

Maintenance Manual

EDACS[®] COMPACT VERTICAL VOTER



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NOTICE!

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IMPORTANT SAFETY INFORMATION

The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Ericsson, Inc. assumes no liability for the customer's failure to comply with these standards.

1. **SAVE THIS MANUAL** - It contains important safety and operating instructions.
2. Before using this equipment, please follow and adhere to all warnings, safety and operating instructions located on the product and in the manual.
3. **DO NOT** expose equipment to rain, snow or other type of moisture.
4. Care should be taken so objects do not fall or liquids do not spill into the equipment.
5. **DO NOT** expose equipment to extreme temperatures.
6. **DO NOT** use auxiliary equipment not recommended or sold by Ericsson, Inc. To do so may result in a risk of fire, electric shock or injury to persons.
7. **GROUND THE EQUIPMENT**-To minimize shock hazard, the equipment cabinet(s) must be connected to a good earth or building ground which eventually goes to earth.

The equipment supplied is equipped with three-conductor AC power cords. These power cords must be plugged into approved three-contact electrical outlets with the grounding wires firmly connected to an electrical ground (safety ground) at the power outlet. The power cords must also meet International Electrotechnical Commission (IEC) safety standards.

8. To reduce risk of damage to electrical cords, pull by plug rather than cord when disconnecting a unit.
9. Make sure all power cords are located so they will not be stepped on, tripped over or otherwise subjected to damage or stress.
10. An extension cord should not be used unless absolutely necessary. Use of an improper extension cord could

result in a risk of fire and electric shock. If an extension cord must be used, ensure:

- a. The pins on the plug of the extension cord are the same number, size, and shape as those of the plug on the power supply.
 - b. The extension cord is properly wired, in good condition, and
 - c. The wire size is large enough for the AC ampere rating of unit.
11. **DO NOT** operate equipment with damaged power cords or plugs - replace them immediately.
 12. **DO NOT** operate this product in an explosive atmosphere unless it has been specifically certified for such operation.
 13. To reduce risk of electric shock, unplug unit from outlet before attempting any maintenance or cleaning.
 14. Use only fuses of the correct type, voltage rating and current rating as specified in the parts list. Failure to do so can result in fire hazard.
 15. **GROUNDING AND AC POWER CORD CONNECTION** - To reduce risk of electrical shock use only a properly grounded outlet. The system components are equipped with electric cords having an equipment grounding conductor and a grounding plug. Be sure all outlets are properly installed and grounded in accordance with all local codes and ordinances.
 16. **DANGER** - Never alter the AC cord or plug. Plug into an outlet properly wired by a qualified electrician. Improper connection or loss of ground connection can result in risk of an electrical shock.
 17. **ELECTROSTATIC DISCHARGE SENSITIVE COMPONENTS** - This station contains CMOS and other circuit components which may be damaged by electrostatic discharge. Proper precaution must be taken when handling circuit modules. As a minimum, grounded wrist straps should be used at all times when handling circuit modules.

VOTER SPECIFICATIONS

(Refer to individual equipment manuals for complete specifications and LBI-39153 for rack-up configuration.)

DIGITAL VOTER SHELF

Size: (Height x Width x Depth)	13.3 cm (5.22 in.) x 48.26 cm (19.00 in.) x 24.03 cm (0.5 in.)
Power Requirements:	+ 5 Vdc @ up to 12.5 Amps (max.) +12 Vdc @ up to 800 mA (max.) -12 Vdc @ up to 630 mA (max.)
Weight:	12 kg (26.5 lbs.) maximum

ANALOG VOTER SHELF

Size: (Height x Width x Depth)	17.78 cm (7 in.) x 48.26 cm (19.00 in.) x 24.13 cm (9.5 in.)
Power Requirements:	24 Vdc \pm 5% @ up to 600 mA (typ.)
Weight:	30 kg (46.3 lbs.) maximum

POWER SUPPLY

Size: (Height, Width) (Depth)	13.34 cm (5.25 in.), 48.26 cm (19.00 in.) 350A1441P1 - 47 cm (18.5 in.), 350A1441P2 - 41.3 cm (16.25 in.)
Power Requirements:	110 - 120/220-230 Vac 50/60 Hz @ 6.0/3.0 Amps (max.).
Weight:	11 kg (24.3 lbs.) maximum

POWER DISTRIBUTION PANEL

Size: (Height x Width x Depth)	8.9 cm (3.5 in.) x 48.26 cm (19.00 in.) x 7 cm (2.75 in.)
Weight:	3.1 kg (6.83 lbs.) maximum

ENVIRONMENT

Humidity (EIA):	90% at 50°C (122°F) non-condensing
Temperature:	Operating: 0° C to 40° C (32° F to 104° F) Storage: -20° C to 85° C (-4° F to 185° F)
Altitude:	Operating: up to 4,570 m (15,000 ft.) Storage: to 15,250 m (50,000 ft.)

83-inch DEEP CABINET (Empty)

Size: (Height x Width x Depth)	211 cm (83.06 in.) x 58.42 cm (23.0 in.) x 58.42 cm (23.0 in.)
Power Requirements:	110 - 120/220 - 230 Vac 50/60 Hz @ 0.5 Amps (max.).
Weight:	approximately 56.7 kg (125 lbs.)

69-inch OPEN RACK (Empty)

Size: Height	217.17 cm (85.5 in.)
Base (Width x Depth)	52.07 cm (20.5 in.) x 32.0 cm (12.6 in.)
Power Requirements:	110 - 120/220 - 230 Vac 50/60 Hz @ 0.5 Amps (max.).
Weight:	approximately 34.0 kg (75 lbs.)

INTRODUCTION

This manual provides an overview of the **EDACS[®]** (Enhanced Digital Access Communication System) Compact Vertical Voter. Additional information for the installation, setup, and repair of the voter system and individual voter subassemblies may be found in the maintenance manuals listed on the front page.

The Compact Vertical Voter (CV²) system is an integral part of a Voted or Simulcast radio system.

Although functionally equivalent to the older horizontal voter, the CV² system's modular design (a three to one size reduction) conserves valuable floor space and increases system reliability.

DESCRIPTION

Voting is a technique for balancing the talk-back range of portable radios with the talk-out range of high power transmitters. Typically, base stations use 100-watt transmitters that can broadcast their signals much further than 3 to 5-watt portables. By adding a number of geographically dispersed satellite receiver sites to the communication system, the portable radio user can be confident that if he hears the dispatcher, the dispatcher will hear him.

The satellite receivers receive audio and digital signals transmitted by the portables and route the signals to the centrally located Voter system. The Voter monitors the

signals from all receivers including the main site's receiver and selects the receiver with the best signals. This process is referred to as voting. After voting on the best signal, the Voter routes the voted signals to the main site (Control Point for Simulcast systems) or to the Dispatcher (see Console operation). This process ensures that the best signal is always re-transmitted and/or routed to the dispatcher.

VOTER SYSTEM

A typical (Non-Simulcast) Voter system, as shown in Figure 1, includes a main transmit/receive site, a number of receive-only satellite sites, and a centrally located Voter.

The Main Site and Satellite Site receivers receive audio or digital signals from the portable radios. These received signals are then sent to the Voter for processing via direct connection, telephone lines, or microwave links.

At the Voter, the Digital and Analog Voters select (vote on) the best analog and digital signals. Analog voting evaluates and selects the site receiving the best Clear Voice audio transmission. Digital voting selects the site receiving the best digital signal. Digital signals include Digital Voice, Data, and Digital messaging (Control Channel signaling).

The Voter continuously compares the analog and digital signals, selects the receivers with the best signals, and relays voted digital messages to the main site GETC. It also directs the Analog Voter to relay voted audio to the main site and when available to a dispatch Console.

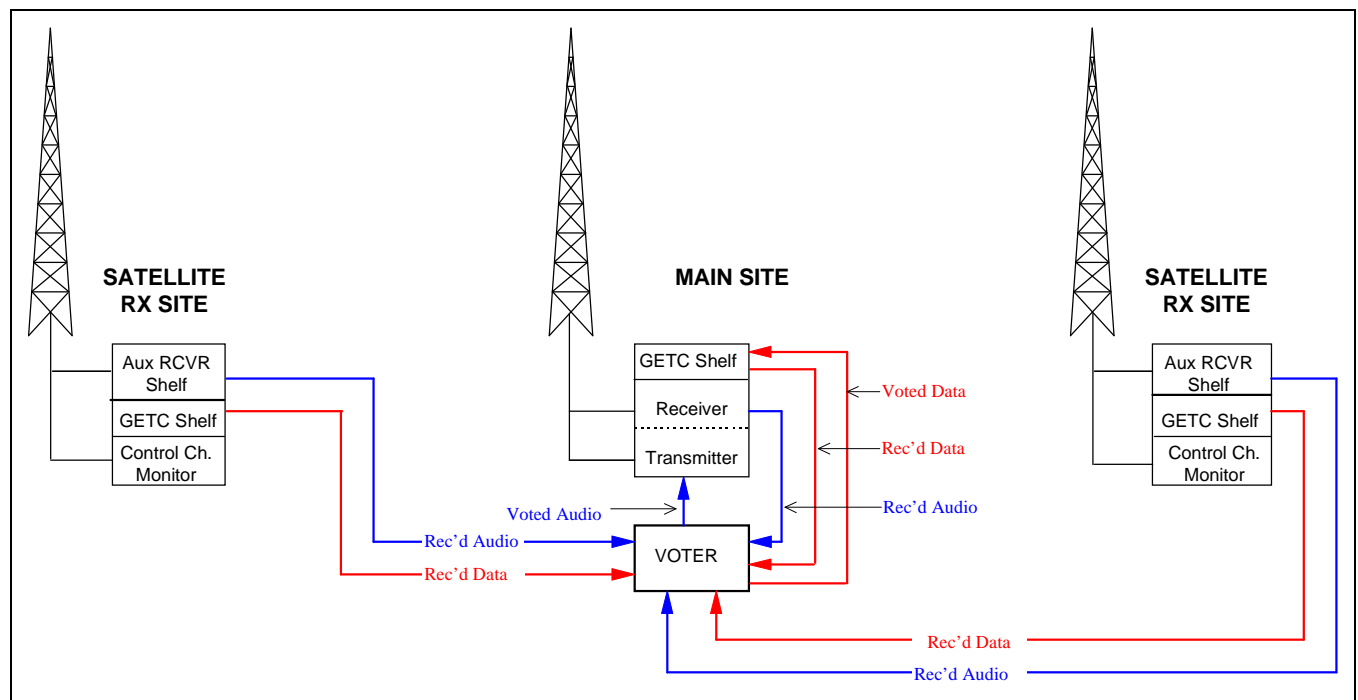


Figure 1 - Typical Voter System (non-Simulcast)

SIMULCAST SYSTEM

The most common use of the Voter is as part of a Simulcast system. Simulcast is an EDACS system that **simultaneously broadcasts** the same information across a wide area using a single set of frequencies.

A typical Simulcast system, as shown in Figure 2, consists of:

- Control Point Equipment
- Transmit Site Equipment
- Receive-only Equipment

Control Point

The Control Point coordinates the activities of the RF sites and employs special circuitry for precise control of the amplitude and phase of each signal. It also routes digital messages to the Site Controller, Master Alarm system, and the Console Electronics Controller (CEC) or Integrated Multisite and Console Controller (IMC) when using Digital Dispatch.

The Voter is co-located at the Control Point. It processes the received audio and digital signals and passes the best signals on to the Control Point equipment.

RF Sites

Simulcast systems also include of two or more RF sites. An RF site may be either a transmit site or a receive only (Satellite Receiver) site. A transmit site includes both a transmitter and receiver for each channel as well as common equipment required for simulcast operation. Receive-only sites include a receiver for each channel. These sites enhance portable talk-back coverage. The RF sites are connected to the Control Point by microwave or fiber optic links.

CONSOLE OPERATION

Consoles allow dispatchers to communicate with field radios and vice versa. In a Voted or Simulcast system, multiple consoles may be connected to the system via the CEC/IMC switch. The switch interfaces with the Voter through a Voter Digital Relay Board (VDRB) which is controlled by the CEC/IMC switch or CV² Selector.

The VDRB, by default, routes voted audio to the Control/Main Site and console. When directed, the VDRB also routes clear voice, data, digitized voice or encrypted voice calls to and from the CEC/IMC. From the IMC (see Figure 3), this traffic can be routed to or from other systems (Multisite) and/or to or from console (dispatch) positions.

