



TW Party-Line Intercom Overview

Featuring:

Audiocom®

Table of Contents

<u>TELEX INTERCOM HISTORY</u>	3
<u>WHAT IS TW (TWO WIRE)</u>	3
<u>PARTY-LINES AND CHANNELS</u>	4
<u>AUDIOCOM - A BALANCED SYSTEM</u>	5
<u>INTERCOM SYSTEMS COMPARED</u>	6
<u>POWER SUPPLIES - THE CORE</u>	7
<u>MASTER AND USER STATIONS</u>	7
<u>BELTPACKS</u>	8
<u>CABLING</u>	8
<u>SIGNALING</u>	8
<u>INTER-SYSTEM COMPATIBILITY</u>	8
<u>WHY CHOOSE AUDIOCOM</u>	8

TELEX INTERCOM HISTORY

Telex Communications Inc. has been a leading manufacturer of hardwired and wireless intercom for over 25 years. With installations in every corner of the world and in a host of applications such as broadcast, entertainment, education, aerospace and industrial, Telex intercom systems provide the widest range of communications solution for any application.

Telex manufactures two brands of hardwired TW intercom, AudioCom and RTS. Both product lines offer the superior technology and quality that differentiates Telex products from the rest, but each line is tailored to meet specific application needs. RTS TW intercom systems are primarily utilized in television broadcast and aerospace applications as well as two wire extensions to the industry leading RTS ADAM advanced digital audio matrix point to point intercom system.

Telex AudioCom intercom systems, utilizing industry leading balanced audio system structure and highly configurable and expandable modular designs, are utilized in virtually every kind of application and venue throughout the world. Applications include theater, theme park, church, hotel, casino, education, industrial, military and corporate venues.

WHAT IS TW (TWO WIRE)

The term Two Wire or TW as it is commonly referred, is a description of the number of actual conductors necessary for the operation of an intercom system. Two wire systems, as the name implies, work on a single pair of wires to produce fully bi-directional audio. This is somewhat of an anomaly as normally TW systems in the field are run on three-conductor microphone cable. The third “wire”, the shield, provides a DC and/or audio return path, depending on system type, in addition to the two “working” wires. It is important to note that the shield, or third wire is necessary for proper operation.

The idea behind two wire intercom systems is simple, provide two way, hardwired communications throughout widely varying situations and venues using the minimum number of conductors necessary. Since microphone cable is relatively inexpensive and normally very common in many different types of venues, it serves as the primary form of cabling for most two wire intercom systems today.

While the idea behind two wire intercommunications is simple, the various system configurations manufacturers have designed and implemented to carry out that idea are not. All TW systems provide DC power to down-line devices so that each individual piece of communications gear does not need to be plugged in or have batteries. In quality intercom systems such as AudioCom, each intercom channel has it's own isolated power supply so that trouble on one channel does not affect other intercom channels. How different manufacturers distribute power and call signals while maintaining high quality, low noise audio is the primary difference between modern intercommunications systems.

