



# Cable Envoy™

Addressable Messaging System



## Installation Guide

p/n CX601

The Cable Envoy™ system embodies technology protected by United States Patent No. 5,495,283.



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# **SECTION 1**

## **INTRODUCTION**

This installation guide has been written to provide an overview of the Cable Envoy™ system and to familiarize the user with the individual components, their functions, and operation. Installation and wiring information is provided as well as component installation and replacement guidelines.

To acquire a detailed understanding of the operation of the Cable Envoy™ system use the Cable Envoy™ User's Guide in conjunction with this Installation Guide.

## **SECTION 2**

### **SYSTEM DESCRIPTION**

#### **2.1 The Cable Envoy™ System Overview**

The Cable Envoy™ is an Addressable Messaging System used to display text messages on individual channels of a cable TV system. Messages may be presented as a single line crawl format, displayed at the bottom or top of the video display, or as a two line caption displayed at the bottom of the display. Single or multi-page messages may also be overlaid on the video signal, or displayed over a colored background.

The character fonts included within the character generator provide for the display of messages in various languages including English, Spanish, German, and French.

The Cable Envoy™ system's input devices may include a local or remote PC for initial set-up and data entry, or for entering messages to be stored within the system. Message display may be activated via a PC, emergency alert decoder or by tone commands from a telephone.

##### **2.1.1 Uses**

Cable Envoy™ is designed to provide viewers with Emergency Alert System (EAS) notifications in full compliance with FCC regulations. Emergency alerts may be displayed using a combination of crawl displays, overlaid on any program channel(s), along with one or more 'details' channels, providing full page displays with additional information on such alerts. Audio override capabilities permit alert tones to accompany crawl messages and audio alert information to be played on the details channels.

The Cable Envoy™ provides the cable company with the ability to display messages on any channel within the cable system. This capability may be particularly useful for notifying viewers of upcoming channel changes, pay-per-view promotions, program changes, special events, and the like.

##### **2.1.2 Addressable Messaging Channel Units.**

The Cable Envoy™ system comprises a number of channel units (i.e. one for each TV channel served by the system). Each channel unit includes a character generator, audio and video switcher and signal buffer. Channel units communicate to a server unit via an RS-485 network. The server unit may, in turn, communicate with input/output devices such as a personal computer, modem, an EAS decoder, or other standard serial data communications devices.

Each channel unit is uniquely addressable and responds to commands and data addressed to it from the server, permitting playing of individual messages on a specific channel, or several messages to be played on different channels simultaneously. Alternatively, a number of channels may be grouped by assigning these channel units with a virtual address, such that when a command is issued with that address all channels whose virtual address is the same will respond to the command.

### **2.1.3 Audio Switching**

Each channel unit may be commanded to override a channel's audio signal and replace it with an override audio signal. The audio override signal may be derived from a local microphone, telephone line, alert device or computer.

Each channel unit is equipped with a tone generator, which may be used to issue alert 'beep' tones over the channel's audio signal. The channel unit may be commanded to issue 1 to 10 beeps at the beginning of a crawl or multiple page message. This feature is only available for baseband audio switching systems.

### **2.1.4 Video Override**

Cable Envoy™ provides the capability for each channel unit to replace its video source with an alternate video source. The alternate source, which is common to all channels may typically be a graphics background, e.g. a graded blue with the cable company's logo, which provides for text to be overlaid on it by a channel unit.

Whenever a full page of text is to be displayed on a channel, the channel unit can be commanded to switch to the common video source and overlay the text on that video. This feature is useful for displaying messages on a channel's video whenever a loss of channel video occurs, whenever the video for a channel has to be blacked out due to programming restrictions, or to provide information to viewers when a channel is taken off the system.

### **2.1.5 Video Monitoring**

Each channel unit monitors the presence of video from its source. Should the video signal be lost (detected by loss of sync) then the channel unit will automatically switch to the common video source (or a colored background if there is no common video), and display a notice indicating a loss of signal.

A loss of video signal condition will cause the channel unit to report the occurrence to the server which may in turn relay the condition to initiate a telephone call to a pager or remote monitoring station.

### **2.1.6 Configuration**

Channel units are installed in a 5-1/4" equipment rack, each rack accommodates from 1 to 10 channel units. The racks may be distributed throughout the cable TV headend and placed adjacent to the channel modulators or signal sources. This arrangement provides for flexibility in placing racks within the headend and limits the amount of video and audio cabling required to install the Cable Envoy™ system.

## **2.2 Server Unit**

The Server unit is a combination channel unit and communication controller. It continuously polls each channel unit and maintains a table of the status of each channel unit within the system. The server also acts to direct commands and messages received from its input device to one or more channel units.

### **2.2.1 Communications Functions**

The server maintains a channel status table which may be interrogated by the user to determine the state of all channel units. If any change of state occurs at a channel unit (i.e. video loss, message activation, etc.) the server will report the occurrence via its data port and update the status table.

### **2.2.2 Display Functions**

The server unit may be used as a character generator to display text either, overlaid on its input video, or over a common video source, or as text on a colored background. Text may be displayed either as a single page, a multiple of pages, or in a caption mode. Since the server must continuously monitor the activity between its data input and channel units, it cannot support a crawl type display.

### **2.2.3 Data & Audio Entry**

A Cable Envoy™ system can consist of one server unit operating alone, as a stand alone character generator, or in conjunction with one or more channel units. The server may receive data from an input device via an RS 232c interface. If more than one input device is required, a communications multiplexer is used to increase the number of input devices which can be serviced by the server unit.

## **2.3 Communications Multiplexer**



The Communications Multiplexer (commux) unit incorporates an internal modem which provides the Cable Envoy™ system with telephone communications capabilities as follows:

- Allows data communications to and from remote locations, permitting messages to be composed via a PC then transmitted via telephone to the Cable Envoy™
- Enables receipt of audio voice or tone control signals from the telephone line, for use by the communications multiplexer. This capability provides an audio override via telephone and the ability to activate the display of pre-stored messages via touch tone control.

The telephone interface permits line status and control signaling as, ring indicator, carrier detect, request to send, clear to send, off-hook, seize line and hang-up commands.

The commux transfers audio and data to the server unit.

To expand the capabilities of the Cable Envoy™ system, a communications multiplexer (commux) is used to accommodate additional input devices which may be used to access the system. The commux provides data and audio interfaces for external devices as follows:

- A) A local terminal or PC and local audio input
- B) An EAS data and audio interface
- C) A Printer interface

### **2.3.1 Commux Software**

In addition to providing data and audio connectors for these devices, the commux also incorporates software that is used to interpret data and command protocols specific to each device.

The EAS data interface interrogates the data format for specific EAS actions and uses that information to access and transmit responses to the EAS decoder and issue commands and messages to the Cable Envoy™ server. Similarly, the interfaces provided for the modem or terminal will provide prompts or menus and act upon responses to execute the appropriate commands or actions.

### **2.3.2 Additional Capabilities**

The commux embodies non-volatile memory which is used for message storage, and retrieval. This permits pre-stored messages to be saved and accessed as required for an EAS condition, or on command via the PC or modem.

Included in the commux software are routines for:

- Message creation and editing
- Data transfer routines for uploading or down loading messages
- EAS decoder set-up and test routines
- Time and date entry
- Password entry
- Scheduling of events

To access the commux from an interface (i.e. PC) requires a specific password for that interface, also to enter the set-up routines requires an additional password.

### **2.3.3 Time Outs and Resets**

All operating modes of the commux will time out, such that the commux will not be hung up in a data entry mode due to lack of activity. If a telephone call is made to the system and is not answered within ten ring cycles, the commux hardware will force a reset of the commux activity. An external watchdog timer is also used to ensure proper commux activity.

## **2.4 Channel Units**

Each channel unit interfaces to a television channel using its baseband audio and video signals. The channel unit is configured in two parts, a channel unit rack interface module (RIM), which attaches to the rack, and a removable channel card.

### **2.4.1 Channel Unit RIM**

The channel unit RIM comprises:

- video input and output BNC connectors
- a printed circuit connector which connects with the rack backplane
- a header connector which attaches to the channel card, when installed.
- Audio connections comprising either:
  - 2 - 6 position terminal plugs for baseband stereo audio.
  - 2 – BNC connectors for modulated 4.5 MHz audio signals.For composite video w/audio, there are no audio connections.

The RIM is permanently affixed to the rack's rear panel with two jam nuts which secure the BNC connectors to the panel.

Included on the channel interface are relays, which in their passive state, pass the video and audio signals from the input to the output connectors (unterminated). When a channel card is not installed, or when there is no power applied to the rack, the interface relays are in their passive state.

### 2.4.2 Channel Card

The channel card carries all the active electronics including:

- a microprocessor with program and data memory
- an RS-485 communications interface
- video processing circuitry including sync. detection and DC restoration
- character generation, character overlay and background control
- video baseband switching and video output buffering
- audio baseband switching, output buffering, and tone generation.

Channel card functions include:

- Monitoring communications from the server unit, responding to polling requests, reporting current status, receiving and executing commands.
- Servicing of display activity including maintaining crawl activity or multi-page display periods, outputting audio tones (beeps) if active.
- Monitoring current video activity by testing video sync. presence, automatically switching video signals and displaying loss of video message.

