Maintenance Manual

EDACS®
C3 ADVANTAGE™
DISPATCH SYSTEM

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SPECIFICATIONS *

OVERVIEW

DISPATCH CONSOLE EQUIPMENT

Type	C3 Maestro Console; "CRT" type (See the applicable maintenance manual for detailed specifications.)
Compact CEC Interface	
C3 Maestro Cables Supplied w/ Standard Package	100-foot (30.5 meters) in length; RS-422 control data and 600-ohm audio
Customer Supplied C3 Maestro Connections	
Control Data Link	
Type	RS-232 and RS-422 full-duplex serial connections provided
Date Rate	9.6k or 19.2k baud; rate programmable at C3 Maestro console
Local (Co-Located) Connection	4000 feet (1219 meters) maximum using 2 pairs (RS-422)
Remote Connection	User provided private or leased facilities and data modems interfaced to equipment via 3-wire (RS-232) interconnections
Audio Link	
Local (Co-Located) Connection	600-ohm balanced line
Remote Connection	User provided private or leased facilities
AUDIO SWITCHING	Compact CEC Digital Audio Switch (See following specs.)
SYSTEM DATABASE SET-UP	
LID (Logical ID) & GID (Group ID) Programming	Program unit and group databases entities via C3 Maestro's Editor program or an optional EDACS System Manager computer

C3 MAESTRO CONSOLE

(See the applicable maintenance manual)

COMPACT CEC DIGITAL AUDIO SWITCH

FEATURES

Primary Design	
Control Type	Multiple distributed microprocessors
Audio Processing	Pulse Code Modulation; 64k baud µ-Law quantization
Audio Switching	Time Division Multiplexed bus system
System Reliability	• Redundant high-speed data bus with tri-state devices • Informational, warning and error messages displayed via CEC Manager • LED indicators on each board provide indications of current board status for quick troubleshooting and diagnostic checks
CEC Manager Functions	• Reconfigure Compact CEC on-line with no service interruption • Program console parameters and permission lists on-line • Interface with EDACS System Manager (optional) to automatically download database changes

GENERAL

Regulatory & Environmental Data	
Complete System	Meets FCC Part 15
Power Supply	Meets UL, CSA and IEC 950 electrical safety standards

Radio Frequency Interference (RFI)	Conforms to FCC Part 15 Class A and EN55022 Class A
Temperature Ranges	
Operating	+0 to +40° Celsius (+32 to +104° Fahrenheit)
Non-Operating	-20 to +85°C (-4 to +185° Fahrenheit)
Maximum Humidity	90% non-condensing
Uninterruptible Power Supply (UPS)	Recommended
Cabinet Characteristics	
Dimensions (height x width x depth)	69 1/16 x 24 x 24 inches (175.5 x 61 x 61 centimeters)
Material	16-gauge cold rolled steel
Color	Light gray with black trim
Installed Card Cages	2
Primary	Upper: Card Cage 1
Conventional	Lower: Card Cage 2 (CIA rack)
Installed Uplink Equipment	1 General Electric Trunking Card (GETC)
Installed Power Supply Units	1 Redundant Power Supply (RPS) Unit
Cabinet Ventilation	Top-mounted two-speed cabinet fan
Processing Speeds	
Call Routing Time	Less than 10 milliseconds (Compact CEC input to output)
Console Access Time	Less than 500 milliseconds
Auxiliary Inputs And Outputs	
Auxiliary Inputs	Opto-isolated, balanced input
Impedance	1200 ohms (approximate)
Current	5 mA nominal, 10 mA maximum
Auxiliary Outputs	Form-A and open-collector
Voltage Rating	24 Volts ac or dc (Form-A); 50 Vdc (open-collector)
Current Rating	1 Amp, non-inductive load (Form-A); 20 mA (open-collector)
TRUNKED SITE CONTROL DATA INTERFACE	
Type	GETC in an uplink configuration
Uplink Location	Installed in Compact CEC cabinet approximately one (1) rack unit below the conventional Card Cage (Card Cage 2)
Effective Data Rate	9.6k baud
Line Requirements	Type 3002 data-grade 4-wire phone line or equivalent
CONVENTIONAL BASE STATION INTERFACES	
Total Interfaces	4 (standard package) or 8 (maximum expansion capability)
Line Connections	2-wire or 4-wire
Input And Output Impedances	600-ohm (±10%) balanced lines
Control Signaling	
Tone	11 EIA standard function tones from 1050 to 2050 Hz; hold tone dynamic range of -45 to -20 dBm
DC	0, -2.5, ±6 and ±11 mA (135 Vdc maximum)
Configuration	Each channel individually programmable via CEC Manager
AUDIO PERFORMANCE (Per Audio Channel/Port)	
Frequency Response	±3 dB from 300 to 3000 Hz
Distortion	Less than 3% from 300 to 3000 Hz
Hum And Noise	At least 50 dB below audio signal at maximum output level
Input/Output Level Control	Digital Level Memory (DLM); gain level stored in digital memory; each memory programmable via CEC Manager
Input Range	-20 to +10 dBm adjustable via DLM (LRIM channels n/a)

Output Range	-20 to +10 dBm adjustable via DLM
Gain Performance	Automatic Level Control (ALC) provided; programmable (enable/disable) via CEC Manager
Input And Output Impedances	600-ohm (±10%) balanced lines

POWER SUPPLY

Redundant Power Supply (RPS) Unit

Input Voltage	120 Vac ±15% or 230 Vac ±15% (47 to 63 Hz)
Input Voltage Selection	Automatic (no configuration necessary)
Input Power	580 Watts maximum at full dc load
DC Outputs	+5 Vdc, +15 Vdc and -15 Vdc
Total Output Power	380 Watts maximum
Duty Cycle	Continuous
Output Hold-Up Time	20 milliseconds under full load
Status Indicators	All outputs operational and over-temperature
Redundancy	Dual (2) redundant power supply modules
Over-Voltage Protection	Provided for all dc outputs
Short-Circuit Protection	Primary power and primary current limiting
Reverse Voltage Protection	Provided
Thermal Protection	Thermal overload protection enabled at 80°C
Electrical Safety Standards	Meets UL, CSA and IEC 950 standards
Location	Bottom of cabinet

Compact CEC Cabinet UPS Recommendations

Rating	700 Watts
Hold-Up Time	Until generator (customer supplied) can be brought on-line
Switch-Over Time	Less than 20 milliseconds

* These specifications are intended primarily for the use of the serviceman. See the appropriate Specifications Sheet for complete specifications.

INTRODUCTION

The **EDACS® C3 Advantage Dispatch System** provides enhanced console dispatch and integrated control for an EDACS® trunked site and conventional radio channels. The C3 Advantage equipment package consists of:

- **C3 Maestro dispatch console(s)** – As shown in Table 1, the C3 Advantage dispatch system supports up to three (3) C3 Maestro consoles. Basically, a C3 Maestro console is an IBM® PC compatible computer running custom software developed by Ericsson Inc., a specialized audio enclosure, and accessories such as a dispatch keyboard, speakers and headsets. This state-of-the-art CRT-based dispatch console provides advanced dispatch features such as instant communication module transmit, trunked group and conventional channel patch control, display of caller ID, and display of recent call history. Hardware features include a select speaker, up to three unselect speakers (two max. if equipped with Call Director patch), supervisor and operator headset jacks, and an optional Call Director telephone patch interface.

- **Compact CEC Digital Audio Switch** – This scaled-down version of the CEC **(C**entral **E**lectronics **C**ontroller**)** Digital Audio Switch interconnects the C3 Maestro consoles, the EDACS trunked site and conventional base station equipment. The Compact CEC incorporates the same highly-reliable digital audio switching and redundant power supply technology found in the CEC Digital Audio Switch plus an uplink GETC for interfacing to the EDACS trunked site.

- **CEC Manager Application Program & CEC Manager** – The CEC Manager application program is custom software developed by Ericsson Inc. In the C3 Advantage dispatch system, it provides all diagnostic and configuration functions for the Compact CEC. In addition, it also provides certain configuration functions for the C3 Maestro consoles connected to the Compact CEC. This software may be installed and executed on a stand-alone IBM® PC compatible computer or it may be installed and executed on one of the C3 Maestro console personal computers. In either case, the computer software and hardware combination is customarily referred to as the "CEC Manager". In the past, it has been referred to as the "**MO**nitor **M**odule **P**ersonal **C**omputer" ("**MOM PC**").

Although not included with the C3 Advantage equipment package, the following items are interconnected to the Compact CEC and thus, each is considered an integral part of the C3 Advantage dispatch system:

- **EDACS trunked site** – In a fully-expanded C3 Advantage dispatch system, up to twelve (12) channels of an EDACS trunked site can be interfaced to the Compact CEC for dispatch and conventional channel patch communications across the C3 Advantage dispatch system. The site may be, for example, an EDACS Level 1 system (EDACS site with Site Controller) or an EDACS Basic system (EDACS site with no Site Controller). In the case of the EDACS Level 1 system, the System Manager computer is optional. EDACS Basic systems are not normally equipped with a System Manager.

- **conventional radio systems** – Conventional base station equipment interfaces to, and is remotely controlled by the C3 Maestro console(s) via the Compact CEC. Conventional channels can be patched to trunked groups operating on the EDACS site. The Compact CEC interfaces with both tone and dc remote controlled conventional base stations via 2 or 4-wire line connections.

- **logging recorders** – Unit, group and conventional channel call audio can be programmed at the CEC Manager for recording on external recording equipment. As shown in Table 1, eight (8) outputs are provided.

Table 1 – C3 Advantage Interfacing Capability

INTERFACE	STANDARD EQUIPMENT PACKAGE	MAX. EXPANSION CAPABILITY
dispatch consoles	one C3 Maestro console	three C3 Maestro consoles
trunked sites	one 4-channel (max.) EDACS site	one 12-channel (max.) EDACS site
conventional channels	four , each programmable for tone or dc control and 2 or 4-wire connections	eight, each programmable for tone or dc control and 2 or 4-wire connections
logging recorder	eight audio outputs provided	eight audio outputs provided

C3 MAESTRO CONSOLE

The EDACS® C3 Maestro console is a state-of-the-art CRT-based dispatch console system designed to interface to EDACS® **CEC** (**C**onsole **E**lectronics **C**ontroller), **Compact CEC**, and **IMC** (**I**ntegrated **M**ultisite and **C**onsole **C**ontroller) Digital Audio Switch equipment. The C3 Maestro provides enhanced console dispatch features on a PC-AT™ computer platform. A standard C3 Maestro console system consists of:

- an IBM® PC-AT™ compatible Personal Computer (PC) system running MS-DOS® software and custom C3 Maestro application software, a color video display monitor (the "CRT") and a standard PC keyboard
- a Dispatch Keyboard typically referred to as the "Custom Keyboard"
- a specialized audio enclosure which provides audio conditioning, routing and amplification functions
- a set of speakers (typically two – one for select audio and one for unselect audio)
- volume controls for the speakers
- other accessories such as headsets, microphones and footswitches

The C3 Maestro console's video display monitor and keyboard replace the array of controls and indicators found on traditional modular/desktop-type consoles. Standard headsets, microphones, footswitches and speakers can be connected to the C3 Maestro. Also, a variety of other external inputs and outputs are supported.

NOTE

Refer to the maintenance and operator manuals included with the C3 Maestro console for a complete description of it.

COMPACT CEC DIGITAL AUDIO SWITCH

The Compact CEC Digital Audio Switch is a state-of-the-art digital audio switch which forms the heart of a C3 Advantage dispatch system. Housed in a single 69-inch high, 19-inch rack mount cabinet, it interfaces the C3 Maestro console(s), the EDACS trunked site and conventional radio channels together for central communications. It also provides audio outputs for logging recorder equipment.

The Compact CEC Digital Audio Switch is manufactured with many of the same components as the CEC Digital Audio Switch. Essentially, when compared to a CEC, the Compact CEC differences reduce system cost, installation space and time, set-up time, and maintenance without sacrificing primary CEC features. By reducing costs, these differences make the Compact CEC more attractive for customers who do not require the full-featured CEC.

HARDWARE COMPONENTS

Card Cage And Backplane Assembly

The Compact CEC contains two (2) Card Cage and Backplane Assemblies which are typically referred to as simply "Card Cages" or "racks". The upper-most Card Cage – Card Cage 1 – is the considered the "primary" Card Cage since all TDM audio switching is accomplished within this Card Cage. The lower Card Cage – Card Cage 2 – is specifically reserved for boards used to interface to conventional base stations. This Card Cage is typically referred to as the "**CIA** rack" (**C**onventional **I**nterface **A**dapter rack).

Each Card Cage is 6-rack units (10½ inches) high and has twenty-one (21) identical mechanical slots for board insertion. Mechanical slot access is located on the front side of a Card Cage.

The Backplane printed circuit board is mounted at the rear of the assembly. This Backplane has numerous connectors on both its front and back sides. Connectors on its front side mate with connectors on the boards inserted into the front of the Card Cage. Connectors on the back side of the Backplane printed circuit board provide connections for the Terminator Boards, power supply cables, audio and data cables to and from the Concentrator Cards, and the Local Bus Cables.

In the Compact CEC, boards inserted into Card Cage 1 include Controller Boards, Audio Boards and a Clock Board. Boards inserted into Card Cage 2 include a Controller Board and up to two (2) Conventional Interface Boards. See the Application Assembly Diagram (Sheet 3 of 5) in this manual for detailed rack-up information.

