CLEAR-COM ENCORE

PIC-4704, MA-704, AX-704 IFB SYSTEM

INSTRUCTION MANUAL

PIC 4704, MA-704, AX-704 IFB System Instruction Manual

Part Number 810501Z Rev. 1

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CONTENTS

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. 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.

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.

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 PIC-4704, MA-704 and AX-704 products meet all relevant CE and FCC 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.

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.

OPERATION

INTRODUCTION

During the production of a program for transmission or recording, a director or producer frequently needs to cue the performing talent. This is done using Interrupt FoldBack (IFB), a type of closed-circuit intercom for sending program and cue audio on "IFB" lines for the talent to monitor. The IFB line carries three signals: program audio, cue audio, and the dip or mute control. See the signal flow diagram below (Figure 1-1). Electronic control allows the director to interrupt the program signal when addressing the talent. IFB communications are one-way only from an access location to the selected talent position.

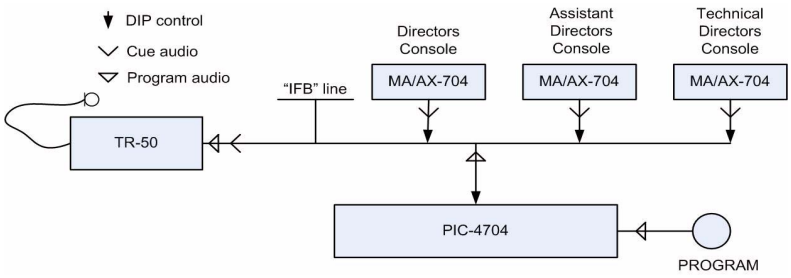

Figure 1-1: Audio Control Paths

Clear-Com's new stand-alone IFB components provide high performance, cost-effective answers for applications where regular intercom functions are not also required, or where space contraints require compact, versatile packaging. The simplest stand-alone system consists of a PIC-4704, an MA-704, a PS-702 for power, and one to four TR-50 talent receivers. This system will permit cuing of one to four talent positions from only one access location.

Note: Throughout this manual, "access location" refers to the physical place someone needs to cue the talent from. "Talent position" refers to the individual "talent" cue channels.

DESCRIPTION

Clear-Com's stand-alone series of IFB components offers two types of talent access station. The MA-704 has a socket for a gooseneck microphone and a pre-amplifier with line-level output. It provides access to four talent positions. Each AX-704 allows access, from the same location, to an additional group of four talent positions; it requires an external line-level signal for its cue audio source. The MA-704's cue audio and ALL control signals will feed up to 24 AX-704s, so that only one MA-704 is required at each *access* location. Each talent position may be accessed independently, or simultaneously with any other(s). The ALL button on the MA-704 simultaneously accesses all talent positions of the MA-704 and each AX-704 extension unit fed from that MA-704.

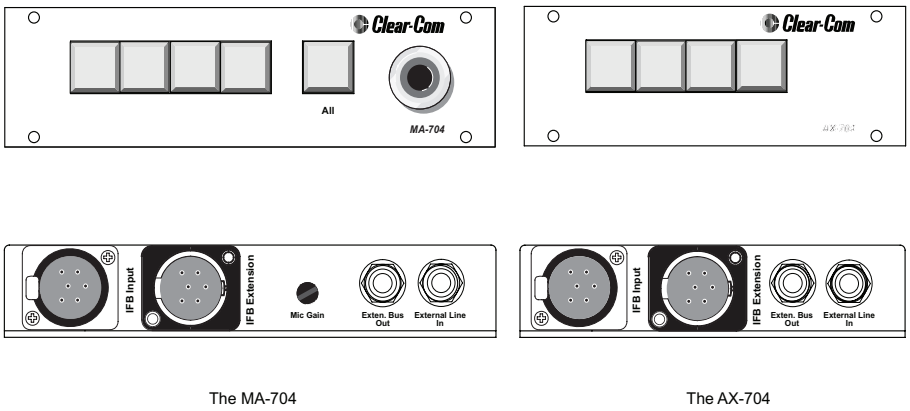

Figure 1-2: MA-704 and AX-704 Units

A PIC-4704 unit is required for every four talent positions, or fraction thereof. For example, a system with five to eight talent positions will require two PIC-4704s. The same IFB system with three access locations will require three MA-704s and three AX-704s, but will still need only two PIC-4704s. The PIC-4704 performs the program feed and interrupt functions for each talent position, and also terminates the IFB lines.