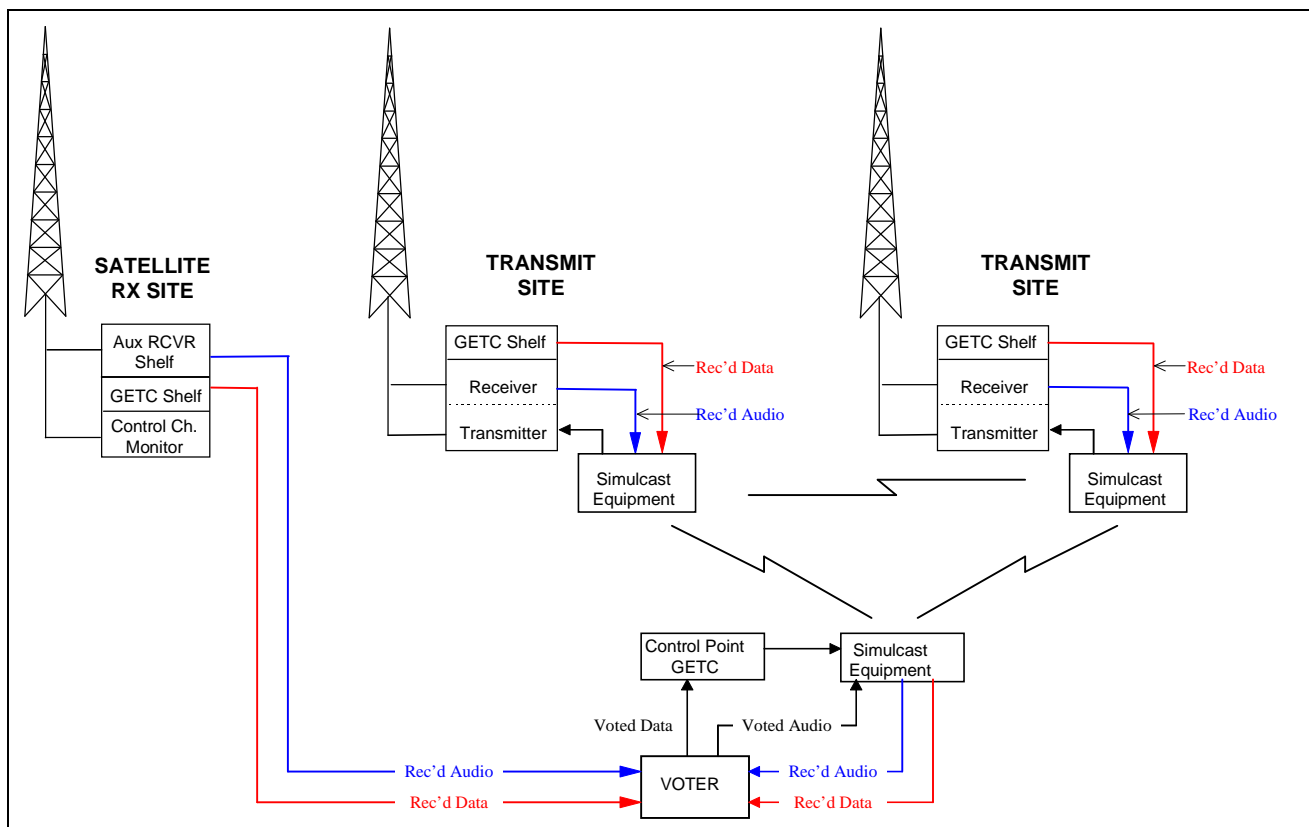


Figure 2 - Typical Simulcast System

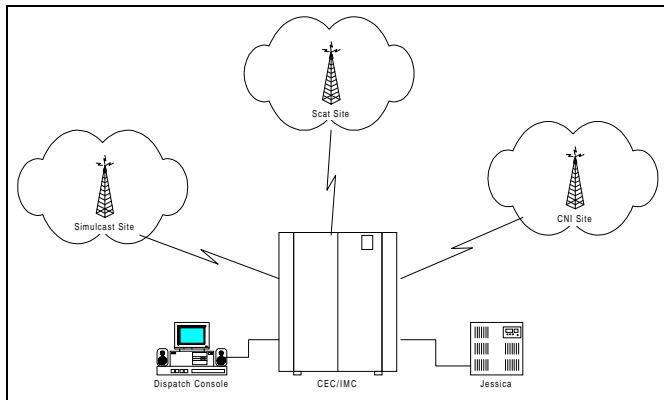


Figure 3 - Console with CEC/IMC in Multisite Network

VOTER EQUIPMENT

The equipment requirements for a CV² system depends on the overall system configuration. There are a number of factors which affect the configuration. These factors include the number of sites supported, the number of channels, if the system is Simulcast or non-simulcast, if the system uses Digital Dispatch or is supporting Voted Digital Interconnect. Specific configuration details may be found in LBI-39153.

Typically, a CV² system is installed in either 83-inch high cabinet or an 86-inch high open rack. The number of cabinets or racks required to house the equipment depends on the number of sites and whether the site supplies AC or DC voltage as the primary power source.

The components installed in a CV² system cabinet(s) (or racks) include the following equipment (refer to the example of an 83-inch cabinet shown in Figure 6):

- 5/12 Volt Power Distribution Panel (1 ea per cabinet)
- 24 Volt Power Distribution Panel (1 ea per cabinet)
- 5/12 Volt Power Supply (up to 2 ea per cabinet group)
- 24 Volt Power Supplies (1 ea per cabinet group)

- Voter Unit(s) (quantity depends on configuration)

In installations using multiple cabinet configurations, up to three (3) cabinets or racks may be grouped together for power distribution. The Power Distribution Panels in the first cabinet in each group distribute the 5, 12, and 24 Volt power to the other cabinets or racks in the group. The source of this power may be either external or from the power supplies installed in the first cabinet.

POWER DISTRIBUTION PANELS

The Power Distribution Panels (PDP), 19C852636P1, distribute DC power to all Voter equipment installed in the cabinet or rack. Each cabinet requires two PDPs for power distribution. One PDP distributes the +5 and ±12 Vdc and the other distributes the 24 Vdc. Both PDPs are identical, except for the voltage labeling. A typical PDP is shown in Figure 4.

Source voltage to the each PDP is supplied by either the Redundant Power Supply System (RPS) installed in the Voter cabinets or racks or from an external source provided by the customer.

Refer to LBI-39153 for Interconnect diagrams showing the power distribution within each cabinet and power distribution between multiple cabinets.

Maintenance and accessory information for the PDP is available in the PDP Maintenance Manual, LBI-39158.

POWER SUPPLIES

The Voter system requires +5, ±12, and +24 Vdc for operation. This power is either provided from an external source or by the Redundant Power Supply System (RPS) installed in the Voter cabinets. A typical RPS, as shown in Figure 5, includes a chassis and one or two power modules. When using the RPS as the power source, it is necessary to install one or two +5 and ±12 Vdc systems and a +24 Vdc system including the following:

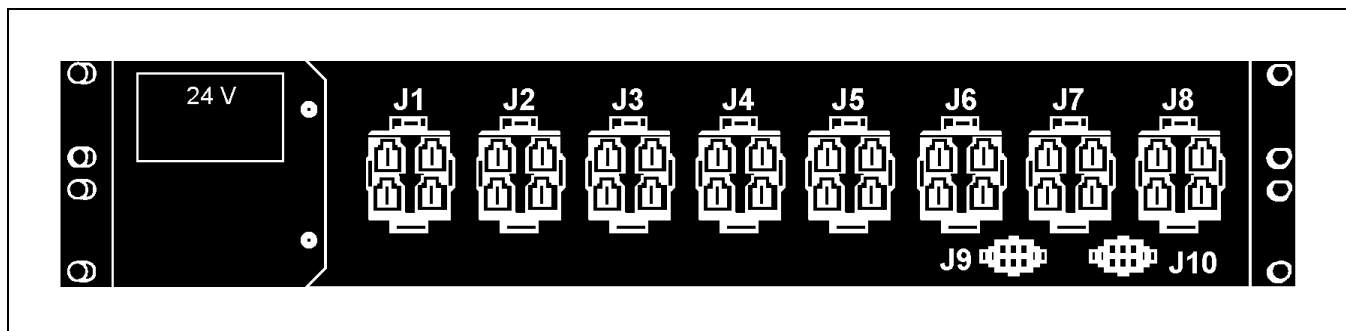


Figure 4 - Typical Power Distribution Panel (24 Volt model shown)

- **+5/±12 Vdc RPS** - 350A1441P1 chassis and 350A1441P3 (+5/±12 Vdc) Power Modules.
- **24 Vdc RPS** - 350A1441P2 chassis and 350A1441P5 (+24 Vdc) Power Modules.

Normally the Voter system uses one or two +5/±12 Vdc RPS system per Cabinet (rack) group, depending on the number of Voter Units installed, and one 24 Vdc RPS system per installation.

The **+5/±12 Vdc RPS** operates as an “N+1” redundant system. This means that “N” power modules are required for system load and an additional module “+1” is added to provide redundancy. Each of the +5/±12 Vdc RPS power modules share the current load and are capable of providing up to 380 Watts per module. In the unlikely event one module should fail, the remaining modules are capable of providing system power.

The **24 Vdc RPS** operates as a “2N” redundant system. In this configuration, the modules are connected in parallel with each module capable of supplying up to 360 Watts. The current load is shared by the modules and in the unlikely event one of the modules should fail, the other module is capable of handling the entire load.

Additional information on the RPS may be found in LBI-39038.

VOTER UNIT

The term “Voter Unit” refers the minimum voter hardware required for voter operation. Each Voter Unit consists of the following main elements:

- Digital Voter Shelf (1 ea)
- Analog Voter Shelf (2 ea for 2-12 site system, 3 ea for systems with 13-17 sites)
- EDACS Interface Panel
- Interconnect Cable Set

With the exception of the interconnect cables, these elements are further defined in the following paragraphs. For a description of the interconnect cabling, refer to the Cable Connection lists, Cable Diagrams, and the Voter Unit Interconnect Diagrams contained in LBI-39153.

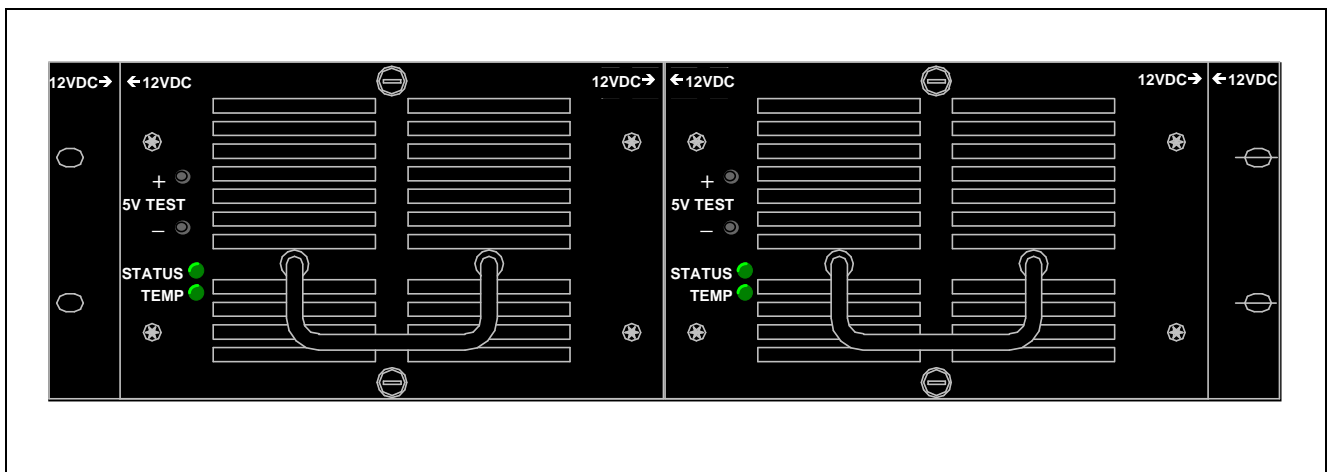
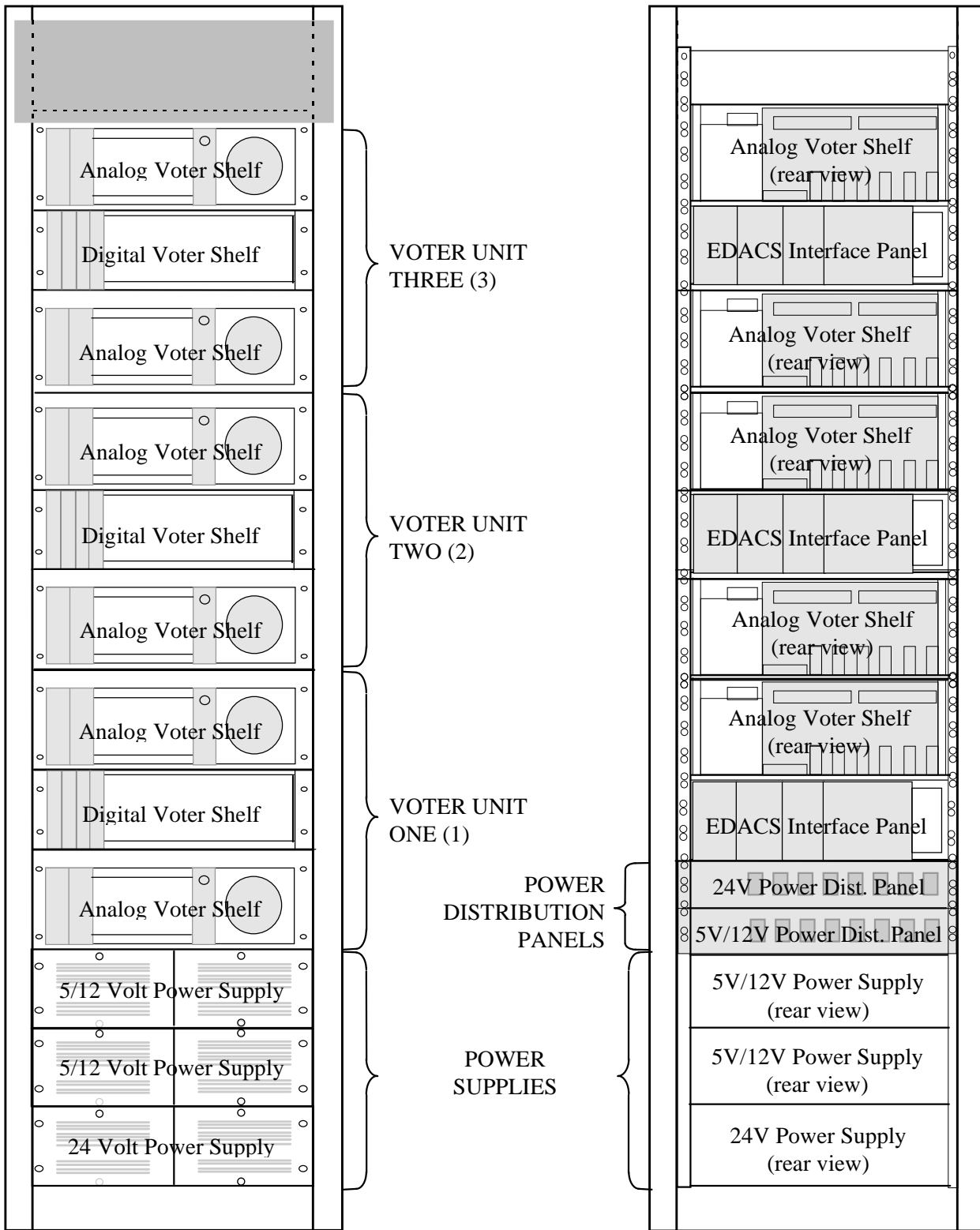


Figure 5 - Typical +5/±12 Volt Redundant Power Supply System



(Front View)

(Rear View)

Figure 6 - Typical 83-Inch Cabinet with Power Supplies

Digital Voter Shelf

The Digital Voter Shelf, shown in Figure 7, furnishes housing and electrical connections for the modules installed in the shelf. The type and number of modules installed in a Digital Voter Shelf depends on the type of system, number of sites and channel configuration. For example, in a Simulcast system the shelf may be configured for one channel per shelf and support up to 17 sites or two channels per shelf supporting a maximum of six (6) sites. Refer to LBI-39153 for a listing of the various configurations.

