

# Chapter 7

# Connectors



## Professional Terms

1/8" connector	male connector
1/4" connector	mini connector
adapter	phone connector
barrel adapter	phono connector
BNC connector	PL259 connector
cable end connector	plug
cannon connector	RCA connector
chassis mount connector	S-VHS connector
connectors	T-connector
DIN connector	USB
F-connector	XLR connector
female connector	Y/C connector
FireWire	Y-connector
HDMI	
jack	

## Objectives

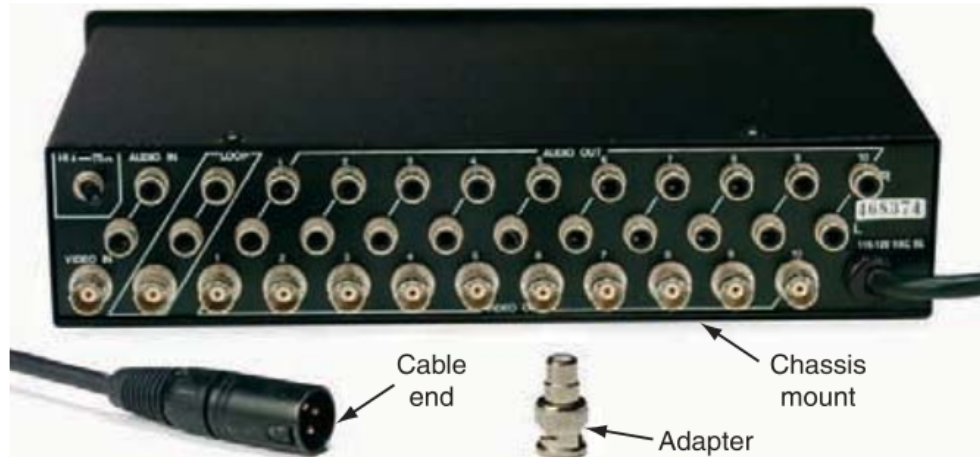
After completing this chapter, you will be able to:

- Explain how connectors and adapters are used in the broadcast industry.
- Identify the types of connectors used in the broadcast industry.

## Introduction

The names of the various connectors must be learned and used correctly. In the remaining chapters of this textbook, connectors are referenced by name. Having access to connectors, cables, and electronic devices will reinforce your understanding and recognition of the connectors and adapters used in the broadcast industry. Upon completion of this text, it is recommended that you review the connector names and descriptions in this chapter before beginning to work with production equipment in earnest.

**Figure 7-1.** All connectors are either permanently attached to a piece of equipment (chassis mount), on the end of a cable (cable end), or designed to change one connector type into another type (adapter).



## Connectors

**connectors:** Metal devices that attach cables to equipment or to other cables.

**chassis mount connector:** A connector that is built into a piece of equipment.

**cable end connector:** A connector found on the end of a length of cable.

**adapter:** A connector that changes the type, or connector end, of an existing connector.

**plug:** A connector with one or more pins that are designed to fit into the holes of a jack (female connector). Also called a *male connector*.

**jack:** A connector with one or more holes designed to receive the pins of a male (plug) connector. Also called a *female connector*.

**BNC connector:** A type of connector commonly used in television production. The female and male versions lock together securely with a simple 1/4-turn twist.

**Connectors** are metal or metal and plastic devices that attach cables to equipment or to other cables, **Figure 7-1**. Any cable can carry any video or audio signal, as long as the cable is adapted for the necessary connector. A connector can be classified into only one of the following categories:

- **Chassis mount connectors** are built into a piece of equipment.
- **Cable end connectors** are on the end of a length of cable.
- **Adapters** change the type, or connector end, of existing connectors.

One type of connector end is referred to as the **plug**, or the **male connector**. The other connector is a **jack**, or the **female connector**. Male connectors have one or more pins that are designed to fit into the holes of a female connector. Female connectors have one or more holes designed to receive the pins of a male connector.

