LNS-8
Live News Switcher

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1.1 General Description

The LNS-8 Live News Switcher features both audio and video switching capabilities in a one rack unit frame. While the LNS-8 is designed for use in small installations; bandwidth, signal switching quality, and versatility have not been sacrificed.

The LNS-8 is configured to switch one video level. It also has the capability of being configured with two levels of audio to provide a total of three levels of switching control. In addition, the LNS-8 allows matrixes to be ganged together.

Control of the LNS-8 Live News Switcher is provided by a local control panel and/or by remote control panels. The LNS-8 can also be controlled through the CPU link by an external RS232/RS422 control device. The LNS-8 Control Panel provides full breakaway capability and audio-follow-video (AFV) switching. The local control panel can be installed directly into the LNS-8 chassis.

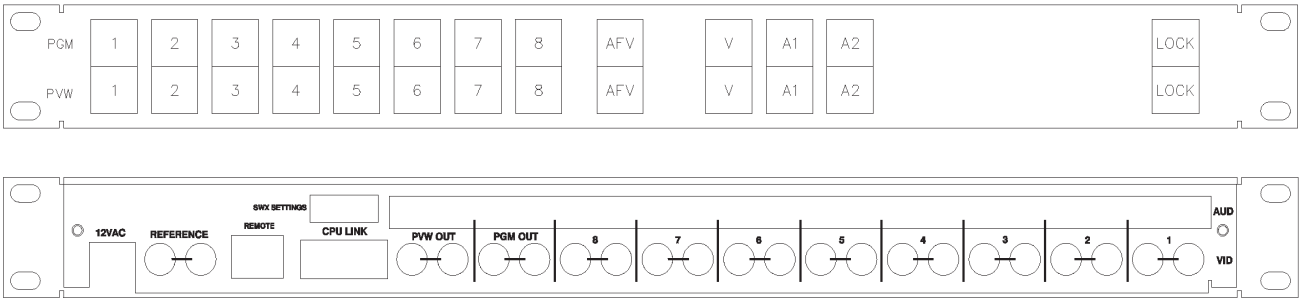


Figure 1-1 LNS-8 Live News Switcher (Front and Rear Views)

1.2 LNS-8 Live News Switcher Specifications

Analog Video Specifications

INPUT CHARACTERISTICS

Level	1V P-P Nominal
	2V P-P Max. (without obvious distortion)
Impedance	75 Ohm Looping
Return Loss	>40dB to 5MHz
Coupling	Direct (DC)
Type	Non-Balanced
Connector Type	BNC

OUTPUT CHARACTERISTICS

Level	1V P-P Nominal
	2V P-P Max. (without obvious distortion)
Impedance	75 Ohms
Return Loss	>40dB to 5MHz
	>15dB to 100MHz
Coupling	Direct (DC)
DC on Outputs	<±10mV Max.
Connector Type	BNC
Number	Two
Output Isolation	>40dB to 10MHz

GAIN CHARACTERISTICS

Gain	Unity
Gain Stability	<±0.1dB Max.
Gain Adjust Range	±1.5dB

LINEAR DISTORTIONS

Frequency Response	<±0.1dB to 5MHz
	<±0.2dB to 10MHz
	+0.2dB, -0.5dB to 35MHz
	+0.5dB, -1.0dB to 100MHz
	+1.0dB, -3.0dB to 250MHz
Vertical Tilt	0.25% (50Hz Square Wave)
Horizontal Tilt	0.25%
Low Frequency	+0.2%/mS Max. with 10% Overshoot
	(10-90% or 90-10% Change)

1.2 LNS-8 Live News Switcher Specifications Cont:

Analog Video Specifications Continued:

PULSE AND BAR RESPONSES

Factor (2T)	0.2% K
Bar Slope	0.2% K
Pulse/Bar Ratio	0.2% K
Pulse Sharp	0.2% K

CHROMINANCE / LUMINANCE

Gain Inequality	±1% Max
Delay Inequality	±1nS

NON-LINEAR DISTORTIONS

(All tests, 10-90%, 3.58MHz or 12.5-87.5%, 4.43MHz)

Differential Gain	0.1% @ 4.43MHz
Envelop Delay	<2nS, DC to 85MHz
Differential Phase	0.1º @ 4.43MHz
Line Time Non-Linearity	0.2%
Transient Gain	1% (Luminance, Chrominance, or Sync)