A combination of the following modules may be housed in the Digital Voter Shelf:

- **Digital Voter Shelf (188D6544P1)** - The Digital Voter Shelf is a standard VME Shelf with a specially designed backplane. The backplane distributes power from the Power Distribution Panels to the modules. It also provides interfacing between the modules and routes signals between the modules and the EDACS Interface Panel. Maintenance information for the VME Shelf and backplane is contained in LBI-39150.
- **Selector(s) (ROA 117 2240/2)** - Each shelf requires a Selector (two (2) Selectors for two channels per shelf configuration). The Selector contains a General Purpose Trunking Card

(GPTC), the Selector Configuration Plug, and unique Selector programming. Maintenance information for the Selector is available in LBI-39151.

- **Digital Receivers (ROA 117 2240/1)** - A Digital Receiver is required for each corresponding receiver site. The Digital Receiver contains a General Purpose Trunking Card (GPTC), a Digital Receiver Configuration Plug, and unique Digital Receiver programming. Maintenance information for the Digital Receiver is available in LBI-39151.
- **Rockwell Modem Intfc Card - (ROA 117 2247/1)** - The Rockwell Modem Interface Card (RMIC) allows for modulated signal communication between the Digital Receivers or Selector(s) and the remote or satellite sites. Maintenance information for the interface cards is contained in LBI- 39152.
- **RS-232 Interface Card - (ROA 117 2247/2)** - The RS-232 Interface Card provides a direct communication link between the Digital Receivers or Selector(s) and the Main Site equipment (distance not to exceed 50 feet). Maintenance information for the interface cards is contained in LBI- 39152.

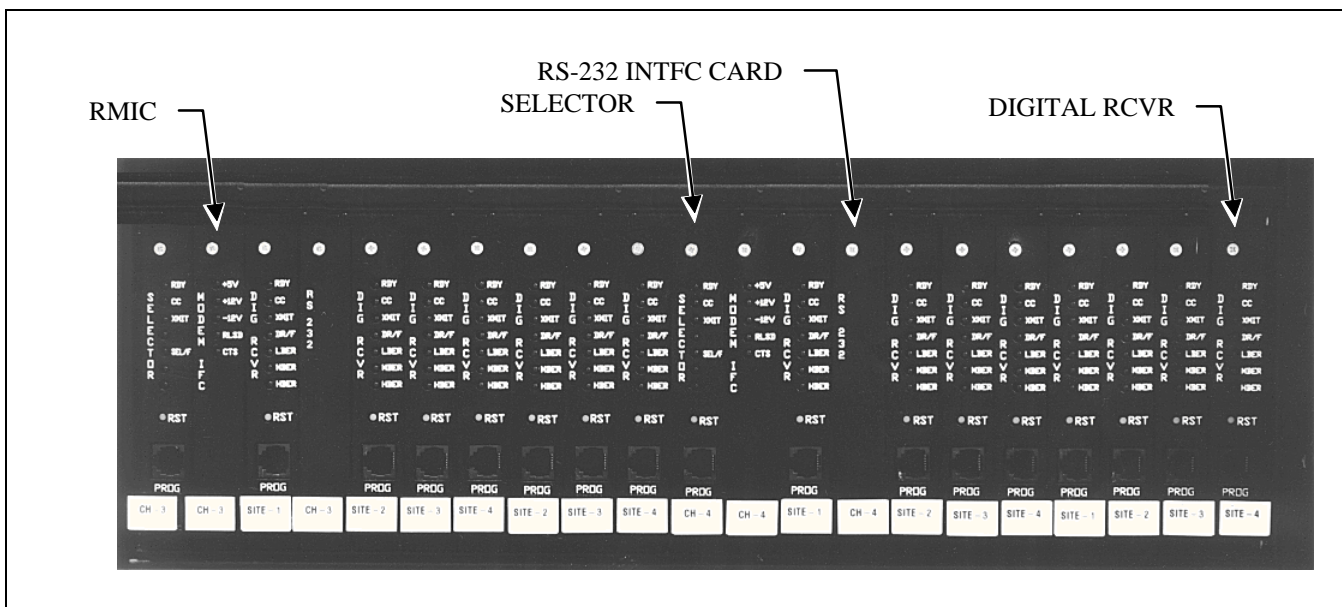


Figure 7 - Digital Voter Shelf

Analog Voter Shelf

The Analog Voter Shelf, shown in Figure 8, provides continuous voting of satellite receivers and selects the receiver with the best audio quality. The selected audio is amplified and applied to the selector speaker and to the phone lines.

The number of sites supported by the Voter System determines the number of Analog Voter shelves and modules required by each Voter Unit. As a minimum, each Voter Unit contains two (2) Analog Voter shelves.

Each Analog Voter Shelf contains a combination of the following subassemblies:

- **Analog Voter Shelf (19E500936G2)** - The shelf itself furnishes housing for the modules and provides electrical connections via the backplane.

- **Analog Receiver Module (19D903175G1)** - The Analog Receiver module receives and votes on the site with the best audio signal. One Receiver module is required for each corresponding Satellite Receiver site.
- **Audio Module - (19D413958G5)** - The Audio module routes the selected Analog receivers signal to the speaker and the Main Site. One Audio module is required for each shelf.
- **Power Supply Module - (19D413917G4)** - The Power Supply module converts the 24 Volt source voltage from the Power Distribution Panel into regulated 20 and 24 Vdc. One Power Supply module is required for each shelf.

For complete description and maintenance information on the Analog Voter refer to LBI-38676. For information on configuring the Analog Voter for operation in a CV² system, refer to LBI-39153.

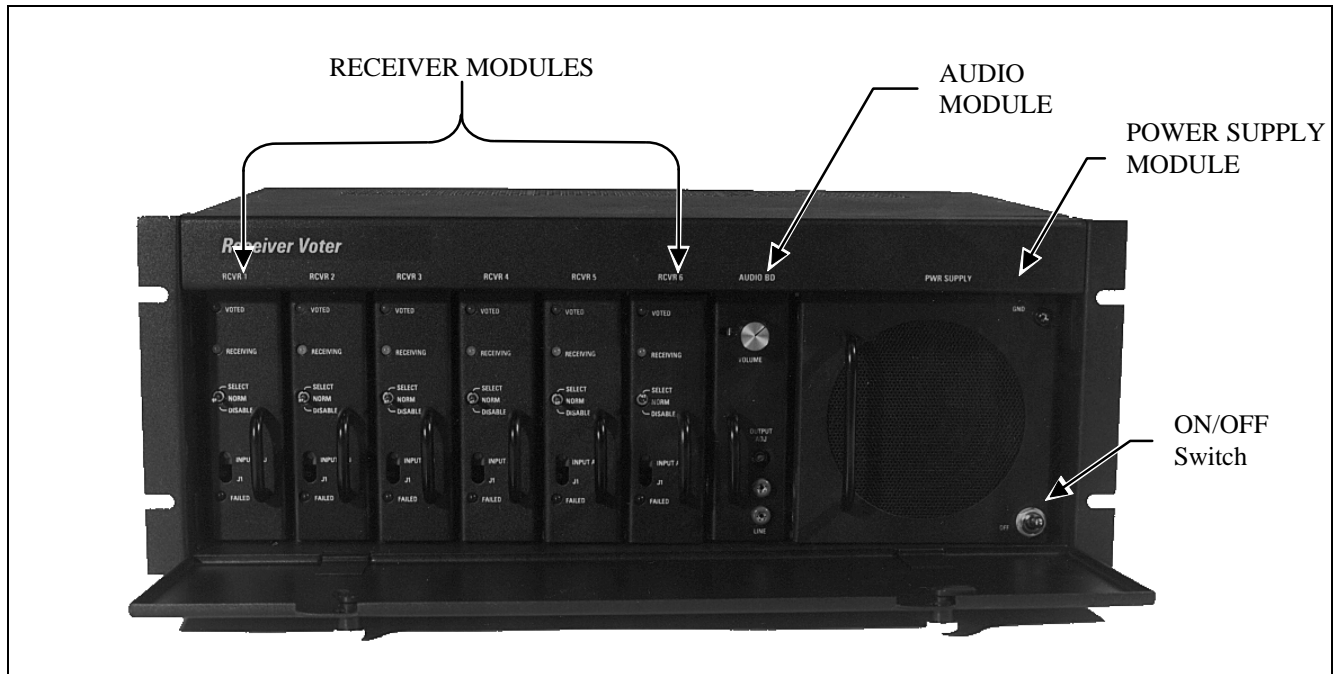


Figure 8 - Analog Voter Shelf

EDACS Interface Panel

The EDACS Interface Panel serves as a central interconnect point for all signals entering or leaving a Voter Unit and between the digital and analog shelves. It also connects voice and data signals between the IMC switch and the sites. These signals are routed to and from the EDACS Interface Panel to the Voter's Analog and Digital Cross Connect Panels, located in adjacent cabinet, via 25-pair TELCO cables.

The configuration of the EDACS Interface Panel depends on the system configuration. Specifically, whether the voter unit is configured for one channel or two Channel per shelf applications.

The EDACS Interface Panel configured for use with the CV² system uses a combination of the following

subassemblies. A complete description and maintenance information for each subassembly is available in LBI-39075.

- **Audio Interface Board (19C852204G1)** - The Audio Board routes audio signals to and from the Analog Voters and routes signals to and from the IMC (Integrated Multisite Controller).
- **Voter Digital Relay Board (188D6495G1)** - The Voter Digital Relay Board (VDRB) selects the type of signal, analog or digital, to route to the IMC and other equipment.
- **Digital Interconnect Board (ROA 117 2227 or ROA 117 2228)** - The Digital Interconnect Board routes digital signals to and from the Digital Voter and routes control signals between the Digital and Analog Voters. ROA 117 2227 is for 2 Ch./shelf, and ROA 117 2228 is for 1 Ch./shelf.

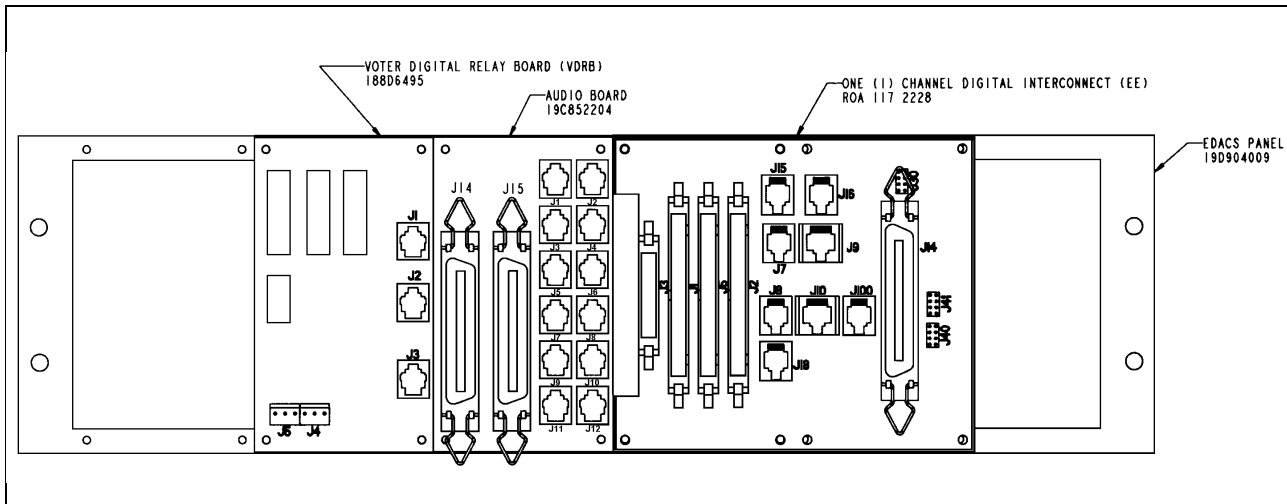


Figure 10 - Typical CV² Interface Panel Configured for Simulcast One (1) Channel per Shelf

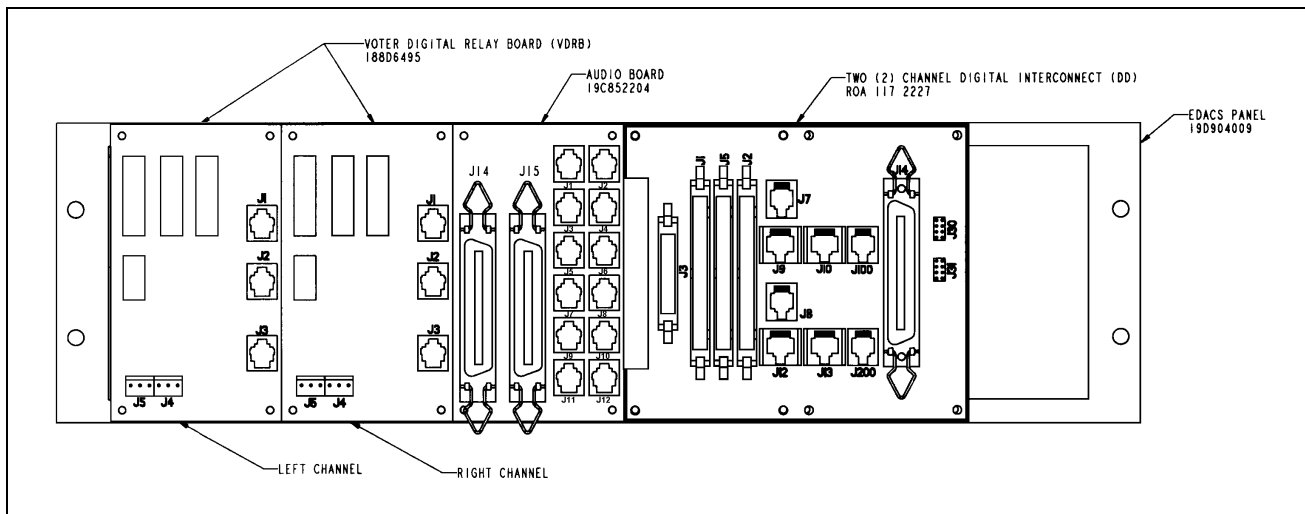


Figure 9 - Typical CV² Interface Panel Configured for Simulcast Two (2) Channels per Shelf

CONTROLS AND INDICATORS

DIGITAL VOTER SHELF

Selector

The Selector front panel indicators and controls are described below.