The channel card may be removed by releasing two quarter turn fasteners on the channel unit's front panel.

### 2.4.3 Channel Card Address

Each channel card includes an eight position DIP switch, which is used to set the identification address for each channel card. Figure 1 on page 27 provides information on the DIP settings for channel addresses.

The identification code must be unique to each card and should not include any settings which would be used as a virtual address. Typically the unit's address is set at some binary coded decimal number between 01 and 99. Addresses such as AA, BB, CC, DD, EE are used as virtual addresses, AA is the default address for all channel units.

***The DIP switches are not used to set virtual addresses.***

Unit ID 00 is reserved for the server channel. Address FF is reserved as a universal address which is recognized by all channels.

## 2.5 Rack Interface Unit

Each rack contains an Interface Unit which is used to transfer signals to or from the rack. These signals include an audio override signal, originating from the server unit, a common video signal, derived from an external video source and used to replace a channel's video source when required. The rack interface provides buffering between the input and output connectors for the audio override signal and common video signal.

Data and control signals are also connected to the rack interface for communications between the client racks and the server rack. These signals include a signal to activate an override relay at each rack, a system reset signal, and RS-485 data signaling for communications between the server unit and all channel units.

## 2.6 Power Unit

Rack power units are available for either 115 VAC or –48 VDC supplies.

The 115 VAC power unit is an integral power supply that is mounted onto the left side of each rack. The supply connects to a 115 VAC outlet via an attached power cord.

The –48 VDC supply is a plug in card located at the left side of the rack. Power connections are via a plug-in terminal strip located at the rear of the rack. Connections for both primary and backup power supplies are provided.

Outputs from each power unit provides +5 volts, +12 volts and -12 volts, which is applied to the rack backplane via a connector.

## **2.7 Server & Client Racks**

The Cable Envoy™ components (i.e. channel units, server unit, communications multiplexer) are housed in 5-1/4" X 19" equipment racks. There are two types of racks, the Server Rack and Client Rack.

The Server Rack includes a server unit, up to five channel units and accommodation for a communications multiplexer with modem (commux).

Figures 2 and 3, on page 10, illustrates a fully complemented Cable Envoy™ server rack.

The Client Racks are configured for channel units only and may accept up to 10 channel units per rack. Figures 4 and 5 page 11, illustrates a fully complemented Cable Envoy™ client rack.



Figure 2  
Fully Equipped Server Rack – Front View

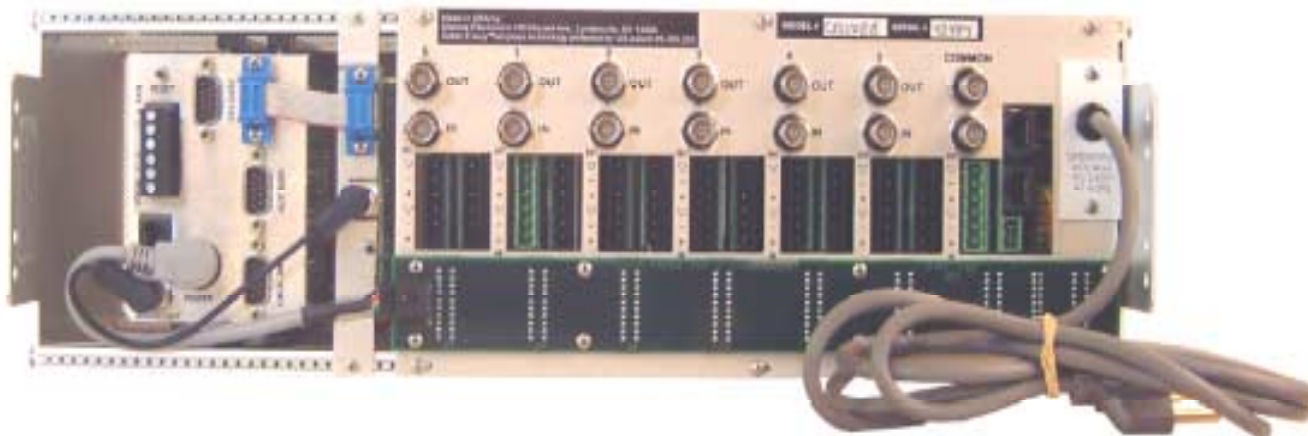


Figure 3  
Fully Equipped Server Rack – Rear View



Figure 4  
Fully Equipped Client Rack – Front View

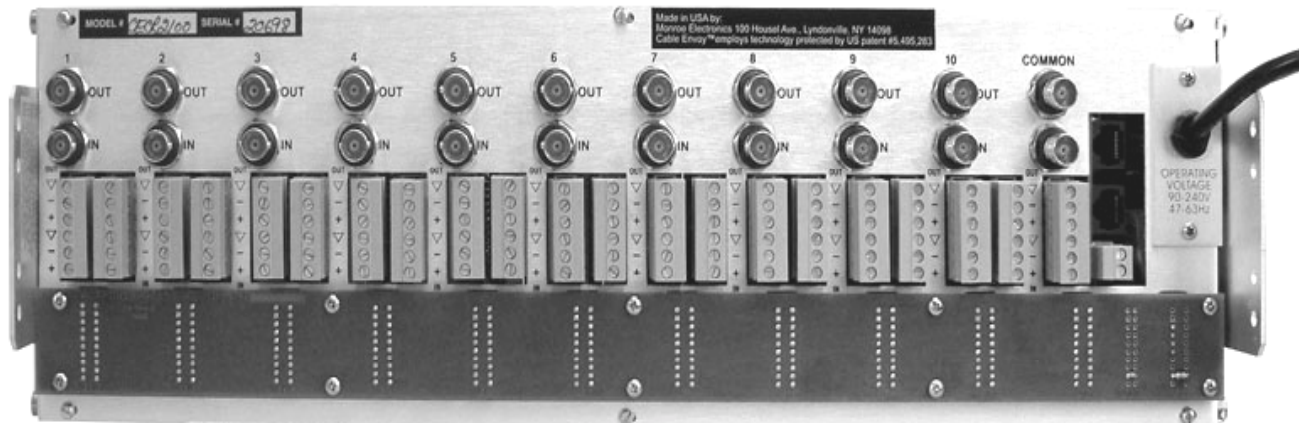


Figure 5  
Fully Equipped Client Rack – Rear View

## **SECTION 3**

### **INSTALLATION PLANNING**

#### **3.1 Installation within a Headend**

When planning the installation of a Cable Envoy™ system within a cable television headend, consideration should be given to:

- the distribution of client racks throughout the headend
- the location of the server rack
- the installation of cabling to interconnect the various client racks with the server rack.

#### **3.2 Distribution of Racks**

A typical Cable Envoy™ system consists of several equipment racks; a server, which includes up to 5 channel units and one or more client racks each carrying up to 10 channel units. The channel units accept baseband video and audio signals from each television channel source, and outputs baseband video and audio signals to be routed to that channel's respective modulator or scrambler.

#### **3.3 Location of Client Racks**

Since the bulk of the cabling required to connect a client rack will be baseband video and audio cabling, it is preferable that each Cable Envoy™ rack be placed adjacent to the modulators/scramblers they serve, thereby minimizing the amount of cabling required.

The Cable Envoy™ signal distribution scheme permits client racks to be located within various rack bays throughout the headend. Each rack may be configured to have from 1 to 10 channel units. The number of channel units will depend upon the location of the respective channel modulators, e.g. if there are eight modulators within a rack bay, then it would be preferable to place a client rack in that bay equipped with eight channel units to serve that configuration of modulators.

### **3.4 Location of Server Rack**

The server rack is the master controller of the Cable Envoy™ system. A fully equipped server rack will house the communications multiplexer with modem (commux), server unit and up to five channel units. The commux serves as the connection location for devices which will be used to control or monitor the Cable Envoy™ system. Equipment which is typically connected to the commux includes:

- An EAS decoder, usually rack mounted adjacent to the server rack.
- A local terminal (PC) used to set-up the system, monitor system activity, or to enter, edit or select messages.
- A dial-up telephone line, used to either provide for remote entry of messages, or for touch tone control of the system from a telephone, or for automatically reporting channel status conditions.

### **3.5 Signal Distribution between Racks**

Signals which are to be distributed to each rack originate at the server rack and are routed to the nearest client rack. Signals are then routed from that client rack to the next nearest client rack, and so on until all racks are connected. At each client rack, the video and audio signals from the server are terminated, then buffered onto the cables connecting that client rack to the next client rack in sequence.

Cables required to interconnect racks include:

- A Data cable: Consisting of four twisted wire pairs, for communications to and from each client rack. Refer to Appendix A. The data cable also distributes an 'override' signal for activating a relay at each client rack, and a "reset" signal which is used for initializing all channel units.
- An Audio cable: 600 ohm, two wire shielded ground cable, required to distribute audio override signals to each rack.
- A Common Video cable: 75 ohm baseband signal cable, (RG-59 or equivalent), required for distribution of the common video signal.

### **3.6 Rack Installation**

Each rack requires 5-1/4" of 19" rack space. Provision for 1-3/4" of space above and below each rack to provide for good ventilation is desirable.

Racks are powered by either 115 VAC, 40 watts, or -48 VDC, 25 watts.



