MAINTENANCE MANUAL

EDACS® COMPACT VERTICAL VOTER INTERFACE PANEL

TABLE OF CONTENTS

Page

SPECIFICATIONS* **3**

INTRODUCTION **4**

DESCRIPTION **4**

EDACS INTERFACE PANEL **6**
PARTS LISTS 6

AUDIO INTERFACE BOARD **7**
CIRCUIT ANALYSIS 7
PARTS LISTS 7
SCHEMATIC DIAGRAM 8

VOTER DIGITAL RELAY BOARD **9**
CIRCUIT ANALYSIS 11
TROUBLESHOOTING 11
IC DATA 12
PARTS LIST 13
OUTLINE DIAGRAM 13
SCHEMATIC DIAGRAM 14

DIGITAL CROSS CONNECT PANEL (DD) - ROA 117 2227 ..... **15**
JUMPERS 15
OUTLINE DIAGRAM 15
PARTS LIST 16

DIGITAL CROSS CONNECT PANEL (EE) - ROA 117 2228 ..... **17**
JUMPERS 17
OUTLINE DIAGRAM 17
PARTS LIST 18

CROSS CONNECT DIAGRAMS **21**
ROA 117 2227 21
ROA 117 2228 22

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FIGURES AND TABLES

Page

Figure 1 - Typical CV^2 Interface Panel Configured for Simulcast One (1) Channel per Shelf....4
Figure 2 - Typical CV^2 Interface Panel Configured for Simulcast Two (2) Channels per Shelf....5
Figure 3 - EDACS Interface Panel....6
Figure 4 - Audio Interface Board Layout....7
Figure 5 - VDRB in Clear Voice Mode (Primary Site)....9
Figure 6 - VDRB with Clear Voice routed to and from the IMC (Secondary Site)....9
Figure 7 - VDRB in Digital Voice or Data Mode (Primary Site)....10
Figure 8 - VDRB with Digital Voice or Data routed to and from the IMC (Secondary Site)....10
Figure 9 - Simplified VDRB Circuit Diagram....11
Figure 10 - Voter Digital Relay Board....13
Figure 11 - Digital Interface Board, ROA 117 2227....15
Figure 12 - Digital Interface Board, ROA 117 2228....17

Table 1 - Jumpers for Digital Interface Board ROA 117 2227....15
Table 2 - Jumpers for VDI Output....17
Table 3 - Jumpers for RS-232/Modem Interface....17

SPECIFICATIONS*

ITEM	SPECIFICATION
EDACS INTERCONNECTION PANEL	
Dimensions (HxW)	5.25 x 19 (3 RU)
Mounting	Fits standard 19 inch rack. Uses standard EIA mounting.
Modules	Provides mounting for five (5) parallel interface modules and one serial interface module.
AUDIO INTERFACE MODULE 19C852204G1	
Common Cable Connectors:	
J14 and J15	Two 25 Pair Telco Connectors with Bail Lock.
J1 thru J12	Twelve (12) 6-Position, six contact Module (RJ12).
VOTER DIGITAL RELAY MODULE 188D6495G1	
Input Voltage	+12 Vdc
Regulated Voltage	+5 Vdc
Termination	600 Ohms
Inputs	Voter Data, Voter Voice , Switch In
Outputs	Switch Out, Site Data, Site Voice
1-CH DIGITAL INTERCONNECT BOARD ROA 117 2228	
Connectors:	
J1, J2, & J5	Three 50 Pin (2x25) Connectors.
J3	One 24 Pin (2x12) Connectors.
J14	One 25 Pair Telco Connector with Bail Lock.
J7, J8, J100, & J200	Four 6-Position, six contact Modular Connectors.
J9, J10, J12, and J13	Four 8-Position, eight contact Modular Connectors.
2 CHANNEL DIGITAL INTERCONNECT BOARD ROA 117 2227	
Connectors:	
J1, J2, & J5	Three 50 Pin (2x25) Connectors.
J3	One 24 Pin (2x12) Connectors.
J14	One 25 Pair Telco Connector with Bail Lock.
J7, J8, J15, J16, & J18	Five 6-Position, six contact Modular Connectors.
J9 and J10	Two 8-Position, eight contact Modular Connectors.

* These specifications are intended for use during servicing. Refer to appropriate Specification Sheet for the complete specification.

INTRODUCTION

This manual provides maintenance information for the **E**nhanced **D**igital **A**ccess **C**ommunication **S**ystem (**EDACS**®) Compact Vertical Voter (CV^2) Interface Panel.

DESCRIPTION

The CV^2 Interface Panel serves as the focal point for all analog and digital signals entering or leaving a Voter Unit and provides interconnect cabling between Voter Unit elements. This allows users to quickly and easily connect all audio, digital, and control lines to the Voter system.

The CV^2 Interface Panel is available in three versions.

- Simulcast Configuration using One (1) Channel per Shelf.
- Simulcast Configuration using Two (2) Channels per Shelf.
- Voted (non-Simulcast) Configuration.

The one and two channel Simulcast Interface Panels consist of a combination of sub-assemblies mounted on the EDACS Panel. An Interface Panel for a one (1) channel 17 site Simulcast system is shown in Figure 1 and a typical two channel six site Simulcast configuration is shown in Figure 2. Each sub-assembly is briefly described below. Detailed descriptions for each sub-assembly are provided later in this manual.

EDACS Interface Panel (19D904009G23) - The EDACS Interface Panel includes the panel frame (19D903881P1) and one Audio Interface Board (19C852204G1). The Audio Board routes audio signals to and from the Analog Voters and the Analog Cross Connect panel which is mounted in another rack.

Voter Digital Relay Board (188D6495G1) - The Voter Digital Relay Board (VDRB) provides a means to route audio/digital type call traffic to and from the multisite equipment or dispatch Consoles.

Digital Cross Connect Panel (ROA 117 2227 or ROA 117 2228) - The Digital Interface Board routes digital signals to and from the Digital Voter and routes control signals between the Digital and Analog Voters. The ROA 117 2227 (also referred to as the "DD" board) is used in the Simulcast two channel per shelf configuration and the ROA 117 2228 (also referred to as the "EE" board) is used in the Simulcast one channel per shelf configuration.

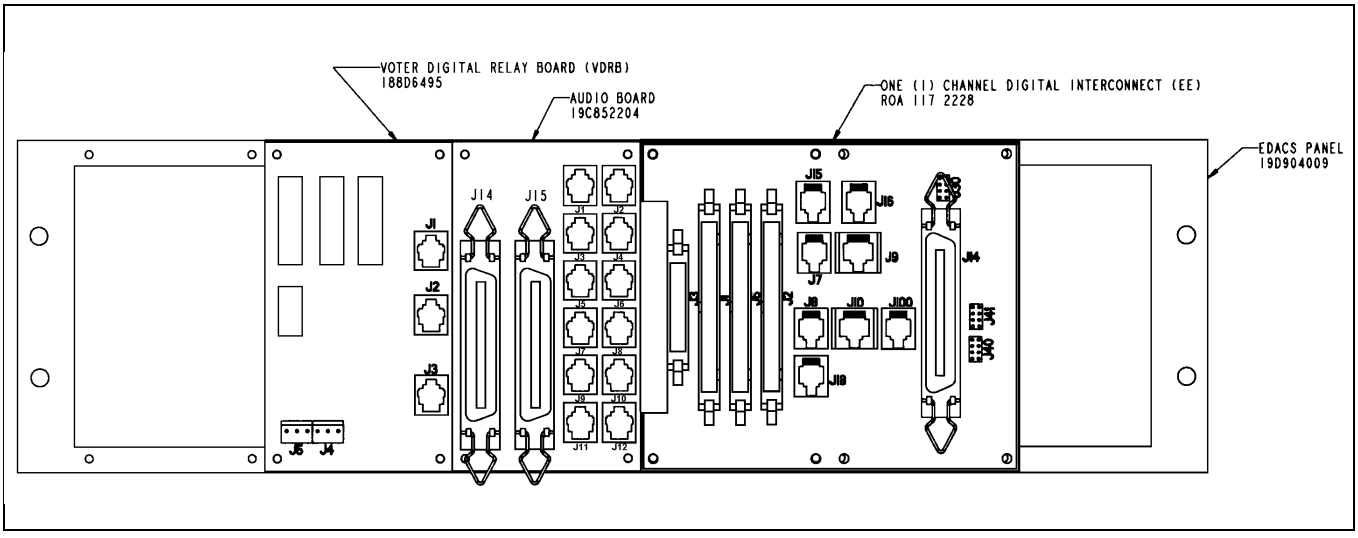


Figure 1 - Typical CV^2 Interface Panel Configured for Simulcast One (1) Channel per Shelf