The unlabeled LEDs (V13, V15, and V16) are unassigned and will normally be OFF. However, if one of the LEDs comes ON it does not necessarily indicate a problem.

NOTE

The numbers shown in parentheses refer to the Selector's circuit diagram reference designator.

Table 1 - Selector Indicators

INDICATOR	PURPOSE
RDY (Red)	Ready indicator (V14) ON - indicates the Selector's programming code is functional and it is ready to send and receive messages. OFF - Selector communication error, refer to Troubleshooting section in LBI-39153.
CC (Red)	Control Channel indicator (V11) ON - indicates the Selector is operating in the Control Channel mode. OFF - indicates the Selector is operating in the Working Channel mode.
XMIT (Red)	Transmit indicator (V10) ON (flickering or flashing at a 1 Hz rate) - indicates the Selector is sending information to the Main Site. OFF - Indicates a communication failure, refer to the Troubleshooting section in LBI-39153.
SEL/F (Red)	Selector and Fault indicator (V12) ON - indicates normal operation. OFF or Flashing - Off indicates a module failure, flashing indicates a BSL failure (2 Hz flash rate) or phone line failure (1 Hz flash rate). Refer to the Troubleshooting section in LBI-39153.

Table 2 - Selector Controls and Connectors

CONTROL	PURPOSE
RST (Green)	Reset button (S4) Use to manually reinitialize Voter software.
PROG (RJ-12)	Programming Connector (X3) Use to download the Voter software from a PC to the Selector.

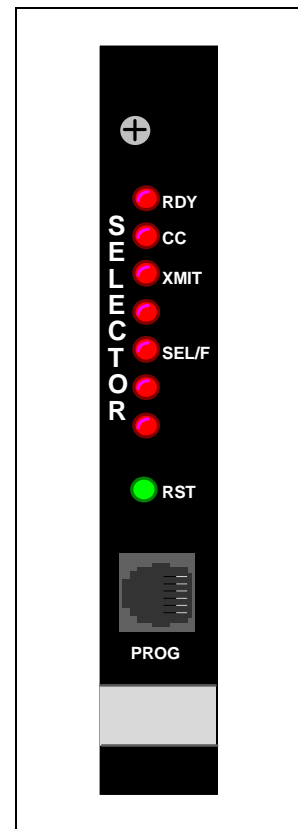


Figure 11 - CV² Selector

Digital Receiver

The Digital Receiver front panel indicators are described below.

NOTE

The numbers shown in parentheses refer to the circuit diagram's reference designator.

Table 3 - Digital Receiver Indicators

INDICATOR	PURPOSE
RDY (Red)	Ready indicator (V14) ON - indicates the Digital Receiver's programming code is functional and the receiver is ready to send and receive messages. OFF - Receiver communication error, refer to Troubleshooting section in LBI-39153.
CC (Red)	Control Channel indicator (V11) ON - indicates the Digital Receiver is operating in the Control Channel Mode. OFF - indicates the receiver is operating in the Working Channel mode.
XMIT (Red)	Transmit indicator (V10) ON - indicates the Digital Receiver is sending information to the Selector over the Backup Serial Link (BSL). Typically, the XMIT LED flashes at a 4 Hz rate which represents the required 250 millisecond status updates. OFF - indicates a communication failure, refer to the Troubleshooting section in LBI-39153.
DR/F (Red)	Digital Receiver and Fault indicator (V15) ON - indicates normal operation. OFF or Flashing - Off indicates a module failure, flashing indicates a BSL failure (2 Hz flash rate) or phone line failure (1 Hz flash rate). Refer to the Troubleshooting section in LBI-39153.
	The Bit Error Rate (BER) Indicators (V12, V13, and V16) indicate the calculated Bit Error Rate sent to the Selector during a Digital Voice call.

LBER (Red)	ON - indicates the BER value is between zero (0) and 3%.
MBER (Red)	ON - indicates the BER is between 3 and 4.5%.
HBER (Red)	ON indicates the BER is greater than 4.5%.
	All OFF - indicates no BER value is being sent to the Selector.

Table 4 - Digital Receiver Controls and Connectors

CONTROL	PURPOSE
RST (Green)	Reset button (S4) Use to manually reinitialize Voter software.
PROG (RJ-12)	Programming Connector (X3) Use to download the Voter software from a PC to the Digital Receiver.

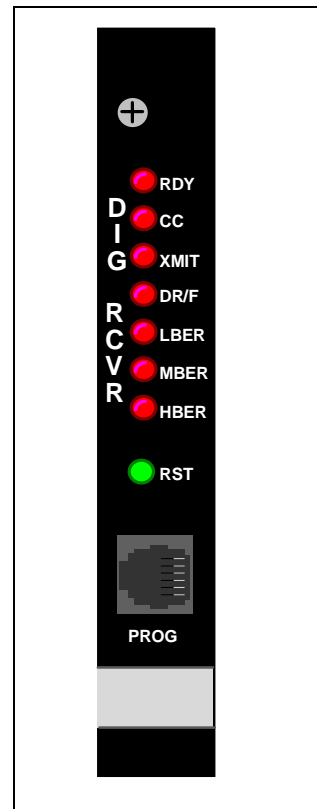


Figure 12 - CV² Digital Receiver

Rockwell Modem Interface Card

The 9600 Baud Rockwell Modem Interface Card's front panel indicators are described below:

NOTE

The numbers shown in parentheses refer to the circuit diagram's reference designator.

Table 5 - Rockwell Modem Interface Card Indicators

INDICATOR	PURPOSE
+5V (Red)	+5 volt Indicator (V1) ON - indicates fuse F1 is good and +5 Vdc (V _{CC}) is being applied to the card's circuitry. OFF - indicates a problem, refer to the Troubleshooting section in LBI-39153.
+12V (Red)	+12 volt Indicator (V2) ON - indicates fuse F3 is good and +12 Vdc (V _{DD}) is being applied to the card's circuitry. OFF - indicates a problem, refer to the Troubleshooting section in LBI-39153.
-12V (Red)	-12 volt Indicator (V3) ON - indicates fuse F3 is good and -12 Vdc (V _{SS}) is being applied to the card's circuitry. OFF - indicates a problem, refer to the Troubleshooting section in LBI-39153.
RLSD (Red)	Received Line Signal Detect indicator (V12) ON - indicates the modem receiver is in the data state and receiving an input signal of sufficient amplitude. OFF - indicates the modem receiver is in the idle state and is not receiving an input signal or the signal is too weak.
CTS (Red)	Clear To Send indicator (V11) ON - indicates the RM, responding to a Request-to-Send (RTS) signal from the Selector CPU, is set up and ready to send data. OFF - indicates RM is not ready to send data.

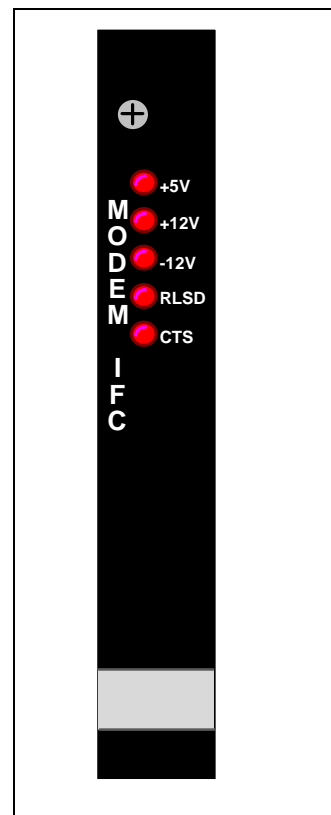


Figure 13 - CV² Rockwell Modem Interface Card

ANALOG VOTER SHELF

The Analog Voter Shelf houses up to six receiver modules, an audio module, and a Power Supply/Speaker module.

Analog Receiver

The Analog Receiver modules have three LED indicators, a mode selection switch, and the Input Adjustment potentiometer. Table 6 describes the purpose of each receiver indicator and control.

Table 6 - Analog Receiver Indicators and Controls




INDICATOR or CONTROL	PURPOSE
 VOTED (green)	Indicates the Satellite receiver associated with this Analog Receiver is the selected (voted) site. Audio from this site is routed to the main site repeater via the Audio module.
 RECEIVING (amber)	Indicates the receiver is receiving audio signals from its associated Satellite Receiver.
 FAILED (red)	Indicates a loss of signal possibly resulting from a telephone line failure between the Satellite and the Analog Receiver or receiver malfunction. Refer to LBI-38676. Receiver is removed from the voting process.
MODE SWITCH	This toggle switch selects the receiver's operating mode as follows: Select - manually selects this receiver as the voted site. Normal - Allows the receiver to be selected if it receives the best input signal. Disable - manually removes the receiver from the voting process.
J1	Test Point for measuring level of input signal.
INPUT ADJ	Adjusts the amplitude of input signal during receiver alignment.



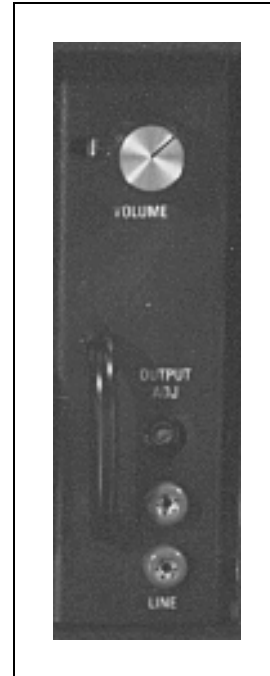
Figure 14 - Analog Voter Receiver

Audio Module

The audio module has a speaker Volume Control, Output Level Adjustment, and Output monitor jacks, but no indicators.

Table 7 - Audio Module Indicators and Controls

INDICATOR or CONTROL	PURPOSE
VOLUME	Adjust to speaker audio output.
OUTPUT ADJ	Adjusts the amplitude of the output signal sent to the Main site repeater.
LINE	Connections for monitoring the output signals.

**Figure 15 - Audio Module**

GETC INDICATORS

GETCs are used at the Simulcast Control Point and Transmit Sites, Main Site, and Auxiliary Receiver sites for communicating with the Voter. For reference, their indicators are listed here. For detailed operating information, refer to the applicable GETC or Simulcast configuration manual.

Each GETC shelf has a row of seven LED indicators across the front panel. The pattern of lit indicators shows the function or state of the GETC. The following sections describe the indicator states for different GETC applications within the voter system. Detailed information on the GETC shelf assembly can be found in the separate GETC Maintenance and Configuration manuals.

Refer to the System Checkout section in LBI-39153 for additional information describing the various operating states of GETCs when communicating with a voted system.

Main (Control) Site GETC

The list in Table 8 identifies the GETC indicators and their functions when used as a Main (Control) Site GETC.

Table 8 - Main (Control) Site GETC Indicators

INDICATOR	PURPOSE
L1	BSL (Backup Serial Link) ON - indicates communication is occurring on the BSL, such as in Failsoft operation. OFF - indicates GETC communications occur over the site controller serial link(s).
L2 thru L5	OFF - Normally operation.
L6	Low Speed Data Enabled - Used with indicator L7 to indicate Control Channel mode. ON - indicates Assigned Voice channel. OFF - indicates Unassigned Working Channel.
L7	High Speed/Voice Path Indicator - ON - indicates GETC is transmitting high speed data (HSD). OFF - indicates GETC is transmitting clear voice on Working Channel.

Satellite Site GETC

The list in Table 9 identifies the GETC indicators and their functions when the GETC is used as Satellite Site GETC.