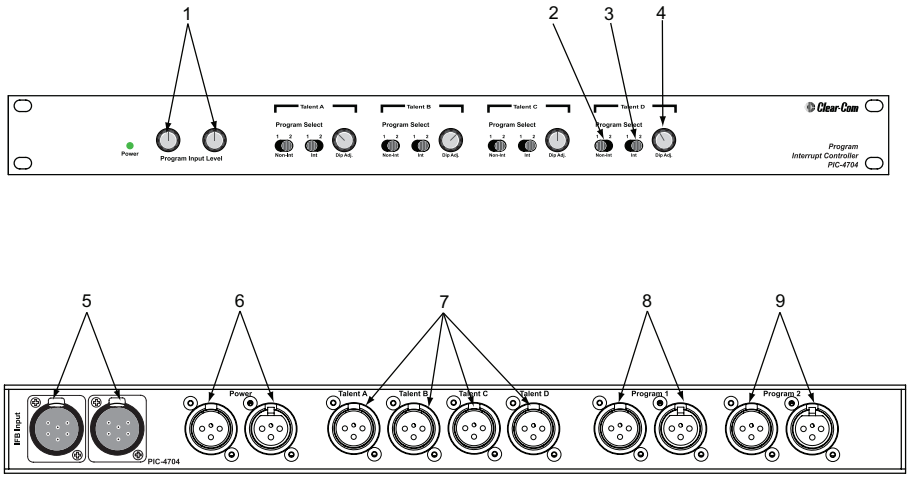

Figure 1-3: PIC-4704 Controls and Connectors

The PIC-4704 controls and connectors shown in Figure 1-3 are:

1. Program input level adjustment
2. Selector for non-interruptible program feed
3. Selector for interruptible program feed
4. Audio dip adjustment control
5. IFB inputs
6. Connectors to power supply (station or power supply)
7. Outputs to talent receivers
8. Program 1 loop through
9. Program 2 loop through

The connectors on the MA-704, AX-704, and PIC-4704 are arranged for convenient interconnection as a stand-alone system. However, all the units' electrical characteristics are identical to those of the integrated IFB systems on our standard broadcast intercom line. With suitable connector adaptors, both types of units can be mixed in a system.

OPERATION

The system is operated by engaging the desired cue buttons on the access stations. A control voltage on the IFB line causes the PIC-4704 to dip the program feed to that channel so that the cues given are understandable. (At an optional split-feed receiver, the program is dipped only in the cue side; the other side has continuous program with no cue.)

1. Press the IFB button on the access station corresponding to the talent position(s) you wish to cue, then speak into the MA-704's microphone.
2. Press the MA-704's 'All' button and you simultaneously activate every IFB line, including those on any accompanying AX-704 units.

The control voltage also causes the corresponding buttons at all other access locations to change in color from blue to amber, indicating which channels are in use.

2 INSTALLATION

SYSTEM CAPACITY

A system may have up to fifty access locations. Cue audio from the MA-704 can drive up to twenty-three AX-704 units, thus permitting a maximum of ninety-six talent positions.

In order to use the IFB system at its maximum capacity, two factors must be considered: system wiring (architecture) and power requirements. The MA-704 consumes a maximum of 180 mA (idle current 140 mA), and the AX-704 consumes a maximum of 150 mA (idle current 120 mA). Since the resistance of the conductors in the interconnect cable may be on the order of five to ten Ohms per 1000 feet, care must be taken to avoid having too many stations on one long cable run.

For example, a system with two MA-704s on a 2000 foot cable which has 16 Ohms cumulative resistance in the power conductor, plus another 10 Ohms in the common conductor, the voltage drop is a maximum of 9 volts. If another two MA-704s were to be added for the same cable run, the voltage drop would be an unacceptable 18 volts. Therefore, the other set of access stations would have to be connected on separate cable run from the PIC-4704.

To determine the number and type of power supplies a system requires, add up the number of Unit Loads (1 Unit Load=50 mA).

- PIC-4704=2 Unit Loads
- Four TR-50s=1 Unit Load
- MA-704=4 Unit Loads
- AX-704=3 Unit Loads

A PS-702 has enough capacity for 24 unit loads.