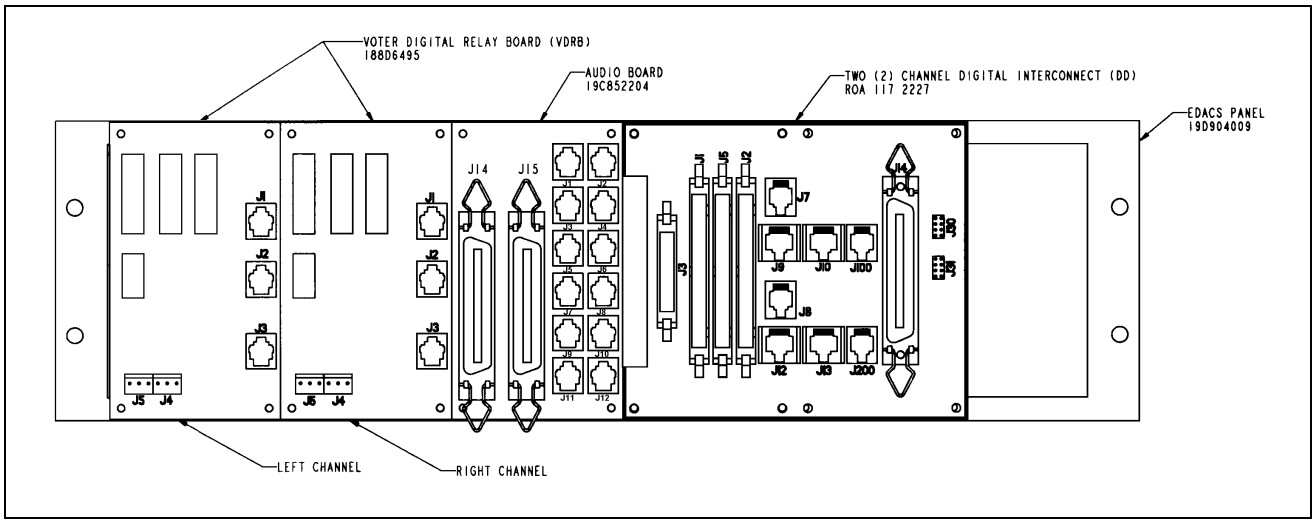


Figure 2 - Typical CV^2 Interface Panel Configured for Simulcast Two (2) Channels per Shelf

EDACS INTERFACE PANEL (19D904009G23)

The EDACS Interface Panel provides the mounting mechanism for the Voter Interface Panels. Each EDACS Interface Panel includes the frame, 19D903881P1 and an Audio Interface Board, 19C852204G1, described separately in this manual.

EDACS INTERFACE PANEL

19D904009G23 (Figure 3)

SYMBOL	PART NUMBER	DESCRIPTION
		---------- ASSEMBLIES ----------
2	19D903881P1	Frame, Mounting: 19-inches wide x 5.25 high.
3	19C852204G1	Audio Interface Board. (See separate parts list.)
		----------MISCELLANEOUS ----------
5	19A702381P506	Screw, Thread forming, Pan Head: TORX, No. M3.5-.6 x 6. (Qty. 4)

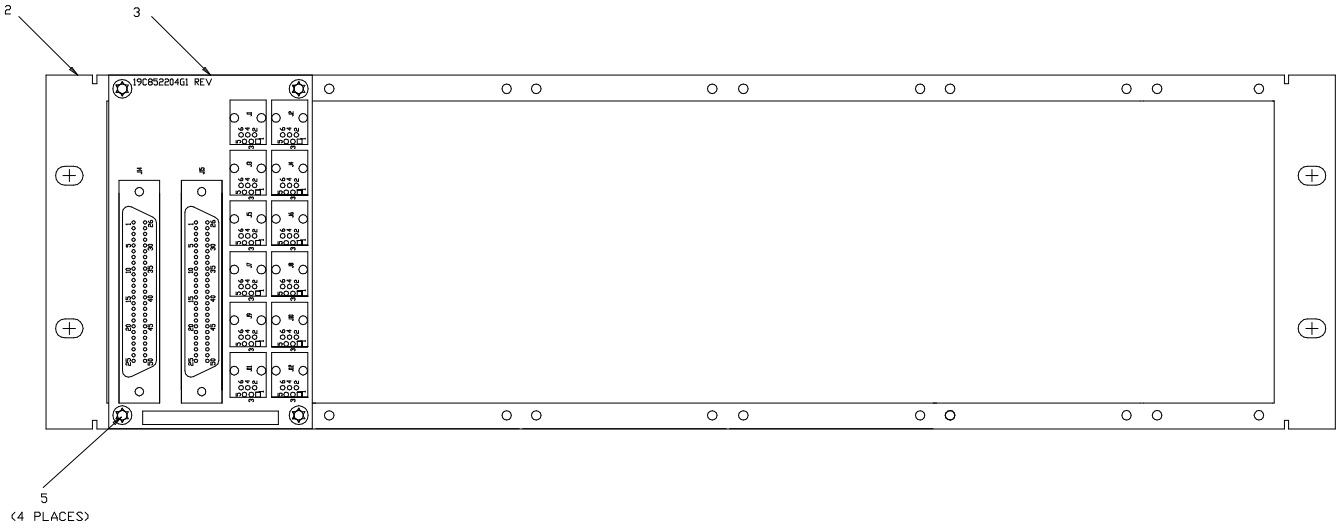


Figure 3 - EDACS Interface Panel

(19D904009, Sh.23, Rev. 1)

AUDIO INTERFACE BOARD (19C852204G1)

The Audio Interface Board is used to cross connect audio data between an EDACS Voter Unit and the Audio cross connect panel via a 25-pair cable. The board is supplied as part of the 19D904009G23 EDACS Interface panel, which also includes the 19D903881P1 frame.

The board itself contains twelve 6-position (RJ12) modular jacks (J1 thru J12) and two 25-pair Telco Connectors (J14 and J15). The connections between J14 and J15 are straight through pin 1 to pin 1, 2 to 2, etc.

Connections between Telco Connectors (J14 and J15) and the modular connectors (J1 thru J12) are shown in Schematic Diagram 19D903852.

AUDIO INTERFACE BOARD

19C852204G1 (Figure 4)

		AUDIO INTERFACE BOARD 19C852204G1
		---------- JACKS ----------
J1 thru J12	344A3288P1	Modular jack: 6-position; sim to AMP 520425-3.
J14 and J15	19B800935P14	Two 25 Pair Telco Connectors with Bail Lock.
		--------- MISCELLANEOUS ---------
4	N80P9004B6	Machine screw: No. 4-40 x 1/4. (Qty. 4)

CIRCUIT ANALYSIS

The Audio Board routes audio information from two (2) series connected 25 pair Telco connectors (J14 and J15) to twelve (12) modular RJ12 connectors (J1 through J12) These modular jacks connect the audio inputs and outputs to the Analog Voters and the Voter Digital Relay Board as shown in the Interconnect Diagram 188D6802 (see LBI-39153).