## **SECTION 4**

### **SERVER RACK INSTALLATION**

#### **4.1 Server Rack Components**

The server rack is always equipped with a Power unit, Interface, Server Unit, and from 1 to 5 Channel Units. The Communications Multiplexer with modem (commux) may be included to expand the capabilities of the system.

Channel units and Interface circuit cards may be removed without disturbing the video signals or disconnecting the rear cabling. Cables must be disconnected from the commux and server unit prior to removal. Each unit in the server rack may be removed by releasing either two or four quarter turn quick release fasteners.

#### **4.2 Server Unit - Front Panels**

Figure 2, on page 10, illustrates the front panel configuration of a fully equipped server rack. Positioning of the rack components are fixed.

##### **4.2.1 Commux Indicators**

Commux indicator lights are as follows:

PWR	Red – when lighted indicates that the Commux is powered.
EAS	Green – when lighted indicates that the EAS data input is active.
PC	Green – when lighted indicates that the PC data input is active.
MODEM	Green – when lighted indicates that the Modem input is active.
PRN	Green – when lighted indicates that the Printer port is active.
TELE	Green – when lighted indicates that the Telephone line is active.
CARR	Yellow – when lighted indicates that the modem is active and able to transmit/receive data.

##### **4.2.2 Server Unit Indicators**

Server indicator lights are as follows:

PWR	Red - when lighted indicates that the server unit is powered
BUSY	Green - when lighted indicates that the server character generator is active.

### 4.2.3 Channel Units Indicators

Channel indicator lights are as follows:

READY	Red - when lighted indicates that the Channel unit is powered
BUSY	Green - when lighted indicates that the Channel unit's character generator is active.

The 'BUSY' light on a channel unit will be lit whenever a channel video signal has been lost. A quick scan of busy lights will help to identify the location of a lost video signal.

### 4.3 Server Rack - Rear Panel

The rear panel of the server, shown in Figure 3 on page 10, consists of: A) a section showing the rear of the commux and server modules; B) a section for connections to 5 channel units; and C) rack interface connections and rack power.

### 4.4 Commux & Server Connections.

This section provides for connections of data and audio sources which are used to transfer text and audio signals to the channel interfaces, and to control and monitor the operation of the Cable Envoy™ system.

#### 4.4.1 Commux Connections

Supplied Commux connections include:

- Commux power connection.
- Commux to Server data cable (DB-9 pin to DB-9 pin).
- Commux to Server audio cable (phono plug to phono plug).

External connections to Commux:

- Local PC or terminal device - DB-9 pin cable to local terminal (or PC ) device.
- Local Audio Cable - 2 wire signal/ground audio cable to terminal block.
- EAS Data cable - DB-9 pin cable to EAS decoder.
- EAS Audio cable - 2 wire signal/ground audio cable to terminal block.
- Auxiliary data or Printer cable (when used). - DB-9 pin cable to auxiliary device.

External connections to modem:

- Telephone line cable with RJ-11 connector.
- Required for connecting the Cable Envoy™ system to a dial-up telephone line.

Data interfaces are RS-232c, DCE (Data Communications Equipment) for connection directly to a DTE (Data Terminal Equipment) device such as a PC. Connections to other DCE devices (such as an EAS decoder) will require a null modem cable.

All data connections are set for 9600 baud, 8 data bits, 1 stop bit, no parity.  
Audio signals are 600 ohm impedance.

#### **4.4.2 Server Connections**

Connection to the server unit includes an RS232c data connection and an RCA type phono audio connection.

When used with the commux, the data and audio inputs connect directly to the commux using the supplied cables. The baud rate between the commux and server is normally set at 38.4 Kbaud.

If the server is used in a dedicated application, e.g. connected directly to an EAS decoder, then a set of alternate cables will be supplied for connection to the decoder. For dedicated type applications the server software is changed (via a PROM), which sets the data communications rate to the server at 9600 baud.

**Note:** A reset push-button is provided on the rear of the server unit. This push-button should be depressed whenever power has been initially applied to the unit.

#### **4.4.3 Remote Server Connections**

Server racks may be placed at distant sites and be controlled via a communications link from a central commux. The communications link may be either, a dedicated telephone line, dial-up telephone, a T1 or Ethernet facilities.

T1 and Ethernet connections are made via an external unit which bridges between the external communications facilities and the RS232 server connection.

For telephone type connections an optional circuit board is available for the server which includes a modem and telephone line connection. Telephone connection is made via an RJ11 modular connector.

To provide a unique address for each remote server, an identification code is programmed by setting DIP switches on the server circuit board. (Refer to section – 6-1-4 Programming Channel Address)

#### **4.5 Channel Unit Connections**

Each television channel is interfaced to the Cable Envoy™ via baseband video and audio connections. Server and channel unit locations are designated on the rear of the server rack as 'S' - server unit location and numbers 1 through 5 for channel unit locations.

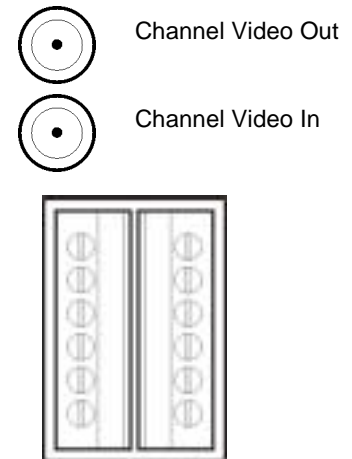
### 4.5.1 Channel Unit Video Connections

Each baseband video signal from a video source is connected to the "IN" BNC connector.

The "OUT" BNC connector provides the video signal to be routed to a modulator or scrambler.

**Note:** Video input signals are terminated with 75 ohms. Video output signals should be terminated with 75 ohms.

When either the Cable Envoy™ rack power is disconnected, or a channel card is removed from the rack, the video IN connectors are connected directly to the video OUT connectors.



### 4.5.2 Channel Unit Audio connections

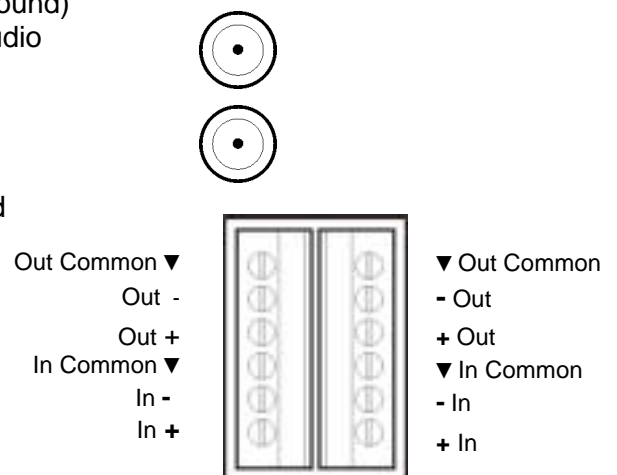
#### Baseband Audio Connections

Screw type terminal plugs are provided for connecting balanced or unbalanced audio signals. Provision is made to accommodate both mono and stereo channel signals.

The input audio signals (i.e. +, -, and shield ground) are connected to the lower terminals on the audio connector, with corresponding outputs being connected to the respective upper terminals.

Note:- The audio inputs are terminated with 600 ohms. Audio outputs should be terminated with 600 ohms.

Typically if monaural audio is used then the left connector terminal would be wired with the channels audio signal. If stereo audio is used then the right connector would be used for the second audio signal.



#### 4.5 MHz Audio Connections

Each 4.5 audio signal is connected to the Audio "IN" BNC connector.

The "OUT" BNC connector provides the audio signal to be routed to a modulator or scrambler.

Note: 4.5 MHz audio input signals are terminated with 75 ohms. 4.5 MHz audio output signals should be terminated with 75 ohms.

When either the Cable Envoy™ rack power is disconnected, or a channel card is removed from the rack, the audio IN connectors are connected directly to the audio OUT connectors.

## 4.6 Server Rack Interface Connections

The server rack interface connections provide for:

- a common baseband video source for each channel within the rack
- a connection for override audio signal
- a data connection for signaling to client racks
- a relay contact closure for override purposes

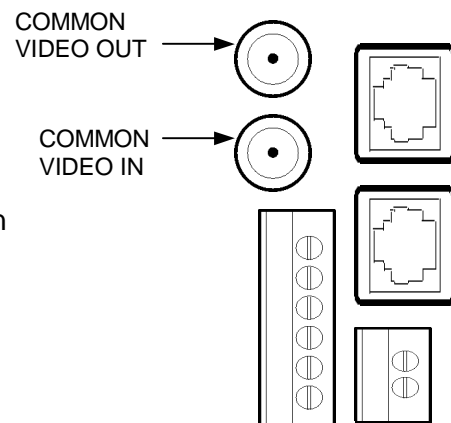
#### 4.6.1 Common Video

The common video input is provided as an alternate video source which may be used to replace a channel's video signal either, under program control, or whenever a program blackout is in effect, or whenever a text message is to be displayed as text overlaid on the common video background. The common video signal if connected, will be displayed automatically whenever a loss of video occurs on a video channel. The common video signal is distributed to each channel card via the rack backplane.

Common video requires a baseband signal connected to the "IN" connector under the "COMMON" BNC connectors. This signal is terminated in 75 ohms.

The BNC connector designated "OUT" under "COMMON" is a buffered output of the common video input signal.