CROSSTALK

Video to Video	-65dB to 5MHz (All Inputs and Outputs Hostile)

SWITCHING CHARACTERISTICS

Switching Time	1µS
Differential Delay	
Input to Input, Same Output	±1º @ 5MHz
Output to Output, Same Output	±1.5º @ 5MHz

SIGNAL TO NOISE

Video Filter	-73dB (Low Pass to 5MHz Standard B, C, G, H, I or to 4.2MHz Standard M)

1.2 LNS-8 Live News Switcher Specifications Cont:

Analog Audio Specifications

INPUT CHARACTERISTICS

Level	+24dBm Max
Impedance	≥60K Ohm
Common Mode Rejection Ratio	>60dB, 20Hz to 20KHz
Coupling	Direct (DC)
Connector Type	3-Pin, 2-Part, Detachable Plug

OUTPUT CHARACTERISTICS

Level	+24dBm into 600 Ohms
Level Variation Between Inputs	±0.1dB
Impedance	≤45 Ohms
Coupling	Direct (DC)
DC on Outputs	±20mV
Connector Type	3-Pin, 2-Part, Detachable Plug

SHORT CIRCUIT PROTECTION: A sustained short circuit to signal ground or chassis ground will not damage any component. Once the short is removed, the switcher will automatically recover without any operator or maintenance intervention.

GAIN CHARACTERISTICS

Gain	Unity, ±0.1dB into Hi-Z
Gain Stability	±0.05dB

FREQUENCY CHARACTERISTICS (Ref. 1KHz)

Sine Wave Response	<±0.1dB 20Hz to 20KHz

DISTORTION CHARACTERISTICS

Total Harmonic Distortion (THD)	<0.05% @ 24dBm, 20Hz to 20KHz
Intermodulation Distortion (IMD)	<0.05% @ 24dBm, 20Hz to 20KHz

CROSSTALK (All Inputs and Outputs Hostile)

20Hz TO 20kHz	-85dB

HUM AND NOISE

Wideband, 10Hz to 300KHz	<-73dBm
80KHz Low Pass Filter	<-78dBm
30KHz Low Pass Filter	<-86dBm
15KHz Low Pass Filter	<-89dBm
"A" Weighted	<-90dBm

1.2 LNS-8 Live News Switcher Specifications Cont:

System Specifications

POWER REQUIREMENTS

AC Voltages	Power Pack
	100 - 130 Volts, ±10%, 47 - 63 Hz
	200 - 260 Volts, ±10%, 47 - 63 Hz
DC Voltages	12VDC ±10%, 1.2 Amps

SAFETY STANDARDS

UL, CSA, VDE, and CE

RFI AND EMI STANDARDS

FCC

PHYSICAL CHARACTERISTICS

Height	1.75 Inches (44.5mm), 1RU
Width	19 Inches (483mm)
Depth	9 Inches (229mm)

ENVIRONMENTAL (Operational)

Temperature	Oº C to 40º C
Humidity	10% - 90% Non-Condensing

2.1 Introduction

This section details the LNS-8 Live News Switcher and LNS-8 Control Panel installation procedures. The following topics are discussed:

- Receipt Inspection
- Unpacking
- Location
- Mounting
- Cabling
- Video Matrix Card Installation
- Audio Matrix Card Installation
- Control Panel Installation
- Rear Panel Connectors
- LNS-8 Live News Switcher System Connections

NOTICE

THE LNS-8 LIVE NEWS SWITCHER VIDEO MATRIX, AUDIO MATRIX, AND CONTROL PANEL CARDS CONTAIN STATIC SENSITIVE DEVICES. CARE SHOULD BE USED WHEN IT IS NECESSARY TO HANDLE THESE CARDS. IT IS RECOMMENDED THAT A GROUND WRIST STRAP AND GROUNDING MAT BE USED BEFORE ATTEMPTING ANY EQUIPMENT INSTALLATIONS AND ADJUSTMENTS.

2.2 Receipt Inspection

The LNS-8 Live News Switcher and the LNS-8 Control Panel were tested and inspected prior to leaving the factory. Upon receipt, inspect the equipment for shipping damage. If any damage is found, contact the carrier immediately and save all packing material.

2.3 Unpacking

The standard LNS-8 Live News Switcher is comprised of a frame, video matrix card, audio matrix card, and a control panel card. Prior to discarding packing material compare the parts received against the packing list. Carefully inspect the layers of packing material for any components which may have been overlooked during the initial unpacking.

