



User Guide

RM-702 and RM-802-IM Two Channel Remote Station User Guide

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RM-702/RM-802-IM User Guide

399G260 Rev A

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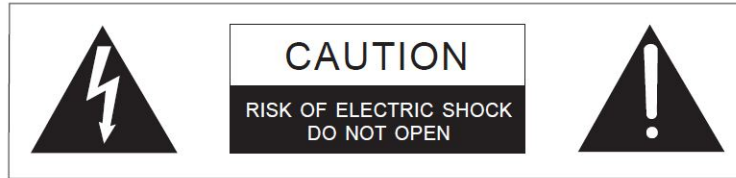
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Important Safety Instructions

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. Only use attachments/accessories specified by the manufacturer.
10. 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.
11. Unplug this apparatus during lightning storms or when unused for long periods of time.
12. 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.
13. **WARNING:** To reduce the risk of fire or electric shock, do not expose this product to rain or moisture.



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.

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 station is used improperly. They also refer you to important operating and maintenance instructions in the manual.

1 Compliance

Clear-Com, LLC, an HME Electronics, Inc, company is committed to compliance with the laws and regulations of each country where Clear-Com markets the product below.

Applicant Name : Clear-Com, LLC

Applicant Address : 1301 Marina Village Parkway, Suite 105, Alameda, California 94501, United States

Manufacturer Name : HM Electronics, Inc.

Manufacturer Address : 2848 Whiptail Loop, Carlsbad CA 92010 USA

Country of Origin : USA

Brand : Clear-Com

Product Name : Remote Station

Product Regulatory Model Number : RM-702 and RM-802-IM

This document was prepared in the English language. In case this document is translated into another language and a discrepancy arises between languages, the English version shall prevail as being the version which best expresses the intent of the parties. Any notice or communication given in conjunction with this document must include an English version.

Caution: All products are compliant with regulatory requirements detailed in this document when the user follows all the installation instructions and operating conditions per Clear-Com specifications.

Caution: Product modifications not expressly approved by the party responsible for compliance can void the user's authority to operate the equipment.

Caution: Use of accessories and peripherals other than those recommended by Clear-Com may void the product's compliance as well as the user's authority to operate the equipment.

European Union (CE mark)

The CE marking indicates compliance with the following directives and standards.

Directives:

- Electromagnetic Compatibility Directive 2014/30/EU
- Low Voltage Directive 2014/35/EU
- RoHS Directive 2011/65/EU

Standards:

- EN 55032, EN 55024, EN 60950-1, EN 50581

Maritime Certification

The regulatory model MS802 bears the DNV-GL mark, indicating conformity with DNVGL-CG-0339 Edition November 2016.

Location Classes:

The influence of the ambient environment on equipment depends upon the field of application on board. Environmental testing therefore implies tests being directly related to intended location on board as well as general tests, which are not directly related to location. There are five location classes: Temperature, humidity, vibration, enclosure and EMC. The allowed location of installation on board depends on the maritime approved location class.

Model RM-802-IM was DNV-GL type approved for Temperature Location Class A, Humidity Location Class A, Vibration Location Class A, EMC Location Class A & B and Enclosure Location Class A.

Model RM-802-IM is allowed to be installed in the control room and bridge. For more details please follow the Table 1 Location Class below.

Model RM-802-IM is not allowed to be installed in machinery spaces, pump room, holds, rooms with no heating and open deck.

Encore Models with DNV Certification, for use in Industrial and Marine Applications



RM-802-IM	
Temperature	0°C to +50°C
Humidity	Relative humidity up to 96 %
Vibration	Frequency range: 2 –13.2 Hz, Amplitude: 1.0 mm (peak value) Frequency range: 13.2–100 Hz, Acceleration amplitude: 0.7 g
EMC	DNVGL-CG-0339 - Class A & B
Enclosure	IP20

Waste Electrical and Electronic Equipment (WEEE)

The European Union (EU) WEEE Directive (2012/19/EU) places an obligation on producers (manufacturers, distributors and/or retailers) to take-back electronic products at the end of their useful life. The WEEE Directive covers most Clear-Com products being sold into the EU as of August 13, 2005. Manufacturers, distributors and retailers are obliged to finance the costs of recovery from municipal collection points, reuse, and recycling of specified percentages per the WEEE requirements.

Instructions for Disposal of WEEE by Users in the European Union

The symbol shown below is on the product or on its packaging which indicates that this product was put on the market after August 13, 2005 and must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of the user's waste equipment by handing it over to a designated collection point for the recycling of WEEE. The separate collection and recycling of waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local authority, your household waste disposal service or the seller from whom you purchased the product.



2 Operation

2.1 Introduction

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

2.2 The Clear-Com Concept

Clear-Com is a closed-circuit intercom system that consistently provides high-clarity communication in 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 beltpacks 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. 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 have auxiliary program inputs with local volume control, allowing an external audio source to be fed to the intercom system.

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

Depending on the type of main and remote stations selected (and assuming that enough DC power is available) remote stations can be distributed along a mile 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.

2.3 Description

The RM-702/RM-802-IM is one of a series of professional intercom stations specifically designed for the broadcast industry. This two-channel, one-rack-space station is ideal for ENG and EFP trucks, production studio consoles, and small TV facilities. The station can be tailored to your needs through its programmable talk button options. The RM-702/RM-802-IM is compatible with all Clear-Com party-line intercoms.

The station also incorporates an internal single-channel program interrupt system (IFB). When activated, one or more stations can interrupt the program to a talent with Clear-Com's wired or wireless talent receivers. Direct connection to Clear-Com's IFB system is easily accomplished through a 1/4 in. (0.62 cm) phone jack on the rear panel intended to directly connect to a Clear-Com MA-704.

The RM-702/RM-802-IM remote speaker/headset station allows selectable two-channel talking and/or listening on a Clear-Com intercom system. The operator can communicate on either of the channels separately or on both at once. Illuminated dual-action talk buttons provide electronic momentary or latching capability. The latching feature may be disabled if desired. The talk buttons can also be remote controlled for footswitch or other use. Monitoring activity is possible through the speaker or headset or both at once.

The RM-702/RM-802-IM features visual call signaling to attract the attention of operators who have removed their headsets or turned off their speakers.

This station accepts dynamic headsets. The station accepts two different lengths of plug-in gooseneck microphones, 9 in. (22.86 cm) and 18 in. (45.72 cm), to allow for different operating locations/positions.

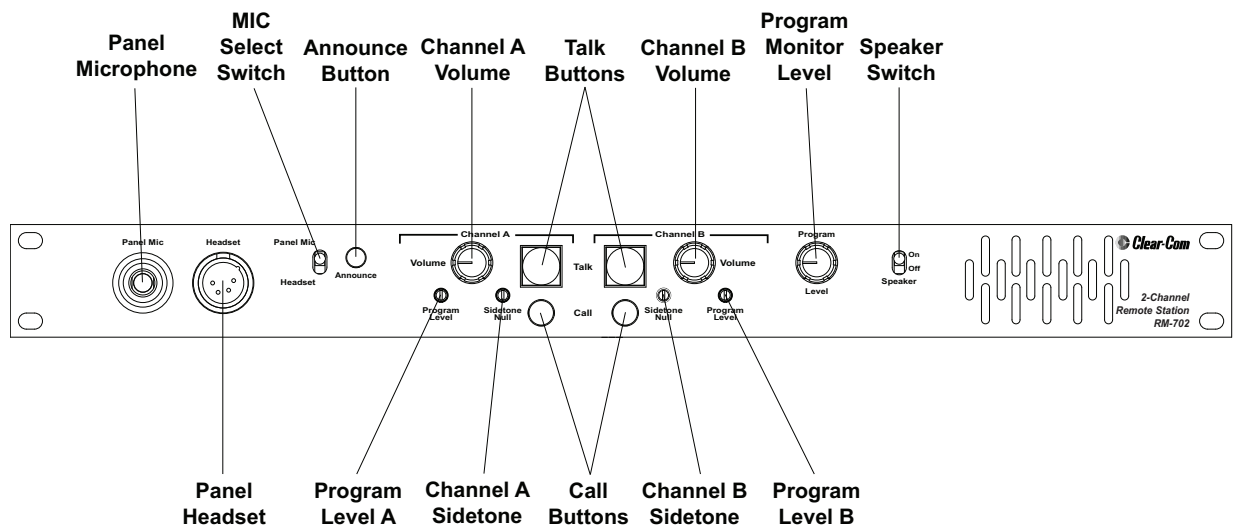
The station's speaker can be turned on or off by a convenient front panel switch when private conversation via the headset is desired. A speaker dipping circuit provides an additional amount of acoustic output before feedback. This feature helps to reduce feedback when stations are placed in close proximity to each other. The station accepts a balanced program input for monitoring external audio in the headset or speaker. Individual sidetone controls for each channel allow the operator to vary the level of his/her own voice as heard in the headset/speaker.

Studio announce allows control of a paging speaker in a studio. A front panel button activates this function and an associated relay.