Audio Board

Basically, each Audio Board in the Compact CEC consists of a microprocessor control section and four (4) nearly identical full-duplex audio processing circuits. Each audio circuit converts incoming audio (source or input audio) applied to the channel's 600-ohm balanced-line input into µ-Law **PCM** (**P**ulse **C**ode **M**odulation) digitized audio signals. The digitized audio signals are then placed on the Compact CEC's **T**ime **D**ivision **M**ultiplexed (**TDM**) audio

network at a predefined time slot for the respective channel. Next, signals from this source channel are digitally applied to the Backplane so any other Audio Board in the upper Card Cage (Card Cage 1) can extract or "pull" the digitized audio from the TDM audio bus. The audio extraction process (destination or output audio) uses similar circuitry built into each Audio Board channel that basically performs the reverse action. The resulting audio is applied to a channel's balanced line output.

The TDM audio network is formed by eight (8) TDM audio buses. Each bus has thirty-two (32) multiplexed time slots that carry a single audio channel. Sixteen (16) time slots are reserved. This design allows simultaneous routing of up to 240 channels through a Compact CEC; however, the Compact CEC never requires more than thirty-two (32) time slots.

An on-board 80C535 microprocessor controls most of the Audio Board's basic functions. However, the Controller Board provides master Audio Board control via parallel I/O signals and high-speed HDLC serial data connections. Audio routing is controlled by the parallel I/O signals from the Controller Board and the HDLC serial link controls non-critical functions such as notch filter enable/disable. Both the parallel I/O and HDLC signals are transferred from the Controller Board to the Audio Board(s) within a given "interface module" by the Local Bus Cables installed on the rear side of the Backplane. Additional details on the "interface modules" are contained in subsequent sections of this manual.

Normally, the Audio Boards are labeled "**AUDIO**" on their top extraction handle and they are labeled in accordance with their assigned channels on their bottom extraction handle. For example, the MIM's second Audio Board – MIM channels 5 thru 8 – is labeled "**05 - 08**" on its bottom handle. See the accompanying maintenance manual for detailed Audio Board service information.

Controller Board

The Controller Board is a microprocessor-controlled unit which routes control data and other messaging information between its Audio Board(s), the external devices connected to it, and other Controller Boards within the Compact CEC.

Every Controller Board contains a set of unique "interface module" software personalities. Each software personality is designed to interface a particular external device such as an EDACS trunked site or a console to the Compact CEC. Personality selection is accomplished via DIP switches on the board. Additional details on the "interface modules" are contained in subsequent sections of this manual.

An Intel 80C152 microprocessor on the Controller Board is the "communications controller" for the board. The 80C152 architecture includes a high-speed **G**lobal **S**erial **C**hannel (**GSC**) bus used to link all Controller Boards within the Compact CEC's primary Card Cage together. Peerless CSMA/CD local area network protocol techniques are utilized on the GSC bus. A redundant GSC bus structure provides continuous operation in the event of a hardware failure.

The 80C152 also directly controls two RS-232/RS-422 serial ports. These ports are used to interface a Controller Board with external devices such as an uplink GETC (MIM Controller Board) and a C3 Maestro console (CIM Controller Board). Control data is transferred over these serial interfaces.

The Controller Board also has an Intel 80C186 microprocessor. **D**ual-**P**ort **R**AM (**DPRAM**) chips are used to transfer data between the 80C186 and 80C152. The 80C186 is the "interface controller" that performs most I/O functions and logical processing for the Audio Boards within its interface module. It switches the TDM audio network by assigning time slots to active channels. As previously mentioned, master Audio Board control is accomplished using a high-speed HDLC serial data link and parallel I/O signals. These interconnections between the Controller Board and the Audio Board(s) are referred to as the "local control bus" and are handled over the Local Bus Cables on the rear of the Card Cage 1's Backplane.

The 80C186 controls two on-board dual HDLC serial communication controller chips. One HDLC chip provides a full-duplex RS-422 port and the other provides the HDLC link to the Audio Board(s) via the local control bus. This HDLC link is used for non-critical Audio Board control.

As shown in the Application Assembly Diagram in this manual, Controller Boards are labeled on their top extraction handle in accordance with the interface module to which they control, for example "**MIM**" or "**CIM**". On the bottom extraction handle, they are labeled in accordance with their respective device assignment number. For example, the second CIM Controller Board is labeled "**02**" on its bottom handle. See the accompanying maintenance manual for detailed Controller Board service information.

Clock Board

The Clock Board is located in slot twenty-one (21) of the upper Card Cage (Card Cage 1). As shown in the Application Assembly Diagram in this manual, this slot is the far right-hand slot as viewed from the front.

The board generates synchronized clock pulses for the TDM audio network across the primary Backplane. These pulses, applied to the Audio Boards via Futurebus lines on

the Backplane, define TDM time slots in which the digitized audio signals are written to and read from the TDM audio network.

Two (2) identical but completely separate clock circuits – "A" and "B" – on the Clock Board provide redundant (back-up) clocking capability for the Audio Boards. Clock pulse outputs from both circuits are selectively applied to the Audio Boards via Futurebus transceivers and the Backplane. The MOM Controller Board controls A/B clock selection by sending clock select command signals to all interface modules within the Compact CEC's primary Card Cage. If any of the selected clock pulses fail, clock monitoring circuitry on the Audio Boards alarm the MOM Controller Board via their respective Controller Board. The alarm signals are sent from the Audio Board(s) to the respective Controller Board via the local control bus. Controller Boards then signal the MOM via the GSC bus.

The initial start-up or default clock circuit is "B". If the MOM and two (2) other Controller Boards report a "B" clock circuit problem the MOM will switch clock operation to the "A" clock by sending clock switch commands to all interface modules in the primary Card Cage. Similarly, the MOM will also switch back to the "B" clock if a problem exists with the "A" clock. This redundant clock circuit selection can be enabled and disabled via the CEC Manager.

See the accompanying Clock Board maintenance manual for detailed service information.

NOTE

If the Compact CEC is equipped with a single Clock Board (standard configuration), both toggle switches on the front of the Clock Board should be left in the "ON" position.

Terminator Board

The Terminator Board provides line termination for the Futurebus digital lines on the Backplanes. These lines include the TDM audio buses, the GSC control bus and the clock lines. Two (2) Terminator Boards are required on each Card Cage within the Compact CEC for a total of four (4) in the entire Compact CEC cabinet.

Each Terminator Board has sixty-three 39-ohm pull-up resistors, with each resistor pulling its respective Futurebus line to a 2-volt regulated supply. The design includes primary and secondary 2-volt regulated supplies with the secondary supply providing back-up operation in case the primary regulator fails. Relay alarm outputs are provided for both the primary and the secondary regulators. See the accompanying Terminator Board maintenance manual for detailed service information.

Conventional Interface Board

Remote control signal generation and audio interfacing for conventional base station equipment are furnished by the **C**onventional **I**nterface (**CI**) Board. This board is installed in the **C**onventional **I**nterface **A**dapter (**CIA**) rack. The CIA rack – Card Cage 2 – is considered a secondary interface because it does not have direct TDM and GSC bus links to the primary Compact CEC interface modules in the upper Card Cage – Card Cage 1. The CIA rack is connected to the VMIM interface module in Card Cage 1 via 600-ohm audio connections and an RS-232 serial control data connection. Additional details on the "interface modules" are contained in subsequent sections of this manual.

Each CI Board provides four (4) duplex audio channel links for conventional base station equipment. In a standard C3 Advantage package, one (1) CI Board is installed in the CIA rack to provide interfacing with up to four conventional channels. Optionally, a second CI Board may be installed in the rack to provide interface capability with up to eight (8) conventional channels. In this case, a second VMIM Audio Board must be installed in the primary Card Cage – Card Cage 1.

Every CI Board channel has remote control signal generation circuitry programmable via the CEC Manager on a per channel basis for either tone or dc signalling. During a conventional channel transmit operation, transmit audio signals from the Audio Board within the VMIM are summed with the control signal generated on the CI Board (either tone or dc) and the summed signal is passed to the conventional base station via a 2- or 4-wire phone line. Although no external connections are provided, E & M signaling capability is available for microwave (or equivalent) connections. This transmit operation may occur when a C3 Maestro dispatcher makes a call to a conventional channel or, if the conventional channel is patched to a trunked group, when an individual on the trunked group makes a group call.

Voice-**O**perated (**VOX**) and **C**arrier **O**perated **R**elay (**COR**) detection circuitry is incorporated into each conventional channel for receive audio detection. VOX or COR operation is selected on a per channel basis by the CEC Manager. When receive audio from a conventional base station (or voter) is detected the CIA signals the VMIM of the call. The CI Board transfers receive audio from the base station (or voter) to the respective channel within the VMIM. From the VMIM, the audio is distributed to one or more C3 Maestro consoles via CIM(s) and/or, if the conventional channel is patched to a trunked group, to the trunked group via the MIM.

An Intel 80C152 microprocessor furnishes control for the CI Board. It links the CI Board to the CCI Controller Board using a local GSC control bus. See LBI-38774 for detailed service information on the Conventional Interface Board.

Concentrator Cards And Punch Blocks

In the Compact CEC cabinet, four (4) Concentrator Cards are mounted on a hinged horizontal panel on the rear cabinet rail. As shown in the Application Assembly Diagram, the cards are identified A1 thru A4. A1 and A3 are Audio Concentrator Cards, A2 is a Data Concentrator Card and A4 is a MOM Concentrator Card.

The hinged panel can be swung out to gain access to the rear of the Backplanes and the internal side of the Concentrator Cards. The hinge is located on the right rear-most mounting rail as viewed from the rear of the cabinet.

Basically, the Audio and Data Concentrator Cards (A1 - A3) convert the 24-pin dual-row header connections located on the Backplane to standard 50-pin Champ® type connections located on the external side of the card. This is accomplished by the card itself and the associated cables referred to as "Concentrator Card Cables". Each Concentrator Card Cable mates a 24-pin dual-row connector on the Backplane to an identical type connector on the internal side of a Concentrator Card. The card then wires several of its internal 24-pin dual-row header connectors to a Champ® connector. A Champ® connector is then coupled to a punch block within the cabinet using a standard 25-pair Telco-style cable. See LBI-39117 for Concentrator Card pin-outs.

The Compact CEC's three (3) punch blocks, identified PB1 thru PB3, are mounted on a punch block panel. As shown in the Application Assembly Diagram in this manual, this assembly is mounted near the bottom of the Compact CEC cabinet on the cabinet's rear mounting rails. If required, this assembly can be removed from the cabinet's rails and mounted outside the cabinet on a nearby wall, for example. With the exception of the MOM interconnections, all external audio and control data interconnections to and from external equipment are made at these punch blocks. See LBI-39117 for punch block pin-out details.

The MOM Concentrator Card converts a 24-pin dual-row header connector at the MOM interface module Backplane point into two (2) DB-9 connectors. This card also uses an accompanying Concentrator Card Cable. The DB-9 connectors provide the RS-232 hook-up points for the CEC Manager computer and the System Manager (optional) computer. See LBI-39117 for specific interconnection details.

Uplink GETC

Control data between the Compact CEC's MIM and the EDACS trunked site is transferred via the uplink and downlink GETCs and a dedicated 4-wire data grade phone line (or equivalent). Basically, the uplink GETC in the Compact CEC performs a high-speed modem function for the MIM. It is inserted in the uplink/downlink control data path between the MIM Controller Board and the dedicated phone line.

As shown in the Application Assembly Diagram in this manual, the uplink GETC is located just below the lower Card Cage in the Compact CEC cabinet. It is powered by the same power supply that supplies power to the Card Cages. In contrast, CEC and IMC applications generally rack uplink GETCs in a separate cabinet and employ a dedicated power supply in the separate uplink GETC cabinet.

The downlink GETC at the EDACS site is typically located in the same cabinet as the Site Controller. If the EDACS site is not equipped with a Site Controller, the downlink GETC is generally racked in one of the station cabinets.

Uplink/downlink control data is transferred between the MIM Controller Board and the uplink GETC via 19.2k baud RS-232 serial link. These signals are routed via a cable which interconnects the MIM control data connection point at the Backplane (connector PA201) to a DB-9 connector on the back of the GETC (connector J100).

The uplink GETC-to-site link (uplink-to-downlink) operates over the 4-wire phone line at 9600 baud using 16-state (4-level 4-phase) quadrature amplitude modulation techniques. Interconnections within the Compact CEC cabinet are a part of the cables between a terminal block on the back of the GETC (TB10) and the Data Concentrator Card, and a Telco cable between the Data Concentrator Card and punch block PB2. See LBI-39117 for a detailed cable interconnection diagram and punch block pin-outs.

The GETC maintenance manual is LBI-38894 and the uplink/downlink configuration manual is LBI-38896.

Redundant Power Supply (RPS) Units

The Compact CEC employs a **R**edundant **P**ower **S**upply (**RPS**) unit mounted at the very bottom of the cabinet. This unit incorporates dual (2) independent hot-pluggable slide-in switching power supply modules which each have an ac power input (120 or 230 Vac nominal) and +5, +15 and -15 Vdc outputs. "ORing" diodes inside the RPS unit combine or sum matching dc outputs from each module before application to the Backplanes. Summed +15 Vdc power is also applied to the uplink GETC. Each module has a 380-

Watt maximum output capability. With this design, each RPS module normally shares approximately 50% of the dc load; however, *one module can completely fail without "downing" the Compact CEC.* The RPS unit occupies three (3) rack units (5¼ inches).