Note:- Common video input signals are terminated with 75 ohms. Video output signals should be terminated with 75 ohms.



When either the Cable Envoy™ rack power is disconnected, or a rack interface card is removed from the rack, the common video IN connectors are connected directly to the video OUT connectors, i.e. the video signals will be terminated by the device connected to the video OUT connector.

## 4.6.2 Common Audio

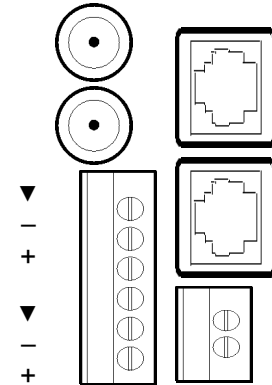
The common audio signals are buffered output signals, provided to distribute the audio override signals, received via the server unit and commux, to other client racks in the system.

### Baseband Audio connections:

Audio output connections should be made using 600 ohm shielded wire from the common output terminals (i.e. marked +, - and shielded ground).

COMMON  
VIDEO OUT

COMMON  
VIDEO IN



### 4.5 MHz Audio connections:

Connect to the audio output using 75 ohm cable and BNC connections.

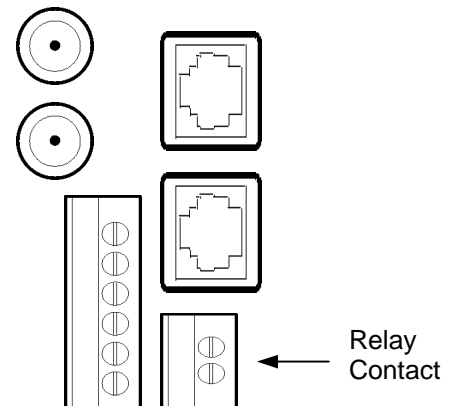
Note: The common audio inputs on the server rack are unused.

## 4.6.3 Contact Closure

The contact closure is provided for use as a general override signal. This may be used to change a channel modulator input source. e.g. when an EAS alert is operational, the relay contact may be used to switch a modulators input channel from a processed video input to an alternate input displaying EAS information.

The relay connection provides a normally open condition. It is closed by program control when an override condition exists.

Alternate strapping on the interface card may reverse the contact condition to normally closed, open during override. Contact the factory for information on alternate relay strapping.



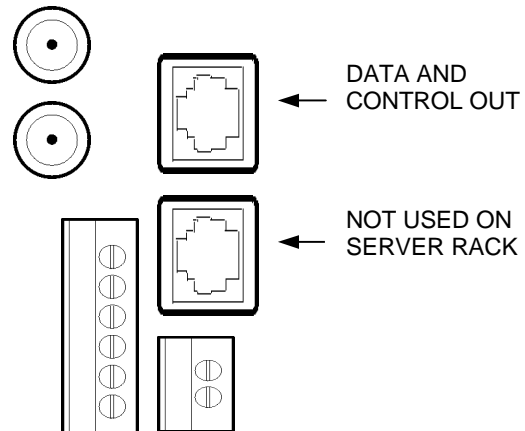
#### 4.6.4 Data Signaling

All communications between the server unit and channel units occur over an RS-485 data network which is present on the backplanes of the server and client racks. When interconnecting racks, the data signaling has to be extended to the other racks.

Refer to Appendix A for detailed information on preparation and wiring for the data signaling cable.

Data connection from the server rack is provided from the upper RJ-45 data receptacle.

Note. The lower data receptacle is unused on the Server rack.



#### 4.7 Server Rack Power

For 110 VAC power units:

Server rack input power requirements are: 110 VAC +/- 10%, 40 Watts.

Power is applied by plugging the AC power cord attached to the rack into an adjacent power connection within the rack cabinet.

For -48 VDC power units:

The -48 VDC, 25 Watt power unit consists of a plug-in card located at the left side of the rack.

Power connections include; Primary supply connections (-P, +P), and Backup supply connections (-B, +B). Supply connections are made via a removable 6 pin terminal plug

The 'Primary' power when applied activates a relay on the power unit, which connects the power circuitry to the 'Primary' power source.

In the absence of primary power, the relay is inactive, connecting the 'Back-up' power source to the power circuitry.

If a single power source is provided, connect the supply to the 'Back-up' connections (-B, +B).

# **SECTION 5**

## **CLIENT RACK INSTALLATION**

### **5.1 Client Rack Components**

Each client rack is equipped with a Power unit, Interface, and from 1 to 10 Channel Units.

Channel units and Interface circuit cards may be removed without disturbing the video signals or disconnecting the rear cabling. Each unit in the client rack may be removed by releasing either two or four quarter turn quick release fasteners.

### **5.2 Client Rack Front Panels**

Figure 4, on page 11, illustrates the configuration of a fully equipped server rack. Positioning of the rack components are fixed. (i.e. the power unit and interface are always located at the right side of the rack, etc.). Blank panels may be ordered to fill non-used positions within the rack.

#### **5.2.1 Channel Unit Indicators**

Channel indicator lights are as follows:-

- PWR - Red, when lighted indicates that the channel unit is powered
- BUSY - Green, when lighted indicates that the channel's character generator is active.

### **5.3 Client Rack Rear Panel**

The rear panel of the client rack is shown on Figure 5, on page 11. This consists of; connections for 10 channel units, rack interface connections and rack power.

### **5.4 Channel Unit Connections**

Each television channel is interfaced to the Cable Envoy™ via baseband video and audio connections. Channel unit locations are designated on the rear of the client rack from 1 through 10.



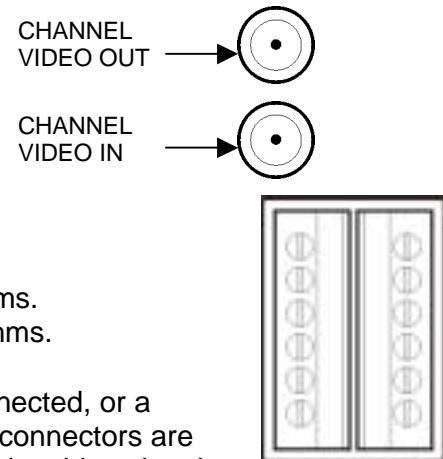
### 5.4.1 Channel Unit Video Connections:

Each baseband video signal from a video source is connected to the "IN" BNC connector.

The "OUT" BNC connector provides the video signal to be routed to a modulator or scrambler.

Note:- Video input signals are terminated with 75 ohms.  
Video output signals should be terminated with 75 ohms.

When either the Cable Envoy™ rack power is disconnected, or a channel card is removed from the rack, the video IN connectors are connected directly to the video OUT connectors, i.e. the video signals will be terminated by the device which is connected to the video OUT connector.



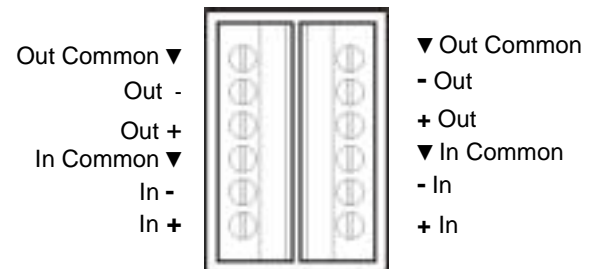
### 5.4.2 Channel Unit Audio Connections:

#### Basband Audio Connections

Screw type terminal plugs are provided for connecting balanced or unbalanced audio signals. Provision is made to accommodate both mono and stereo signals.

The input audio signals (i.e. +, -, and shield ground) are connected to the lower terminals on the audio connector, with corresponding outputs being connected to the respective upper terminals.

**Note:** The audio inputs are terminated with 600 ohms. Audio outputs should be terminated with 600 ohms.



Typically if monaural audio is used then the left connector terminal would be wired with the channels audio signal. If stereo audio is used then the right connector would be used for the second audio signal.

#### 4.5 MHz Audio Connections

Each 4.5 audio signal is connected to the Audio "IN" BNC connector.

The "OUT" BNC connector provides the audio signal to be routed to a modulator or scrambler.

Note: 4.5 MHz audio input signals are terminated with 75 ohms.  
4.5 MHz audio output signals should be terminated with 75 ohms.

When either the Cable Envoy™ rack power is disconnected, or a channel card is removed from the rack, the audio IN connectors are connected directly to the audio OUT connectors.

## 5.5 Client Rack Interface Connections

The client rack interface connections provide for:

- A common baseband video source for each channel within the rack.
- Connections for an override audio signal.
- Data connections for signaling to the server and other client racks.
- A relay contact closure for override purposes.

### 5.5.1 Common Video

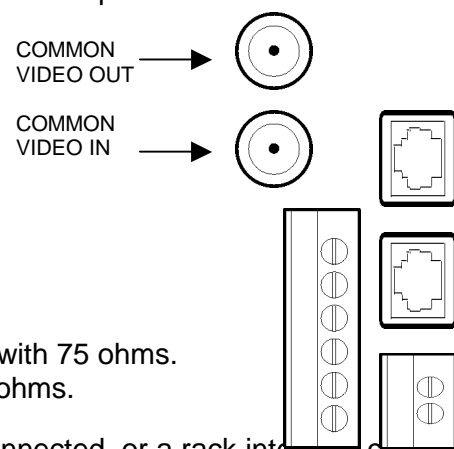
The common video input is provided as an alternate video source, which may be used to replace a channel's video signal, either under program control, or whenever a program blackout is in effect, or whenever a text message is to be displayed as text overlaid on the common video background. The common video signal if connected, will be displayed automatically whenever a loss of video occurs on a video channel. The common video signal is distributed to each channel card via the rack backplane.

