

# **CLEAR-COM ENCORE**

**CS-702 TWO-CHANNEL MAIN STATION**

**INSTRUCTION MANUAL**

CS-702 Portable Two-Channel Main Station Instruction Manual

Part number: 810344Z Rev. 3

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# IMPORTANT SAFETY INSTRUCTIONS

*Please read and follow these instructions before operating this product.*

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades, with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. **WARNING:** To reduce the risk of fire or electric shock, do not expose this product to rain or moisture.

**Please familiarize yourself with the safety symbols in Figure 1. When you see these symbols on this product, they warn you of the potential danger of electric shock if the main station is used improperly. They also refer you to important operating and maintenance instructions in the manual.**



This symbol alerts you to the presence of uninsulated dangerous voltage within the product's enclosure that might be of sufficient magnitude to constitute a risk of electric shock. Do not open the product's case.



This symbol informs you that important operating and maintenance instructions are included in the literature accompanying this product.

*Figure 1: Safety Symbols*

## **EMC AND SAFETY**

**The CS-702 Two-Channel Main Station meets all relevant CE, FCC, UL, and CSA specifications set out below:**

**EN55103-1 Electromagnetic compatibility. Product family standard for audio, video, audio-visual, and entertainment lighting control apparatus for professional use. Part 1: Emissions.**

**EN55103-2 Electromagnetic compatibility. Product family standard for audio, video, audio-visual, and entertainment lighting control apparatus for professional use. Part 2: Immunity.**

**UL 60065-7, CAN/CSA-C22.2 No.60065-3, IEC 60065-7 Safety requirements.**

**And thereby compliance with the requirement of Electromagnetic Compatibility Directive 2004/108/EC and Low Voltage Directive 2006/95/EC**

**This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.**

# 1

# OPERATION

*Clear-Com is a closed-circuit intercom system that consistently provides high-clarity communication in both high-noise and low-noise environments.*

## INTRODUCTION

Congratulations on choosing this Clear-Com product. Clear-Com was established in 1968 and remains the market leader in providing intercoms for entertainment, broadcast and industrial applications. The ruggedness and high build quality of Clear-Com products defines the industry standard. In fact, many of our original beltacks and main stations are still in daily use around the world.

Please read this manual completely to better understand the functions of this product. If you encounter a situation or have a question that this manual does not address, contact your dealer or call Clear-Com directly at the factory. Our applications support and service people are standing by to assist you. (Refer to Chapter 5: “Warranty” for contact information.) Thank you for selecting Clear-Com for your communications needs.

## THE CLEAR-COM CONCEPT

Clear-Com is a closed-circuit intercom system that consistently provides high-clarity communication in both high-noise and low-noise environments. A basic system consists of a single- or multi-channel power supply or main station connected to various single- or multi-channel remote stations, such as beltacks and loudspeaker stations.

Clear-Com manufactures a wide variety of both portable and fixed-installation units. All are compatible with each other. Clear-Com intercom systems can also interface with other communication systems and devices.

Clear-Com stations are interconnected with two-conductor, shielded microphone cable, using 3-pin XLR connectors. One wire carries the DC power from a main station or power supply to all remote stations, and the other wire carries two-way (duplex) audio information. The shield acts as a common ground. One termination (per channel) is needed throughout the intercom network, and is usually located in the main station or power supply.

Clear-Com is a distributed amplifier system; each main and remote station houses its own mic preamplifier, headset or speaker power amplifier, and signaling circuitry. The *automated headset detection* circuit shuts off a station’s mic pre-amp when the headset is disconnected, so background noise on the line is not increased by an unused yet online station. Low-impedance mic input lines and specially designed circuitry make Clear-Com channels virtually immune to RFI and dimmer noise.

Clear-Com main stations, power supplies and certain remote stations each have an auxiliary program input with its own volume control, which allows an external audio source to be fed to the intercom system.

*The power provided by main stations and power supply units enable remote stations to operate with minimal current while generating extremely loud listen volumes.*

Visual signal circuitry (*call lights*), a standard feature on all main and remote stations, allows you to attract the attention of operators who have removed their headsets.

Depending upon the type of main and remote stations selected and assuming that enough DC power is available remote stations and headset stations can be distributed along 1 mi. (1.67 km) of wire. Remote stations bridge the intercom line at a very high impedance and place a minimum load on the line. The audio level always remains constant and does not fluctuate as stations leave and join the network.

The DC power provided by main stations and power supply units enable remote stations to operate with minimal current while generating extremely loud listen volumes. The higher voltage and low current keep voltage losses to an absolute minimum in long lines.

## DESCRIPTION

The CS-702 is a portable, two-channel main station with a regulated power supply and a versatile monitoring system. It features excellent speech intelligibility in all noise-levels. The CS-702 contains a mic preamp with a limiter.

The CS-702 provides DC voltage and the ability to talk and listen on two separate channels. It supports and monitors two intercom lines containing remote headset or remote speaker stations.

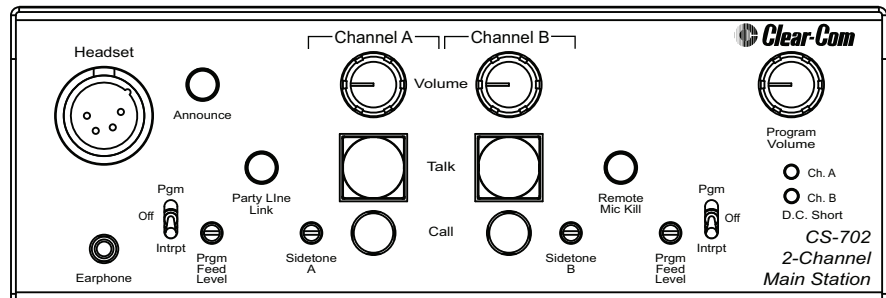


Figure 1-1 CS-702 Front Panel

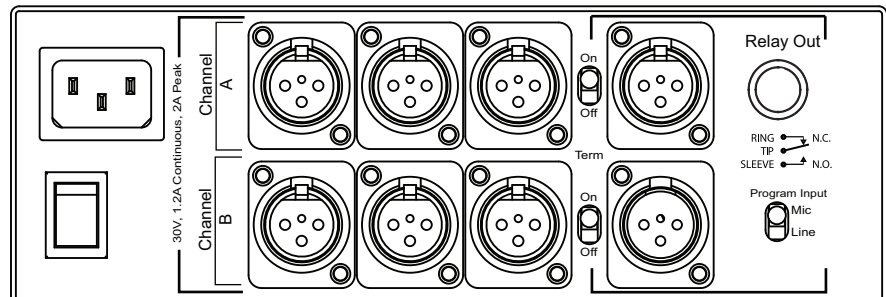


Figure 1-2 CS-702 Rear Panel



## MONITORING SYSTEM

The front panel of the CS-702 has one headset connector for use by the operator. The operator monitors the intercom channels by turning up the appropriate *listen level* volume controls (one for channel *A*, one for channel *B*). Either channel may be monitored separately, or both simultaneously (without tying the two channels together). These volume controls are always active regardless of *talk* channel selection on the station.