Each RPS module's ac power cord is plugged into a separate in-cabinet ac outlet strip. As shown in the Application Assembly Diagram (Sheet 1 of 5), these strips are horizontally mounted just above the punch blocks. Separate ac outlet strips allow each module to be powered from separate ac power sources and/or circuit breakers. A power cord from each strip is routed outside of cabinet. See LBI-39117 for additional information.

The hot-pluggable slide-in power supply modules within the RPS also feature +5 Vdc remote sensing, status indicators, automatic 120/230 Vac input line voltage selection, thermal shutdown, over-voltage protection and alarm outputs. In addition, each module has a recessed front panel +5 Vdc output trimmer control. The "ORing" diodes on the outputs of each module eliminate catastrophic failures if a short develops in the output stage of a single module. Remote +5 Vdc regulator sensing built into each module compensates for diode and cable voltage drops in the +5 Vdc wiring.

To provide adequate ventilation for the RPS, GETC, and the boards installed in the Card Cages, the Compact CEC cabinet is equipped with a top-mounted cabinet fan. This fan's power cord is plugged into one of the in-cabinet ac outlet strips.

INTERFACE MODULES

The Compact CEC is formed by a series of "interface modules" which each route audio and/or control data between the Compact CEC and the external devices connected to it. In a C3 Advantage dispatch system, these external devices include the EDACS trunked site, C3 Maestro console, conventional base station channels, logging recorder equipment, the CEC Manager computer and, optionally, the System Manager computer. The following sub-sections describe the interface modules used in the Compact CEC.

NOTE

The abbreviations shown in **UPPER CASE BOLD** text in the following lists identify the label that is applied on the top extraction handle of the interface module's Controller Board.

The following interface modules are located in the upper or primary Card Cage – Card Cage 1. Each is formed by a Controller Board and one or more Audio Boards:

- **M**ASTR II/III **I**nterface **M**odule (**MIM**) – The MIM interfaces audio and control data to and from the EDACS trunked site.
- **C**onsole **I**nterface **M**odule (**CIM**) – Each CIM interfaces audio and control data to and from a C3 Maestro console. The Compact CEC may be equipped with up to three (3) CIMs to support three C3 Maestro consoles in the C3 Advantage dispatch system.
- **L**ogging **R**ecorder **I**nterface **M**odule (**LRIM**) – The LRIM provides eight (8) audio outputs to logging recorder equipment connected to the Compact CEC.
- **MO**nitor **M**odule (**MOM**) – The MOM interfaces the CEC Manager computer (MOM PC) and, if present, the System Manager computer to the Compact CEC. It also stores various databases and it has master control of several important Compact CEC features/functions such as control over redundant clock switching.
- Con**V**entional **M**ASTR II/III **I**nterface **M**odule (**VMIM)** - The VMIM routes audio and control information between other primary interface modules located in the upper Card Cage – Card Cage 1 – and the CCI interface module which is located in the lower Card Cage – Card Cage 2.

The CCI interface module is located in the Conventional Interface Adapter (CIA) rack – Card Cage 2. The CCI consists of a Controller Board and one or two CI Boards:

- **C**onventional **C**ontroller **I**nterface (**CCI**) – The CCI interfaces the CIA rack – Card Cage 2 – to the VMIM. To the VMIM, the CCI makes the CIA rack appear as an EDACS trunked site. The CCI Controller Board communicates with the VMIM and CI Board(s) to control conventional channel remote control signalling.

MASTR II/III Interface Module (MIM)

Interfacing between the Compact CEC and the EDACS trunked site is accomplished with the **M**ASTR II/III **I**nterface **M**odule (**MIM**). In this context, the EDACS trunked site could conceivably be any type of EDACS radio system such as a standard EDACS Level 1 system (EDACS site with Site Controller), an EDACS Basic system (EDACS site with no Site Controller), a simulcast system, a voted system, or a SCAT system.

The MIM in the Compact CEC consists of a Controller Board and between one (1) and three (3) Audio Boards. As shown in the Application Assembly Diagram (Sheet 3 of 5),

these boards are located in the primary Card Cage – Card Cage 1 – slots 2 thru 5. Slots 4 and 5 are considered "expansion" slots for installation of additional Audio Boards.

Each Audio Board provides four (4) full-duplex audio channels or audio "ports" into and out of the Compact CEC. Each channel is coupled to one of the trunked site's channels via a 4-wire 600-ohm phone line (or equivalent) link. The MIM may be equipped with three (3) Audio Boards. In this case, a 12-channel audio link (maximum) may be established between the Compact CEC and the EDACS trunked site.

The Controller Board in the MIM provides the control data communications between the EDACS trunked site and other Controller Boards in the Compact CEC. As previously described, the MIM requires a **G**eneral **E**lectric **T**runking **C**ard (**GETC**) to provide control data uplink communication to the EDACS trunked site's downlink.

Audio Boards and the uplink GETC are connected to the EDACS site by 600-ohm phone lines or equivalent microwave links. GETC-to-site links require data-grade (type 3002) phone lines. The MIM Controller Board is connected to the uplink GETC by RS-232 serial connections operating at 19.2k baud. The GETC-to-site link operates at 9.6k baud using 16-state (4-level 4-phase) quadrature amplitude modulation modems built into the GETC.

Console Interface Module (CIM)

An EDACS C3 Maestro dispatch console is connected to the Compact CEC using a **C**onsole **I**nterface **M**odule (**CIM**). The CIM consists of a Controller Board and a single Audio Board. Each CIM interfaces audio and control data to and from its respective console. The Compact CEC may be equipped with up to three (3) CIMs to support three C3 Maestro consoles.

As shown in the Application Assembly Diagram (Sheet 3 of 5), the first CIM's Controller and Audio Boards are located in the primary Card Cage – Card Cage 1 – slots 6 and 7 respectively. If installed, the second and third CIMs' boards occupy Card Cage 1 slots 8 thru 11.

In most installations, console control data is linked between the CIM and the console by a direct RS-422 serial link. At the Compact CEC, the CIM Controller Board provides the RS-422 serial port. The Controller Board has "auto-baud" sensing – it automatically sets the port's transmit baud rate (9.6k or 19.2k baud) based on the received baud rate. This installation is considered a co-located installation since the console is located relatively near the Compact CEC and no data modems are needed in the control data link.

Remote consoles require 4-wire dedicated 9600 baud data modems – one at the Compact CEC end and one at the C3 Maestro end. For these installations, RS-232 connections are also provided by the CIM Controller Board's serial port for data modem hook-ups.

Full-duplex audio support for the console is provided by the CIM's Audio Board. Dual-speaker consoles consume two (2) channels: one 4-wire link for the select speaker and mic, and a 2-wire link for the unselect speaker. Four-speaker consoles require all four Audio Board channels.

A dual-speaker console equipped with Call Director telephone patch equipment requires, at a minimum, three (3) Audio Board channels: one 4-wire link for the select speaker and mic, a 2-wire link for the unselect speaker, and a 4-wire link for the Call Director patch audio between the console and the Compact CEC.

Logging Recorder Interface Module (LRIM)

Support for logging recorders in the C3 Advantage dispatch system is provided by the LRIM interface module within the Compact CEC. The LRIM consists of a Controller Board and two (2) Audio Boards. As shown in the Application Assembly Diagram (Sheet 3 of 5), these boards are located in the upper or primary Card Cage – Card Cage 1 – slots 12 thru 14.

Each LRIM Audio Board provides four 600-ohm analog audio outputs to the recording equipment. An output can be programmed at the CEC Manager to supply audio based on groups, individual units or conventional channels within the C3 Advantage dispatch system.

The LRIM Controller Board is only used for Audio Board control. Logging recorders do not require any control data interfacing.

ConVentional MASTR II/III Interface Module (VMIM) & Conventional Interface Adapter (CIA) Rack

The **VMIM** interface module and **CIA** secondary interface rack couple conventional tone or dc controlled base stations and conventional voting systems to the Compact CEC. If fully-expanded, the VMIM – CIA set in the Compact CEC can couple a total of eight (8) conventional channels to the Compact CEC. The standard C3 Advantage package outfits the Compact CEC with four (4) conventional interface channels.

Each interfaced conventional base station can be either a tone or a dc remote controlled station and it can be connected to the Compact CEC via a 2-wire or a 4-wire

hook-up. E & M signalling connections are also available for microwave (or equivalent) links. The CEC Manager allows per-channel programming of these parameters.

The CIA appears to the VMIM as an EDACS trunked site. It provides the databasing capabilities that enable conventional channels to be patched or "simul-selected" to trunked groups. Also included within the CIA is the hardware required to communicate with conventional base stations using either tone or dc control signals and/or E & M signalling.

Specifically, the VMIM in the Compact CEC is formed by a Controller Board and one or two Audio Boards. As shown in the Application Assembly Diagram (Sheet 3 of 5), these boards are located in the upper or primary Card Cage – Card Cage 1 – slots 15 thru 17. The standard C3 Advantage package has one VMIM Audio Board (slot 16) for four conventional channels and the fully-expanded package is equipped with two VMIM Audio Boards (slots 16 and 17) for eight conventional channels.

The CIA secondary interface rack, – Card Cage 2 – is formed by a Controller Board configured as a **C**onventional **C**ontrol **I**nterface (**CCI**) and either one or two **C**onventional **I**nterface (**CI**) Boards. Each CI Board is paired with a VMIM Audio Board in Card Cage 1 to provide four 600-ohm 2- or 4-wire duplex audio links to conventional stations.

Each VMIM Audio Board channel is connected to a respective CIA CI Board channel via 600-ohm 4-wire connections between the two Card Cages. Like the VMIM Audio Boards, standard C3 Advantage package has one CI Board for four conventional channels and the fully-expanded package is equipped with two CI Boards for eight conventional channels. See Card Cage 2 – slots 2, 3 and 5.

Control data communications between the VMIM and the CIA rack is accomplished with an RS-232 serial link between the VMIM and CCI Controller Boards. This control data link operates at 19.2k baud.

MOM Interface Module

The MOM interface module is formed by a Controller Board and an Audio Board. As shown in the Application Assembly Diagram (Sheet 3 of 5), these boards are located in the upper or primary Card Cage – Card Cage 1 – slots 19 and 20. The MOM provides many very important functions for the Compact CEC including:

- interfacing to the CEC Manager (MOM PC) via an RS-232 "auto-baud" serial port; serial link programmable at CEC Manager for 9600 or 19.2k baud operation
- interfacing to the System Manager, if employed, via a second RS-232 (non-"auto-baud") serial port; port programmable at CEC Manager for 9600 or 19.2k baud operation
- master control of patch and simul-select operations
- trunking site status (trunked, failsoft 1, failsoft 2) updating at the C3 Maestro console(s)
- initializing other interface modules in Card Cage 1 upon MIM, CIM, VMIM or LRIM Controller Board reset and NOVRAM clear operations
- redundant clock switching, if enabled via the CEC Manager
- redundant GSC bus switching
- data logging to the CEC Manager
- generating console emergency and ring tones

All the above functions are performed by the MOM Controller Board except for the generation of the console emergency and ring tones. These tones are generated by the MOM Audio Board and applied to the TDM audio bus.

Also see the sections entitled "**CEC MANAGER APPLICATION PROGRAM AND CEC MANAGER**" and "**SYSTEM MANAGER**" that follow.

CEC MANAGER APPLICATION PROGRAM AND CEC MANAGER

The CEC Manager application program is custom software developed by Ericsson Inc. In the C3 Advantage dispatch system, it provides all diagnostic and configuration functions for the Compact CEC. In addition, it also provides certain configuration functions for the C3 Maestro consoles connected to the Compact CEC. This software may be installed and executed on a stand-alone IBM® PC compatible computer or it may be installed and executed on one of the C3 Maestro console personal computers. In either case, the computer software and hardware combination is customarily referred to as the "CEC Manager". In the past, it has been referred to as the "**MO**nitor **M**odule **P**ersonal **C**omputer ("**MOM PC**"). When hooked to an IMC or a StarGate Digital Audio Switch, this same combination is referred to as an "IMC Manager" and a "StarGate Manager" respectively.