### Talk the Talk

When referring to these types of connectors aloud, only the connector name is used: BNC, DIN, 1/4", mini, or Y/C. "Please bring a female RCA to male PL259." The words "connector" or "adapter" are understood and, therefore, not actually spoken when industry professionals use these connector terms.



### BNC Connector

The female and male versions of a **BNC connector** lock together securely with a simple 1/4-turn twist. A BNC is the most common connector used in television production, **Figure 7-2**. BNC actually stands for British Naval Connector, but this connector is simply referred to as a "BNC."

**Figure 7-2.** This barrel adapter consists of 2 female BNCs.



## DIN Connector

“DIN” is a generic term that refers to any connector with four or more holes/pins. *DIN connectors* are also commonly found on computer equipment cables. In television production, use this term only if there is no other more exact term available.

**DIN connector:** A term that refers to any type of connector with four or more holes/pins.

## F-Connector

The *F-connector* (Figure 7-3) comes in two styles: push-on and professional. With the push-on style connector, the male end simply pushes onto the female connector. The professional style F-connectors have a small nut that secures the male and female ends together. BNC connectors have almost completely replaced F-connectors in the industry. While an F-connector requires tedious manipulation of a tiny nut to secure it, a BNC requires only a ¼-turn. F-connectors are commonly found on the back of consumer VCRs and TVs. The female chassis mount connectors are marked “Ant. In” and “Ant. Out.” The corresponding male F-connector is on the cable running from the VCR to the cable box or television.

**F-connector:** A type of connector that carries an RF signal and is commonly found on the back of consumer VCRs and televisions.



**Figure 7-3.** This cable end connector is a male F-connector.

## Phone Connector

A *phone connector* is ¼” in diameter and single-pronged, with a little indentation near the end of the prong (Figure 7-4). It is also called a

**phone connector:** A connector that is ¼” in diameter and single-pronged, with a little indentation near the end of the prong. This type of connector is commonly found on the cord used with large stereo headphones. Also called a ¼” connector.



**Figure 7-4.** 1/4” phone and 1/8” mini connectors.



**1/4" connector.** Most large stereo headphones have a phone connector at the end of the cord to connect with the stereo equipment.

## Talk the Talk

When verbally referring to a phone connector, it is very common to drop both the words "inch" and "connector." For example, "Please bring me a male quarter to a male quarter 6 feet long."



## Mini Connector

A **mini connector** is 1/4" in diameter and is single-pronged, **Figure 7-4**. It is also often called a **1/8" connector**. The mini looks similar to the 1/4" connector, but is smaller in size. This type of connector is most commonly found on headsets for portable CD players, iPods, and MP3 players.

**mini connector:** A connector that is 1/8" in diameter and single-pronged. It is most commonly found on headsets used with mp3 players and other personal audio devices. Also called a 1/8" connector.

**phono connector:** A connector commonly found on the back of quality home entertainment system components. The female phono connector is usually a chassis mounted connector. The male phono connector is usually a cable end connector with a single, center prong surrounded by a shorter crown. Also called an **RCA connector**.

## Phono Connector

Many of the components of a home entertainment system usually have **phono connectors**, or **RCA connectors**, on the back (**Figure 7-5**). They are labeled "audio in," "audio out," "left," and "right." The female phono connector is usually a chassis mount connector, with the male then being a cable end connector. The male has a single center prong surrounded by a shorter crown.

**Figure 7-5.** A female RCA cable end connector.



## PL259 Connector

The **PL259 connector** is similar to the F-connector, but is much larger. A CB radio is very likely to have a PL259 connector for the antenna. The male end has a single prong with a nut to tighten, like the F-connector, **Figure 7-6**. The nut is larger and easier to handle, but must still be turned

**PL259 connector:** A connector that is similar to the F-connector, but much larger. The male end has a single prong with a large nut to tighten.

**Figure 7-6.** A male PL259 to female BNC adapter.



many times to secure the connection. The PL259 has also been replaced, for the most part, by BNC connectors.

## Y/C Connector

A *Y/C connector* has four tiny round pins and a rectangular plastic stabilizing pin. This connector may be nickel or gold plated. Because of the fine pins, it is a fragile connector for video inputs and outputs. The consumer term for Y/C connectors is *S-VHS connectors* or S-connector.