The jack marked *earphone* is connected in parallel with the earphone circuit of the headset connector. It can be used for monitoring or recording.

## DUAL-ACTION TALK BUTTONS

Each channel has its own *talk* button which can either *latch* on, or operate *momentarily*. Pressing the button quickly will toggle the talk function, alternately turning it *on* or *off*. The talk button will illuminate amber when activated and blue when not activated.

## STAGE ANNOUNCE (PAGING)

The *stage announce* button on the front panel sends the signal from the operator's headset microphone to the balanced, line-level *stage announce* output on the back panel.

The *stage announce* button also mutes the operator's voice output to the intercom channels. This mute function can be defeated with an internal user-selectable jumper. The *stage announce* button also activates a SPDT relay when pressed. The 1 ampere contacts can be used for any user-desired control function (i.e. muting a local monitor speaker).

## CALL SIGNALING

Visual "call signaling" attracts the attention of people who have removed their headsets or turned off their speakers. The CS-702 front panel provides a *call* button for each channel. Pressing the *call* button turns on the *call* lights at all stations on that channel. The call is active regardless of *talk* status.

When a remote station sends a *call* signal, the *call* button associated with that channel flashes red, whether or not the channel is selected.

## PROGRAM INPUT

The CS-702 accepts a balanced, mic-level or line-level program input which can be monitored in the headset. Program volume for the operator's headset is adjustable with the *program volume* knob on the front panel. The external program is also assignable and adjustable in level to either or both channels, and mixes with the intercom signal. The program feed can be set to be interrupted by the *talk* for a particular channel.

## SIDETONE

The *sidetone* controls for each channel on the front panel allows adjustment of the operator's own voice as heard in the headset.

## LINKING CHANNELS TOGETHER

A front panel button is provided. It allows the operator to instantly connect channel *A* and channel *B* together for a combined intercom system consisting of both channels.

## REMOTE MIC-KILL FUNCTION

The CS-702 provides the ability to turn off any open mics on remote stations. Momentarily pressing the *RMK* button will remove the DC power from both channels clearing the *talk* function of all the beltpacks.

## POWER SUPPLY PROTECTION

The CS-702 power supply is regulated, current-limited, and provides DC power from an AC mains supply. The CS-702 has an automatic short-circuit sensor to protect the system from miswired cable, shorts in the lines, or general current overload. If a short occurs, the *red* LED on the front panel marked *D.C. Short* illuminates. Removing the short will cause the power supply to reset itself automatically in as little as  $\frac{1}{2}$  second, depending upon whether there was a single or multiple short or overload.

## SYSTEM TERMINATION

The CS-702 provides individually-selectable audio termination networks for both channel *A* and channel *B*.

## PORTABILITY

The unit is lightweight and sturdy for applications that require that it be moved between various locations.

## EASY INTERCONNECTION

The CS-702 provides three 3-pin, male XLR outputs for channel *A* (connectors are wired in parallel) and three for channel *B*. Intercom signals are fed from the CS-702 with standard mic cable (see next section).

## EASY SYSTEM EXPANSION

The CS-702 can be connected together with other CS-702s or other Clear-Com power supplies for multiple two-channel systems and back-up power support.

# FRONT PANEL DESCRIPTION

Normal operation of the CS-702 only requires access to the front panel controls. For intercom operation set the *listen level* controls for each channel to desired level and press the *talk* switches when talking. The rest of this section is a detailed description of each control.

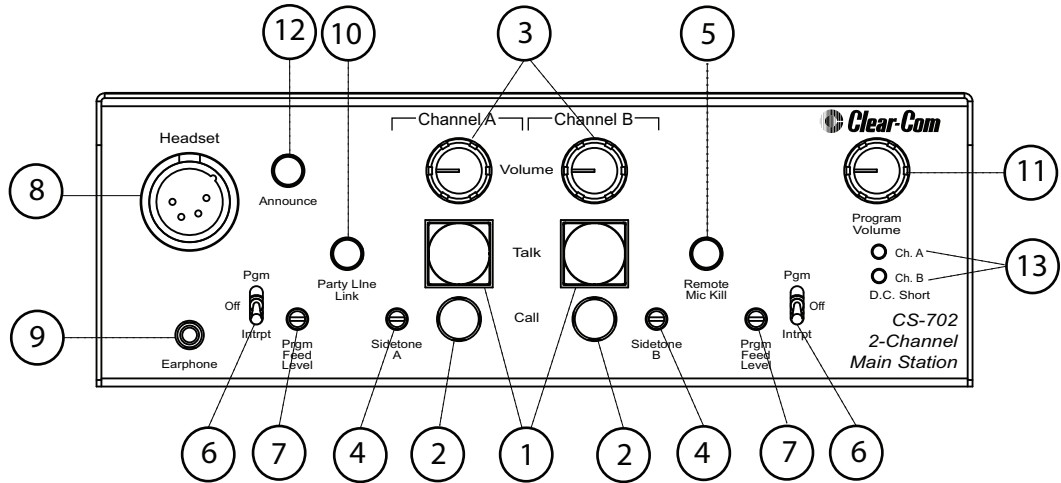


Figure 1-3 CS-702 Front Panel

1. **Talk Buttons:** Each channel has its own illuminated *talk* button for activating the microphone feed to a given channel. Mechanically the pushbutton is momentary in action; however, electrically the button has dual action (*momentary* or *latching*) depending on how the button is pressed.
  - **MOMENTARY:** Press and hold the *talk* button while speaking. Release it when finished.
  - **LATCHING:** Press and release the button quickly to latch the *talk* function. Press and release the button again to turn off the talk function.
  - **TALK INDICATION:** The *talk* button illuminates amber when you press it to send a talk signal, and blue when not active. When illuminated blue, the talk button indicates that the station is receiving power.
  - **CALL INDICATION:** The *call* button will flash red when a *call* signal is received on the channel.
2. **Call Buttons:** Each channel has its own *call* button. Pressing the call button at any time will send a *call* signal on that channel regardless of the activation of the *talk* circuit for that channel.
 