SYSTEM ARCHITECTURE

Two basic cabling methods for connecting the system may be used: “daisy-chain” (or loop-through) and “hub.” Both methods may be combined in any system. Since the PIC-4704 has only two IFB line connectors, a hub-type system is limited to two branches unless a special splitter box is used. Generally, resistance-buildup effects and resultant voltage drop are worse when using the daisy-chain approach. The hub approach minimizes voltage-drop effects at the expense of greater cumulative cable capacitance. Cable capacitance is not quite the problem it is in regular intercom systems, because there is no sidetone null change, only a degradation of high-frequency response.

Referring to the typical system block diagrams shown below, only the system in Figure 2-2 is connected using the “hub” method; all other systems are shown connected via the “daisy-chain” method.

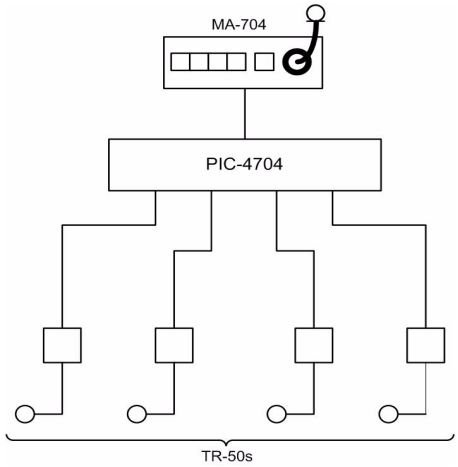

Figure 2-1: One Access Location to up to Four Talent Positions

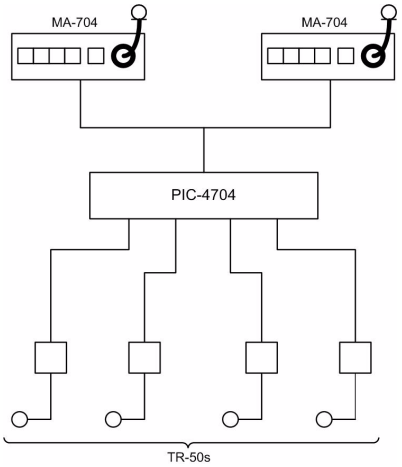

Figure 2-2: Two Access Locations to up to Four Talent Positions

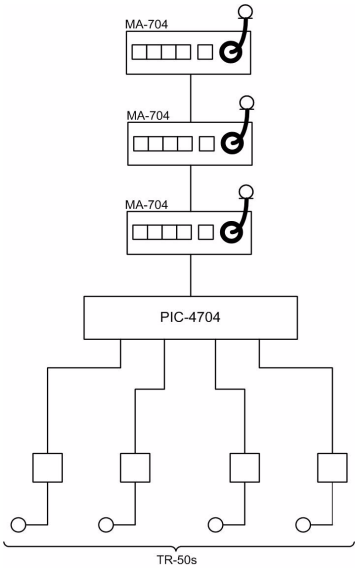

Figure 2-3: Three Access Locations to up to Four Talent Positions

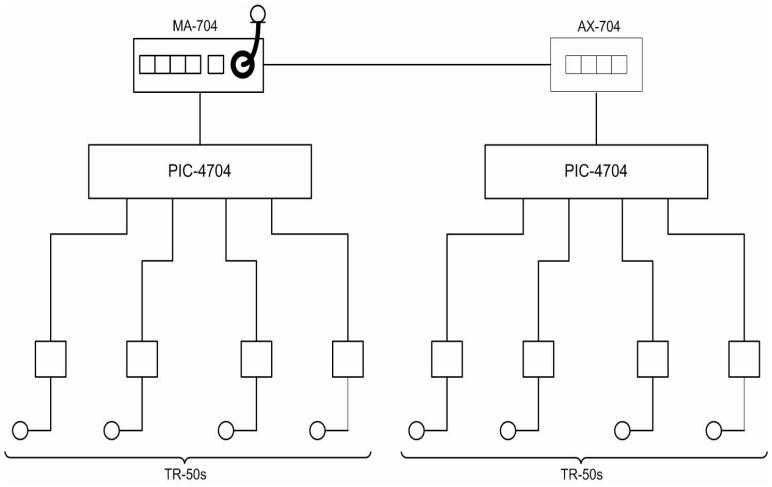

Figure 2-4: One Access Location to up to Eight Talent Positions

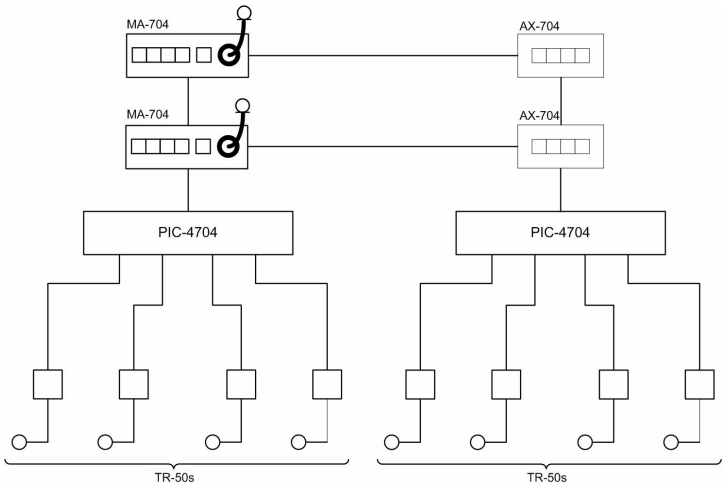

Figure 2-5: Two Access Locations to up to Eight Talent Positions

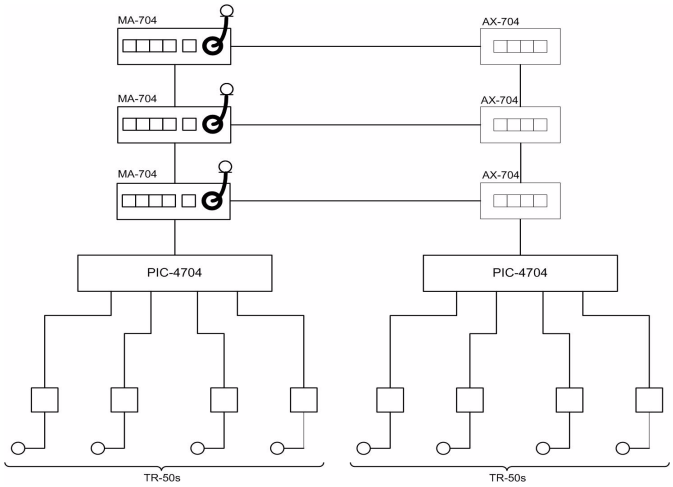

Figure 2-6: Two Access Locations to up to Eight Talent Positions

INTERCONNECT CABLING