The RM-702/RM-802-IM installs in a standard 19 in. (48.26 cm) equipment rack, using only one rack space. The station provides two 3-pin, XLR connectors for input and loop-through on each channel.

2.4 Operation

Normal operation of the RM-702/RM-802-IM requires access only to the front panel controls. For intercom operation, set the listen level controls for each channel to the desired level and press the talk switches when talking. If a headset is being used, set the sidetone control for the receiving channel for the desired amount of sidetone in the earphone. If the panel mic and speaker are being used, set the sidetone control for minimum feed-through to the speaker to prevent feedback.



The rest of this section is a detailed description of each control.

2.4.1 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. The latching function can be defeated with a rear-panel DIP switch.

- **LATCHING:** Pressing the button quickly will toggle the talk function, alternately turning it on or off.
- **MOMENTARY:** Pressing the button for longer than 1/4 second will turn the button press into a momentary function such that when the button is released

the talk function will turn off. In any case the talk function is activated all of the time the button is pressed.

- **TALK INDICATION:** The talk button illuminates yellow when a talk is activated and blue when talk is not active.
- **CALL INDICATION:** The call button will flash red when a call signal is received on that channel.
- **AUTO-CALL ON TALK:** Each channel can be set to send a call signal when the talk function is active. This function is used to activate IFB circuits or any other call-activated function available on other stations. A DIP switch on the rear panel activates this function.
- **SPEAKER DIP FUNCTION:** Pressing either talk button will reduce the output level of the speaker by a set amount to avoid feedback.

2.4.2 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 will flash red while the call button is pressed indicating the presence of a call signal on the line.

2.4.3 Volume Controls

Each channel has a separate volume control for monitoring incoming audio. 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.

2.4.4 SideTone Controls

Each channel has a sidetone null control. This control sets 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 the speaker and panel microphone are used together, providing a possible acoustic feedback path, it will be necessary to use an almost complete null of the sidetone control.

2.4.5 Program Send Level Control for Channel A and B

Both channels A and B have a program send level control that sets the volume of program audio being sent to that channel when the program is activated.

2.4.6 Speaker On/Off Switch

The switch marked speaker on/off is used to turn the speaker on and off.

2.4.7 Mic Select Switch

The mic select switch enables the operator to select which microphone is active.

2.4.8 Program Monitor Level Control

The program volume control sets the amount of the program signal heard directly in the headphone or speaker. This control only affects what is heard in the headphone or speaker and does not affect program feed to the intercom lines.

2.4.9 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 for activating external switching, as needed when the announce button is pressed.

The button illuminates amber when 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. (See the section on internal options and adjustments.)

3 Installation

This section discusses the installation of the RM-702/RM-802-IM in an intercom system including typical applications, overall installation theory, detail of each connector, and adjustments.

3.1 Installation Overview

This section describes the Clear-Com concept of intercom line connection. The following subjects are discussed:

- Intercom line connection
- Line termination
- Station powering
- Cable considerations

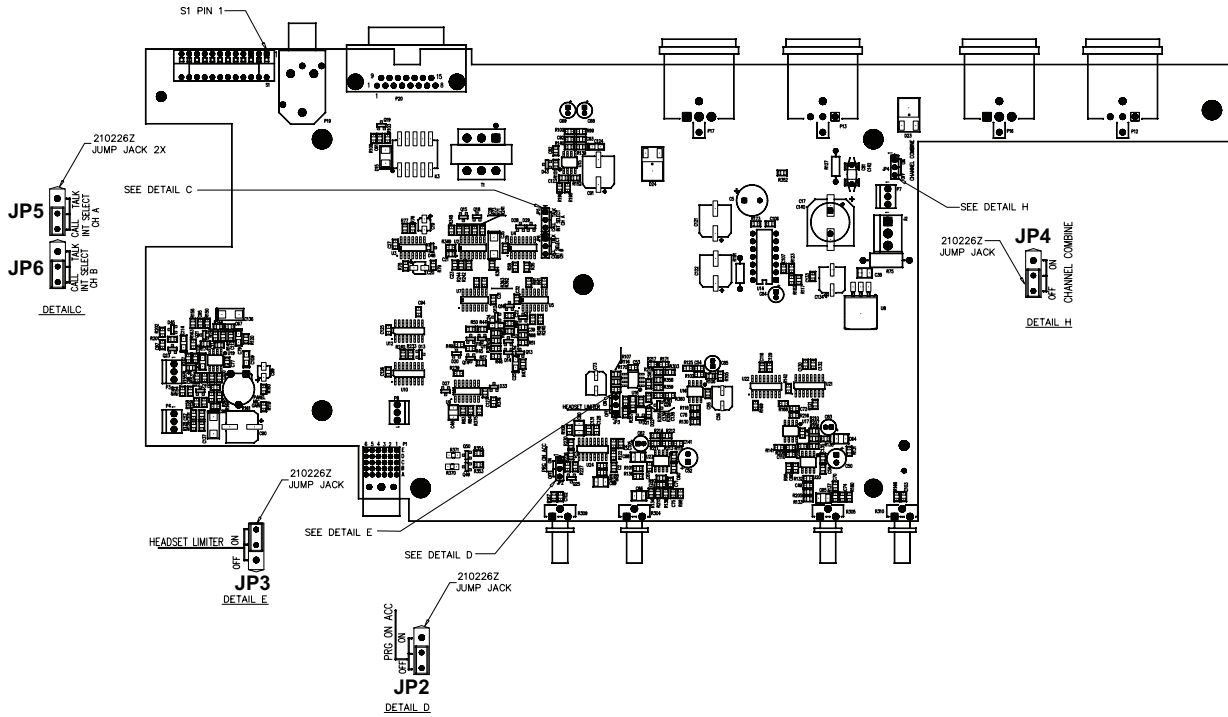
3.1.1 Intercom Line Connection

The RM-702/RM-802-IM provides male and female XLR-3 connectors for each intercom line, which are looped through.

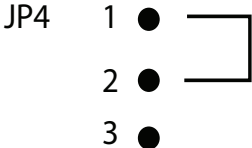
3.1.2 Connecting or Isolating RM-702/RM-802-IM Channels

An internal jumper in the RM-702/RM-802-IM unit allows you to defeat the power-channel isolation of the unit, as described in the following procedure.

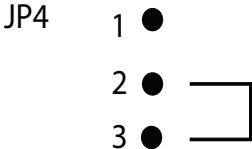
Note: *This adjustment should only be carried out by qualified service personnel.*



1. Please observe anti-static procedures. The circuit cards can be damaged by static electricity. Please ground yourself and tools before touching any circuit cards.
2. Remove the cover of the RM-702/RM-802-IM.
3. On the main circuit board, locate the JP4 three-pin jumper.
 The jumper is located on the rightmost upper portion of the circuit card, when viewed from the front of the unit. The label "J4" appears behind the jumper. A jumper plug is placed over pins 2 and 3.
4. Do one of the following:
 - a. To connect the two channels, place the jumper plug over pins 1 and 2.



- b. To isolate the two channels, place the jumper plug over pins 2 and 3.



The RM-702 unit is shipped with the jumper plug over pins 2 and 3 to maintain the power-channel isolation. Power-channel isolation ensures that if one channel loses power, the other channel will continue to operate.

5. Replace the cover of the RM-702/RM-802-IM.

3.1.3 Line Termination

The fundamental concept of Clear-Com party-line intercom is that all stations provide high-impedance current-sourced signals into a single common system termination.

The receive or listen section of stations contain 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.

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.

The RM-702/RM-802-IM does not provide termination on the intercom line. Clear-Com main stations and power supplies 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.

The termination of an intercom line (or channel) is a 220 Ohm resistor in series with a 4.7 K Ohm that is paralleled with a 10 uF capacitor.

3.1.4 Station Powering

Typical Clear-Com systems are powered by a main station or a power supply.

Clear-Com power supplies can be paralleled to increase the number of remote stations that can be operated in a system.

3.1.5 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:

- DC resistance of the ground or common conductor affects crosstalk. For runs longer than 500 ft. (152.5 m), do not use wire smaller than 20 gauge.
- The capacitance of the interconnect cable affects system frequency response and sidetone stability. Total capacitance should not be greater than 0.25 μ F.

Portable Installation Cable: Practical 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.

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 of less than 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.