The *call* button for that channel illuminates brightly when pressed, indicating the presence of a *call* signal on the line.
3. **Listen Level Controls:** Each channel has a separate *listen level* control. Listening is always *on* and is not controlled by any logic. To listen to a

channel, turn up the appropriate control. To not listen to a channel, turn the control completely *off*.

4. **Sidetone Controls:** Each channel has a *sidetone null* control. This control is used to set the amount of the microphone that is heard in the earphone from that channel.

This control is a true hybrid null control and therefore is sensitive to changes in line loading. For headphone use it is best to find the null for a given channel and then rotate the control clockwise to obtain the desired sidetone level.

If an external speaker is used providing a possible acoustic feedback path, it will be necessary to use an almost complete null of the *sidetone* control.

5. **Remote Mic Kill Buttons:** It sometimes becomes desirable in an intercom system to turn off all open microphones in a system.

Pressing and holding the *RMK* button for several seconds will reset all open microphones at all beltacks on both channels.

**Caution:** *RMK CANNOT be used if power for a channel is derived from some place other than the local station. The RMK action momentarily shorts the power line of the affected channel. RMK only works from a single main station system.*

6. **Program Enable Switches:** The CS-702 has the ability to feed an external program signal to either of the two channels independently. The *program enable* switch allows the program to be turned *on*, *off*, or *on with interrupt*.

- In the *on* position, the program is fed to the channel under all conditions.
- In the *off* position, the program is not fed to the channel.
- In the *int* position, the program is fed except when a talk is activated to the channel. This *program interrupt* or *IFB* function can be used for talent cuing and dressing room show monitor applications.

7. **Program Feed Level Controls:** Each channel has a *program feed level* control that sets the amount of program being sent to that channel when the program is activated.

8. **Headset Connector:** The headset connector is located on the front panel. All Clear-Com headsets are recommended for use with the CS-702. The following is a description of the characteristics of a suitable headset:

- Mic Type --- Dynamic, see technical specifications for details
- Headphone --- Dynamic, see technical specifications for details

The wiring of the headset is to be as follows:

- Pin 1 --- Mic common
- Pin 2 --- Mic hot
- Pin 3 --- Headphone common
- Pin 4 --- Headphone hot

The mic and headphone wiring in the headset cord must be individually shielded. **Do not connect pins #1 and #3 together.** Headset extension cords or headset “Y” cables are not recommended because they will increase crosstalk between channels.

9. **Earphone Jack:** The jack marked *earphone* provides an output intended to drive an extra earphone. This output is capable of driving a headphone or loudspeaker.
10. **Party Line Link Switch:** This switch marked Party Line Link on the front of the unit allows the operator to “combine” channels *A* and *B* so that all stations can talk to each other. (Normally channels *A* and *B* are totally isolated and stations on one channel cannot talk to stations on the other channel.) When in the *Party Line Link* operating mode, only the channel *A* controls operate. The channel *B* controls have no effect.

*Note:* When the switch is in the Party Line Link position, the channels do not actually “combine.” What really happens is that the three “B” channel connectors are simply internally disconnected from the “B” circuitry and connected to the “A” channel circuitry, putting all stations on the channel “A” party line. This maintains all the correct line and station terminations.

*Caution:* The link function will work properly at the main station that is providing the “line terminations” for the system. If there is more than one main station in the system equipped with a “link” switch, **DO NOT ATTEMPT TO USE THE “LINK” SWITCH ON THE STATIONS THAT ARE NOT PROVIDING THE LINE TERMINATION.** Both double-line termination and station un-termination will result, causing significant sidetone mis-adjustments and possible feedback and oscillation.

11. **Program Volume Control:** The *program volume* control sets the amount of the program signal heard directly in the headphone. This control only affects what is heard in the headphone and does not affect *program* feed to the intercom lines.
12. **Announce Button:** The *announce* button allows the operator to instantly use the microphone input to directly talk to a system external to the intercom such as a paging speaker/amplifier in another room. A dry set of relay contacts on the rear panel is also available that can be used to activate external switching as needed when the *announce* button is pressed.

Pressing the *announce* button momentarily disables any active *talks*. Active *talk* circuits will be restored when the button is released. The *talk muting* action can be defeated if desired by moving an internal jumper (refer to the section “Internal Options and Adjustments”).

13. **Power Supply LEDs:**
  - **NORMAL OPERATION:** The *talk* buttons illuminate blue when the station is receiving power.
  - **OVERLOAD AND SHORT CONDITIONS:** A red D.C. Short light indicates that an overload or short condition exists.

Lowering an excess load or removing a short will allow the automatic reset circuit to attempt to reset the power supply, to restore normal operation to the power supply without operator intervention.

## REAR PANEL DESCRIPTION

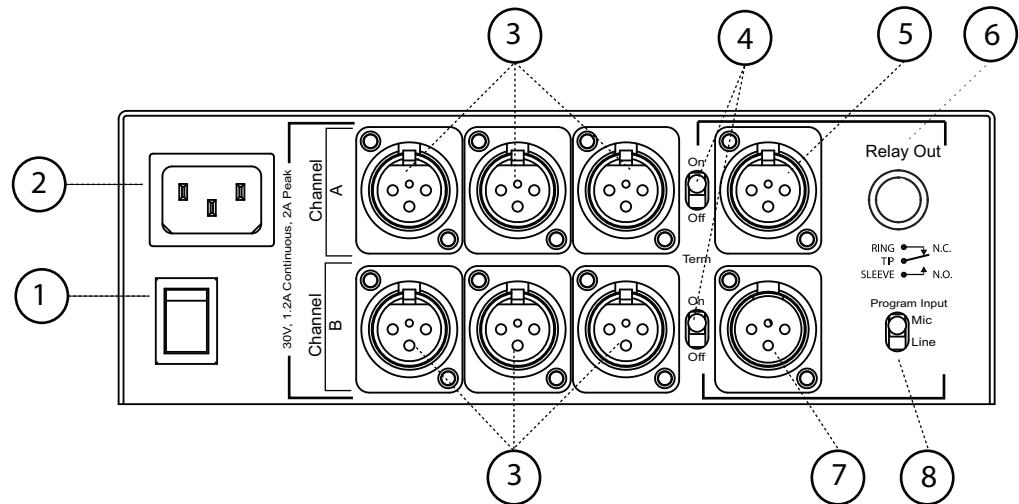


Figure 1-4 CS-702 Rear Panel

1. **Power Switch:** The AC power switch is located on the bottom left corner of the rear panel.
2. **Power Connector:** Just above the power switch is an EIA power receptacle for AC power input.
3. **Intercom Line Connectors:** There are two sets of three XLR-3M intercom connectors for both channel outputs. Standard Clear-Com wiring is as follows:
  - Pin #1 --- Ground
  - Pin #2 --- Power
  - Pin #3 --- Intercom audio
4. **Termination Switches:** Each intercom channel is provided with a *termination* switch allowing easy termination of the intercom line. The switch is provided in case there are multiple *main* stations connected to the intercom line.
 