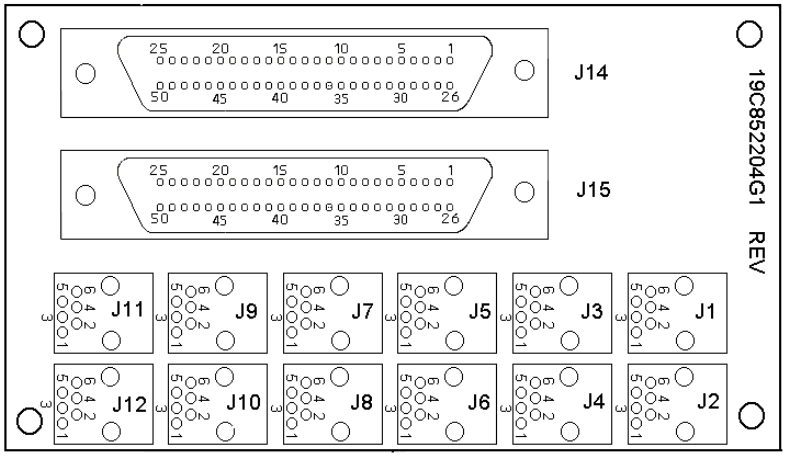
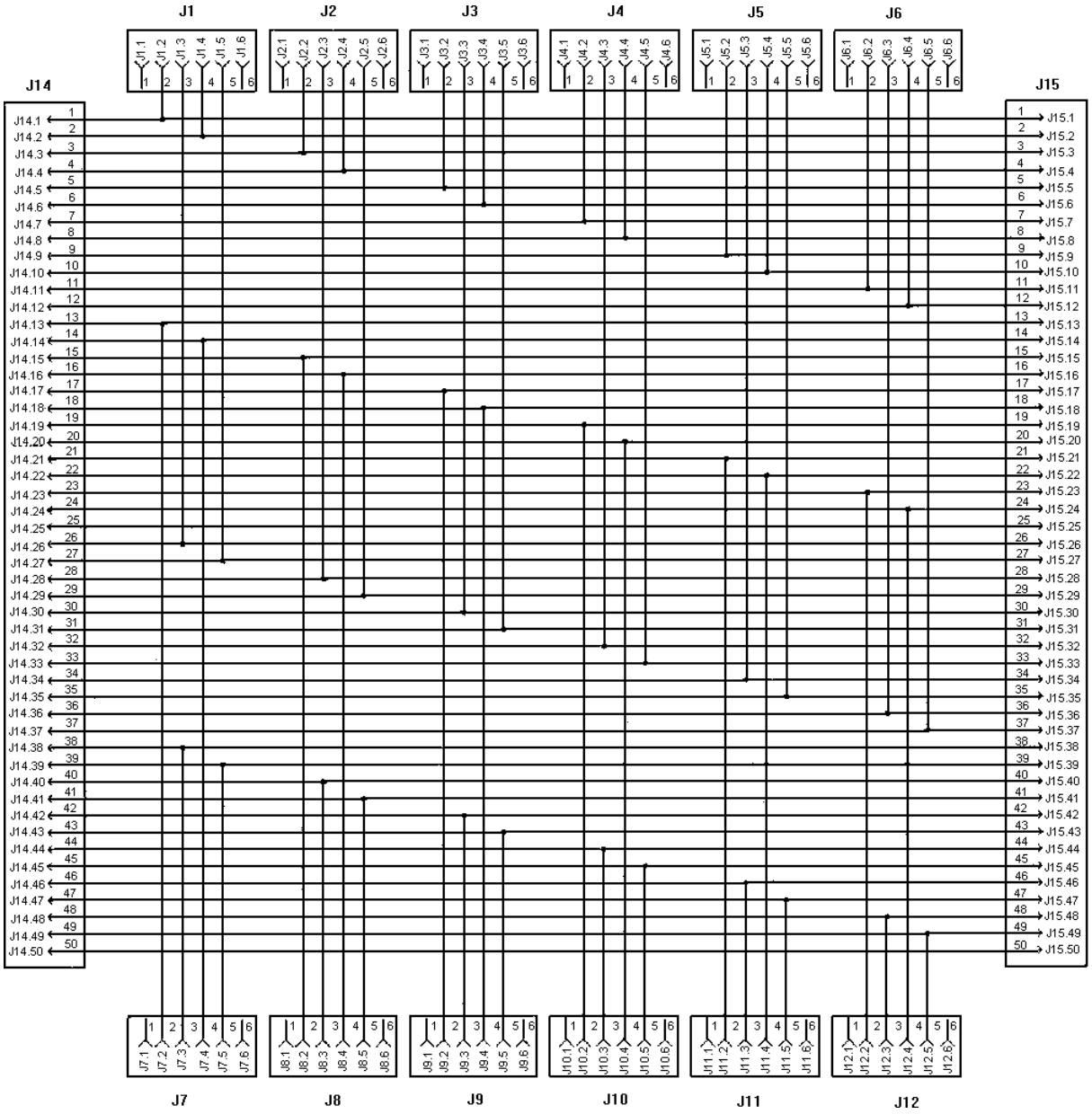


Figure 4 - Audio Interface Board Layout

(19C852204, Sh. 1, Rev. 0)



EDACS AUDIO INTERFACE BOARD
19C852204G1
(19D903852, Sh. 1, Rev. 0)

VOTER DIGITAL RELAY BOARD (188D6495G1)

The purpose of the Voter Digital Relay Board (VDRB) 188D6495G1 is to provide a means for routing analog and digital traffic to and from the Console Electronics Controller (CEC) or Integrated Multisite and Console Controller (IMC). This traffic can be audio (Clear Voice), Digital Voice, encrypted voice, or Digital data. From the CEC/IMC, this call traffic can be routed to/from other sites (Multisite) or to/from a console (dispatch) positions.

The VDRB is basically a switching relay which is controlled by the Selector (via the VG line) and the IMC (via the PTT line). A low condition is the active state for both the VG and PTT lines. When the Selector pulls the VG line low, Voted data is routed to the CEC/IMC. When the CEC/IMC puls the PTT line low, audio or data from other sites or consoles is routed to the Main site.

The switching arrangement allows the VDRB to operate in one of four configurations.

- Local Clear Voice.
- MultiSite Clear Voice.
- Local Digital Voice or Data.
- MultiSite Digital Voice or Data.

Local Clear Voice

VG - Hi
PTT - Hi

Clear Voice call on the local site only (no Multisite calls), refer to Figure 5.

- Voted audio is connected to Main Site audio input for repeating and to CEC/IMC audio/data input for console monitoring.
- Voted Data is connected only to Main Site data input (for the GETC to act upon).

MultiSite Clear Voice

VG - Hi
PTT - Lo

A Clear Voice from a console or remote site via the CEC/IMC. CEC/IMC audio/data output is connected to the Main Site audio input, refer to Figure 6..

- Voted audio is connected to CEC/IMC audio/data input so message trunked response can be heard without switching.
- Voted Data is connected only to Main Site data input, but is not used.

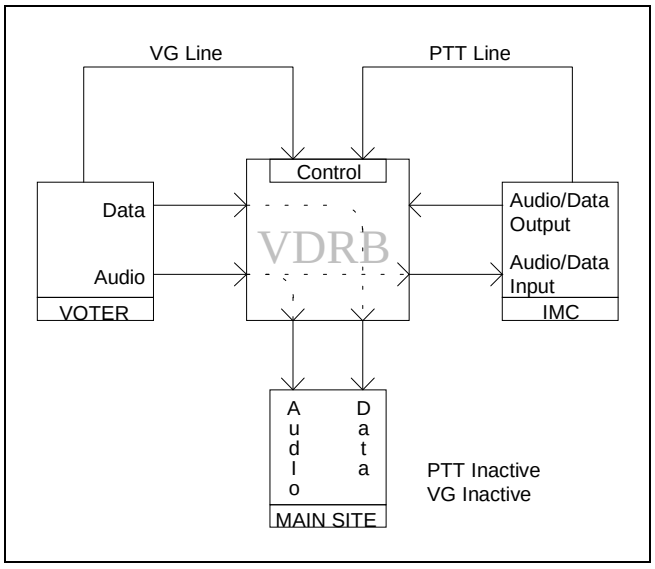


Figure 5 - VDRB in Clear Voice Mode (Primary Site)

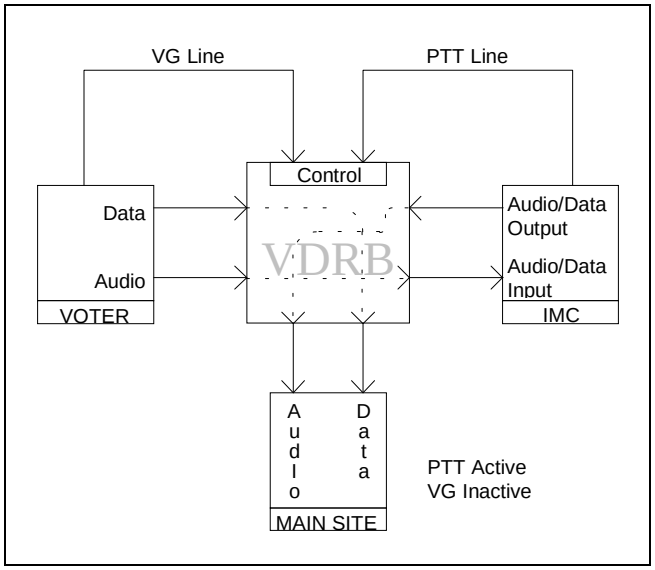


Figure 6 - VDRB with Clear Voice routed to and from the IMC (Secondary Site)

Local Digital Voice or Data

VG - Lo
PTT - Hi

Digital Voice or Digital Data on the local site only (no Multisite calls), refer to Figure 7.

- Voted audio is connected to Main Site audio input, but it is not used.
- Voted Data is connected to Main Site data input for retransmitting and to the CEC/IMC audio input for console monitoring.

MultiSite Digital Voice or Data

VG - Lo
PTT - Lo

A Digital Voice or data call from a console or remote site via the CEC/IMC. CEC/IMC audio/data output is connected to the Main Site data input, refer to Figure 8.

- Voted audio is connected to the Main Site audio input, but is not used.
- Voted data is connected to CEC/IMC audio/data input so message trunked calls can be answered.