3.2 Description of Front panel Connectors

3.3 Headset Connector (Front Panel)

Note: *The following is a description of a recommended headset.*

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

Wiring

Pin 1 --- Mic common

Pin 2 --- Mic hot

Pin 3 --- Headphone common

Pin 4 --- Headphone hot

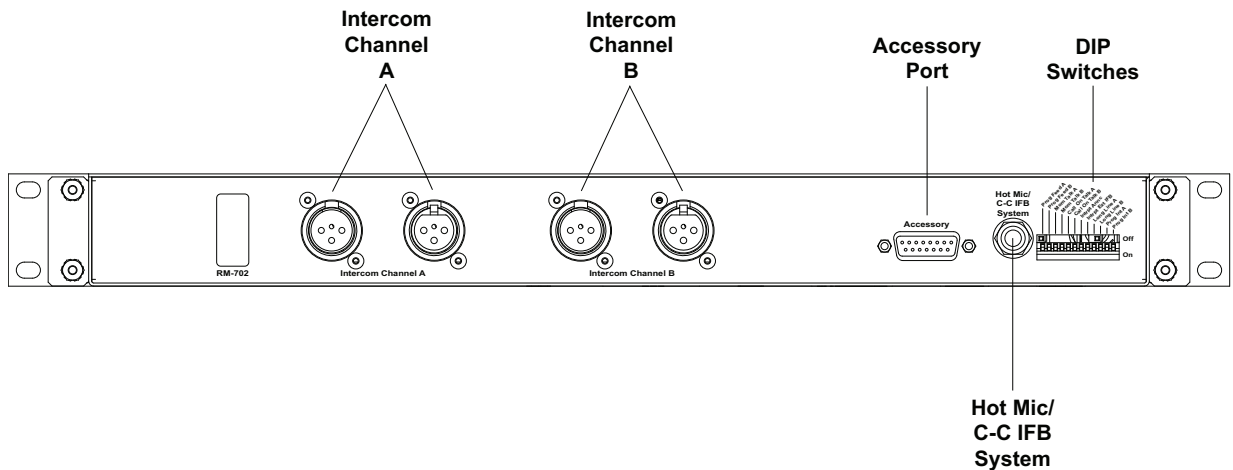
3.3.1 Panel Mic Connector (Front Panel)

Clear-Com provides two plug-in panel microphones for use on the RM-702/RM-802-IM. The GM-9 is 9 in. (22.86 cm) long and GM-18 is 18 in. (45.72 cm) long. The microphone is of the electret type. The microphone has a built-in 1/4 in. (0.64 cm) phone jack for a connector. A mating receptacle is mounted on the RM-702/RM-802-IM.

To install a GM-9 or GM-18 panel mount microphone, use the following steps:

1. Check the set screw in the mic-mounting flange to make sure it is clear of the threads in the bushing.
2. Screw the microphone into the bushing hand-tight.
3. Set the set screw on top of the bushing to lock the mic in place.

3.4 Description of Rear Panel Connectors



3.4.1 Intercom Line Connectors (Rear Panel, XLR-3 2 Male & 2 Female)

The RM-702/RM-802-IM has a male and female pair of XLR-3 connectors for each intercom line. The male-female pair of connectors are wired parallel and intended for loop-through connection.

The pinout of the intercom connectors is as follows:

Pin 1 --- Ground (shield)

Pin 2 --- Power

Pin 3 --- Audio

3.4.2 IFB/Hot Mic (Rear Panel, 1/4-Inch Phone Jack)

A 1/4 in. (0.64 cm) phone jack marked IFB/HOT mic provides an output signal from the selected microphone. This output is intended to work with Clear-Com's MA-704 IFB control panel. A control signal into this connector from the MA-704 causes all active talks from the station to cease and only sends the IFB output.

The pin description of the connector is as follows:

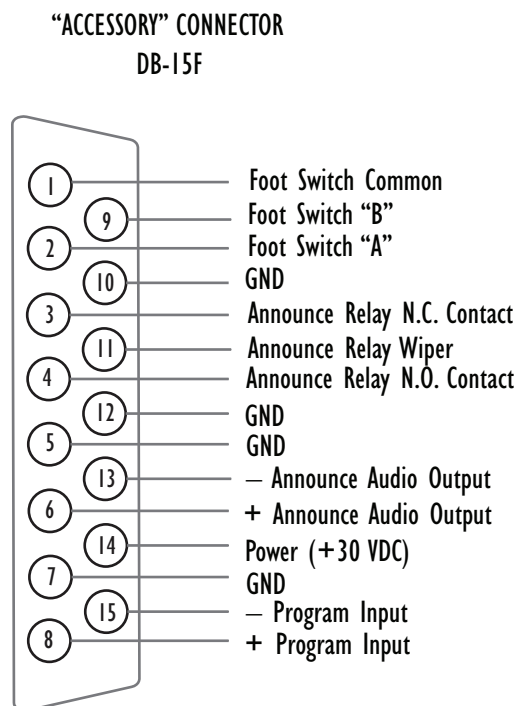
Tip --- Microphone audio output

Ring --- Control signal (>15 VDC)

Sleeve --- Ground (shield)

3.4.3 Accessory (Rear Panel, DB-15F)

The accessory DB-15F connector on the rear panel provides program input, announce audio output, announce relay contacts, and foot switch inputs for activating a talk on either channel. The pin assignment of the connector is as follows:



3.5 Description of Options and Adjustments

3.5.1 DIP Switch Option Switches (Rear Panel)

Twelve DIP switches on the rear panel enable various options in the station:

- **PROGAM ENABLE A:** Enables *program* audio on channel A when set to the *on* position.
- **PROGRAM ENABLE B:** Enables *program* audio channel B when set to the *on* position.
- **MOM TALK A:** Setting the momentary talk A switch to the on position will disable the latching function of the channel A talk button. In this mode, the

talk button must always be held in continuously while the operator is talking on channel A.

- **MOM TALK B:** Setting the momentary talk B switch to the on position will disable the latching function of the channel B talk button. In this mode, the talk button must always be held in continuously while the operator is talking on channel B.
- **CALL ON TALK A:** If the call on talk A switch is set to the on position, a call signal will be placed on channel A whenever the talk function is activated. This can be used to activate any call-activated functions available on other stations.
- **CALL ON TALK B:** If the call on talk B switch is set to the on position, a call signal will be placed on channel B whenever the talk function is activated. This can be used to activate any call-activated functions available on other stations.
- **INTRPT ANNC:** If the interrupt announce switch is set to the on position, pressing the announce button will disconnect the microphone from the intercom line(s). This will allow announcements to be made without being heard over the intercom channels.
- **INTRPT EXT IFB:** When the hot mic output is connected to Clear-Com's IFB system and the interrupt external IFB switch is set to the on position, pressing a key on the IFB system will disconnect the selected headset or panel microphone from the intercom line(s). This allows the RM-702/RM-802-IM microphone to be used to cue talent without affecting intercom line communication.
- **LONG LINE A:** If a long cable run on channel A is unavoidable and approaches 1,000 ft. (305 m) or more, set the long line A option switch to the on position. The ability to set a sidetone null on channel A depends upon properly setting this switch.
- **LONG LINE B:** If a long cable run on channel B is unavoidable and approaches 1,000 ft. (305 m) or more, set the long line B option switch to the on position. The ability to set a sidetone null on channel B depends upon properly setting this switch.
- **PROGRAM INTERRUPT A:** Interrupts the *program* audio to channel A while a *call* signal is sent on channel A (default).

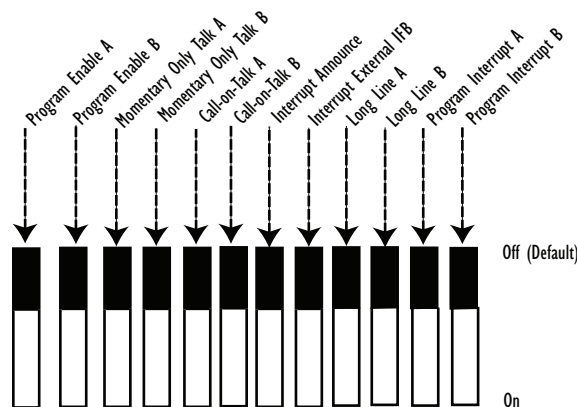
You can change this option so that a *talk* signal, rather than *call* signal, interrupts the *program* audio on channel A. You do this by re-setting an

internal jumper. See the next section, “Re-Setting Program Interrupt Options,” for instructions.

- PROGRAM INTERRUPT B: Interrupts the *program* audio to channel B while a *call* signal is sent on channel B (default).

You can change this option so that a *talk* signal, rather than a *call* signal, interrupts the *program* audio on channel B. You do this by re-setting an internal jumper. See the next section, “Re-Setting Program Interrupt Options,” for instructions.

The RM-702/RM-802-IM is shipped from the factory with all DIP switches in the off position. To enable a function, place that DIP switch in the on position.



3.5.2 Re-Setting Program Interrupt Options

When you set one of the rear-panel *program interrupt* DIP switches to *on* for a particular channel (A or B), any *call* signal activated on that channel interrupts the *program audio* during the call signal.

You can change this option so that activating a *talk* signal, rather than a *call* signal, interrupts the program audio for the duration of the signal. You do this by re-setting an internal jumper on the station’s internal circuit board.

To re-set the program interrupt option:

1. Please observe anti-static procedures. Static electricity can damage a circuit card. Please ground yourself and tools before touching the circuit card.
2. Remove the cover of the RM-702/RM-802-IM by removing the eight Phillips screws.