**Caution:** For proper operation it is imperative that **one and only one** termination be present on a Clear-Com line. Clear-Com line drivers depend on a known load value for proper operation.
5. **Announce Output Connector:** The *announce* output is an XLR-3M. The output is transformer isolated. Wiring is as follows:
  - Pin #1 --- Ground
  - Pin #2 --- -Audio
  - Pin #3 --- +Audio

6. **Announce Relay Contact Terminals:** The *announce* relay contacts are available on a 1/4" jack. The contact description is as follows:

Tip--- C --- Common

Ring--- N/C --- Normally Closed Contact

Sleeve--- N/O --- Normally Open Contact

7. **Program Input Connector:** The *program* input is an XLR-3F. It is an electronically balanced (differential) input. Wiring is as follows:

Pin #1 --- Ground

Pin #2 --- -Audio

Pin #3 --- +Audio

8. **Program Gain Switch:** The *program input gain* switch is located next to the *program input* connector. In the *mic* position the input will accept a low-impedance dynamic microphone and gives a gain of 41dB from input to the Party Line.

In the *line* position the input presents a balanced high impedance and gives a -16dB gain from input to Party Line.

**Caution:** *These servicing instructions are for use by qualified service personnel only. To avoid electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.*





# 2

# INSTALLATION

## INSTALLATION OVERVIEW

The CS-702 is a combination of a very versatile intercom station and a system power supply. Installations can vary depending on what features are used. The fundamental concept of the Clear-Com party-line intercom is that all stations provide high impedance current sourced signals into a single common system termination.

The high DC resistance allows a *call* voltage to be placed on the line without drawing too much current. The DC source for this *call* signal is also a current source thereby providing a high impedance and not affecting the audio signal.

The receive or “listen” section of stations contains a *hybrid null* circuit that attempts to reject (null) any *talk* signal being sent by that station on that channel. The *hybrid null* circuit depends on a known impedance on the intercom line to accomplish this. Variations in impedance on the line upset the null.

Clear-Com main and some remote stations provide switch-selectable termination networks on all intercom output lines. It is up to the user to determine where the termination will be provided. An unterminated line will cause excessive levels, possible oscillation of line drivers, and severe unbalance of hybrid null networks. A double- or multiple-terminated line will cause low levels and severe unbalance of hybrid null circuits.

***Caution: All Clear-Com intercom lines must be terminated. Care must be taken NOT to fail to terminate or to “double-terminate” a line. All unused intercom inputs must be terminated to keep the line drive circuits stable.***

## CLEAR-COM STATION TYPES

Clear-Com party-line intercom stations all fall into one of four distinct categories that relate to system powering and termination. The four types are as follows:

### A. MAIN STATION:

- Supplies system power for external stations.
- Provides switch-selectable terminations.

### B. MASTER STATION:

- Contains a power supply just for itself.
- Provides switch selectable line terminations.

### C. REMOTE STATION:

- No power supply. Derives power from the intercom line.
- May or may not have terminations.

D. POWER SUPPLY:

- Supplies system power for external stations.
- Provides switch-selectable terminations.

## SYSTEM POWERING

Typical Clear-Com systems consist of a *main* station and multiple *remote* stations. The *remote* stations are powered from the *main* station through the intercom cable (Figure 2-5).

*Figure 2-5 Typical Single Power Source System*

Clear-Com power supplies can be paralleled to increase the number of *remote* stations that can be operated in a system (Figure 2-6). The termination switches in the second power source would need to be in the *off* position.

***Note: The RMK function will not work on a system that has two or more power supplies.***

*Figure 2-6 System With Multiple Power Sources*

## CABLE CONSIDERATIONS

The Clear-Com intercom line is intended to run on a shielded twisted pair of cable per channel of intercom. One conductor carries full duplex (two-way) audio, the other conductor carries the DC power for remote stations. The shield is used for ground return for audio and power. When choosing interconnect cable, keep the following considerations in mind:

1. DC resistance of the ground or common conductor affects crosstalk. For runs longer than 100 ft. (30.5 m) do not use wire smaller than 20 gauge. The total resistance of the ground return (the combined parallel sum of all shields to a location) to any point in the system should be under  $1.5\Omega$ .
2. The capacitance of the interconnect cable affects system frequency response and sidetone stability. Total capacitance should not be greater than 0.25  $\mu\text{F}$  (capacitance between conductor and shield) equivalent to an intercom system containing 5,000 ft. (1525 m) of cable at 50 pF per ft. (0.305 m).

### **Portable Installation Cable**

Typical cable for portable system interconnections is flexible, two-conductor, shielded microphone cable. For runs less than 500 ft. (152.5 m) a cable made of 24-gauge wire is acceptable. For runs longer than 500 ft. (152.5 m) use a 20-gauge cable or larger.

Portable remote stations such as belt packs have a pair of input and output connectors; when installing a system that includes these, they can be *daisy-chained* or *loop-through connected* along one interconnect path. Daisy-chaining and line-splitting decreases the amount of cable required and simplify the installation.

## Permanent Installation Cable

Vinyl-jacketed shielded pair is the cable of choice for permanent installations. Use a low-capacitance 20-gauge wire for short runs (under 500 ft. [152.5 m]) and 18-gauge cable for runs greater than 500 ft. (152.5 m). Placing the cable in conduit is recommended but not necessary.

Multi-pair cable that is individually shielded is acceptable for use in multi-channel systems. For cross-talk considerations, the shields must be tied together on both ends of the cable to produce the lowest possible DC path for ground return.

## INTERNAL OPTIONS AND ADJUSTMENTS

To access the internal options and adjustments, you must remove the station's cover to gain access to the internal circuit board.

**Before removing the station's cover ensure the power to the station is disconnected.**

Remove the screws on either side of the station. Remove the four screws on the top of the station. Remove the cover.