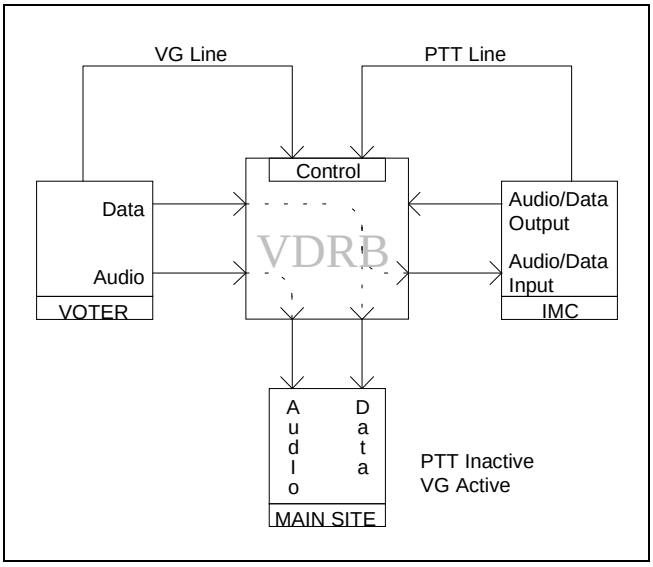


Figure 7 - VDRB in Digital Voice or Data Mode (Primary Site)

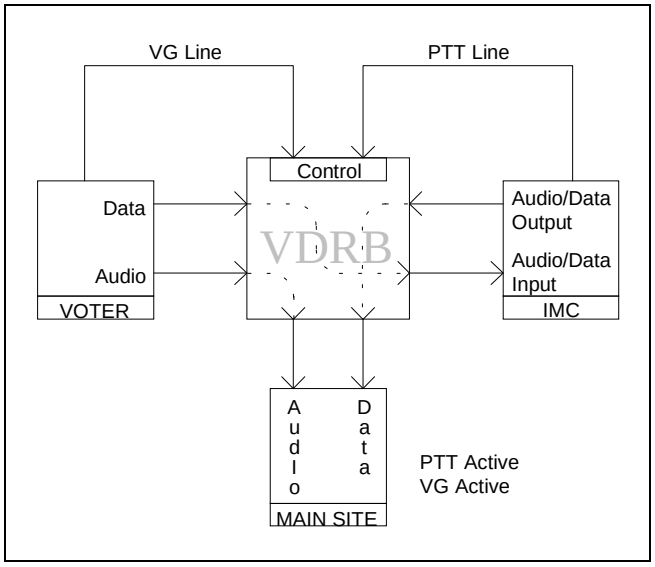


Figure 8 - VDRB with Digital Voice or Data routed to and from the IMC (Secondary Site)

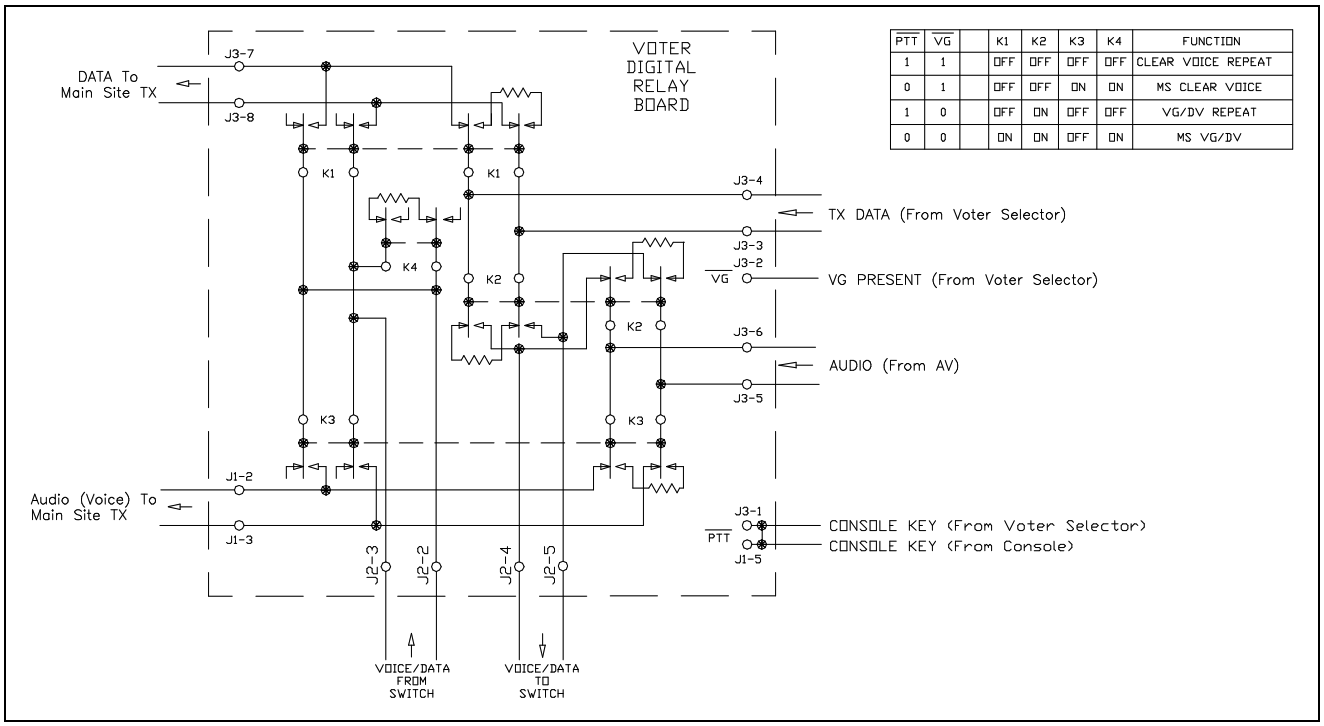
CIRCUIT ANALYSIS

There are two lines (voice and data) from the voter, and two lines (voice and data) to the main site. There is also a line (voice/data) to and from the IMC. Relays K1 through K4 provide the switching for these lines, with resistors R4, R6, R7 R8 and R9 providing 600 ohm terminations to replace terminations lost as the output line is switched to a different input line. Integrated circuit components U1 and U2 are the relay drivers. Diodes D1 thru D4 provide transient suppression when the relay is deactivated.

Voltage regulator U4 provides a regulated +5 volts for the logic circuits. The circuit board expects a supply voltage between +7 and +15 volts and draws less than 0.25 Amperes (both LED's on). Integrated circuits U3 and U5 provide the logic circuitry which creates the relay control signals from the two inputs, Voice Guard (VG) present and switch PTT. Each input is active when in a low state. Schematically this is indicated with a bar, $\overline{VG}$ and $\overline{PTT}$. Each input has diode decoupling coupling/protection. LED's DS1 and DS2 provide visual indication of the states of the two input lines. DS1 indicates a $\overline{VG}$ signal and DS2 indicates a $\overline{PTT}$ signal.

TROUBLESHOOTING

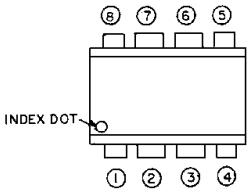
If the relay board appears not to be switching properly, make sure that the inputs are proper. The LED's (DS1 and DS2) can be used for this purpose. If the VG or PTT line is not sufficiently close to ground (about half a volt) it may not trip the logic gate. Poor signal ground could cause this condition.



PTT	VG		K1	K2	K3	K4	FUNCTION
1	1		OFF	OFF	OFF	OFF	CLEAR VOICE REPEAT
0	1		OFF	OFF	ON	ON	MS CLEAR VOICE
1	0		OFF	ON	OFF	OFF	VG/DV REPEAT
0	0		ON	ON	OFF	ON	MS VG/DV

Figure 9 - Simplified VDRB Circuit Diagram

U1 AND U2
DUAL TTL NAND RELAY DRIVER
344A3290P2 (SN75452B)

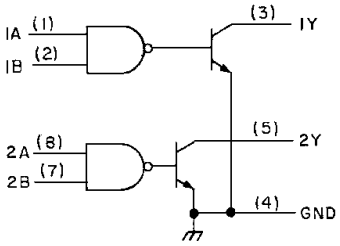


FUNCTION TABLE
(EACH DRIVER)

A	B	Y
L	L	L (OFF STATE)
L	H	H (OFF STATE)
H	L	H (OFF STATE)
H	H	L (ON STATE)

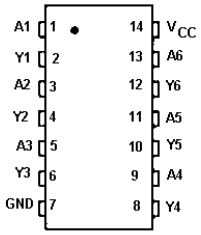
POSITIVE LOGIC
$Y = \overline{AB}$ OR $\overline{A} + \overline{B}$