Use one multi-pair cable for each group of four channels when connecting the IFB lines between the access stations and their associated component (other MA-704s or AX-704s and the PIC-4704). This cable must have (four) separately shielded conductors or pairs of conductors to prevent crosstalk. Suitable cable types are: Alpha #6054, Belden #8725 or 9330, and Mogami #2602. As noted in the previous section, the resistance buildup in both the power and common (or ground) conductors must be kept at a minimum for proper operation. Resistance buildup in the common conductor will also increase crosstalk. Follow the diagram below for best results in connecting the cable to the XLR connectors. Notice that all four of the spare conductors in each pair are tied together to pin 2 (DC power), and all shields are tied together to pin 1 (common). This arrangement minimizes resistance buildup effects in long cable runs.

Clear-Com has ready-made cable in 25, 50, and 100 foot lengths to fit your cabling and system architecture needs.

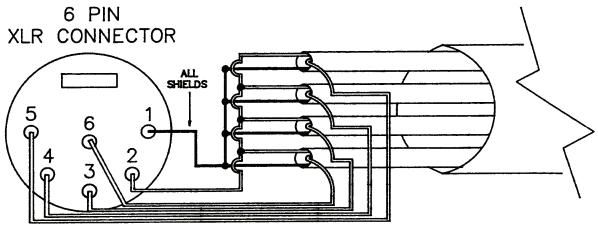

Figure 2-7: XLR6 Cable Wiring

In a system with more than four talent positions (one group), the cue audio from the MA-704's mic preamp and the ALL control signal must be bussed from the MA-704 to each AX-704 unit. A two-conductor shielded mic cable with 1/4-inch TRS phone plugs at each end is used for this purpose. Refer to Figure 2-8 for pinout details.

Note: The diagram shows the access stations for talent positions 5–8 connected in a "hub" from the second PIC-4704 while the stations for the first group of talent positions (1–4) are shown connected in the "daisy-chain" method. In practice, stations for both groups of talents would be interconnected in the same manner.

Connect single channel talent receivers to the PIC-4704 using standard two-conductor mic cable. Only two conductors are necessary for cabling between the power supply and the PIC-4704(s). If any section of this cable is more than a few feet long, be sure that heavy-guage wire is used.