*Note: These adjustments should only be carried out by qualified service personnel.*

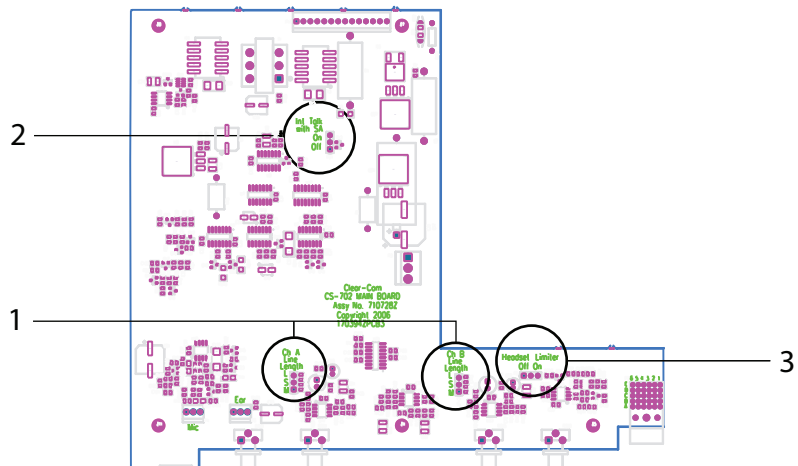


Figure 2-7 Location of Jumpers and Adjustments on PCB

- 1 **JP-1 and JP-2 Line Length Selection Jumpers:** Jumpers *JP-1* and *JP-2* allow the optimization of the hybrid null circuitry for excessive intercom cable lengths. *JP-1* is for channel *A* and *JP-2* is for channel *B*.

Each jumper has three pins, labeled *L*, *S*, and *M*. A jumper plug is placed over pins *L* and *S*, which is the default position for the pins. Moving the jumper plug to place it over the following pin sets reconfigures the station for the following line lengths:

- **Long Lines.** For line lengths in excess of 500 feet (152.5 m), place the jumper plug over pins *L* and *S*. This is the default position to which the unit is set when shipped from the factory.
- **Medium Lines.** For line lengths between 200 feet and 500 feet (61m – 152.2 m), place the jumper plug over pins *S* and *M*.
- **Short Lines.** For line lengths less than 200 feet (61 m), remove the jumper plug, or store it on the jumper by placing it sideways over pin *S*.

- 2 **JP-3 Interrupt Enable/Disable Jumper:** Jumper *JP-3* allows you to select to either mute or not mute active *talks* when you use the *stage announce* feature. The jumper has three pins. When shipped from the factory a jumper plug covers pins 2 and 3 (ON). When the jumper plug is placed over pins 2 and 3, active talks are muted when you use the stage announce feature.

Placing the jumper plug over pins 1 and 2 turns *off* the muting feature, so that active talks can be heard even when the stage announce feature is used.

- 3 **Headset Audio Limiter:** To protect the hearing of the user, the headset audio limiter restricts the maximum audio level heard in the headset. By default, this feature is *on* when the station is shipped from the factory. You can turn this feature *on* or *off* using an internal three-pin jumper.

**To turn the headset audio limiter on or off:**

1. Ground yourself and tools before opening the station or performing any operation on the circuit board. Circuitry can be damaged by static electricity.
2. Unscrew the top and side screws on the station’s cover, then lift the cover off the station.
3. Locate the three-pin jumper labeled “JP4” on the circuit board.

A jumper plug connects pins 2 and 3 of the jumper. This is the *on* position for the headset audio limiter feature.

4. Lift the jumper plug off pins 2 and 3 and place it over pins 1 and 2. This is the *off* position for the headset audio limiter.

The headset audio limiter feature does not operate when the jumper plug is in this position.

5. To turn the headset audio limiter feature on again, lift the jumper plugs off pins 1 and 2 and place them over pins 2 and 3.

The headset audio limiter feature operates when the jumper plug is in this position.

## INTERCONNECTION SETUP

After determining system configuration and channel assignment, pick a location for the CS-702; it can be anywhere as long as it is provided with a source of AC power.

1. Use standard shielded mic cable (refer to the section “Cable Considerations”). **Always avoid sharp bends in the cabling**; allow at least 3 in. (7.62 cm) behind rack-mount units for cable extending from rear panels.
2. Route all cables from the *main* station to the *remote* stations. Pin assignments on **all** 3-pin intercom connectors are:  
Pin #1 --- Common  
Pin #2 --- DC Power  
Pin #3 --- Intercom audio
3. Route cables away from heavy AC power sources, such as lighting panels, electric motors, or power transformers.
4. In permanent installations, **be sure to install the system in accordance with approved local building code.**
5. If program monitoring is required, connect the external signal to the *program input* (3-pin female) connector on the CS-702 rear panel. The station operator can hear the program in the headset mixed with intercom activity or the program can be sent to either intercom line. The program pre-amp’s gain is switch-selectable (on the rear panel) for either mic level or line-level and the input is balanced.
6. If the *stage announce* function is to be used, connect to the *announce output* (3-pin male XLR) connector on the CS-702 rear panel and the output is transformer balanced. If the output is to be used as an unbalanced source, connect one side to common (pin #2 to pin #1).  
If the Stage Announce relay is to be used, connect to the appropriate screw-lug terminals (N/O or N/C) depending on what action is needed for the external equipment to be controlled. The relay is a *Form C* (break before make) contact.  
**Note: The contact rating of the relays is 1 ampere resistive at 24 VDC or 0.5 ampere(s) resistive at 120 VAC.**
7. Turn on *power* switch on the rear panel. The call buttons illuminate blue when the unit is initially turned on and receiving power. Plug in a headset, and set *intercom*, *program*, and *sidetone* levels as desired.

## HEADSETS

The following is a description of a recommended headset:

Mic Type --- Dynamic; see technical specifications for details.