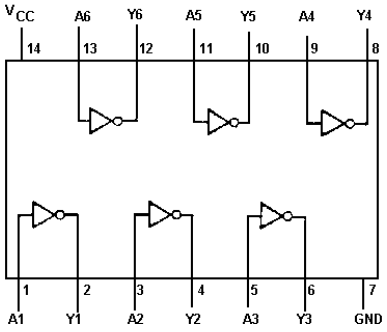
LOGIC DIAGRAM (POSITIVE LOGIC)



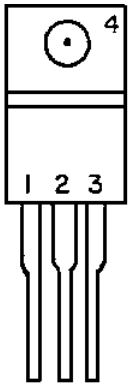
U3
HEX INVERTER
19A700037P305 (74LS04)

PIN ASSIGNMENT



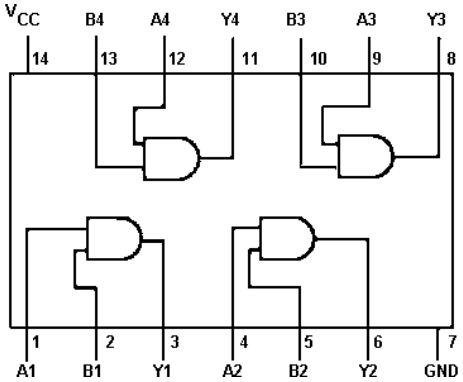


U4
VOLTAGE REGULATOR
19A134717P1 (MC7805CT)



1. INPUT
2. COMMON
3. OUTPUT
4. TAB COMMON

U5
QUAD 2-INPUT AND GATE
19A700037P307 (74LS08)



VOTER DIGITAL RELAY BOARD
188D6495G1

SYMBOL	PART NUMBER	DESCRIPTION
		---------- CAPACITORS ----------
C1	19A703314P12	Electrolytic: 100 uF ±20%, 25 VDCW.
C2	19A703314P5	Electrolytic: 22 uF -10+50% tol, 25 VDCW; sim to Panasonic LS Series.
C3 thru C6	19A702250P113	Polyester: 0.1 uF ±10%, 50 VDCW.
		---------- DIODES ----------
D1 thru D4	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
D5 and D6	19A700047P3	Silicon: 100 mW; sim to 1N6263.
		------- INDICATING DEVICES -------
DS1 and DS2	19A703595P4	Optoelectronic red; sim to Hewlett Packard HLMP-1301
		---------- JACKS ----------
J1 and J2	344A3288P1	Modular jack: 6-position; sim to AMP 520425-3.
J3	344A3288P5	Modular jack: 8-position; sim to AMP 555164-1.
J4 and J5	19A116659P55	Connector, printed wiring: 3 contacts rated at 5 amps; sim to Molex 09-65-1031.

SYMBOL	PART NUMBER	DESCRIPTION
		---------- RELAYS ----------
K1 thru K3	19B235003P2	Relay: 4 Form C single side stable; sim to Aromat DS4E-M-DC12V.
K4	19B235003P1	Relay: 2 Form C single side stable; sim to Aromat DS2E-M-DC12V.
		---------- RESISTORS ----------
R1 and R2	19A700106P87	Composition: 10K ohms ±5%, 1/4 w.
R4	19A701250P176	Metal film: 604 ohms ±1%, 1/4 w.
R6 thru R9	19A701250P176	Metal film: 604 ohms ±1%, 1/4 w.
R10 and R11	19A700106P55	Composition: 470 ohms ±5%, 1/4 w.
		----- INTEGRATED CIRCUITS -----
U1 and U2	344A3290P2	Digital: Dual TTL NAND Driver; sim to SN75452B.
U3	19A700037P305	Digital: Hex Inverter; sim to 74LS04.
U4	19A134717P1	Linear: 5 Volt Regulator; sim to MC7805CT.
U5	19A700037P307	Digital: Quad 2-Input AND gate; sim to 74LS08.

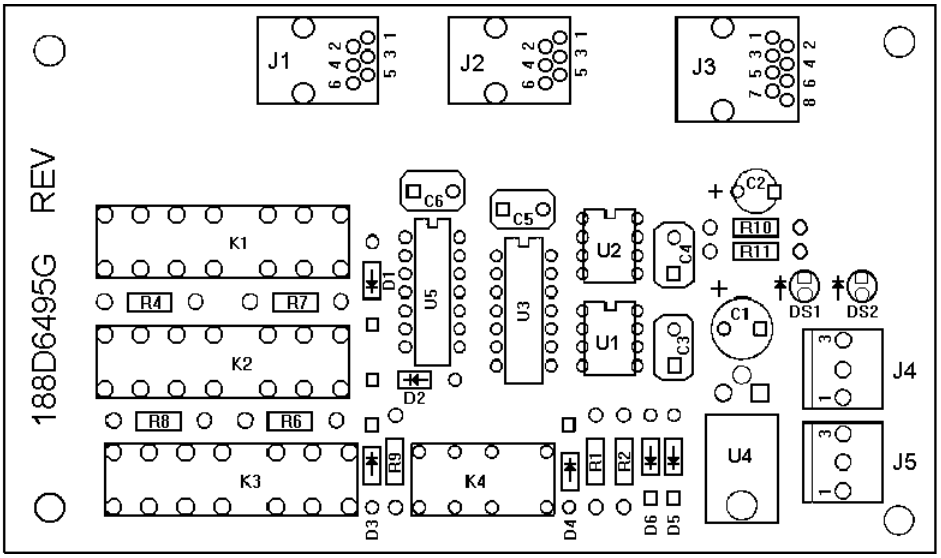
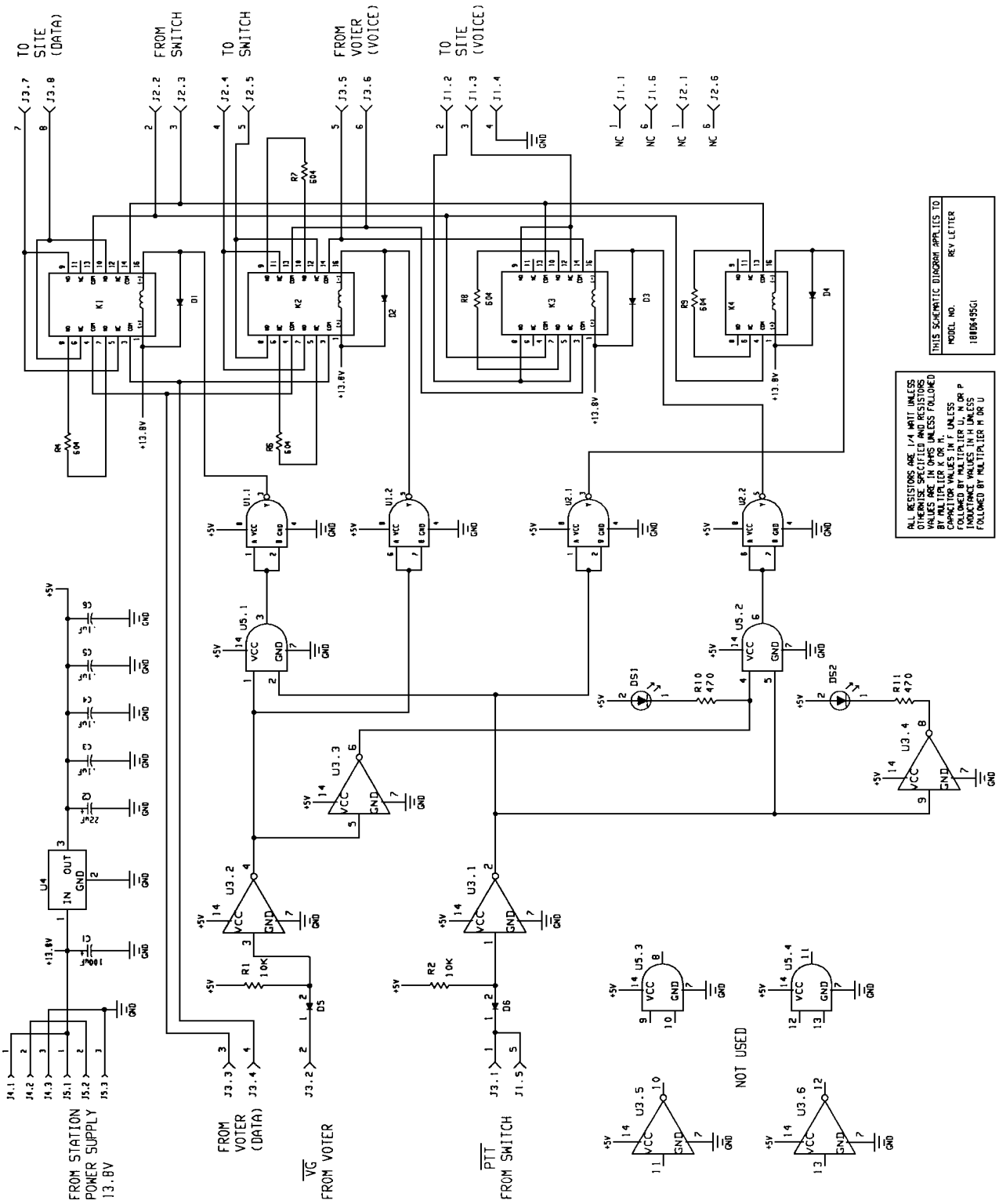


Figure 10 - Voter Digital Relay Board

(188D6495, Sh. 1, Rev. 0)



VOTER DIGITAL RELAY BOARD
188D6493G1
(188D6493, Sh. 1, Rev. 0)

DIGITAL CROSS CONNECT PANEL (DD) - ROA 117 2227

The Voter "DD" Digital Cross Connect (Interface) Panel (ROA 117 2227) is used in two channel per shelf configurations.