2.4 Location

The LNS-8 Live News Switcher may be located anywhere power is available. However, units should be mounted as close as possible to their associated equipment to minimize cable runs. Installation should be in an area where the ambient temperature does not exceed 40°C (104°F) inside the equipment rack.

2.5 Mounting

The LNS-8 Live News Switcher is rack mountable in a standard 19” equipment rack. Sufficient space must be provided behind the equipment rack to allow for the audio, video, control, and power cables and space (at least one inch) should be provided at the sides of the units for air flow through the vents. All mounting holes should be utilized and mounting hardware tightened securely. As with all equipment installed in a rack, the bottom screw on each side should be installed before proceeding with the remainder of the screws. Then all screws should be securely tightened. Support the LNS-8 Live News Switcher's bottom while installing it in the rack. Figure 2-1 illustrates chassis installation in the equipment rack.

To install a LNS-8 Live News Switcher's chassis in an equipment rack follow these steps:

1. Align the chassis with the slotted opening in the rack.

2. Install the bottom screws first.

3. Install the two top screws

4. Tighten all four screws securely.

2.5 Mounting Continued:

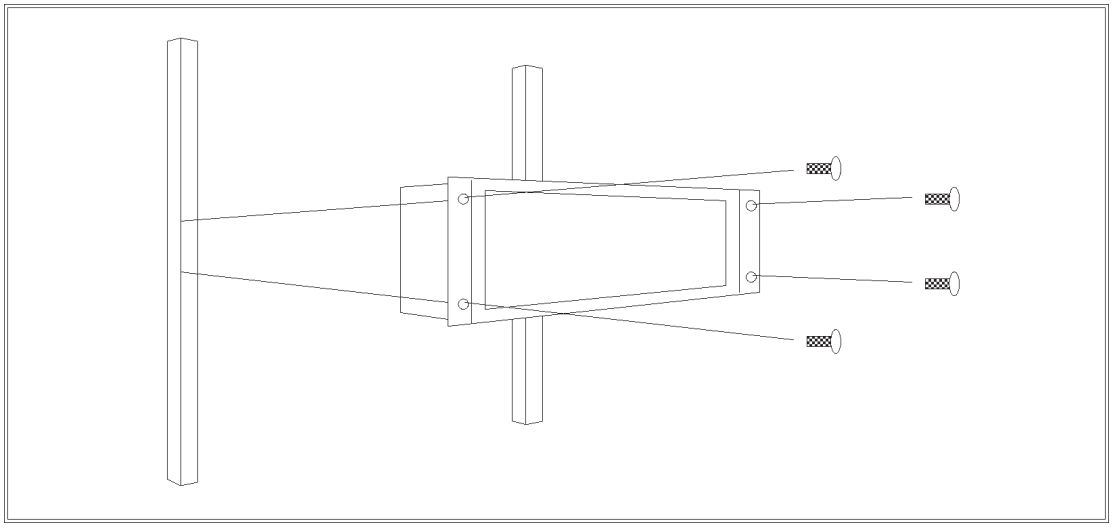


Figure 2-1 Chassis Installation

2.6 Cabling

Considerable weight will be added to the rear panel of the LNS-8 Live News Switcher by the audio cables, video cables, control cables, and power cable. Therefore, all cables should be strained relieved and secured to racks or other supporting structures. Failure to provide adequate cable support can result in cables separating from connectors. If cable runs are to be stored under an elevated floor, they should be tied to the racks as a guide. If cables are run along the floor, do not allow them to lay in the work area behind the racks. Stepping or tripping on the cables may result in connections being pulled free or wire breakage inside the insulation. The LNS-8 Live News Switcher's chassis should be installed in the equipment rack prior to attaching cables.

It is **strongly** recommended that you utilize Belden 8281 75 ohm cable for all video cabling. **NOTE: Do not use 50 ohm cable, as this will produce standing waves and oscillations.**

Use the following rules when cabling the LNS-8 Live News Switcher:

1. Lay all cables in their intended positions, separating video and audio cables from control and power cables wherever possible.

2. Provide proper support for each cable during the cabling process. The use of tie-wraps is recommended, as shown below in Figure 2-2.