Wiring:

Pin #1 --- Mic common

Pin #2 --- Mic hot

Pin #3 --- Headphone common

Pin #4 --- Headphone hot

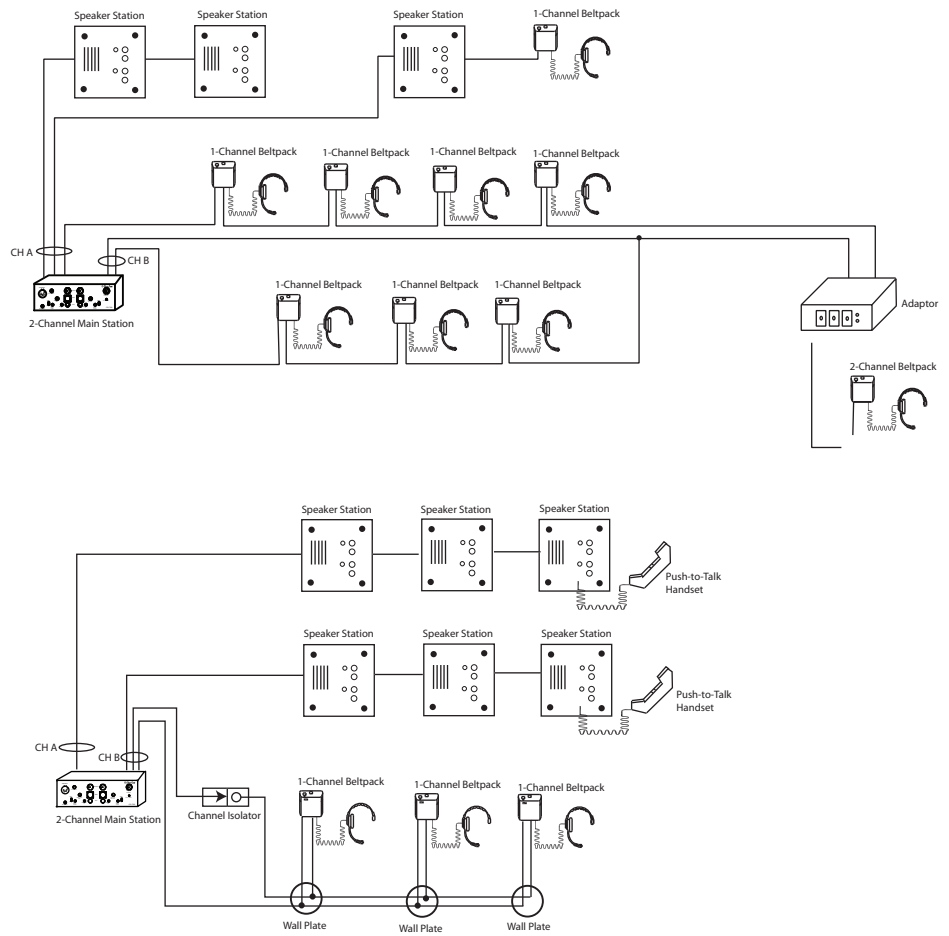


Figure 2-8 Typical CS-702 Systems





# 3

# MAINTENANCE

## INTRODUCTION

This chapter provides maintenance information for the station.

**Caution:** *These servicing instructions are for use by qualified personnel only. To reduce the risk of electrical shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.*

## CS-702 BLOCK DIAGRAM

The following is a block diagram of the CS-702:

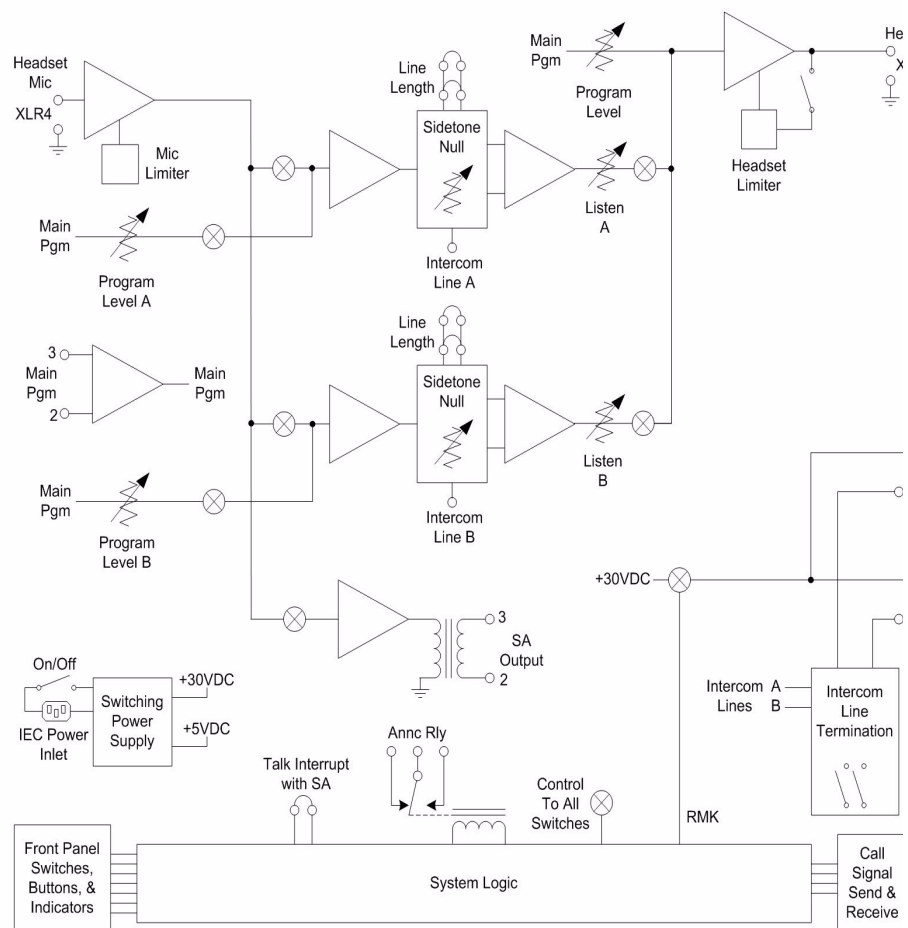


Figure 3-9 CS-702 Block Diagram

## TROUBLESHOOTING TIPS

SYMPTOM	CAUSE	SOLUTION
System does not operate. Talk lights do not illuminate blue. Red <i>short</i> LED is not illuminated.	Loss of AC power.	Plug unit into dependable AC source.
	Fuse could be blown.	Replace power supply.
The red <i>short</i> light stays illuminated.	Shorted or mis-wired intercom cable.	Remove cables (one at a time) from main station until faulty line is located. Check for shorts between pins #1 and #2. When removing a possible short, wait for several seconds to see if the automatic reset will clear itself.
	Defective remote station.	Check remote unit.
Excessive background noise picked up by microphone.	Distance from mic to mouth is too far.	Move closer to mic.
	Too many mics on in entire system.	Turn off all unused mics. RMK can be used to kill all Series 500 belt-pack open mics.
	Volume too high.	Lower headset volume.
Hum or buzz in system.	Inductive pickup caused by close proximity of main or remote station to power lines or transformers.	Relocate the offending unit or wiring.
	10 Ohm chassis ground resistor is open.	<p>Check the DC resistance for 10 Ohms between the chassis and pin #1 of any intercom connector.</p> <p><b>If this condition occurs, it is because the system ground came into contact with something that was “HOT” with respect to the power supply earth ground. Carefully check the system ground and AC distribution in the area.</b></p> <p><i>This is a potentially dangerous situation. A shock hazard may exist between a remote station headset and ground.</i></p>
	Inductive pickup by headset mic; check by switching mic <i>on</i> and <i>off</i> .	Move mic away from “hum field.”