SYSTEM CONNECTION

1. Determine the architecture for your IFB system.
2. Decide upon a location for the PIC-4704(s).
3. Connect the PIC-4704(s) to Clear-Com power supply(s) such as the PS-702 or PS-704.
4. Connect the program sources(s) to the PIC-4704(s) as required. A balanced program source is connected to pins 2 and 3 of the program input. The common pin can be connected to the common or ground point of the source, if necessary, to eliminate any residual hum. If a single-ended source is used, either pin 2 or 3 must be connected to the common point of the source. The "high" side is connected to the other pin (2 or 3).
5. Use standard multi-pair shielded cables and two-conductor shielded mic cables to interconnect the access stations as described in the preceding section.
6. Route all cables from the access locations and the talent receivers to the PIC-4704(s) using either or both of the methods discussed in the previous section. Pin assignments for the rear panel IFB XLR connectors are: Pin 1, Common; Pin 2, power; Pins 3–6, talent channels 1–4 respectively.
7. Route cables away from heavy AC power sources such as lighting panels or electric motors.
8. In permanent installations, cables should be installed in accordance with approved local building codes.

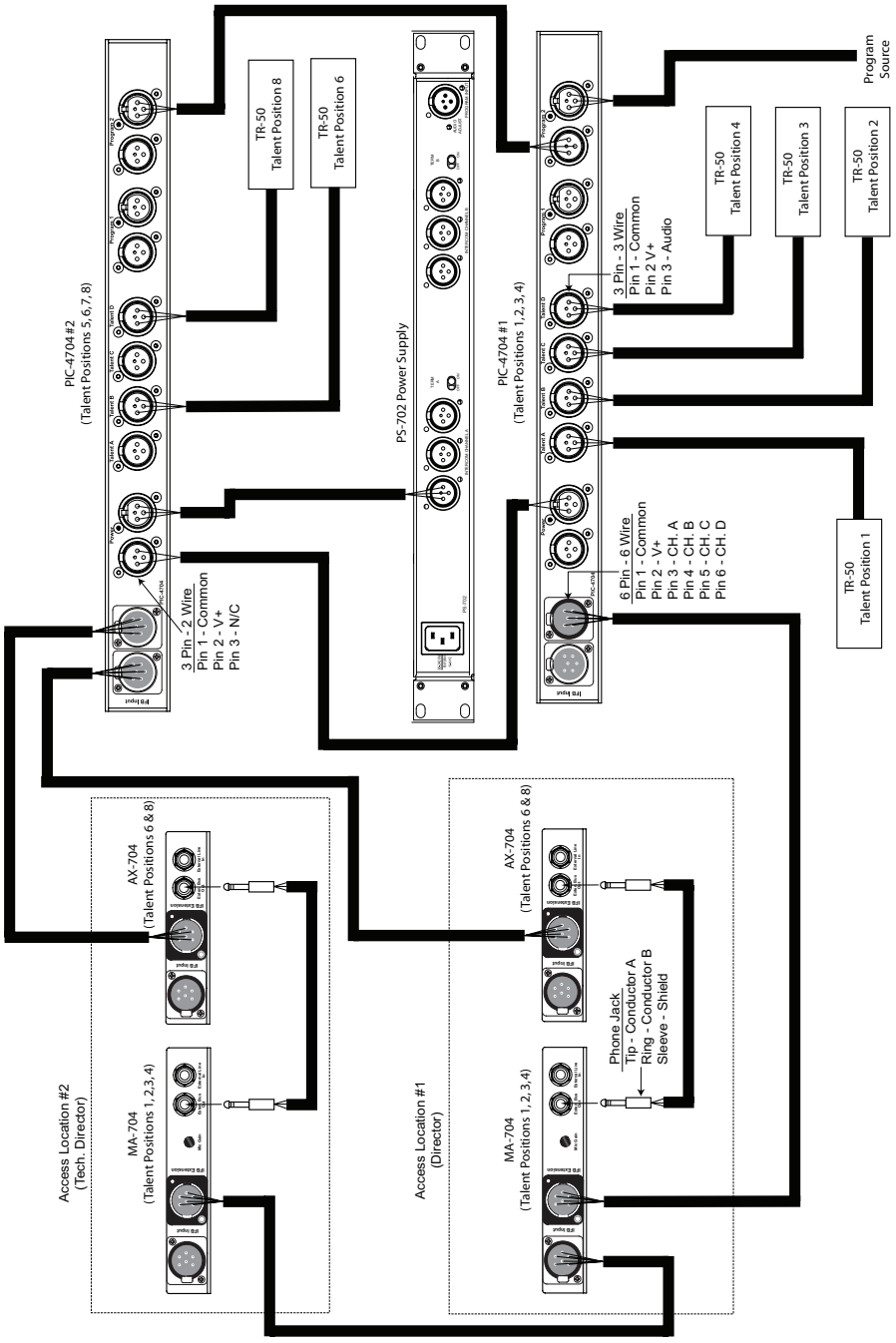

Figure 2-8: IFB Wiring Example

PHYSICAL MOUNTING

The PIC-4704 is designed for mounting in a standard 19-inch rack. It requires only one 1.75-inch rack space, and is 7.5-inches deep.

The MA-704 and AX-704 may be mounted in a console or desk, or in a standard 19-inch rack using the optional model CEP-RK rack kit. Refer to the diagrams below for mounting dimensions when installing in a desk or console. There are no special constraints on relative positioning of MAs and AXs, though it is expected that the extension bus cable (the one with phone plugs) will be no more than 10 feet (normally 18 inches long). Be sure to make allowance for the XLR connectors to be plugged into the back of each access station.