2.6 Cabling Continued:

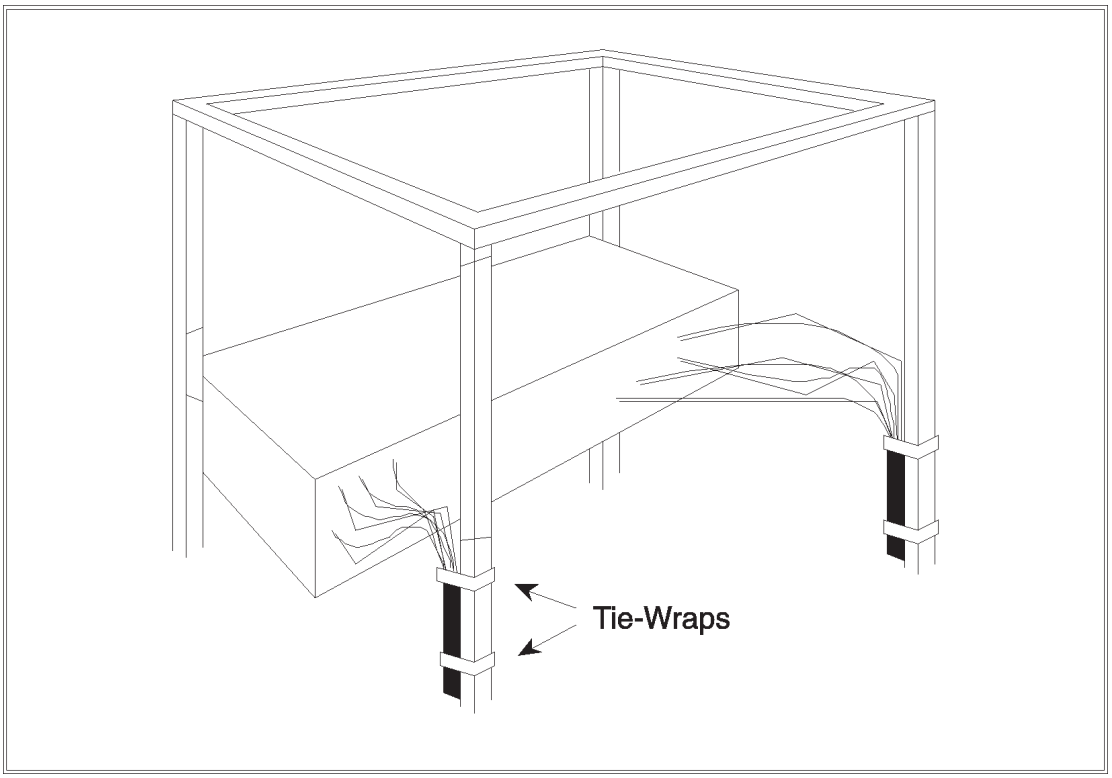


Figure 2-2 Cables Attached to Supports

2.7 Audio Matrix Card Installation

The LNS-8 Dual Channel Audio Matrix Card offers two levels of switching which form a stereo pair. To install the audio matrix card on the video matrix card take the following steps:

1. Align the fiveholes on the audio matrix card with the five circuit card stand-offs on the video matrix card.

2. Align the circuit card connector on the audio matrix card with the circuit card connector on the video matrix card.

3. Carefully push down on the audio matrix card while making sure the holes and the stand-offs stay aligned. Also make sure the connectors stay aligned.

4. Continue carefully pushing down on the audio matrix card until it is firmly in place.

2.7 Audio Matrix Card Installation Continued:

5. Once the audio matrix card is in place, attach it to the videomatrix card's standoffs using five 4-40 X 1/4 SEMS screws.

6. Tighten the screws until they snug but do not over tighten them.

2.8 Video Matrix Card Installation

The LNS-8 Video Matrix Card contains the electronic circuitry for 8 looping inputs and 2 looping outputs.

To install the LNS-8 Video Matrix Card into the LNS-8 Live News Switcher's chassis take the following steps:

1. Align the video matrix card with the rear of the frame.

2. Carefully slide the video matrix card into the back of the frame until the video matrix card's rear panel makes contact with the rear of the frame.

3. Attach the video matrix card's rear panel to the frame using two 4-40 X 1/4 SEMS screws and three 4-40 X 3/16 pan head screws.

