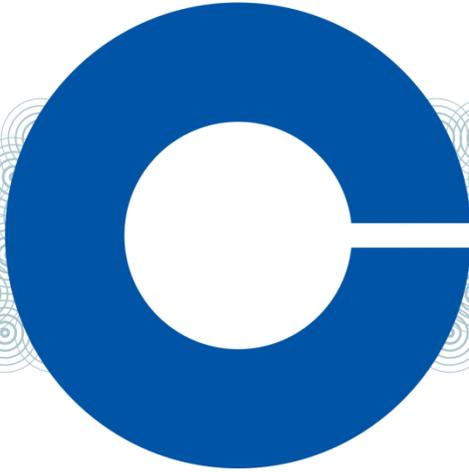


# Clear-Com World Wide Training



## Training Syllabus

## Clear-Com Intercoms

**2020**

July, 2020

Prepared by Rom Rosenblum



# First, a bit of history

Clear-Com's establishment in 1968 was born out of the observation by the early founding team members, Charlie Butten and Bob Cohen, that production crew members working rock 'n' roll concerts and tours were struggling to communicate because they lacked a discrete, easily accessible means of staying in touch with one another. This led to the company's first product offering, a beltpack carrying a portable Partyline intercom system that was connected via standard microphone cable to other beltpacks, enabling two-way, full-duplex communications. Performance professionals rapidly embraced the product, which ultimately changed how production crews around the world did their jobs in live performance, broadcast and many other markets.

Clear-Com would follow up this first success with numerous industry leading innovations throughout the next 40 years, from the first advanced digital matrix technology and integrated wireless intercom, to the development of the groundbreaking I.V.Core technology, which powers Clear-Com Concert™ and the Hybrid Intercom Network. With the additions of LQ™, HelixNet™, FreeSpeakII™ and many other innovative comms projects, Clear-Com has become the world leader in Mission-Critical Communications Systems. All these offerings are rooted in Clear-Com's philosophy to continually seek new ways to design and support intercoms that help customers do their jobs with ease and efficiency — a philosophy the company has followed from the very beginning.



*Charlie Butten accepting his 2010 EMMY Award for inventing the Partyline Belt Pack in 1968*



RS-100A



RS-500 series



RS-600 Series



RS-700 Series (Newest)

**Audience and goals:**

Clear-com's training proposal is designed with a scalable syllabus for entry level and advanced intercom users, who at least have familiarity with standard wired Belt Packs and some RF intercom knowledge. Though we are prepared to present this information in a brand-agnostic manner, our objective is to make members familiar, fluid, and proficient with our Encore™ Analog Partyline wired system, FreeSpeakII™ Wireless Comms, LQ™ Network Connectivity products, HelixNet™ Digital Partyline and other Clear-Com products and devices, as we are seeing these systems increasingly on work calls. While these products are certainly intuitive and provide an easy out of box experience, we will train advanced members to impress clients with their ability to configure and operate Clear-Com intercom systems at the power user level and strive for a high level of familiarity of all users to feel at ease with all comms. Though simple configurations are easily achievable, the more advanced features are within easy reach. Whenever possible, we will keep the training as generic as possible, including the attributes of Clear Com products, as well as other manufacturers' features and models and their operation. This will include pin outs for most comms products and handy tricks to interface all the many popular professional intercom systems, wired or wireless. Your presenter has spent many years doing exactly what you do every day. He or she can relate to the workflow and challenges which class participants confront at their gigs. Your members will feel more at ease knowing that their Clear-Com presenter has walked the walk and understands the real-world challenges that you face on the job every day. Clear-Com knows that a smooth gig, staffed by a knowledgeable crew makes us all look good and leaves the client feeling well served and ready to recommend both crew and gear for future shows.

We at Clear-Com know that our relationship with you will last more than our time spent together in the training but will continue for the length of our careers. We take these relationships seriously and pride ourselves in keeping them strong. That is our goal. To make the staff shine and have the client confident for return business.

Fraternally,



Rom Rosenblum

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# Abbreviated Glossary

- 1) **ALL CALL:** A group of selected endpoints that will receive a talk path from one source point.
- 2) **BISCUIT:** A speaker Box, usually a small “throw-down” station that has a speaker and a mic, emulating a Belt Pack (**BP**), but can use either a Head Set (**H/S**) or mic/speaker scheme.
- 3) **CALL SIGNAL:** A voltage sent, usually via the audio path (in **2wire**) to get one’s attention.
- 4) **CHANNEL:** Common term for partyline, panel label, audio pathway, RF band, etc.
- 5) **CROSSTALK:** when one circuit can hear remnants of another, discrete circuit (or channel).
- 6) **WET/DRY:** In 2wire, wet signals have parasitic voltage to power devices and dry has only audio.
- 7) **SOURCE / DESTINATION:** Source generates a signal and Destination receives it.
- 8) **DUPLEX:** A two-way signal on the same circuit. (Send & Receive). **SIMPLEX** would be one way.
- 9) **GPIO:** General-Purpose Input/Output controls sends signals to outboard devices for triggers.
- 10) **IFB:** Interruptible Fold Back. A duckable signal sent to talent for monitoring and instructions.
- 11) **ISO:** When engaged from a source, all other pathways sent to the ISO’d destination are muted.
- 12) **LATENCY:** Delay that a circuit (usually a digital one) imposes on a signal, created by buffers.
- 13) **MIX MINUS:** An Audio Program (**PGM**) feed, usually minus the source that is receiving it.
- 14) **PTT:** Push-To-Talk or **MOMENTARY**. As opposed to a **LATCHED**, or “stuck-on” talk path.
- 15) **RMK:** Remote Mic Kill. A control that unlatches all (or some) talk paths on devices assigned.
- 16) **SIDE TONE:** The amount of your own mic that you hear when your mic is engaged to a path.
- 17) **SA:** Stage Announce, or “**Voice Of God**”. A circuit to a PA or powered speaker on a set.
- 18) **SFP:** Small Formfactor Pluggable, or a plug-in device that accommodates a fiber termination such as an LC connector. They translate light from glass to an electronic signal on copper.
- 19) **TERMINATION:** A Circuit used in 2wire systems to control line integrity and load balance.
- 20) **Tie Lines** = Generally cables that have no dedicated use that link one section to another. Tie lines usually terminate at patch panels or other IO panels.
- 21) **Turn around:** A term used to describe an audio interface cable or barrel type tube device, sometimes called couplers, that converts a female-to-female or male-to-male connector used to turn snake channels from a send to a return or vice versa, but they also come in handy when a stage hand has inadvertently run a very long XLR cable in the wrong direction.
- 22) **Wet Line:** An intercom that carries both audio and DC voltage / current. As opposed to a dry line that carries only the audio.
- 23) **Two-Wire:** A communications system where the path is the same for both talk and listen. In intercom channels there are two wires (one path). Two-wire systems can be two-wire balanced or two-wire unbalance
- 21) **Four-Wire:** A communications system where the paths are different for talk and listen. In intercom channels there are four wires (two paths). Four-wire systems can be four-wire balanced and four-wire unbalanced. Four-wire audio is more or less defined as a pair of conductors carrying an input/receive signal and a second pair carry the output/send signal. The four-wire circuit gets its name from the fact that a balanced pair of conductors was used in each of two directions for full-duplex operation.

# The Basic Building Blocks of Clear-Com Comms

It all started with Charlie Butten's emulation of Alexander Graham Bell's telephone 2wire circuit

## Party Line (PL) 2wire Intercom

- 1) Explanation of **4wire vs. 2wire** intercom basics and 2 to 4 wire conversion
  - a. 4wire is two paths on two circuits. Easy to make and maintain, but hard to distribute (needs matrix-type products)
  - b. 2wire has both in and out paths on one circuit. Needs nulling and termination. It's somewhat complicated to produce, but easy to distribute ("Y" cords, etc.)
- 2) **2wire Infrastructure**; mic cable (pin out) Daisy chaining, Splitters, Power Supply anywhere in the chain ... Ground issues and Nulling
- 3) **Brief discussion** regarding the differences between Clear-Com and RTS 2wire protocols
- 4) **Some Gear**; Belt Packs (BPs), Main Station (MS), Remote Station (RM) and KB/HP wall or box panels (**Why "Biscuit"?**)
- 5) **Call Signal** a little tickle of DC voltage (9 to 12 volts down the audio line). It is seen by: FL-7, BPs and panels. A call signal can also trigger the relay for a radio when using the TW-47 radio interface or go across platforms
- 6) Interfaces;
  - A) **TWC-701**: Combining two channels. 6 pin vs. 3 pin wire for Two Channel BPs (see appendix for pinout)
  - B) **TW12C**: Used to interface RTS to Clear-Com and vice versa
  - C) **MT-1**: interface card used between two powered systems to reduce hum
  - D) **TW-47**: used to connect a radio to the Party Line
  - E) **FL-7**: call flasher/ tone generator
  - F) **EF-701**: single channel 2wire to 4wire adaptor (best for the widest variety of connections)
  - G) **IF4w4**: 4 channel 2wire to 4wire adaptor (manual null) No Call passes, though
- 7) **Headsets/Mics Pin Out**, HS  $\approx 400\Omega$  (no lower than 36 Ohms) Mic  $\approx 200\Omega$ . Discuss types of mics and models/styles of Head Sets
- 8) **SYSTEM PLANNING** "here's the gear...now, GO!"

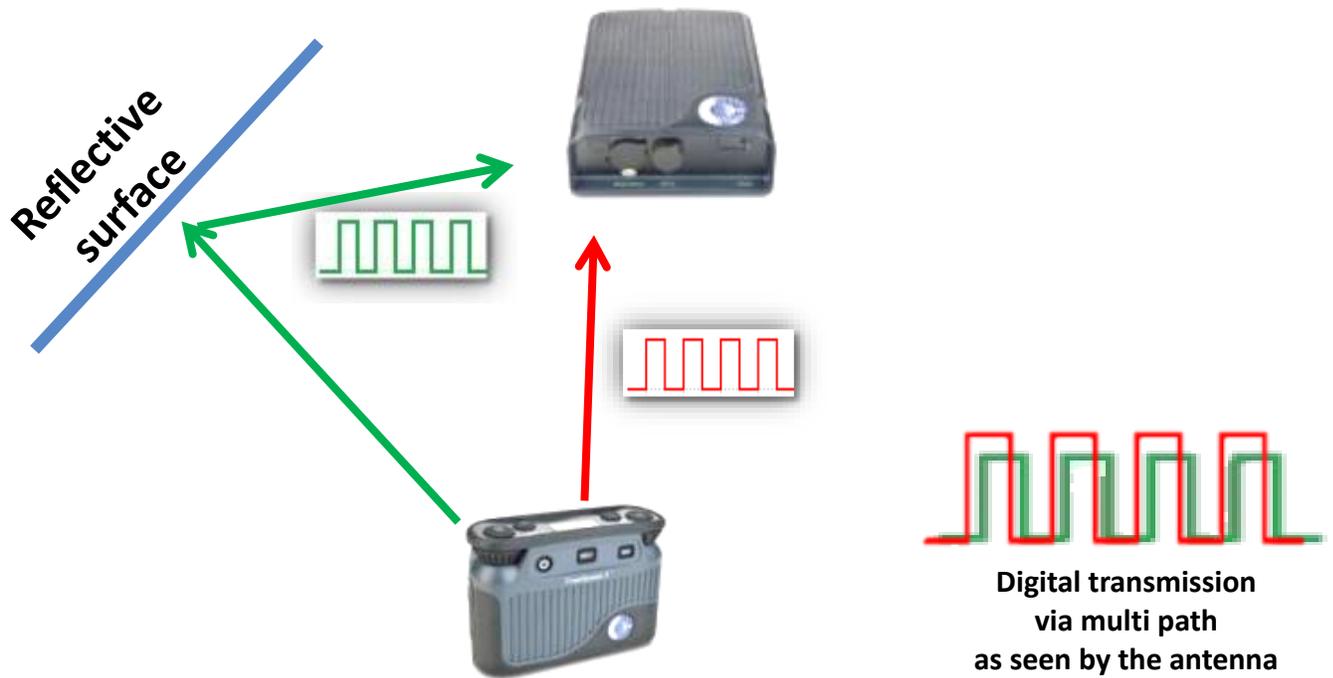
*What to do when equipment rental company's truck pulls up...*
- 9) **Fiber or IP connectivity**...taking the power out and wetting it back up at the other end.
  - a. What's an SFP?



- a. What are the different types of fiber connectors?

Single-mode vs. Multi-mode ... Single mode for very long distances, Multi-mode for local, shorter runs

# Multi Path Reflective Issues



# Wireless Intercoms

**DX-121<sup>®</sup>**



BS-121



BS-121 backplane



CC-15



BP200



WH220

Now 12-hour battery life

New 4wire/2wire bridging across channels

Newer, better Auto-Null

Improved Loss-Packet-Concealment

# New

# DX-410®

New BV32 audio codec with improved audio quality

New Look-Ahead RF hopping helps to avoid crowded area of the 2.4GHz spectrum



BS 410



BS410 backplane



BP410



Previous BP-200



## BP210 Beltpack Communicator Programming

MODE	PROGRAMING FUNTIIONS FROM "OFF" STATE
Registration	Hold <b>ISO</b> then press and release <b>PWR</b>
HANDS FREE (IC1, IC2, or ISO)	Hold down <b>IC1, IC2, or ISO</b> and <b>volume up</b> and press and release <b>PWR</b>
PRESS-TO-TALK (IC1, IC2, or ISO)	Hold down <b>IC1, IC2, or ISO</b> and <b>volume down</b> and press and release <b>PWR</b>
Listen ONLY	Hold down <b>volume down</b> and press and release <b>PWR</b>
Listen and transmit	Hold down <b>volume up</b> and press and release <b>PWR</b>
ISO restrict	Press and hold <b>IC1</b> then press and release <b>PWR</b>
Release ISO restrict	Press and hold <b>ISO</b> and <b>IC1</b> then press and release <b>PWR</b>
POWER ON/OFF	Press and hold <b>PWR</b>
MODE	PROGRAMING FUNTIIONS FROM "ON" STATE
HEADSET VOLUME	Press <b>volume up</b> or <b>down</b> (15 steps)
SIDETONE ADJUST	Hold down <b>IC1</b> and <b>volume up</b> or <b>down</b> arrows (5 steps)

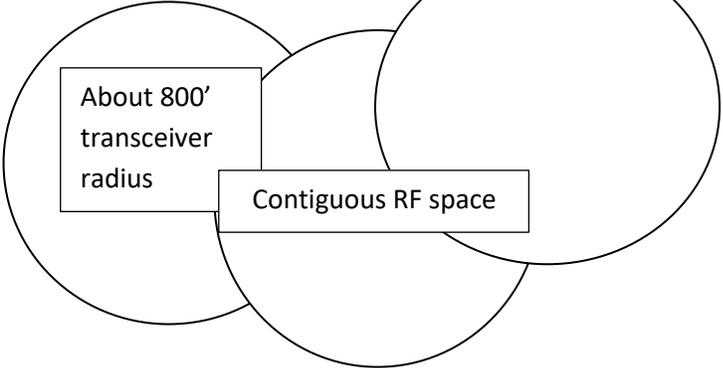
# WBS / BTR UHF comms



# FreeSpeak II

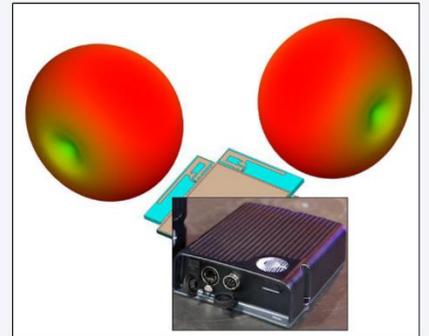


Separated RF space



## Antenna Pattern

- Two printed inverted F-antennas (IFA)
- Orthogonal for polarization diversity
- The spacing allowed by mechanics for spatial diversity
- Resulting radiation pattern is almost omnidirectional



## FSII Transceiver Module



New FreeSpeak II-SPL Splitter



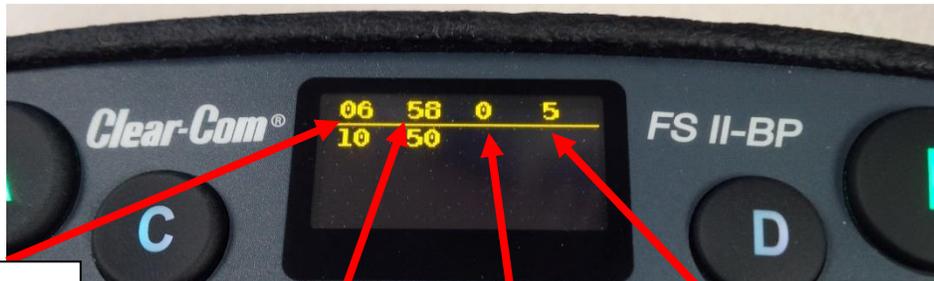
AC-60 5Bay Charger

## Original (now, discontinued) FreeSpeak II Base



Can collocate the 2.4GHz and the 1.9GHz transceivers on a single system

# FreeSpeak II Beltpack Site Mode explanation of metrics



**(06) RPN# (Antenna ID #)**

The Transceiver that you're connected to. (If you subtract 5 from this number it will tell you which antenna slot this is reporting).

**(58) RSSI Number**

Received Signal Strength Indicator  
Higher is better.  
30 to 60 for good performance

**(0) FER Frame Error Rate**

A measure of signal.  
Lower is better & more than 4 is very not good.  
More than 1 when you are standing still can be problematic.

**(5) LQ is Link Quality (or Q.O.S.)**

This is a combined quality metric ranging from 1 (poor) to 5 (high)

Note: Site Survey – BP CONNECTED TO A SYSTEM

Note: This requires that the FS II beltpack have full (Advanced) menu access set in EHX software or Config Editor software (or you have to locally give it access in the Settings/Admin Options menu, with the menu code {set in the software} at the BP and then enable full menu access if the BP has limited access)

Note: This option is only available if the BP is connected to a system (referred to as the current system)

Note: The A & B talk keys will operate as normal when in this mode

To access site survey mode place the beltpack into master menu mode / scroll to "Site Survey" then press the "D" button to enter

Display lists all visible RFPs (Transceiver Antennas) ONLY connected to the current system

Shows 2 digit RPN number only (To get antenna # subtract 5 from the RPN). The Current Antenna is shown at the top of display.

NOTE: the top line is displaying the TCVR info that the BP is now connected to.

The second line displayed (above picture 10 & 50) is a second antenna in this system reporting its RSSI.

RPN #	RSSI	FER	LQ
10	58	0	5
08	59	0	5
13	37		
12	30		
22	25		

If other TCVRs (antennas) were active, you'd see them as well. (As below)

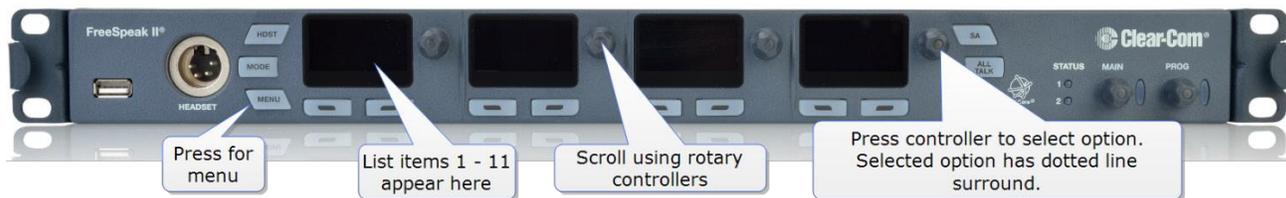
## Transceiver Placement

- Ideally you want to place Transceiver at 7 – 12 ft. pointing towards cover area.
- Transceiver antenna is in upper left hand corner of the transceiver
- Polar Pattern is Modified Omni-Directional
- RF Bounces so look for reflective services
- Metal is RF Barrier
- Water, Glass, and Metal can cause multipath



# FreeSpeak II New Basestation menu 'at-a-glance' guide

## New FSII Basestation

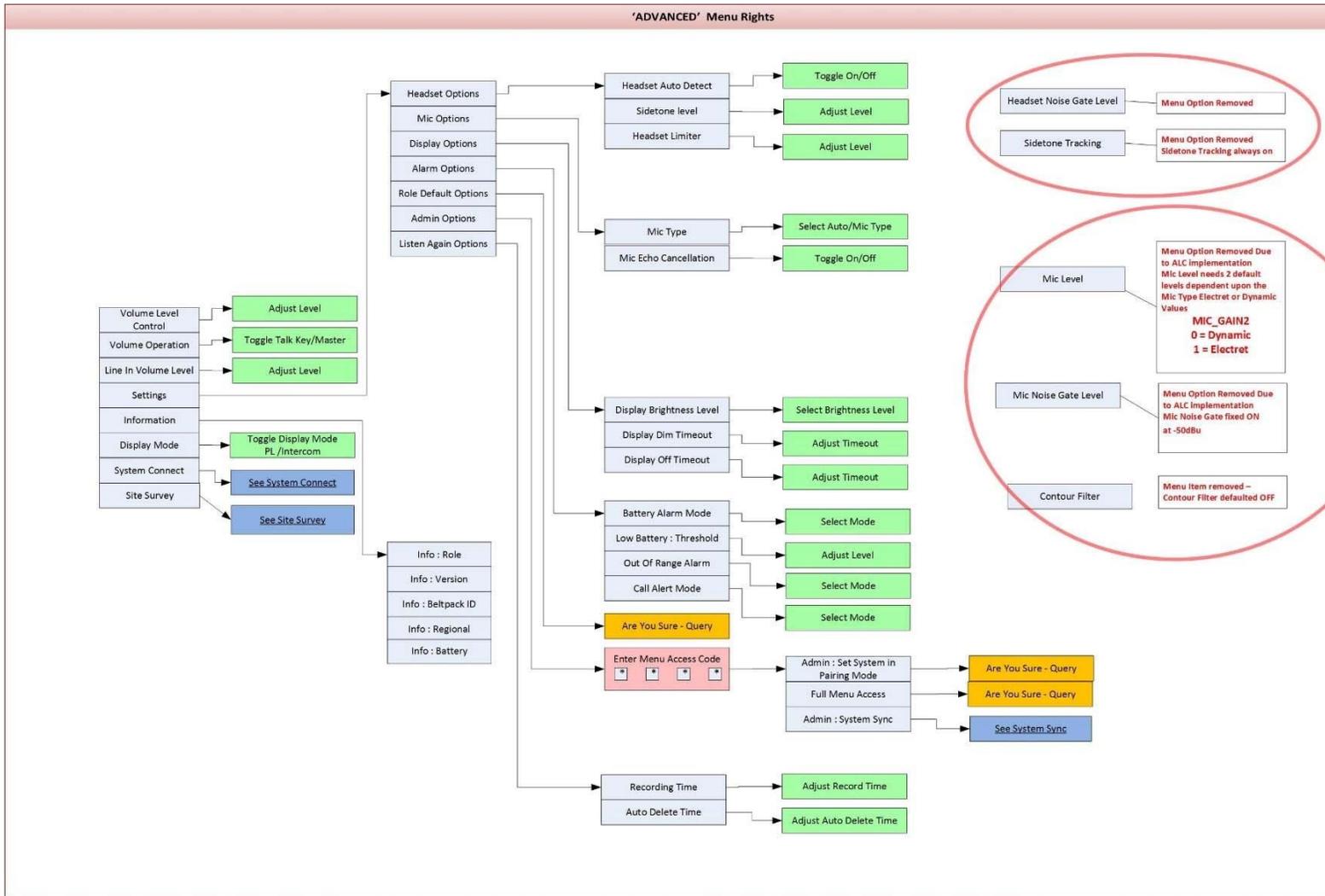


	List item	Description
1.	<b>Audio Settings</b>	Headset, Program input, Stage announce.
2.	<b>Station settings</b>	Program audio on Basestation Keysets (1-4). Base station display options.
3.	<b>Channels</b>	Change Channel name (label).
4.	<b>4-wire audio</b>	Program audio for 4-wire (Ports 1-4).
5 & 6.	<b>2-wire audio, A&amp;B, C&amp;D.</b>	Program audio for 2-wire (Ports A&B, C&D).
6.	<b>Key Assign</b>	Select each beltpack (Role) and program/edit audio on keys (A,B,C,D).
7.	<b>Beltpacks</b>	Change beltpack Role, unregister beltpack, check beltpack software version.
8.	<b>Roles</b>	Create, clone and/or delete Roles.
9.	<b>Antennas</b>	Change antenna name (label). Set cable compensation if required.
10.	<b>Networking</b>	Station id (name) DHCP or Static IP address Station IP address / subnet mask / gateway.
11.	<b>Administration</b>	Beltpacks: start over-the-air registration. Software: View version and upgrade License: View license and upgrade



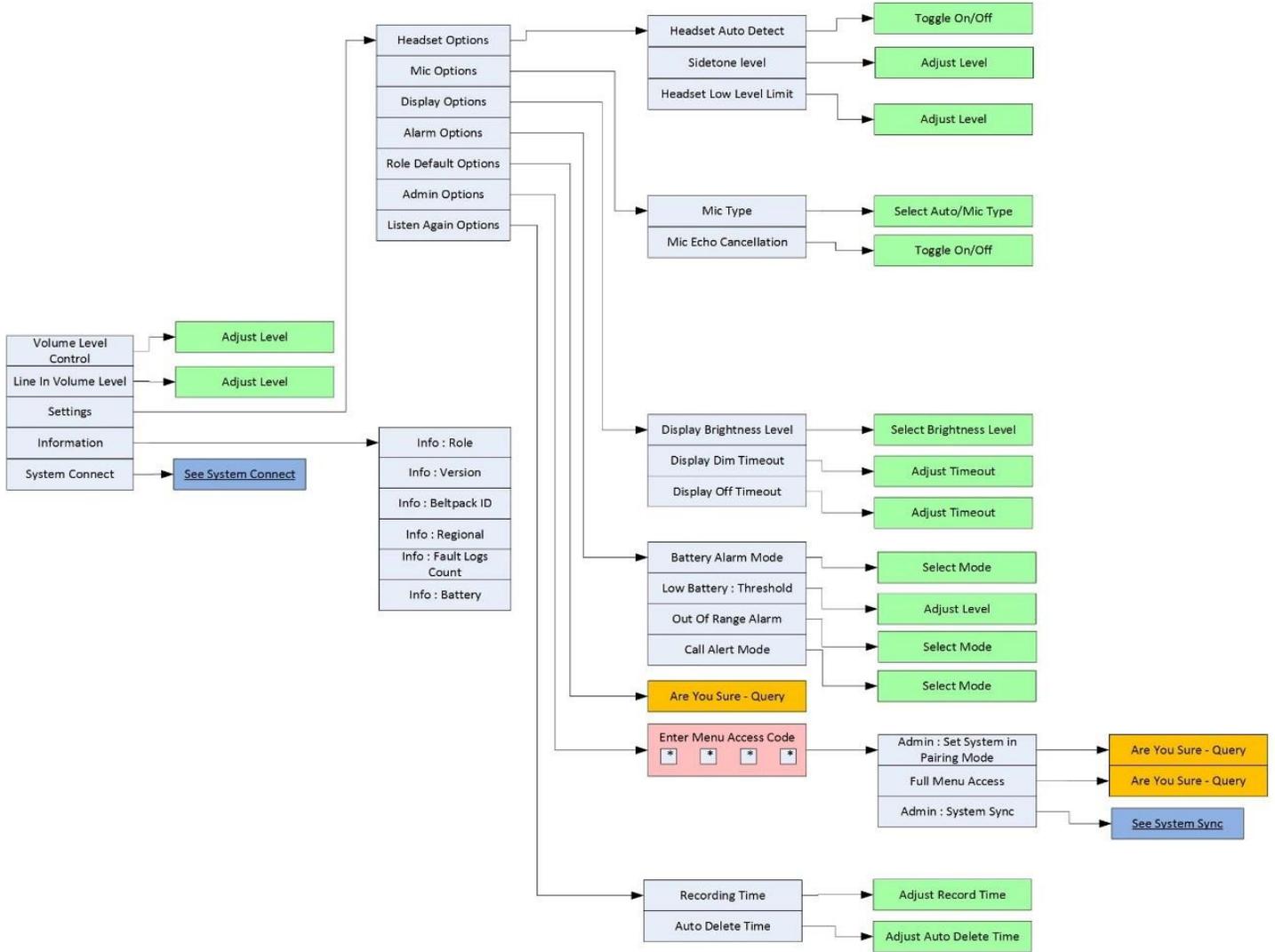
## New FSII Base's Backplane

# FreeSpeakII Beltpack Menu Trees

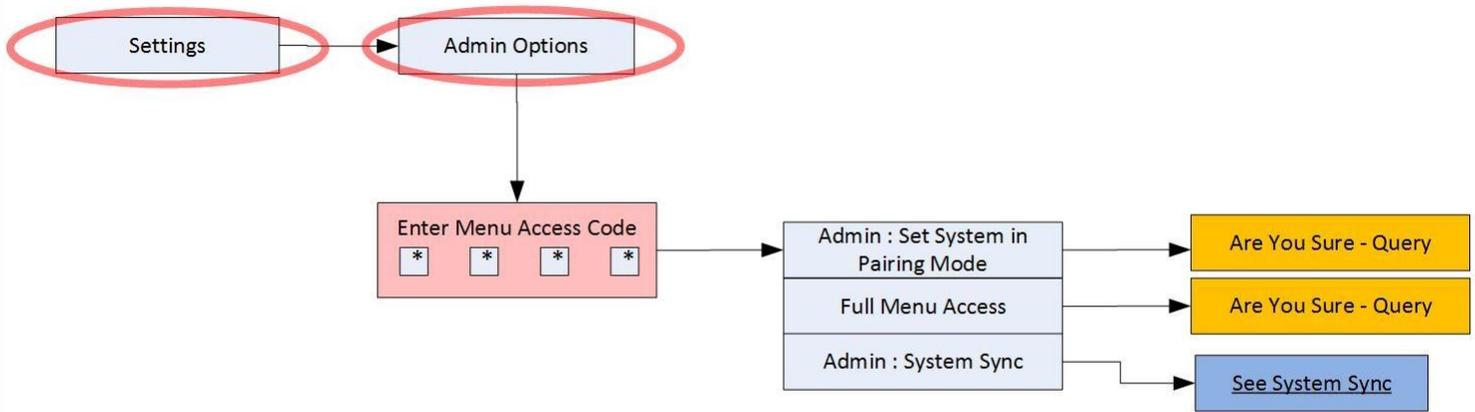


Archange! - CC_ArchangeFunctionalSpec-MenuOverview-v4.4.vsd			
REV 4.3	ADVANCED Menu	Page 1 of 11	02-Janu

'NORMAL' Menu Rights



## 'NONE' Menu Rights



# Clear-Com *Headsets*

HC-X4	HEADSET CABLE XLR4
HC-Y4	HEADSET CABLE XLR4 MALE
HC-X5	HEADSET CABLE XLR5M
HC-X6	HEADSET CABLE XLR6
HC-X7	CABLE, HEADSET XLR7
HC-Y5	CABLE, HEADSET XLR5F



CC-300



CC-400



CC-120



CC-220



CC-26K



CC-30



CC-15

## About Headsets and Microphones for analog PL

Intercom stations, whether they be analog or digital partyline or more sophisticated matrix user key-panels, have been generally designed for use with dynamic headsets. A dynamic headset typically incorporates a noise cancelling dynamic microphone with an impedance range of about 150 to 500 ohms depending on the manufacturer. An electret microphone headset is useable with an analog partyline intercom and may be self-sensing (i.e., internal circuitry senses an electret element) or may have to be selected for use.