When used in the CV^2 System, the Interface panel routes the following signals:

- E & M Squelch signals from the Digital Shelf to the Analog Receivers.
- Voted Audio Outputs from the Digital Shelf to the Analog Shelf.
- Modem and RS-232 inputs to the Digital Shelf.
- Digital Data between the Digital Cross Connect Panel and the Digital Shelf.

System Interconnect Diagrams and wiring lists using the "DD" board are contained in LBI-39153. The Cross Connect Diagram for the board is located at the end of this manual.

JUMPERS

The DD Interface Board uses two jumper connectors to properly transfer RS-232, or modem data to and from the Digital Shelf.

The jumper configuration depends on whether the system includes the Voted Digital Interconnection (VDI) option or not and how the digital receivers communicate with the sites.

Table 1 - Jumpers for Digital Interface Board ROA 117 2227

Voter System		Non-VDI	VDI	
Main Site Connection		RS-232 or Modem	Simulcast (RS-232)	Non-Simulcast (Modem)
Digital Interface Board	J30	No Jumpers	1 to 2 3 to 4	5 to 6 7 to 8
	J31	No Jumpers	1 to 2 3 to 4	5 to 6 7 to 8

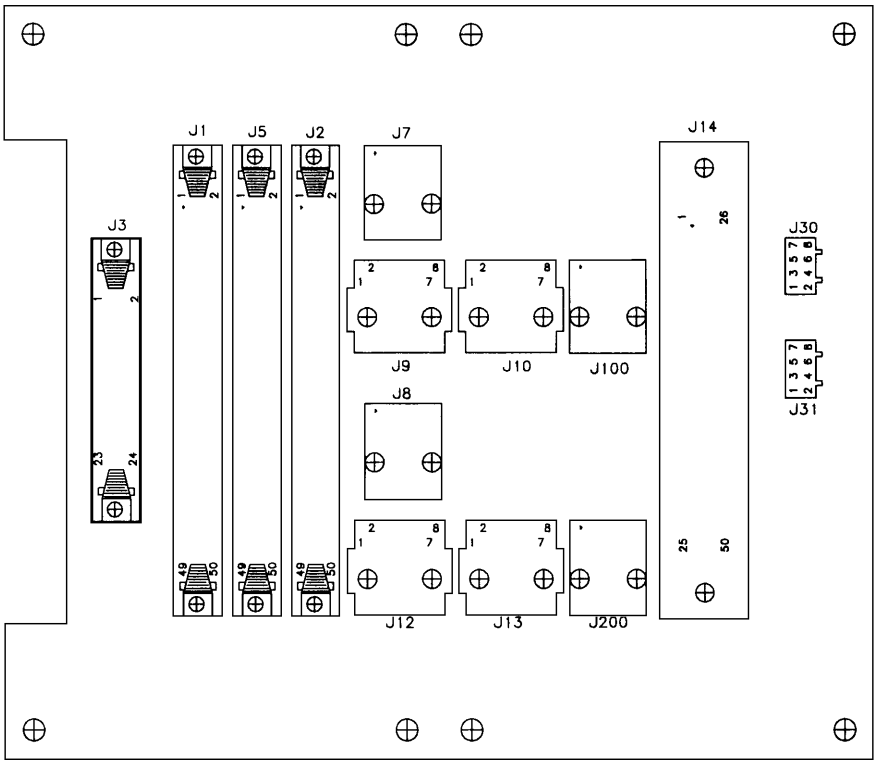


Figure 11 - Digital Interface Board, ROA 117 2227

(1078-ROA 117 2227, Sh.1, Rev. C)

DIGITAL INTERFACE BOARD (DD)
131-32 ROA 117 2227 Rev. B

SYMBOL	PART NUMBER	DESCRIPTION
		---------- CONNECTORS ----------
J1 and J2	RPV 403 143/050	Connector, 50 pin (2 x 25).
J3	RPV 403 143/124	Connector, 24 pin (2 x 12).
J5	RPV 403 143/050	Connector, 50 pin (2 x 25).
J7 and J8	RNV 403 04/6	Connector.
J9 and J10	RNV 256 205	Fork contact unit; sim to MMP-Jack RAK 8/8.
J12 and J13	RNV 256 205	Fork contact unit; sim to MMP-Jack RAK 8/8.
J14	RNT 403 237/050	Connector, 50 pin.
J30 and J31	RNV 380 220/204	Header, 8 pin (2 x 4).
J100 and J200	RNV 403 04/6	Connector.
		---------- MISCELLANEOUS ----------
2	TVA 117 2214 R3	Printed wiring board.
3	RPV 403 143/901	Locking spring (qty 8).
4	80/SBC 151 112/0500	Screw: URX-Z UNC 4-40x13 ST FZS (qty 2).

PRODUCTION CHANGES

Changes in the equipment to improve performance or simplify circuits are identified by a "Revision Letter," which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the parts list for the descriptions of the parts affected by these revisions.

Rev. R3A - ROA 117 2227

The 2 Channel/Six Site Digital Interface Board was revised to allow using the interface board for three modes of communication: RS-232, RS-422, and modem and to provide VDI capability. All changes included in the initial production of the product.

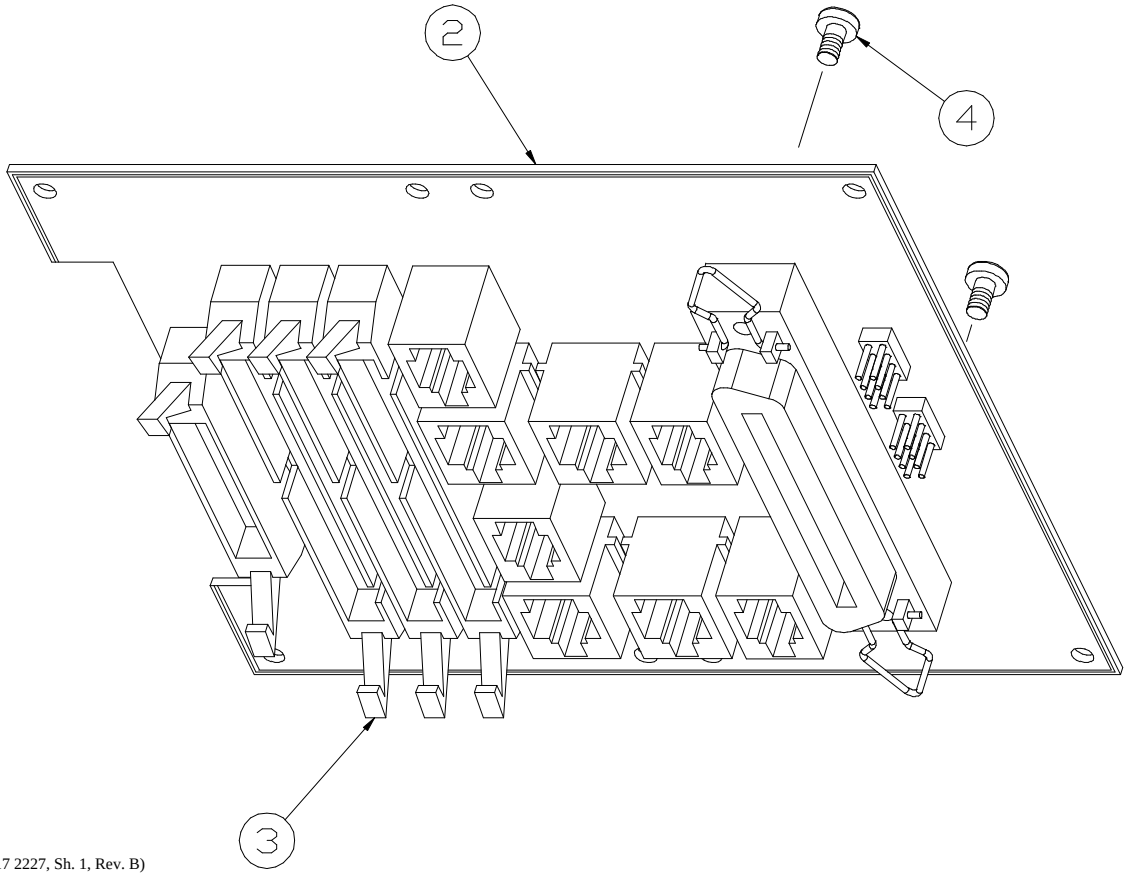
Change Summary:

J1, J2 and J5 changed from RPV 403 148/050 to RPV 403 148/050.