SYMPTOM	CAUSE	SOLUTION
System feedback (acoustical)	Volume too high at one station.	Adjust.
	Two or more speaker stations have mics on simultaneously.	Move speaker stations farther away from each other. Turn down volume on one or more speaker stations.
	Headset mis-wired.	Rewire headset connector.
	Headset laying on table and microphone on.	Turn mic off.
	Headset quality.	Some headsets have poor isolation between the microphone and earphone. Adjust sidetone.
System feedback (electrical)	Channel not terminated.	Set the <i>main station</i> or <i>power supply termination</i> switch for that channel to the <i>on</i> position.
	Headset mic level high.	Check sidetone levels.
	A headset extension cord was used.	Headset extension cords must be used with great care and are not recommended.
Audio sounds low and distorted; <i>call</i> light stays on.	An ultrasonic oscillation is present; headset is mis-wired.	Rewire headset connector.
	A headset extension cord was used.	Headset extension cords must be used with great care and are not recommended.

Table 3-1: Troubleshooting Tips



# 4

# TECHNICAL SPECIFICATIONS

## CS-702 TWO-CHANNEL STATION

dBu is an absolute measurement. 0 dBu is referenced to 0.775 volts RMS

### Headset Microphone Input

Input Type	Dynamic
Input Impedance	$\geq 1\text{K}\Omega$
Mic Limiter Threshold	$0\text{dBu} \pm 3\text{dB}$
Mic Limiter Range	$\geq 15\text{dB}$

### Program Line Input

Maximum Level before Clipping	$\geq 20\text{dBu}$
Input Impedance	$\geq 5\text{K}\Omega$

### Program Mic Input

Maximum Level before Clipping	$\geq -35\text{dB}$
Input Impedance	$\geq 1\text{K}\Omega$

### Headset Output

Load Impedance	$\geq 8\Omega$
Output Impedance	$\leq 25\Omega$
Output Limiter Threshold	$+5\text{dBu} \pm 3\text{dB}$
Maximum Output Level before Distortion	$\geq 17\text{dBu}$

### Party Line Output

Off Noise	$< -74\text{dBu}$
Output Impedance	$> 10\text{K}\Omega$

### Party Line Input

Crosstalk	$< -60\text{dB}$
Max level before Clipping	$\geq 12\text{dBu}$
Sidetone Null Capability	$> 25\text{dB}$

### Stage Announce/Balanced Line Out

Type	Balanced
Output Impedance	$\geq 200\Omega$
Load Impedance	$\geq 600\Omega$

### Frequency Response

Headset Mic - Party Line	$200 - 18\text{KHz} \pm 3\text{dB}$
Headset Mic - Line Out	$200 - 18\text{KHz} \pm 3\text{dB}$

Program Input - Party Line	200 - 20KHz $\pm$ 3dB
Program Input - Headset Out	200 - 18KHz $\pm$ 3dB
Party Line - Headset Out	200 - 18KHz $\pm$ 3dB

### Max Distortion

Headset Mic - Party Line	$\leq$ 0.5%
Headset Mic - Line Out	$\leq$ 0.5%
Program Input - Party Line	$\leq$ 0.2%
Program Input - Headset Out	$\leq$ 0.2%
Party Line - Headset Out	$\leq$ 0.2%

### Noise

Headset Mic - Party Line	$<$ -70dBu
Program Input - Party Line	$<$ -85dBu
Program Mic - Party Line	$<$ -70dBu
Program Input - Headset Out	$<$ -60dBu
Program Mic - Headset Out	$<$ -40dBu
Party Line - Headset Out	$<$ -50dBu

### Max Gain

Headset Mic - Party Line	41dB $\pm$ 2dB
Headset Mic - Announce Out	55dB $\pm$ 3dB
Program Input - Party Line	$\geq$ -16dB
Program Mic - Party Line	41dB $\pm$ 2dB
Program Input - Headset Out	$\geq$ 18dB
Program Mic - Headset Out	$\geq$ 70dB
Party Line - Headset Out	$\geq$ 34dB

### Mains Power

Input Voltage Range	100 - 240 VAC
Input Frequency Range	50 - 60 Hz
Input Power	$\leq$ 60 VAC
Output Voltage	30 VDC $\pm$ 0.5V
Output Current per Channel (Continuous)	1.2 A
Output Current per Channel (Peak)	2 A (Do not exceed the 1.2A rating for more than 2 seconds per 1 minute period)
Short Circuit Recovery Time (1st short)	$\leq$ 0.5 sec
Short Circuit Recovery Time $\geq$ 20 shorts in 20sec)	$\leq$ 20 sec

### Rear Panel Connectors

Intercom:	(6) XLR-3M (3 per channel)
Announce Out:	(1) XLR-3M (audio)
Announce Relay:	(1) 1/4 in. (0.64 cm) phone jack (relay)
Program:	(1) XLR-3F
AC Power:	IEC 320 connector

## Rear Panel Controls

- (2) Termination On-Off switches
- (1) Power switch
- (1) Program input Mic/Line switch

## Front Panel Connectors

Panel Mic:

- (1) 3.5mm earphone jack

Headset:

- (1) XLR-4M

## Front Panel Controls & Indicators

- (1) Announce button
- (1) Party line link button
- (2) Program ON-OFF-INTERRUPT switches
- (2) Program level controls
- (2) Sidetone controls
- (2) Talk buttons
- (2) Call buttons
- (1) RMK button
- (1) Program volume control
- (2) Listen controls
- (2) Short LEDs

## Environmental

32 - 122° F (0 - 50° C)

## Dimensions

8.5 in. W x 3.0 in. H x 10.0in. D  
(216 mm x 76 mm x 254 mm)

## Weight

5.02 lbs. (2.28kg)

## Notice About Specifications

While Clear-Com makes every attempt to maintain the accuracy of the information contained in its product manuals, that information is subject to change without notice. Performance specifications included in this manual are design-center specifications and are included for customer guidance and to facilitate system installation. Actual operating performance may vary.