Intercom station panel microphones are typically electret design and have an impedance of 300 to 200 ohms and designed to be phantom-powered with a voltage range of 1.5 to 15 V DC. These panel microphones are typically gooseneck and are offered in various lengths and with differing connectors (e.g., 1/4inch TRS and/or DIN screw in).

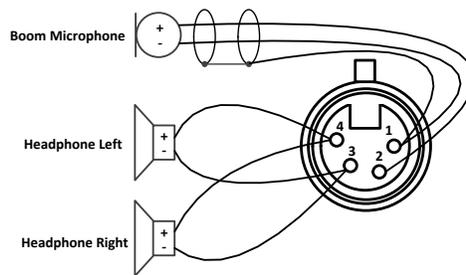
Push-to-talk handsets and telephone-type handsets are useable in any partyline intercom system but more practical to users who cannot use a headset because of their workflow.

These units because of the nature for being telephone equipment, tend to have limited frequency response of 300–3300 Hz. The limited high frequency, although being sufficient for voice grade communications, may not be suitable for users who maintain long periods of listening because of fatigue.

Headphone impedances in headsets range from 50 ohms to 1000 ohms. The use of a 50ohm headphone must have a headphone amplifier capable of powering the line. Lower impedance loudspeakers will draw more current from the amplifier. This becomes more important when we talk about IFB earpieces that may have extended audio bandwidth that includes low frequency content that excites the loudspeaker to pull more current. While low impedance headsets are a good choice to provide enough SPL (sound pressure level) to overcome the interference from loud environments, caution should be used to avoid distortion and most important ear damage. One option for high noise environments are headphones that offer an acoustic isolation of 20dB or more to protect the user. Headphones from manufacturers are typically labeled lightweight and full cushion, and offered as single-sided for one earphone or dual-sided with two headphones. It is important to note many user stations including matrix key-panels and wireless user stations have a headphone impedance range from 25 to 600ohms.

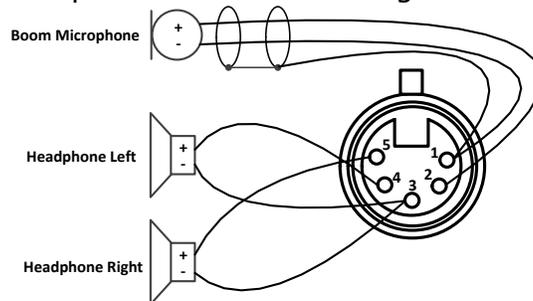
### **Binaural/ Split Ear Function**

To be considered, Binaural/ Split Ear requires a stereo headphone or 'dual muff' headset. Within intercom, the listen function is (by and large) set up as mono, i.e. a user listens to all intercom channels, and any program if inserted, in both left and right earphones. The dual muff headset will be provided with a 4-pin XLR wired as monaural headphones as shown in Figure 4.



**Figure 4: Dual Muff Headset to 4pin XLR – Mono**

The purpose to Binaural/ Split Ear operation places channel 1 in one ear and channel 2 in the other ear or vice versa – the operation resulting in listening to 2 disciplines separately and independently. In this case, the dual muff headset will be provided with a 5-pin or 6-pin XLR wired as stereo or split headphones as shown in Figure 5.



**Figure 5: Dual Muff Headset to 5pin XLR – L/R stereo**

# HelixNet®



New HX II-BP



HelixNet Masterstation and Belt Packs w/ CC-400 H/S



Updating is easy



S-Mount



New HelixNet Wall Plate



# From The HelixNet<sup>®</sup> Quick Start Guide

The following quick start guide provides basic installation instructions for your HelixNet Partyline system, and provides a quick reference to possible topologies and cable capacitance. It covers the following products:

- HelixNet Main Station (HMS-4X)
- HelixNet Beltpack (HBP-2X or HXII-BP)
- HelixNet Interface Modules (HLI-2W, HLI-4W2, HLI-ET2 and HLI-FBS)

## Before installing

To ensure that HelixNet Partyline delivers the desired performance, review the cable specifications for the venue or application space before installing. To safely interface two-wire and four-wire audio source with HelixNet Partyline, use the optional two-wire (HLI-2W2) and four-wire (HLI-4W2) interface modules.



**Warning:** *HelixNet Partyline operates at a different voltage than two-wire partyline systems (such as Clear-Com Encore or PL-Pro). Do **not** connect any analog two-wire partyline equipment to the Main Station powerlines as severe damage may occur.*

## Installing the Main Station

To install the HelixNet Partyline Main Station:

1. Connect the supplied power cord to the HMS-4X Main Station power connector **(A)**.
2. Connect the power cord to mains power.
3. Connect a screened cable from a powerline port to the XLR-3 port on the HBP-2X Beltpack **(C)**.
4. Connect the headset to the HBP-2X Beltpack **(D)**.



## Installing Interface Modules

To install an interface module to the HMS-4X Main Station:

1. Disconnect the HMS-4X Main Station from mains power.
2. Remove the blanking plate **(E)** and insert the interface module **(F)** into the module bay.
3. Reconnect the HMS-4X Main Station to mains power.

To configure the interface module, navigate to **Menu > Module Settings**.



## Two budgets to keep in mind:

- 1) **PLM** (Power Line Modem).  
10 HBPs per PLM (there are two per HelixNet Master Station)  
or 2 to 3 HKBs or HRMs per PLM (more power drawn with high volume speaker engaged).
- 2) **Data**.  
60 HelixNet devices per system (could be up to three HMSs linked together, but still only 60 devices).

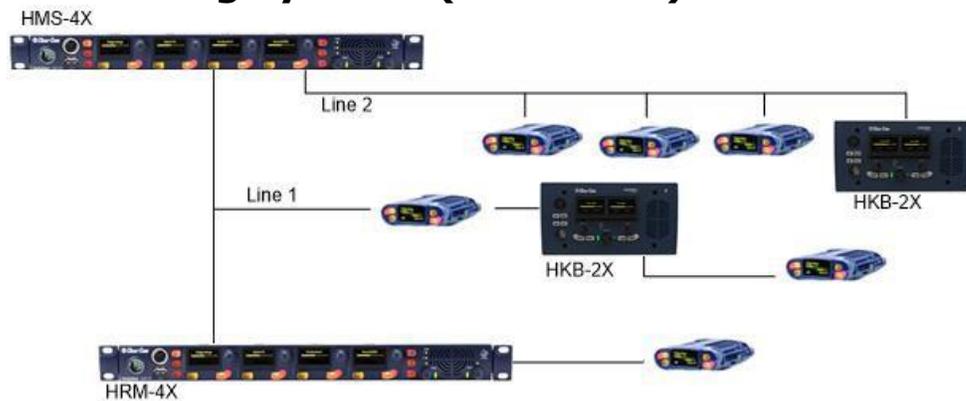
HelixNet digital Partyline uses cable infrastructure to transport audio and data over a range of frequencies. The maximum frequency used for transmission is approximately 25MHz. Depending on the amount of audio and data transmitted, HelixNet digital Partyline can work with as much as 90dB signal attenuation. **However, the receivers are very sensitive and are susceptible to crosstalk between cables.** Think of it as RFI induction.

**Therefore, it is important to maintain cable shield integrity through all connectors, splitter boxes and patch panels utilizing the PLM (Power Line Modem). Patch Panels need separation by several rack spaces when they are not from the same PLM.**

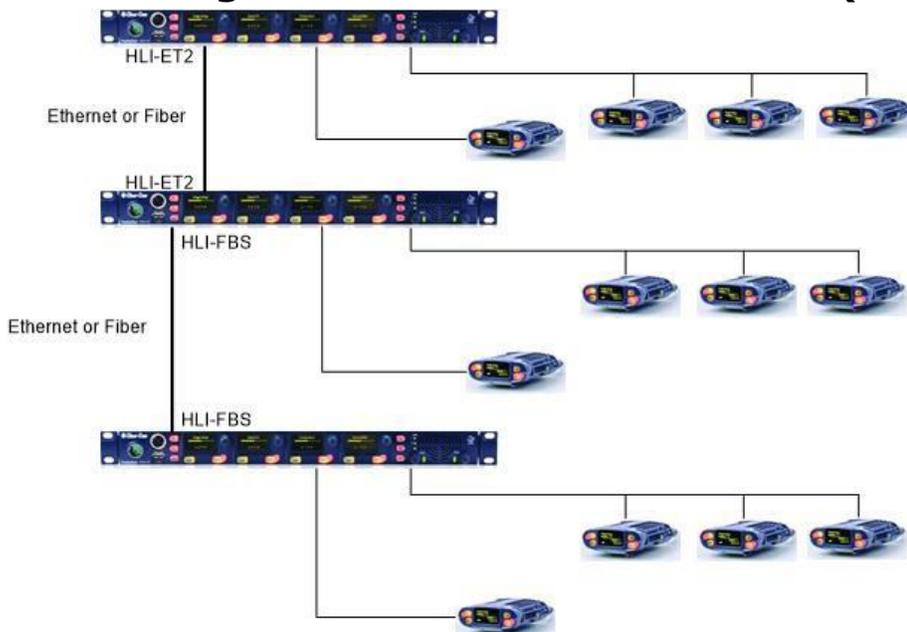
The symptoms of crosstalk are:

- Main Station front panel LINE LED indicator turns amber or red
- Beltpacks and stations (End points) take longer than usual to boot and connect.
- Endpoint signal strength indicators show low signal strength (zero or one bar).
- HMS diagnostics screen (Diagnostics->Powerlines) show collisions or errors on the line.

## Connecting by cable (Powerline).



## Connecting more than one Main Station (Linking)



Up to three Main Stations can be linked. In earlier versions of HelixNet (2.0 and below) linking Main Stations was a way of expanding the Channel capacity of your system (4 Channels on each Main Station).

In HelixNet 3.0 and up, this is no longer necessary as each Main Station already has 12 Channels, with the option of licensing more. A system, regardless of the number of linked HMS units, will have 12 channels by default with the potential of increasing that number to 24 with the purchase of a license for each HMS within the Link- Group.

Linking Main Stations in HelixNet 3.0 has the following benefits:

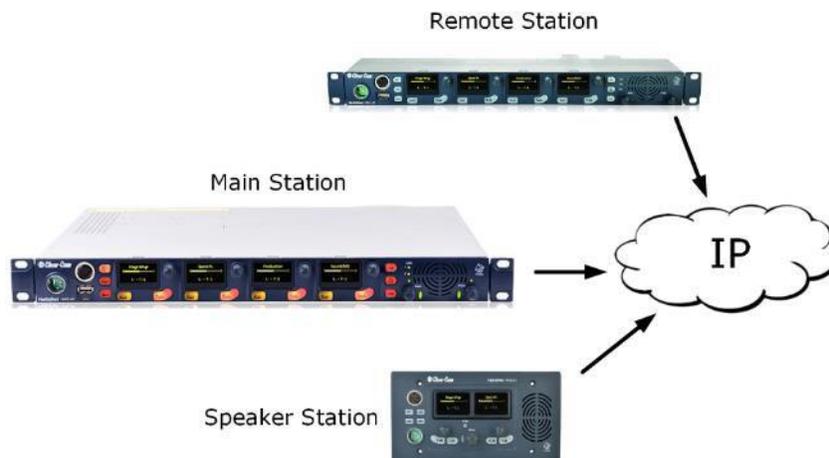
- More beltpack connections (20 per Main Station)
- System distribution as far as your LAN allows.
- The ability to configure all devices from an Internet browser using the CCM (Core Configuration Manager).

## Key Expansion Groups (Main Stations and Remote Stations)



### HRM/HMS Expanding over IP:

- All devices in the Expansion Group use the headset/microphone/loudspeaker of a "Host" HRM or HMS
- Some menus disappear from the "Expanded" HRM/HMS devices (e.g. microphone, headset, display settings).



## Pairing by LAN

## To edit the HelixNet's IP address:

a) In **Menu mode**, select **Networking**.

**Note:** The Networking menu only appears if an Ethernet or Fiber interface module is detected.

b) From the second menu, select **Preferences**. c) From the third menu, select **IP Address**.

d) From the fourth display screen, edit the IPv4 address.

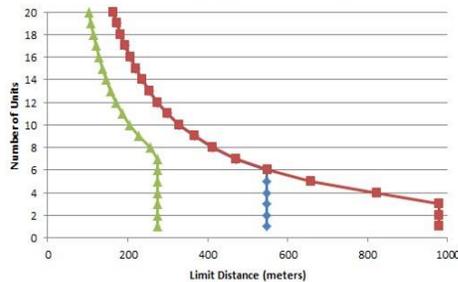
**Note:** The HelixNet system uses a 10.0.0.x IP address range internally between the Main Station and the Beltpacks, and therefore will not allow setting the external IP address to anything in that range.

### Quick reference to cable capacity and distance

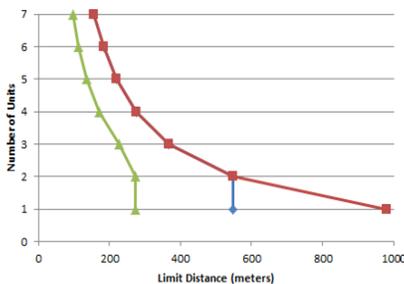
Clear-com recommends that only screened twisted pair or screened CAT5 cabling is used between the HelixNet Main Station (powerline) and beltpacks, Remote Stations or Speaker Stations. If the powerline is connected to a bulkhead patch bay or multi-box please ensure that the patched bay (or multi-box) is screened and uses screened patch cabling.

Manufacturer	Cable type	Gauge (AWG)	Style	Attenuation / 100m
<b>Belden</b>	<b>9463f</b>	20	Std	16 dB
<b>Belden</b>	<b>9207</b>	20	Std	9 dB
<b>Belden</b>	<b>1533P</b>	24	Cat5e	11 dB

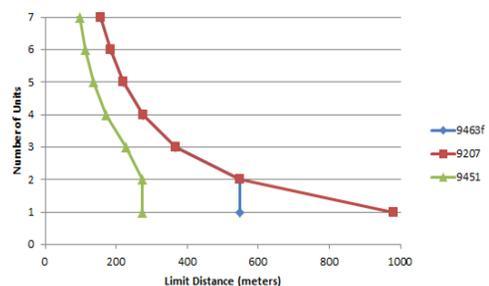
**Beltpack Limit Distances**



**Speaker Station Limit Distances**



**Remote Station Limit Distances**



**Clear-Com recommends Belden 9207 for fixed installation, and Belden 9463F for portable installations.**

**Tip:** The attenuation of a cable increases with distance, and this can impact audio quality. If your priority is audio quality, experiment with attaching one or two fewer devices to each line. For in-depth cabling advice, contact your Clear-Com Tech-Support representative. In the USA, Call: (510) 337-6600 and select option 2 at prompt.

# HelixNet Flasher for Call Signal from a Belt Pack

If you need a Flasher light for your HelixNet system, there is no equivalent to the FL-1 or FL-7 Flasher that we used in the legacy Analog Clear-Com 2wire intercom systems.

But there's a way cleverer way to flash in HelixNet to make Call Signal more attention-getting to the operator.

Pick up the rubber flap on the bottom or side of the HelixNet Belt Pack to expose the micro USB jack.

Insert the micro USB connector into that jack and insert the USB LED device of your choice into the USB slot.



Examples of the adapter and LED flasher parts:



90° Micro USB OTG Cable:

[https://www.amazon.com/dp/B013G4DMCE/ref=sspa\\_dk\\_detail\\_1?psc=1&pd\\_rd\\_i=B013G4DMCE&pf\\_rd\\_m=ATVPDKIKX0DER&pf\\_rd\\_p=1713835751726239774&pf\\_rd\\_r=EZ3747AK2JHV4N29CMGR&pf\\_rd\\_wg=Vgxu1&pf\\_rd\\_s=desktop-dp-sims&pf\\_rd\\_t=40701&pd\\_rd\\_w=IXX8C&pf\\_rd\\_i=desktop-dp-sims&pd\\_rd\\_r=ed447e5c-7a19-11e8-83b9-cb11207450ec](https://www.amazon.com/dp/B013G4DMCE/ref=sspa_dk_detail_1?psc=1&pd_rd_i=B013G4DMCE&pf_rd_m=ATVPDKIKX0DER&pf_rd_p=1713835751726239774&pf_rd_r=EZ3747AK2JHV4N29CMGR&pf_rd_wg=Vgxu1&pf_rd_s=desktop-dp-sims&pf_rd_t=40701&pd_rd_w=IXX8C&pf_rd_i=desktop-dp-sims&pd_rd_r=ed447e5c-7a19-11e8-83b9-cb11207450ec)



DROK 5 ea. USB LEDs:

[https://www.amazon.com/DROK-Efficient-Brightest-Emergency-Decoration/dp/B00TGTB4HO/ref=sr\\_1\\_5?ie=UTF8&qid=1530110073&sr=8-5&keywords=USB+LED](https://www.amazon.com/DROK-Efficient-Brightest-Emergency-Decoration/dp/B00TGTB4HO/ref=sr_1_5?ie=UTF8&qid=1530110073&sr=8-5&keywords=USB+LED)

There are many options you can find, but here are some quick links.

For a USB female to USB Micro adapter on Amazon, click:

[https://www.amazon.com/UGREEN-Adapter-Samsung-Controller-Android/dp/B00N9S9Z0G/ref=sr\\_1\\_1\\_sspa?ie=UTF8&qid=1530107157&sr=8-1-spons&keywords=USB+female+to+USB+micro&psc=1](https://www.amazon.com/UGREEN-Adapter-Samsung-Controller-Android/dp/B00N9S9Z0G/ref=sr_1_1_sspa?ie=UTF8&qid=1530107157&sr=8-1-spons&keywords=USB+female+to+USB+micro&psc=1)

or for 90 degree ones, which I am coming to prefer:

[https://www.amazon.com/CableCreation-Female-Assorted-Direction-Straight/dp/B013G4DMCE/ref=sr\\_1\\_20?ie=UTF8&qid=1530107445&sr=8-20&keywords=USB+female+to+USB+micro](https://www.amazon.com/CableCreation-Female-Assorted-Direction-Straight/dp/B013G4DMCE/ref=sr_1_20?ie=UTF8&qid=1530107445&sr=8-20&keywords=USB+female+to+USB+micro)

For a USB flasher LEDs on Amazon, click:

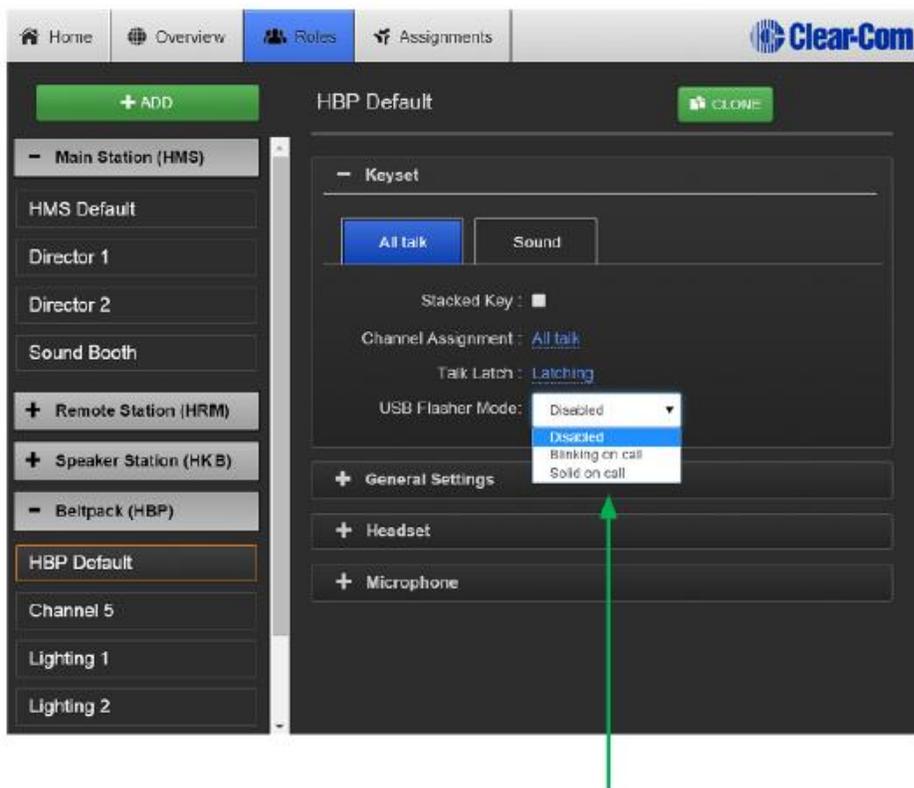
[https://www.amazon.com/INVESCH-Powered-Portable-Keychain-Camping/dp/B01H36HLAK/ref=sr\\_1\\_9?s=electronics&ie=UTF8&qid=1530107323&sr=1-9&keywords=USB+LED](https://www.amazon.com/INVESCH-Powered-Portable-Keychain-Camping/dp/B01H36HLAK/ref=sr_1_9?s=electronics&ie=UTF8&qid=1530107323&sr=1-9&keywords=USB+LED)

or:

[https://www.amazon.com/X-DRAGON-Flexible-Adjustable-Portable-Notebook/dp/B012S7IDYC/ref=sr\\_1\\_6?s=electronics&ie=UTF8&qid=1530107323&sr=1-6&keywords=USB+LED](https://www.amazon.com/X-DRAGON-Flexible-Adjustable-Portable-Notebook/dp/B012S7IDYC/ref=sr_1_6?s=electronics&ie=UTF8&qid=1530107323&sr=1-6&keywords=USB+LED)

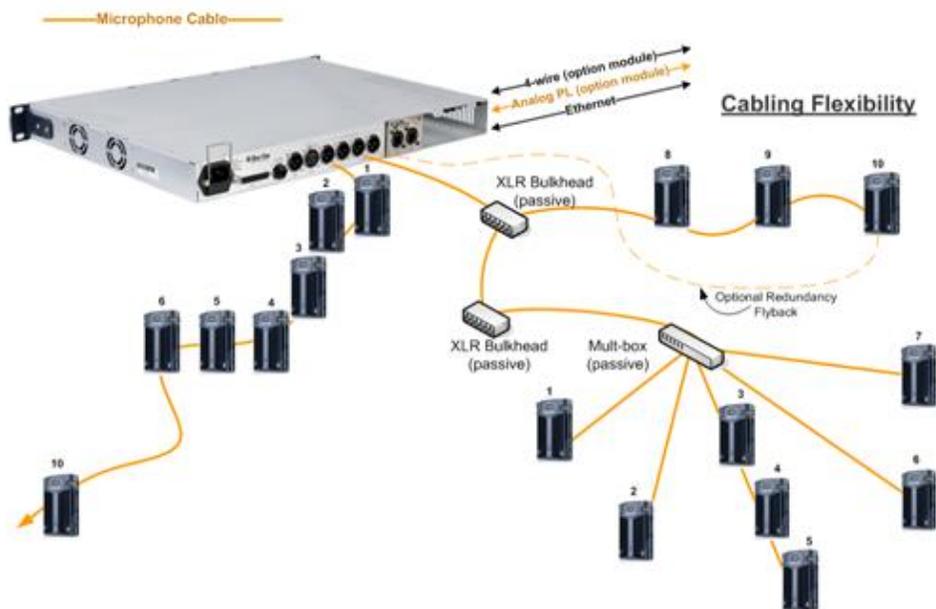
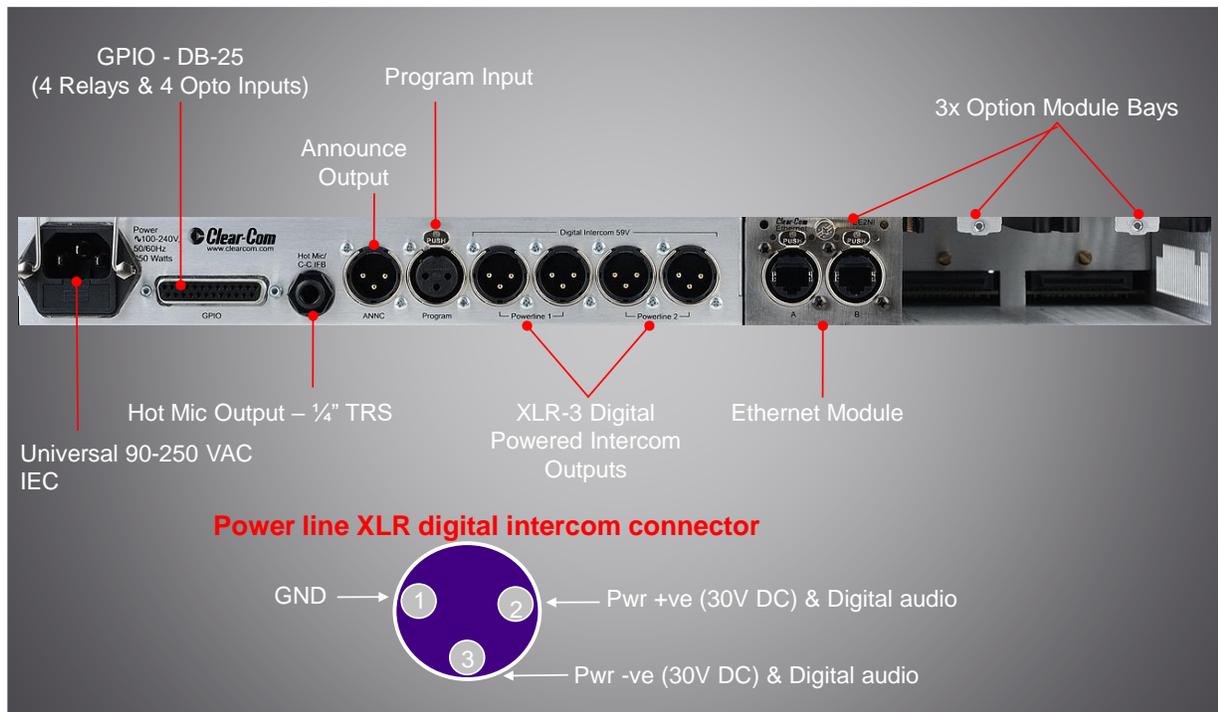
If the LED is too bright, you can put a colored balloon over the LEDs to dim the energy emitted.