Common video requires a baseband signal connected to the "IN" connector under the "COMMON" BNC connectors. This signal is terminated with 75 ohms.

The BNC connector designated "OUT" under "COMMON" is a buffered output of the common video input signal.

**Note:** Common video input signals are terminated with 75 ohms. Video output signals should be terminated with 75 ohms.

When either the Cable Envoy™ rack power is disconnected, or a rack interface card is removed from the rack, the common video IN connectors are connected directly to the video OUT connectors, i.e. the video signals will be terminated by the device connected to the video OUT connector.



### 5.5.2 Common Audio

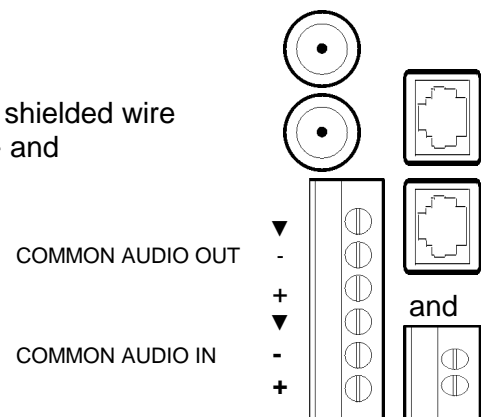
The common audio signals are buffered output signals, intended to distribute the audio override signals, received via the server unit and commux, to other client racks in the system.

#### Baseband Audio connections:

Audio connections should be made using 600 ohm shielded wire from the common output terminals (i.e. marked +, - and shielded ground).

#### 4.5 MHz Audio connections:

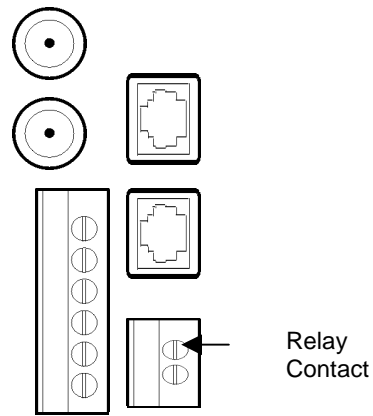
Connect to the audio output using 75 ohm cable BNC connections. The common audio inputs on the client rack are connected either to the server rack or the previous client rack in the distribution sequence.



### 5.5.3 Contact Closure

The contact closure is provided for use as a general override signal. This may be used to change a channel modulators input source e.g. when an EAS alert is operational, the relay contact may be used to switch a modulator's input channel from a processed video input to an alternate input displaying EAS information.

The relay connection provides a normally open condition. It is closed by program control when an override condition exists.



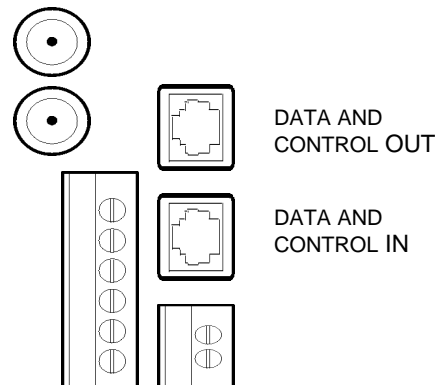
Alternate strapping on the interface card may reverse the contact condition to normally closed, open during override. Contact the factory for information on alternate relay strapping.

### 5.5.4 Data Signaling

All communications between the server unit and channel units occur over an RS-485 data network which is present on the backplanes of the server and client racks. When interconnecting racks, the data signal is transmitted via four pair data cable with RJ-45 connectors.

Refer to Appendix A for detailed information on preparation and wiring for data signaling cable. The data cable from the previous client rack or server rack, is connected to the input (i.e. lower) RJ-45 data receptacle.

The output data connection from the client rack, to be connected to the next client rack in sequence, is provided from the upper RJ-45 data receptacle.



## 5.6 Client Rack Power

For 110 VAC power units:

Client rack input power requirements are: 110 VAC +/- 10%, 40 Watts

Power is applied by plugging the AC power cord attached to the rack into an adjacent power connection within the rack cabinet.

For -48 VDC power units:

The -48 VDC, 25 Watt power unit consists of a plug-in card located at the left side of the rack. Power connections include; Primary supply connections (-P, +P), and Backup supply connections (-B, +B). Supply connections are made via a removable 6 pin terminal plug

The 'Primary' power when applied activates a relay on the power unit, which connects the power circuitry to the 'Primary' power source.

In the absence of primary power, the relay is inactive, connecting the 'Back-up' power source to the power circuitry. If a single power source is provided, connect the supply to the 'Back-up' connections (-B, +B).

## SECTION 6

### INSTALLING & REPLACING COMPONENTS

#### 6.1 Installing a New (additional) Channel Unit

The purpose of this section is to describe the procedure required to install and set-up a channel unit.

##### 6.1.1 Channel Unit Physical Description

The channel unit circuitry comprises two parts:

- 1) A channel unit card assembly that slides into the front of an equipment rack and is secured by the quick release fasteners.
- 2) A channel rack interface module (RIM) assembly, which is attached to the rear panel of the equipment rack. When the channel card is installed from the front of the rack, it will connect with the rack interface module (RIM).

This arrangement permits a channel card to be removed or replaced without disrupting the channel wiring at the rear of the rack unit. Relays on the channel RIM ensure continuity of audio and video signals whenever a channel card is removed.

##### 6.1.2 Installing a Channel RIM Assembly

Before installing a channel unit, first select an available card slot within a client or server rack. **Make sure that there are no active channel units displaying alert or other messages. When safe to do so remove power to the rack.**

The channel RIM assembly comprises a printed circuit assembly, with either, two BNC connectors and two 6 pin terminal headers with plugs (for baseband audio), or four BNC connectors (for 4.5 MHz audio).

Install the supplied plastic washers onto both BNC connectors (for baseband audio), or the first and third BNC connectors (for 4.5 MHz audio). From the front of the rack, slide the new channel RIM assembly into the rack along the channel card guides until the BNC connectors penetrate the rear panel. Make sure that assembly is not tilted and that approximately four thread turns are exposed on the BNC connectors.

Attach two jam nuts and washers, to each BNC connector being fastened to the panel, and tighten. Use of a 9/16" extended socket wrench is recommended.

Connect video and audio cabling for the new channel RIM. Check that there is continuity of signal through the video and audio connectors. (When no power is applied, or when the channel card is removed, the input and output connectors are connected via relay contacts on the channel interface assembly).

Check that the channel card will slide into the card guides from the front of the rack and connect with the interface assembly. When installed correctly, the front panel of the channel card will be flush with the front of the rack.

### **6.1.3 Installing a Channel Unit Card**

Before installing a channel unit card, an identification address has to be set on the card. Channel unit addresses are typically numbered from 01 through 99.

### **6.1.4 Programming the Channel Address**

When the new address code is determined, the position of the switches on the dip switch assembly on the channel card will have to be set. Note: The DIP switch assembly is located on the component side of the PC board, adjacent to the bottom of the front panel.

As shown in the channel setting chart below Figure 1 on page 27, switches 1, 2, 3 & 4, determine the units digit of the address, switches 5, 6, 7, & 8, determine the tens digit of the address. The chart illustrates the DIP switch settings required to set the individual channel addresses.

Insert the channel card into the rack along the card guides and fasten in place. Apply power to the rack.

### **6.1.5 Testing a Channel Unit Installation**

To ensure that the new channel card is installed correctly, monitor the video output from the channel. Momentarily disconnect the video input signal to the channel. The video output should show a "loss of video" message overlaid on the common video signal. Disconnecting the common video input signal will show the default message on a blue background. When the default message is being displayed, the BUSY light on the front panel will be lighted. Replace the video input signals.

While the default video tests are being made, the server unit will be reporting the change of status for the new channel. If a PC or terminal is connected, this activity should be indicated.

### **6.1.6 Replacing a Channel Card**

When replacing a channel unit with another unit, first determine the address of the board being replaced by noting the DIP switch settings, refer to Figure 1 on page 27. Set the DIP switch settings of the new board to the same as the settings on the board being replaced. Install the new board and test as outlined in 6.1.5.