In the C3 Advantage dispatch system, the CEC Manager interfaces with the MOM in the Compact CEC to provide the following functions for the Compact CEC and the interconnected C3 Maestro console(s):

- log and view channel assignment/drop message data for all calls placed through the Compact CEC
- log and view GSC bus message data
- monitor error reports on a interface module-by-interface module basis
- monitor GSC bus loading
- monitor various interface module statistics, their assignments and associated GSC node address
- set MOM serial interface baud rates for itself and the System Manager computer (if employed), enable/disable data logging, enable/disable printer, enable/disable redundant clocks, and set the datalog threshold number
- set system time and date and configure the NETCLOCK/2 interface (optional); this time and date is broadcast throughout the entire Compact CEC to provide synchronized call/data logging time stamps and synchronized clock displays at all C3 Maestro consoles
- if the System Manager is employed, transfer unit (LID), group (GID) and site databases from the System Manager to the CEC Manager; transferred information is automatically distributed to the Compact CEC's interface modules as required
- if the System Manager is employed, distribute CEC Manager-stored System Manager database information to the Compact CEC's interface modules and to the C3 Maestro dispatch console(s); in this case, an active MOM-to-System Manager link is not required
- configure the number of TDM buses to match number of buses supported by the installed Audio Boards
- configure the number of TDM bus time slots required by the MIM, CIM and VMIM interface modules
- adjust Audio Board channel parameters for the MIM, CIM and VMIM interface modules such as nominal input and required output levels
- adjust CI Board channel parameters such as tone or dc remote signalling control
- configure console user-specific parameters; up to ten (10) different console user profile set-ups (shifts) are available for each C3 Maestro console
- if the System Manager is employed, assign unit, group, conventional channel and phone line privileges to each C3 Maestro console
- configure LRIM channels such as required output level and assign an entity (unit, group, etc.) or entities to each LRIM channel
- program the bi-state auxiliary input and auxiliary output (aux. I/O) events

The CEC Manager is connected to the Compact CEC via an RS-232 serial data link provided by a serial port at the MOM Controller Board. Supported baud rates, configurable at the CEC Manager, are 9600 and 19.2k baud. The MOM Controller Board has "auto-baud" sensing – it automatically sets this port's transmit baud rate (9.6k or 19.2k baud) based on the baud rate received from the CEC Manager. At the CEC Manager, serial connections for the link are normally made at the PC's COM1 serial port.

CEC Manager's RS-232 serial connections at the Compact CEC are made at the MOM Concentrator Card. As shown on the Application Assembly Diagram (Sheet 1 of 5) in this manual, this Concentrator Card is identified as A4. See LBI-39117 for specific interconnection information.

SYSTEM MANAGER

The System Manager is a Digital Equipment Corporation (DEC) VAX computer equipped with the VMS operating system. Normally, most larger EDACS trunked sites such as an EDACS Level 1 system are equipped with a System Manager. It provides configuration and storage functions for EDACS databases.

EDACS databases configurable from the System Manager include the site database, the unit (LID) database and the group (GID) database. Pertinent database information is transferred from the System Manager to the Compact CEC and then forwarded to the C3 Maestro dispatch consoles. This eliminates the need for separate entry and maintenance of this information at each dispatch console. See LBI-39117 and the System Manager's publications for additional information.

NOTE

In a C3 Advantage system, each unit entity (LID) may be one of following:

- an EDACS portable radio
- an EDACS mobile radio
- an EDACS desk top station
- a C3 Maestro dispatch console
- a conventional radio channel
- a Call Director patch telephone line

Like the CEC Manager, the System Manager (if present) is connected to the Compact CEC via an RS-232 serial data link provided by a MOM Controller Board serial port. Supported baud rates are 9600 and 19.2k baud. Also like the CEC Manager, the System Manager's RS-232 serial connections at the Compact CEC are made at the MOM Concentrator Card. See LBI-39117 for additional information.

If the EDACS trunked site ***is not*** equipped with a System Manager, the C3 Advantage system is considered "System Manager-less". In this case, database configuration ***must*** *be performed at the one or more of several places* including the C3 Maestro console(s), the site's Site Controller (if present), and the site's station GETCs. Configuration at the C3 Maestro console(s) is always required before C3 Advantage dispatch communications are possible. See LBI-39117 for details.

INSTALLATION AND SET-UP

Refer to LBI-39117 which is included with this set of manuals for installation and set-up details on the C3 Advantage equipment. LBI-39117 contains:

- Compact CEC installation information including floor plan information, UPS recommendations, cabling information, Concentrator Card pin-out listings and punch block pin-out diagrams
- a recommended Compact CEC power-up procedure
- references to the applicable C3 Maestro console manuals for C3 Maestro installation, power-up and set-up
- C3 Advantage dispatch system unit (LID), group (GID) and site database configuration information – with and without System Manager
- Compact CEC set-up information including configuration of all DIP switches and configurations from the CEC Manager

GLOSSARY

Audio Board — An **Audio Board** is the hardware device within the Compact CEC which provides audio channels or "ports" into and out of the Compact CEC. Each Audio Board is equipped with four (4) full duplex audio channels. Audio interfaced in to and out of the Compact CEC via the Audio Boards includes EDACS trunked site channel audio and C3 Maestro console mic and earphone/speaker audio. The board digitizes analog signals applied to its audio inputs and applies the digitized signals to the Compact CEC's TDM audio bus. It also performs the reverse process for its audio outputs.

C3 Maestro — The **C3 Maestro** is the CRT-type console designed to take advantage of the advanced features of EDACS. It consists of a specialized audio unit, a custom dispatch keyboard and an IBM PC compatible computer running custom software developed by Ericsson Inc. The C3 Maestro interfaces to the Compact CEC via the CIM within the Compact CEC.

CCI Board — **C**onventional **C**ontrol **I**nterface **Board** – This is a Controller Board configured for use in the CIA rack. The CCI Board communicates with the VMIM to provide master CI Board control. (Also see **VMIM**, **Controller Board** and **CI Board.**)

CEC Manager — The **CEC Manager** provides Compact CEC monitoring and configuration functions via the CEC Manager application program. This custom software is the window into the Compact CEC for the system administrator and service technicians. In the C3 Advantage dispatch system, this program is normally executed on a stand-alone IBM PC compatible computer; however, it may be executed on one of the C3 Advantage's C3 Maestro consoles.

CIA rack — **C**onventional **I**nterface **A**dapter **rack –** The CIA rack allows conventional tone and dc controlled base stations and voting systems to be connected to the Compact CEC. It is considered a "secondary interface" since it does not have direct TDM and GSC bus connections to the primary Compact CEC interface modules. For a conventional audio output line, the CIA rack adds tone or dc control signals for remote base station control. For a conventional audio input line, the CIA rack provides audio signal detection. Input and output audio signals are routed to and from the VMIM.

CI Board — **C**onventional **I**nterface **Board –** This board is located in the CIA secondary interface rack. It contains circuitry used to connect conventional tone and dc controlled base stations and voting systems to the Compact CEC.

CIM — **C**onsole **I**nterface **M**odule – The CIM is the interface module used to connect a C3 Maestro console to the Compact CEC. The CIM consists of a Controller Board and an Audio Board.

Compact CEC — **Compact C**onsole **E**lectronics **C**ontroller – The Compact CEC is an advanced radio communications controller incorporating time division multiplex digital audio switching technology. The Compact CEC connects C3 Maestro dispatch consoles to an EDACS trunked site and conventional base station channels. It also provides logging recorder audio outputs.

control data — **Control data** includes any data used for system control.

Controller Board — The **Controller Board** processes control data, holds databases, and controls the Audio Board(s) within its respective interface module.

DPRAM — **D**ual **P**ort **R**andom **A**ccess **M**emory – These specialized memory chips have two separate data buses that allow two microprocessor chips to quickly and efficiently transfer data between each other.

EDACS® — **E**nhanced **D**igital **A**ccess **C**ommunication **S**ystem® – EDACS® is a trunked radio communication system. EDACS meets or exceeds the communications needs of the public service, industrial, commercial and utility markets.

EDACS radio system — **E**nhanced **D**igital **A**ccess **C**ommunication **S**ystem **radio system** – The term "EDACS radio system" refers to EDACS RF radio equipment that may be interfaced to the Compact CEC, CEC and IMC Digital Audio Switch equipment. The equipment may be located at a single location, such as an EDACS trunked site or it may be located at several locations, such as in a voting system. Other examples of EDACS radio systems include simulcast and SCAT systems.

failsoft — **Failsoft** refers to the mode of operation of the EDACS trunked system when the Site Controller is not operational. In failsoft mode, basic trunked features are maintained but higher-level features are not operational. An EDACS Basic system, which is not equipped with a Site Controller, operates in failsoft mode at all times.

GETC — **G**eneral **E**lectric **T**runking **C**ard – The GETC is a microprocessor-controlled shelf that can be configured to perform many different signal processing tasks for EDACS communications equipment. In Compact CEC applications, the GETC is equipped with a 9600 baud modem and configured for uplink operations. It provides serial control data communications between the Compact CEC and the EDACS trunked site.

GSC bus — **G**lobal **S**erial **C**hannel **bus** – The GSC bus is a high-speed serial bus that provides packetized control data transfers between Controller Boards in the Compact CEC.

IMC — **I**ntegrated **M**ultisite and **C**onsole **C**ontroller – The IMC is a Digital Audio Switch that routes audio, mobile data, and Aegis data signals between EDACS radio systems and dispatch consoles. It is a second generation multisite controller plus a console controller for the C3 series consoles.

interface module — The term "**interface module**" is used to refer to a subset of hardware components within the Compact CEC that permits it to connect or link to an external device such as a dispatch console or an EDACS radio system. Each interface module is formed by a Controller Board and one or more Audio Boards, or in the case of the conventional interface, a Controller Board and one or two CI Boards. Interface modules in the Compact CEC include MIM, CIM, LRIM, VMIM and CCI.

LRIM	**L**ogging **R**ecorder **I**nterface **M**odule – This interface module provides audio outputs for logging recorders. Each output channel can be programmed to supply audio based on groups or individual units within the C3 Advantage system.
MIM	**M**ASTR II/III **I**nterface **M**odule – The MIM is the interface module within the Compact CEC that connects an EDACS trunked site to the Compact CEC.
MOM	**MO**nitor **M**odule – The MOM is a interface module that provides serial data connections for the CEC Manager (MOM PC) and the System Manager computers. It also stores various Compact CEC databases and provides master control of several important Compact CEC functions such as redundant clock switching.
MOM PC	(see **CEC Manager**)
patch	A **patch** is when two or more talk groups are connected together by a dispatcher. This allows the patched groups to communicate as a single group.
PCM	**P**ulse **C**ode **M**odulation – An audio processing technique used to encode and decode analog signals so they can be transferred digitally.
secondary interface	The term "**secondary interface**" refers to the CIA rack. This rack is considered to be secondary because it is not connected to the primary TDM and GSC buses within the Compact CEC.
simul-select	A console operator can simultaneously communicate with two or more talk groups by selecting the groups for "**simul-select**" communication. Simul-select communication uses only a single radio channel at each active radio system.
site	This term normally refers to radio equipment at a single specific location.
System Manager	The **System Manager** is a DEC multitasking computer which performs features for an EDACS radio system such as database storage, monitoring system operation, generating management reports, individual unit enable/disable and dynamic regrouping.
TDM bus	**T**ime **D**ivision **M**ultiplexed **bus** – The TDM bus in the Compact CEC is a digitally multiplexed bus system used to digitally transfer audio within the Compact CEC. Each audio signal coming into the Compact CEC is assigned a TDM time slot and receiving devices extract the digitized signals from the appropriate time slot.
VMIM	Con**V**entional **M**ASTR II/III **I**nterface **M**odule – The VMIM couples the CIA secondary interface rack to the primary Compact CEC interface modules. The VMIM - CIA set allows connection of conventional base stations and conventional satellite receiver voting systems to the Compact CEC.