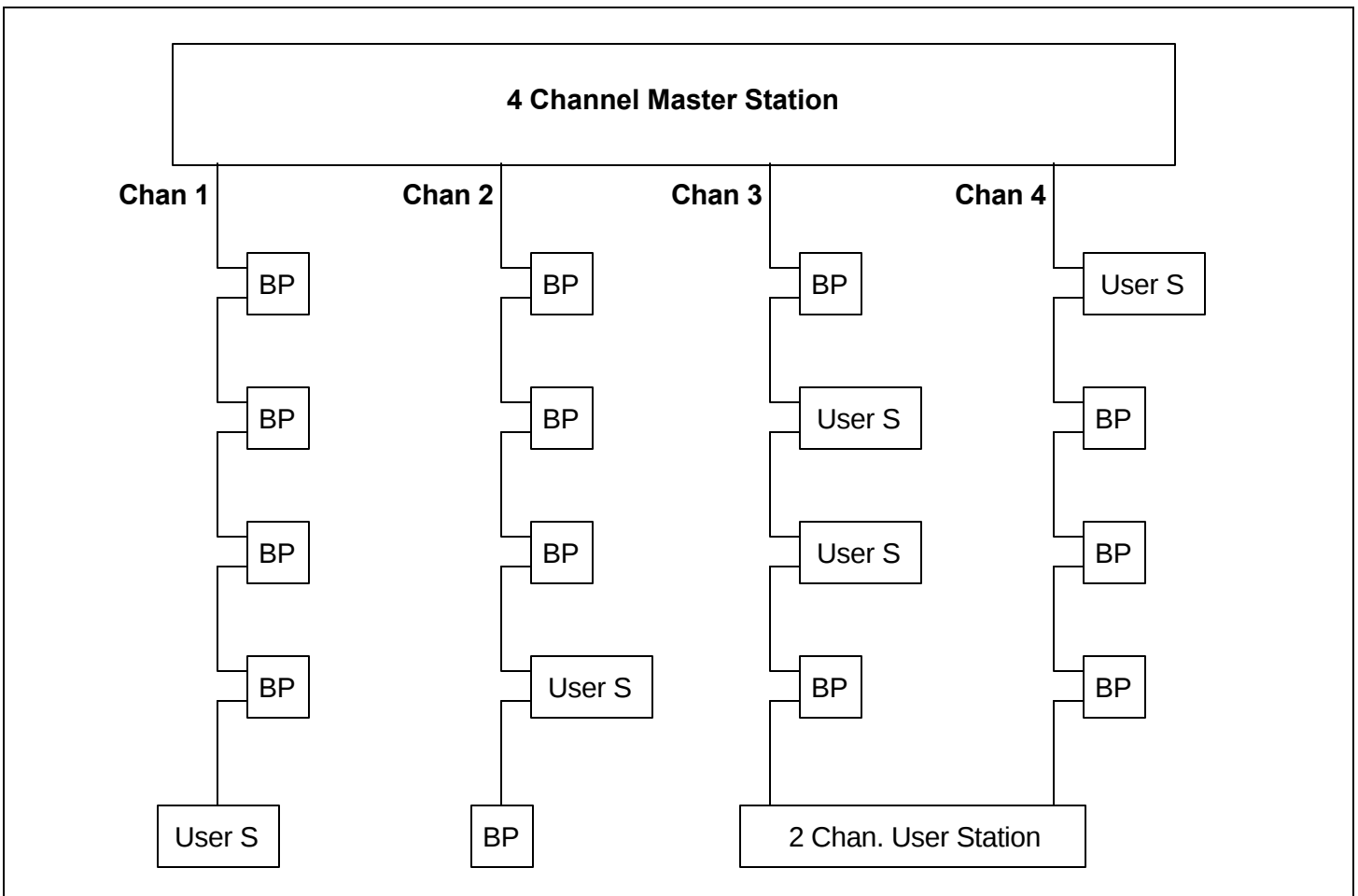
PARTY LINES AND CHANNELS

Two wire intercom systems, in their most basic form, are one channel or a party-line system. Each user who is connected to the intercom system can hear all of the conversation that happens between any other users. The name party line comes from the days when you (and a hundred of your closest friends) could call a “party” number and talk to everyone at once. This system was easy to use, but had a serious problem. It was very difficult to understand what was being said with multiple conversations about several different topics happening at once.

In some ways this is similar to today’s modern intercom systems. Most productions have a number of groups of people that need to talk about very different topics. On a one-channel party line intercom all of these conversations coexist and everyone hears each one. The solution to this problem is multiple intercom channels.

Intercom channels divide the audio from specific users into groups. Each channel has an individual power source and is completely electrically isolated from every other channel. In this way audio, lighting, video, engineering, production, security and so forth can all have their own communications forum simultaneously without interfering with any other group.

Users who need to access multiple intercom channels may do so by utilizing multi-channel remote stations or belpacks. These stations and belpacks allow users to switch between two or more intercom channels so that they may be involved in more than one conversation. This is especially important for technical management and production staff.