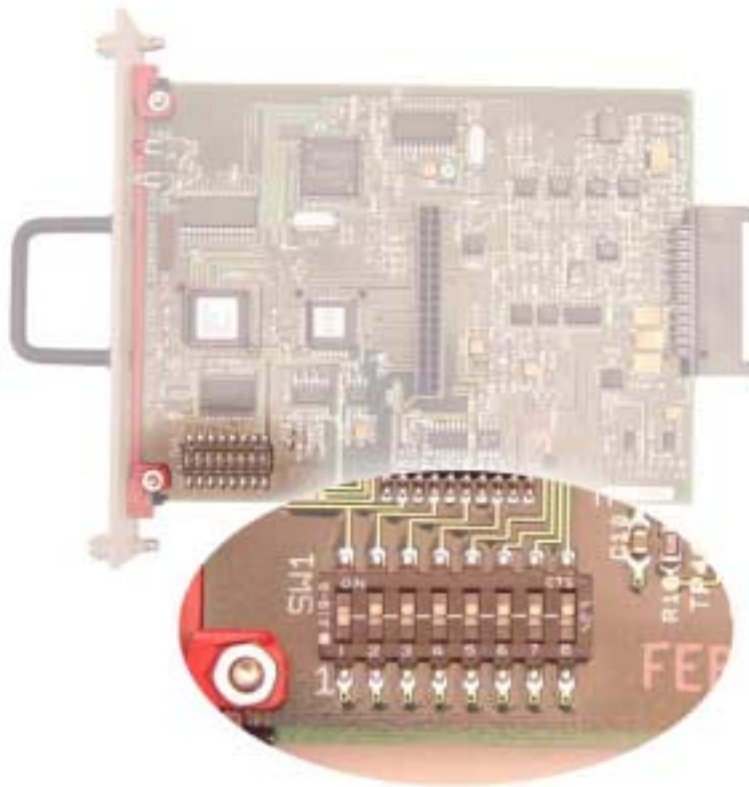


Figure 1

Channel Address Dip Switch Location

Example:      Units Digit = 1  
                  Tens Digit = 0      Channel Unit address is set for 01

Units Digit					Tens Digit				
1	2	3	4		5	6	7	8	
↑↑	↑↑	↑↑	↑↑	0	↑↑	↑↑	↑↑	↑↑	0
↓↓	↑↑	↑↑	↑↑	1	↓↓	↑↑	↑↑	↑↑	1
↑↑	↓↓	↑↑	↑↑	2	↑↑	↓↓	↑↑	↑↑	2
↓↓	↓↓	↑↑	↑↑	3	↓↓	↓↓	↑↑	↑↑	3
↑↑	↑↑	↓↓	↑↑	4	↑↑	↑↑	↓↓	↑↑	4
↓↓	↑↑	↓↓	↑↑	5	↓↓	↑↑	↓↓	↑↑	5
↑↑	↓↓	↓↓	↑↑	6	↑↑	↓↓	↓↓	↑↑	6
↓↓	↓↓	↓↓	↑↑	7	↓↓	↓↓	↓↓	↑↑	7
↑↑	↑↑	↑↑	↓↓	8	↑↑	↑↑	↑↑	↓↓	8
↓↓	↑↑	↑↑	↓↓	9	↓↓	↑↑	↑↑	↓↓	9
↑↑	↓↓	↑↑	↓↓	A	↑↑	↓↓	↑↑	↓↓	A
↓↓	↓↓	↑↑	↓↓	B	↓↓	↓↓	↑↑	↓↓	B
↑↑	↑↑	↓↓	↓↓	C	↑↑	↑↑	↓↓	↓↓	C
↓↓	↑↑	↓↓	↓↓	D	↓↓	↑↑	↓↓	↓↓	D
↑↑	↓↓	↓↓	↓↓	E	↑↑	↓↓	↓↓	↓↓	E
↓↓	↓↓	↓↓	↓↓	F	↓↓	↓↓	↓↓	↓↓	F

## **6.2 Installing a Commux Unit**

The Communications Multiplexer (commux) expands the capabilities of the Cable Envoy™ system from one input device to four input devices. These typically include data inputs from a local terminal (PC), an EAS decoder and an auxiliary device such as a printer. Audio signals from a local microphone, EAS decoder or from a telephone line are also interfaced and controlled by the server. The commux connects between these data and audio inputs to the server unit.

### **6.2.1. Location**

The commux is located in the first and second slots from the right side (front) of the server rack. Slots three and four are provided for the server module. The commux unit assembly consists of two full size printed circuit boards and a third smaller circuit board. These boards are mounted between a double width front panel and a metal rear panel.

To install the commux, locate the two large printed circuit boards between the card guides located at the top and bottom of the rack at the commux location. Slide the commux assembly into the rack until the front panel is flush with the front of the rack. Secure the commux by using a flathead screwdriver to engage the four quarter turn fasteners on the commux's front panel, with the rack.

### **6.2.2. Connections**

Prior to installing any cables to the commux, remove power to the server rack. Each commux unit is supplied with three cables, a power cable, a 9 pin jumper cable, and an audio jumper cable.

#### **Power Connector**

Install the power cable by attaching the four pin socket connector to the four pin connector J14 on the server motherboard, then connect the five pin DIN type connector to the input marked "POWER" on the commux rear panel.

#### **Server Connections**

Connect the 9-pin data ribbon cable between the "SERVER DATA" connector at the rear of the server, and the "SERVER" connector on the commux rear panel.

Connect the audio jumper cable from the "AUDIO IN" connector at the rear of the server, to the "AUDIO OUT" connector on the commux rear panel.

#### **Local Terminal**

Connection of a local terminal requires a 9 pin data communications cable from the local PC. Connect the local terminal cable to the "LOCAL DATA" input on the rear of the commux.

#### **Local Audio**

Connection of local audio requires a two wire (signal and ground) cable from the local audio source. Attach the local audio cable to pins marked "LOCAL AUDIO + v" on the terminal plug connector.

### **EAS Decoder**

Each Cable Envoy system is provided with two cables for connection to an EAS Decoder they include a 9 pin data cable, and a two wire audio cable.

Connect the data cable "H" from the EAS decoder to the "EAS DATA" input on the rear of the commux. Attach the EAS audio cable "I" to pins marked "EAS AUDIO + v " on the terminal plug connector.

### **Auxiliary Data Connections**

The auxiliary data connector requires a 9 pin D - type connector for connection to a printer or other device if used. Consult factory prior to connecting a device to this data port.

When all necessary cables have been connected, apply power to the server rack, then press the reset push-button on the rear of the commux for approximately one second.

The commux indicators "PWR" and "PC" will be lit. The commux is ready for use.

## **6.2.3 Replacing a Commux Unit**

To remove the commux proceed as follows:

1. Remove the power from the server rack.
2. Disconnect data cables from the Local terminal, EAS decoder and Auxiliary data if used.
3. Disconnect the audio terminal plug connector with the EAS and local audio inputs.
4. Disconnect the data jumper cable and audio jumper cable between the commux and server unit. Remove only the connections at the rear of the commux.
5. Disconnect the power connector from the rear of the commux.
6. Release the four quarter turn fasteners on the front panel of the commux and remove the assembly.
7. Install the replacement commux ensuring that the cables are reconnected as described in section 6.2.2.



### 6.3 Replacing an Interface Unit

Each Cable Envoy rack assembly has an interface unit located at the second position from the left side (from front) on the server and client racks.

**Note:** the interface for the client and server racks are different, ensure that the replacement interface unit being installed is for the correct type of rack.

There are two parts to the interface unit:

1. A removable interface card assembly which slides into the front of a Cable Envoy™ rack and is secured to by two quick release fasteners.
2. A circuit assembly which is attached to the rear panel. This assembly has connectors for attaching common video, EAS audio, relay contact and data signaling cables to the rack unit. The interface card when installed from the front of the unit will connect with the connector assembly.

This arrangement permits the interface card to be removed or replaced without disrupting the installed cabling at the rear of the rack. Relays on the connector assembly ensure continuity of audio and video signals whenever an interface is removed or when power is removed from the rack.

**Before replacing an interface unit, ensure that there are no active channel units displaying alert or other messages within the rack. If safe to do so, remove power to the rack.**

If only the interface card requires replacement; release the two quick release fasteners on the front panel and remove the existing interface unit. Install the new card, ensuring that it is located between the card guides, then engage fasteners.

If it is necessary to replace the interface card's rack interface module (RIM) assembly, remove the existing interface card. Remove all wiring from the interface connector assembly at the rear of the unit.

Using a 9/16" extended socket wrench, unscrew two jam nuts which are attached to the BNC connectors, then remove the RIM assembly from the front of the rack.

Install the supplied plastic washers on to both BNC connectors on the RIM. From the front of the rack, slide the new RIM assembly into the rack, along the channel card guides, until the two BNC connectors penetrate the rear panel. Ensure that the assembly is not tilted, that the BNC connectors are perpendicular with the rear panel, and that approximately four thread turns are exposed on the BNC connectors.

Attach two jam nuts, one to each BNC connector and tighten.

Install the new card, ensuring that it is located between the card guides, then engage fasteners.

# **SECTION 7**

## **OPERATING MODES**

### **7.1 Video Operating Modes**

There are six conditions for video signal transfer between the input and output connections, they are:

1. With no power supplied to the rack, or if the server or channel card is removed from the unit, then the Video IN signal is connected directly to the Video OUT via a normally closed relay contact.
2. With power applied, and the character generator inactive, the input video signal is terminated, DC restored and buffered to the output.
3. When text is displayed, either as a crawl, overlay, or caption, the video signal is routed via the internal character generator then buffered to the video output.
4. If the common video is selected, then the baseband video signal to the character generator is switched from its video input to the common video, which is then DC restored and buffered to the output.
5. If the video input signal is lost, then the common video signal will be buffered to the video output and the video loss default notice displayed.
6. If there are no video signals present, an internal video signal will be generated by the character generator. This will consist of a text display on either a Blue or Green background.