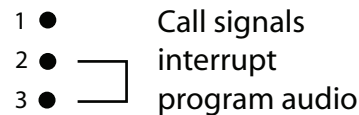
3. On the main circuit board, locate one of the following:
 - a. **For channel A:** The *JP5* three-pin jumper, located in the center of the circuit board.
 - b. **For channel B:** The *JP6* three-pin jumper, located in the center of the circuit board.
4. A jumper plug covers two of the three pins on each jumper. To change the program-interrupt option on your station, do one of the following:
 - a. **For channel A:** Move the jumper plug so that it covers pins 1 and 2. This causes *talk* signal activation to interrupt the program audio.
 - b. **For channel B:** Move the jumper plug so that it covers pins 1 and 2. This causes *talk* signal activation to interrupt the program audio.

In the default position, the jumper plug covers pins 2 and 3, which causes *call* signal activation, rather than *talk* signal activation, to interrupt the program audio.

JP5, for channel A



JP6, for channel B



FOR EITHER CHANNEL:

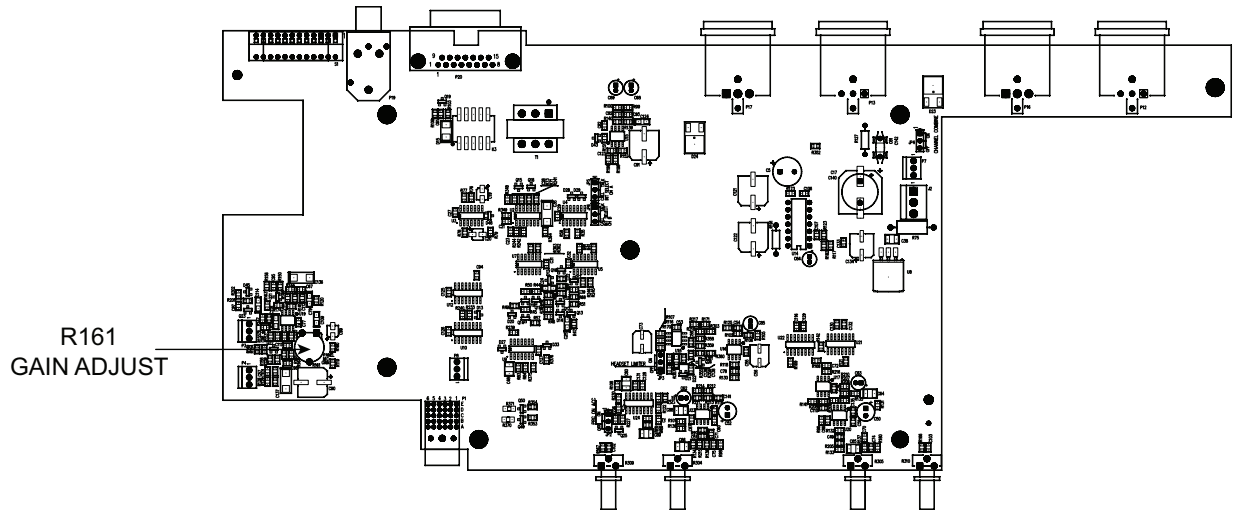
To interrupt program audio during talk signals, place jumper plug over pins 1 and 2.

To interrupt program audio during call signals, place jumper plug over pins 2 and 3.

3.5.3 Panel Mic Level Adjustment (Internal)

The microphone preamplifier for the panel microphone has an internal gain adjustment control. This gain can be adjusted for different operating conditions. As shipped from the factory, the control is set to minimum gain such that the panel microphone and a headset microphone have the same volume when worked at about 2 in. (5.08 cm).

To adjust the panel microphone gain, you must open the unit. Ground yourself and tools before touching the circuit board, as circuit boards can be damaged by static electricity. Remove the top cover of the unit, and locate the jumper labeled "R161." It is located on the leftmost side of the circuit board, toward the front of the unit when facing it. Use a small screwdriver to turn the control clockwise to increase gain or counterclockwise to decrease gain.



3.5.4 Intercom Line Length Compensation (Rear-Panel DIP Switches)

The receive circuits of the intercom channels have been optimized for an intercom line length of up to 1,000 ft. (304.8 m). The capacitance of the intercom line must be compensated for in the receive circuits if a good sidetone null is to be achieved. When using a speaker, a good sidetone null is necessary to achieve a usable listening level.

A set of two rear-panel DIP switches have been provided to compensate for lines longer than 1,000 ft (304.8 m). Each intercom channel has its own DIP switch.

To change the setting of the line length compensation DIP switches, move either the *long line A* or *long line B* DIP switch to the "on" position for intercom lines longer than 1,000 ft. (304.8).

3.5.5 Program Feed on Announce

You can set up the announce feature so that program audio is sent out on the announce line as well as the announce audio. You set this option up by using an internal jumper on the circuit board.

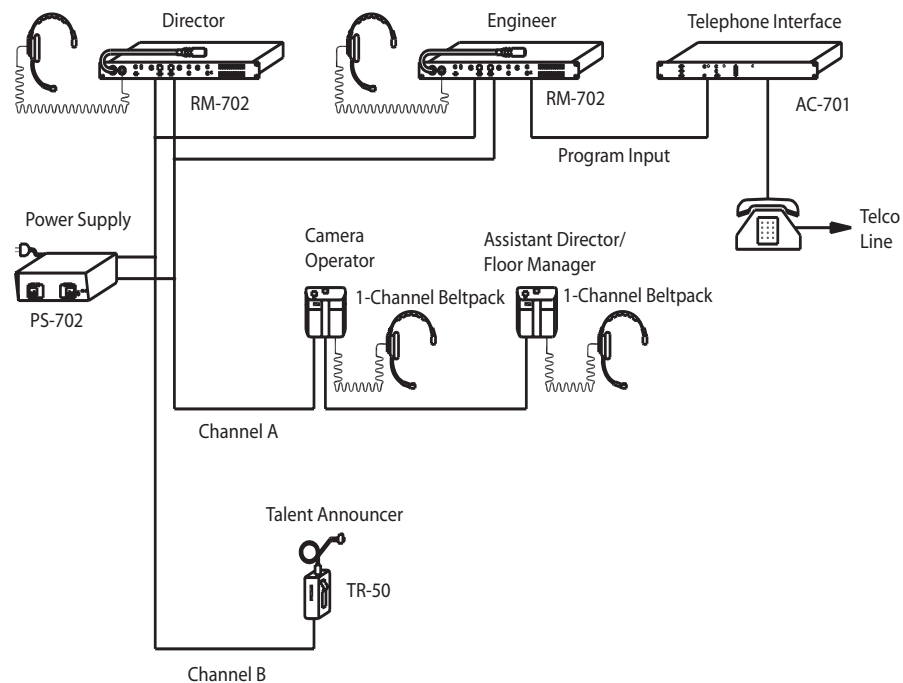
To send out program audio along with announcements:

1. Please observe anti-static procedures. Static electricity can damage a circuit card. Please ground yourself and tools before touching the circuit card.
2. Remove the cover of the RM-702/RM-802-IM unit by removing the eight Phillips screws.
3. Locate the *JP2* three-pin jumper on the centermost front portion of the circuit card.
A jumper plug covers pins 2 and 3 of the jumper. This is the *off* position.
4. Remove the jumper plug from the pins and place it over pins 1 and 2. This is the *on* position.
Program audio will now accompany the announce audio.

3.6 Typical System Applications

3.6.1 ENG/EFP Truck

The following block diagram describes a typical ENG/EFP truck installation.



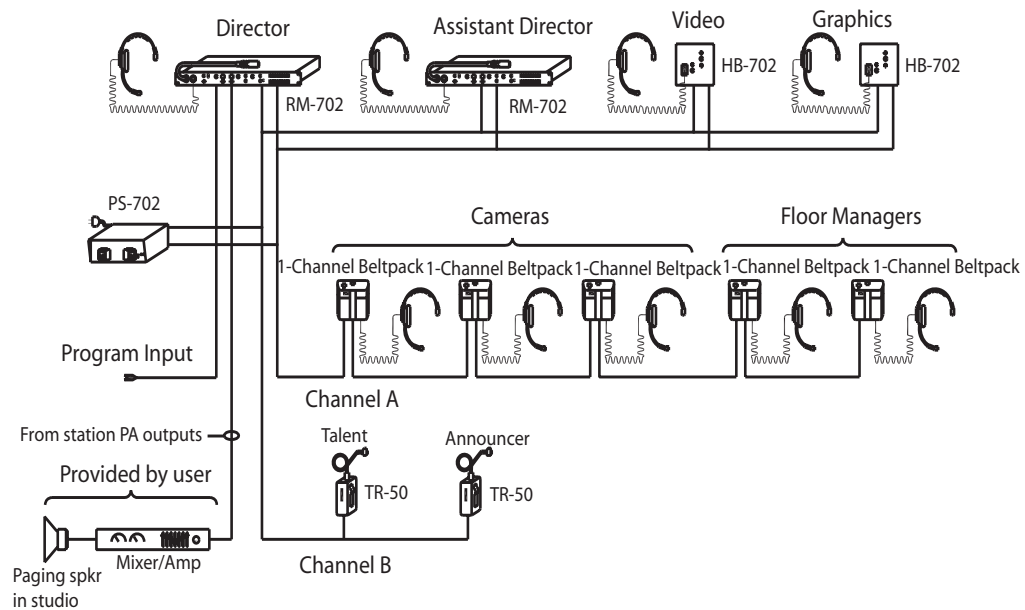
The system has two 2-channel RM-702/RM-802-IM rack-mount stations. The system is powered from a Clear-Com power supply that also provides the terminations for both channels.