AUDIOCOM - A BALANCED SYSTEM

AudioCom is unique among professional intercom systems today. AudioCom intercom systems utilize a technologically superior balanced audio transmission configuration. The use of balanced audio produces a variety of functional benefits including lower inherent system noise, immunity to external noise sources such as RFI, dimmers and AC power; and the ability to make substantially longer cabling runs without special wiring.

The term “balanced audio” refers to the way in which audio is passed down the cable. In a balanced audio system the desired audio signal is split and sent out of phase down two separate conductors in the cable. The key to the balanced audio concept is that any noise that is induced on the line during transmission will be in phase on the transmission line. This is important because since the two audio signals are out of phase on the transmission line, when the desired audio signal is put back in phase on the “receive” side, the noise will then be out of phase and cancel leaving only the desired audio.

Transformers and differential amplifiers are normally used to facilitate the balanced audio concept in professional audio products. AudioCom uses the same components with a unique dual ended power supply design to produce full duplex balanced audio across all intercom channels on only two working wires. Even though balanced audio is standard fare in professional audio gear, AudioCom is the only intercom system to offer this technology for professional communications users. There are two key benefits from using balanced audio in a communications system, reduction of induced system noise and longer cable runs.

Noise reduction. Intercom lines typically run in and around equipment and cables that produce electrical noise. On unbalanced systems that noise can be passed through the system and reproduced in the user's headset causing fatigue and loss of intelligibility. Equipment that can cause this type of noise is numerous. A few examples are Lighting dimmers, electrical motor/generators, radio frequency transmitters (such as two way radios and wireless audio equipment), neon and fluorescent lighting, and many others.

This type of equipment is almost always present in production and industrial locations where intercom lives. With AudioCom's unique balanced audio system design, induced line noise is virtually eliminated for the clearest most intelligible audio in the communications industry at both high and low ambient noise conditions.

Longer cable runs. Making long cable runs is one of the primary challenges of intercom system layout and design. AudioCom intercom systems run a “wet” balanced system which floats the audio on both conductors at the system power voltage of 24VDC. Because the audio is floating 24Volts above the noise floor, and because the system is balanced, dramatically longer cable runs may be achieved with resorting to special cable configurations. Cable runs of up to 3000 feet may be utilized using standard microphone cable.

AudioCom utilizes a distributed amplifier system structure. Each main or remote station houses its own microphone preamplifier, headset or speaker power amplifier, and signaling circuitry. Stations bridge the intercom line at a very high impedance (more than 10K Ohms), and place a minimum load on the line. High bridging impedance plus special load sensing circuitry ensures that the audio level always remains constant, and does not fluctuate as stations are added or removed from the system as may occur on other professional intercom systems. Low-impedance mic input lines (50-150 Ohms) and specially designed filtering and audio shaping circuitry in conjunction with our unique balanced audio transmission system make AudioCom virtually immune to outside noise sources of any type.

INTERCOM SYSTEMS COMPARED

There are three major TW, party-line intercom systems currently in use today. These systems can be divided into two major categories, balanced and unbalanced audio systems, and then further into whether they are inherently one or two channel on a pair of wires.

AudioCom is the only major intercom system available today that offers the superior audio quality that is derived from a balanced system. Listed below is a pin-out comparison of AudioCom, RTS and Clear-Com. Notice that AudioCom can be run in it's secondary configuration to be fully compatible with Clear-Com in every intercom function including call signaling.