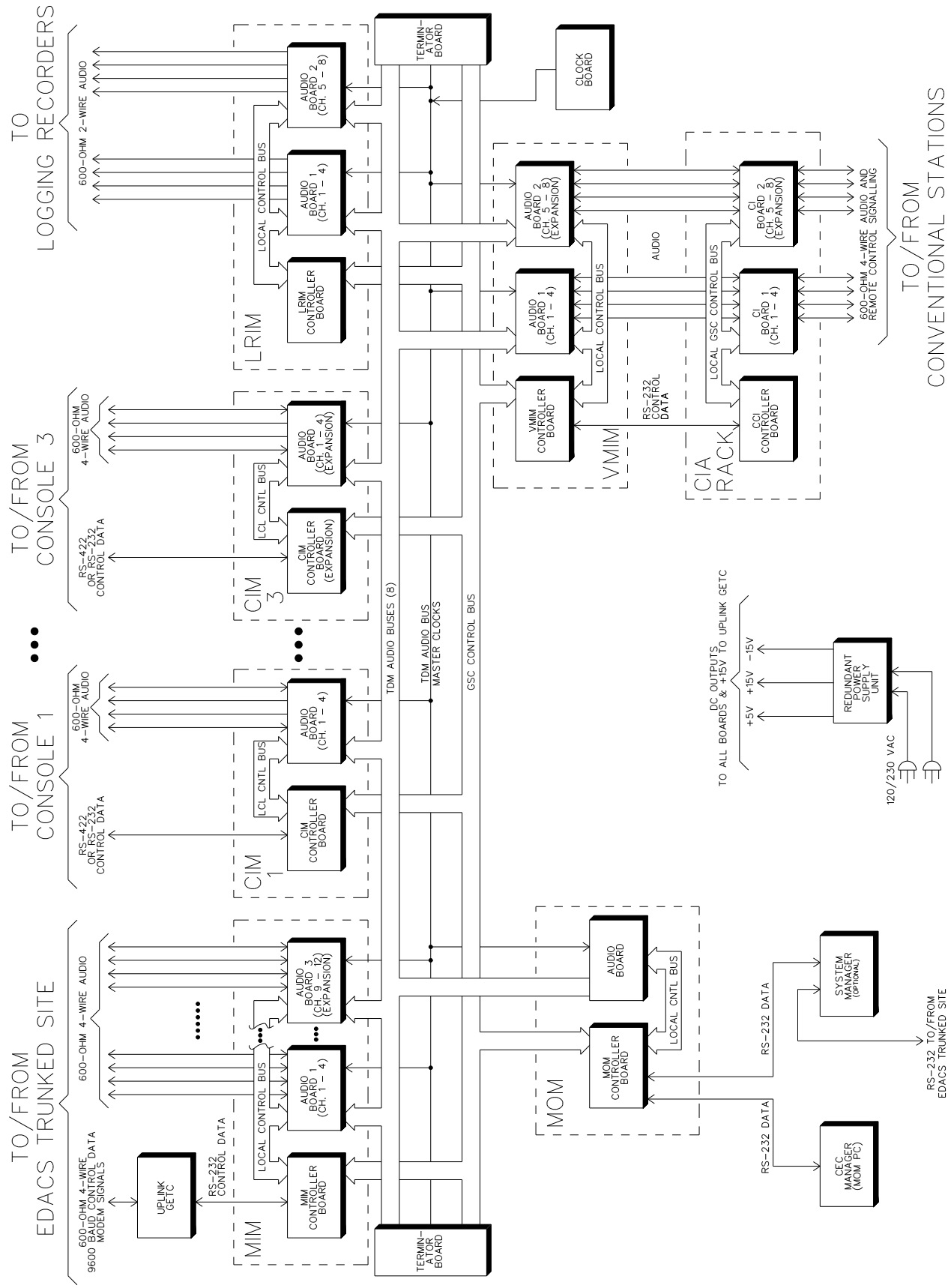
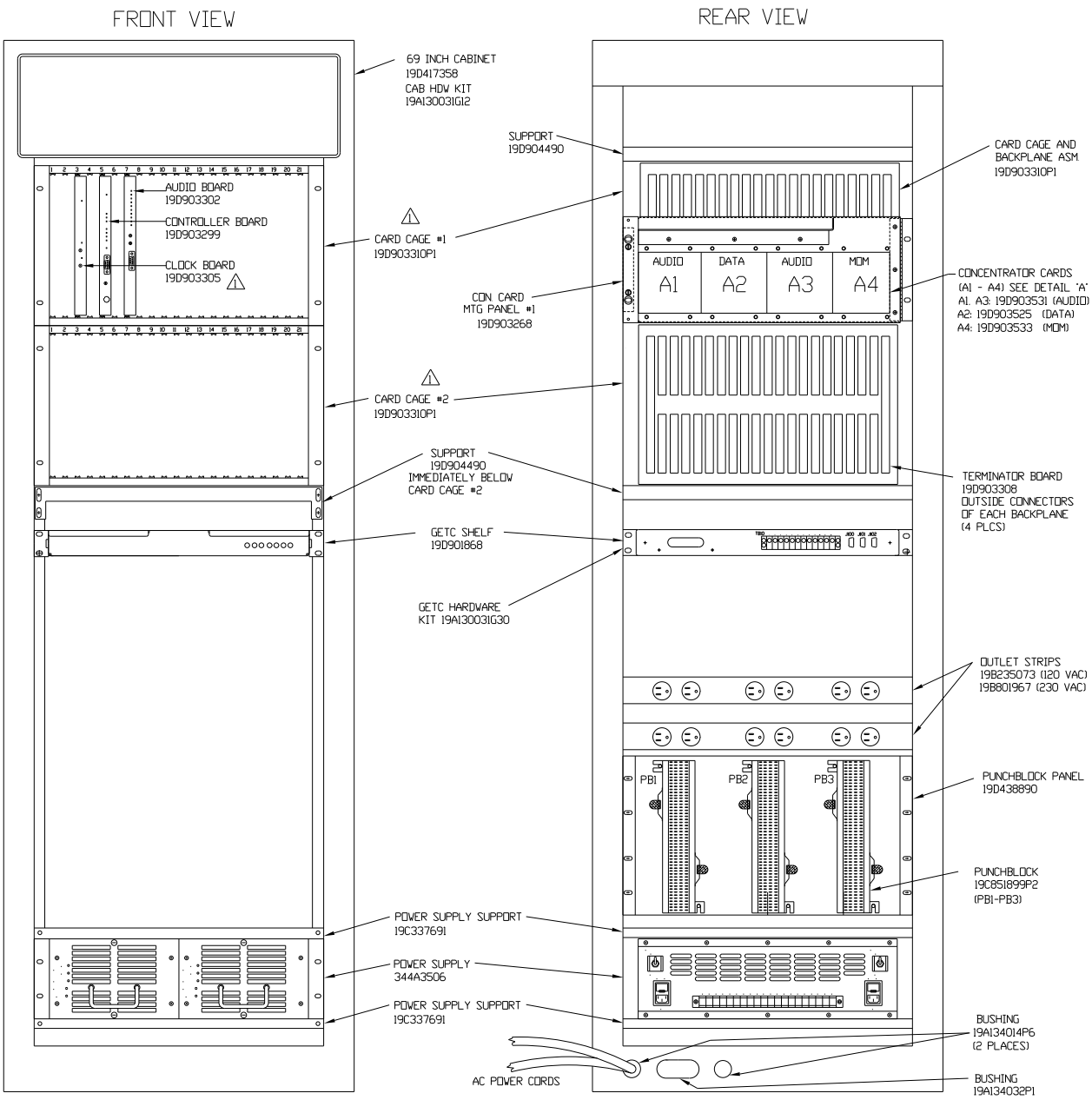


Figure 1 – Compact CEC Architecture

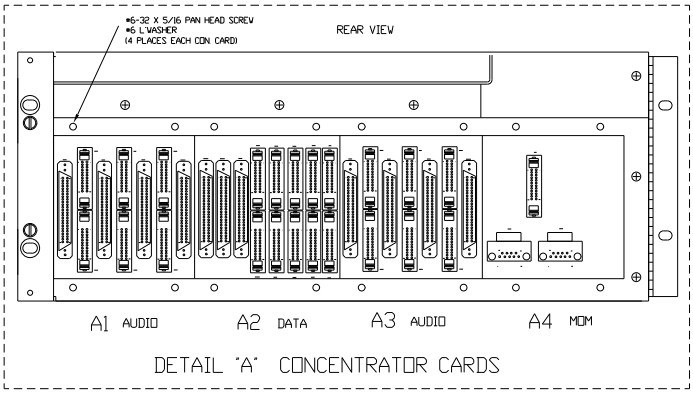


NOTES:

⚠ SEE SHEET 3 OF 5 FOR SPECIFIC BOARD/CARD PLACEMENT.

2 RAIL HARDWARE: SCREW 19A134011P1
CLIP 7160861P33
LOCK WASHER N403P21

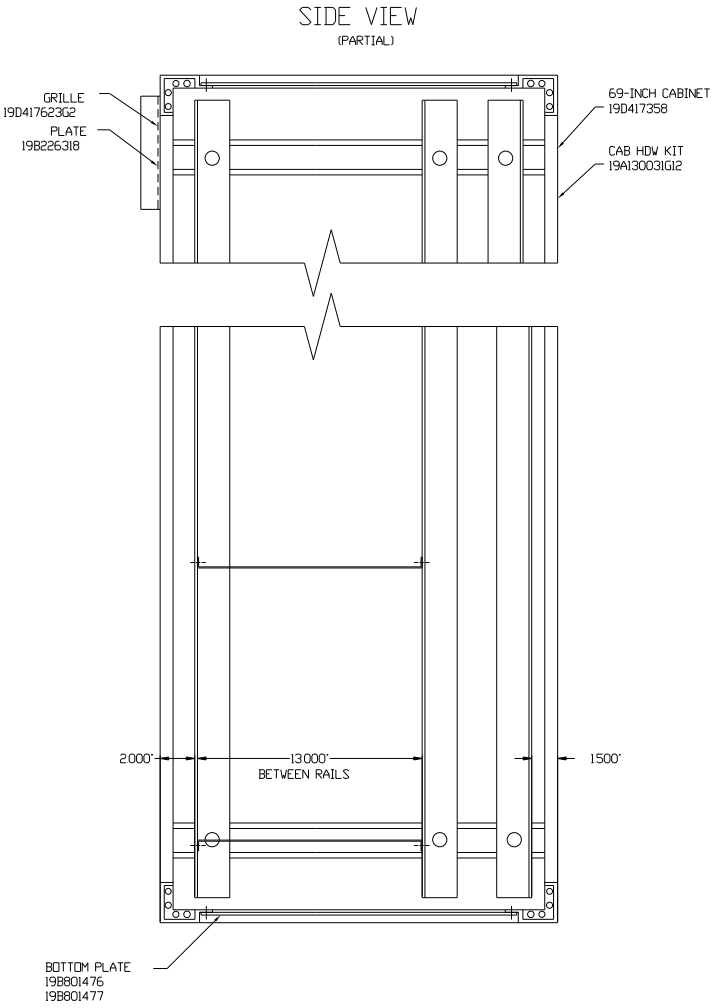
3 CABLING NOT SHOWN



COMPACT CEC CABINET

Sheet 1 of 5 (Front & Rear Cabinet Views)

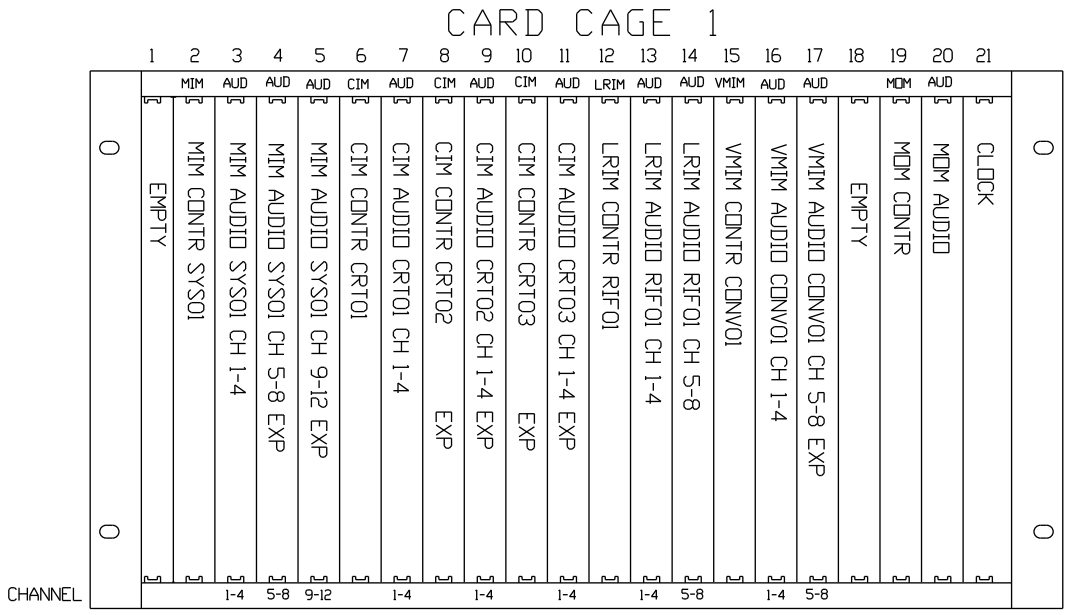
(MADE FROM 188D6170, Sh. 1, Rev. 1)