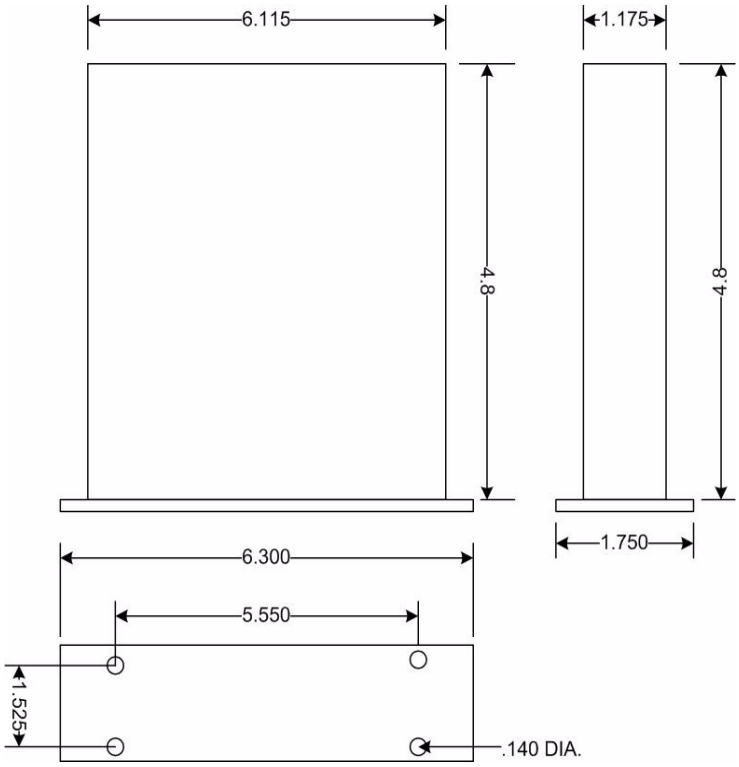

Figure 2-9: MA-704 Mounting Dimensions

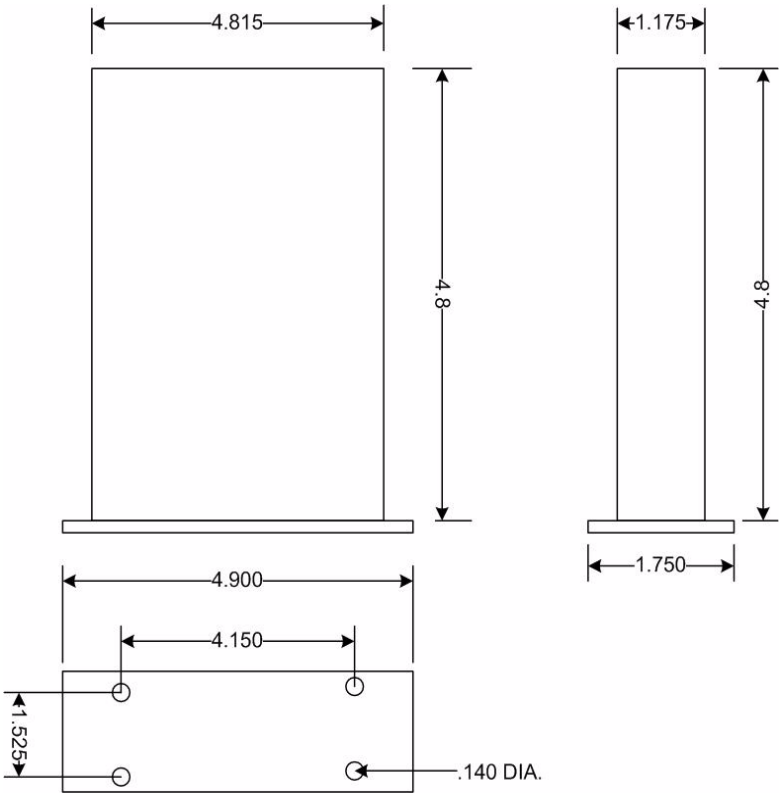

Figure 2-10: AX-704 Mounting Dimensions

SETUP AND SYSTEM CHECK

After program sources are connected, assign them at the PIC-4704 to the talent channels with the Program (Source) select switches for each channel's interrupt and non-interrupt talent feeds (see Figure 1-3). Set the switch left to select source 1 or right to select source 2.

Set the attenuation or dip of the program feed during cuing with the dip adjustment trims (see Figure 1-3). They can be set from no attenuation (fully CW) to greater than 50 dB (fully CCW).

Before adjusting the Program Level trims at the PIC-4704, the volume at the Talent Receivers must be adjusted (via the control on the Receiver) for a comfortable cue audio level in the earpiece or headset while someone is cuing that talent position from one of the access locations.

The Program Input Level controls permit use of program levels ranging from –20 dBu to 0 dBu. At full clockwise rotation, the gain from program input to the IFB line is approximately unity. So at maximum gain setting, a program level of –20 dBu will be roughly the same volume on the IFB line as the cue audio. If the program source level is around 0 dBu, the controls will have to be set near full counter-clockwise rotation to match the cue audio level on the IFB lines.

The only adjustment possible at the MA-704 is a trim (± 5 dB) of the mic gain. Adjusting this gain should be necessary only in unusual circumstances, because of the mic preamp's limiter.

3 MAINTENANCE

The table of possible problems on the next page, which generally involves system wiring, covers only the most likely problems. In any troubleshooting effort, keep these points in mind:

1. The power for all units in the system is routed from the power supplies through the PIC-4704.
2. All access stations (MAs and AXs) and the talent receivers are connected across the IFB lines in a bridging configuration (high impedance).
3. Each IFB line is terminated by its associated PIC-4704. The termination is about 220 Ohms AC, and approximately 5,000 Ohms DC.
4. Three different types of signals are present on the IFB line:
    a. Cue audio, which originates from an access station's microphone.
    b. Program audio, from the associated PIC-4704.
    c. Interrupt control signal, a DC voltage which also originates at an access station.
5. The cue audio and all control signals for operation of the AX-704 stations at any given location are supplied by the MA-704 station at that location.

TROUBLESHOOTING TIPS

SYMPTOM	CAUSE	SOLUTION
Channel access button not lit or too dim.	(a) No power. (b) Insufficient power	(a) Check that power supply is operating and connected to the PIC-4704 (b) Increase power capacity or connect fewer stations on each cable run.
Access button won't light amber when engaged at any station.	(a) Excessive DC load on affected IFB line. (b) IFB line shorted in cabling.	(a) Isolate and replace faulty module on affected line. (b) Isolate and repair cable.
Access button remains lit in amber after being released.	IFB line not termintated.	Insure that station connections to PIC-4704 are intact.
No cue from an AX-704 station.	(a) Associated MA-704 not operating. (b) Faulty or missing connection to MA-704 or AX-704 unit.	(a) Insure that MA-704 is connected to a PIC-4704. (b) Verify connection of extension bus to affected AX-704 unit.
Hum or buzz from program. (program control affects loudness)	Mis-connection of program source to output.	Program inputs are balanced. If single-ended source is used, one of inputs must be referenced to common.