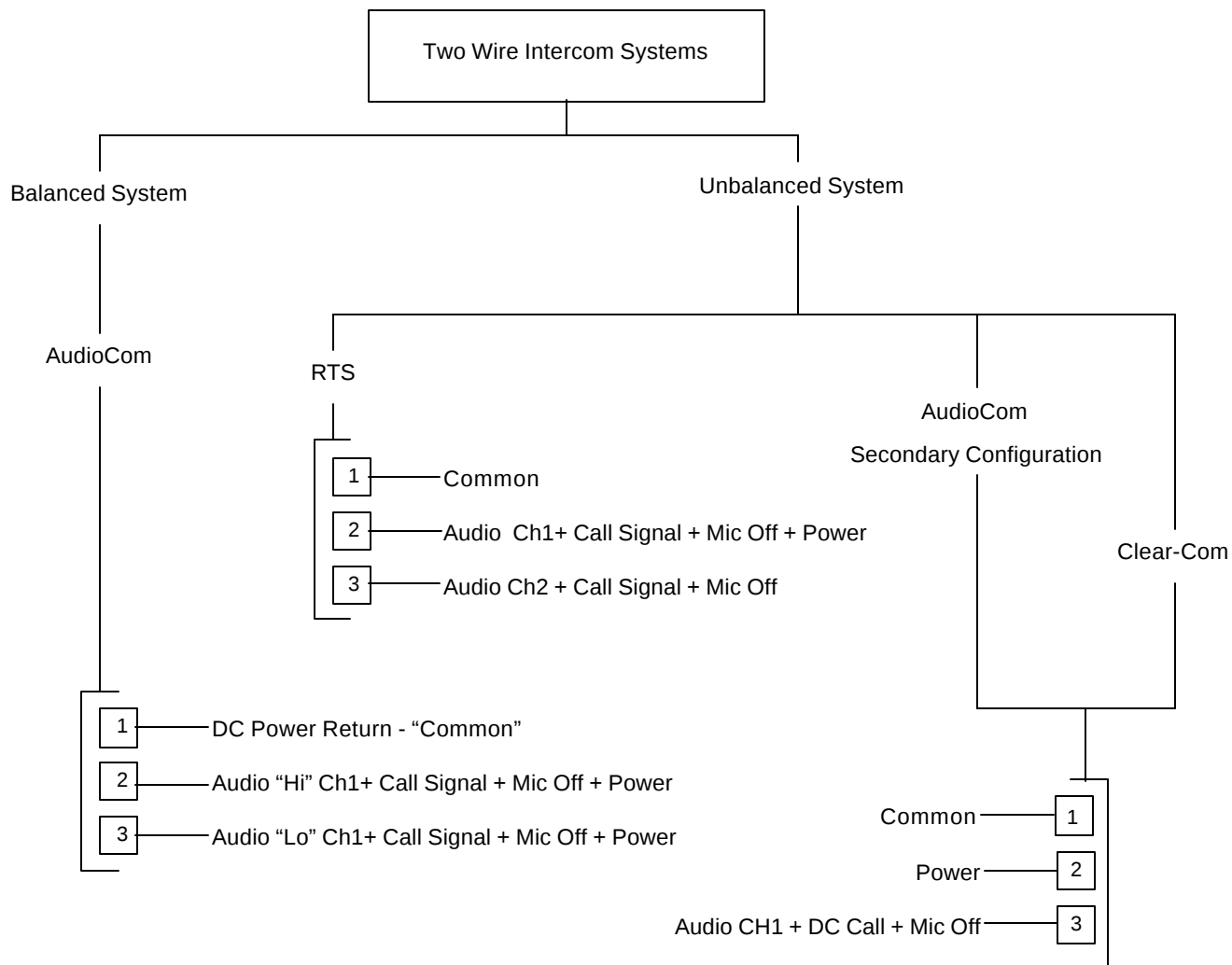


Figure 1

POWER SUPPLIES - THE CORE

Power supplies are the heart and soul of any two wire intercommunications system. AudioCom power supplies have special features which are not found in traditional designs. AudioCom supplies provide extremely low-noise 24 Volt DC power to multiple intercom lines. AudioCom supplies offer a robust design that allows operation to continue under the harshest of conditions such as low AC line voltage, momentary shorts on DC power lines to stations, and excessive peak loads during power-on conditions.

Deciding how many remote user stations that a power supply can handle is not always a trivial matter. The current requirements of AudioCom remote stations and beltacks vary with model and use. For instance a station which is just "there" and not being used may draw only a small amount of current. A good rule of thumb is to design systems so that they utilize only 70 to 80% of available power. Under normal circumstances a single 2 Amp power supply can power at least 25 beltack and or headset stations under worst case scenarios.