Call the beltpack and see the light flashing.



USB flasher mode setting

**Figure 15-5 Set USB flasher on beltpack**



PoE Switch with Ethercon connectors



Note that not all EtherCon connectors are alike. See appendix

## Networking Specifications

Specification	Value
Latency on Powerline	40-80ms (Depends on cable type and length, and how many devices are connected. The greater the number of devices, the greater the latency.)
Latency over IP Network	30ms + Network Latency (Main Station to endpoint)
Bandwidth used	300 kbps per active Talker, for a maximum of 1 talker per device in the system Each Beltpack and Speaker Station counts as 1 device Each Main Station and Remote Station counts as 2 devices
IP version	IPv4

# HelixNet™ Roles

The following Quick Start Guide provides an overview of Roles in HelixNet 3.1. Roles are a new HelixNet feature that enable you to quickly and easily configure your HelixNet devices. For more information, see the *HelixNet 3.1 User Guide*.

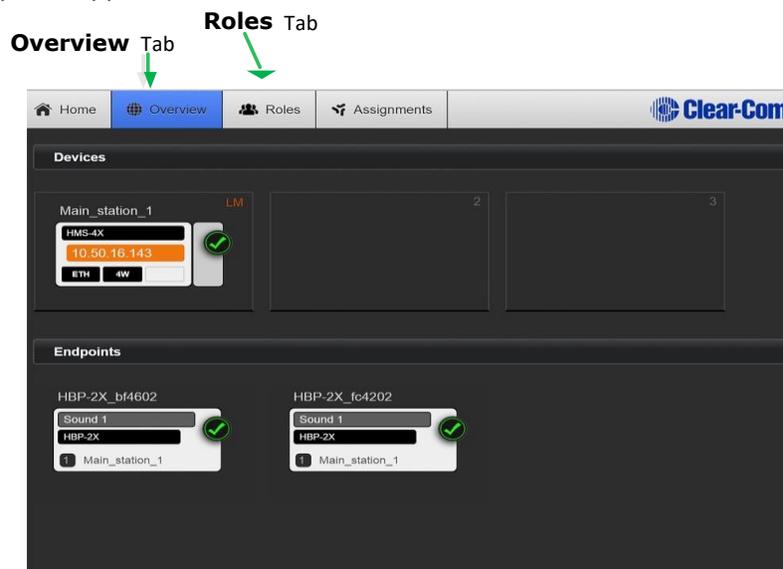
## Introduction

You can use the Core Configuration Manager (CCM) to create and assign Roles to each HelixNet device (HMS-4X, HRM-4X, HKB-2X, HBP-2X and HXII-BP-X4). Roles contain configuration information such as Channel assignments, audio settings, program feeds and relays. You can define roles in advance (use the default settings if you wish) and apply them later. Whenever a role is modified, the changes apply immediately to any device that has selected that role. The same Role can be used by many devices of the same type.

**Note:** To use Roles, you must have an Ethernet module or a Fiber module (connected to an Ethernet switch) installed in a HelixNet Main Station. If you choose not to use Roles, select **Local Config** instead of a Role.

**REMEMBER:** A role, in HelixNet, can be selected by more than one endpoint (HBP, HRM or HMS)

1) From a computer connected to the same network as your Main Station, open a Web browser and enter the IP address of the Main Station (default user name: **admin**, default password: **admin**). The **Overview** page appears. devices connected to your system appear in this screen.



**Note** The orange highlight shows which device the browser is currently connected to. This is the host device.

**Note** A maximum of three Main Stations can be linked.

- 2) From the top Navigation Bar, select **Roles**. The example below lists Main Station Roles on the left side with the Channel assignment and configuration setting on the right side.

**Note:** A default Role is always present that contains factory settings. You can edit this default Role.

Main Station Roles available for configuration

Channel assign and talk latch settings for selected keyset

Role configuration settings drop - down menus

- 3) Use the **Roles** screen to select and edit an existing role, or to create a new role for any HelixNet device. Use the **ADD** or **CLONE** button to make new Roles. Use the **DELETE** button to remove a Role.

**Note:** You cannot delete a default Role.

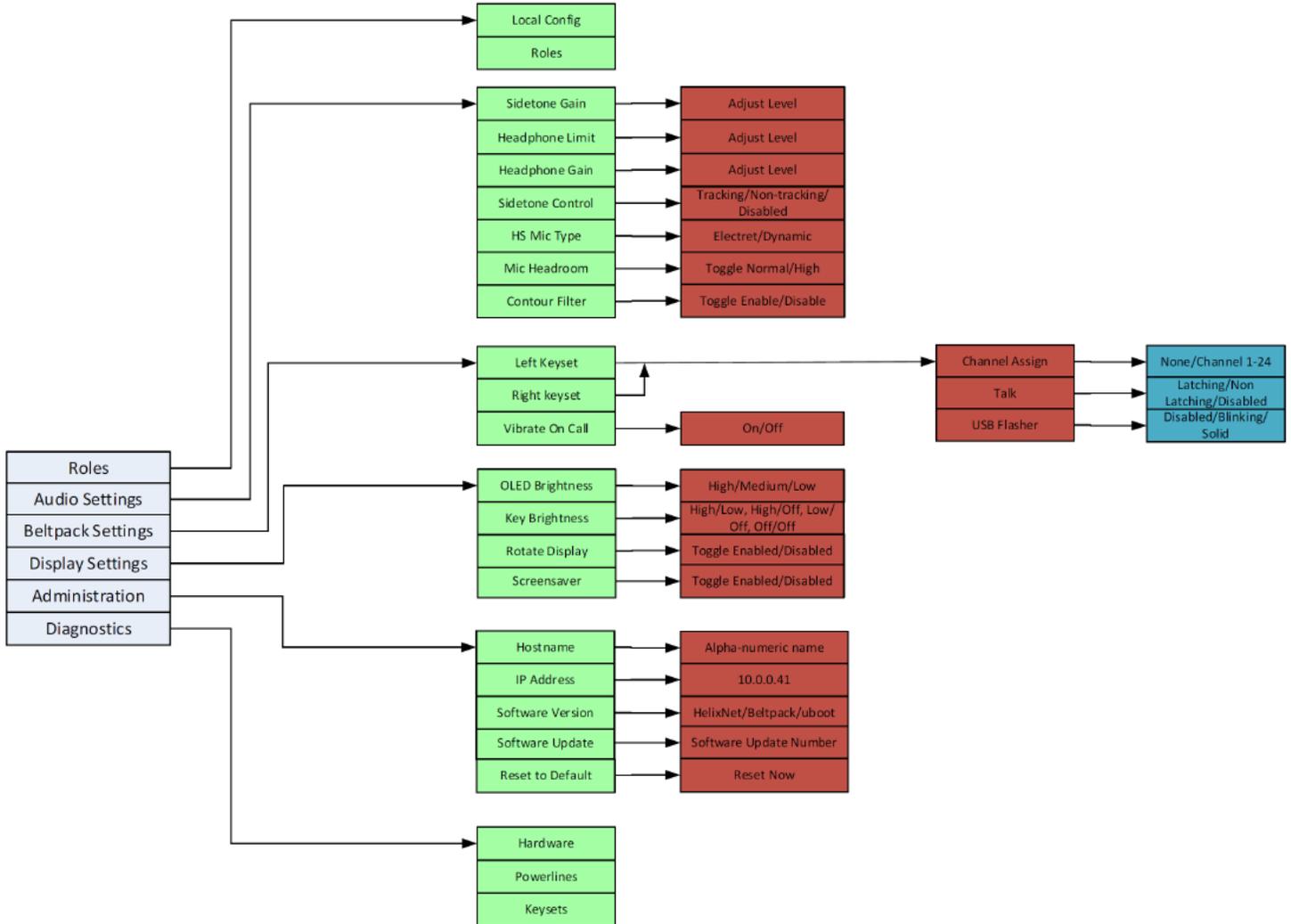
**Note:** You will always create a new Role from a template.

- 4) When any HelixNet device powers up for the first time or connects to the Main Station, choose which Role to apply. The settings or configuration information associated with that role are applied to that HelixNet device.

**Note:** You can select a new Role for any device from its menu (if menu access is enabled). The new Role's settings and configuration information are immediately applied.

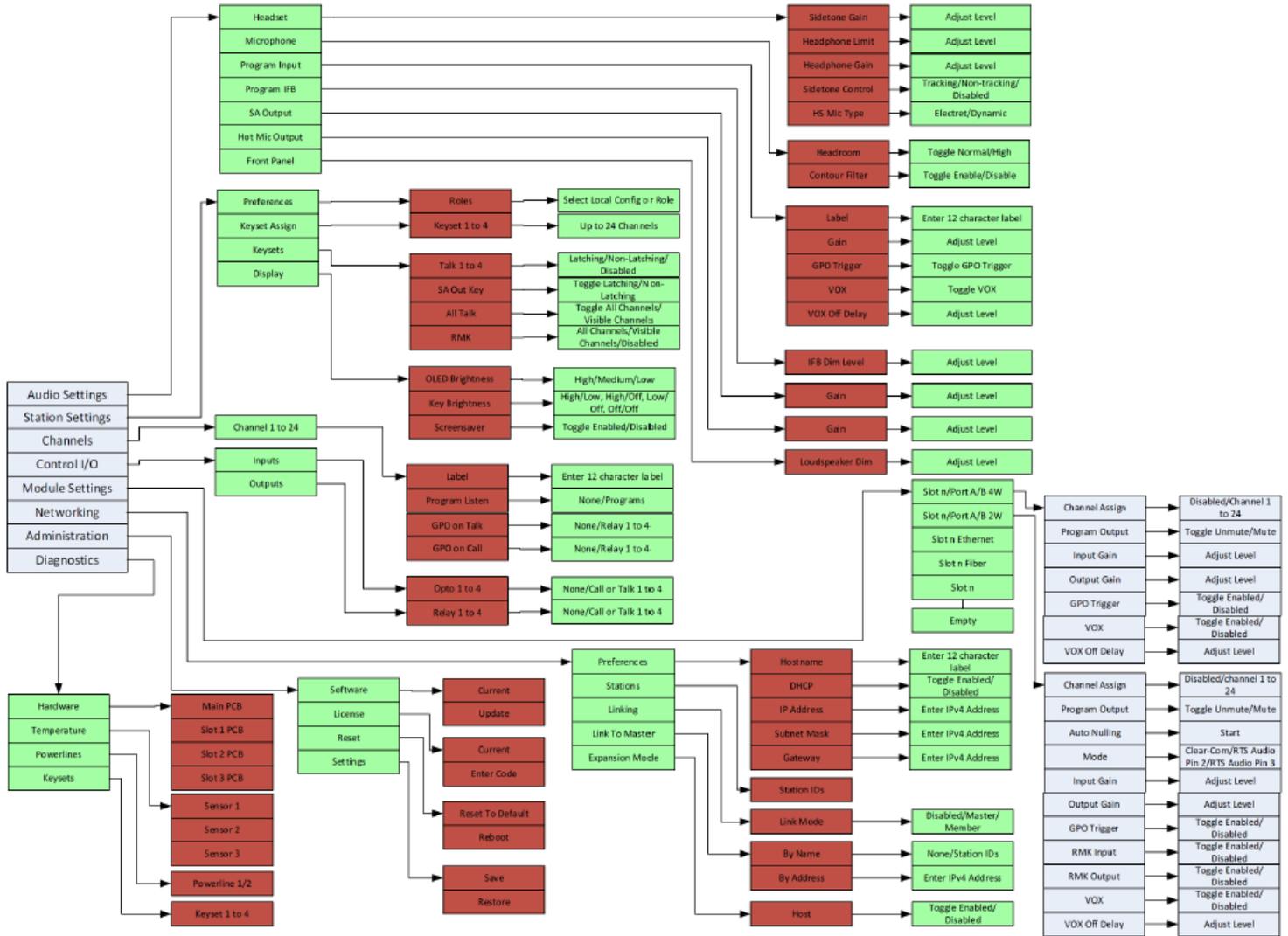
# HelixNet Beltpack Menu Tree

Table 22-4 Beltpack menu tree



# HelixNet Master Station Menu Tree

Table 22-1 Main Station menu tree



# What are the recommended Switches for HelixNet?

We recommend the following specifications when selecting a managed switch to use with HelixNet:

- 100/1000Base-T Layer 3 Managed Switch
- If Energy Efficient Ethernet is supported, ensure it is disabled
- SPF/Mini-GBIC support If connecting two or more switches together, we recommend the bridge / link ports between the switches supports at least 1GB.
- Disable IGMP snooping

## What is the PoE specs for HelixNet?

HelixNet is IEEE 802.3af compatible, that is 48V/15.4W per PoE port.

HRM and HKB can drain up to 13W when the loudspeaker is at max volume.

HXII-BP will drain up to 4W.

To clarify the HRM and HKB are designed and built to draw no more than 12.95W to fit within the PoE specification (vanilla PoE). The PoE spec specifies the switch to be able to provide 15.4W per port to accommodate for cable resistance on a full 100m run. Both numbers are accurate and it would be right to show both as in some people's minds 12.95W is a cue word for PoE (and they may think that going higher may mean something more than PoE.... Which isn't the case).

Now in reality this is contingent on how you run your loudspeaker, so keep in mind that using the speaker, especially at high volume, adds quite a bit of current draw from the PoE power, so plan accordingly.

Please remember that the user is responsible for adding up the power capacity that is needed from any combination of multiple devices to validate that the switch can handle the load.

## **BOOTING AN HMS-4X WITH A USB DRIVE FOR A NON-RESPONSIVE (BRICKED) STATION**

- 1) Copy the [npl.ccb](#) file provided to you to the root directory of a USB drive (File System FAT32) \*
- 2) The USB drive needs to be connected to the Micro USB port (same size as on Android phones) on the HMS-4X. Use a Micro-AB USB adapter with full size USB drives.



Mirco USB to USB ([Search for USB to micro USB adapter to find one of these](#))

- 3) Push in and hold the 'Main' and 'PGM' encoder knobs then press and release the 'HSet' button while continuing to hold the 'Main' and 'PGM' encoder knobs.
- 4) The Left most display will show blinking Call and Talk buttons with 'Net Boot' above the Call button and 'USB Boot' above the Talk button.
- 5) Press the Talk button for 'USB Boot'.
- 6) Reading USB stick please wait... message appears on the screen
- 7) If an error message appears after this message, the USB drive is not compatible\*.
- 8) Otherwise booting continues with the display showing:  
BOOT FROM STICK  
Please wait...  
Load npl.ccb  
Load OK  
Stage 2  
(HMS-4X will continue booting)
- 9) Now you can upgrade the station to the version you require in the normal way.

For an online video for how to push the code, <Ctrl> click <https://photos.app.goo.gl/1qBqNEbuUCRb9A572>

Once the booting process is complete, reload the HMS-4X's firmware using either:

- The PC browser CCM (Device Tab: General > Upgrade > Select file..)
- Or a USB drive plugged in to the HMS-4X with the firmware copied to the root directory (Menu > Administration > Software > Update > click the knob on the right)
- After you are done, make sure you also push the .gz archive file into the base for the new HX IIs-BP's code-upgrade.

*\* not all USB drives are compatible with the USB boot process. Smaller drives with a capacity of 8 gig or less are recommended.*

Examples:

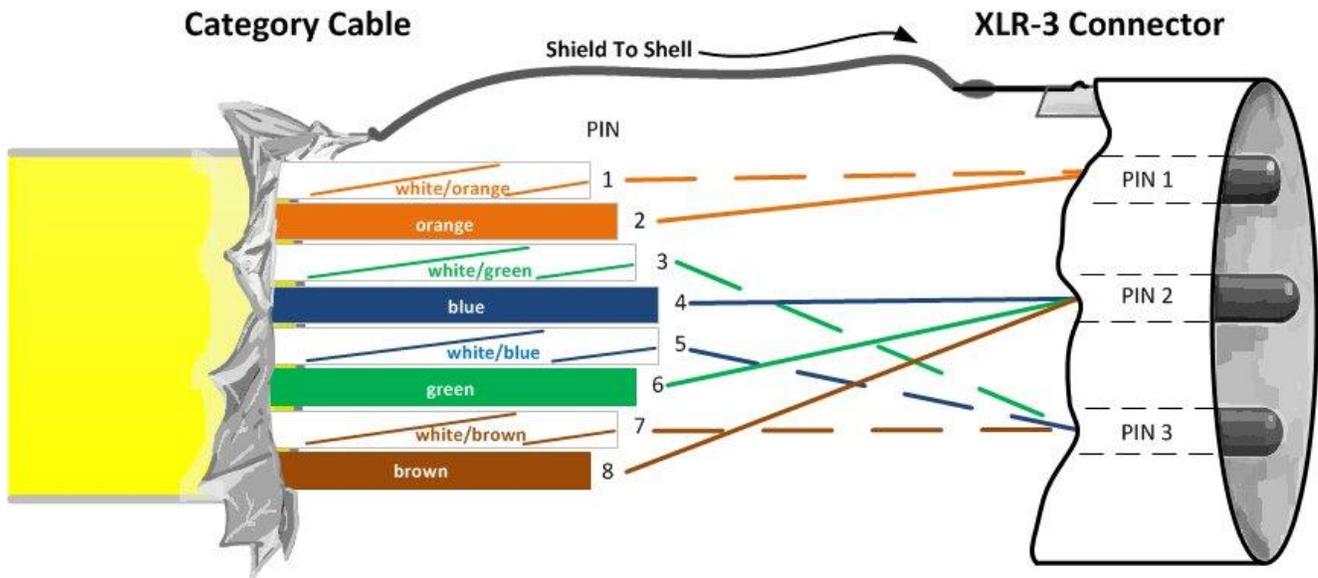
**San Disk 8G Cruzer Blade Memory Sticks**

**Verbatim 8G USB 2.0 "Store & Go" Memory Sticks**

An example of a known good drive (Verbatim) is: [https://www.amazon.com/Verbatim-Store-Flash-Drive-Green/dp/B000NDRTZI/ref=sr\\_1\\_7?ie=UTF8&qid=1521227627&sr=8-7&keywords=verbatim%2Busb%2Bflash%2Bdrive&th=1](https://www.amazon.com/Verbatim-Store-Flash-Drive-Green/dp/B000NDRTZI/ref=sr_1_7?ie=UTF8&qid=1521227627&sr=8-7&keywords=verbatim%2Busb%2Bflash%2Bdrive&th=1)

# Using Shielded Category Cable for PLM connectivity

## Recommended wiring scheme for CAT5/6 to XLR connector



**Cat cables**

When long PLM runs are needed, this is the best cable to use.

## Quick reference: Two-wire connection to RTS 2W system

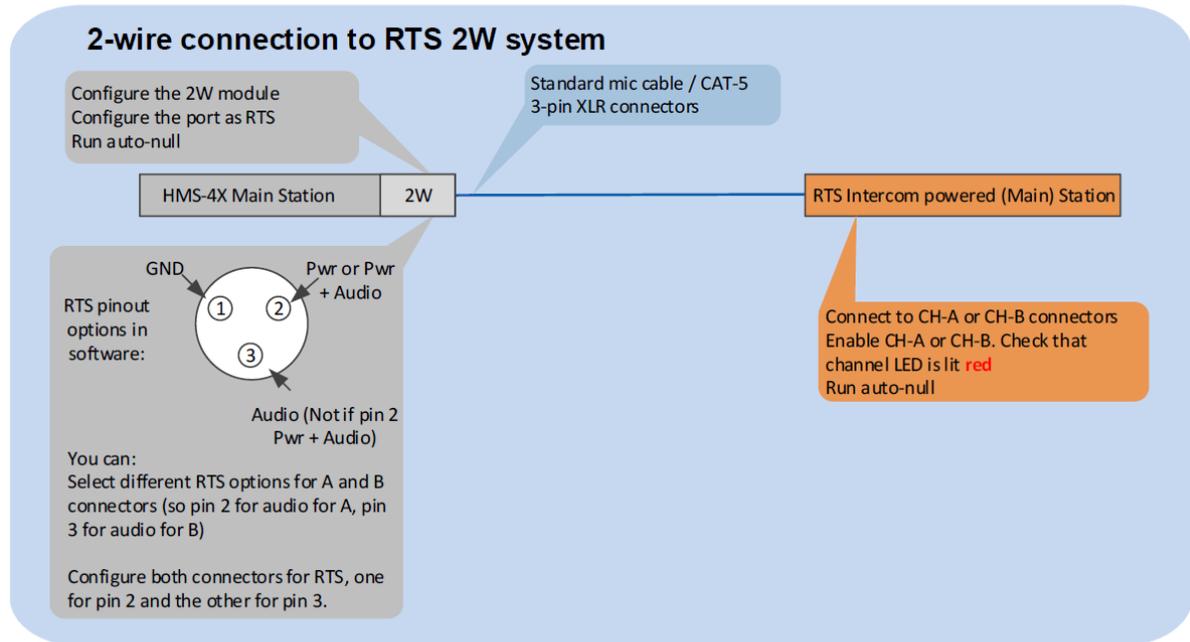


Figure 19-2: Two-wire connection to RTS 2W system

Belden 1351A or 1533P with the following connections at the XLR connector:

Cat5/5e/6	X
<b>White/Orange</b>	1
<b>Orange</b>	1
<b>White/Green</b>	3
<b>Blue</b>	2
<b>White/Blue</b>	3
<b>Green</b>	2
<b>White/Brown</b>	3
<b>Brown</b>	2
<b>Shield/Drain</b>	1



Snake with RJ45-female EtherCon connection, 3SRXFM3 ~ \$120  
RJ45 to 3pin XLR connectors, one female & three male

mike@mwcommsolutions.com

**It is important to connect the cable shield or drain wire to the XLR pin 1 to maintain the shield integrity throughout the cable and connector.**

**Note:** The total amount of cable deployed for a digital intercom line contributes to the total capacitance of the line, even though some cables might not have a Beltpack connected at the other end. The more capacitance there is, the more attenuation there will be. Clear-Com recommends that you use the minimum amount of cable. For example, daisy-chain or split a cable at the far end, close to the Beltpacks, rather than make two homeruns to a central patch panel.

# Upgrading a HelixNet system.

Go to the [www.clearcom.com](http://www.clearcom.com) web site and download the latest HelixNet zip file:

as of August, 2017, it can be found at: <http://bit.ly/2u7vhqV>

Once the download is complete unzip the file and put the contents onto a thumbdrive, there should be the following files:

NPL-3.1.45.0.ccb

HXII-BP-3.1.45.0.ubifs.gz

NOTE: as the Firm Ware evolves, the name of the file will reflect the newer FW version number.

Upgrade Instructions (using the front panel menus on HMS-4X units running v1.0 or higher):

1. Download and unzip the (2) v3.1 upgrade files to a USB Flash Drive
2. Insert the USB Flash Drive into the USB port on the front of the Main Station
3. Press the Menu button and navigate to the following menu: Administration > Software > Upgrade
4. Select the .ccb upgrade file within the 4th display and press the encoder to apply. Allow the system to update.
5. Press the Menu button and navigate to the following menu: Administration > Software > Upgrade
6. Select the .ubifs upgrade file within the 4th display and press the encoder to apply. Allow the system to update.
7. Verify that the system is now updated to version 3.1.45
8. NOTE: Make sure to update all HMS-4X units.

Upgrade Instructions (using the CCM web browser with HMS-4X units running v3.0 or higher):

1. Download and unzip the (2) v3.1 upgrade files
  2. Navigate the CCM web browser to Home > General tab
  3. Select the .ccb upgrade file and update. Allow the system to update.
  4. Select the .ubifs upgrade file and update. Allow the system to update.
  5. Verify that the system is now updated to version 3.1.45
  6. NOTE: Make sure to update all HMS-4X units. Open a CCM window for each individual HMS-4X (the IP address on the device icon must be orange) to update that particular HMS-4X unit.
- If you can't get to the menus on the unit directly or via the web browser let me know.

# LQ<sup>®</sup>

## IP Audio and Comms transport Box



### NOTE:

- 1) Agent IC and SIP clients can be hosted by an LQ box.
- 2) SIP telephony accessible to/from LQ channels.
- 3) LQ ports are able to be available to a VLAN connected HelixNet system to add ports to the HelixNet's backplane.



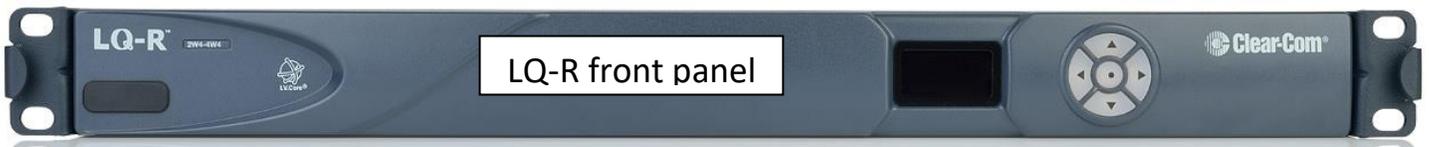
← LQ 2W2



← LQ 4WG2



← LQ 4W2

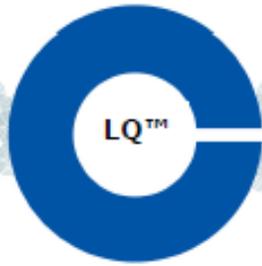


LQ-R front panel

LQ-R 4W-8 Backplane



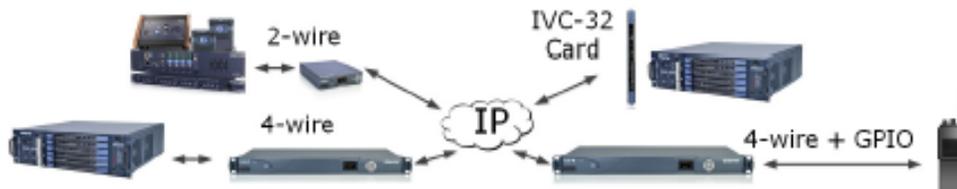
LQ-R 2W4 4W4 Backplane



# LQ™ Series Quick Start Guide

The following **Quick Start Guide** provides basic installation and configuration instructions for your LQ system. LQ is a new IP interface for Clear-Com audio products. It offers Internet, LAN and WAN connectivity for multi-linking audio.