4 SPECIFICATIONS

PIC-4704, AX-704 AND MA-704 TECHNICAL SPECIFICATIONS

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

Panel Microphone Input (MA-704)

Input Type	Electret
Input Impedance	>=2KΩ
Mic Limiter Threshold	0dB ± 3dB
Mic Limiter Range	>= 15dB

Program Line Input

Maximum Level before Clipping	>= 20dBu
Input Impedance	>= 5KΩ

Frequency Response

Panel Mic - Talent (MA-704 only)	200 - 18KHz ± 3dB
Program Input - Talent	200 - 18KHz ± 3dB
Extension Line - Talent	200 - 18KHz ± 3dB

Max Distortion

Panel Mic - Talent (MA-704 only)	<= 0.5%
Program Input - Talent	<= 0.1%
Extension Line - Talent	<= 0.1%

Noise

Panel Mic - Talent (MA-704 only)	< -65dBu
Program Input - Talent	< -85dBu
Extension Line - Talent	< -85dBu

Max Gain

Panel Mic - Talent (MA-704 only)	>= 30dB
Program Input - Talent	>= -14dB
Extension Line - Talent	-14dB ± 3dB

Min Gain

Panel Mic - Talent (MA-704 only)	<= 40dB
Program Input - Talent	<= -45dB

Power (PIC-4704)

Input Voltage Range	20-30 VDC
Input Current	<= 90mA

Power (MA-704)

Input Voltage Range	20-30 VDC
Input Current (Idle)	<= 140mA
Input Current (Max)	<= 180mA

Power (AX-704)

Input Voltage Range	20-30 VDC
Input Current (Idle)	<= 120mA
Input Current (Max)	<= 150mA

Rear Panel Connectors (PIC-4704)

IFB Input	(2) XLR6F
Power In	(1) XLR3F
Power Out	(1) XLR3M
Talent Out	(4) XLR3M
Program In	(2) XLR3F
Program Out	(2) XLR3M

Rear Panel Connectors and Controls (MA-704)

IFB Input	(1) XLR6F
IFB Extension	(1) XLR6M
Extension Bus Out	(1) ¼" jack
External Line In	(1) ¼ jack
Mic Gain	(1) Gain adjust

Rear Panel Connectors and Controls (AX-704)

IFB Input	(1) XLR6F
IFB Extension	(1) XLR6M
Extension Bus Out	(1) ¼" jack socket
External Line In	(1) ¼ jack socket

Front Panel Controls & Indicators (PIC-4704)

(1) Power indicator LED
(2) Program input level controls
(4) Non-interrupt program select switches
(4) Interrupt program select switches
(4) Audio dip level controls

Front Panel Controls & Indicators (MA-704)

(5) Talk buttons
(1) ¼" microphone jack socket

Front Panel Controls & Indicators (AX-704)

(4) Talk buttons

Environmental

32 - 122° F (0 - 50° C)

Dimensions (H x W x D)

PIC-4704 1.75 in. x 19 in. x 7.5 in.
MA-704 1.75 in. x 6.3 in. x 5.5 in.
AX-704 1.75 in. x 4.9 in. x 5.5 in.

Weight

PIC-4704 5.76 lbs. (2.62 kg)
MA-704 1.71 lbs. (.78kg)
AX-704 1.35 lbs. (.61 kg)

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

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

WARRANTY PERIOD

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

Both warranty and non-warranty repairs are available.

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 beltpacks, 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, VGC'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 VGC's customers during the full course of their warranty period.

Instructions for reaching VGC's User Support Centers are given below.

Telephone for Europe, Middle East and Africa: +49 40 6688 4040 or +44 1223 815000

Telephone for the Americas and Asia: +1 510 337 6600

Email: vitec.support@AVC.de

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.

WARRANTY REPAIRS AND RETURNS

Before returning equipment for repair, contact a User Support Center to obtain a Return Material Authorization (RMA). VGC 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 VGC's expense.

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

Europe, Middle East and Africa

Tel: +44 1223 815000 Email: customerservicesEMEA@vitecgroup.com

North America, Canada, Mexico, Caribbean & US Military

Tel: +1 510 337 6600 Email: customerservicesUS@vitecgroup.com

Asia Pacific & South America

Tel: +1 510 337 6600 Email: customerservicesAPAC@vitecgroup.com

VGC 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.

NON-WARRANTY REPAIRS AND RETURNS

For items not under warranty, you must obtain an RMA by contacting the User Support Center. VGC 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: VGC 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 VGC'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, VGC'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 VGC warranty does not cover any defect, malfunction, or failure caused beyond the control of VGC, 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 VGC, 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 VGC), 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 VGC 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.