## XLR Connector

An *XLR connector* is usually a 3-pin connector for microphones, but can be 4-pin, 5-pin, and other pin configurations, **Figure 7-7**. This connector may also be called a *cannon connector*. When it is a 3-pin connector, it is simply called an "XLR connector." If there are more than 3 pins, it is referred to by the number of pins. For example, "4-pin XLR" or "5-pin XLR." The advantage of an XLR connector is that the male and female ends fit together and a hook automatically locks the two together, **Figure 7-8**. The male and female ends do not separate once locked. Depressing a button on the connector disengages the hook, and the ends separate easily.



**Figure 7-7.** A female XLR (circled) to male 1/4" phone adapter.



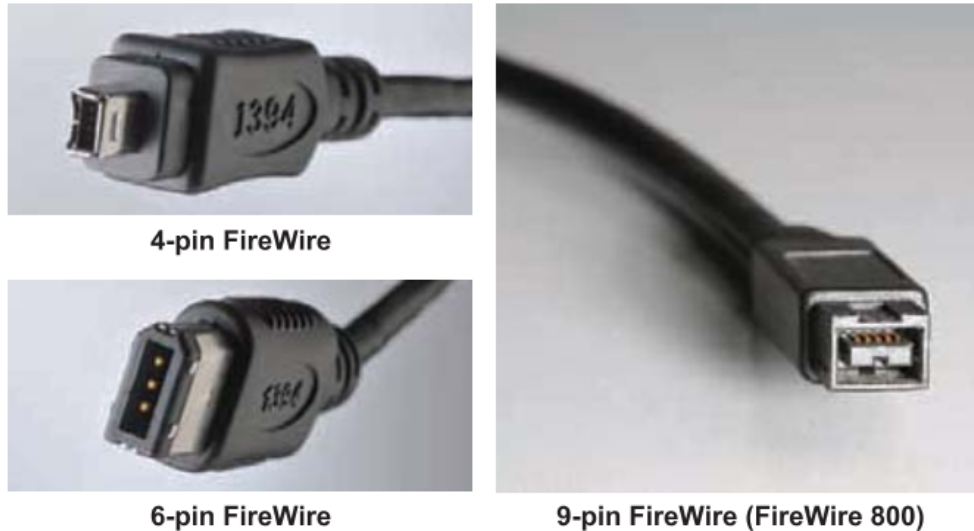
**Figure 7-8.** Male (left) and female (right) XLR connectors.

**Y/C connector:** A video input and output connector that is characterized by four tiny round pins and a rectangular plastic stabilizing pin.

**S-VHS connector:** The consumer term for a Y/C connector.

**XLR connector:** A connector for microphones that usually has 3-pins, but can have 4-pins, 5-pins, and other pin configurations. The male and female ends lock together with a hook. Also called a *cannon connector*.

**Figure 7-9.** Various configurations of FireWire.



4-pin FireWire

6-pin FireWire

9-pin FireWire (FireWire 800)

#### **FireWire connector:**

A type of connector designed to carry digital signals and available with 4-pin (audio and video only) and 6-pin (audio, video, and power) connections. This connector is also known as *IEEE 1394*.

#### **USB connectors:**

A durable digital connector for video, audio, and power. The electrical contacts are enclosed in a metal housing and buffered by a plastic plate.

## FireWire Connector

*FireWire* is made of copper cable and is available with 4-pin (audio and video only), 6-pin (audio, video, and power), and 9-pin (audio, video, and power) connections, **Figure 7-9**. This connector is also known as *IEEE 1394*. FireWire connectors and cables are designed to carry digital signals.

## USB Connector

A *USB* is a digital connector for video, audio, and power, **Figure 7-10**. This type of connector is most often found on computers. The USB is durable connector, with the electrical contacts enclosed in a metal housing and buffered by a plastic plate.

**Figure 7-10.** A USB connector.



## HDMI Connector

**HDMI connector:** This connector is designed to carry high definition video and audio, as well as power. HDMI stands for High Definition Multimedia Interface.