Channel B is connected to talent receivers for announcers.

A telephone line interface is connected to the program input of station #2. It provides a program feed from the studio via a dial-up telephone line. Its DIP switch options are set to insert program audio on channel B and interrupt the program when a call signal is present on channel B. The option DIP switches for placing a call signal on channel B is set on both RM-702s. Now, whenever either RM-702/RM-802-IMs initiate a talk to the announcers, it interrupts the program feed (to the announcers).

3.6.2 Cable/School Television Studio

The following block diagram describes a typical cable or school television studio installation.



The system has several 2-channel RM-702/RM-802-IM rack mount stations and several wall mount 2-channel stations. The system is powered from a Clear-Com power supply that also provides the terminations for both channels.

A line of single-channel beltpacks is connected to channel A. The beltpacks are used for the cameras and floor managers. Normal communication between all parties is on channel A.

Channel B is connected to talent receivers for announcers. The program that is to feed the announcers is connected to the first RM-702/RM-802-IM. Its DIP switch options are set to insert program on channel B and interrupt the program when a call signal is present on channel B. The option DIP switches for placing a call signal on channel B is set on both RM-702s. Now, either RM-702/RM-802-IMs will interrupt the program feed to the announcer when a talk is initiated from it to the announcers.

A PA amplifier is connected to the announce output of the first RM-702/RM-802-IM such that the operator of that station could talk directly to everyone in the studio.

3.7 Actual Applications

This section describes detailed instructions for various types of applications. A block diagram such as those in the previous section describing an ENG/EFP truck and a cable/school television studio should be developed for your application. The following sub-topics in this section describe in detail each of the major application types that might be encountered. The sub-topics in this section are:

- Intercom line wiring
- Program input
- Internal IFB operation
- External IFB (MA-704 and PIC-4704 connections)
- PA feed to studio output
- Remote control of talk switches
- Inadequate sidetone adjustment

3.7.1 Intercom line wiring

The intercom line wiring has several purposes in the Clear-Com system:

- Connection of the audio intercom signal between stations.
- Delivery of DC power for remote stations (such as the RM-702/RM-802-IM) to operate from.
- Termination of the intercom audio line external to remote stations.

Connect the intercom lines of stations and power supplies using a shielded twisted pair cable with XLR 3-pin connectors (the same as used for balanced microphones). Refer to the installation overview section of this manual for more information.

The RM-702/RM-802-IM has a male and female pair of XLR-3 connectors for each intercom line. The male-female pair of connectors are wired parallel and intended for loop-through connection.

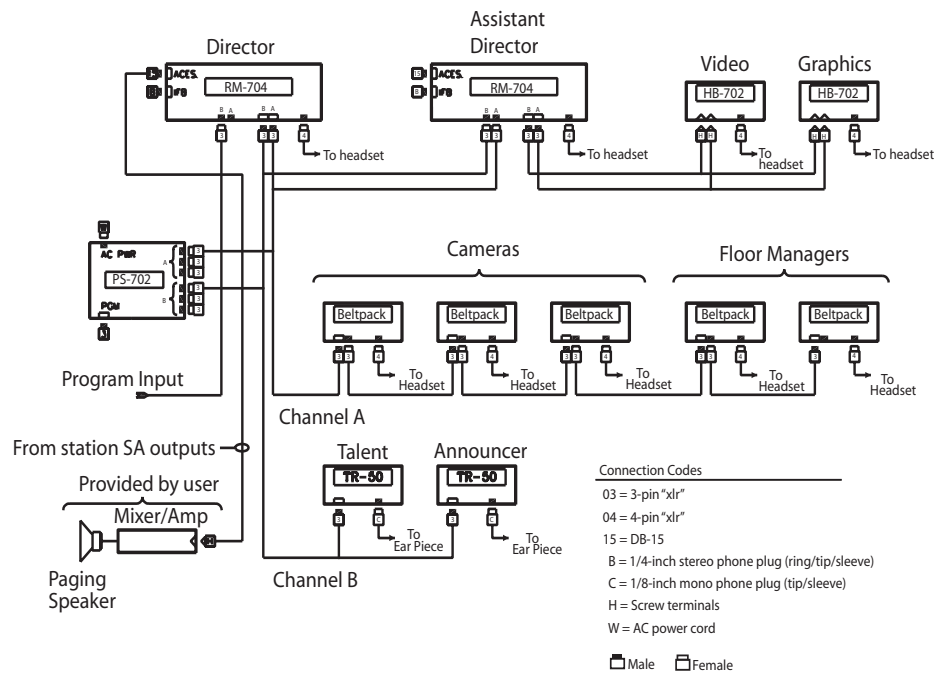
The pinout of the intercom connectors are as follows:

Pin 1 --- Ground (shield)

Pin 2 --- Power

Pin 3 --- Audio

The following application shows the practical connection of the intercom lines in the block diagram of the cable/school television studio.



The entire system is wired using male/female microphone cables looped-through each station except for the HB-702s. The HB-702 has screw terminals for the intercom lines. The PS-702 provides the DC power for the system and the line termination switches must be turned on.

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. The RM-702/RM-802-IM does not provide termination on the intercom line.

3.7.2 Program Input

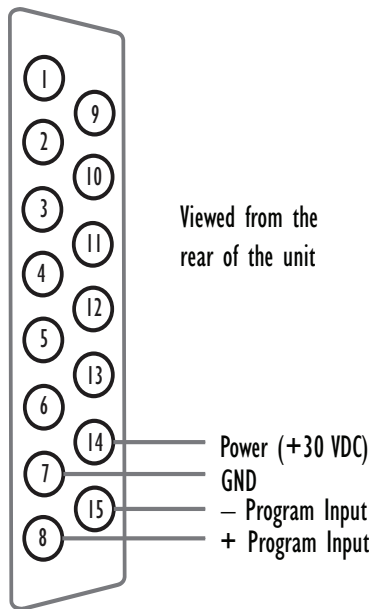
There are two different purposes for the program input: monitoring program in the speaker and headphone, or feeding the Channel A and B intercom lines with program material.

- **Monitoring Program:** To monitor program in the headphone or speaker:

1. Connect the program source to the proper pins on the DB-15.
2. Make sure the appropriate rear-panel *program enable* DIP switch is set to the *on* position. For channel A, set the *program enable A* DIP switch to *on*. For channel B, set the *program enable B* DIP switch to *on*.

3. Use the large knob labeled "Program Volume," located right next to the speaker on/off switch, to set the appropriate program volume level. This knob controls the program volume in the speaker/headphone.
4. Set either the A or B potentiometer marked *Program Level*, located under either the A or B channel's volume knob, to the lowest setting. This control affects the program volume going out onto the selected intercom line.
 - **Feeding Channel A or B Intercom Line:** To feed the A or B channel with program material:
 1. Connect the program source to the proper pins on the DB-15.
 2. Make sure the appropriate (A or B) rear-panel *program enable* DIP switch is set to the *on* position. For channel A, set the *program enable A* DIP switch to *on*. For channel B, set the *program enable B* DIP switch to *on*.
 3. Set the large knob, labeled "Program Volume," located right next to the speaker on/off switch, to the appropriate level. This knob controls the program volume in the speaker/headphone.
 4. Set either the A or B potentiometer marked *Program Level*, located under either the A or B channel's volume knob, to the desired level. This control affects the program audio level on the intercom line.
 5. If it is desired to interrupt this program feed, set the appropriate (A or B) rear-panel *Program Interrupt* DIP switch to *on* and ensure that the *Program Enable* DIP switch for the channel is set to *off*. When you do so, any time you activate a *call* signal, the program audio is interrupted for the duration of the call signal. There is an option to change this so that any time you activate a *talk* signal, the program audio is interrupted for the duration of the talk signal. See the earlier section in this chapter, "Re-setting Program Interrupt Options," for more information on setting this option.
- **To Connect To The Program Input:** The program input of the RM-702/RM-802-IM is available in the DB-15 accessory connector on the rear panel.