### **7.2 Audio Operating Modes**

1. The audio signals are directly connected between the inputs and outputs via normally closed relay contacts.
2. Whenever an audio override condition is initiated, a relay disconnects the channels audio input(s) and connects the audio signal received at the server unit to the audio output signals.
3. Alert tones may also be generated by the channel units, for alerting at the beginning of each displayed message.

## SECTION 8

### 4.5 MHz AUDIO MODULATOR

The 4.5 MHz audio modulator is used to provide compatible audio signals for systems which employing either 4.5 MHz audio or composite video with audio signals. This board is provided as an optional circuit board, which attaches to the Server unit in the Server rack.

The baseband audio from commux or EAS decoder or other 600-ohm audio source connects to the modulator via an RCA type phono connector.

An external 4.5 MHz audio signal is provided via a BNC connector on the modulator. This signal has a 75 ohm source impedance and should be terminated with 75 ohms.

Jumpers on the modulator assembly are used to connect either the baseband audio signal or a 4.5 MHz modulated signal to server rack.

Modulator settings include:

- Carrier frequency adjustment.

- Modulation level.

- Output level.

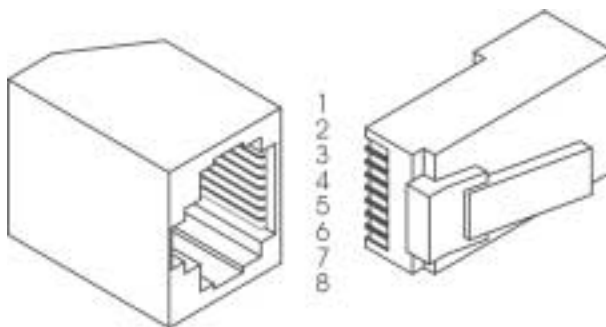
## Appendix A

### Data Cable Assembly

Data signaling between racks is transmitted via Unshielded Twisted Pair (UTP) data cable. This cable is four pair, solid wire, with RJ-45 connectors and should conform to Category 3 (4 MHz) or better, data cable.

Data cables may either be purchased in pre-assembled lengths, or made to length at site. To prepare cables to length at site requires purchasing bulk UTP cable, RJ-45 connectors, modular crimp tool with die and a cable stripper. Cables should be assembled with **straight through** pinning using the following color sequence:

Contact	Signal	Wire color
1	RSET+	white/orange
2	RSET-	orange
3		white/green
4	TD+	blue
5	TD-	white/blue
6		green
7	RLY+	white/brown
8	RLY-	brown



**Note:** Wiring in accordance with the color chart will ensure proper selection of twisted wire pairs.

Data wire type: 4 Pair twisted, 24 gauge, solid, Category 3, PVC

Connectors: RJ-45 plugs, Category 3 or 5

## **Appendix B**

### **Connections to MIP-921e EAS Decoder**

#### **Connecting the HollyAnne MIP921 to the Cable Envoy™ Commux**

There are two cables which connect the MIP921 to the commux as follows:

1. Audio Cable CX508S

Stripped ends connect directly to the 'EAS Audio' terminals on the 6 position terminal strip at the rear of the commux unit.

The stripped ends attach to the 'Audio Out' terminals on the 12 position I/O terminal strip on the MIP921.

2. The Data Cable CX506S

The DB9 female connector attaches to the EAS data connector at ON commux unit.

The DB9 male connector attaches to the COMM. 2 input on the MIP921

#### **Connecting the HollyAnne MIP921 to the Cable Envoy™ Server**

1. Audio Cable AX0017

Phono connector end connects directly to the phono socket on the rear of the server unit.

Stripped ends attach to the 'Audio Out' terminals on the 12 position I/O terminal strip on the MIP921.

2. The Data Cable CX506S

The DB9 female connector attaches to the data connector at the rear of the server unit.

The DB9 male connector attaches to the COMM. 2 input on the MIP921

# The Cable Envoy™ CEMS-1000 System

The CEMS-1000 is the most basic configuration of a Cable Envoy™ system. It comprises one Server Rack equipped with a Rack Interface Unit, Power Supply and a Server Unit.

A typical application of the CEMS-1000 system is to interface with an EAS decoder and to provide a single character generator display of alert or test signals transferred from the decoder, which may be used on one channel of a cable system, or if used in conjunction with either a comb filter generator or IF switching equipment, the character generator display may display pages of text messages on a number of cable channels.

Alternatively, the CEMS-1000 system may be upgraded to display crawls, captions or overlaid video text messages on a selected single channel.

## Upgrading the CEMS-1000 system

The CEMS-1000 may be easily upgraded by adding channel cards to accommodate additional channels. Also, additional client racks may be added and connected to the CEMS-1000 server rack.

A communications multiplexer may be added to expand input capabilities and a modem for remote activation via dial up communications. This addition requires a change of software in the server unit.

## CEMS-1000 Installation Summary

### Equipment Supplied

CEMS1000 19" wide X 5-1/4" high Equipment Rack comprising:

Server unit  
Rack interface unit  
Power supply

Cables Supplied: Data cable - CX506S  
Phono Plug - CX509  
Audio Cables - AX0017  
Cable Envoy User's Guide  
CEMS-1000 Installation Guide

### Baseband Video and Audio connections

#### Video Signal connections

The TV channel which is to have the character generator applied should have its video baseband signal connect to the Server Unit prior to the channel modulator as follows:

Connect the baseband video signal to the BNC connector marked 'IN' under the 'S' designated connectors.

The output video signal marked 'OUT' under the 'S' designated connectors.

**Note:** The output video signal should be terminated (75 ohm) at the modulator.

## Audio signal(s) connections

The baseband audio signals are connected to removable terminal blocks located under the 'S' designator. If monaural audio is provided the signals should be connected to the left terminal block (as viewed from rear).

Connect the audio signals from the source to the '+', '-' and common connections (lower three connections) on the terminal block.

Connect the audio signals to the modulator to the '+', '-' and common connections (upper three connections) on the terminal block.

If stereo signals are available connect the second audio channel signals to the right terminal block on the rear of the server.

**Note:** Audio signals should be terminated (600 ohm) at the modulator.

## Rack Interconnections

The rack interconnections and their use with the CEMS1000 are as follows:-

Common Video In	Provided to enable an alternate baseband video signal to be used to replace the channel video signal. (terminated 75 ohm)
Common Video Out	Buffered output of common video in, for distribution to another Cable Envoy rack.
Audio Out	A buffered audio signal carrying alternate audio signal as received by the server unit. Used for distribution to another Cable Envoy rack.
Audio In	Not used on a Server rack.
Relay Contact	A normally open relay contact, closed when video override is activated on the server unit.
Data & Control Out	An RJ45 type socket is provided to extend the Cable Envoy signaling Server rack to Client racks.
Data & Control In	Not used on a Server rack.

## Installing a New Channel Unit

Refer to section 6.1 of this manual.

## EAS Decoder - Cable Envoy Commux Data Interchange.

Command Structure    STX + Control Code + Optional Data + ETX

Start of Text (STX)    Hex 0x02

End of Text            Hex 0x03

Control -1            Hex 0x04, request/acknowledge audio header & attention signal

Control -2            Hex 0x05, request/acknowledge alert voice & audio EOM

Control -3            Hex 0x06, request/acknowledge header translation

Control -4            Hex 0x07, notify CG that Decoder is ready to transmit.

Control -5            Hex 0x08, request/acknowledge text message

Control -6            Hex 0x09, request/acknowledge user recorded voice

Control -7            Hex 0x0A, request/acknowledge alert audio only

Control -8            Hex 0x0B, inform CG of exception (abort or time-out)

Control -9            Hex 0x0C, request/acknowledge Spanish header translation

Control -10           Hex 0x0D, request/acknowledge Spanish alert audio

Control -11           Hex 0x0E, request/acknowledge Spanish recorded voice

Data Format            9600 baud (8,N,1) RS232c, ASCII Control Codes

Data Connector        DB9: Pin 2 = Rx, Pin 3 = Tx, Pin 5 = Gnd.

Audio                  600 ohms balanced, 0.5 - 6.0 Vp-p

Cable Envoy Commux virtual address assignments:

English crawl channels	AA - Default virtual address for all channels
English details channels	BB - Channels assignments entered by user

Spanish crawl channels	CC - Channels assignments entered by user
Spanish details channels	DD - Channels assignments entered by user

Channel assignments entry: - at prompt - #01#05, etc.

Commux automatically assigns virtual address to channel selected when an EAS alert or test is received.



# Installing a New PROM in the Commux Unit

## A. Remove the Commux unit from the rack unit as follows:

1. Remove the power from the server rack.
2. Disconnect data cables from the Local terminal, EAS decoder and Auxiliary data (if used).
3. Disconnect the audio terminal plug connector with the EAS and local audio inputs.
4. Disconnect the data jumper cable and audio jumper cable between the commux and server unit. Remove only the connections at the rear of the commux.
5. Disconnect the power connector from the rear of the commux.
6. Release the four quarter turn fasteners on the front panel of the commux unit and remove the assembly.