# LIMITED WARRANTY

Clear-Com warrants that at the time of purchase, the equipment supplied complies with any specification in the order confirmation when used under normal conditions, and is free from defects in workmanship and materials during the warranty period.

During the warranty period Clear-Com, or any service company authorized by Clear-Com, will in a commercially reasonable time remedy defects in materials, design, and workmanship free of charge by repairing, or should Clear-Com in its discretion deem it necessary, replacing the product in accordance with this limited warranty. In no event will Clear-Com be responsible for incidental, consequential, or special loss or damage, however caused.

*Return Material  
Authorization (RMA)  
numbers are required for  
all returns.*

*Both warranty and  
non-warranty repairs are  
available.*

## WARRANTY PERIOD

The product may consist of several parts, each covered by a different warranty period. The warranty periods are:

- Cables, accessories, components, and consumable items have a limited warranty of 90 days.
- Headsets, handsets, microphones, and spare parts have a limited warranty of one year.
- UHF wireless IFB products have a limited warranty of one year.
- UHF wireless intercom systems have a limited warranty of three years.
- All other Clear-Com and Drake brand systems and products, including belt packs, have a limited warranty of two years.

The warranty starts at the time of the product's original purchase. The warranty start date for contracts which include installation and commissioning will commence from the earlier of date of the Site Acceptance Test or three months from purchase.

## TECHNICAL SUPPORT

To ensure complete and timely support to its customers, Clear-Com's User Support Center is staffed by qualified technical personnel. Telephone and email technical support is offered worldwide by the User Support Center.

The User Support Center is available to Clear-Com's customers during the full course of their warranty period.

Instructions for reaching Clear-Com's User Support Centers are given below.

**Americas and Asia-Pacific Headquarters California, United States** Tel: +1.510.337.6600 Email: CustomerServicesUS@clearcom.com

**Europe, Middle East, and Africa Headquarters Cambridge, United Kingdom**

Tel: +44 1223 815000 Email: SalesSupportEMEA@clearcom.com

**Canada Office Quebec , Canada** Tel: +1 (450) 653-9669

**China Office Beijing Representative Office Beijing, P.R.China**

Tel: +8610 65811360 / 65815577

Once the standard warranty period has expired, the User Support Center will continue to provide telephone support if you have purchased an Extended Warranty.

For latest contact information please refer to the Service and Support section at [www.clearcom.com](http://www.clearcom.com).

## **WARRANTY REPAIRS AND RETURNS**

Before returning equipment for repair, contact a User Support Center to obtain a Return Material Authorization (RMA). Clear-Com representatives will give you instructions and addresses for returning your equipment. You must ship the equipment at your expense, and the support center will return the equipment at Clear-Com's expense.

For out-of-box failures, use the following contact information:

**Americas and Asia-Pacific Headquarters California, United States** Tel: +1.510.337.6600 Email: CustomerServicesUS@clearcom.com

**Europe, Middle East, and Africa Headquarters Cambridge, United Kingdom** Tel: +44 1223 815000 Email: SalesSupportEMEA@clearcom.com

**Canada Office Quebec , Canada** Tel: +1 (450) 653-9669

**China Office Beijing Representative Office Beijing, P.R.China** Tel: +8610 65811360 / 65815577

Clear-Com has the right to inspect the equipment and/or installation or relevant packaging.

For latest contact information please refer to the Service and Support section at [www.clearcom.com](http://www.clearcom.com).

## NON-WARRANTY REPAIRS AND RETURNS

For items not under warranty, you must obtain an RMA by contacting the User Support Center. Clear-Com representatives will give you instructions and addresses for returning your equipment.

You must pay all charges to have the equipment shipped to the support center and returned to you, in addition to the costs of the repair.

## EXTENDED WARRANTY

You can purchase an extended warranty at the time of purchase or at any time during the first two years of ownership of the product. The purchase of an extended warranty extends to five years the warranty of any product offered with a standard two-year warranty. The total warranty period will not extend beyond five years.

**Note:** Clear-Com does not offer warranty extensions on UHF wireless intercom systems, or on any product with a 1-year or 90-day warranty.

## LIABILITY

THE FOREGOING WARRANTY IS CLEAR-COM'S SOLE AND EXCLUSIVE WARRANTY. THE IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ANY OTHER REQUIRED IMPLIED WARRANTY SHALL EXPIRE AT THE END OF THE WARRANTY PERIOD. THERE ARE NO OTHER WARRANTIES (INCLUDING WITHOUT LIMITATION WARRANTIES FOR CONSUMABLES AND OTHER SUPPLIES) OF ANY NATURE WHATSOEVER, WHETHER ARISING IN CONTRACT, TORT, NEGLIGENCE OF ANY DEGREE, STRICT LIABILITY OR OTHERWISE, WITH RESPECT TO THE PRODUCTS OR ANY PART THEREOF DELIVERED HEREUNDER, OR FOR ANY DAMAGES AND/OR LOSSES (INCLUDING LOSS OF USE, REVENUE, AND/OR PROFITS). SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES OR THE LIMITATION ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU. IN ANY EVENT, TO THE MAXIMUM EXTENT PERMITTED UNDER APPLICABLE LAW, CLEAR-COM'S LIABILITY TO CUSTOMER HEREUNDER SHALL NOT UNDER ANY CIRCUMSTANCES EXCEED THE COST OF REPAIRING OR REPLACING ANY PART(S) FOUND TO BE DEFECTIVE WITHIN THE WARRANTY PERIOD AS AFORESAID.

This warranty does not cover any damage to a product resulting from cause other than part defect and malfunction. The Clear-Com warranty does not cover any defect, malfunction, or failure caused beyond the control of

Clear-Com, including unreasonable or negligent operation, abuse, accident, failure to follow instructions in the manual, defective or improperly associated equipment, attempts at modification and repair not approved by Clear-Com, and shipping damage. Products with their serial numbers removed or defaced are not covered by this warranty.

This warranty does not include defects arising from installation (when not performed by Clear-Com), lightning, power outages and fluctuations, air conditioning failure, improper integration with non-approved components, defects or failures of customer furnished components resulting in damage to Clear-Com provided product.

This limited warranty is not transferable and cannot be enforced by anyone other than the original consumer purchaser.

This warranty gives you specific legal rights and you may have other rights which vary from country to country.