J3 changed from RPV 403 148/024 to RPV 143/124.

J30 and J31 RPV 380 220/204 added.

Printed wiring board TVA 117 2214 changed from R2 to R3.



(1/1078-ROA 117 2227, Sh. 1, Rev. B)

DIGITAL CROSS CONNECT PANEL (EE) - ROA 117 2228

The Voter "EE" Digital Cross Connect (Interface) Panel (ROA 117 2228) is used in one channel per shelf configurations.

The board uses three jumper connectors to properly transfer RS-232, or modem data between the Digital Shelf and the site. Refer to Tables 2 and 3 for Jumper configurations. Table 3 applies if there are cards installed in slots 4, 16, 18, or 20.

Table 2 - Jumpers for VDI Output

Voter System		Non-VDI	VDI Output	
Main Site Connection		RS-232 or Modem	RS-232 (Simulcast)	MODEM (Non-Simulcast)
Digital Interface Board	J30	No Jumpers	1 to 2 3 to 4	5 to 6 7 to 8

Table 3 - Jumpers for RS-232/Modem Interface

Digital Shelf Number	RS-232 or Digital Receiver Installed	RMIC Installed
Slot 4	J40-1 to 2 J41-1 to 2	No Jumpers
Slot 16	J40-3 to 4 J41-3 to 4	No Jumpers
Slot 18	J40-5 to 6 J41-5 to 6	No Jumpers
Slot 20	J40 7 to 8 J41 7 to 8	No Jumpers

The wiring list and interconnect diagrams a for a CV^2 System using the "EE" board are contained in LBI-39153.

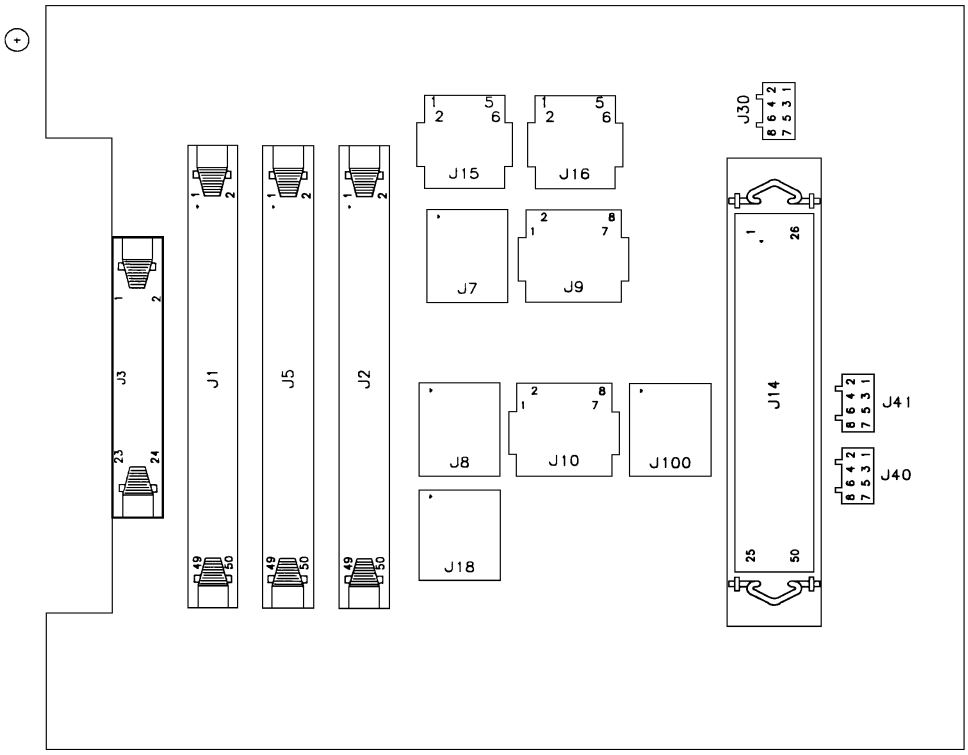


Figure 12 - Digital Interface Board, ROA 117 2228

(1078-ROA 117 2228, Sh. 1, Rev. B)

DIGITAL INTERFACE BOARD (EE)
131-32 ROA 117 2228 Rev. B

SYMBOL	PART NUMBER	DESCRIPTION
		---------- CONNECTORS ----------
J1 and J2	RPV 403 143/050	Connector, 50 pin (2 x 25).
J3	RPV 403 148/024	Connector, 24 pin (2 x 12).
J5	RPV 403 143/050	Connector, 50 pin (2 x 25).
J7 and J8	RNV 403 04/6	Connector.
J9 and J10	RNV 256 205	Fork contact unit; sim to MMP-Jack RAK 8/8.
J14	RNT 403 237/050	Connector, 50 pin.
J15 and J16	RNV 403 04/6	Connector.
J30	RNV 380 220/204	Header, 8 pin (2 x 4).
J40 and J41	RNV 380 220/204	Header, 8 pin (2 x 4).
J100	RNV 403 04/6	Connector.

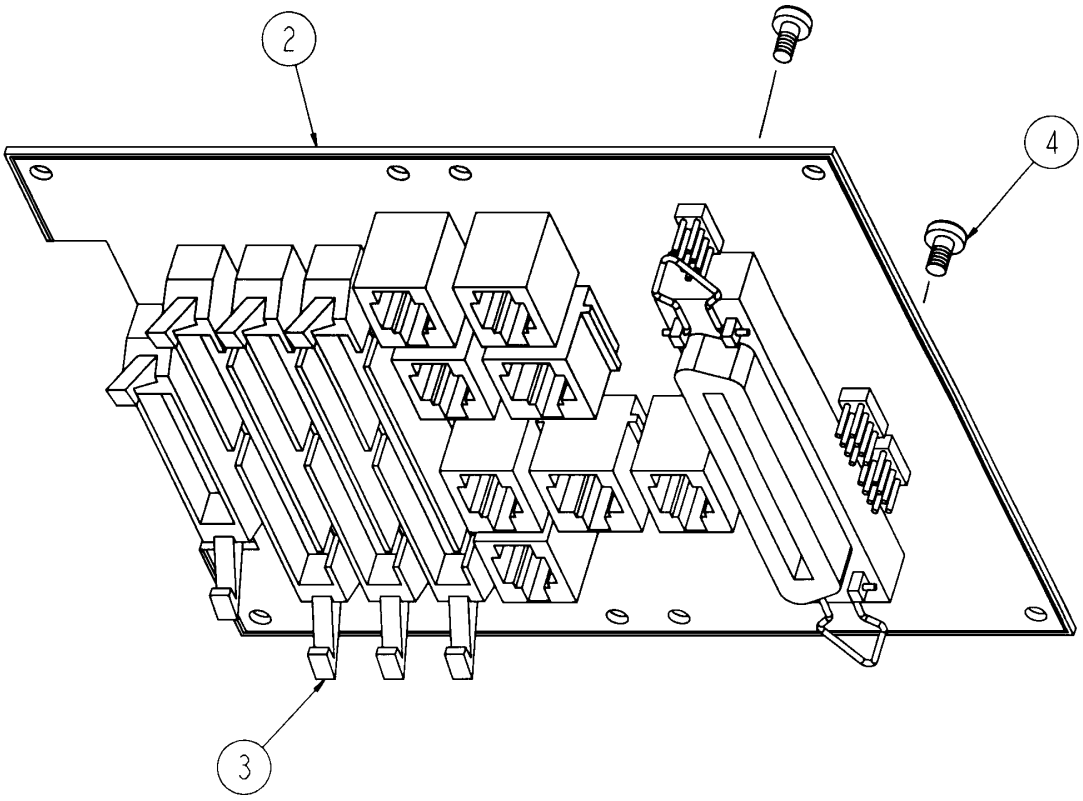
SYMBOL	PART NUMBER	DESCRIPTION
		---------- MISCELLANEOUS ----------
2	TVA 117 2215 R1	Printed wiring board.
3	RPV 403 143/901	Locking spring (qty 8).
4	80/SBC 151 112/0500	Screw: URX-Z UNC 4-40x13 ST FZS (qty 2).