*HDMI* stands for High Definition Multimedia Interface, **Figure 7-11**. This connector is designed to carry high definition video and audio, as well as power. HDMI connectors are commonly found on consumer Blu-ray and high definition DVD players, but the HDMI connector is also extremely common on all professional, high definition production equipment.

## Adapters

An adapter is used to connect two different types of connectors, **Figure 7-12**. For example, a cable that ends in a male BNC needs to plug





**Figure 7-11.** HDMI cable end connectors.

**Figure 7-12.** Several types of adapters.



**Female BNC male RCA**



**Female PL259 to male BNC**



**Female RCA to male BNC**

into a female RCA chassis mount connector. Using a female BNC to male RCA adapter, the two connectors can be joined. Most studios have a wide variety of adapters, with almost every conceivable combination available.

### PRODUCTION NOTE

It is best to have as few adapters as possible in runs of cable. A little bit of the signal is lost at every adapter connection in the run. Think of it as a leaky hose—each adapter in the run is like poking another hole in the hose.



## T-Connector

A *T-connector* is a special kind of connector that takes its name from its shape; it looks like the capital letter *T*, **Figure 7-13**. It is made of metal and

**Figure 7-13.** This arrangement of this T-connector is two female BNCs to male BNC.



**T-connector:** A connector that is shaped like the capital letter *T* and is made entirely of metal. The three ends of a T-connector are used to split one signal into two signals, or to combine two signals into one.

does not flex. The three ends of a T-connector are used to split one signal into two signals, or to combine two signals into one.

## Y-Connector

**Y-connector:** A connector that has three wires with a connector on the end of each. All the wires are tied together in the middle. The three ends of a Y-connector are used to split one signal into two signals, or to combine two signals into one.

A **Y-connector** is very similar to the T-connector, except it has three connectors separated by wires or all molded together. In either case, the device looks like a capital letter Y, **Figure 7-14**. A Y-connector serves the same function as the T-connector.

**Figure 7-14.** A two female RCAs to male RCA Y-connector.



**barrel adapter:** A type of adapter that has the same type of connector and connector end on both sides.

## Barrel

A **barrel adapter** has the same type of connector and connector end on both sides, **Figure 7-15**. The barrel has a specific purpose—it allows two identical short cables to be connected together and make one long cable. For example, suppose you need a cable with a male RCA on each end to connect two pieces of gear together. The problem is the two pieces of gear are 10 feet apart and you have two 6-foot cables with male RCAs on each end. If you have a female RCA barrel adapter, you can connect the two cables to each other creating a 12-foot cable with a male RCA on either end. Problem solved!

**Figure 7-15.** This barrel adapter has 2 female RCAs.





## Wrapping Up

Knowing the appropriate use of and name given to each of the connectors is an important step in learning how to record quality audio. The importance of memorizing the names of all the connectors cannot be stressed too much. If a supervisor asks a P.A. to obtain a certain cable or adapter from the storage area, the P.A.'s job may actually depend on bringing back the correct item.

## Review Questions

Please answer the following questions on a separate sheet of paper. Do not write in this book.

1. List the three categories of connectors.
2. What is the difference between male and female connector ends?
3. Which connectors combine multiple signals into one?
4. Which connectors are specifically designed to carry high definition and digital signals?
5. How are adapters different from other connectors?

## Activities

1. Inspect the connectors on various pieces of electronic equipment in your home. List several of the items and identify the type of connector(s) used with each.

## STEM and Academic Activities



### Science

1. Connectors are made of or contain metal to conduct signals between the cables they connect. Research the conductivity of various metals. Which metals are the best conductors? Which metals are commonly used in A/V cables and connectors?

### Engineering

2. What do you think the next generation of A/V connectors will look like? How will they operate? Write a summary of your vision for the next generation of A/V connectors and sketch a prototype.

### Social Science

3. For one day, make note of every time you use a connector of some type (cell phone charger, mp3 player dock or headphones, portable DVD player, gaming system controller, etc.). You may be surprised at the number of connectors involved in your daily life!

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