Table 9 - Satellite Receiver & Simulcast TX Site GETC Indicators

INDICATOR	PURPOSE
L1	Ready ON indicates GETC is functioning and ready to send and receive messages. OFF - indicates a possible problem. Refer to LBI-39153 and LBI-38988.
L2	Control/Working Channel Indicator ON - indicates GETC is operating in the Control Channel mode. OFF - indicates GETC is in the Working Channel mode.
L3	Not used.
L4	Channel Alarm ON - indicates a test call is in process. If the indicator remains on, the channel has failed. OFF - normal operation when no test calls are being made.
L5	Not used.
L6	Low Speed Data Enabled - ON - indicates Working Channel is assigned. OFF - indicates Unassigned Working Channel.
L7	High Speed Data enabled - ON - indicates GETC is transmitting high speed data (HSD). OFF - indicates no HSD (Voted systems) or GETC is transmitting clear voice on Working Channel (Simulcast only).

SYSTEM OPERATION

The Compact Vertical Voter (CV²) system is an integral part of an EDACS Simulcast or Voted radio system. Receivers at Satellite Sites, RF Sites, or the Main Site forward audio and digital signals to the voter system for processing. The Voter system selects (votes on) the site with the best signals and relays the selected signals to the Main or Control site and if required to the Dispatcher.

The following paragraphs explain the basic voter operation and then the interaction of the CV² system in a Simulcast and Voted system.

VOTER SYSTEM

The Voter system provides voting on both analog and digital signals. Analog voting involves selecting the site receiver receiving the best Clear Voice (CV) transmission. Digital voting involves selecting the site receiver receiving the best Digital Voice, Data, or Digital messaging such as Control Channel status and assignment messages.

The main components of the CV² system are the Analog and Digital Voter shelves. These shelves are grouped together as a Voter Unit. A Voter Unit includes one Digital Voter shelf and two or three Analog Voter shelves. If the total number of sites is 12 or less, then two Analog Shelves are necessary. If there are 13 to 17 sites, a third Analog Voter shelf is added to the Voter Unit.

Each Analog Voter shelf consists of an Audio Amplifier, a Power Supply module, and a number of Analog Receiver modules. The number and position of the receivers is determined by system requirements as defined in the Voter Installation Manual, LBI-39153, Configuration tables.

Each Digital Voter shelf consists of one Selector per channel and a Digital Receiver for each channel at each site. The Digital Voter Shelf also includes communication cards as required by the system's configuration (see LBI-39153).

In addition to the components previously mentioned, each Voter Unit includes an EDACS Interface Panel installed behind the Digital Voter Shelf. The Interface panel routes all signals between the shelves and between the Voter Unit and the Simulcast or Voted system equipment.

Analog Voting

The main purpose of the Analog Voter is to select (vote on) the site receiver with the best Clear Voice audio signal. It then routes the voted audio to the Control Point (Simulcast system) or the main site repeater (Voted system).

The Analog Voter functions under the control of the Digital Selector and its corresponding Digital Receiver. The Digital Selector controls the Analog Voter's voted audio

output. The Digital Receiver controls the Analog Receiver's audio output whenever the site receiver is idle or not receiving.

When the Analog Voter receives a Clear Voice signal it informs the Selector (via the RCVNG LINE) that an Analog Receiver is receiving a signal. The Selector queues the Digital Receivers via the Backup Serial Link (BSL) to process the call. Each Digital Receiver detecting valid high speed data (HSD) from the Site GETC, unmutes (enables) its corresponding Analog Receiver. It keeps the Analog Receiver unmuted as long as it receives "Low Speed Data Detected" messages from the Site GETC, or until the Site GETC sends a channel drop message.

When an Analog Receiver is enabled, its signal is added to the voting process. The Analog Voter then selects the best audio signal among the enabled receiver modules and routes it to the transmitter or the Dispatcher (see Dispatch Console Interface) as voted audio.

During all types of calls, the Selector controls muting and unmuting of the Analog Voter audio output. If the Selector receives an unkey, a drop message, or two status messages in a row with no low-speed data, it mutes the voted audio output. The selector also mutes the Analog Voter any time it detects a telephone line or BSL failure. If the Selector receives a valid message requiring a Clear Voice channel, it forwards the message to the Control Site and unmutes the Analog Voter.

Digital Voting

Digital voting occurs when the channel is receiving a digital signal. The channel may be operating in either the Control Channel or Working Channel mode.

The Control Channel mode involves processing EDACS system related messages such as channel requests, Status, key and unkey, RF, Alarm, Special Key, and Special Call Block messages. The Selector relays these messages to the Control Site.

The Working Channel mode involves processing digital information such as Digital Voice calls and Data Calls or relaying EDACS system messages.

Site receivers send both Digital Voice and Data calls to their corresponding Digital Receiver. The Digital Receivers receive data from remote or Satellite receivers via an RMIC (for modem data) or an RS-232 Interface Card (for serial data), depending on the system configuration. The Digital Receiver processes the information, maintains sync on the data stream, and performs continuous Bit Error Rate (BER) calculations during a Digital Voice call. During a Data call, the site receiver performs an initial BER calculation. The Digital Receiver then sends a Ready message to the Selector over the BSL.

The Selector continues the digital voting process by simultaneously notifying all the remaining Digital Receivers to begin their BER calculations and report the results via the BSL. The Digital Receiver with the lowest BER value sends the voted output to the Selector. In the event of two or more equal BER values, the Digital Receiver with the lowest slot time number is voted.

The Selector receives the voted output from the Digital Receiver via the BSL and relays it to the Main Site GETC, Control Point Trunking Card or Control Point GETC, or Dispatcher, depending on system requirements and configuration.

The Selector also expects the Digital Receivers to relay a status message containing their current status and status of

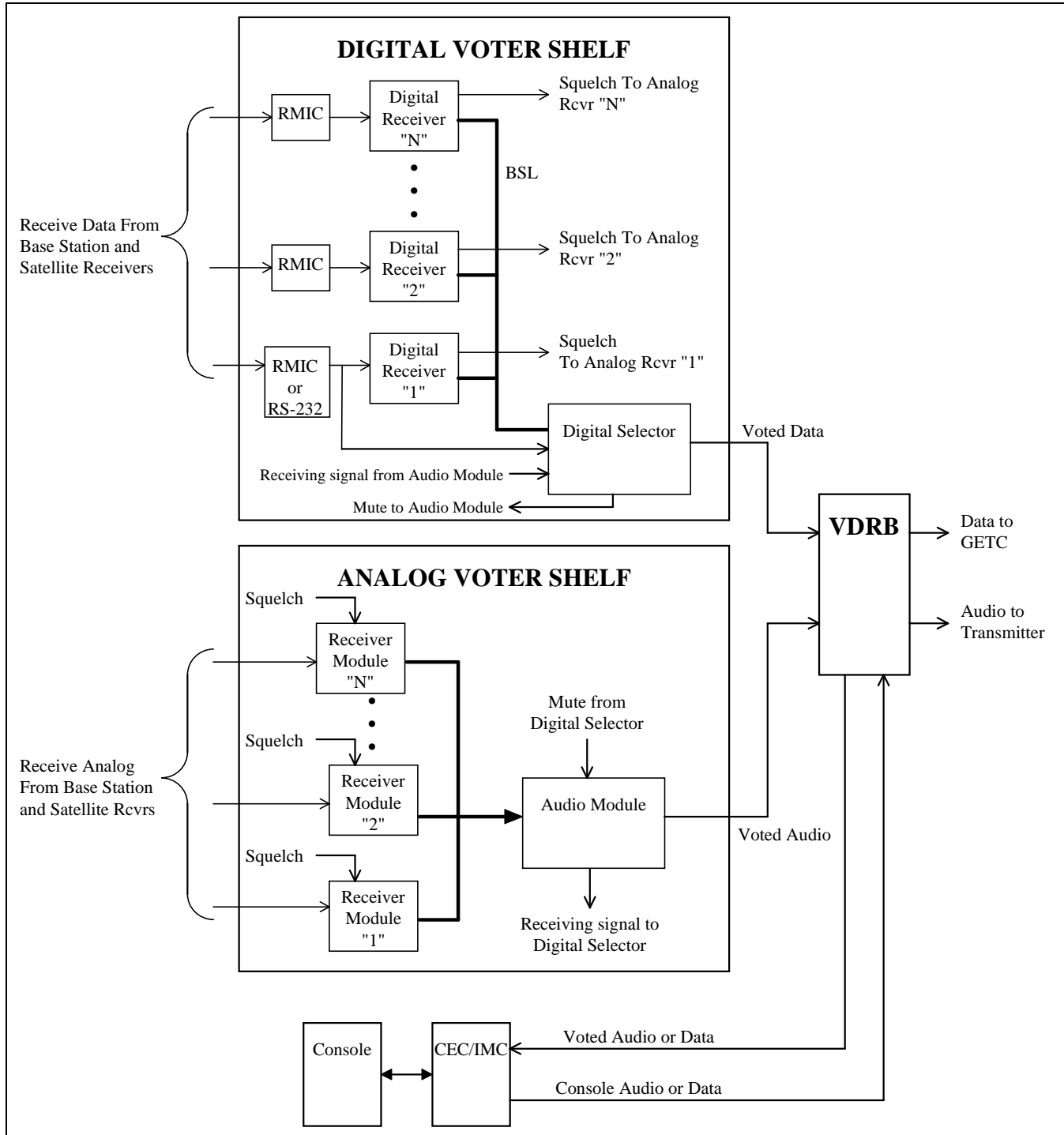


Figure 16 - Simplified Voter Block Diagram

their corresponding site receiver. In addition, each receiver appends its status message to include the site's number and sends the message via the BSL to the Selector. The receivers send the messages at 250 milliseconds intervals, provided no other digital messages need to be sent. If a receiver receives an Alarm or RF message, it sends the message to the Selector immediately. Alarm and RF messages have a higher priority than status messages.

The Selector echoes the status messages, including the site number, on the BSL for other Digital Receivers to hear. The Digital Receivers use site number information to determine if the message on the BSL is their own.

Dispatch Console Interface

EDACS Simulcast or Voted systems may also interface with Dispatch Consoles. The consoles are linked to the system via the Console Electronic Controller (CEC) or Integrated Multisite and Console Controller (IMC).

The CV² system uses a Voter Digital Relay Board (VDRB) to route analog and digital traffic to and from the CEC/IMC and Dispatch Console as shown in Figure 17. This traffic can be clear voice, data calls, digitized voice or encrypted voice (Voice Guard or Aegis). The CEC/IMC and Selector control the VDRB and route the signals as described in the following paragraphs. Refer to LBI-39075 for a complete circuit analysis of the VDRB's operation.

During Clear Voice calls originating from a site, the voted audio is routed through the VDRB to the Simulcast Audio distribution equipment or EDACS Station transmitter for repeating and to the CEC/IMC for monitoring by the Dispatch Console. Voted data is routed to the Simulcast Control Point Trunking Card or Station GETC for processing.

During Clear Voice calls originating from a Dispatch Console, the VDRB routes audio and data from the CEC/IMC to the Simulcast or EDACS Voter System. Voted audio is routed to the Simulcast Audio equipment or EDACS transmitter and Voted Data is routed to the Control Point Trunking Card or Station GETC for processing.

During Digital Voice or Data calls from the originating site, Voted data is routed to the Control Point Trunking Card (Simulcast) or Station GETC and the CEC/IMC for console monitoring.

Digital Voice (also referred to as Digital Dispatch) or Data from the console is routed through the CEC/IMC to the Simulcast Control Point Trunking Card or EDACS Station GETC. The VDRB also routes Voted data to the IMC so the console can answer message trunked calls.

SIMULCAST SYSTEM

A Simulcast System consists of a single Control Point and two or more RF sites as shown in the simplified block diagram in Figure 18.

Control Point

The Control Point is co-located with the Voter and makes the Voter an integral part of the Simulcast System. However, the Control Point does not contain transmit or receive equipment, so all Transmit-Receive Sites are considered remote, even if one is co-located with the Simulcast Control Point. Data and Voice signals are brought to the Voter Digital and Analog Receivers via a T1 inter-site communication link (microwave, leased lines, or fiber optic) and multiplex (MUX) equipment at the Control Point and Transmit-Receive Sites.

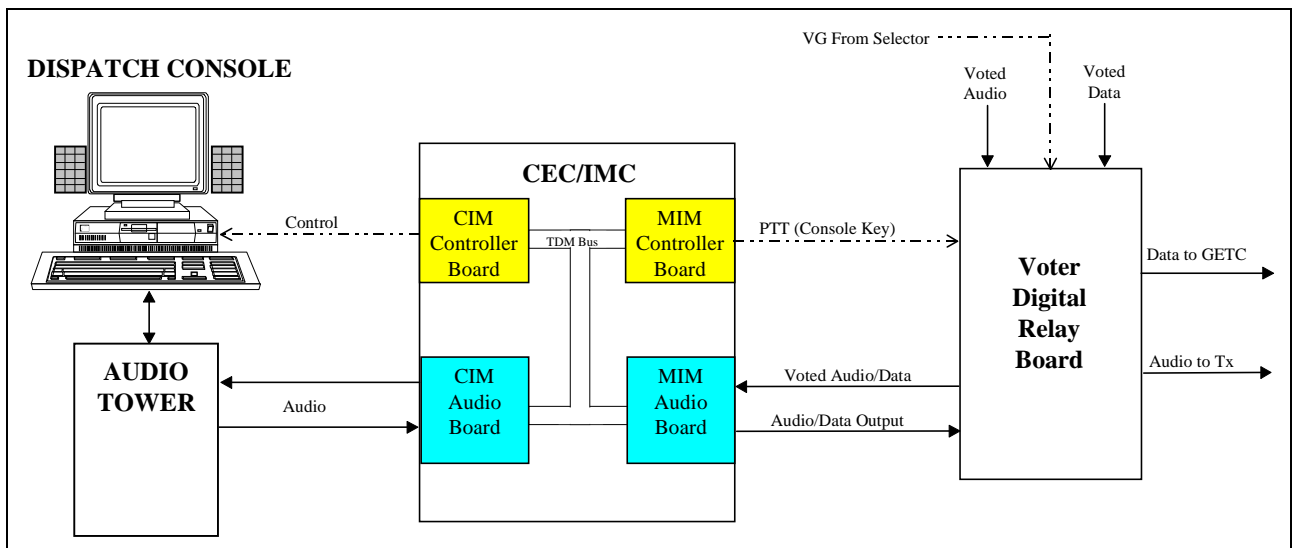


Figure 17 - Simplified CEC/IMC To Voter Block Diagram

Voted voice and data signals are routed to the Control Point Trunking Card for processing by the Simulcast equipment and distribution to the Transmit-Receive Sites. The voted voice is the Simulcast repeat audio source, the voted data is the voted digital voice source and path for trunking data messages to the Control Point Trunking Card.