PRODUCTION CHANGES

Changes in the equipment to improve performance or simplify circuits are identified by a "Revision Letter," which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the parts list for the descriptions of the parts affected by these revisions.

Rev. R2A - ROA 117 2228

The 1 Channel/shelf Digital Interface Board was revised to allow using the interface board for three modes of communication: RS-232, RS-422, and modem and to provide VDI capability. All changes are included in the initial production of the product.



(1/1078-ROA 117 2228, Sh. 1, Rev. B)

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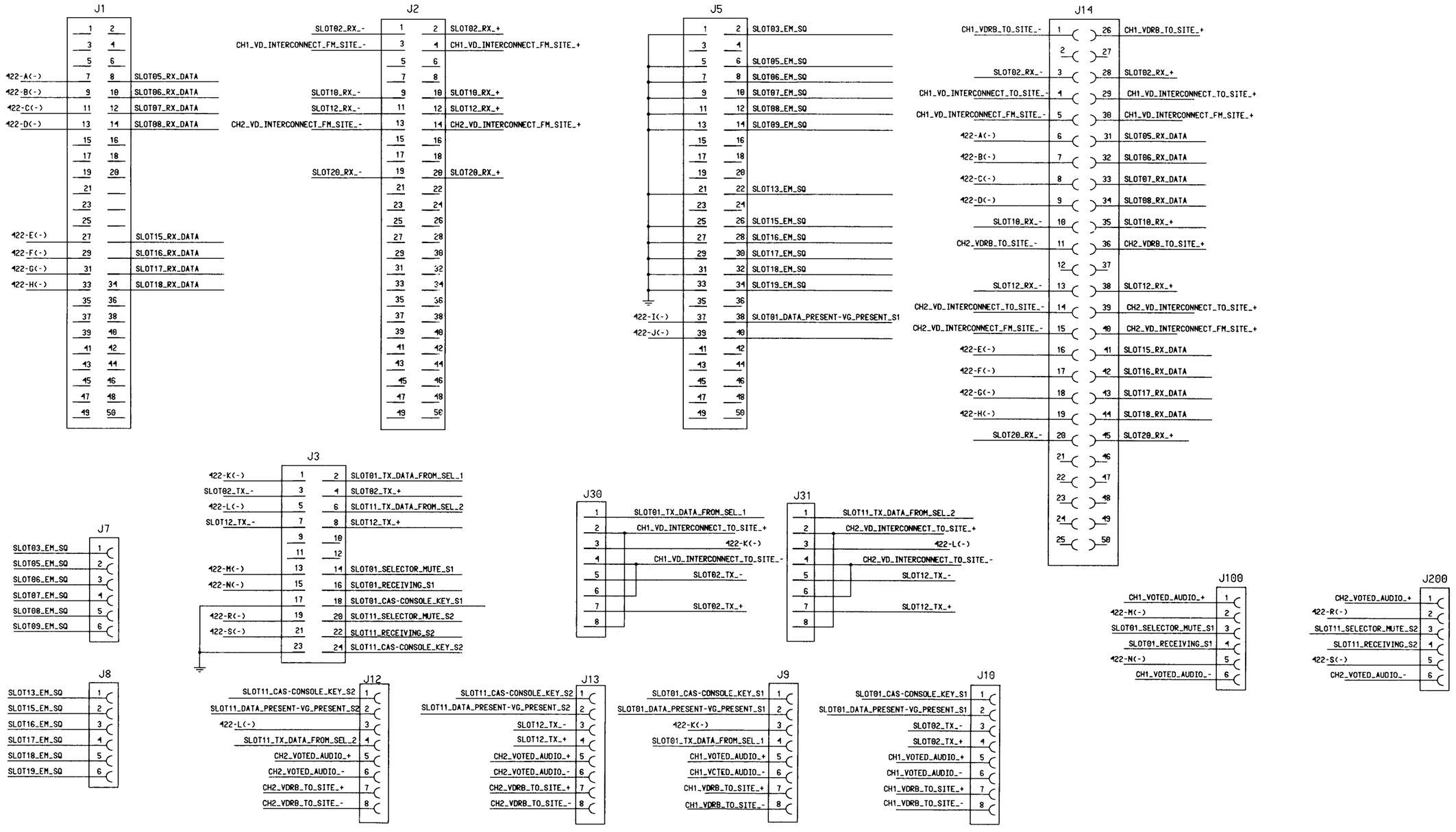
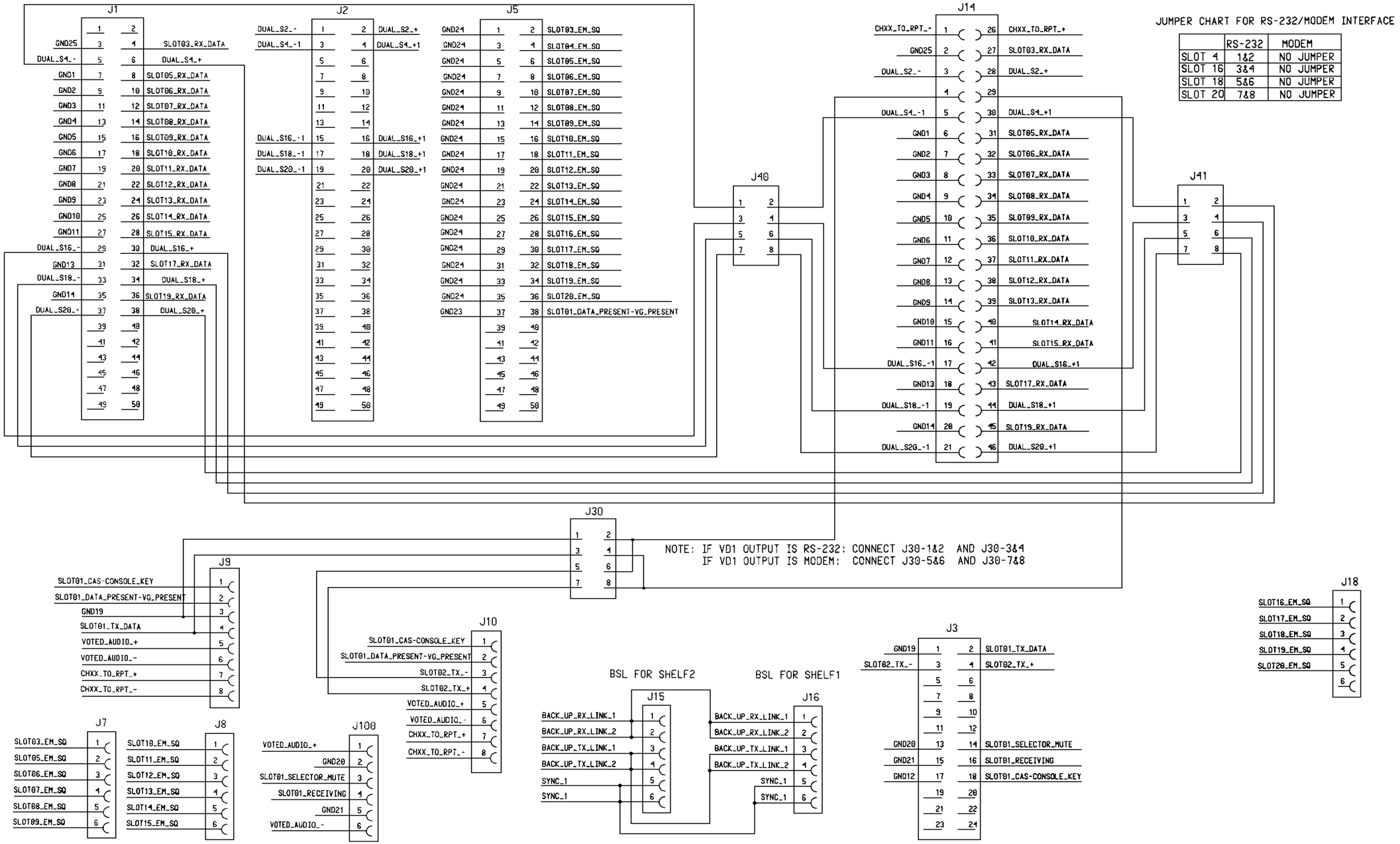


DIGITAL CROSS CONNECT PANEL
ROA 117 2227

(1911-ROA 117 2227, Sh. 1, Rev. B)



JUMPER CHART FOR RS-232/MODEM INTERFACE

	RS-232	MODEM
SLOT 4	1&2	NO JUMPER
SLOT 16	3&4	NO JUMPER
SLOT 18	5&6	NO JUMPER
SLOT 20	7&8	NO JUMPER

DIGITAL CROSS CONNECT PANEL
ROA 117 2228

(1911-ROA 117 2228, Sh. 1, Rev. A)