- LQ-2W2 provides connection for two 2-wire analog partyline ports (XLR connectors)
- LQ-4W2 provides connection for two 4-wire ports (RJ45 etherCON connectors)
- LQ-4WG2 provides connection for two 4-wire ports + GPIO (D9)
- LQ-R2W4 provides connection for four 2-wire ports (XLR) each with a male and a female connector
- LQ-R4W8 provides connection for eight 4-wire ports (RJ45, etherCON)
- LQ-R2W4-4W4 provides connection for four 2-wire ports (XLR) and four 4-wire ports (RJ45, etherCON).
- LQ-2W4+4WG4 provides connection for four 2-wire (XLR) and four 4-wire+GPIO ports (D9)
- LQ-R4WG8 provides connection for eight 4-wire+GPIO ports (D9).



## Powering and connecting the LQ units

- 1) Connect the LQ unit to a network using standard Ethernet cable and power it on (use either the DC power supply cable provided or PoE). The 1 rack unit has redundant power supplies.
- 2) Connect the audio cables.
- 3) Open a Web browser on a device connected to the same network as the LQ device.
- 4) Input the IP address shown on the LQ device's display into the address field of the browser.
- 5) Enter the default login credentials for the Core Configuration Manager: Username – **admin**, Password – **admin**.



## Core Configuration Manager (CCM)

The CCM has four main pages:



- **Home** - Settings for the host device (the device whose IP address the browser is connected to).
- **Overview** - Settings for all devices in a Link-Group.
- **Assignments** - Configuration of audio and data routes between LQ devices (setting the network quality).
- **External Systems** - external matrix systems via IVC-32 card

**Note:** If your network does not support DHCP you must assign a static IP address to the LQ device:

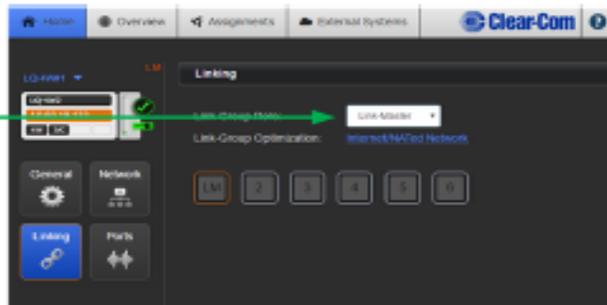
- 1) Connect a standard (straight) Ethernet cable from a computer to either LAN port on the device.
- 2) Ensure the computer is in DHCP mode.
- 3) Open a web browser and input the device's IP address in the address field.
- 4) Navigate to the device's network screen within the home page and allocate a static IP address.

## Linking the devices

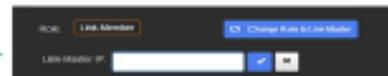
Each device's role is set as Link-Master by default.

- 1) Select one device in the group to be designated as the Link-Master, connect it to the network and power it on.
- 2) Connect another LQ device to the same network and power it on.
- 3) Enter the IP address shown on the display of the Link-Member device into the address field of your Web browser to connect to that device's Core Configuration Manager.

- 4) Navigate to **Home > Linking**.
- 5) Click **Change Role to Link-Member**.



- 6) Enter IP address of Link-Master. Click on blue check mark or press <ENTER> key to submit.
- 7) Select an available device ID (highlighted in blue).
- 8) Click **Apply changes**.
- 9) Repeat linking process for each device.



## Audio port settings

From the Core Configuration Manager (CCM) go to **Overview > select device > A/B**. The LQ devices arrive with the following default settings:

2W	
Power	Disabled
Mode	Clear-Com
Input/Output gain	0dB
Network Quality	High
VOX mode	Disabled
Termination	Disabled

4W	
Input/Output gain	0dB
Network Quality	High
VOX mode	Disabled
Port Function	To Matrix
Baud rate	19200 (Eclipse)

4WG	
Input/Output gain	0dB
Output level (mic Or line level)	Line level
Network Quality	High
VOX mode	Disabled

## Connecting and configuring audio channels

Once an LQ device is connected to a Link-Master, click on the **Assignments** button within the navigation bar to configure channel connections.

Set device to network quality by clicking/touching this icon in **Assignments**:  (default setting = **high**).

See the *LQ Series System User Guide* on the Clear-Com website for more information.

**For use on the public internet**, you will need to coordinate with your IT person or Internet service Provider to have them give you an IP Address that will be bridged to the outside world and have them map the following in their fire wall:

**Port 1007 to TCP:80**

**And port 1008 to TCP/UDP:655**

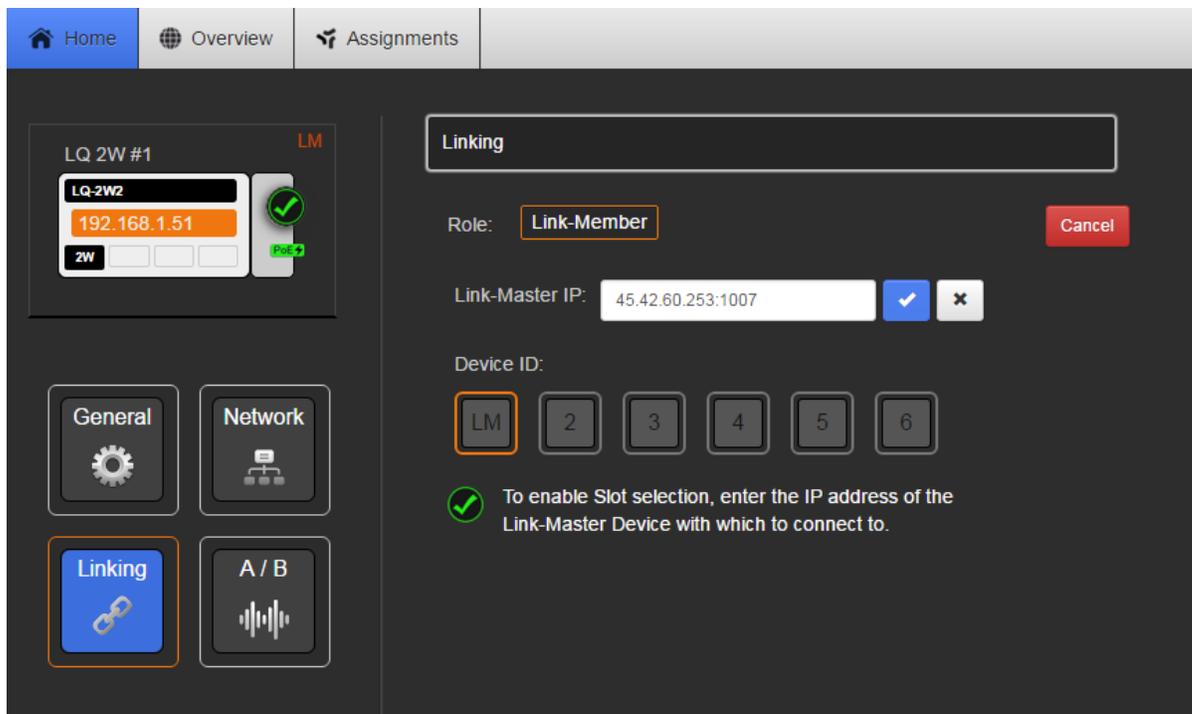
Once you've done that configure the Link-Master like so

Home > Network

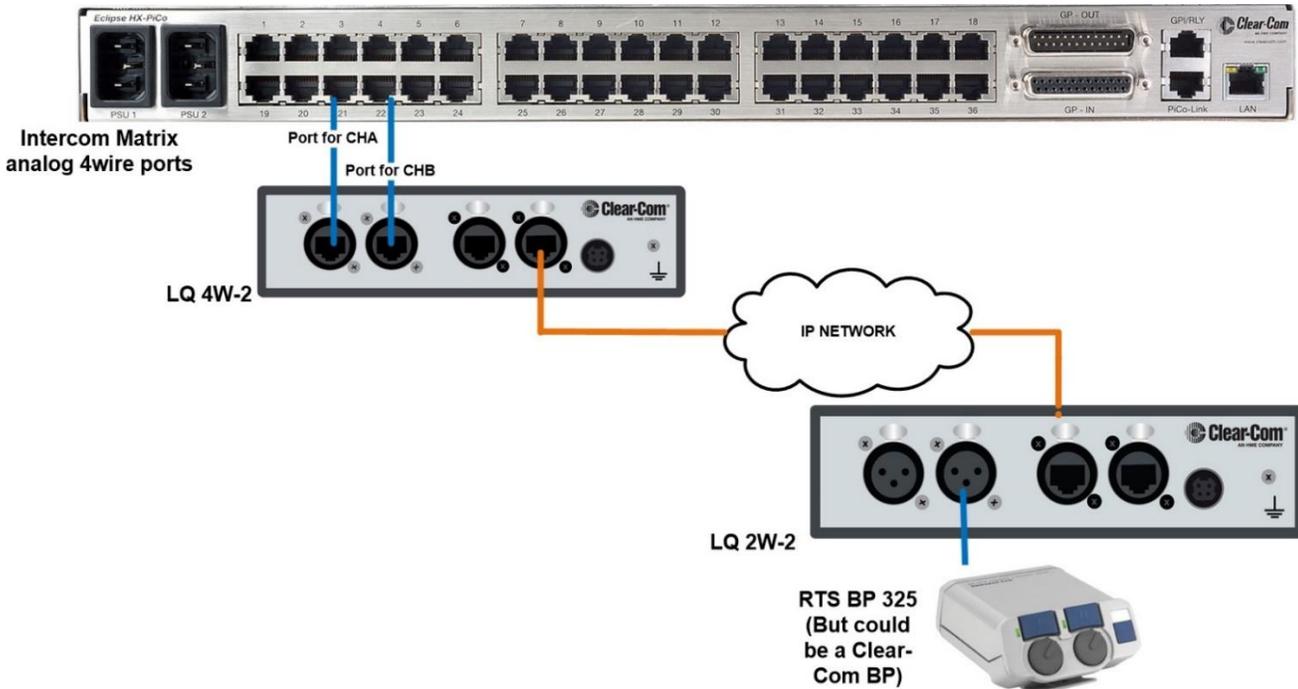


And then in the Link-Member (remote LQ):

Home > Linking

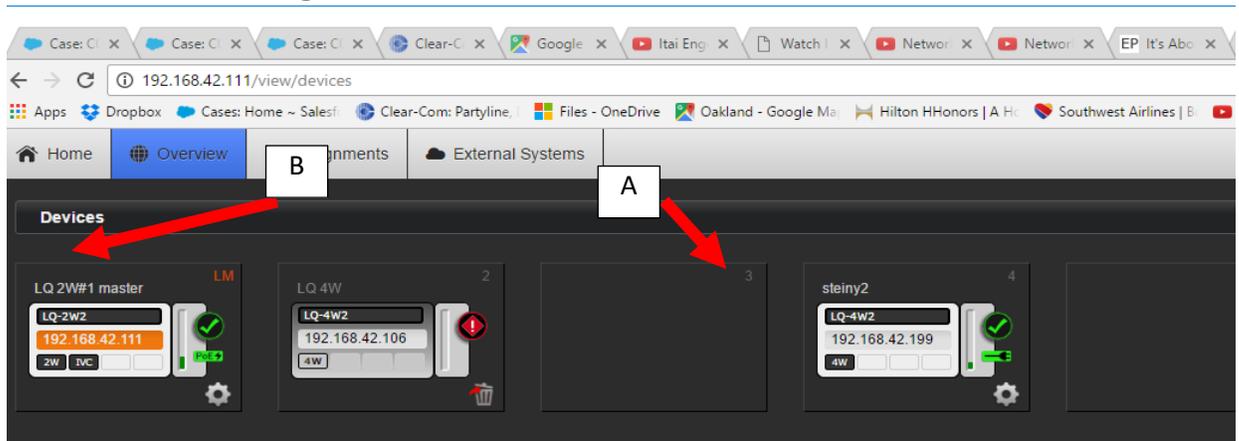


# Setting up an LQ 2Wire box for RTS mode to connect to a BP325 PL box

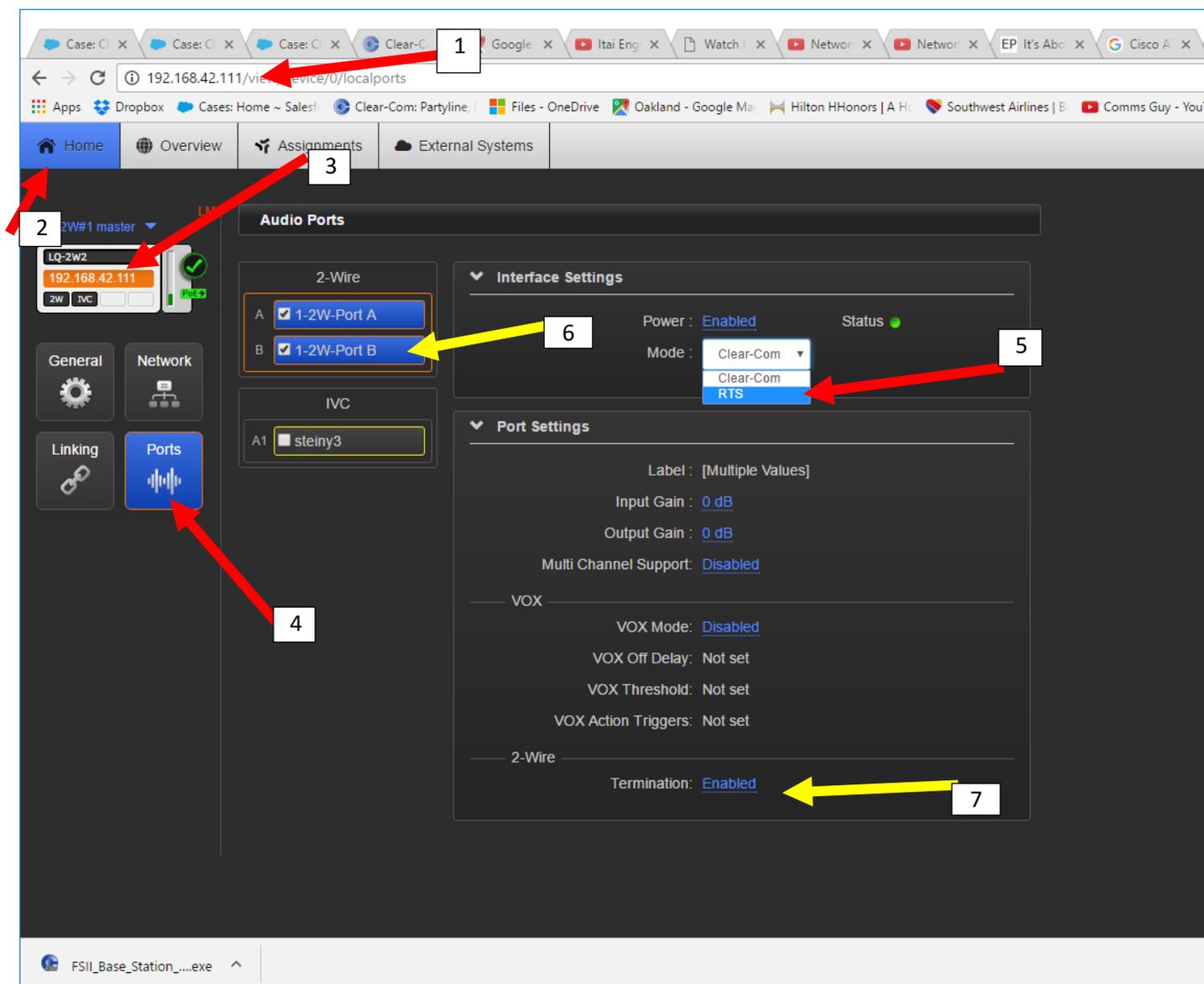


- 1) Type target 2wire LQ box's IP address in your browser's address bar  
**(NOTE: ID: admin & PASSWORD: admin)**  
**IMPORTANT NOTE:** As of January 2020, all new products sold have to have a unique password for initial launch of a Browser-Based GUI. You can then change the password to anything you choose. The unique password will match a mDNS name provided in the menu if the item, or in the case of Transceivers with no display, it can be found on a sticker on the back of the item.

**NOTE: (A)** "steiny2" would be the Matrix side (4wire) and **(B)** "LQ 2W #1 master" is 2wire target shown below



- 2) Click on the HOME tab
- 3) Confirm you are looking at the correct box
- 4) Click on the PORTS button
- 5) Hit the MODE dropdown menu and select RTS...confirm POWER and TERMINATION are correct
- 6) Don't forget to NULL by selecting one port at a time to bring up AUTONULL....
- 7) ...and then the AUTO-NULLING button will appear under TERMINATION



# Agent-IC Intercom SmartPhone App

Eclipse-HX Digital Matrix Solutions

## Key Features and Benefits

- Fully-featured intercom client for mobile access to matrix system
- Free app download via Apple iTunes or App Store and Google Play store
- Operates on all devices running iOS version 8.0 or higher and android
- Wi-Fi, 3G, 4G, LTE network compatible
- Up to 32 clients run on a single IVC-32-HX card

- No external server required
- Password access with bi-directional audio encryption
- Configuration controlled via EHX software
- Supports wired and Bluetooth headset devices
- Allocate Agent-IC licenses on demand with floating licensing scheme matrix via the IVC-32-HX card, there is no additional server required for operation. The ergonomic, easy-to-use interface is designed to be consistent with other user panels, such as V-Series. It's configured similar to a dedicated intercom panel, which enables users to monitor and/or contribute to assigned matrix resources. The convenient "Swipe-to-Latch" gesture is easy to use and avoids inadvertent key latching. The large Talk and Listen keys allows easy readability and functionality on smaller devices, like iPhones.

Agent-IC is a mobile app for remote access to the host Eclipse-HX matrix system on smartphones or tablets conveniently over wireless networks.

## Description

Agent-IC is a downloadable app that provides Eclipse-HX administrators the option of having a fully-featured mobile user station on mobile devices. Each Agent-IC Client's access is managed by the central administration control within the EHX Software. The system supports user login and audio encryption for a secure and private interface with Eclipse-HX. Agent-IC supports point-to-point, point-to-multi-point, partyline, ISO and IFB communication. The app also supports local cross-point level control and notification functions.



# Installation and Accessibility

Users of iPhones, iPads or devices running iOS 8.0 or later, can easily install the Agent-IC app from Apples' App or iTunes stores. Android users can get the app at the Google Play store. Once installed, they can connect to any network accessible host Eclipse-HX matrix. Login credentials and IVC-32-HX cards for the Eclipse-HX matrix are required. Up to 32 clients can be hosted on a single IVC-32-HX card.

## Operation

Agent-IC uses the G.722 codec and operates over Wi-Fi, 3G, 4G and LTE networks. Because it connects to the host Eclipse-HX via the IVC-32 card, it will connect to any point that the IVC-32 card can get to.

Eclipse-HX Digital Matrix Solutions

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### Technical Specifications

#### Platforms Supported

Check App Store for current compatibility iPhone 4S, 5, 5S, 5C, 6, 6+  
iPad 2, 3, 4 iPad Air 1, 2 iPad Mini 1, 2, 3 iPod Touch 5G  
**iOS Version:** 8.0  
**EHX Version:** 8.5 or higher

**NEW:** Download the free app from Google Playstore to test specific make and model.  
Android Version: 5.0 or higher

#### Keys Per Page

**4+ Reply Key:** iPhone 4S, 5, 5S, 5C, 6; iPod Touch 5G  
**5+ Reply Key:** iPhone 6+  
**15+ Reply Key:** iPad 2, 3, 4; iPad Air 1, 2; iPad Mini 1, 2, 3

#### Audio

**Audio Codec:** G.722 (7.4 K/Hz audio bandwidth)  
**Audio Encryption:** AES-128  
**Local Mix Level Control:** Yes  
**Mic Mute and LS Cut:** yes  
**Communication Modes:** Partyline, Conference, Point-to-Point, IFB, ISO, etc.

#### Network

**Type:** Wi-Fi, 3G, 4G, LTE (as available on device)  
**IP Bandwidth:** 140kB/s, bi-directional per client (with silence suppression disabled)  
**Silence Suppression:** Optional  
**Ports Required:** 1  
**Port Number:** Default 6001 (configurable)  
**DNS Support:** Yes  
**Minimum Latency:** From Matrix to Agent-IC: 150ms From Agent-IC to Matrix: 90ms

#### Miscellaneous

**Bluetooth Headset Support:** Yes **Speakerphone Mode:** Yes **Background Operation:** Yes  
**Presence Indication:** Yes, for other Agent-IC clients  
**Call Signaling:** Yes  
**Reply Key Support:** Yes

#### International Character Set

Arabic, Cyrillic, Hangeul, Hebrew, Hiragana, Kanji, Katakana  
In its first year of introduction, we found that the IOS version of the Agent-IC runs very well on any IOS device which is updated to the latest release of IOS. Unfortunately, the Android world is far more diverse with hundreds of Smartphone and Android OS combinations in common use.

For Agent-IC for Android we tested to the two most recent versions of Android (5.x and 6.x) and the following set phones/tablets ...

	<b>OS Version</b>	<b>Notes</b>
Clear-Com tested devices		
<b>Smartphones</b>		
Samsung S5 phone	OS 6.0.1	
Samsung S5 phone	OS 5.1	
Samsung S6 phone	OS 6.0.1	
LG G5 phone	OS 6.0.1	Poor audio in idle state
HTC M8 phone	OS 6.0.1	
HTC 10	OS 6.0.1	
Nexus6p	OS 6.0.1	
OnePlus One	OS 6.0.1	
<b>Tablets</b>		
Samsung Galaxy Tab S2 9.7"	OS 6.0.1	Low-level mic and choppy audio
Lenovo Yoga Pro 3 Tablet	OS 6.0.1	
NEXUS 7	OS 6.0.1	
<b>Android Watches</b>		
Sony SmartWatch 3	Android Wear 1.5	
Motorola 360 Smart Watch	Android Wear 1	Long pair / App load time
Huawei Smart Watch	Android Wear 1.5	

# Eclipse® / EHX®



- CPU Cards:** Configuration cards (Computer)...one active and one standing-by
- MXV Card:** 16 analog ports, used for panels, interfaces or direct connections (4wire audio)
- E-Que card:** Used for connection to transceivers or splitters for FSII wireless BPs
- IVC-32 Card:** 32 ports of hard or soft network clients for panels, trunks or Agent IC seats.
- E-MADI Card:** 64 MADI ports (duplex) into and out of the matrix via coax or fiber connection
- E-FIB Card:** used to fiber link two or more Eclipse frames
- CCI-22:** two ports of 4wire to 2wire connectivity to the frame via the MVX card
- FOR-22:** two ports of analog audio or 2way radio connectivity to the frame via the MVX card
- GPI-6:** two ports of six GPI triggers that can be triggered from matrix panels
- RLY-6:** two ports of six relay triggers that can be triggered from matrix panels

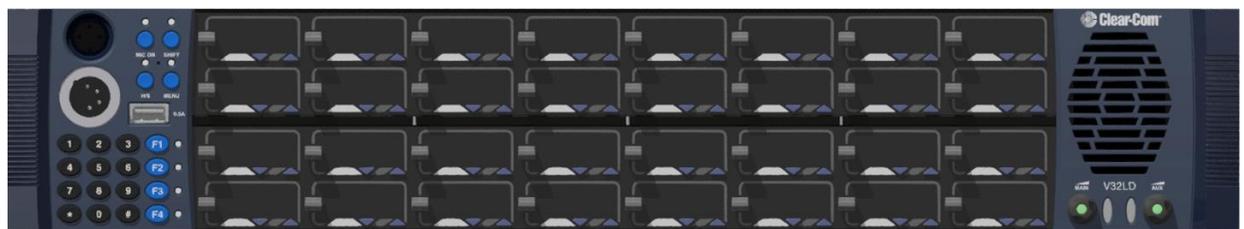
V-Panel:



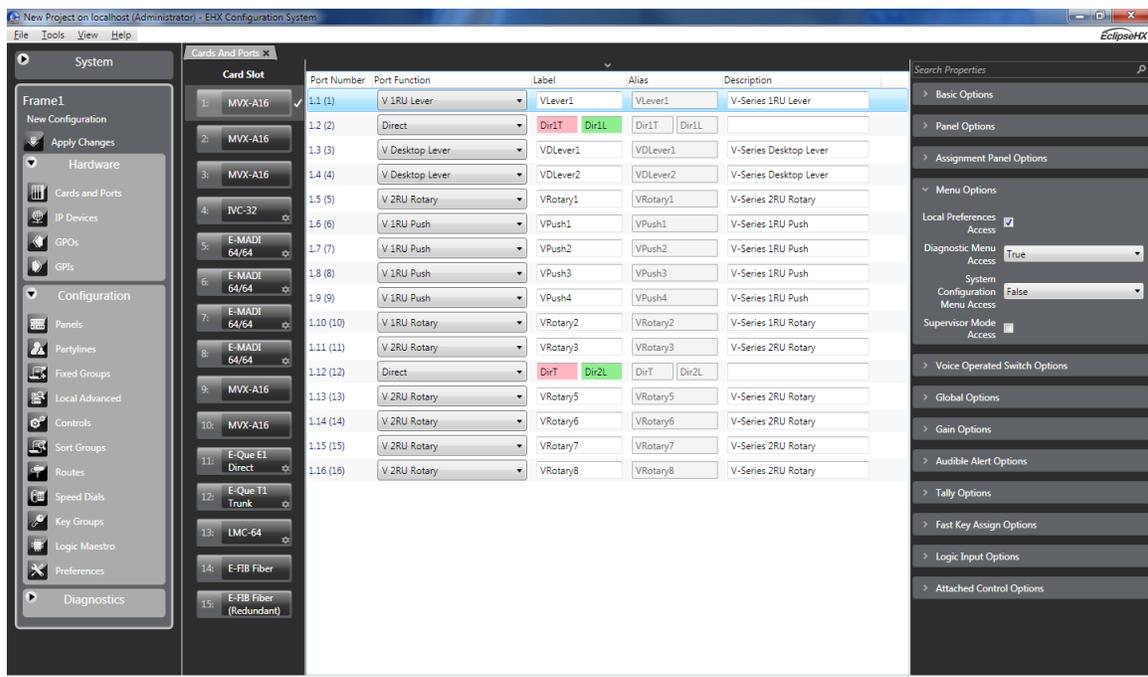
i-Station:



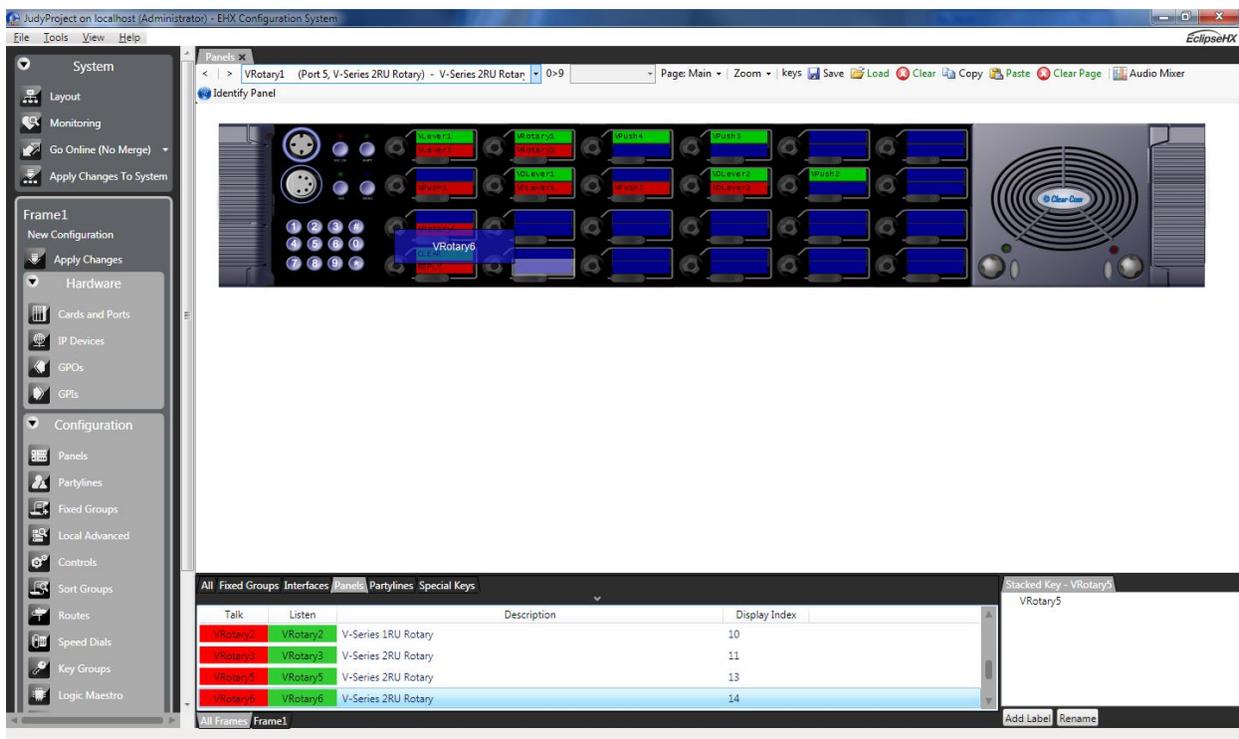
New V-32



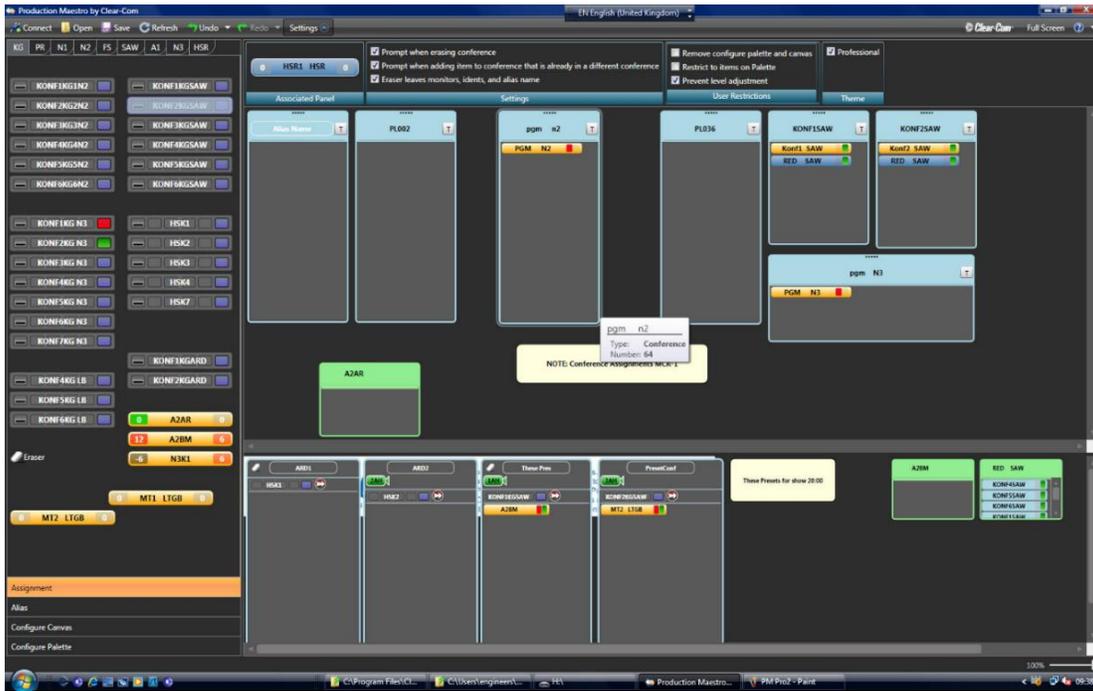
# EHX software



Cards and Ports configuration page



Panel Programming page



## Production Maestro (Dynam-EC)

Control conferences and IFBs in real time with this additional User Interface.

The display can be optimized for use with touch screens

License required for a fee. Passcode is tied to a single matrix frame's specific dongle ID.

### Operational mode Assignment

#### Summary

Use **Assignment** mode, the main operational mode in PM Pro, to assign items (such as panels, four-wires, idents, monitors, key groups, and meters) to conferences and Port Viewers in real-time. In Assignment mode, you also configure and assign routes to virtual IFBs.

### Alias

Use **Alias** mode to create and apply alias labels to conferences and Port Viewers.

### Configure Canvas

Use **Configure Canvas** mode to locate, organize and size conferences, preset conferences, and fixed Port Viewers on the canvas.

You can also apply a meter control to conferences and Port Viewers, and add notes (such as instructions or reminders) to the canvas.

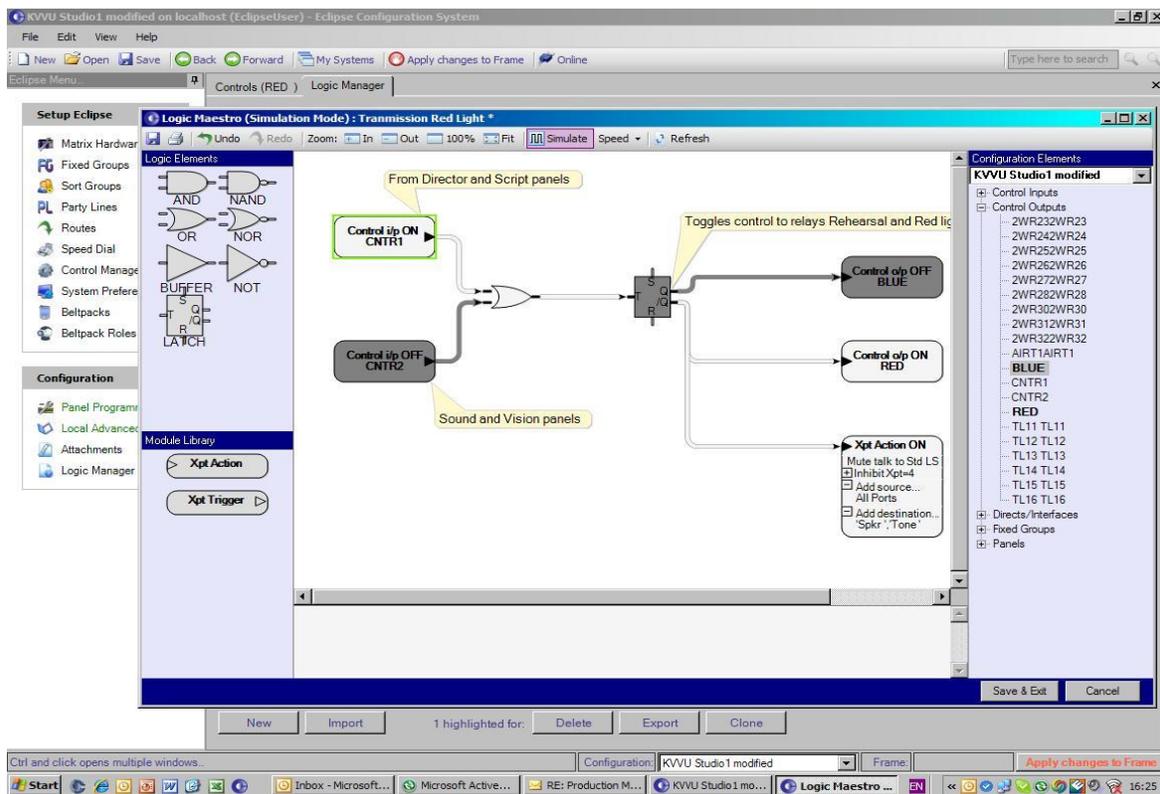
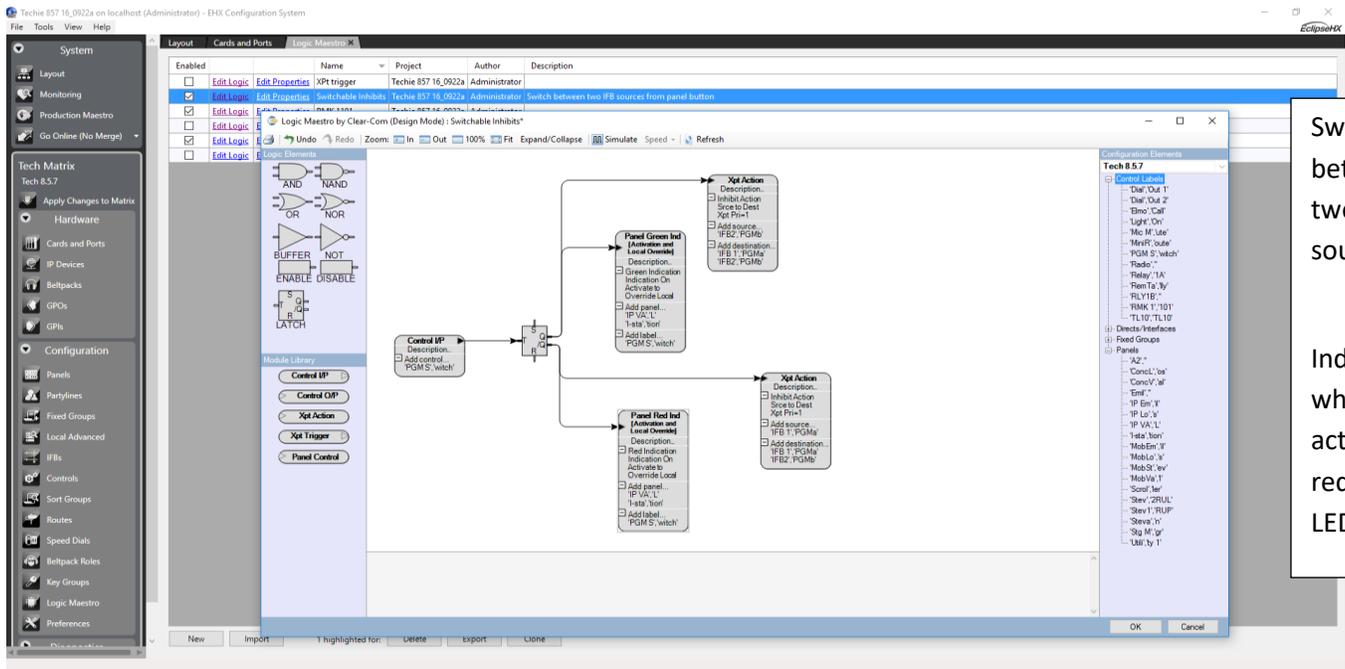
### Configure Palette

Use **Configure Palette** mode to search the canvas for the items (such as panels, four-wires, idents, monitors, and key groups) that you require for configuring conferences, IFBs and Port Viewers in Assignment mode.

Add the required items to the palette. Use the palette tabs to create different sets of items.

**System components:** Panels, direct ports, CPUs, Analog and IP port cards, interfaces, and infrastructure. Point to point communications vs. virtual or hardwired party lines and conferences.

# Logic Maestro



Build macros graphically, trigger events and manipulate controls and cross points with Logic Maestro. Logic Maestro is a visual User Interface built into the EHX software and at no extra cost.

# What is the difference between Partylines (PL) and a Fixed Groups (FG)

There are several types of ways we communicate in the intercom world. It used to be we all used Partylines to communicate. We'd all talk on one big conference and choose when to be heard by engaging our talk button and when to listen by turning our volume knob up or down... *or by simply taking off our headset !*

Now that we use more sophisticated matrix based systems, we can enhance the ways we communicate with several other ways to interact.

So, let's look at the three basic forms of communications:

- 1) **Point to point.** This is when we talk privately from one device to another. Think of it as you would when talking to a friend on your telephone. I push a button with your name on it and, as long only you hear me. When I program these labels on a panel or belt pack, I only need to program the TALK Label, as the matrix or base station will automatically open a listen path from me to you for the duration of my holding down the TALK button.
- 2) **Partyline.** A PL is a conference where more than one user can communicate (in a full duplex fashion) with other users. The partyline allows a user to choose when they talk to the PL and when they listen. One engages the TALK circuit to the PL and all listening will hear that. One can un-engage the listen to the PL or at least turn down the volume, to not hear the PL when they choose. Party lines are the most common form of intercom and have been around since the beginning of these production intercoms since the 1960's. Everyone talks when they choose (by pushing the TALK button) and listens when they choose (either by engaging the LISTEN lever or button, in the case of the panel or by turning up or down on the volume knob in the case of the BP). The PLs are broken down into channels, or separate paths, as needed for separation of conversations according to the required workflow in the system.
- 3) **Fixed Groups, or Groups.** A GROUP is also a conference where more than one user can communicate. However, the structure is a bit different from the PL. We put devices (panels or belt packs) into groups as "members". When one pushes the "audio group" (for example) button, every "member" device will automatically hear the talker for the duration of the time that caller keeps the group button engaged. The panels/BPs do not need a listen from that group, as the matrix or base will automatically open a listen pathway to all members of that group from the caller. Think of it like a point to point, but this is a "point to many". Even though the other devices might not have that group programmed onto their panel/BP, they hear the caller since their device is a member of that group. If you hold up your hand with your thumb (caller) and your pinky (member) sticking out, that would be a POINT TO POINT. Now point all your fingers up. Your thumb is calling all the fingers. That's a GROUP.

- **End-points** – are user interfaces such as matrix panels, beltpacks, and interfaces
- **Fixed Groups** – allows matrix panels or beltpacks to talk to multiple panels, beltpacks, interfaces, and IFB's by grouping them together under a single label. When the talk button for the Fixed Groups is activated, the destinations are forced to listen to the source audio.
  - *Example: Panel A activates Fixed Group "All Call" audio from panel A's mic will be routed to Panels B, C, D, E, and F speakers.*

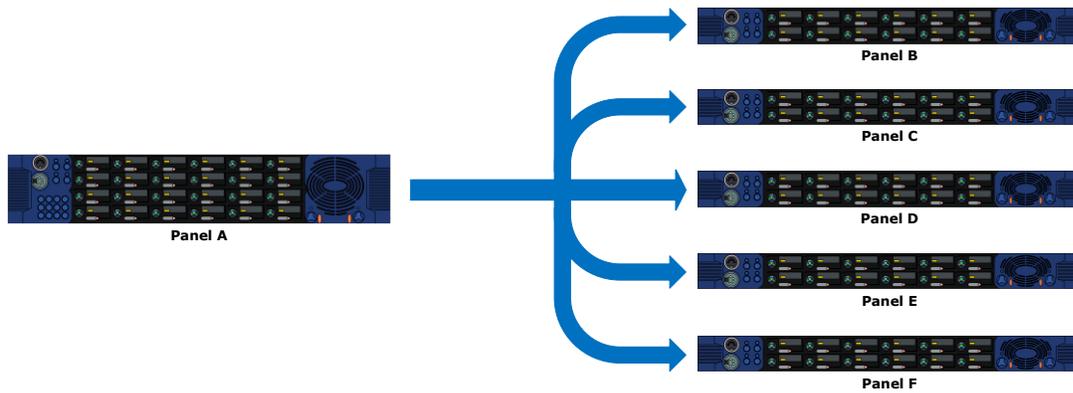


Figure 1

- **Partyline (PL)** - are the most common form of intercom and have been around since the beginning of production intercom in the 1960's. A PL is a conference where multiple matrix panels, beltpacks, and interface devices can in communicate full duplex with each other. A matrix PL allows users to choose when they talk and/or listen the PL.
- **Point to point** - is a direct audio connection between one end-point to another. When one end-point activates a talk button for another end-point, the destination is forced to listen to the source audio.
  - *Example: Panel A activates a button to talk button for panel B, audio would then be routed from Panel A's mic to panel B's speaker (see figure 2). If panel B activates a talk key for panel A then audio from panel B mic would be routed to panel A's speaker then they would be talking in full duplex (see Figure 3).*



Figure 2

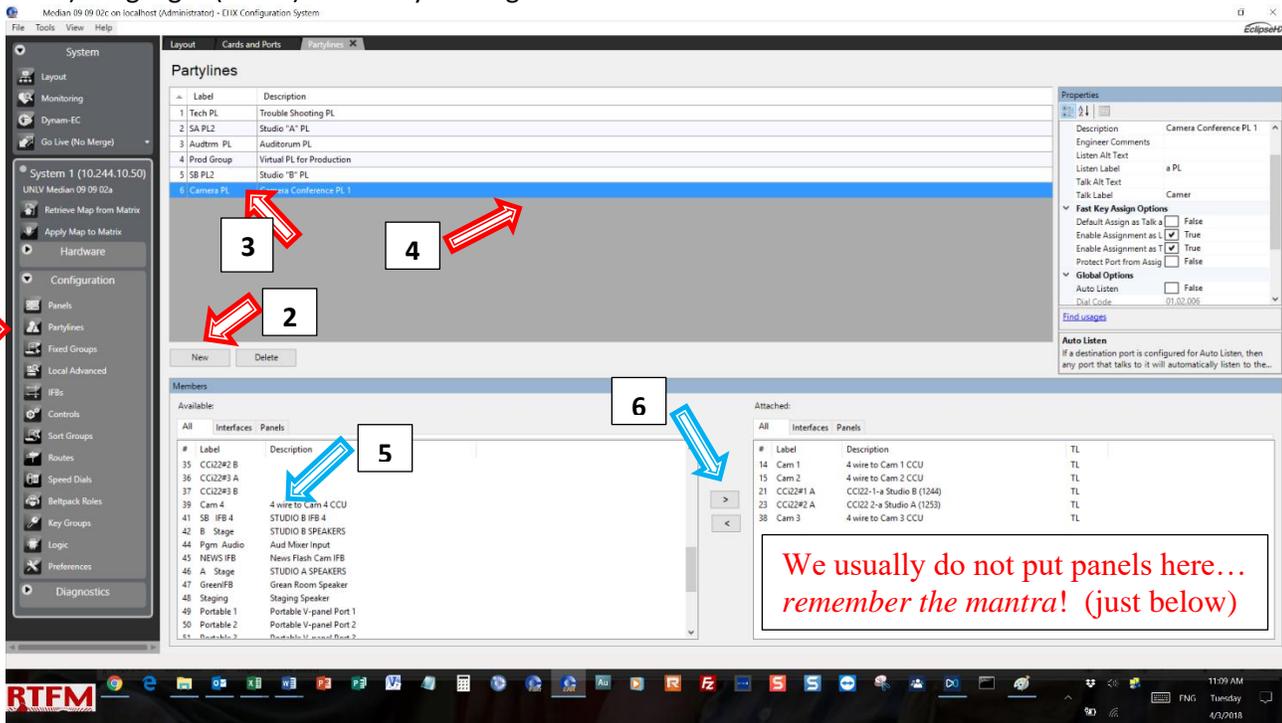


Figure 3

- **Sort Groups** are groups of items such as controls, fixed groups, IFBs, interfaces, panels and partylines that can be treated as a single item programmed to a panel or FSII BP button (or label).

# CREATING A PARTYLINE IN EHX

- 1) In the CONFIGURATION area of the left-hand menu column, click on **Partylines** to choose this page
- 2) Click on the **NEW** button to create a new partyline
- 3) Name the partyline (we've called this one Camera PL) by double clicking on the Label Name and renaming it
- 4) Highlight (select) that PL by clicking on the row so it turns blue. That is now the active PL



- 5) In the AVAILABLE area on the lower left of the page, click on the port you wish to attach to the PL
- 6) Scoot it over the right-hand ATTACHED box.

## Remember this mantra:

*“You don’t put a panel (or beltpack) into a partyline, you program a partyline on to a panel (or BP).”*

We only put interfaces (direct 4wire ports, TEL-14, FOR-22, CCI-22s, etc.) into the PL as an attached member. That way the interface is always getting and giving signal to/from the PL. If we attach a panel in to a PL, anything that panel’s operator said, to ANYONE, would be heard by everyone listening to the PL, even when they are not intending to talk to that PL. And, anything anyone on the PL said would be uncontrollably heard by that attached panel, regardless of if the PL LISTEN was on or off. The fact that it is a permanent member of the partyline requires it to talk and hear constantly to/from the PL. That’s why we only program the PL on to the panel or BP. That way, the operator can choose when to talk and/or listen with the PL, as they see fit.

# CREATING A FIXED GROUP (FG) IN EHX

- 1) In the CONFIGURATION area of the left-hand menu column, click on Fixed Groups to choose this page
- 2) Click on the NEW button to create a new Fixed Group
- 3) Name the Fixed Group (we've called this one *Production*) by double clicking on the Label Name and enter name
- 4) Highlight that FG by clicking on the row so it turns blue. It is now the active FG

The screenshot shows the EHX Configuration System interface. The left-hand menu has 'Fixed Groups' selected, indicated by a red arrow and the number 1. In the main area, the 'Fixed Groups' table has a row for 'Production' highlighted in blue, with a red arrow and the number 2 pointing to the 'New' button, and a red arrow and the number 3 pointing to the 'Production' label. Another red arrow and the number 4 point to the 'Production' row. Below this, the 'Members' section has two tables: 'Available' and 'Attached'. A blue arrow and the number 5 point to the 'Available' table, and a blue arrow and the number 6 point to the 'Attached' table. A red text box on the right contains the text: *With FGs, we do put panels here...as well as any other port needed in that group.*

- 5) In the AVAILABLE area on the lower left of the page, click on the port you wish to attach to the FG
- 6) Scoot it over the right-hand ATTACHED box.

Fixed Groups are “point to many” conferences. When we program a FG on to a panel’s label, we only use the TALK activation. The matrix (or base station) will open a listen pathway from the calling panel /BP to all the members of the FG. There is no need to have any LISTENS programmed on any of the panels. The matrix will automatically open a listen pathway to the members’ panels/BPs.

# What is a SORT GROUP and what can we do with it?

Sort Groups are available for V-Series Panels and FreeSpeak II beltpack roles. Sort Groups are groups of items such as controls, fixed groups, IFBs, interfaces, panels and partylines that can be treated as a single item programmed to a panel or FSII BP button (or label) and accessed in Key Assign mode to assign a member of that sort group to that key on that panel/BP. Selecting Sort Groups in the EHX Setup menu displays the sort group editor.

## CREATING A SORT GROUP (SG) IN EHX

- 1) In the CONFIGURATION area of the left-hand menu column, click on Sort Groups to choose this page
- 2) Click on the NEW button to create a new Sort Group
- 3) Name the Sort Group (we've called this one *Tracks*) by double clicking on the Label Name and enter name
- 4) Highlight that SG by clicking on the row so it turns blue

The screenshot shows the EHX Configuration System interface. On the left, a menu is visible with 'Sort Groups' highlighted. The main area is titled 'Sort Groups' and contains a table with one row: 'Tracks' (Label) and 'New sort group' (Description). Below this table are 'New' and 'Delete' buttons. The 'Members' section is divided into 'Available' and 'Attached' lists. The 'Available' list contains various ports like 'ProGrid 1 Direct', 'Cello Direct', etc. The 'Attached' list contains 'Kick Direct', 'OH (L) Direct', etc. A red arrow labeled '1' points to the 'Sort Groups' menu item. A red arrow labeled '2' points to the 'New' button. A red arrow labeled '3' points to the 'Tracks' label. A red arrow labeled '4' points to the 'Tracks' row. A blue arrow labeled '6' points to the 'Available' list. A text box on the right contains the text: *With SGs, we add all ports that are needed in that Sort Group.*

- 5) In the AVAILABLE area on the lower left of the page, click on all the port you wish to attach to the SG
- 6) Move the desired port, and all needed ports over to the right-hand ATTACHED box.

# HOW TO PROGRAM A PARTYLINE (PL) ON TO ALL TYPES OF ECLIPSE PANELS

On the PANELS page (found at the top of the CONFIGURATION category), click on the PL you want programmed on to the panel. There are some short cuts we'll address later, but the basics are the same for all panels. Keep in mind that there are three forms of panels. Button-panels, Rotary panels and Lever-panels.

With the button variety (ICS-1008/1016, I-Station, and V-Panel Push Button models), any single button can have the following choices for their "activation":

- 1) TALK
- 2) LISTEN
- 3) TALK & LISTEN
- 4) DUA TALK & LISTEN
- 5) FORCED LISTEN

## A Brief Explanation of the Various TALK/LISTEN Button Options

**Talk** When you push the button, you talk to the system, but there is no "listen" function.

**Listen** When you push the button, you can hear the port, but not "talk" to it.

**Talk & Listen** When you push the button, you can both TALK and LISTEN to that port, but when you unlatch or take your finger off the button, both TALK and LISTEN go away.

**Dual Talk & Listen** By tapping the button, you latch the "listen" on. To "talk" to the port, you press and hold the button in, then let go to stop "talking". You can't latch both the "talk" and "listen" in this mode...only the "listen"

**Talk & a Forced Listen** The "listen" is always on. (To turn it down or off, rotate the knob counterclockwise.) You can either latch or push-to-talk (momentary) your "talk" function. This is the most common scheme used for Party Lines, as it emulates the two-wire environment.

*Of course, one needs to also note the two ways to "engage" a button (or lever):*

**MOMENTARY:** By pressing and holding the button or lever for the duration of time it is engaged, you "open" the port pathway. When you let go, you "close" the port pathway.

**LATCHING:** By tapping the button, you "open" the port pathway; and to close, tap the button/lever again.

# PROGRAMING PLs ONTO A V-Rotary or V-Lever PANEL

## Remember the mantra:

“You don’t put a panel (or beltpack) into a partyline, you program a partyline on to a panel (or BP).”