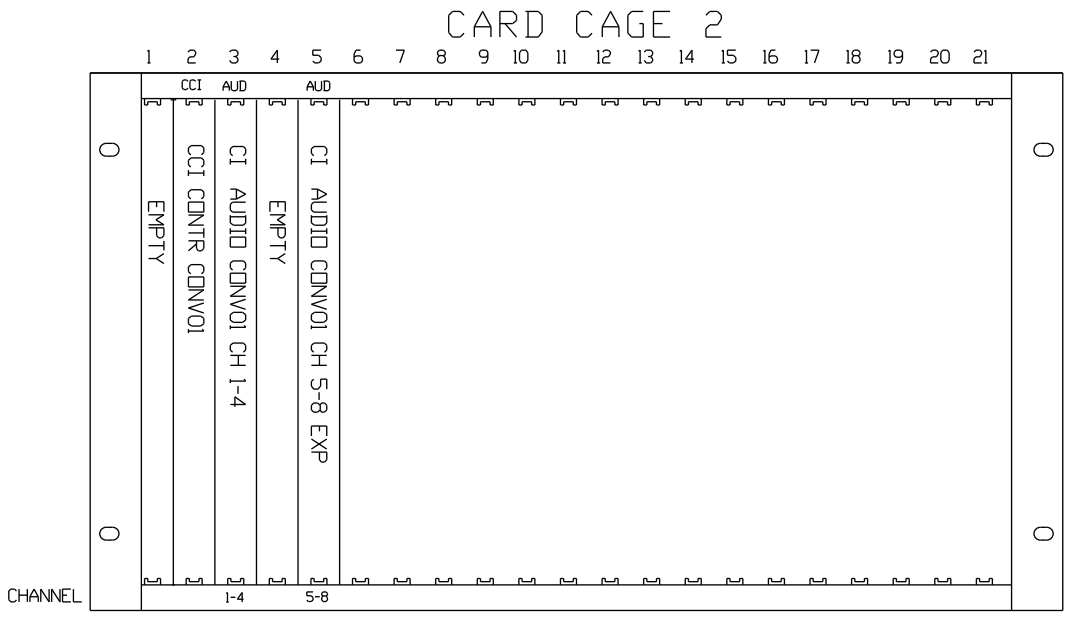


COMPACT CEC CABINET

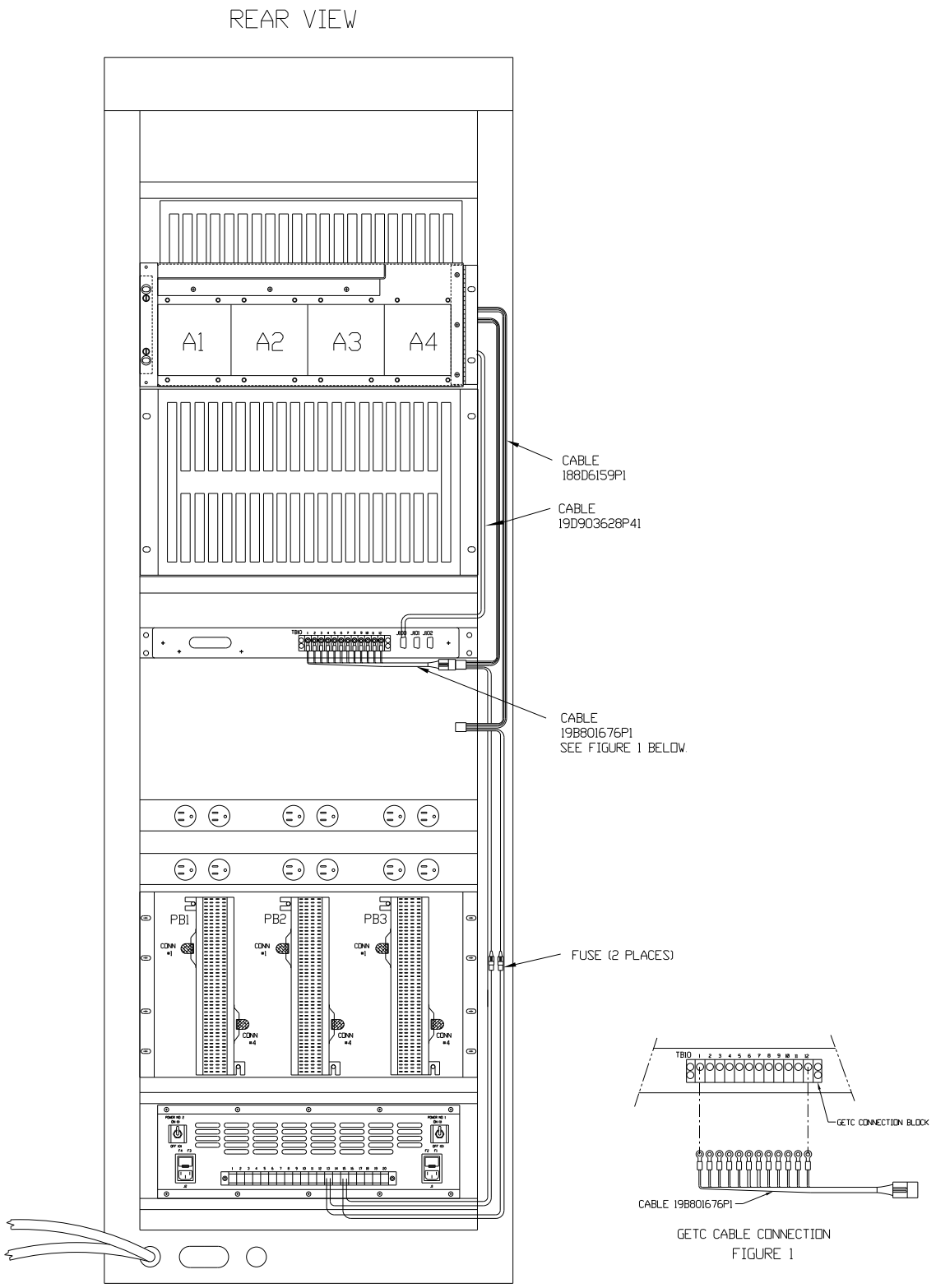
Sheet 2 of 5 (Side View of Cabinet)

(MADE FROM 188D6170, Sh. 1, Rev. 1)



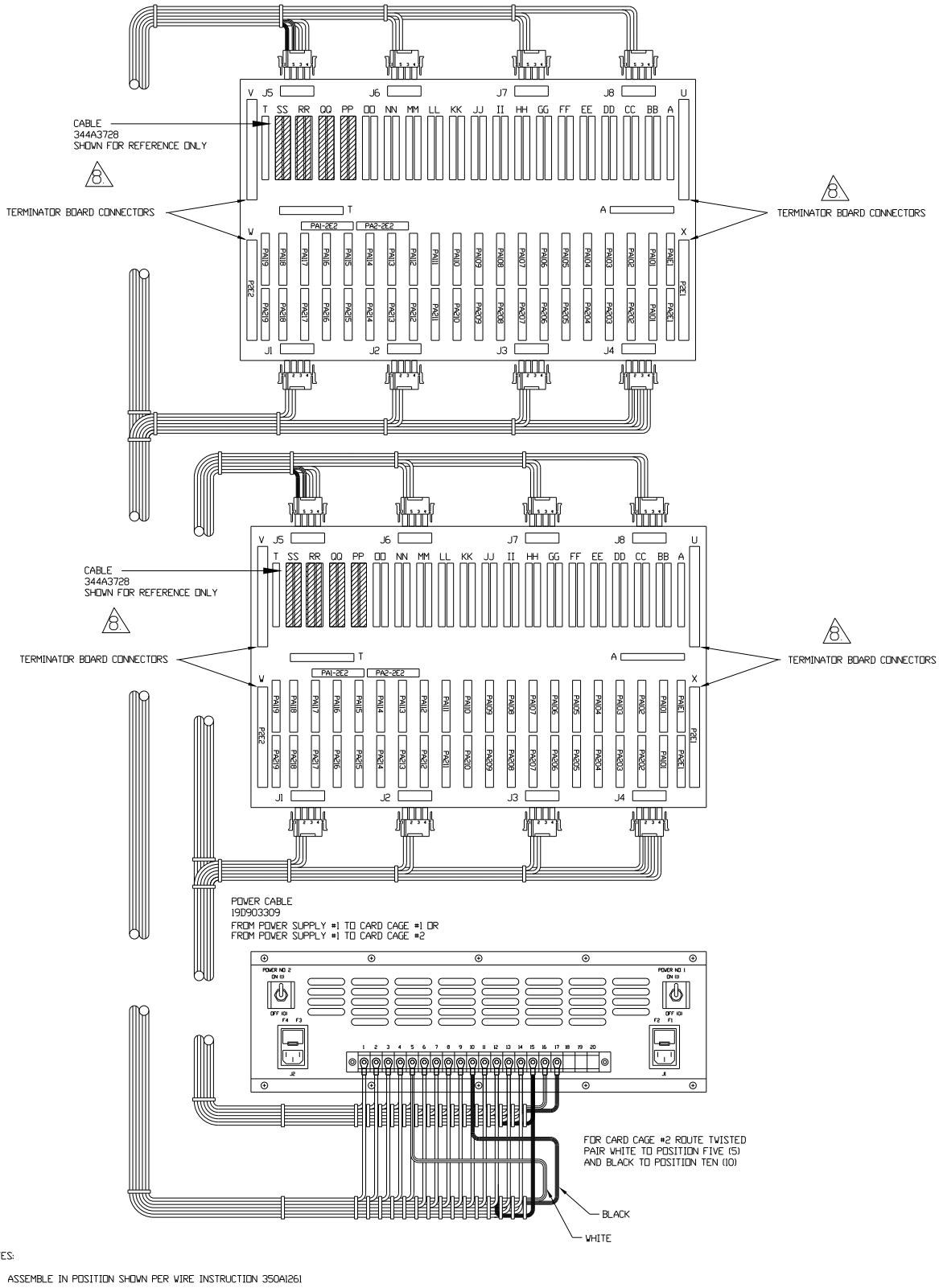


COMPACT CEC
CABINET
Sheet 3 of 5 (Card Cage Rack-Up – Viewed From Front)
(MADE FROM 188D6170, Sh. 2, Rev. 1)



GETC CABLE CONNECTION
FIGURE 1

COMPACT CEC CABINET
Sheet 4 of 5 (GETC Cabling)
(MADE FROM 188D6170, Sh. 2, Rev. 1)



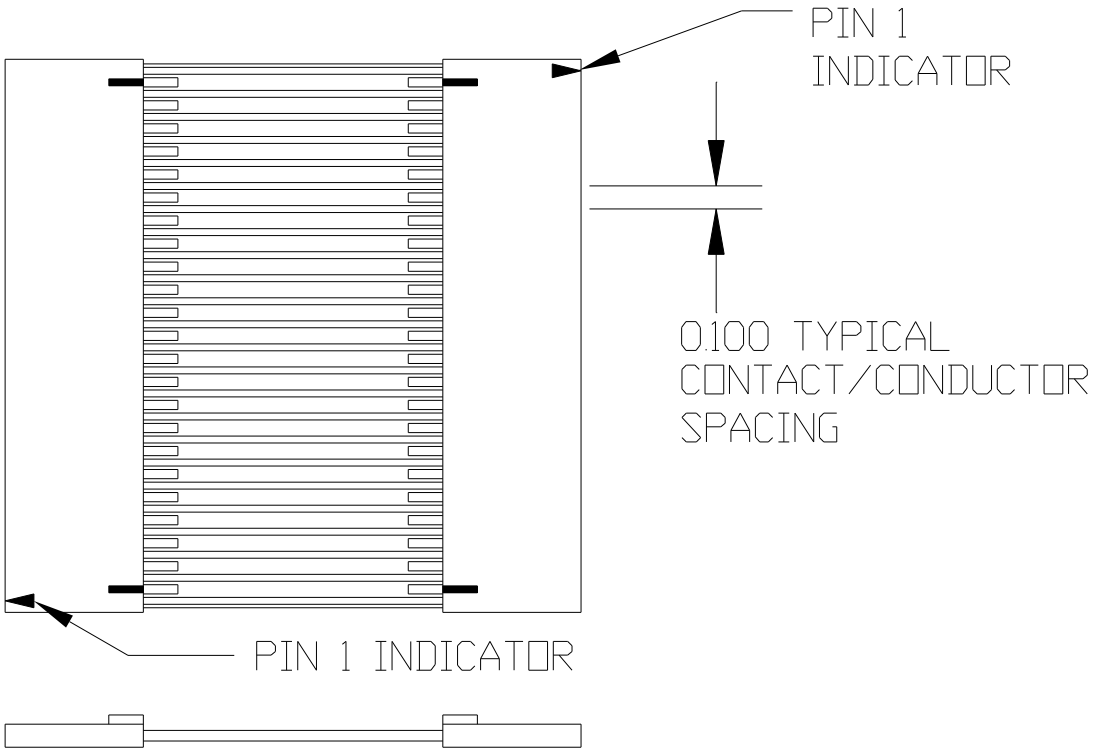
NOTES:

6. ASSEMBLE IN POSITION SHOWN PER WIRE INSTRUCTION 350A1261

COMPACT CEC CABINET

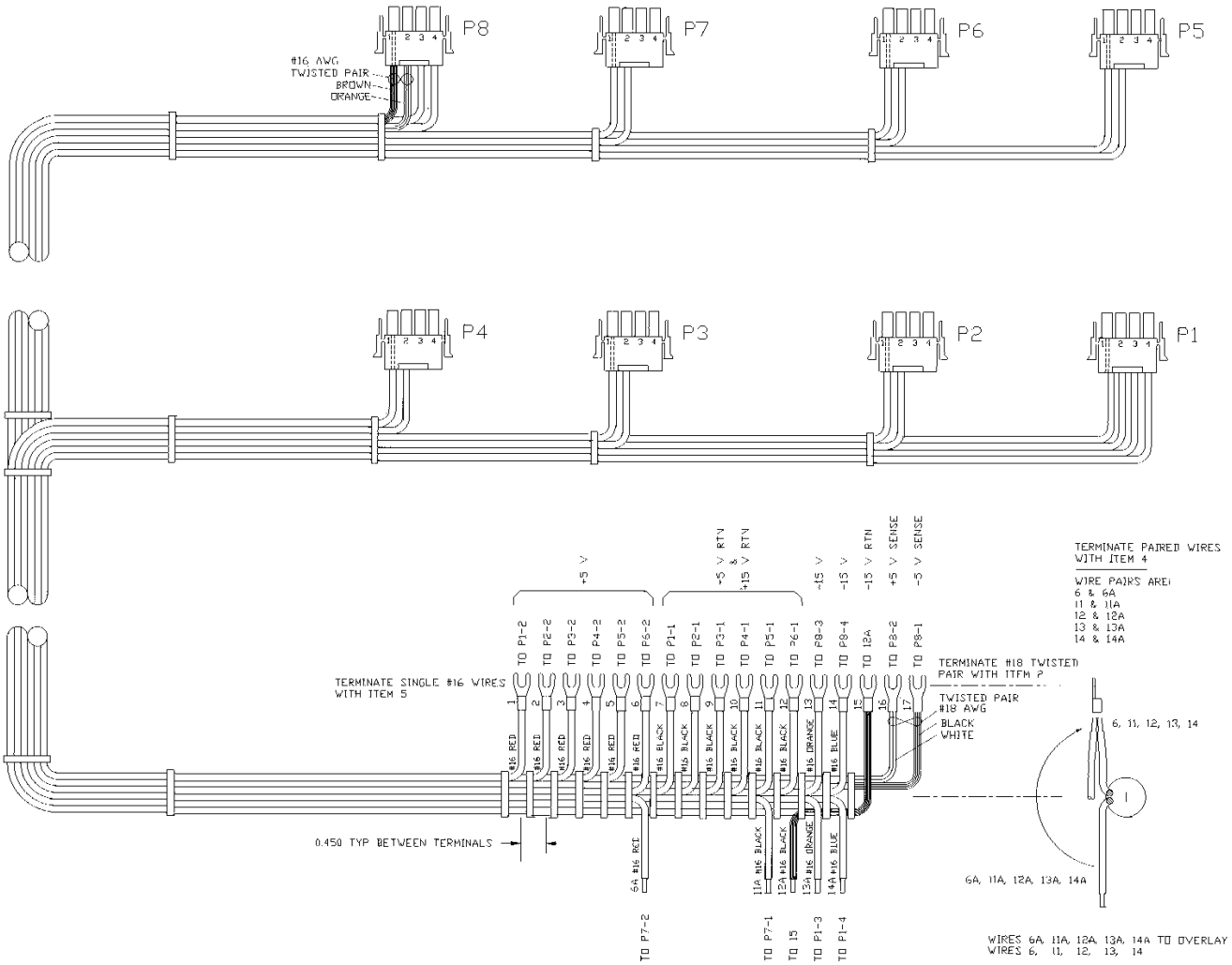
Sheet 5 of 5 (RPS Unit-to-Backplane Cabling