In the Simulcast system, the Control Point coordinates the activities of the RF sites and the Voter system. The Voter Selector listens to the data messages from the Control Point Trunking Card. These messages indicate the Control Point Trunking Card's current operating mode, such as, Control Channel, Clear Voice Working Channel, and Digital Voice Working Channel. The Selector transmits to the Control Point Trunking Card in the RM (Rockwell Modem) mode, but receives from the Control Point Trunking Card in the RS-232 mode. This link is provided through a specially modified RMIC (Mod Kit 350A1693G1) which transmits in the RM mode and receives RS-232.

In the Simulcast system, Digital Receiver #1 listens to data from the Site 1 Receiver GETC.

NOTE

When no audio is being received, each receiver site keeps the analog communication link active by generating a holding tone (1950 Hz for the Analog Voter). When no digital signals from the radio system are being received, each Site GETC keeps the digital communication link active by generating status messages for the Digital Voter.

Transmit Sites

A Simulcast Transmit site is equipped with transmitter/receiver, Simulcast MUX equipment, Control Channel Monitor, and Receiver GETC.

Transmitter and Simulcast Equipment

The transmitter is controlled by the Simulcast Control Point signals routed through the inter-site communications system and the MUX equipment. The receiver voice and data signals are passed back to the Voter through the same MUX equipment. The site receiver GETCs are configured for Simulcast operation and do not trunk.

Receiver

The main function of a site receiver is to receive and validate inbound status messages and audio from radio units and pass the messages and receive audio to the Voter. The Voter passes valid messages to the Control Point equipment, discards duplicate messages, and votes on the analog and digital voice signals.

In the Control Channel mode, the site receiver receives outbound Control Channel messages from its Control Channel Monitor via the Backup Serial Link (BSL). These messages include operating mode, call type, and Control Channel slot timing information. Loss of Control Channel data may cause the site receiver to miss messages.

When operating as a Working Channel, the site receiver GETC monitors the outbound Control Channel messages from the Control Channel Monitor via the BSL. It then searches for the corresponding inbound message on the RF port. When the expected signal is detected, the message and associated voice audio (digital or analog) is relayed to the voter.

The site receiver also generates a 1950 Hz tone. This tone is sent to the Analog Voter whenever the channel is unassigned and no carrier or low speed is present. This causes the Analog Voter to mute (remove from the voting process) the associated Analog Receiver module. If the site receiver receives a key message or low-speed signaling from a radio unit it disables the tone, allowing the output of the Analog Receiver to be voted on.

Control Channel Monitor

A Control Channel Monitor is located at each Transmit Site to detect and pass control and status messages to the site receiver GETCs via the BSL. This keeps the system in sync with the trunking system Channel assignment activity and operating modes. The receiver GETC will not pass Digital Voice traffic to the Voter if the Control Channel Monitor is not operating.

The Transmit Site Control Channel Monitor also functions as part of the Simulcast System Test Call process. It sets up the receiver GETC so it's ready to receive a Test Call from the Test Unit on site. The digital messages from the Test Unit are processed by the receiver GETC and passed to the Digital Voter for call processing.

Satellite Receiver Site

A Satellite Receive Site is added to a Simulcast system if additional receive coverage is needed beyond that available from the receivers at the Transmit Sites. The Satellite Receiver GETCs are set up for the Satellite Receiver mode and do not trunk. The Satellite Site works in the same manner as the Simulcast Transmit Site receive portion. It contains a Control Channel Monitor for the same purpose as the Simulcast Transmit Site, except no Test Calls are made at the site.

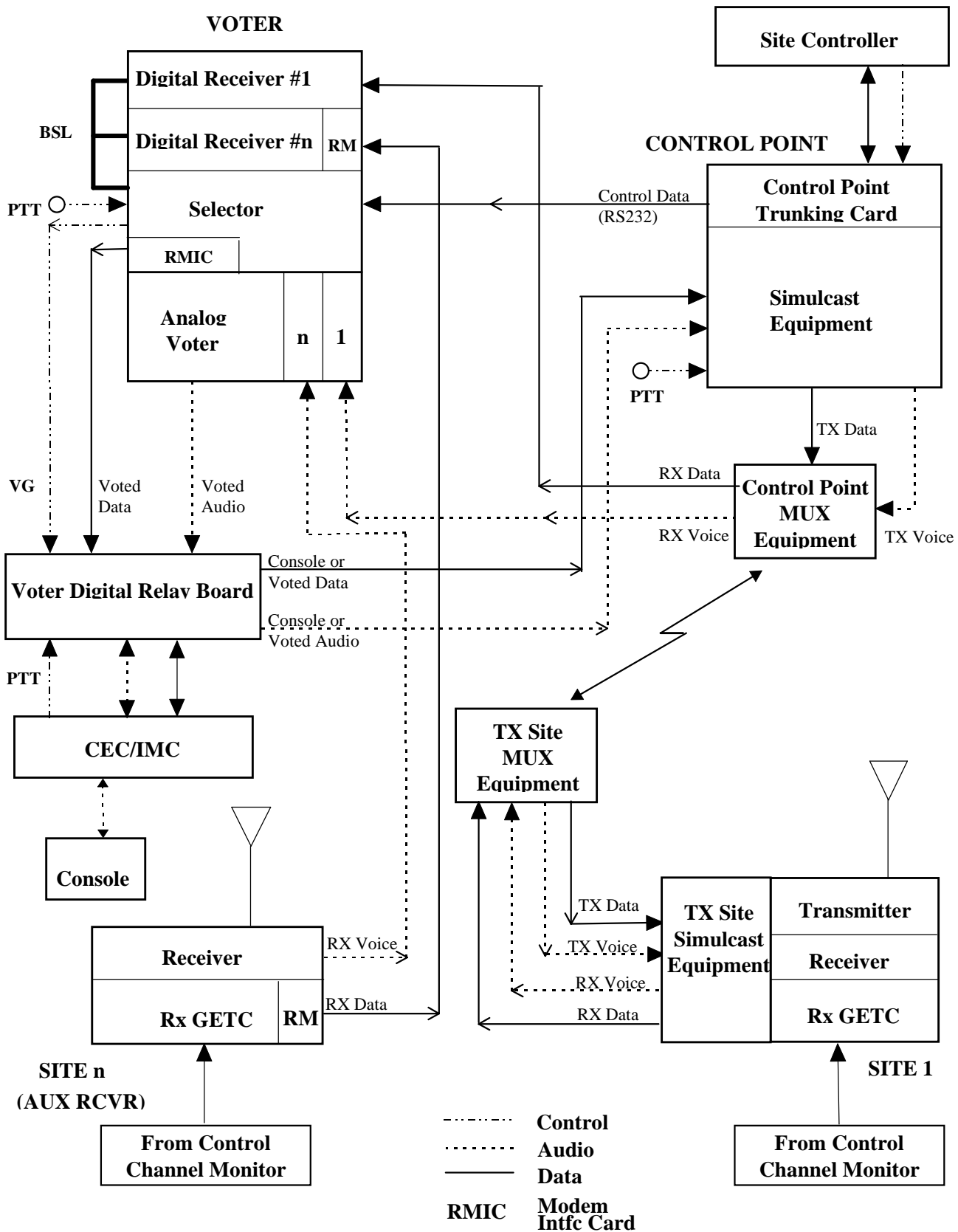


Figure 18 - Simplified Voter Signal Flow (Simulcast System) Diagram

The major components at the Satellite Site are shown in Figure 19. Control Channel and Working Channel RF signals are fed from the antenna to the multicoupler. The multicoupler feeds all receivers. Each channel receiver is connected to a GETC shelf. The Control Channel Monitor receiver is connected to a buffer board, which connects to all the receiver GETCs via the BSL.

During an analog call, the receiver sends the received audio signal to its corresponding Analog Voter receiver. If there are no analog calls, the receiver sends a 1950 Hz tone to the Analog Voter receiver. During a digital call, the receiver provides the Receiver GETC with the received digital signal. The GETC sends the received data to the Digital Voter while maintaining the voting tone to the Analog Voter.

Control Channel Monitor

The Control Channel Monitor at the Satellite Site is a mobile radio which monitors the outbound Control Channel messages from the Main Site. This radio receives and validates the slotted outbound control messages. The monitor routes the data messages to the Buffer Board which

distributes them to all satellite receiver GETCs located at the site via the BSL at 19.2 kilobaud.

The Simulcast Control Channel Monitor uses a separate directional antenna so it will receive the RF signals from only one Simulcast Transmit Site. This reduces the interference from other Simulcast Sites.

Voted Digital Interconnect (Simulcast)

The Voted Digital Interconnect (VDI) option allows a Simulcast system to have access to the Jessica Private Branch Exchange (PBX) Gateway, known simply as Jessica. Jessica is a centralized digital communications gateway connected to the CEC/IMC that links an EDACS radio system to the local Public Switched Telephone Network (PSTN).

Only Simulcast systems with the Digital Dispatch option can be equipped with the VDI option. When the VDI option is installed, a digital path is added between the Voter Selector and the Control Point Trunking Card. This path allows the Control Point Trunking Card to listen to both the CEC/IMC and the Voter simultaneously. See Figure 20.