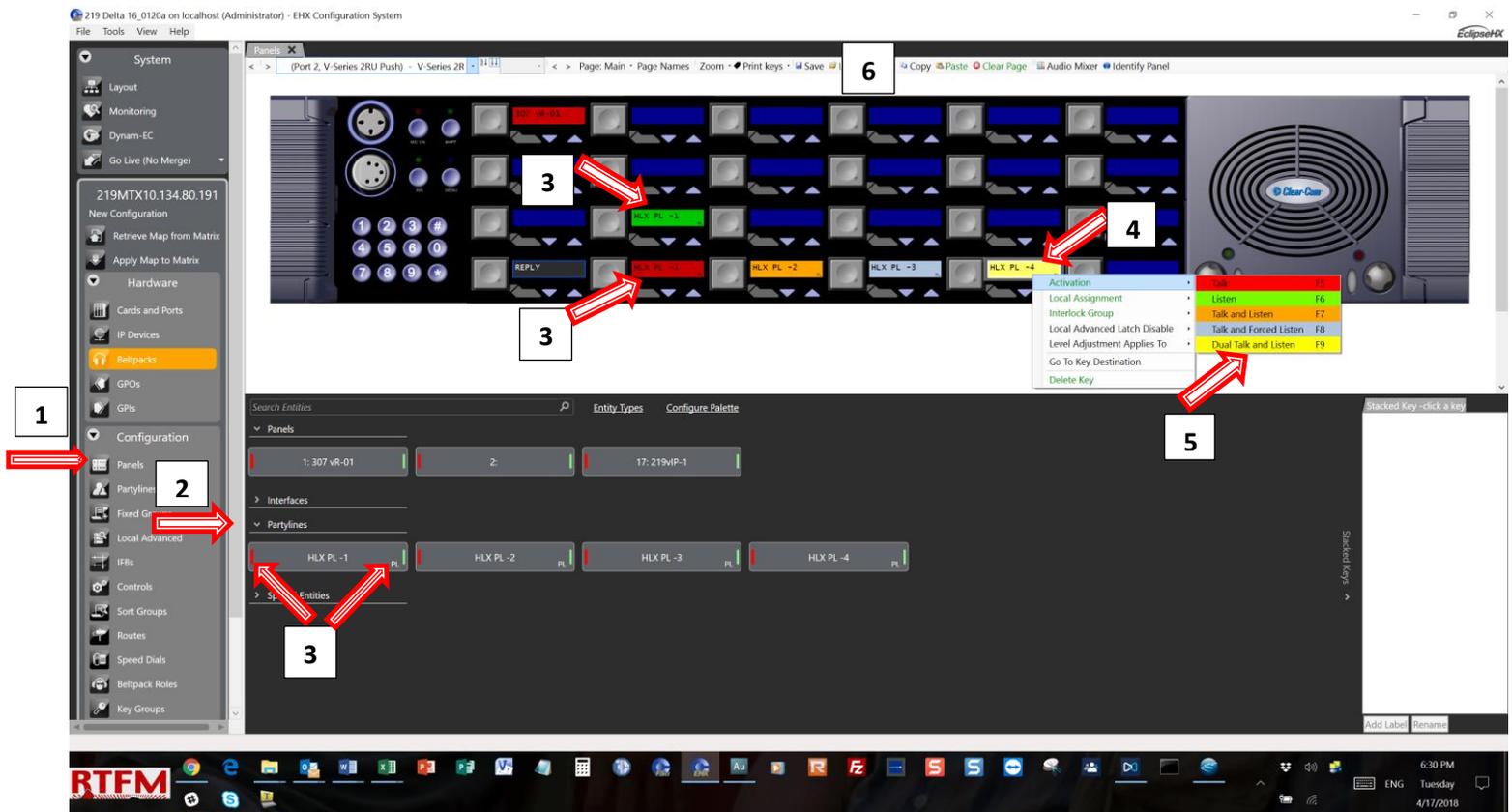
- 1) In the Configuration area of the tab selection are on the left-hand side of the EHX window, select PANELS
- 2) In the bottom window, expand the PARTYLINES category
- 3) To program the TALK of partyline 401 PLO4, click on that PL
- 4) and then click on the bottom blue rectangle for the label you want to program it to.
- 5) Then, do step #3 again, but place it on the top blue rectangle, to achieve both TALK and LISTEN to/from the 401 PLO4 partyline on that panel.
- 6) **TIP:** If you hold the CTRL key on your keyboard while you click on the PL you want (401 PLO4), it will select bot the TALK and the LISTEN, so you only need the one click

## Programing in EHX of a Rotary or Lever panel

The screenshot displays the EHX Configuration System interface. On the left, a 'Configure Filters' sidebar shows a tree view with 'Configuration' expanded to 'Partylines', indicated by a red arrow and the number '1'. Below it, 'Diagnostics' is also indicated by a red arrow and the number '2'. The main window shows a 'Partylines' configuration page for a '604-COM1 (Port 1, V-Series 1RU Rotary)' device. At the top, a physical panel image shows four partyline slots with blue and green buttons; red arrows point to the bottom blue button (labeled '4') and the top blue button (labeled '5') of the 401 PLO4 slot. A '6' is placed above the panel image. Below the panel image, a 'Configure Palette' section shows a list of partylines: 401 PLO1, 401 PLO2, 401 PLO3, and 401 PLO4. A red arrow points to the 401 PLO4 entry, labeled with the number '3'. On the right, a 'Stacked Key - 401 PLO4' window shows the 401 PLO4 label.

# Programming a PL on a Push Button Panel in EHX

- 1) In the Configuration area of the tab selection are on the left-hand side of the EHX window, select PANELS
- 2) In the bottom window, expand the PARTYLINES category
- 3) To program the TALK of partyline "HLX PL-1", click on that PL on the left (red) side of the PL name, and for LISTEN, the right side (green). Or, after programming the label on the button, right click and hover over the ACTIVATION area and select the activation you want.
- 4) To change the "activation" of the button, right click on the label, and...
- 5) ...and then select the activation you wish to change it to; or use the function "F" keys as shown in the activation drop down menu (on the right hand side).



# APPENDIX

## Other systems

WBS 670/680/682 or BTR 800 systems

UHF system with up to two separate channels, typically, not both at the same time. It is designed to interface with wired systems. Take care to not damage the two antennas.

### HME Wireless intercoms

#### DX line:

DX 121, 1 only.

DX 100, DX 200 and 300 service (3) 4/15 BPs and no wired comms interface.

DX 300, DX 210 and 410 service 3 (4)/15 BPs 2.4 GHz systems FHSS. BP or WH.

Pro 850 UHF selectable 4/15

2 Channel DX products are talk/listen on one channel at a time

### ProGrid Fiber Systems

Specifically designed for Clear-Com intercoms. Can be configured for RS485 (RTS ADAM)

Will transport either 4 (V3R) or 8 (V6R) ports in a fiber ring plus Ethernet, RS232 and SANE

Flexible and configurable with the ProGrid GUI via USB-B connector on front panel

MUX-22 can also transport HD/SDI video, as well as intercom or 4wire audio and LAN. Video is point-to-point

### Other matrix systems (RTS ADAM, Riedel DIRECTOR, Trilogy)

#### Cable Recommendations:

For portable applications up to 500 feet we recommend Belden #8413.

AWG: 24

For portable applications longer than 500 feet we recommend Belden #8412.

AWG: 20

For permanent applications up to 500 feet we recommend Belden #8762.

AWG: 20

For permanent applications longer than 500 feet we recommend Belden #8760.

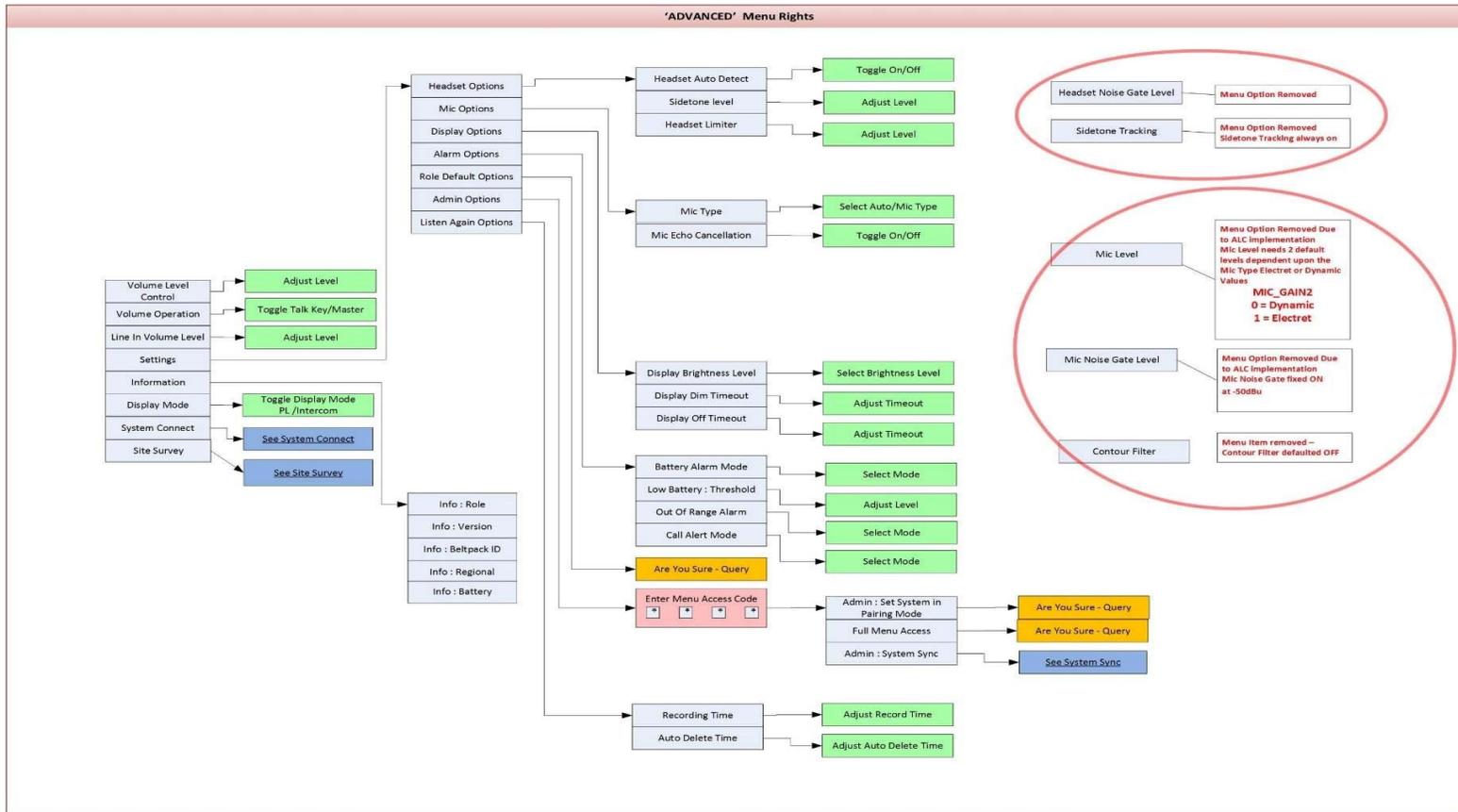
AWG: 18

For 2- channel applications up to 500 feet we recommend Belden #1634A – AWG 22

For 4-channel applications up to 500 feet we recommend Belden #1815R (AWG 22) or #1904A (AWG 24)

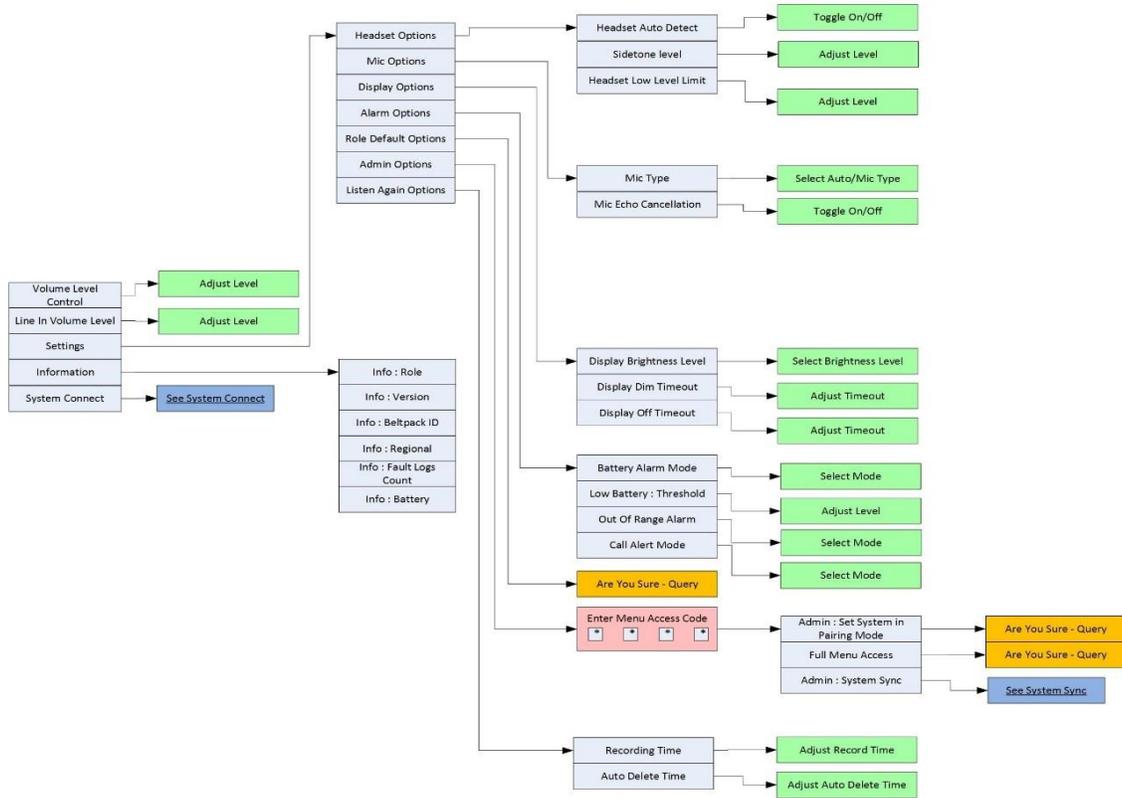
# FSII Menu Trees

## FreeSpeakII Beltpack MenuTrees

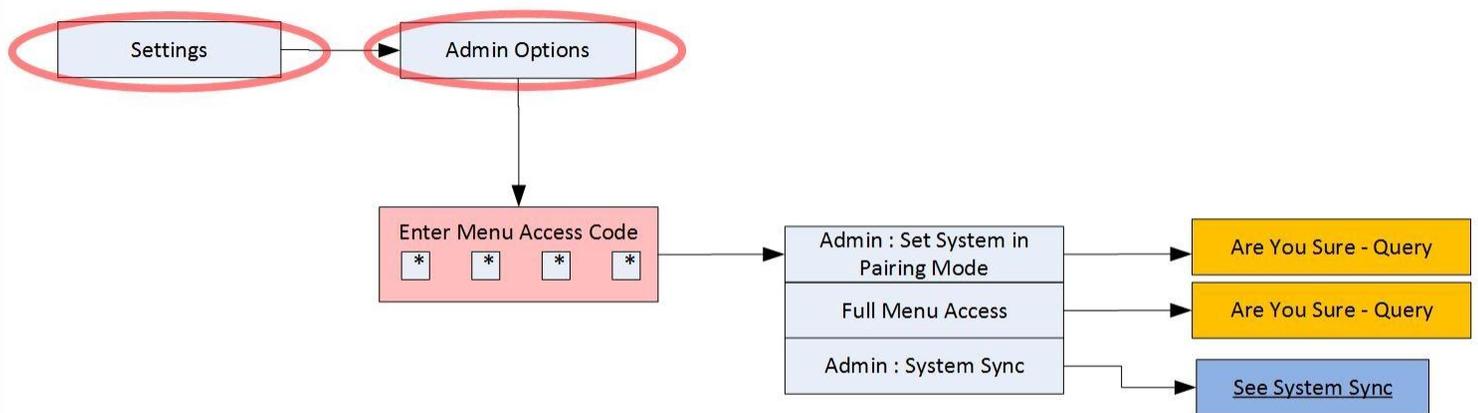


ArchangeI - CC_ArchangeIFunctionalSpec-MenuOverview-v1.4.vsd			
REV 4.3	ADVANCED Menu	Page 1 of 11	02-January-2014

'NORMAL' Menu Rights



'NONE' Menu Rights

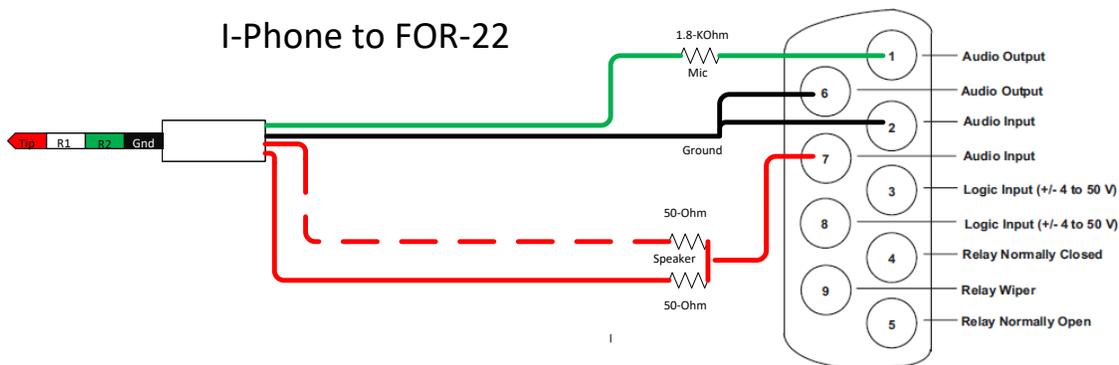


# Pin Outs

## Clear-Com's Base Station Port Pin Out Using 568B pinout

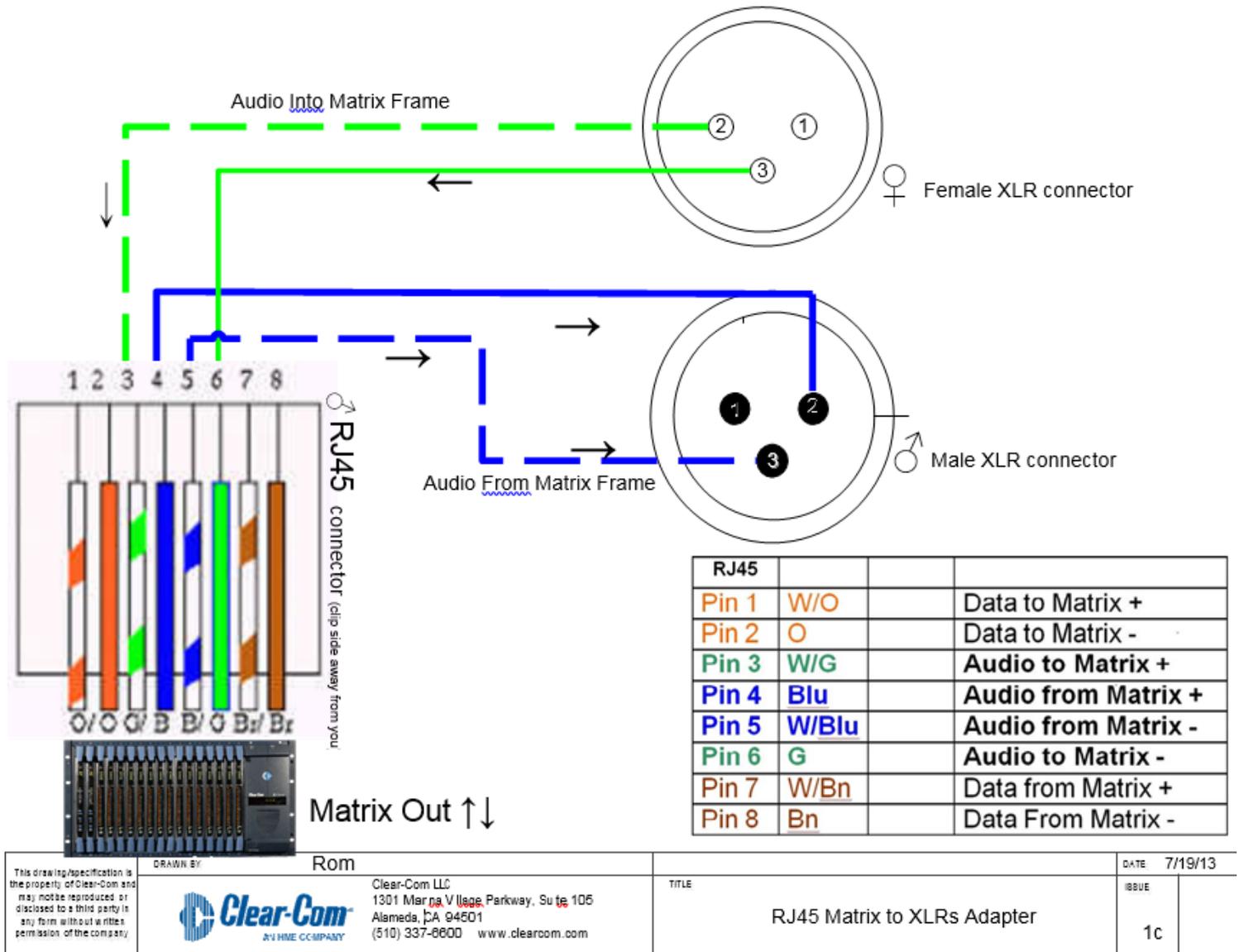
RJ45	Color	Function
Pin 1	W/O	RS-422 Data from Panel +
Pin 2	O	RS-422 Data from panel -
Pin 3	W/G	Audio from Panel +
Pin 4	Blu	Audio tp Panel +
Pin 5	W/Blu	Audio to Panel -
Pin 6	G	Audio from Panel -
Pin 7	W/Bn	RS-422 Data to Panel +
Pin 8	Bn	RS-422 Data to Panel -

## How to wire an I-Phone to be used with an FOR-22



Tip = Ear L (+)  
 R1 = Ear R (+)  
 R2 = Mic (+)  
 Gnd (Shield) = Common Ground (-)

# Clear-Com Matrix port to XLR interconnect



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Rom



Clear-Com LLC  
 1301 Marina Village Parkway, Suite 105  
 Alameda, CA 94501  
 (510) 337-8600 www.clearcom.com

TITLE

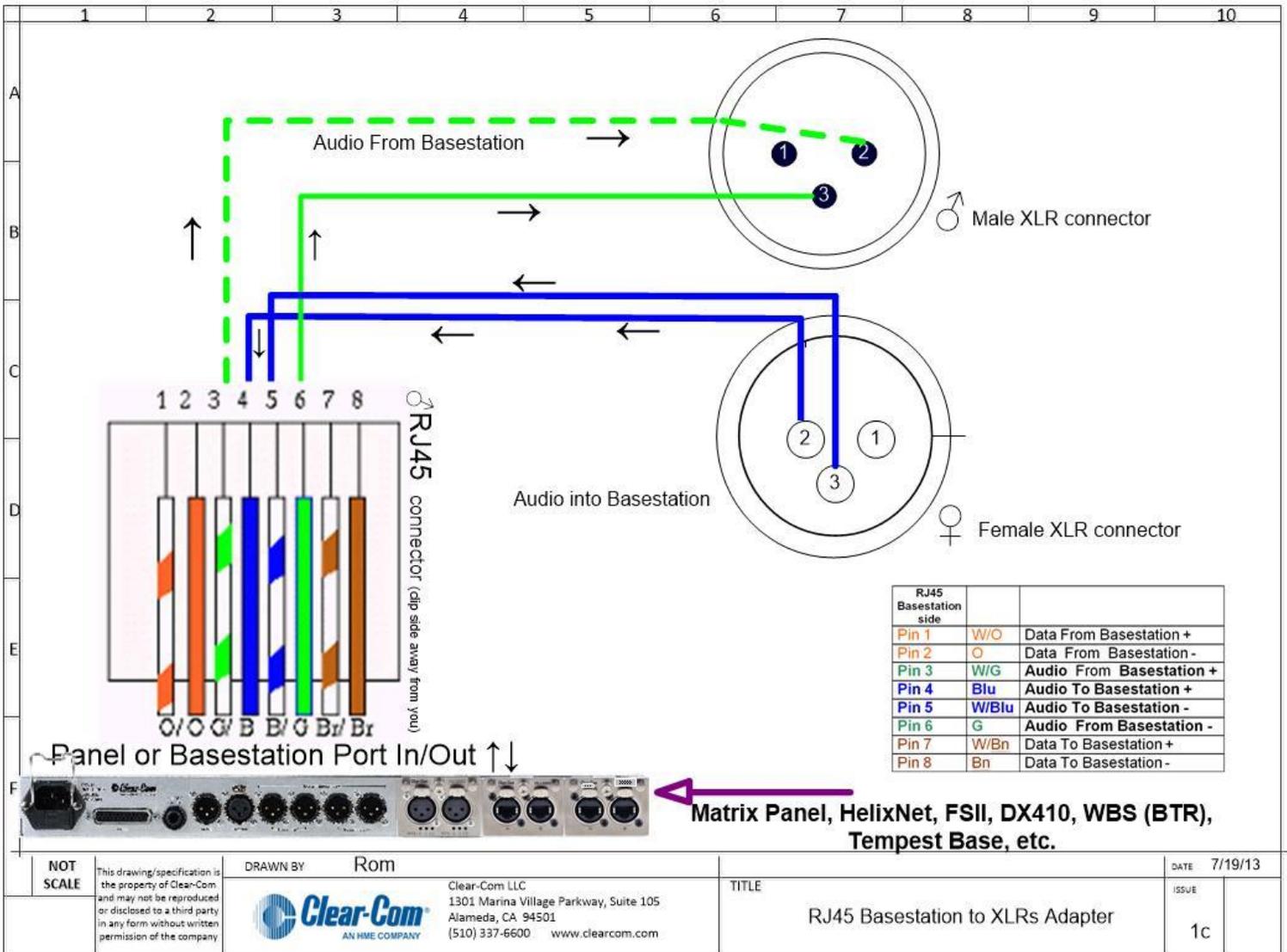
RJ45 Matrix to XLRs Adapter

DATE 7/19/13

ISSUE

1c

# Clear-Com Panel (base) 4wire to XLR interconnect



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1301 Marina Village Parkway, Suite 105  
Alameda, CA 94501  
(510) 337-6600 www.clearcom.com

TITLE

RJ45 Basestation to XLRs Adapter

DATE 7/19/13

ISSUE

1c

# CC-300 / CC-400 Headsets

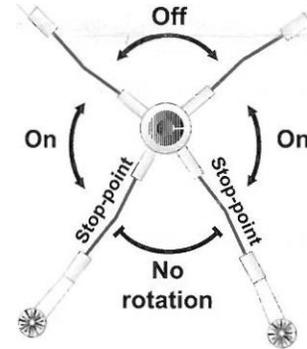
CC-300 (single ear) and CC-400 (dual ear) intercom headsets are designed for use with Clear-Com intercom systems, including digital systems and partyline main stations and beltpacks.

## Using your CC-300 / CC-400 Headset

You can position the microphone boom for either the **right** or the **left** side of the head. You can adjust the fit of the headset by using the slide adjusts to either side of the headband.

Turn the headset microphone on by pulling the boom gently **downwards** (down past the 10 O'clock / 2 O'clock angle).

Turn the headset microphone off by pushing the boom gently **upwards** (to above the 10 O'clock / 2 O'clock angle).



## Wiring

Type	Function	Cable color	XLR-4 Pin	XLR-5 Pin	XLR-6 Pin	XLR-7 Pin
Microphone	Microphone + --	Yellow	Pin 2	Pin 2	Pin 2	Pin 2
	Microphone -	Green	Pin 1	Pin 1	Pin 1	Pin 1
	Shield	-			Pin 6	
Headphone	Speaker Left -	Orange	Pin 3	Pin 3	Pin 3	Pin 3
	Speaker Right -	Red				
	Speaker Left +	Brown	Pin 4	Pin 4	Pin 4	Pin 4
	Speaker Right +	Blue		Pin 5	Pin 5	Pin 5

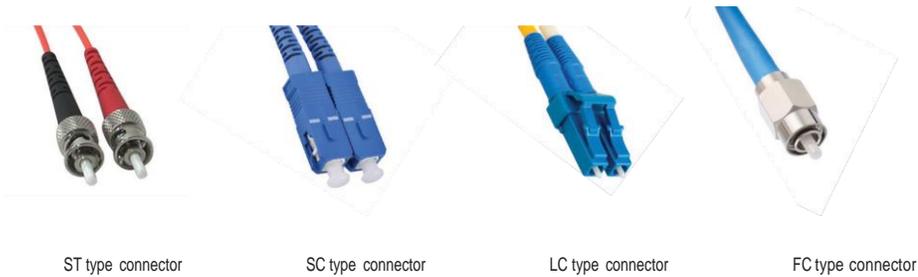
Note:

For the XLR-7 connector, Pins 6 and 7 are non-connects (NC).