(MADE FROM 188D6170, Sh. 3, Rev. 1)



LOCAL BUS CABLE
344A3728P1 (3.25")

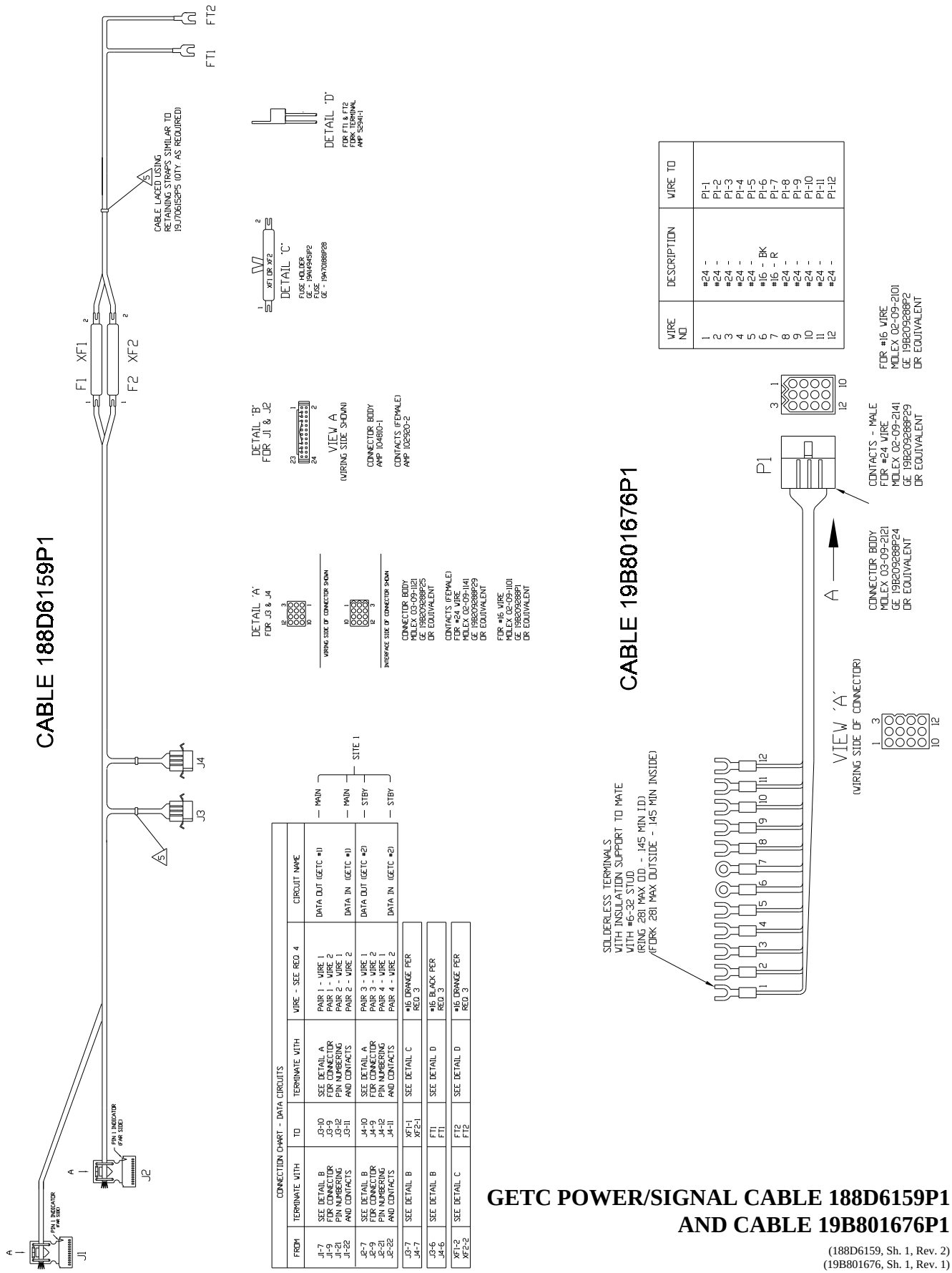
(344A3728, Sh. 1, Rev. 2)



MATERIAL LIST				
ITEM	EGE PART NO.	VENDOR PART NO. (OR EQUIVALENT)	DESCRIPTION	QTY
P1-P8		AMP 1-480702-0	CONNECTOR BODY	8
1		AMP 350536 1 AMP 350550 1	CONTACT, SOCKET, STRIP CONTACT, SOCKET, LOOSE	20
2		AMP 52949-1	FORK TERMINAL (#18)	2
3	19J706152P5	PANDUIT SST-1M	RETAINING STRAP	30
4		AMP 52941-1	FORK TERMINAL (2 #16)	5
5		AMP 52935-1	FORK TERMINAL (1 #16)	10

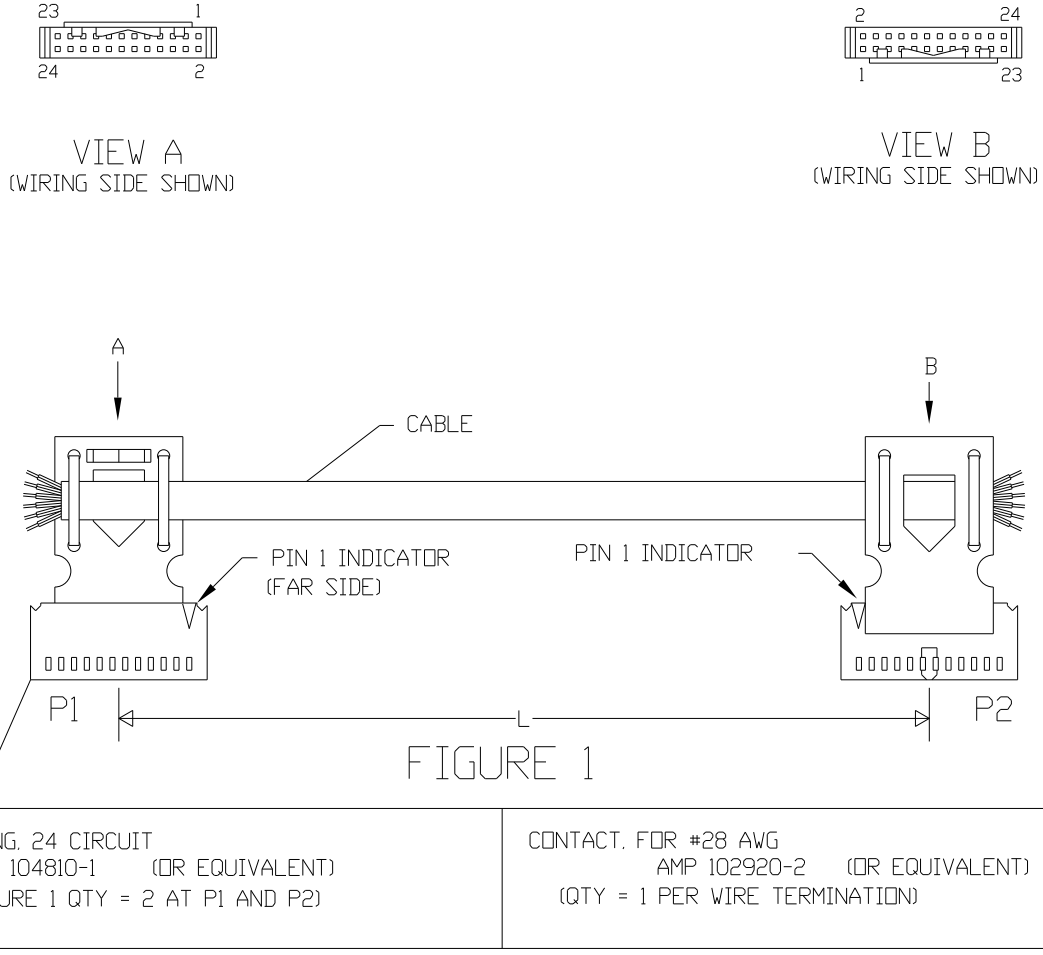
POWER CABLE
19D903309P1

(19D903309, Sh. 1, Rev. 1)



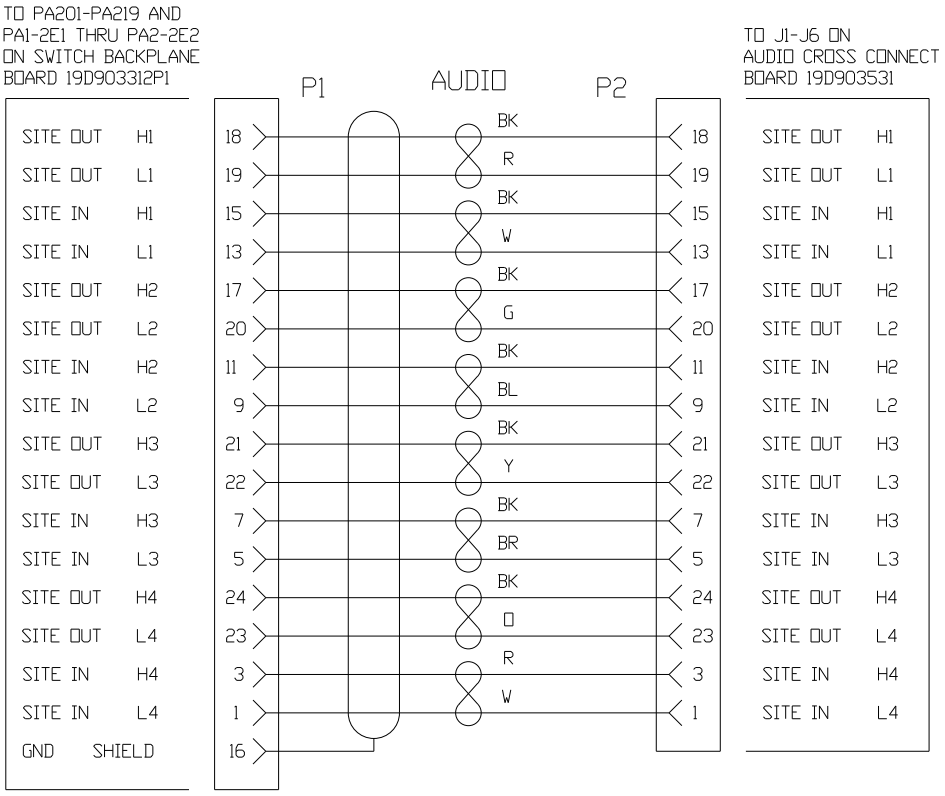
GETC POWER/SIGNAL CABLE 188D6159P1 AND CABLE 19B801676P1

(188D6159, Sh. 1, Rev. 2)
(19B801676, Sh. 1, Rev. 1)



CONCENTRATOR CARD CABLE
19D903628 (Figure 1)

(19D903628, Sh. 1, Rev. 4A)