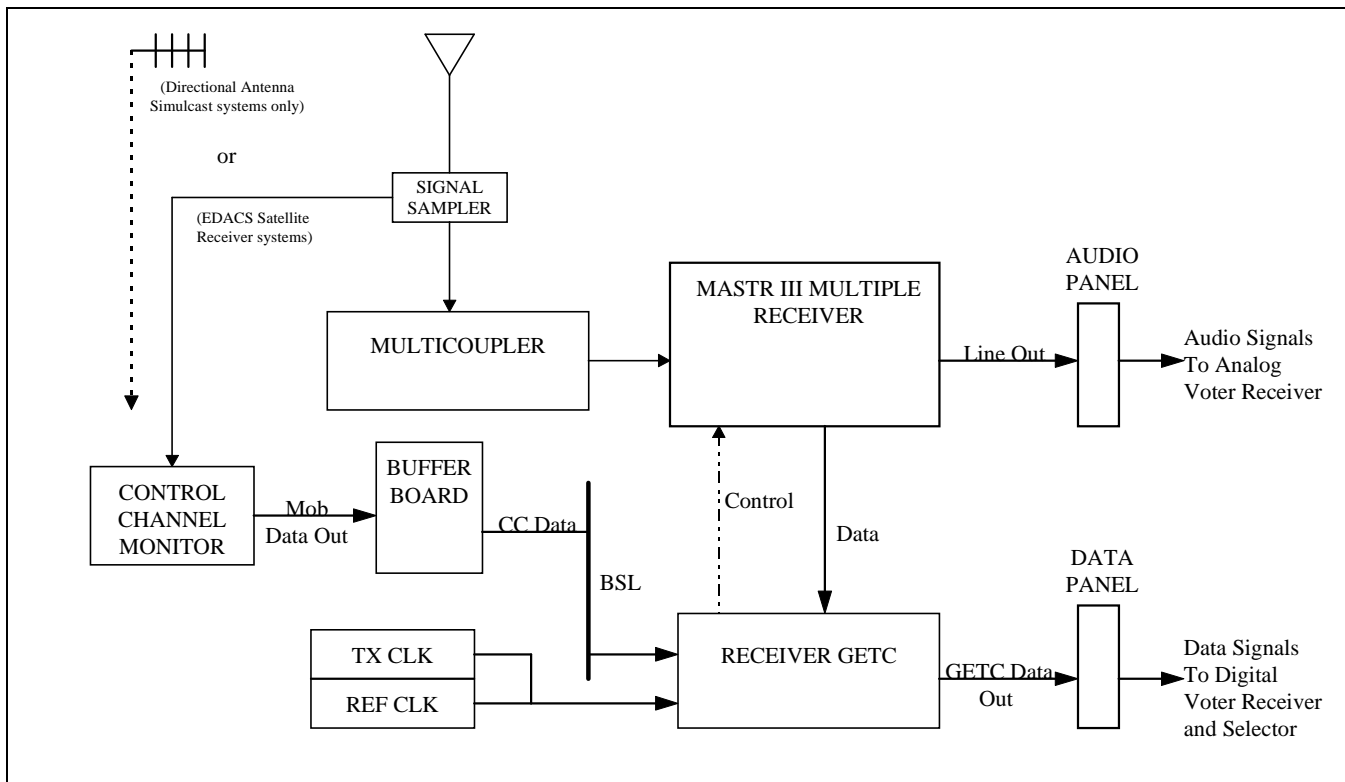


Figure 19 - Typical Satellite Receiver Site Block Diagram

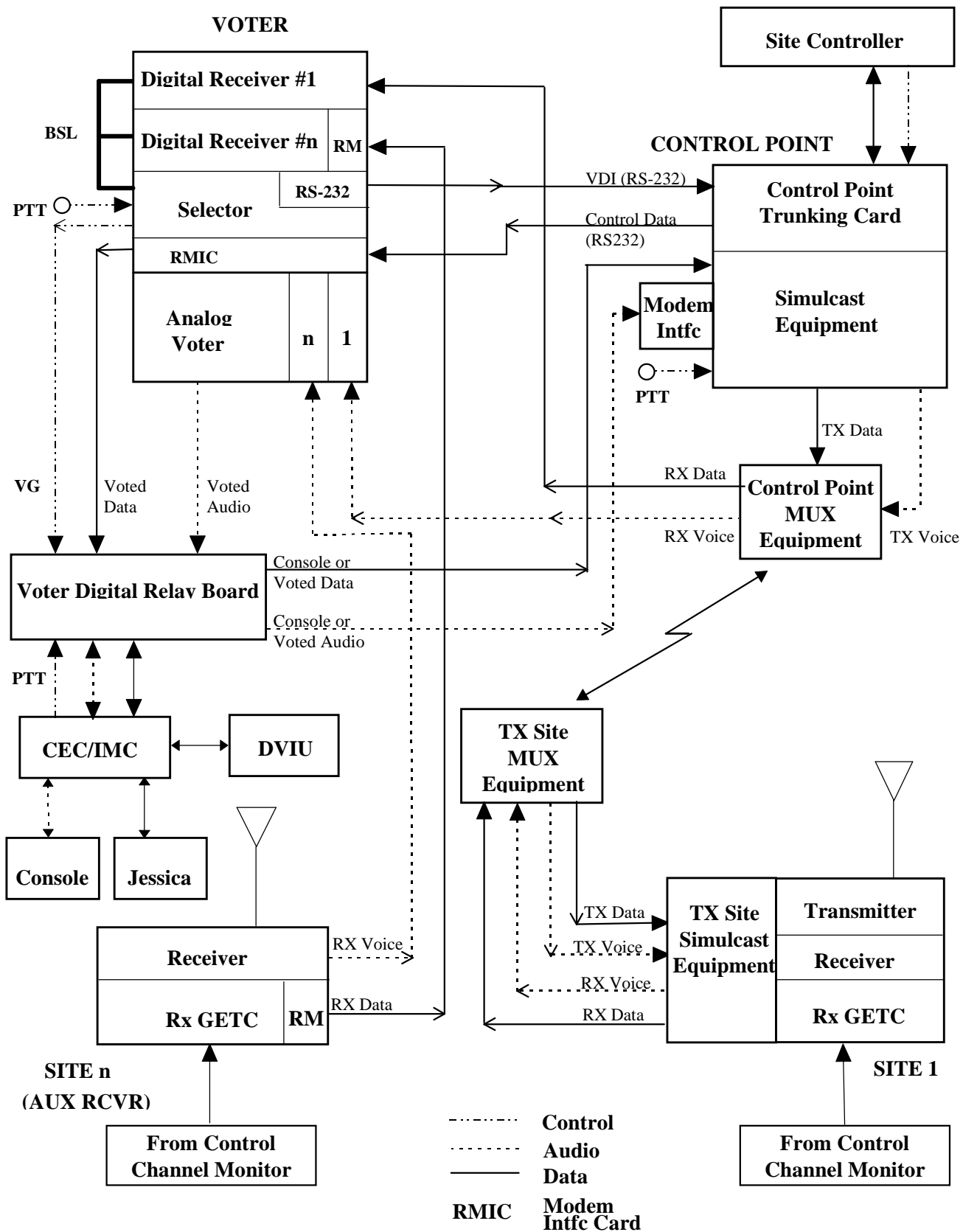


Figure 20 - Simplified Voter Signal Flow (Simulcast System with Digital Dispatch & VDI) Diagram

EDACS (NON-SIMULCAST) VOTER SYSTEM

The EDACS (non-Simulcast) system includes a main transmit/receive site, a number of receive-only Satellite Sites, and a centrally located CV² system with Digital and Analog Voters.

The Satellite Sites and Main Site transmit site receive signals on their RF ports and relay these signals to their corresponding Analog and Digital Receivers. The Analog and Digital Voters work in parallel to vote digital and analog signals. The Selector relays voted digital signals to the Main Site GETC and directs the Analog Voter to relay voted audio signals to the Main Site transmitter.

Main Site

Main Site equipment (Figure 21) in an EDACS (non-Simulcast) Voter system is basically the same as in a non-voted EDACS system. However, in a voted system, two pairs of telephone lines are required per channel. This allows the receivers to transfer both data and voice to the Voters simultaneously.

The audio voice paths are connected to the back of the MASTR III station T/R Shelf. Repeater audio is available at the line audio pair connected to the voter, and audio from the voter is connected to the remote duplex audio input pair.

The Main Site GETCs (those that control the RF transmit function of the EDACS) must be configured for voted operation. The GETC configuration is based on the data programmed into the GETCs personality, the presence or absence of a Clear-to-Send (CTS) signal, and on the presence of continuous messaging from the voter.

Typically, the CV² system is co-located with the Main Site equipment and data paths to and from the voter are separate lines with signals at RS-232 levels. The Main Site GETC is strapped (jumper connected from TB10-1 to 5) providing the GETC with a continuous CTS signal.

If the Main Site is at a remote location, data paths to and from the Main Site GETC are via modem. The CTS signal is supplied by the RM in response to a Request-to-Send (RTS) signal.

Once the Main Site GETCs are configured for voted operation, all working-channel messages received locally by the Main Site GETCs are simply passed down to the Voter.

Digital messages received from the voter determine the GETCs call operation. Messages received by the Main Site's Control Channel are acted upon immediately, and redundant messages are discarded.

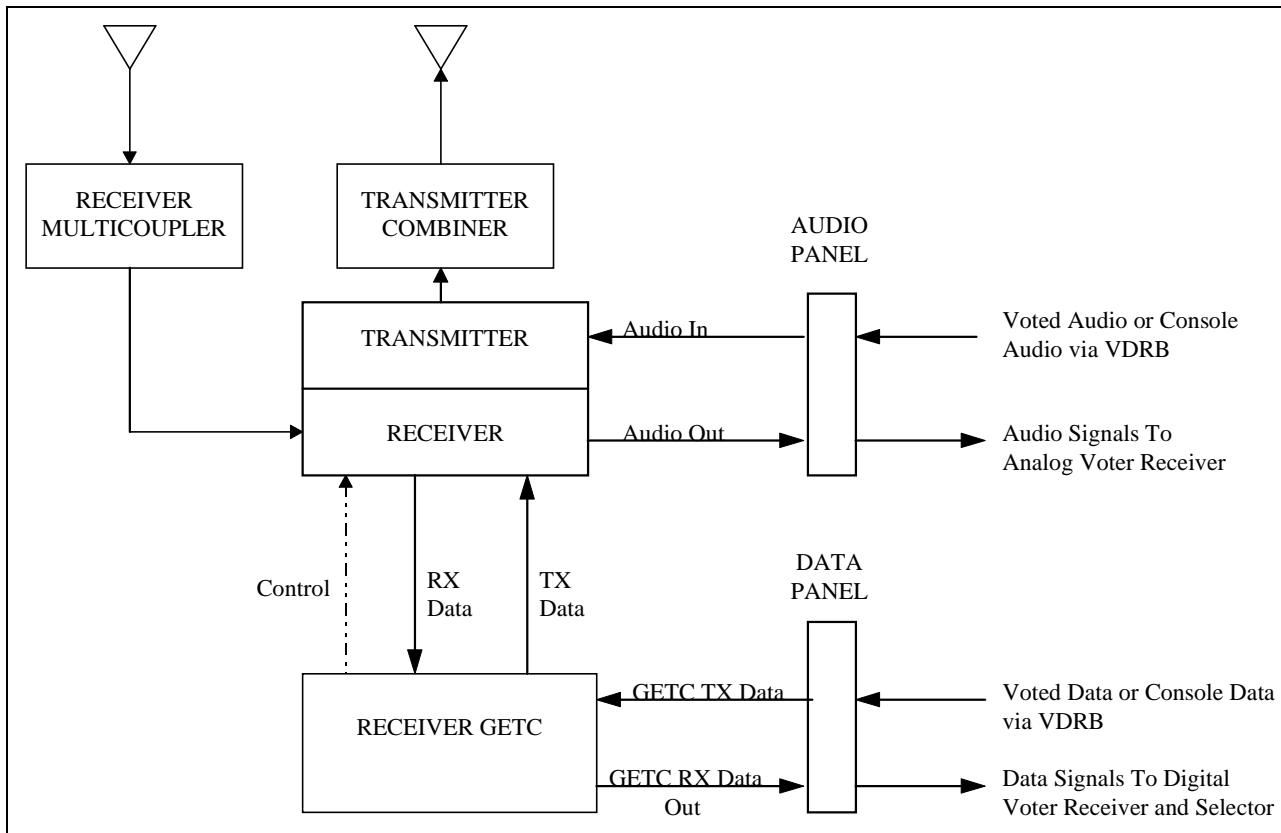


Figure 21 - Main-Site Equipment (Single Channel)

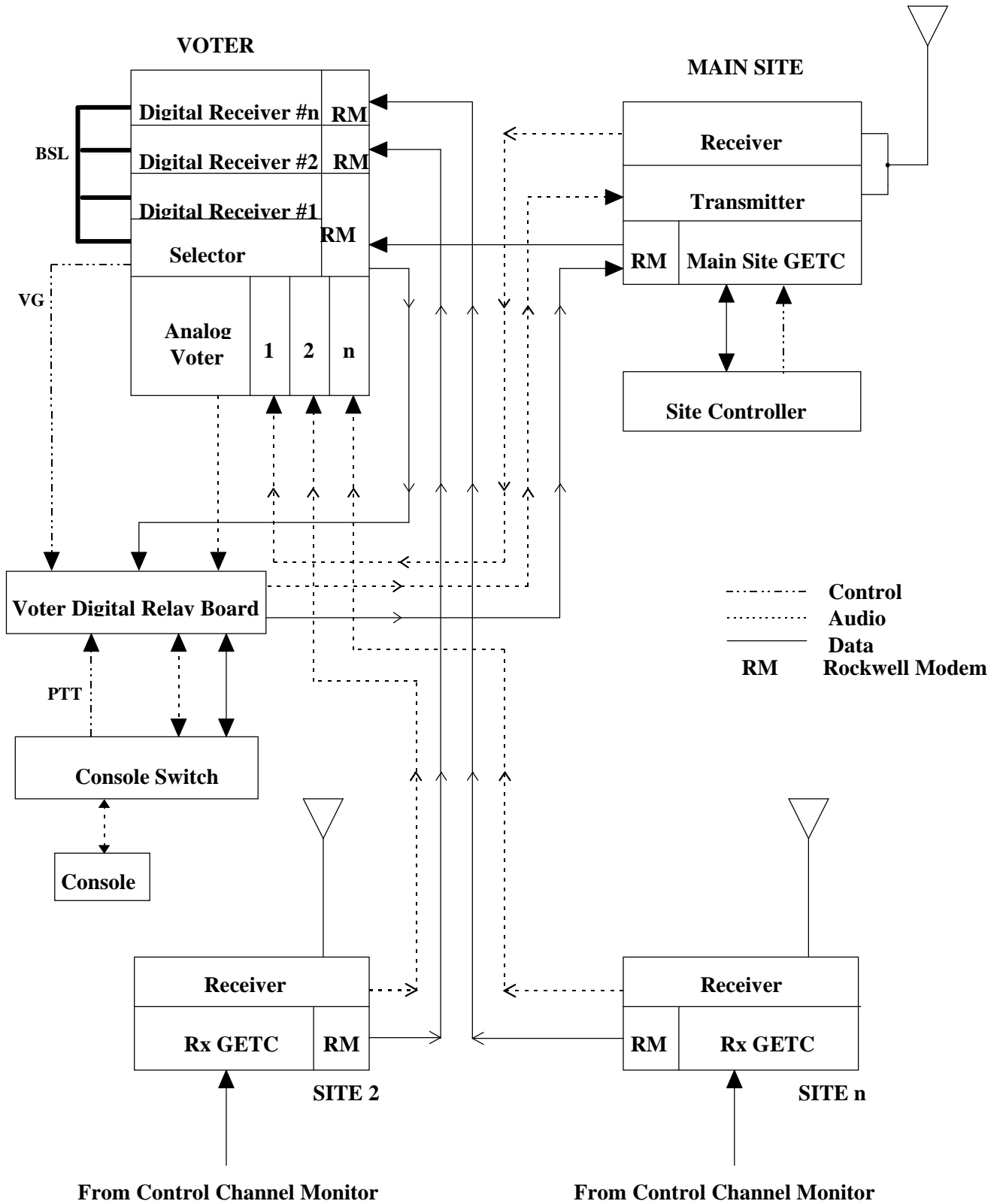


Figure 22 - Simplified Voter Signal Flow (EDACS Non-Simulcast System) Diagram

If the stream of messages from the Voter ceases, the Main Site GETCs revert to a mode where they act upon locally received messages immediately, yet continue to transmit all locally received messages to the Voter. If no CTS signal is received, then the Main Site GETCs operate in single-site mode.

In the Working Channel mode, when the Main Site receives the radio's transmission, it sends a key message and then begins sending received audio to the Voter. (The key message tells the Digital Receiver to unsquelch its receiving unit.) The audio is routed to the Analog Voter where it is voted on before being relayed to the Main Site transmitter.

When no calls are in progress, a mute tone is inserted onto the audio line by the Main Site. The tone is present at all times, except when the channel is assigned and both carrier and low-speed data are present. A tone detection circuit at the corresponding Analog Voter Receiver module mutes its audio path whenever the mute tone is present.