## Cabling Options

CC-300	CC-400	Cable	Connector	Headphone wiring	Microphone wiring
CC-300-X4	CC-400-X4	HC-X4	XLR 4 female	Mono	Unbalanced
CC-300-X6	CC-400-X6	HC-X6	XLR 6 male	Binaural	Balanced
CC-300-X5	CC-400-X5	HC-X5	XLR 5 male	Binaural	Unbalanced
CC-300-Y5	CC-400-Y5	HC-Y5	XLR 5 female	Binaural	Unbalanced
CC-300-X?	CC-400-X?	HC-X?	XLR 7 female	Binaural	Unbalanced
CC-300-B6	CC-400-B6	HC-B6	No connector		

# Fiber



## Multimode Optics

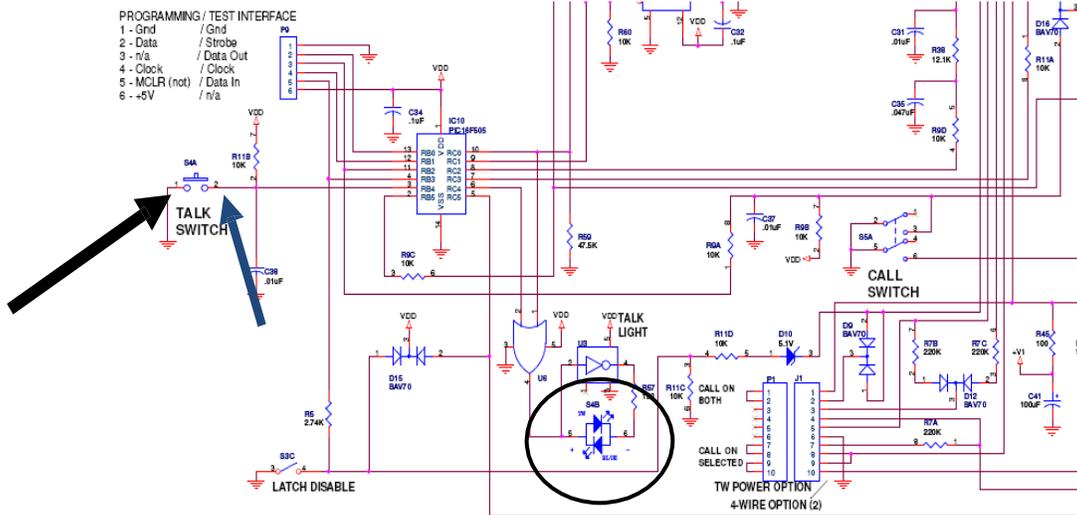
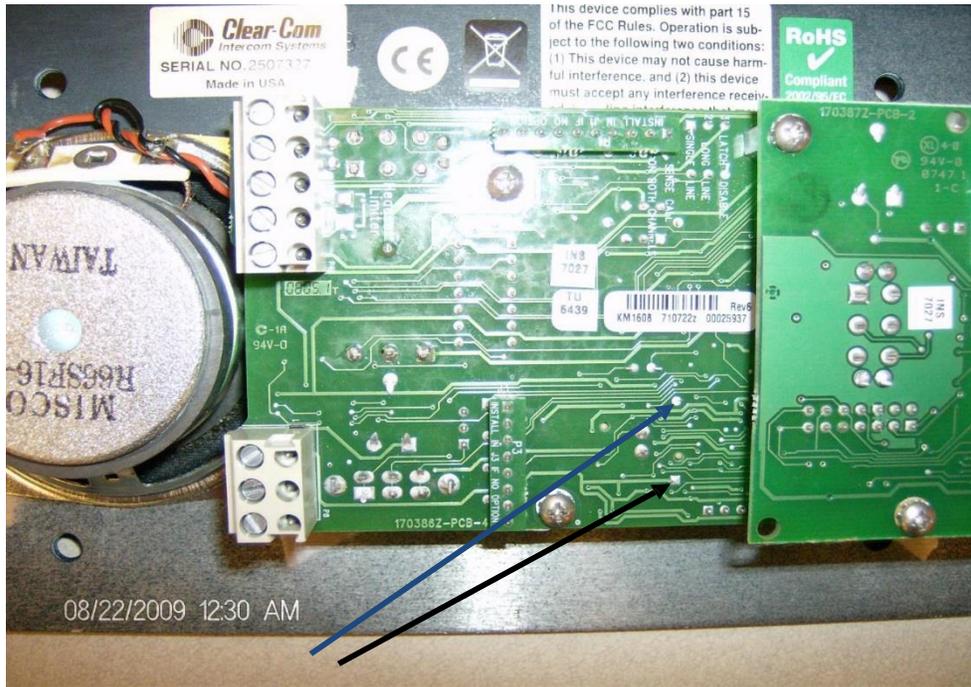
Multimode fiber gives you high bandwidth at high speeds (100 Mbit/s for distances up to 2 km (100BASE-FX), 1 Gb/s up to 1 km and 10 Gb/s up to 550m). Light waves are dispersed into numerous paths, or modes, as they travel through the cable's core typically 850 or 1300 nm. Typical multimode fiber core diameters are 50, 62.5 and 100 micrometers. However, in long cable runs (greater than 914.4 meters (3,000 feet), there is a potential for signal distortion at the receiving end.

## Single-mode Optics

A single strand (most applications use 2 fibers) of glass fiber with a diameter of 8.3 to 10 microns that has one mode of transmission. Single mode fiber with a relatively narrow diameter, through which only one mode will propagate typically 1310 or 1550 nm. Single-mode carries higher bandwidth than multimode fiber, but requires a light source with a narrow spectral width. Also called mono-mode optical fiber, single-mode fiber, uni-mode fiber.

## Footswitch for a KB-702GM

When customers want to put a footswitch on a KB-702-GM, they can jump Hole 1 and 2 to the footswitch and keep the functionality of the talk button and light on the panel itself. Simply solder the two points marked below to the footswitch legs. Make sure to LATCH the talk switch. The talk path will remain open, but the mic will be turned off by the footswitch. NOTE: this will void warrantee.



Difference between the “S” standard type and the Neutrik standard 6pin XLR connectors used the AB-100/120 and in some discontinued Clear-Com 2 channel belt packs and IFB devices.



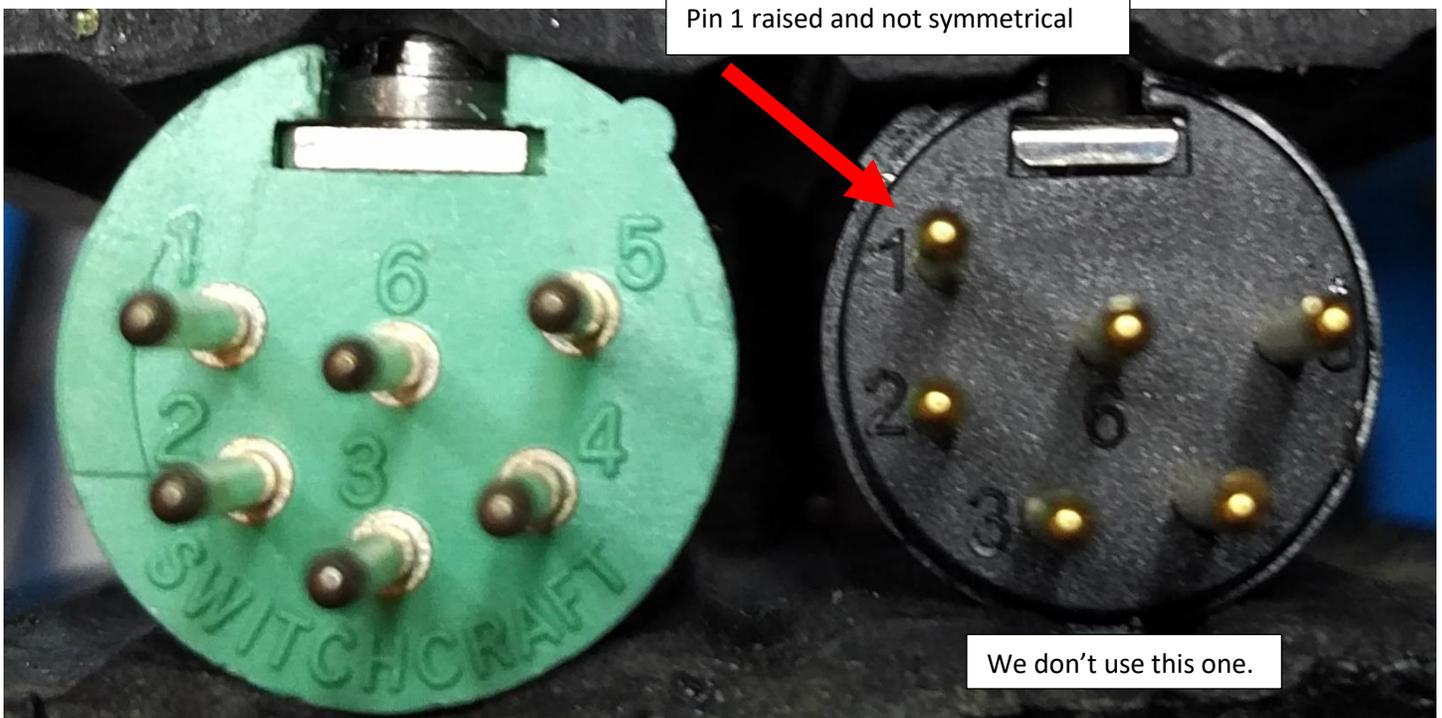
Switchcraft not-so crooked



Neutrik slightly crooked 6pin connector

Clear-Com devices use the “S” type

Neutrik does make an “S” type 6pin XLR, but you must specify it when ordering.



Pin 1 raised and not symmetrical

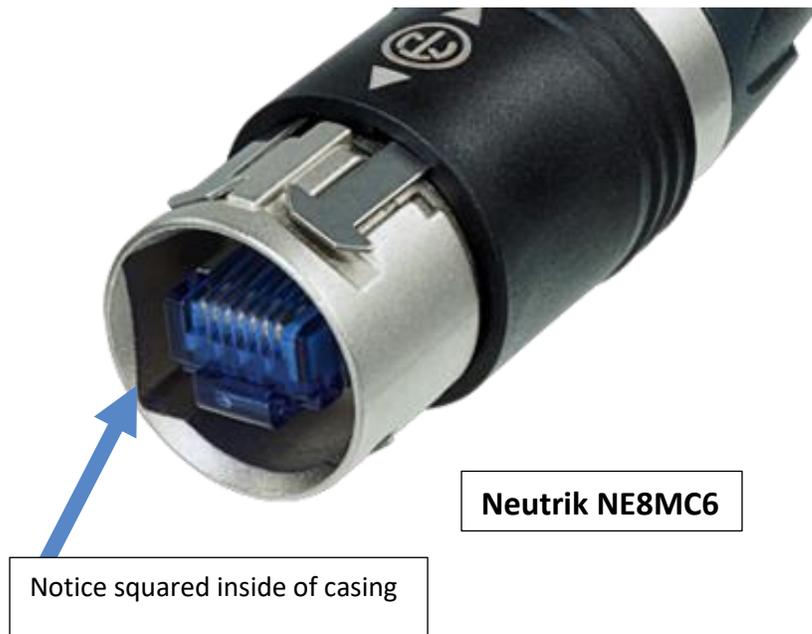
We don't use this one.

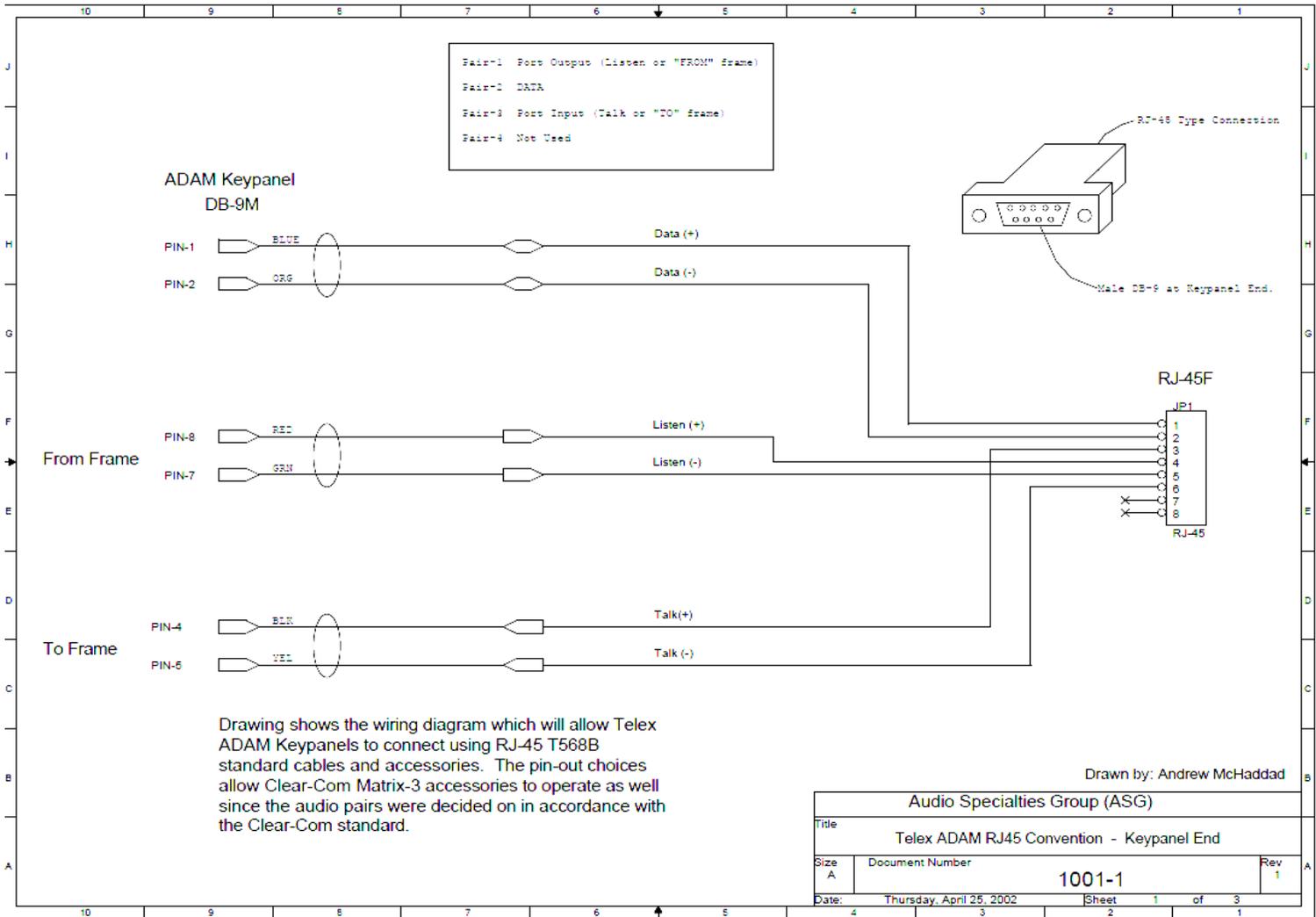
## Selecting the correct EtherCon connector for Clear-Com products

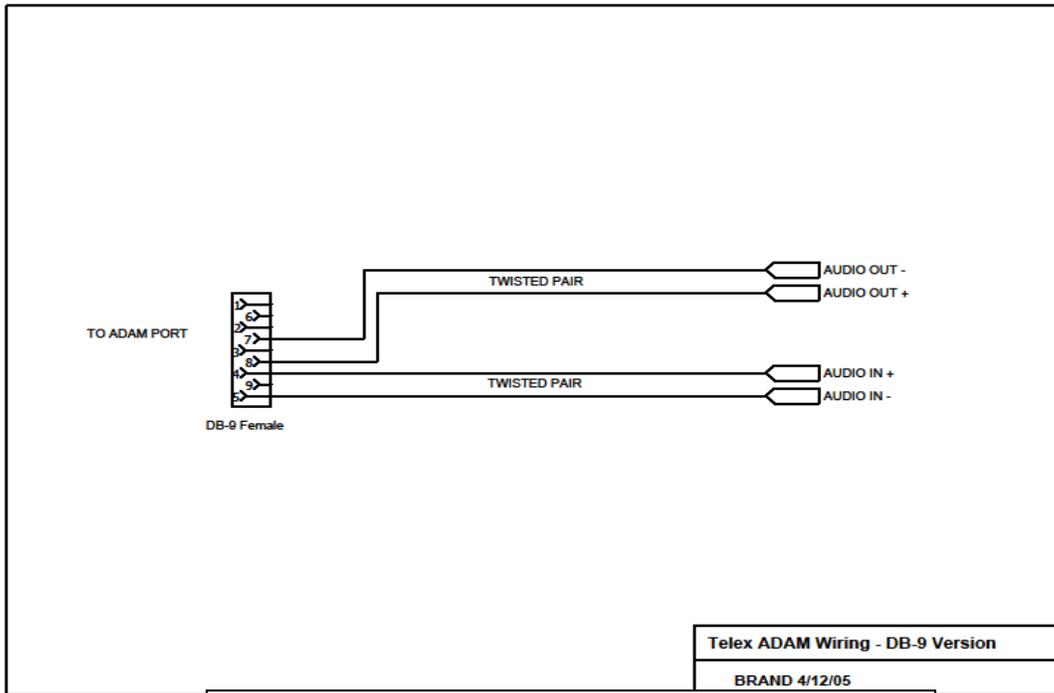
THIS IS THE ONE WE USE FOR CLEAR-COM PRODUCTS



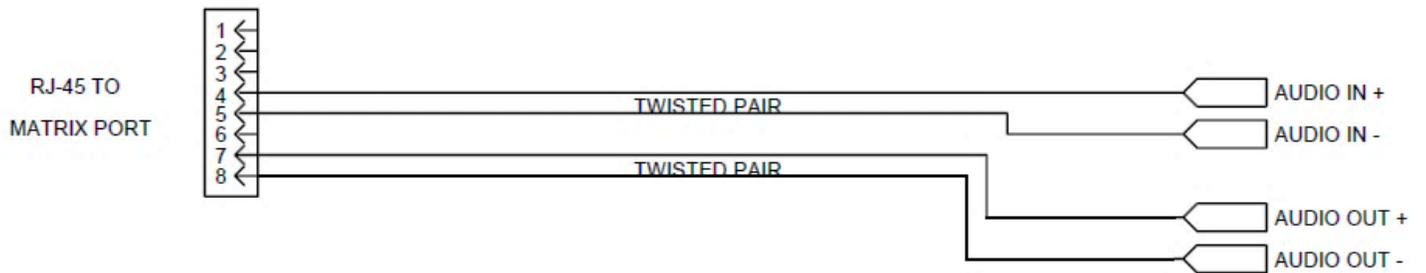
THIS IS THE ONE WE **DO NOT** USE FOR CLEAR-COM PRODUCTS





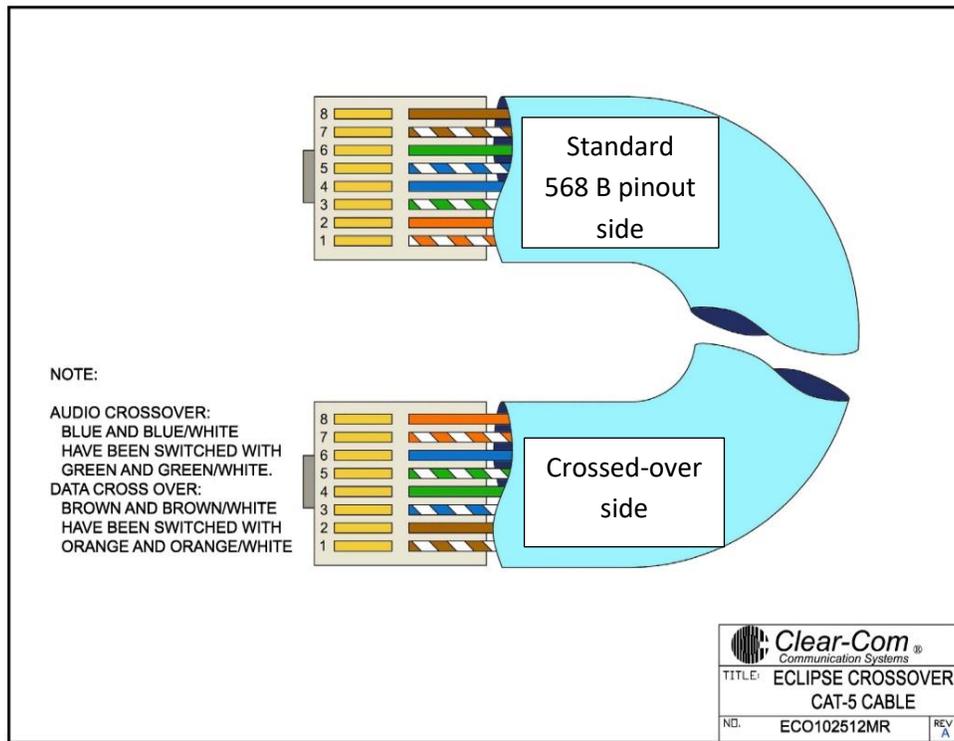
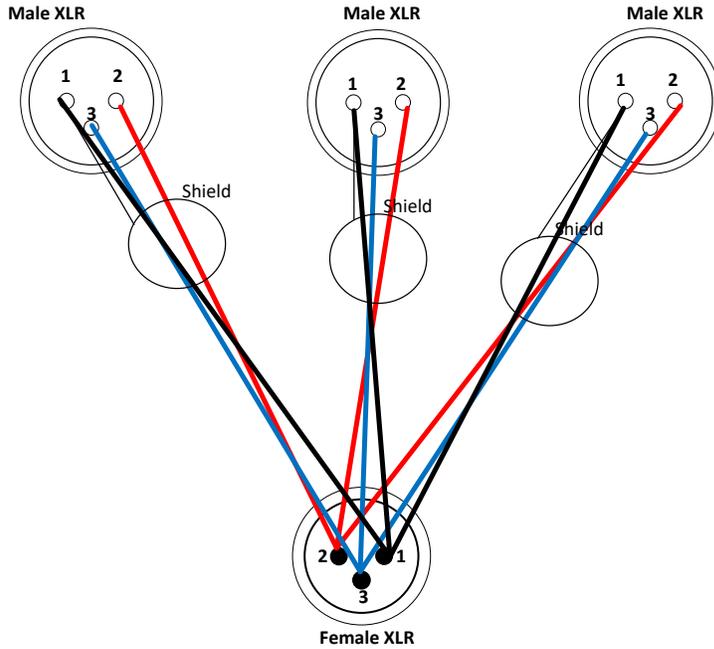


**Older ADAM Port DB-9 pin out to 4wire**

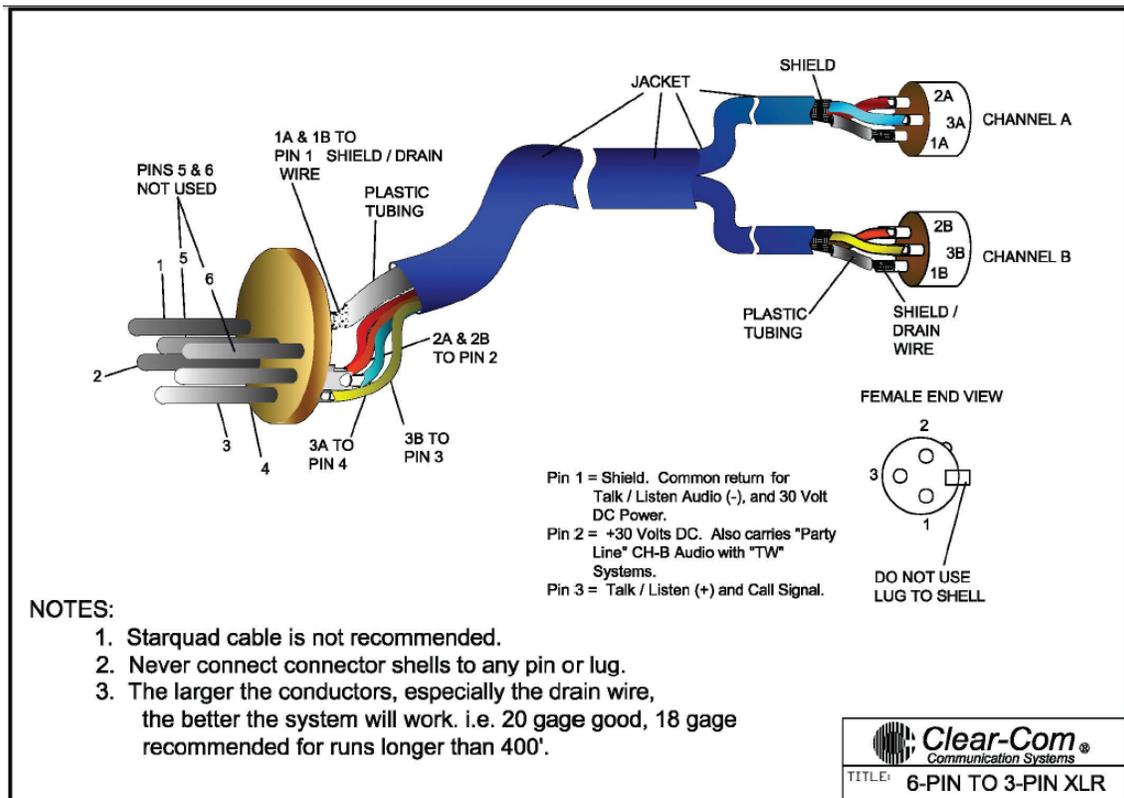


**Riedel ARTIST RJ45 Port pin out to 4wire**

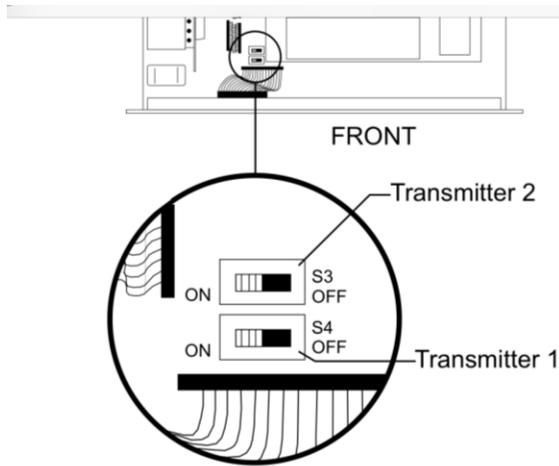
## How to make a 3pin XLR Three-Way “Y” cable



**Audio Crossover CAT5 Pinout. For connecting 4wire port to 4wire**



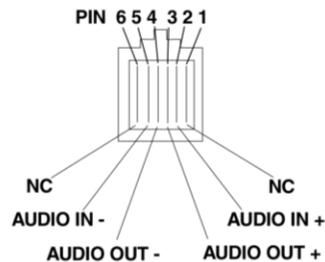
**YC-36 cable for connecting two single Clear-Com PL channels into an RS 602/702 Belt Pack**



**Figure 16**  
 Internal Transmit Switches

of audio are carried on one cable. The intercom switch parallels the four XLR connectors when in RTS mode. RTS channel 1 is placed on intercom A and RTS channel 2 is placed on intercom B as long as the RTS TW input to the base station is wired as in Section 11.

