

## BALANCED AND UNBALANCED LINES

### UNBALANCED CONNECTIONS

An unbalanced line uses only two conductors with one being at or near ground potential, while the other conductor is the hot or high side of the line. The line is said to be unbalanced because the two conductors are of unequal potentials with respect to ground. (One is near ground and the other has some greater value.)

Low cost microphone circuits terminated in a standard 1/4" phone plug are an example of an unbalanced line. Unbalanced lines are the most common interface between consumer grade audio components such as tape decks, CD players, and DJ equipment. A typical unbalanced connection is made using two conductor cables terminated with RCA phono jacks, or 1/4" phone plugs. Unbalanced connections work well for short cable runs in low noise environments.

Unbalanced lines are more susceptible to RF noise and other interference and are not suitable for cable runs of more than 20 feet or complex setups where RF noise may be a problem. The most common hum and noise problems associated with unbalanced lines are RF noise induced by AC power lines, and ground loops between components. To avoid problems keep all audio cables away from AC power cords and feeder lines. If the cables must cross an AC line it should do so at right angles to minimize RF noise pickup.

### BALANCED CONNECTIONS

Balanced lines require the use of three terminals rather than two. One conductor (shield) will be connected to ground, and the signal will be carried by two identical conductors which carry the same voltage but with opposite polarity with respect to ground. The line is said to be balanced since the two signal carrying conductors are of equal (though opposite) potential.

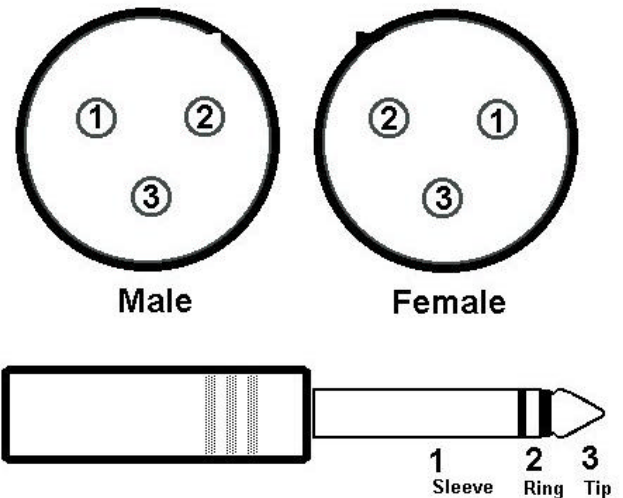
Low impedance microphones terminated with 3 pin XLR or Cannon type connectors are one example of a balanced line. Studio and broadcast equipment is usually interconnected using balanced lines terminated with either 3 pin XLR or a TRS type (3 conductor) 1/4" phone plug.

Balanced lines are useful for eliminating unwanted noises. Induced noise such as that caused by RF interference will effect all conductors in a cable equally. Since a balanced

line contains two signal carrying conductors of equal magnitude but opposite polarity, noises induced along the cable path cancel each other out when they reach the destination load. This makes balanced lines the interface of choice for professional applications, long cable runs or anywhere that induced noises might be a problem.

### Balanced Wiring Configurations (IEC 268)

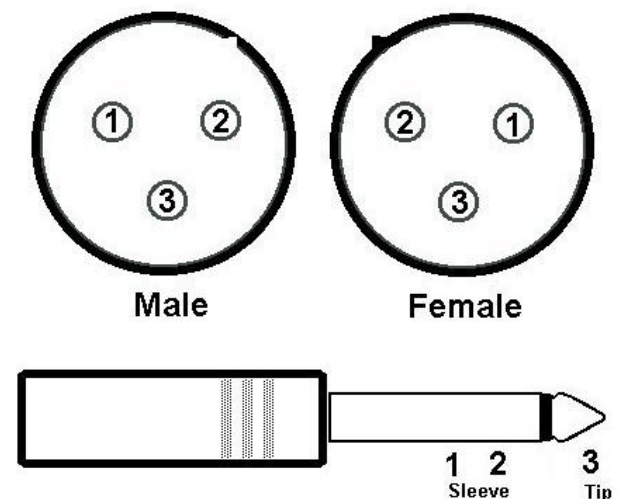
XLR and TRS Phone plugs



- Pin 1** Ground (shield)
- Pin 2** Positive (Signal, hot)
- Pin 3** Negative (Return, common)

### Unbalanced Wiring Configurations

XLR and standard Phone plugs



- Pin 1 and 3** Ground (shield, common)
- Pin 2** Positive (Signal, hot)