NOTE

When no audio is being received, each receiver site keeps the analog communications link active by generating a holding tone (1950 Hz) for the Analog Voter. When no digital signals from the radio system are being received, each site GETC keeps the digital communications link active by generating status messages for the Digital Voter.

Satellite Site

Satellite Receiver operation in a non-Simulcast Voter system is identical to that in a Simulcast system. The only difference being the Control Channel Monitor RF input. In a non-Simulcast Voter, the RF input to the Control Channel Monitor is coupled from the Signal Sampler located between the multicoupler and the antenna (see Figure 19).

Voted Digital Interconnect (Non-Simulcast)

The Voted Digital Interconnect configuration allows voted sites to have access to the Jessica Private Branch Exchange (PBX) Gateway.

For an voted (non-Simulcast) system, an additional GETC per channel is required, making the configuration more like that of a Simulcast system. The Main Site is reconfiguration to add a Control GETC to the Voted System as shown in Figure 20.

All GETCs attached to RF receivers will operate as Satellite Receivers, and the added Control GETC will take on transmit responsibilities similar to those of the Simulcast Control Point Trunking Card. The main purpose of the additional GETC is to provide a synchronous data input port

which can be connected to the output of the voter. This provides the Control GETC the capability of listening to both the IMC and the Voter simultaneously.

Basically, the system functions similar to a Simulcast system (refer to Figure 24) with a co-located transmit site. The major difference is the interface from the output of the Control GETC to the Selector. The Selector RMIC transmit pair is connected to the Main Site Receiver's Rockwell Modem. From the Receiver GETC, Rockwell modem output TTL data is connected to the Control GETC on the Control GETC's free Amps Modem input. This establishes a permanent connection from the Selector output to the Control GETC. Thus, the Main Site now has access to both IMC and selector data.

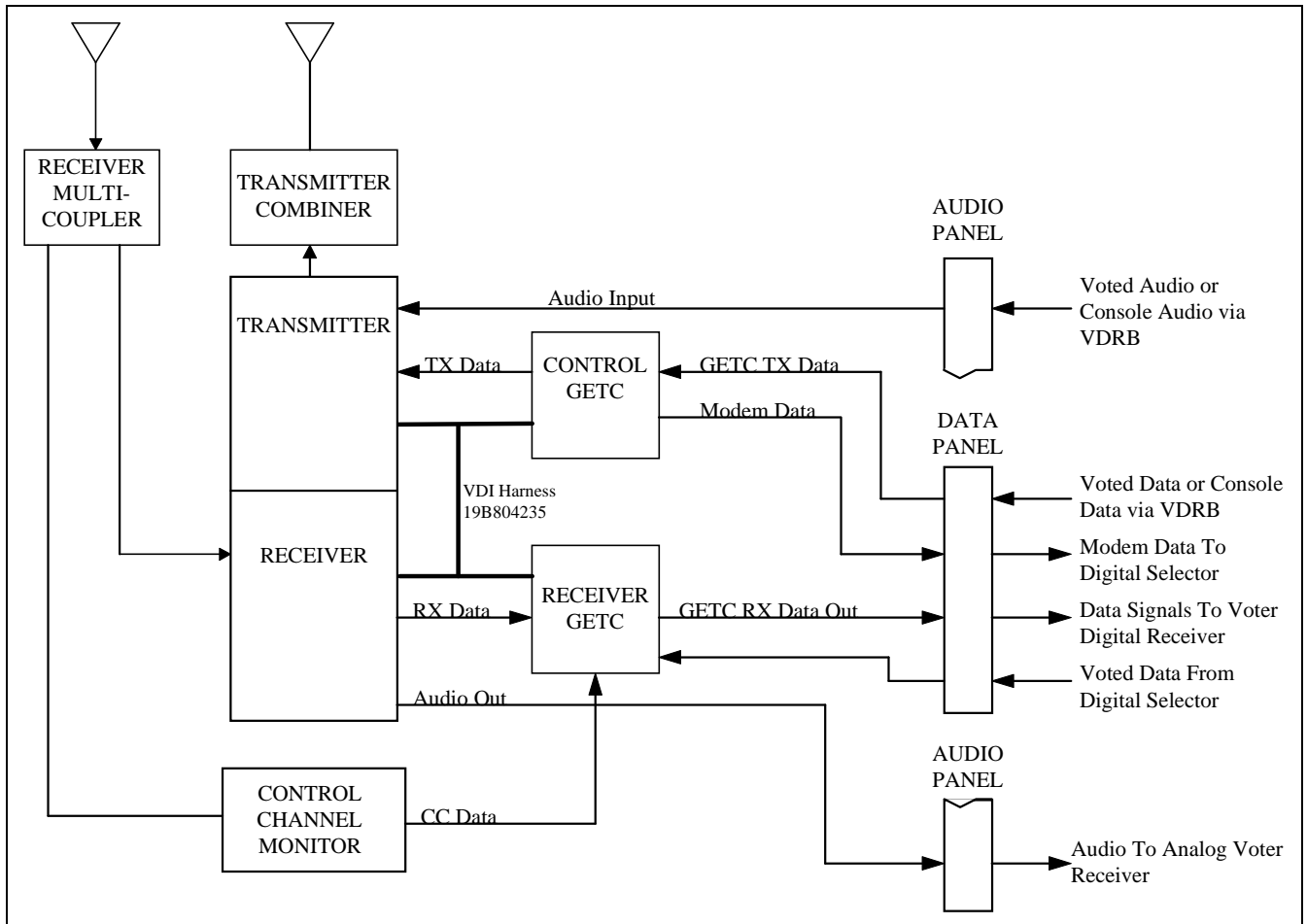


Figure 23 - Typical Main Site (Non-Simulcast) Voted Digital Interconnect Block Diagram

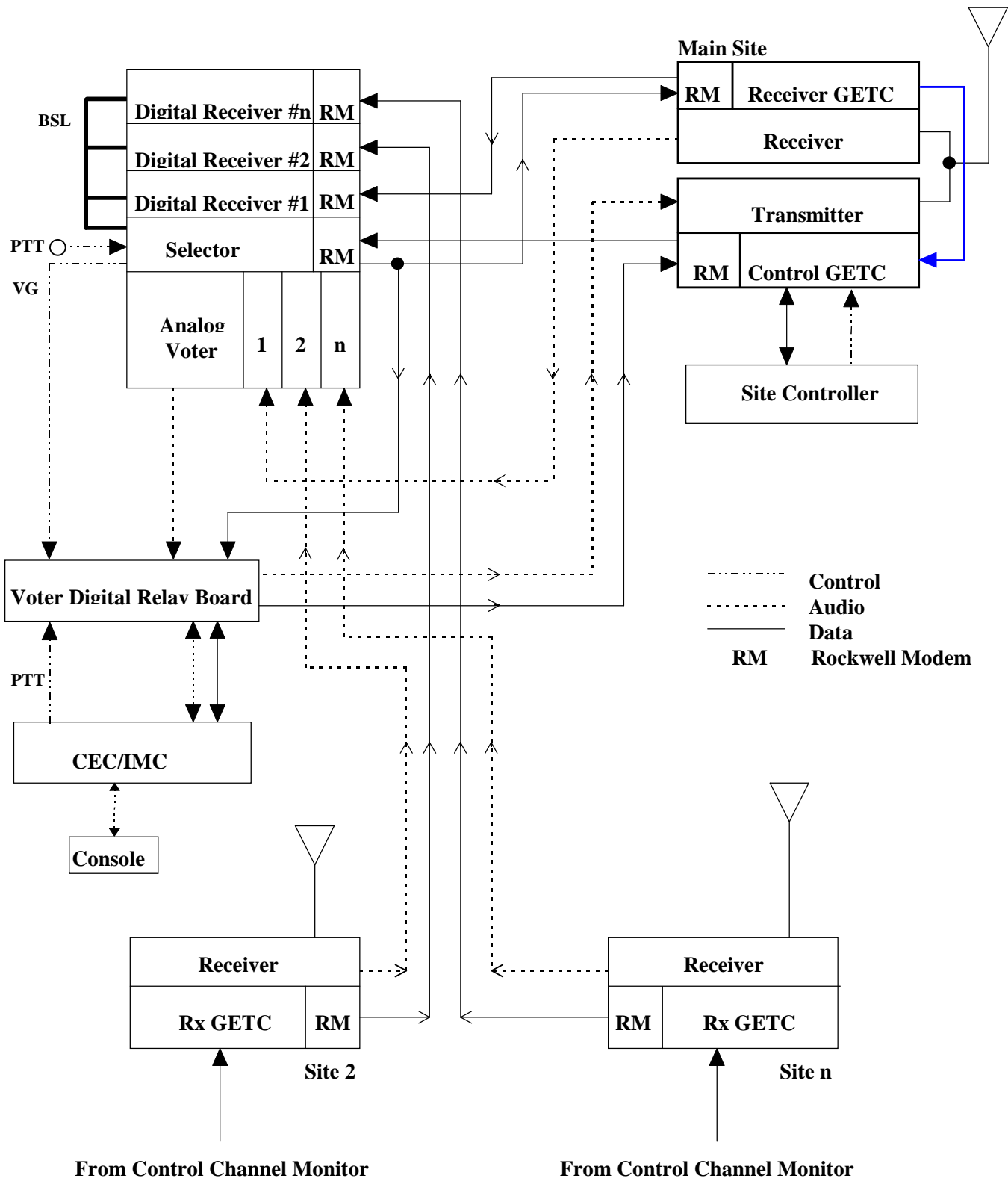


Figure 24 - Simplified Voter Signal Flow (EDACS Non-Simulcast System With VDI Option) Diagram

RELATED PUBLICATIONS

The following publications provide additional information on equipment associated with the EDACS Compact Vertical Voter System.

- | | | | |
|-----------|---|-----------|---|
| LBI-38430 | - MASTR IIe Station Maintenance Manual. | LBI-39074 | - MASTR III EDACS Installation Manual. |
| LBI-38662 | - EDACS Console Electronics Controller (CEC) and Integrated MultiSite and Console Controller (IMC) Digital Audio Switch | LBI-39075 | - EDACS CV ² Interface Panel Maintenance Manual |
| LBI-38676 | - Analog Voter Maintenance Manual | LBI-39090 | - Simulcast Transmit Site Maintenance Manuals. |
| LBI-38894 | - GETC Trunking Card Maintenance Manual for 19D901868G3 and G4. | LBI-39112 | - MASTR III Multiple Receiver Maintenance Manual |
| LBI-38988 | - EDACS Station GETC Configuration Manual. | LBI-39142 | - EDACS Voter Cross Connect Panel Maintenance Manual |
| LBI-39000 | - EDACS Jessica PBX Gateway Systems Manual | LBI-39149 | - EDACS Compact Vertical Voter (CV ²) Maintenance Manual |
| LBI-39031 | - EDACS StarGate Controller Digital Audio Switch Maintenance Manual | LBI-39150 | - EDACS CV ² Digital Voter Shelf Maintenance Manual |
| LBI-39038 | - EDACS Redundant Power Supply System Maintenance Manual | LBI-39151 | - EDACS CV ² Digital Receiver & Selector Maintenance Manual |
| LBI-39041 | - EDACS CEC/IMC Digital Dispatch DVIU Equipment Maintenance Manual | LBI-39152 | - EDACS CV ² Rockwell Modem & RS-232 Intfc Card Maintenance Manual |
| LBI-39062 | - EDACS C3 Maestro Console System Maintenance Manual | LBI-39158 | - EDACS Power Distribution Panel Maintenance Manual |
| | | LBI-39186 | - Simulcast Control Point Maintenance Manuals |

GLOSSARY

Backup Serial Line	The Backup Serial Line is a data bus used for communications between GETCs during Failsafe Trunking. It is connected to each Station, Downlink, and Uplink GETC in an EDACS system.	GETC	Ericsson GE Trunking Card - performs the RF signal processing for the repeater station. It re-synchronizes the data information received by the repeater station, processes it and sends it back to the repeater station for transmission
Bit Error Rate (BER)	The average rate of errors on a radio channel, usually expressed as a percent (e.g., a 5% error rate indicates an average of 1 error in every 20 bits transmitted).	Multisite	A network of multiple EDACS systems. Each system networked may have a different number of working channels.
BSL	See Backup Serial Line.	Rockwell Modem Interface Card (RMIC)	Communication interface card with a Rockwell Modem daughter board. Used to transfer information along analog paths such as phone lines where bandwidth is <3000 Hz.
Console	Communication equipment which provides an operating position for a dispatcher.	RS-232 Interface Card	Communication interface card used for transferring serial data between two units within 50 feet of each other.
Control Channel	An EDACS Trunked System channel over which system control information is continually transmitted and channel request/status information is received from the field radio units. Field radios monitor the Control Channel when not assigned to a Working Channel.	Simulcast	Simultaneous Broadcast by two or more transmitters located at different sites operating on the same RF frequency.
EDACS	EDACS, short for Enhanced Digital Access Communications System, is a registered trademark of Ericsson Inc. It is used by Ericsson to describe specific communications systems and their specific equipment which meet or exceed the needs of the Public Service, Industrial, Commercial, and Utility markets world-wide.	Trunking	The process of dynamically allocating a limited number of radio channels to groups of people for communication purposes.
Frame Sync Line	The Frame Sync Line is a +13.8 VDC bus, with periodic negative pulses (to 0 VDC), sent from the Control Channel GETC to the Working Channel GETCs for synchronizing messages to mobiles.	Voter Digital Relay Board (VDRB)	A board in the EDACS Digital Voter that allows either Clear Voice or Digital Voice to be routed to an IMC for multisite or digital dispatch.
FSL	See Frame Sync Line.	Voting	The process of selecting the best received signal for processing.
		Working Channel	A Working Channel is any radio channel at an EDACS Trunked Site that is available or in use to carry trunked calls.

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