## B. Disassemble the Commux unit

1. Remove the commux back panel by unscrewing the spacer screws attached to the DB-9 connectors, using a 3/16" nut driver.
2. The commux assembly consists of three printed circuit board assemblies, which are assembled together using 6-32 hardware and spacers. The lower circuit board is mounted to the front panel with a red mounting guide. Remove four 6-32" screws from the underside of the lower circuit board.
3. Separate the lower circuit board from the upper boards by prying them apart to disconnect the connections between the middle and lower boards.
4. The program PROM is located on the lower circuit board assembly at location U6 (next to the Dallas Timekeeper).
5. Remove this PROM and replace it with the new PROM

## C. To re-assemble the lower printed circuit board to the upper boards:

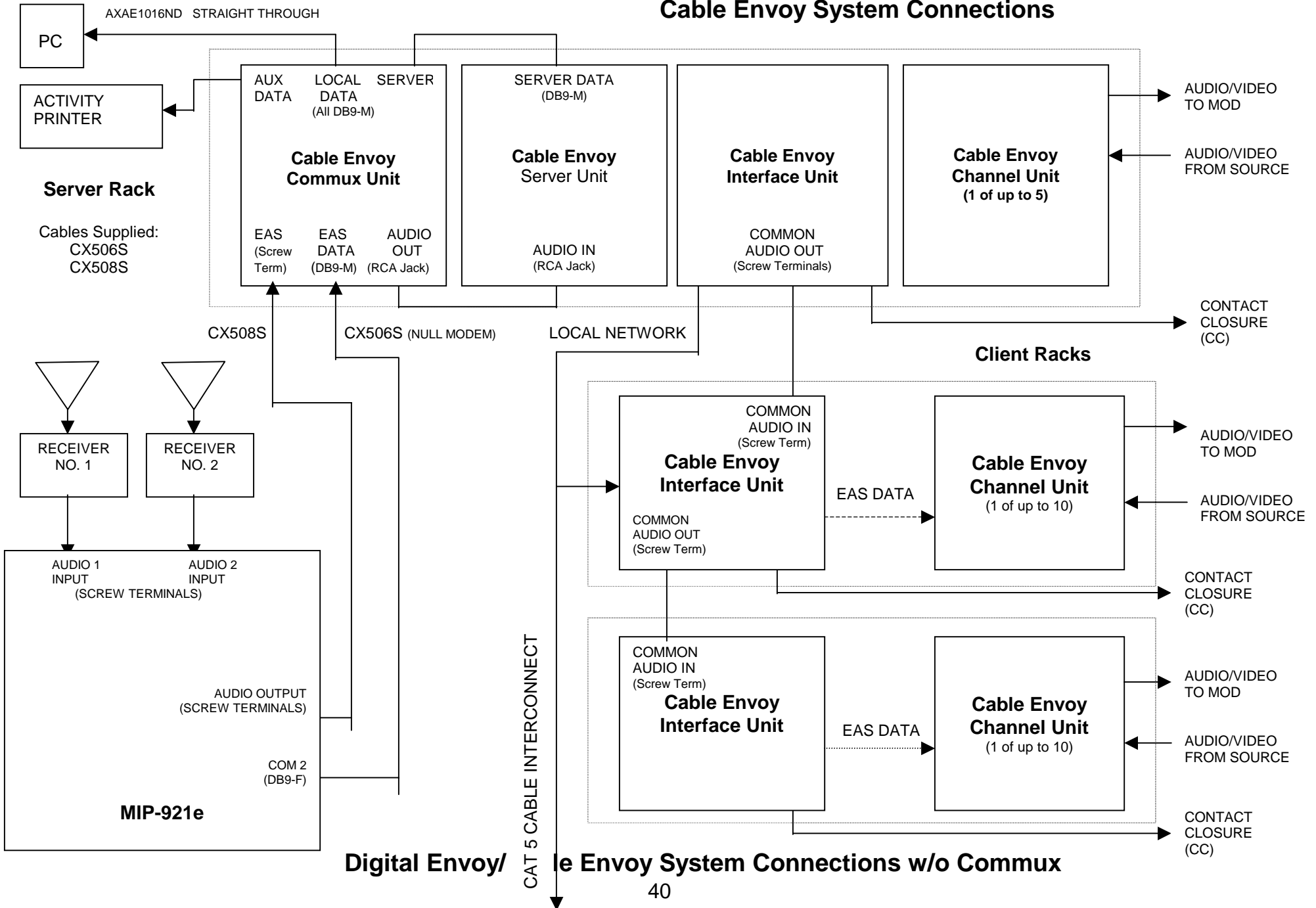
1. Place the upper boards over the lower board.
2. Align and insert the green LED into the hole in the front panel (marked TELE)
3. Align the connector and pins on the connectors which are close to the front panel. Press the boards together such that the connector and pins engage.
4. Align the connectors and pins close to the rear of the boards and press together.
5. Attach the four 6-32 screws to the bottom of the printed circuit board assembly. See note
6. Attach the rear panel using the DB-9 spacer screws. See note.

**Note:** If the PROM is only to be tested and may be replaced shortly, it is unnecessary to attach these screws and rear panel.

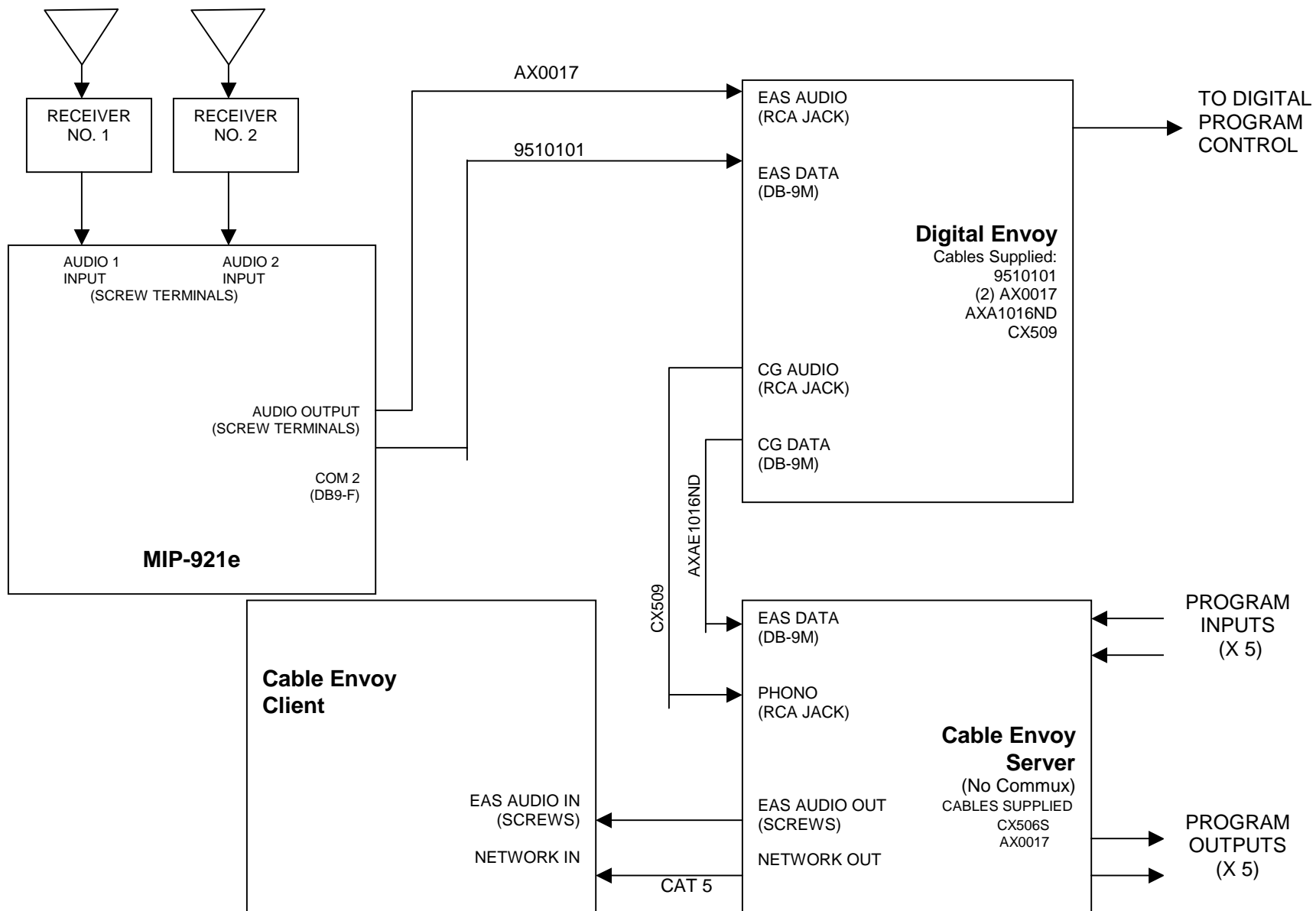
#### **D. Reinstall the commux assembly**

1. Place the commux unit into the rack and align with the board guides..
2. Attach the commux unit to the rack unit via the four quarter turn fasteners on the commux front panel.
3. Attach the data jumper cable and audio jumper cable between the commux and server unit.
4. Attach the audio terminal plug connector with the EAS and local audio inputs.
5. Attach the data cables from the Local terminal, EAS decoder and Auxiliary data (if used).
6. Attach the power connector to the rear of the commux.
7. Apply power to the server rack.

# Cable Envoy System Connections



Digital Envoy/ Cable Envoy System Connections w/o Commux



### Digital Envoy/Cable Envoy System Connections with Commux