The total current capability of a Power Supply is split between its channels. So a 2 Amp, two-channel supply shares the total power supply capability between those two channels. With robust, unique protection circuitry, short circuits or over-loads on either channel will not damage an AudioCom power supply. Fault conditions will simply cut power off to that channel that has the problem. A channel which is within its maximum current rating will not be affected by another channel being automatically cut. In this way AudioCom power supplies allow uninterrupted operation on functional channels even when a short circuit or overload condition exists on an adjacent intercom channel in the same box.

Power supplies also provide a critical aspect of the TW intercom system called line termination. Line termination is a necessary resistance put across the intercom line to ensure proper operation. It is critical that each intercom channel have only one line termination. Many problematic symptoms can occur when a line has multiple terminations such as loss of audio level and distracting squealing sounds. AudioCom systems use a 300 ohm line termination.

MASTER AND USER STATIONS

Master stations and user stations (actually more correctly referred to as remote stations) allow users to communicate from fixed locations to any other user on their intercom channel. Master stations and user stations differ in that Master stations provide power for each intercom channel they access, but user stations do not. It is important to know the difference between master and user stations and when to use each.

Generally speaking master stations appear only once on any intercom channel but user, or remote stations may be used as many times as can be supported by the intercom channel power supply. Using multiple master stations may result in incorrect system operation by creating a dual termination condition on the line.

BELTPACKS

Beltpacks, much like user stations, allow users to communicate with other users on their intercom channel, but do so by providing a more mobile communications environment. Beltpacks are either one or two channel. Two channel beltpacks are further divided into three categories, select, dual listen mono, and dual listen stereo. Deciding which type of beltpack is right for an individual user position is a function of determining who they need to communicate with and how many intercom channels that requires. Only AudioCom offers all metal beltpack construction to last through the rigors of everyday production communications use.

CABLING

Proper cabling is critical to maintaining peak system operability. For most applications standard shielded microphone cable will suffice. It is critical, however, that the correct pin-out configuration is followed throughout the entire system. Mis-wiring a run can cause numerous problems such as a short circuit condition that may render the intercom channel inoperable. For exceptionally long runs (over 3000 feet) individually shielded twisted pair with a “dead ground” connection is the preferred run. Please contact Telex engineering for details.

SIGNALING

Signaling, or calling is a visible light or audible tone used to alert users who are not wearing a headset. AudioCom intercom systems use a technically superior method of transmitting the call light to users on an intercom channel. By using a high frequency (above audible range) electronic signal instead of a DC closure AudioCom systems are inherently ready for transmission extensions such as fiber optic and opto-isolated devices.

INTER-SYSTEM COMPATIBILITY

Using intercom systems of different formats together is not always as easy as it may first appear. Each intercom system uses a different philosophy and pin-out configuration. Only AudioCom offers complete integrated system compatibility with all other major intercom systems. With the flip of an internal switch AudioCom intercom products operate in the secondary unbalanced mode and are completely interchangeable with Clear-Com equipment including call signals and microphone kill signals.

WHY CHOOSE AUDIOCOM

Telex products are designed and built using the latest and most sophisticated processes available. AudioCom intercom equipment employs superior technology compared with other TW party line intercoms. In a business where manpower, space and cabling are at a premium, AudioCom products provide users with a competitive advantage by offering modular open-ended designs and unparalleled reliability. Systems start with a two-channel master station (MS2000) and expand in convenient 4-channel Expansion panels (EMS-4000) up to 22 individual intercom channels.

The unique balanced audio design of AudioCom intercom systems allows users to utilize the longest TW party line cable runs in the industry, while the differential input/output (balanced audio system) guarantees excellent audio quality even under the harshest conditions. Superior audio quality reduces user fatigue and missed cues as a result of users not wearing their headsets, or “tuning out” the noise.

AudioCom products provide its users with invaluable features such as Remote Mic OFF, backlit lettered buttons for darkened environments and compatibility with every major intercom system on the planet. In addition to the excellent Telex quality and performance, AudioCom products provide users with cost effective system pricing and the world-class technical support of one of the most experienced sales, engineering and customer service teams in the intercommunication industry.