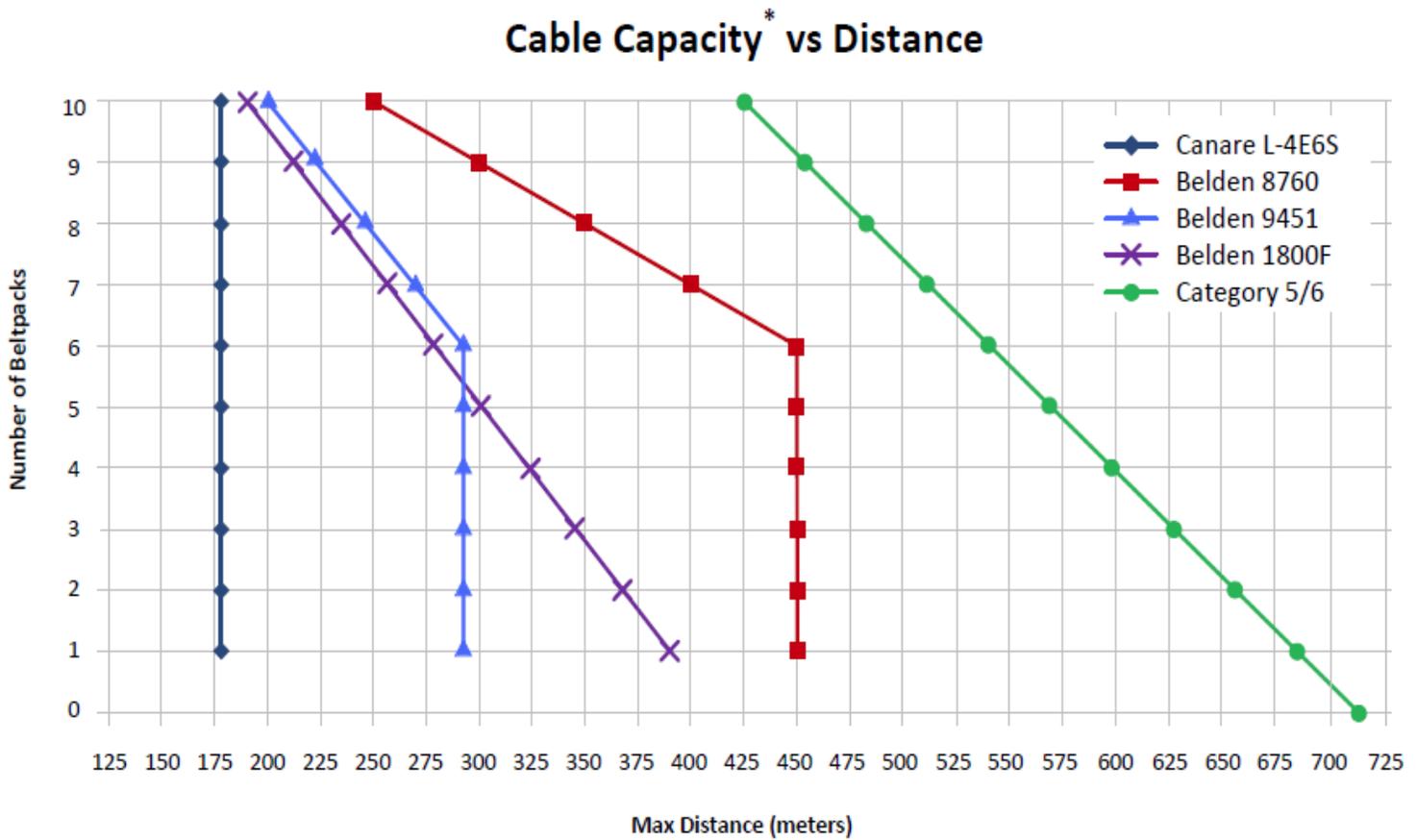
Four-wire intercom systems require one cable for intercom A and one cable for intercom B in order to interface two channels of four-wire intercom to the base station. This interfacing is done through the I/C A and B RJ-11 type jacks on the rear of the unit. See Figure 17 for the pinout of the RJ-11 jacks.



**Figure 17**  
 RJ-11 Type/ Four-wire Pinout

**BTR Base Station 4wire pinout for the RJ12 connector**

# Example of Cable Lengths Guide for HelixNet Systems



\* All cables, including Category cables, must be shielded for optimal system performance.

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# GLOSSARY

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Some of the terms used when discussing production intercom for television or theatre may be new to you as they are unique to intercom applications. These are most common in remote TV truck production activities, but translate to any situation. When we say “truck”, or OB Van, we also mean the main control room area and I/O panel area. Although many of the terms are common to other audio applications, to be certain you understand their meanings we offer the following definitions:

**A1** = Person responsible and in charge of the audio effort. Usually the A1 is the person who mixes the show.

**A2** = This person works for the A1 and is generally responsible for all audio setup outside of the truck

**Active:** As opposed to **passive**, this means that electronic or electric circuitry is involved in accomplishing something.

**A/D:** Analog-to-digital conversion.

**ADC:** Analog-to-digital converter

**All Call:** Activating an All Call button from a Main Station or Remote Main Station will initiate a talk to all channels at once.

**Ambient Noise:** Those background sounds which are not part of the specific communication but are picked up by the microphone. Selection of a good "noise-canceling" microphone will reduce ambient noise.

**Ampere:** The amount of electrical current when one volt is applied to one ohm.

**Amplifier:** Usually an electronic device that increases the amplitude of an electrical signal. Examples include a microphone preamplifier that brings millivolt signals to volt levels.

**Audio Frequency:** Range of frequencies lying within the range of human hearing, often 20 hertz to 20,000 hertz, where hertz is cycles per second.

**AWG American Wire Gauge:** a standardized wire gauge system used for measuring the diameters of round, solid, nonferrous, electrically conducting wire. The AWG of a stranded wire is determined by the total cross-sectional area of the conductor, which determines its current-carrying capacity and electrical resistance. Increasing gauge numbers give decreasing wire diameters.

**Balanced Audio** = Audio that is differently driven down a path, where neither lead of the audio pair is at ground potential. Each signal on the two leads is 180 degrees out of phase with each other. Because of this fact balanced audio is generally immune to outside interference. Audio XLR connectors have three conductors, two for each of the two audio signals and one for ground. Compared to **single ended** audio where the audio signal is on a single conductor and referenced to ground, which is the other conductor. **RCA** audio connectors carry single ended audio.

**Balance Line:** is defined in terms of the impedances of the two signal conductors with respect to a reference, which is usually "ground". Neither conductor is tied to circuit common. Circuit common is either tied to a transformer center tap, or is an electrical center point, or not tied at all.

**Beltpack:** A portable headset user station. This station is designed to be worn on a user's belt with the idea of semi-portability. It can be single or two intercom channels capable. Requires a headset or handset. Interconnects to system with microphone cable and is powered by a central Power Supply or Main Station.

**Breakout Box** = A box with multiple connectors on it that is connected to a cable that encompasses multiple feeds within it. The breakout box provides a separate connector for each of the individual feeds for the signals in the cable. See mults and pigtails.

**Biscuit:** A portable user speaker station.

**Bridging, High Impedance (hi-Z):** A method of connecting to a nominal impedance audio line (such as Clear-Com) and creating a non-significant effect on the circuit. (loading or taking appreciable power from that line.) Simply stated, as you add more and more stations to the line, the volume remains constant.

**Binaural:** Refers to two ears. In intercom use it refers to two signals, may be stereo or may be two different signals fed to two ears independently.

**Bus:** Circuitry that transports multiple digital signals grouped together as parallel lines. Also refers to large conductors used to carry electric power. Such a wire, or in general, a collection of wires that carry some multi-bit information, is called a bus.

**Call Signaling:** This feature is included with the majority of Clear-Com products. It can be an audible and/or visual alert on a user station (a lamp or LED) used to attract the attention of an operator signifying that someone at another station wants to initiate a conversation. The Call light feature is used for two different purposes: 1) primarily to get a user's attention of incoming communication. 2) To indicate a cue, routinely: light on means standby, light off after light on means apply.

**Cans:** Slang for headphones.

**Capacitance:** Exists between the transmission line wires. The capacitance between wires is usually expressed in Pico farads per unit length. This electric field between the wires is similar to the field that exists between the two plates of a capacitor. Your cable consists of two wires normally twisted together in a bundle. Between any two wires there will be capacitance. High capacitance will affect the frequency performance of a line in two ways - increased attenuation and changing phase of a signal.

**Channel:** A "channel" is one individual circuit of communication used within a partyline - it is typically a two-way talk/listen path. An example would be a partyline channel for spot light operators. There can be more than one line circuit channel to allow for multiple conversations or information flows to occur simultaneously. It is possible for a user station (belt pack) to select between several channels available in a system with a channel selector on the user station. This allows for multiple conversations or information flows to occur independently as needed. An example would be a Remote Stage Manager with Carpenters on Channel A and the rest of the production on Channel B.

*\*Channel is also used to describe a range of frequencies (or, equivalently, wavelengths) assigned by a government for the operation of a particular television station or radio station. In common usage, the term also may be used to refer to the station operating on a particular frequency. This is common with two-way radios.*

**Circuit:** A complete path for electrical power or an electrical signal (usually two conductors). In an intercom system, a channel for one or two-way conversation may be called a circuit.

**CODEC:** An acronym of Compression, Decompression = a device or piece of software which takes one file or signal format and translates it to another with an ideally undetectable loss of quality. Equipment that takes baseband video and audio and compresses it into one of many file or transport stream formats or decompresses it back to baseband.

**Conference Line Intercom:** see Partyline

**Crossover Cables:**

**Computers:** A crossover cable is sometimes known as a null modem.

A crossover cable is a type of twisted pair copper wire cable for LANs (local area network) in which the wires on the cable are crossed over so that the receive signal pins on the RJ-45 connector on one end are connected to the transmit signal pins on the RJ-45 connector on the other end. This is the opposite of the usual straight-through LAN cable, in which the receive and transmit signal pins on one connector are connected to the corresponding pins on the other connector. Its purpose is to allow the direct connection of two LAN devices, such as two hubs, two switches or a hub and a switch. It can also be used to create a direct connection between two computers.

**Audio:**

Very similar but not the same as a crossover cable used in Ethernet networks an audio crossover cable is a type of twisted pair copper wire cable in which the wires on the cable are crossed over so that the receive audio signal pins on one end are connected to the transmit audio signal pins on the other end connector.

**Cross Talk:** Leakage of audio transmissions from one channel to another.

**Decibel (dB):** In electronics and communications, the decibel is a logarithmic expression of the ratio between two signal power, voltage, or current levels. In acoustics, the decibel is used as an absolute indicator of sound power per unit area.

**Dry Pair:** A telephone term is used to describe a pair of wires (2 conductors) that carry audio but no voltage. Contrast this with a "Wet Pair" that carries both audio and voltage.

**Daisy Chain:** Some Clear-Com Partyline user stations allow the looping together (or daisy chaining) of user stations. These stations have a "loop through" connector as well as a "line" or "line input" connector. A partyline system can be constructed by connecting one user station to another via the line and loop through connectors. Other wiring options are "home running," which is running a line cable from each user station to a central point connecting to the power supply ("home").

**Destination:** A destination is anything that a talk key talks to or a listen key listens to. Therefore, a destination can be an intercom station, beltpack or interface, (or group of such devices connected together), which is assigned to a source channel of a power supply or central intercom Main Station.

**Dim:** This is the intentional attenuation of an audio signal. "Dim" occurs in two contexts in intercom systems. First, Dim is used to correct a feedback problem that can occur between two user speaker panels operating in close proximity that talk/listen to a common destination. This can help to prevent occasional feedback between the speaker and microphone due to volume settings, microphone placement, etc. Second, dim is referred to the lowering of a program feed to a destination so that a talk path could be heard – such as in a dressing room page or talent IFB cueing.

**Dual Listen:** This is an option or feature of intercom user stations. Dual listen permits an operator to listen to two channels at once. This may be a mix of two channels to one ear, or in a binaural or stereo user station, one channel can be assigned to one ear and the other channel to the other ear.

Dual Listen could also be an intercom channel and a program audio source. The dual listen pots are functionally configured in two ways: 1. One pot controls the audio of the channel actively used, and the second pot controls the audio of a monitored channel. 2. One pot is always one channel and the other pot is always the other channel.

**Duplex:** Duplex refers to bi-directional communications. **“Full” Duplex** describes bi-directional communications all the time. Regular communications between individuals conversing face to face is "full duplex" -- in other words you can talk and listen simultaneously. Full Duplex communication allows simultaneous two-way conversations, plainly - one person can interrupt the other.

The alternative is **"Half” Duplex**. Half Duplex communication allows two-way conversations, one-way at a time, such that one person cannot interrupt the other. A walkie-talkie is a good example of half-duplex communication.

**EFP:** Electronic Field Production. An EFP truck contains the necessary audio, video, intercom, and other equipment to create these productions.

**EMI:** Electromagnetic Interference. Interference caused by the radiation of electrical or magnetic fields from sources such as radio transmitters, light dimmers, computers, and transformers.

**ENG:** Electronic News Gathering. An ENG truck contains the necessary audio, video, intercom, communications, and other equipment to effectively support gathering news and transmitting news reports back to a studio.

**F#&@ the Truck:** An expression taught to new remote truck-studio utilities and newbies- always run the male end of the cable to the truck. The first time you run a one-thousand-foot cable the wrong way, you'll remember. Doing it in the rain promotes greater retention of the concept as well. And **SUCK THE TRUCK:** means sending the female ends to the main I/O.

**Four-Wire:** A communications system where the paths are different for talk and listen. In intercom channels there are four wires (two paths). Four-wire systems can be four-wire balanced and four-wire unbalanced. Four-wire audio is more or less defined as a pair of conductors carrying an input/receive signal and a second pair carry the output/send signal. The four-wire circuit gets its name from the fact that a balanced pair of conductors was used in each of two directions for full-duplex operation.

**Four-Wire Unbalanced:** A four-wire system that uses a circuit common and two additional conductors. The talk pathway consists of one conductor plus circuit common. The listen pathway consists of another conductor and circuit common.

**Four-Wire Balanced:** Four-wire balanced is similar to four-wire unbalanced except that conductors are not tied to circuit common. Circuit common is either tied to a transformer center tap, or is an electrical center point, or not tied at all.

**GHz – Gigahertz:** Thousand million cycles per second.

**GPIO:** General Purpose Input / Output. (You may also see this referred to simply as “GPI”.) GPIO is a means of controlling devices using switch contact closures, DC voltages, or similar methods. Additional general purpose control outputs are provided by optional relay frames.

**Headset:** portable intercom connection from a user station to one or both ears via headphones with integrated microphone on a boom arm. Connects to a beltpack, remote stations or Main Stations. Used by the user to talk and or listen.

#### **Headset Microphone Type:**

**Dynamic Microphone:** Converts sound pressure waves to electrical signals by means of a coil attached to a diaphragm moving in a magnetic field.

**Electret Microphone:** A microphone using a capacitor as the sound pressure sensing element. Electret microphones are a special case of condenser microphones in that they are permanently polarized and require no special polarizing voltage. Electret microphone outputs are high impedance.

**Headset/ Double-Muff:** Headset with two earphones plus a microphone. It can be connected monaurally (same information, both ears) or binaurally (separate feed each ear). In binaural operation, the feed can be intercom in one ear and program in the other, or intercom channel A in one ear and intercom channel B in the other ear. Channels A and B are either conference line channels or other intercom feeds. A binaural feed requires a binaural/stereo capable user station.

**Hertz (symbol: Hz):** a unit of frequency. It is defined as the number of cycles per second. It is the basic unit of frequency in the International System of Units (SI), and is used worldwide in both general-purpose and scientific contexts. Hertz can be used to measure any periodic event; the most common uses for hertz are to describe radio and audio frequencies, more or less sinusoidal contexts in which case a frequency of 1 Hz is equal to one cycle per second.

**IFB:** is abbreviation for Interrupted Fold-Back. It is a communication circuit feature or a separate system that interfaces with the intercom system. In use, a user, (typically talent) listens to the program all the time and is 'interrupted' by the director (typically) with cues or instruction.

**Impedance:** Impedance is the total effect of resistance, capacitance, and inductance and each of these oppose electrical flow on a cable in different ways. Impedance is a combined effect or total opposition to current flow.

**I/O =** input and output connections

**ISO:** A private conversation path. An ISO channel allows one to simply push a button and transfer themselves and the person they wish to speak with to an isolated channel.

**kHz – Kilohertz:** Thousand cycles per second.

**Local area network (LAN):** a computer network covering a small physical area, like a home, office, or small group of buildings, such as a school, or an airport. The defining characteristics of LANs, in contrast to wide-area networks (WANs), include their usually higher data-transfer rates, smaller geographic place, and lack of a need for leased telecommunication lines.

**Latency:** Usually used in context of audio, video, and RF signals. Latency is the time it takes a signal to travel over a path or through a piece of equipment.

**Limitter:** Used to limit dynamic range to ensure adequate intelligibility to the listener. The limiter/compressor in user stations has three functions: 1) It helps loud talkers and soft talkers to be heard equally well, 2) It prevents a loud voice from being severely distorted, 3) It keeps the voltage levels from exceeding system limits.

**Line:** A single communication path.

**Linking:** Linking ties separate channels into one single party line.

**Local Power Option:** Local Power Source is a small AC converter that converts AC line power to low voltage in order to power a user station --a separate connector is provided. User stations usually get DC from the converter, although occasionally low voltage AC power is used.

**Loop-Through** See "Daisy Chain".

**MHz:** Million cycles per second.

**Main Station/ Master Station:** A multi-channel intercom station with an internal power supply which can provide power both to itself and to all of the remote stations connected to it.

**Mix-Minus Bus /feed:** A mix-minus feed is typically used for the IFB.

The mix-minus allows the talent to hear the program audio that includes the voices of other talents at other venues as example, but not the talent's own voice. The effect is to allow more normal conversations, on air, among the performers. The bus feed refers to the mixer mix-minus feed available to one or more IFB program inputs.

**Mono:** Single channel audio

**Mults** = A large cable that is made up of many smaller internal cables. Often used to carry multiple audio feeds. In many instances fiber optic cables are replacing these cables. A mult box is sometimes called a 'press box' usually reserved for the sports media's section of an arena or frequently at press conferences.

**Multi-Channel:** More than one channel

**Null:** A hybrid's ability to isolate the transmit signal from the receive signal in the 2-wire-to-4-wire interface is critical. The quality of this isolation is technically known as return-loss.

A side tone **nulling** control fine tunes the circuitry to best match the devices to the acoustic conditions near the intercom, as well as to the electronic conditions on the intercom line.

They should be set at the time of system installation and adjusted as is comfortable for the user.

Four-wire audio is more or less defined as a pair of conductors carrying an input/receive signal and a second pair carry the output/send signal. This hybrid circuit connects the four-wire audio to the single wire in such a way as to variably restrict the user's reception of his own voice on the intercom line, which is often referred to as "side tone".

High gain between the send and receive poses a risk of oscillation or 'howling' resulting from acoustic and/or electronic coupling within a headset or between a speaker and a microphone.

With manual nulling devices there are the following accessible controls: Separate "R" (Resistance), "L" (Inductance), and "C" (Capacitance) controls compensate for each component of the line's impedance, providing the best null possible.

**Ideally, there should be no portion of the talk signal in the listen signal.**

The variation of the 2-wire line phase coherency is affected by the cable capacitance (length of wire and gauge) and inductive elements of the line.

The "C" control compensates for cable capacitance; the setting depends on the length of the line.

The "L" control compensates for the low-frequency inductive and capacitive elements the wiring of the external party line presents to the line.

The importance of 2-wire termination, lack of, or double termination also influences the null result. If the "R" control is turned fully counter-clockwise, the line has either more than one termination, or an excessive resistive load. If the "R" control is fully clockwise, then the line has no termination.

**Party Line (PL):** Intercom system where all people talking on the system can talk or listen to each other simultaneously. The name **PL (partyline)** came from the original telephone systems where everyone shared the same line and could hear and join all conversations at once. It is often called **conference systems, 2-wire, or TW**, which stands for two-wire (see 2-wire description). A Partyline system allows a group of people to intercommunicate. A Party Line is classically used when several users, such as beltpacks, are active in a common task and they must communicate with each other all the time.

Characteristics of party lines

- When the party line is already in use, if any of the other subscribers to that line pick up the headset, they can hear and participate in the conversation.
- Completely non-private lines
- Systems are created from building block components to correspond the demand of the event.

Conference systems can be distributed or centralized. Most of the systems are distributed conference systems. Distributed means that a station can be plugged-in at any arbitrary point along the bus or channel.

**Pigtail:** A group of cables that converge into one large connector at one end and at the other ends each cable has its own separate connector. It is designed to patch into an existing line or to terminate the ends of a long run

**Point to Point:** One path from one device to one device

**Power Supply:** The source of electrical power (“power outlet”). In North America this source is generally 120 volts AC, 60 hertz. In Japan the source is generally 100 volts, 50 or 60 hertz. In Britain the source is 240 volts, 50 hertz. In Europe the power is usually 220 volts, 50 hertz. In addition, some equipment is operable off of DC sources such as batteries.

**Power Supply Clear-Com:** A specific power supply to operate Clear-Com beltpacks and remote stations. This supply provides low noise DC power (30 VDC  $\pm$  0.5V) up to 1.2 amperes per channel and an audio line impedance of 200 ohms.

**Program:** Audio source that is fed into the intercom channels.

**Program Interrupt:** Disconnects the audio source while the talk button on the Main Station is pushed.  
(IFB)

**Push- To- Talk (PTT):** Usually used on handsets or push-to-talk microphones. Pushing the button enables the microphone talk circuit on.

**QOS:** Quality of Service

**Rack Unit:** A unit of measure used in racks that designate how tall a piece of equipment is when installed in a rack. One rack unit or RU is 1.75 inches tall (44.45 mm). A piece of equipment that is said to be 4 rack units tall has a height of 7 inches.

**Relay:** A relay is an electrically operated switch. Commonly these relays are Normally-open (**NO**) contacts which mean they connect the circuit when the relay is activated; the circuit is disconnected when the relay is inactive. It is also called a **Form A** contact or "make" contact.

Typically, in audio electronics, these relays are of the dry contact type. Dry contact refers to a contact of a relay which does not make or break a current. They simply turn something on or off.

Rating: In audio electronics a rating of .05 to 2 Amp at 24 volts AC/DC maximum is common. A “Phoenix” type connector plug is also common and it plugs into the relay contact port on the rear of the base station for wiring to external devices. A use for a relay is sometimes associated with turning on a light for attention such as an on-air light.

**Remote Mic Kill (RMK):** The ability for certain Main Stations to shut off all talk circuits on an intercom line in a system.

**Remote Station:** Like the beltpack, this would be any of the products connected to the intercom line that allow duplex or half-duplex conversation, but do not contain a Power Supply. A Remote Station cannot power other Stations

**RF:** Radio Frequency.

**Shore (or House) Power:** When using power from the “house” (the building you are in), that is considered shore power. This is not the case when using a portable generator for power. And remember when using a portable generator that you remember to keep the fuel filter clean!

**Sidetone:** This is a small amount of your own voice heard in your earphone as you are speaking.

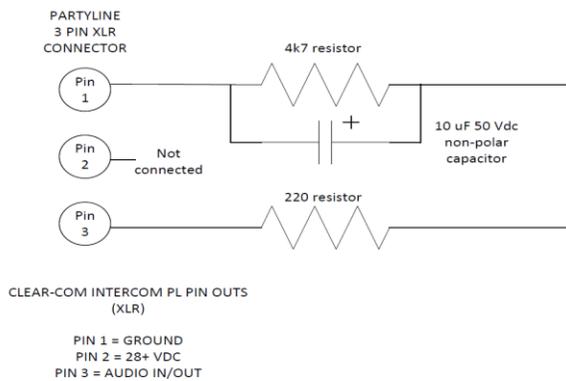
**SFP: Small Formfactor Pluggable, or a plug-in device that accommodates a fiber termination such as an LC connector. They translate light from glass to an electronic signal on copper.**

**Splitter:** Usually refers to a **passive** audio device that takes one audio source in and provides two or more outputs.

**Stage Announce (SA) – or Voice Of God:** Typically a voice page made over a loudspeaker. In wired intercom when a SA control is pressed, either at a base station or an assignable beltpack, the user’s audio is routed to the stage announce connector on the back of the base station. This is usually an analog line level audio output. The user may lose their headset side tone as an indication that stage announce is activated. The other users do not hear the announce audio. The button is non-latching. Sometimes, a relay is activated on the controlling device for use in muting other audio sources.

**Station:** A station is connected to one or more channels. For example, if you have six people who must hear one director you have a seven-station single-channel need. If the same director must speak privately to any one of the six, add a second channel. You now have a seven-station, two channel system.

**Termination:** Passive network that is connected in each channel, usually on the Power Supply or Main Station.



**Tie Lines** = Generally cables that have no dedicated use that link one section to another. Tie lines usually terminate at patch panels or other IO panels.

**Two-Wire:** A communications system where the path is the same for both talk and listen. In intercom channels there are two wires (one path). Two-wire systems can be two-wire balanced or two-wire unbalance

**Turn around:** A term used to describe an audio interface cable or barrel type tube device, sometimes called couplers, that converts a female-to-female or male-to-male connector used to turn snake channels from a send to a return or vice versa, but they also come in handy when a stage hand has inadvertently run a very long XLR cable in the wrong direction.

**Wet Line:** An intercom that carries both audio and DC voltage / current. As opposed to a dry line that carries only the audio.

**XLR:** standard connector for audio, most commonly with three pins or contact points. Four and five pin versions are used for intercom headsets and multi-channel microphones. Cannon Electric invented the connector and made it part of its “X” series of connectors. Because of its locking mechanism the “L” was added, and the fact that it has rubber insulation resulted in the final “R” designation.

# Some Useful and fun websites

AGC Products Page	<a href="http://www.plsystem.com/plasgp01.htm">http://www.plsystem.com/plasgp01.htm</a>
Common Sense	<a href="http://www.comm-n-sense.blogspot.com/">http://www.comm-n-sense.blogspot.com/</a>
SVG Venue Initiative White Paper	<a href="http://sportsvideo.org/main/svg-venue-initiative-white-paper/">http://sportsvideo.org/main/svg-venue-initiative-white-paper/</a>
L-Com Home Page adapters, custom cables	<a href="http://www.l-com.com/home.aspx">http://www.l-com.com/home.aspx</a>
Mike Wilson's Custom Cables and Adapters	<a href="https://www.mwcommsolutions.com/home">https://www.mwcommsolutions.com/home</a>
The Skinny on Audio Coding, by Tim Carroll	<a href="http://www.tvtechnology.com/pages/s.0077/t.1841.html">http://www.tvtechnology.com/pages/s.0077/t.1841.html</a>
Handbook of Pinouts	<a href="http://pinouts.ru/">http://pinouts.ru/</a>
More Comms Pinouts	<a href="http://www.plsystem.com/plwww61.htm">http://www.plsystem.com/plwww61.htm</a>
BEST Audio's Comms Apps	<a href="http://www.bestaudio.com/downloads/">http://www.bestaudio.com/downloads/</a>
Cute Production Cartoon	<a href="https://www.youtube.com/watch?v=bvKhd8E4P8g&amp;feature=youtu.be">https://www.youtube.com/watch?v=bvKhd8E4P8g&amp;feature=youtu.be</a>
Touring A-1 vs. House Guy	<a href="https://www.youtube.com/watch?v=7dlL3zo6n_w">https://www.youtube.com/watch?v=7dlL3zo6n_w</a>
Pete Erskin's RF Coord pg.	<a href="http://www.bestaudio.com/_private/downloads/rf_coordination_process_Pete_Erskine.pdf">http://www.bestaudio.com/_private/downloads/rf_coordination_process_Pete_Erskine.pdf</a>
RTS Support Page	<a href="http://www.rtsintercoms.com/ar/rts/faq">http://www.rtsintercoms.com/ar/rts/faq</a>
Riedel's support page	<a href="http://www.riedel.net/">http://www.riedel.net/</a>
How to Change your PC's IP address:	<a href="https://www.youtube.com/watch?v=FespGoMOd8Q">https://www.youtube.com/watch?v=FespGoMOd8Q</a>
RF Venue has a cool blog:	<a href="#">Managing a Wireless Audio Installation Project</a>
Neat Applications sites:	<a href="https://www.youtube.com/watch?v=jUYqdbGIYSY">https://www.youtube.com/watch?v=jUYqdbGIYSY</a>
Clear-Com's Support Page	<a href="http://www.clearcom.com/support">http://www.clearcom.com/support</a>

# And finally...



Don't try this at home, kids... but ya could!

<https://youtu.be/nfhVlji2i3g?list=UU8F8i3YH86W7hOtIG5WLSkA>

# A WORD OF ADVICE