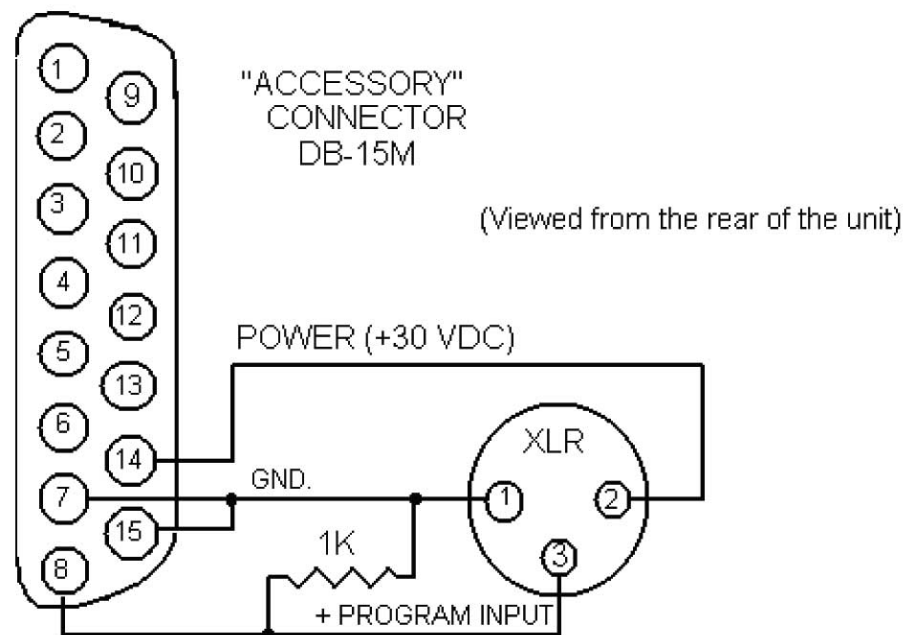
“ACCESSORY” CONNECTOR
DB-15F



1. Connect a balanced input to pins #8 and #15 with the shield connected to pin #7.
2. To connect an unbalanced input, connect the signal to pin #8 and connect the shield to pins #15 and #7.

- **Connecting Party-Line Products As Program Sources:** If other Clear-Com products (such as an AC-701 telephone interface) are to be used as a program source directly, use the following interconnection cable.

Pin #14 of the DB-15 accessory connector provides +30 VDC to power the external device. Connecting pins #7 and #15 together unbalances the program input. The output from the party line device is connected to pin #8 with a 1KOhm load to provide a partial termination.



3.7.3 Internal IFB Operation

To use either channel A or B as an IFB feed, connect the program source to the program input (as described in the previous section) and set the *Program Interrupt A* (or B) DIP switch to the *on* position. The program will now be interrupted whenever there is a call signal present on channel B. If there are multiple RM-702s in the system, the program should only be fed into one of the RM-702s.

To interrupt the IFB program automatically when a talk rather than a *call* signal is active on channels A or B, you must reset an internal jumper as described in "Re-Setting Program Interrupt Options" earlier in this chapter.

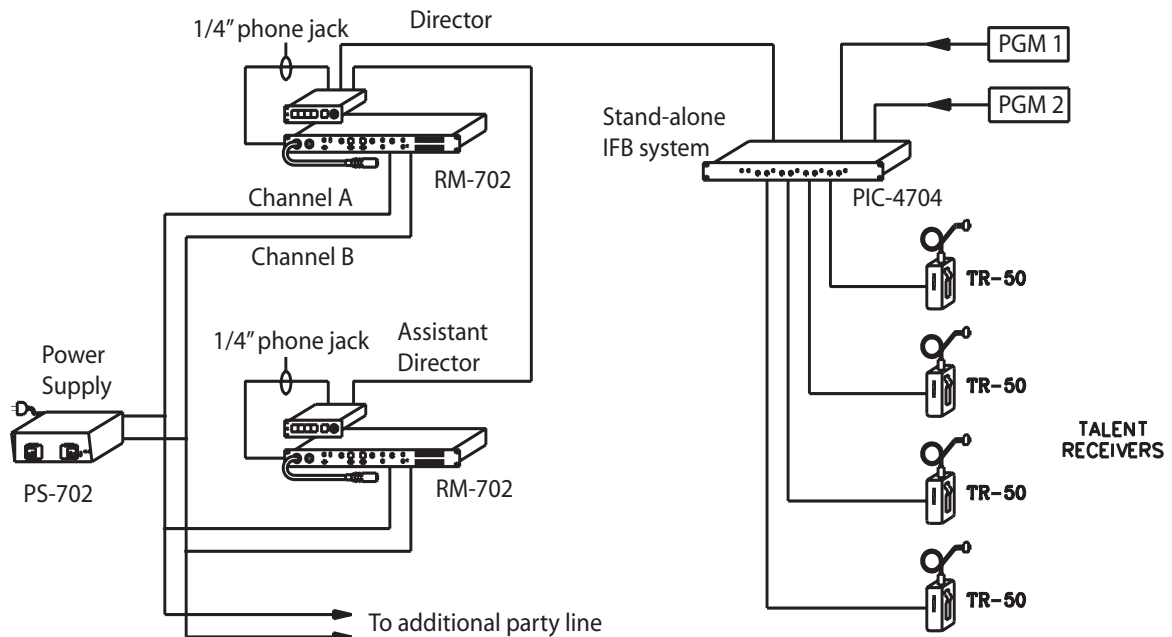
3.7.4 External IFB (MA-704 and PIC-4704 Connection)

Clear-Com provides a stand-alone IFB system called a PIC-4704. The PIC-4704 provides four interruptible IFB feeds from two program sources, and is located in a central location. The MA-704 is a four-channel control head intended to work with the PIC-4704. An MA-704 is located at each location where program interrupt is to be initiated. Each MA-704 has its own panel-mounted microphone which, when mounted next to an intercom station with a panel mounted microphone, causes panel congestion with two microphones at a single location.

The RM-702/RM-802-IM has a 1/4 in. (0.64 cm) phone jack output on its rear panel intended to connect directly to an MA-704 and provide a microphone feed to the MA-704. The MA-704 can be ordered without a panel-mounted microphone. When a button is pressed on the MA-704, a control signal will temporarily transfer the

microphone in use on the RM-702/RM-802-IM to the MA-704, muting any talks active on the RM-702/RM-802-IM.

To connect the RM-702/RM-802-IM to an MA-704, use a two-wire shielded cable with 1/4 in. (0.64 cm) tip, ring, and sleeve jacks on each end. Connect the tip to the tip, the ring to the ring, and use the shield to connect the sleeve to the sleeve.

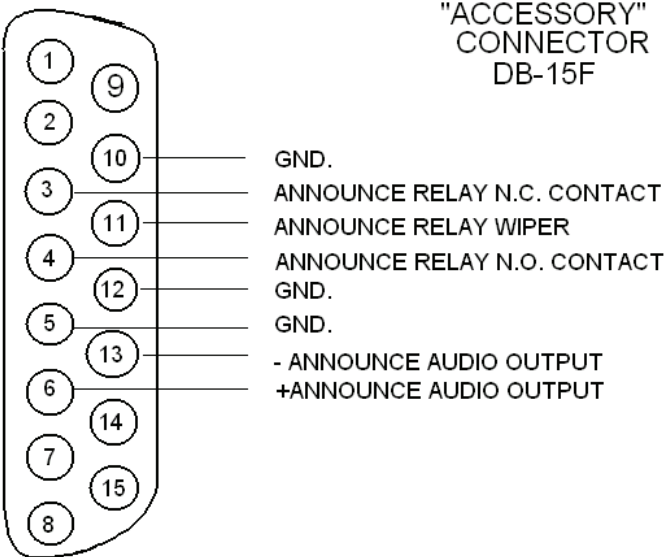


3.7.5 PA Feed to Studio Output

Pressing the button marked announce on the front of the RM-702/RM-802-IM temporarily disables activity of the station and places the output of the selected microphone on the announce audio output terminals of the accessory I/O DB-15 connector on the rear panel of the station. Isolated relay contacts are also available for controlling some external devices, such as a PA amplifier to another room.

