various laboratory instruments and radio equipment. BNC connectors have much lower cutoff frequency and higher loss than the N-connector. BNC connectors are commonly available at 50 ohms and 75 ohms versions. Digital signals in video and telephony applications have necessitated the usage of 75 Ohm connectors.

- **F connector**: Used for TV antenna connections. "F" connectors were primarily designed for very low cost high volume 75 Ohm applications much as TV and CATV. In this connector the center wire of the coax becomes the center conductor.

- **"UHF" connector**: The "UHF" connector is the old industry standby for frequencies above 50 MHz (during World War II, 100 MHz was considered UHF). The UHF connector is primarily an inexpensive all purpose screw on type that is not truly 50 Ohms. Therefore, it's primarily used below 300 MHz. Power handling of this connector is 500 Watts through 300 MHz. The frequency range is 0-300 MHz.

Computer Interface & Video Display Connectors

- **USB Connector**: USB (Universal Serial Bus) is a "plug and play" interface between a computer and peripherals (MP3 audio players, digital cameras, joysticks, keyboards, and printers), which lets you plug in a device without adding an adapter card or even restarting your PC. Most computers (PC and Mac) and many peripheral devices are equipped with some form of USB. USB's speed makes it ideal for music and digital still transfer. USB 1.1, the first USB standard, supports a data transfer speed of 12 Mbps (megabits per second) — significantly faster than a serial connection. Though USB 1.1 can't compete with i.LINK (which maxes out at 400 Mbps), the speed of the newer USB 2.0 standard is 480 Mbps!
IEEE 1394 Firewire connector: Developed in late 1980s and early 1990s by Apple as FireWire, is a serial bus interface standard for high-speed communications and isochronous real-time data transfer. The 1394 interface is comparable with USB, though USB has more market share. Apple first included FireWire in some of its 1999 models, and since the 2000 have included FireWire ports in their computers. As of 2012, nothing beyond an 800 version (IEEE-1394b) has been developed. The interface is also known by the brand i.LINK (Sony), and Lynx (Texas Instruments). IEEE 1394 replaced parallel SCSI in many applications, because of lower implementation costs and a simplified, more adaptable cabling system.

SATA: Serial ATA (SATA or Serial Advanced Technology Attachment) is a computer bus interface for connecting host bus adapters to mass storage devices such as hard disk drives and optical drives. Serial ATA was designed to replace the older parallel ATA (PATA) standard (often called by the old name IDE), offering several advantages over the older interface: reduced cable size and cost (7 conductors instead of 40), native hot swapping, faster data transfer through higher signaling rates, and more efficient transfer through an (optional) I/O queuing protocol. Used to connect hard drives with computers.

VGA Connector: Graphics Array (VGA) connector is a three-row 15-pin DE-15 connector. The 15-pin VGA connector is found on many video cards, computer monitors, and some high definition television sets. On laptop computers or other small devices, a mini-VGA port is used in place of the full-sized VGA connector. DE-15 is also conventionally called an RGB connector, D-sub 15, mini sub D15, mini D15, DB-15, HDB-15, HD-15 or HD15 (High Density, to distinguish it from the older and less flexible DE-9 connector used on some older VGA cards, which has the same shell size but only two rows of pins). VGA connectors and cables carry analog component RGBHV (red, green, blue, horizontal sync, vertical sync) video signals, and VESA Display Data Channel (VESA DDC) data.

DVI connector: Digital Visual Interface (DVI) is a digital display interface developed by Digital Display Working Group (DDWG). It connects a video source to a display device, such as a computer monitor. The DVI standard initially achieved widespread acceptance in the PC industry. It was developed to create an industry specification for the transfer of digital video content. Featuring support for analog connections it allows for the replacement of the analog VGA standard. DVI is designed to carry uncompressed digital video data to a display.
**HDMI connectors:** HDMI (High-Definition Multimedia Interface) is a compact audio/video interface for transferring encrypted uncompressed digital audio/video data from a HDMI-compliant device ("the source" or "input") to a compatible digital audio device, computer monitor, video projector, and digital television.[1] A digital audio/video source for HDMI can include a HDMI-compliant set-top box, DVD player, HD DVD player, Blu-ray Disc player, AVCHD camcorder, personal computer (PCs), video game console (such as the PlayStation 3, Xbox 360 and the Wii U), AV receiver, tablet computer, and mobile phone.[1] HDMI is a digital alternative to consumer analog standards, such as radio frequency (RF) coaxial cable, composite video, S-Video, SCART, component video, D-Terminal, or VGA (also called D-sub or DE-15F). digital video connector / interface for HD monitors and video displays.

**MIDI:** (short for Musical Instrument Digital Interface) is an electronic musical instrument industry specification that enables a wide variety of digital musical instruments, computers and other related devices to connect and communicate seamlessly with one another. The primary functions of MIDI include communicating event messages about musical notation, pitch, velocity, control signals for parameters (such as volume, vibrato, audio panning, cues, and clock signals) (to set and synchronize tempo) between multiple devices; these complete a signal chain and produce audible sound from a sound source. For users, MIDI enables a single player to sound as though they are playing two or more instruments simultaneously. As an electronic protocol, it is notable for its widespread adoption throughout the music industry.
XLR to 1/4" TRS Connector (wired for balanced mono)

The usual way to connect a 3-pin XLR to a 1/4" TRS (AKA stereo jack plug) is to use the following pin allocation:

- XLR pin 1 to 1/4" plug sleeve
- XLR pin 2 to 1/4" plug tip
- XLR pin 3 to 1/4" plug ring

This wiring configuration gives you a balanced mono audio cable.
Stereo Jack to 2x RCA

When a stereo 1/4" jack is being used for a stereo signal (as opposed to a balanced mono signal), the left and right parts of the stereo signal can be split off to two separate connectors. For example, a stereo headphone output can be split into left and right connectors, and one possible use for this would be to use these two independent connectors to feed left and right monitoring speakers.

![Diagram of stereo jack to 2x RCA]

XLR to 1/4" Mono Plug

The most common way to wire a 3-pin XLR to a 1/4 inch (6.5mm) mono plug (sometimes called a jack plug), is to join the negative and shield together.

This can be done by either soldering the shield and negative wires of the XLR to the sleeve of the plug......

![Diagram of XLR to 1/4" mono plug]

Or by soldering a jumper on the XLR.....

![Diagram of XLR to 1/4" mono plug with jumper]

Either way gives you the same result: An unbalanced audio cable.
**XLR to 1x RCA**

When connecting a 3-pin XLR to one RCA, you use the same wiring as if you were connecting an XLR to a 1/4” (jack) plug.

The positive and shield of the XLR are joined together, either at the XLR end or the RCA end. The easiest way is to solder a link between pins 1 and 3 (shield and negative) of the XLR, rather than trying to solder the shield and negative wire to the sleeve contact of the RCA.

This produces an unbalanced audio cable.

**XLR to 2x RCA**

A 3-pin XLR with a stereo signal can be split into left and right by wiring pin 2 of the XLR to the tip of one RCA plug, and pin 3 of the XLR to another RCA tip. Pin 1 of the XLR connects to the sleeve of both RCA plugs.

http://www.sengpielaudio.com/TableOfSoundPressureLevels.htm