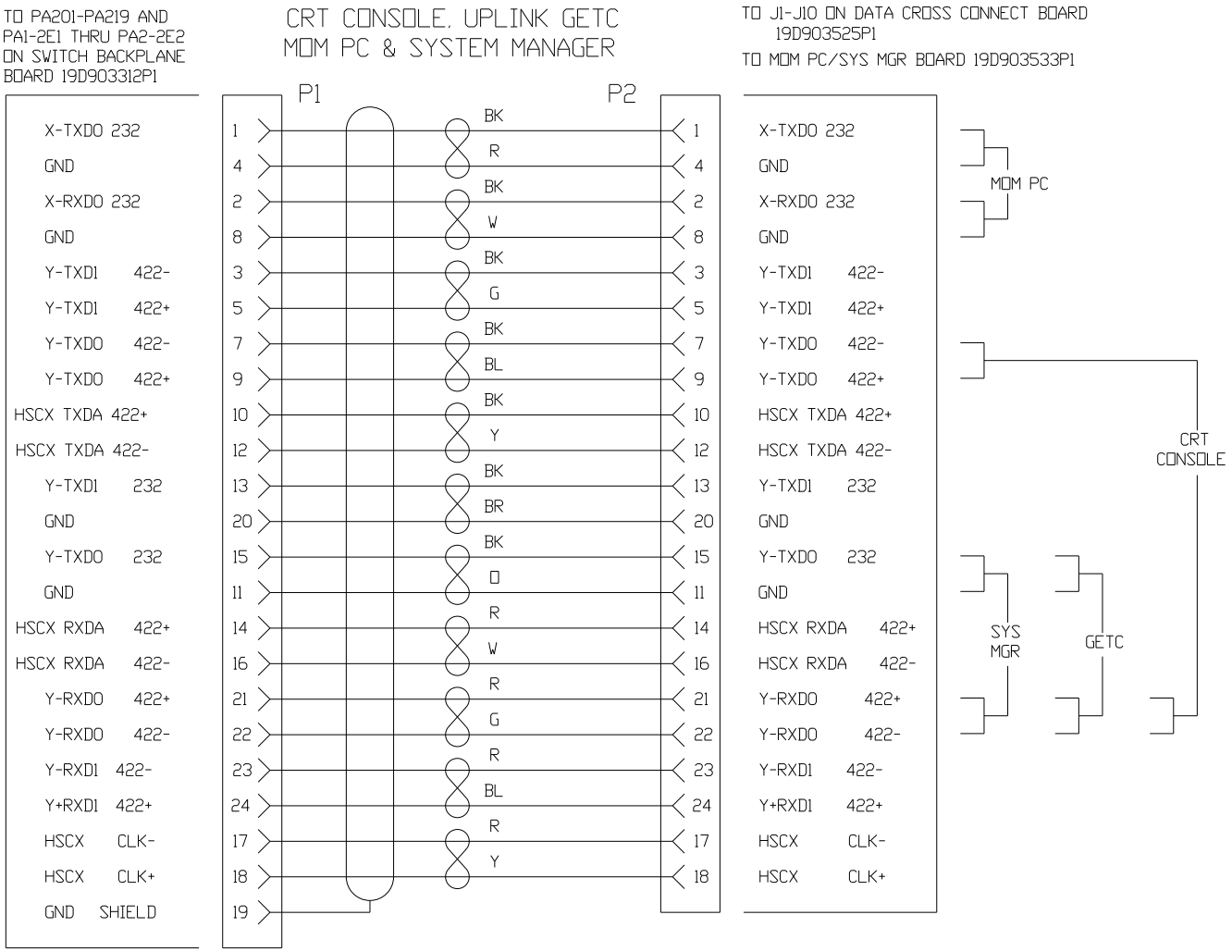
PART 11 ASSEMBLE PER FIGURE 1
L=20.000

PART 12 SAME AS PART 11 EXCEPT
L=40.000

PART 13 SAME AS PART 11 EXCEPT
L=52.000

CONCENTRATOR CARD CABLE
19D903628P12 (Audio)

(19D903628, Sh. 1, Rev. 4A)



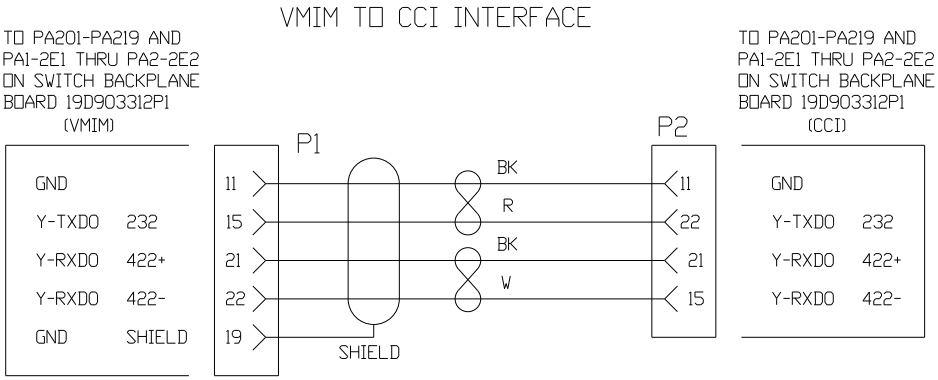
PART 1 ASSEMBLE PER FIGURE 1 L=20.000

PART 2 SAME AS PART 1 EXCEPT L=40.000

PART 3 SAME AS PART 1 EXCEPT L=52.000

CONCENTRATOR CARD CABLE
19D903628P2 (Data)

(19D903628, Sh. 1, Rev. 4A)



PART 31 ASSEMBLE PER FIGURE 1 L=20.000

PART 32 SAME AS PART 31 EXCEPT L=40.000

PART 33 SAME AS PART 31 EXCEPT L=52.000

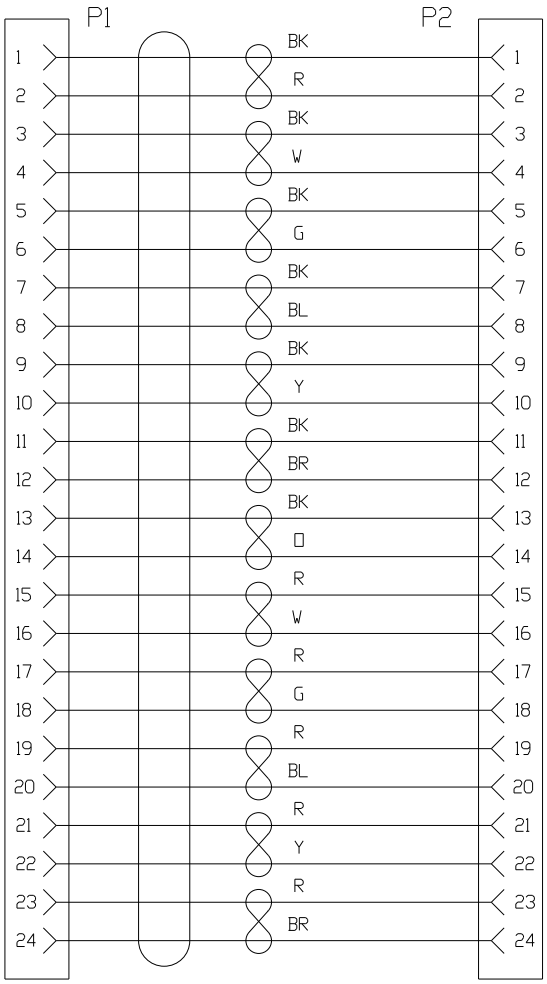
CONCENTRATOR CARD CABLE
19D903628P31 (VMIM-To-CCI)

(19D903628, Sh. 1, Rev. 4A)

TO PA101-PA119 AND
PA1-2E1 & PA1-2E2
ON BACKPLANE BOARD
19D903312P1

AUDIO & CTRLR BOARD
AUX I/O & GENERAL USE

TO J1-J2 & J4-J5 ON AUDIO AUX I/O BOARD
OR ON CTRLR AUX I/O BOARD



PART (51) ASSEMBLE PER FIGURE 1
L=20.000

PART (52) SAME AS PART 51 EXCEPT
L=40.000

PART (53) SAME AS PART 51 EXCEPT
L=52.000

CONCENTRATOR CARD CABLES
19D903628P51 – P53 (Aux. I/O)

(19D903628, Sh. 2, Rev. 4A)

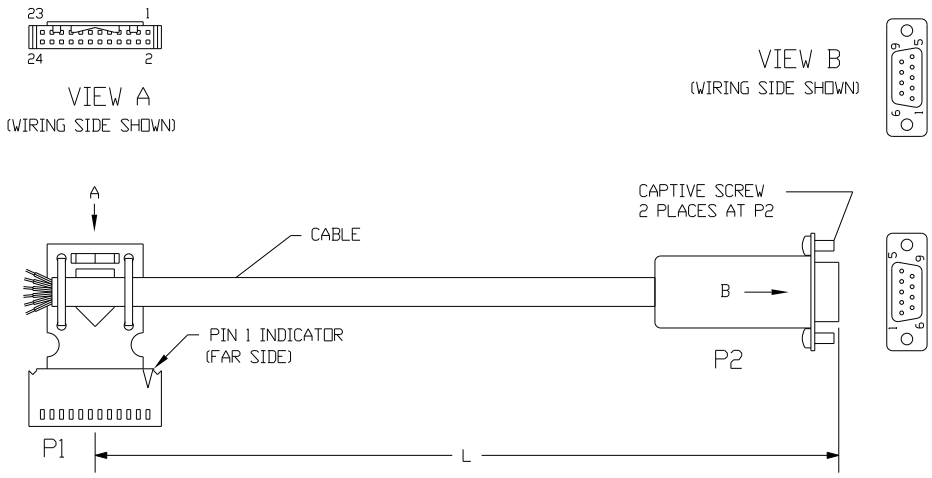
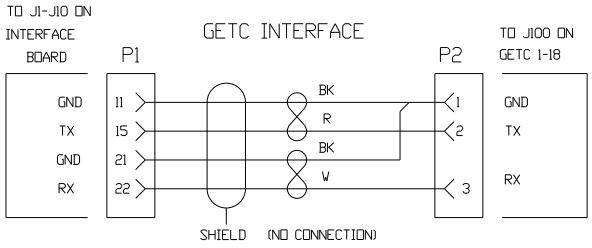


FIGURE 3



PART (41) ASSEMBLE PER FIGURE 3
L=80.000

PART (42) SAME AS PART 41 EXCEPT
L=62.000

MATERIAL LIST				
ITEM	EGE PART NUMBER	VENDOR PART NUMBER (OR EQUIVALENT)	DESCRIPTION	QTY
P1	————	AMP 104810-1	24 CIRCUIT FEMALE HOUSING	1
	————	AMP 102920-2	FEMALE CONTACT (28-24 AWG)	4
P2	19B209727P21	AMP 205204-1	DB9 MALE CONNECTOR HOUSING	1
	————	AMP 66682-8	MALE CONTACT (28-24 AWG) (J2-1 & J2-2)	2
	19B209727P12	AMP 1-66506-0	MALE CONTACT (24-20 AWG) (J2-1)	1
	19B209727P30	AMP 206478-1	SHIELD (9 PIN CONNECTOR)	1
	19B209727P9	AMP 205980-1	#4-40 CAPTIVE SCREW KIT	1

GETC INTERFACE CABLE
19D903628P41

(19D903628, Sh. 2, Rev. 4A)

CABINET ASSEMBLY
OPTION MSCA1P

ISSUE 1

PART NUMBER	DESCRIPTION
	69-INCH EXTRA DEEP CABINET ASSEMBLY 19D417358G4
19D417357G4	Cabinet, welded assembly: 69-inch, gray.
19C320756G3	Door, assembly: 59-inch, gray.
19C320756G4	Door, assembly: 64-inch, gray.
19B226092G2	Frame, welded assembly. (Part of top grill).
19A129903P3	Bracket, door: 2.22" x 1.12" x 1.0", gray.
19A129903P4	Bracket, door: 2.22" x 1.12" x 1.0", gray.
19B226572G3	Bracket assembly, door. (Qty = 2).
19B226572G4	Bracket assembly, door. (Qty = 2).
19B226094P1	Support, side mounting rail: 66.35" x 0.125" thick, steel. (Qty = 2).
19B226094P2	Support, side mounting rail: 66.35" x 0.063" thick, steel. (Qty = 2).
19B226094P3	Support, side mounting rail: 66.35" x 0.125" thick, steel. (Qty = 2).
19A129901P1	Nut, gang channel: sim to Unistrut P4006-1420. (Qty = 18).
19A126220P1	Gasket, foam: 0.50" x 0.25" x 33' roll, black. (Qty = 28 feet).
19B226088P1	Pin, hinge: 0.25" dia. steel. (Qty = 2).
19A129902P1	Spring, steel: 0.38" x 1.35" (free length). (Qty = 2).
4035237P1	Washer, nylon: 0.265" ID x 0.5" OD. (Qty = 2).
	GRILL ASSEMBLY 19D417623G2
7160861P5	Nut, sheet spring: sim to Tinnerman C1505-1032-24D. (Qty = 4.)
19C320979P2	Screen.
19D901998P1	Nameplate.
	MISCELLANEOUS
19B209539P1	Lock, rim.
19B209539P2	Lock, rim.
19B209539P3	Key: Lock rim. (Qty = 2.)
19B801477P1	Cover.
19B226318P2	Plate.

CABINET HARDWARE KIT
19A130031G12

ISSUE 1

PART NUMBER	DESCRIPTION
7160861P5	Nut, sheet spring: sim to Tinnerman C1505-1032-24D. (Qty = 8.)
7160861P33	Nut, sheet spring: sim to Tinnerman C19640-19AB-600. (Qty = 52.)
19A134014P6	Bushing, strain relief: sim to Heyco UB-1093. (Qty = 2.)
19A134032P1	Bushing, protective.
19B219744G2	Strain relief assembly.
19A136621G1	Cable, ground: 10 inches long.
N403P13B6	Lockwasher: No. 6.
N403P16B6	Lockwasher, internal tooth: No. 8.
N80P13009B6	Machine screw, panhead: No. 6-32 x 9/16.
19A134011P2	Screw, thread forming: No. 10-16 x .75". (Qty = 52.)

PUNCH BLOCK PANEL ASSEMBLY
19D438890G3

ISSUE 1

PART NUMBER	DESCRIPTION
19D438890P7	Panel, punch block; steel.
7483709P9	Nut, cinch: No. 8-32. (Qty = 6.)
	----------ASSOCIATED PARTS---------- (Not Included With 19D438890G3 Assembly)
19C851899P2	Punch block: 4 x 50 position pre-wired; sim to Siemon S66M2-5W. (Qty of 3 required.)

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