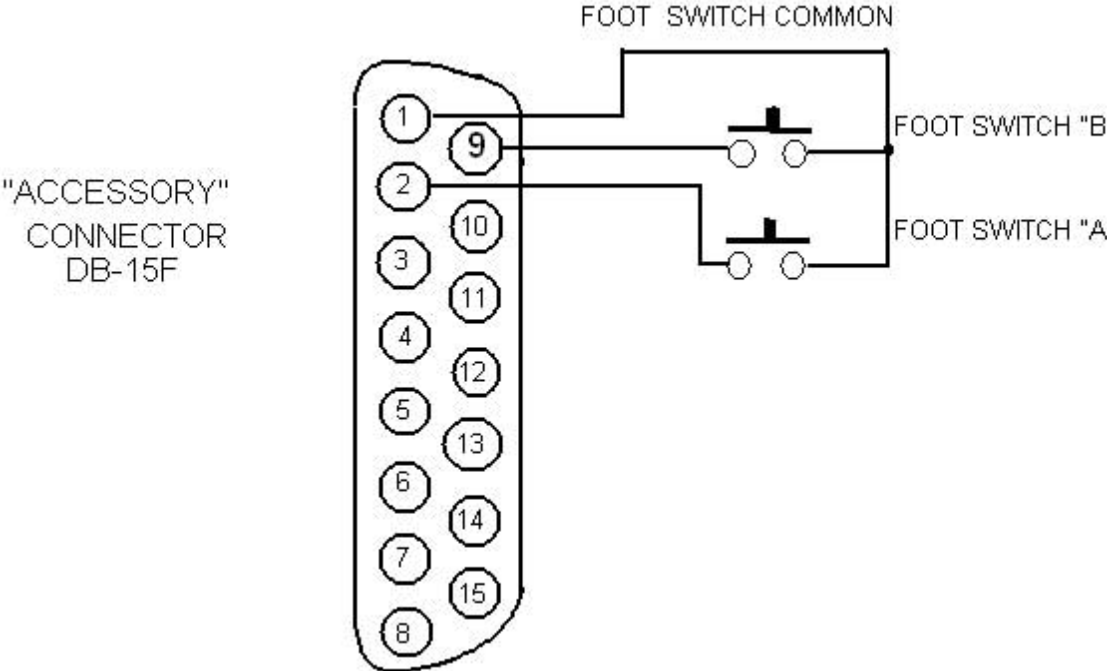
To connect to the announce output, connect a shielded twisted-pair cable to pins #6 and #13 of the accessory connector and use pin #5 for connection of the shield.

A relay is provided that activates when the announce button is pressed and its contacts are available on the accessory connector. The relay is rated for 2.0 Amps of DC current at 24 VDC.



3.7.6 Remote Control of Talk Switches

The talk switches of the RM-702/RM-802-IM can be remotely controlled with external contacts that are available on the accessory connector on the rear panel. A footswitch or remote pushbutton when wired to the accessory connector acts exactly the same as pushing a talk switch on the front panel. Both latching and momentary actions are active.



3.7.7 Inadequate Side-tone Adjustment

The receive circuits of the intercom channels have been optimized for an intercom line length of up to 1,000 ft (305 m). The capacitance of the intercom line must be compensated for in the receive circuits if a good sidetone null is to be achieved. When using a speaker, a good sidetone null is necessary to achieve a usable listening level.

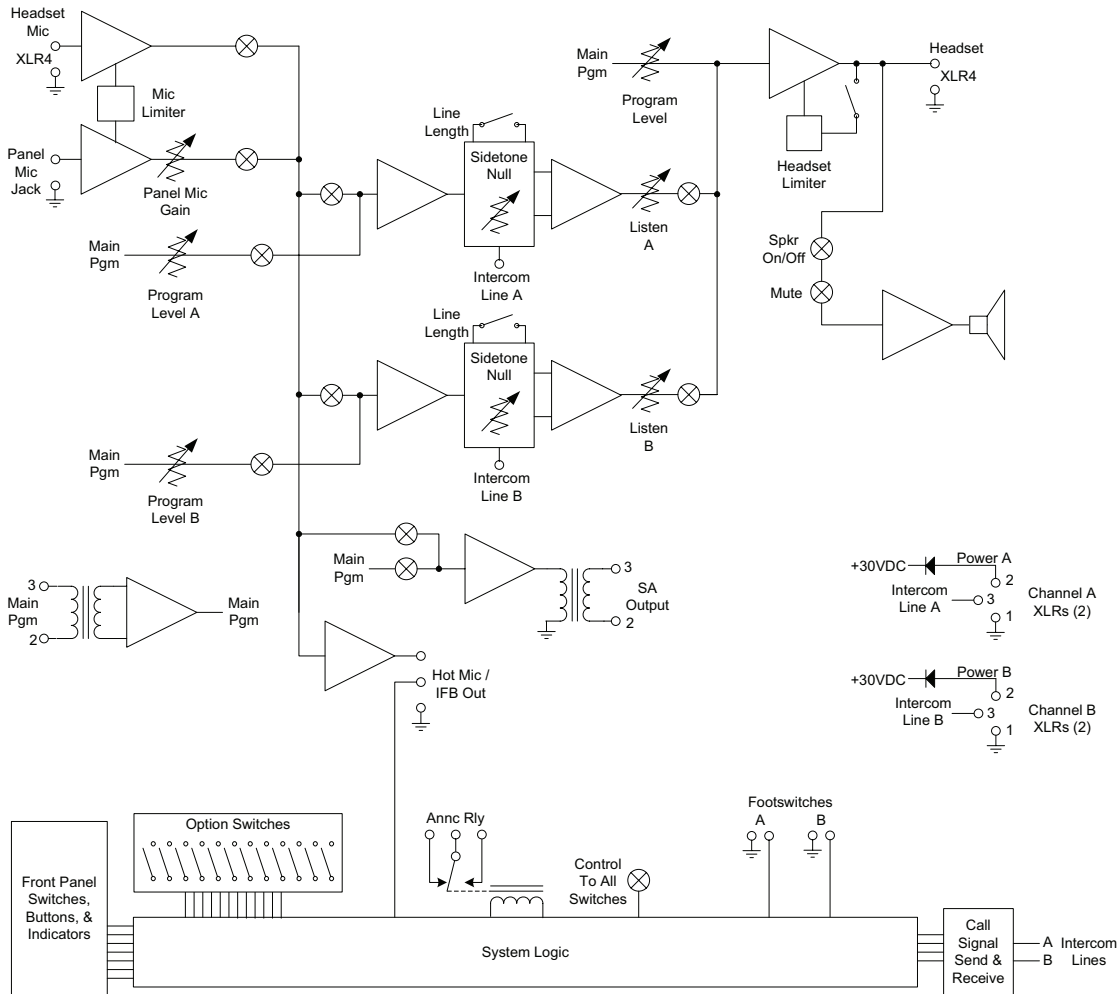
Two rear-panel DIP switches are provided to compensate for lines longer than 1,000 ft. (305 m). Each intercom channel has its own DIP switch, as described in "DIP Switch Option Switches" earlier in this chapter.

4 Maintenance

4.1 Introduction

This chapter provides maintenance information.

RM-702



5 Technical Specifications

5.1 RM-702/RM-802-IM Two-Channel Station

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

5.1.1 Panel Microphone Input

Input Type: **Electret**

Input Impedance: **$\geq 2\text{K}\Omega$**

Mic Limiter Threshold: **0dBu \pm 3dB**

Mic Limiter Range: **$\geq 20\text{dB}$**

5.1.2 Headset Microphone Input

Input Type: **Dynamic**

Input Impedance: **$\geq 1\text{K}\Omega$**

Mic Limiter Threshold: **0dBu \pm 3dB**

Mic Limiter Range: **$\geq 15\text{dB}$**

5.1.3 Program Line Input

Maximum Level before Clipping: **$\geq 20\text{dBu}$**

Input Impedance: **$\geq 5\text{K}\Omega$**

5.1.4 Headset Output

Load Impedance: **$\geq 8\Omega$**

Output Impedance: **$\leq 25\Omega$**

Output Limiter Threshold: **+5dBu \pm 3dB**

Maximum Output Level before Distortion: **$\geq 17\text{dBu}$**

5.1.5 Speaker Output

Load Impedance: **$\geq 4\Omega$**

Max Output Level before 1% Distortion: **20dBu \pm 2dBu**

5.1.6 Party Line Output

Off Noise: **$< -74\text{dBu}$**

Output Impedance: **$> 10\text{K}\Omega$**

5.1.7 Party Line Input

Crosstalk: < **-60dB**

Max level before Clipping: >= **12dBu**

Sidetone Null Capability: > **25dB**

5.1.8 Stage Announce/Balanced Line Out

Type: **Balanced**

Output Impedance: >= **200Ω**

Load Impedance: >= **600Ω**

5.1.9 IFB/Hot Mic

Type: **Unbalanced**

Output Impedance: **180Ω**

Load Impedance: >= **600Ω**

5.1.10 Frequency Response

Panel Mic - Party Line: **600 - 10KHz ± 3dB**

Headset Mic - Party Line: **200 - 12KHz ± 3dB**

Headset Mic - Line Out: **200 - 12KHz ± 3dB**

Program Input - Party Line: **100 - 17KHz ± 3dB**

Program Input - Headset Out: **200 - 10KHz ± 3dB**

Program Input - Speaker Out: **300 - 10KHz ± 3dB**

Party Line - Headset Out: **200 - 10KHz ± 3dB**

Party Line - Speaker Out: **300 - 10KHz ± 3dB**

5.1.11 Max Distortion

Panel Mic - Party Line: <= **0.5%**

Headset Mic - Party Line: <= **0.5%**

Headset Mic - Line Out: <= **0.5%**

Program Input - Party Line: <= **0.2%**

Program Input - Headset Out: <= **0.2%**

Program Input - Speaker Out: <= **0.5%**

Party Line - Headset Out: <= **0.2%**

Party Line - Speaker Out: <= **0.5%**

5.1.12 Noise

Panel Mic - Party Line: < **-65dBu**
 Headset Mic - Party Line: < **-70dBu**
 Headset Mic - Line Out: < **-55dBu**
 Program Input - Party Line: < **-85dBu**
 Program Input - Headset Out: < **-60dBu**
 Program Input - Speaker Out: < **-60dBu**
 Party Line - Headset Out: < **-50dBu**
 Party Line - Speaker Out: < **-50dBu**

5.1.13 Max Gain

Panel Mic - Party Line: >= **37dB**
 Headset Mic - Party Line: **41dB ± 2dB**
 Headset Mic - Hot Mic Out: **55dB ± 3dB**
 Headset Mic - Announce Out: **55dB ± 3dB**
 Program Input - Party Line: >= **-16dB**
 Program Input - Headset Out: >= **18dB**
 Program Input - Speaker Out: >= **24dB**
 Party Line - Headset Out: >= **34dB**
 Party Line - Speaker Out: >= **40dB**

5.1.14 Min Gain

Panel Mic - Party Line: <= **25dB**

5.1.15 Power

Input Voltage Range: **20-30 VDC**
 Input Current (Idle): <= **90mA**
 Input Current (Max): <= **110mA**

5.1.16 Rear Panel Connectors

Intercom: (2) XLR-3M (1 per channel)
(2) XLR-3F (1 per channel)
Hot Mic / IFB Interface: (1) 1/4 in. (0.64 cm) phone jack
Accessory (1) DB-15F

5.1.17 Rear Panel Controls

(12) Option switches

5.1.18 Front Panel Connectors

Panel Mic: **(1) 1/4 in. (0.64 cm) panel mounting jack**

Headset: **(1) XLR-4M**

5.1.19 Front Panel Controls & Indicators

(1) Panel / headset mic switch

(1) Announce button

(2) Program send level controls

(1) Program monitor level control

(2) Listen controls

(2) Sidetone null controls

(2) Talk buttons

(2) Call buttons

(1) Speaker ON-OFF switch

5.1.20 Environmental

32 - 122° F (0 - 50° C)

5.1.21 Dimensions

Dimensions: 19 in. W x 1.75 in. H x 7.0 in. D
(483 mm x 44.5 mm x 178 mm)

5.1.22 Weight

Weight: 5.2 lbs. (2.36 Kg)

5.1.23 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.

6 Technical Support and Repair Policy

To ensure that your experience with Clear-Com and our World Class products is as beneficial, effective and efficient as possible, we would like to define the policies and share some "best practices" that can accelerate any problem solving processes which we may find necessary and to enhance your customer service experience. Our Technical Support, Return Material Authorization, and Repair Policies are set forth below. These Policies are subject to revision and constantly evolve in order to address our Customers' and the Market's needs. Therefore, these are provided by way of guidance and for information only and may be changed at any time with or without Notice.

6.1 Technical Support and Repair Policy

To ensure that your experience with Clear-Com and our World Class products is as beneficial, effective and efficient as possible, we would like to define the policies and share some "best practices" that can accelerate any problem solving processes which we may find necessary and to enhance your customer service experience. Our Technical Support, Return Material Authorization, and Repair Policies are set forth below. These Policies are subject to revision and constantly evolve in order to address our Customers' and the Market's needs. Therefore, these are provided by way of guidance and for information only and may be changed at any time with or without Notice.

6.2 Technical Support Policy

- a. Telephone, online, and e-mail technical support will be provided by the Customer Service Center free of charge during the Warranty Period.
- b. Technical support will be provided free of charge for all software products under the following conditions:
 - i. The application, operating, and embedded software is installed on a product covered by Clear-Com's Limited Warranty, and:
 - ii. The software is at the current release level; or,
 - iii. The software is one (1) version removed from current.
 - iv. Older versions of software will receive "best-effort" support, but will not be updated to correct reported bugs or add requested functionality.

- c. For Technical Support:
 - i. North and South America, (incl. Canada, Mexico, and the Caribbean) & US Military:
Hours:0800 - 1700 Pacific Time
Days:Monday - Friday
Tel:+1 510 337 6600
Email:Support@Clearcom.com
 - ii. Europe, the Middle East and Africa:
Hours:0800 - 2000 Central European Time
Days:Monday - Friday
Tel:+49 40 853 999 700
Email:TechnicalSupportEMEA@clearcom.com
 - iii. Asia-Pacific:
Hours:0800 - 1700 Pacific Time
Days:Monday - Friday
Tel:+1 510 337 6600
Email:Support@Clearcom.com
- d. Email Technical Support is available for all Clear-Com branded products free of charge for the life of the product, or two years after a product has been classified as obsolete, whichever comes first. To log or update a request, send an email to: Support@Clearcom.com.
- e. Support for Distributor and Dealer Sales
 - a. Distributors and Dealers may utilize the Customer Service Centers once a system has been installed and commissioned. Clear-Com Systems and Applications Engineers will provide support to the Distributor from the pre-sales stage through to satisfactory installation for new system purchases. Customers will be encouraged to contact their Dealer or Distributor with their installation and technical support enquires rather than using the Customer Service Centers directly.
- f. Support for Direct Sales
 - i. Customers may utilize the Customer Service Centers once a system has been installed and commissioned by Clear-Com Systems and Applications

Engineers, or in the case of project installations, once the Project Team has completed the hand-over to the Support Centers.

6.3 Return Material Authorization Policy

- a. Authorizations: All products returned to Clear-Com or a Clear-Com Authorized Service Partner must be identified by a Return Material Authorization (RMA) number.
- b. The Customer will be provided with an RMA number upon contacting Clear-Com Sales Support as instructed below.
- c. The RMA number must be obtained from Clear-Com via phone or email prior to returning product to the Service Center. Product received by the Service Center without a proper RMA number is subject to return to the Customer at the Customer's expense.
- d. Damaged equipment will be repaired at the Customer's expense.
- e. Returns are subject to a 15% restocking fee.
- f. Advance Warranty Replacements (AWRs);
 - i. During the first 30 days of the Standard Warranty Period: Once the equipment fault has been verified by Clear-Com or its authorized representative, Clear-Com will ship a new replacement product. The Customer will be provided with an RMA number and be required to return the faulty equipment within 14 days of receipt of the replacement or will be invoiced for the list price of a new product.
 - ii. During days 31-90 of the Standard Warranty Period: Once the equipment fault has been verified by Clear-Com or its authorized representative, Clear-Com will ship a like-new, fully refurbished replacement product. The Customer will be provided with an RMA number and be required to return the faulty equipment within 14 days of receipt of the replacement or will be invoiced for the list price of a new product.
 - iii. To obtain an RMA number or request an AWR:
North and South America, Asia-Pacific, and US Military:
Hours: 0800 - 1700 Pacific Time
Days: Monday - Friday
Tel: +1 510 337 6600
Email: SalesSupportUS@Clearcom.com

Europe, the Middle East and Africa:

Hours: 0800 - 1700 GMT + 1

Days: Monday - Friday

Tel: + 44 1223 815000

Email: SalesSupportEMEA@Clearcom.com

- iv. Note: AWRs are not available for UHF WBS Analog wireless intercom systems. UHF WBS Analog wireless intercom systems out-of-box failures must be returned to Clear-Com for repair.
- v. Note: Out-of-box failures returned after 90 days will be repaired and not replaced unless approved by Clear-Com Management.
- vi. Note: AWRs are not available after 90 days of receipt of product unless an AWR Warranty Extension is purchased at the time of product purchase.
- vii. Note: Shipping charges, including duties, taxes, and insurance (optional), to Clear-Com's factory are the responsibility of the Customer.
- viii. Note: Shipping AWRs from Clear-Com is at Clear-Com's expense (normal ground or international economy delivery). Requests for expedited shipping (E.g. "Next-Day Air"), customs duties, and insurance are the responsibility of the Customer.

6.4 Repair Policy

- a. Repair Authorizations: All products sent to Clear-Com or a Clear-Com Authorized Service Partner for repair must be identified by a Repair Authorization (RA) number.
- b. The Customer will be provided with an RA number upon contacting Clear-Com Customer Services as instructed below.
- c. The RA number must be obtained from Clear-Com via phone or email prior to returning product to the Service Center. Product received by the Service Center without a proper RA number is subject to return to the Customer at the Customer's expense.

d. Return for Repair

- i. Customers are required to ship equipment at their own cost (including transportation, packing, transit, insurance, taxes and duties) to Clear-Com's designated location for repair.

Clear-Com will pay for the equipment to be returned to the Customer when it is repaired under warranty

Shipping from Clear-Com is normal ground delivery or international economy.

Requests for expedited shipping (E.g. "Next-Day Air"), customs duties, and insurance are the responsibility of the Customer.

- ii. Clear-Com does not provide temporary replacement equipment ("loaner") during the period the product is at the factory for repair. Customers should consider a potential prolonged outage during the repair cycle, and if required for continuous operations purchase minimum spare equipment required or purchase an AWR Warranty Extension.
- iii. No individual parts or subassemblies will be provided under warranty, and warranty repairs will be completed only by Clear-Com or its Authorized Service Partner