4. Tighten the screws until they snug but do not over tighten them.

2.9 LNS-8 Control Panel Installation

The LNS-8 Control Panel provides for audio-follow-switching and has full breakaway capabilities. To install the LNS-8 Control Panel in the LNS-8 Live News Switcher's chassis take the following steps:

1. Align the LNS-8 Control Panel with front of the LNS-8 Live News Switcher's chassis.

2. Connect to the control cable between the connector on the rear of the control panel card to the connector on the front of the video matrix card. Make sure the cable locks into place on both connectors.

3. Carefully slide the control panel into the chassis while looping the control cable inside chassis.

2.9 LNS-8 Control Panel Installation Continued:

4. Continue sliding the control panel into the LNS-8 Live News Switcher's chassis until the screws holes on the control panel are aligned with the screw holes on the chassis.

5. Attach the control panel to the chassis using four 4-40 X 3/16 pan head screws.

6. Tighten the screws until they are snug but do not over tighten them.

2.10 Rear Panel Connectors

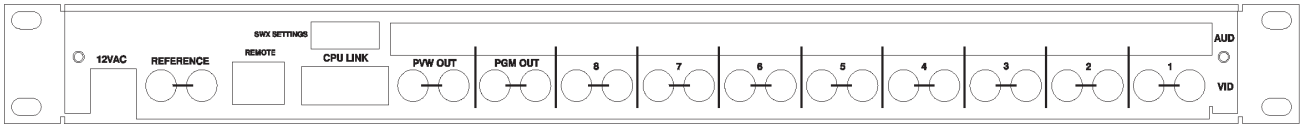


Figure 2-3 LNS-8 Live News Switcher (Rear View)

12 VAC/DC Connector (J29)

This 3-pin connector is utilized to connect the external AC power supply to the LNS-8 Live News Switcher (video matrix card). Power is supplied from the video matrix card to the audio matrix card and to the control panel.

AC
Pin 1 - AC
Pin 2 - GND
Pin 3 - AC

DC
Pin 1 - N/C
Pin 2 - GND
Pin 3 - +12V

Reference Connector (J7 and J8)

The Sync Reference Connector is composed of a set of loop-thru BNC type connectors which can be utilized to provide a reference signal to the LNS-8 Live News Switcher. The reference signal can be either a composite video signal or a video sync signal.

2.10 Rear Panel Connectors Continued:

Control Port Connector (J6)

The Control Port Connector is utilized to the connect remote LNS-8 Control Panels to the LNS-8 Live News Switcher. Up to four control panels (one locally and three remotely or four remotely) may be connected to the LNS-8 Live News Switcher through the control port connector.

CPU Link Connector (J30)

The CPU Link Connector provides a RS232/422 serial port that allows connection of an external control device to the LNS-8 Live News Switcher. The pinout of the CPU Link Connector is as follows:

RS232

Pin 1	Carrier Detect (Input to the LNS-8)
Pin 2	RX (Input)
Pin 3	TX (Output)
Pin 5	Ground
Pin 6	DSR (Input)
Pin 7	RTS (Output)
Pin 8	CTS (Output)
Pin 9	Ring Indicator (Grounded)

RS422

Pin 1	Ground
Pin 2	RX+ (Input)
Pin 3	TX- (Output)
Pin 4	Ground
Pin 5	Ground
Pin 6	Ground
Pin 7	RX- (Input)
Pin 8	TX+ (Output)
Pin 9	Ground

Video Output Connectors (J9-J12)

There are four BNC type video output connectors located on the back of the LNS-8 Live News Switcher, two per each video output channel (Preview and Program) . These connectors provide the means of connecting the LNS-8 Live News Switcher to the video destinations through 75 ohm coaxial cable. Unused outputs should be terminated.

2.10 Rear Panel Connectors Continued:

Video Input Connectors (J10-J28)

There are 16 BNC type video input connectors located on the back of the LNS-8 Live News Switcher, two per each video input channel to enable loop-thru video input connections. These connectors provide the means of connecting the video sources to the LNS-8 Live News Switcher through 75 ohm coaxial cable. If the loop-through connector is not used it must be terminated to maintain proper signal levels.

Audio Output Connectors (J2 and J5)

There are four audio output connectors located on the back of the LNS-8 Live News Switcher, two per each audio output channel forming a stereo pair. The audio connectors provide the means of connecting the LNS-8 Live News Switcher to the audio destinations.

The pinout of the audio output connectors is as follows:

Pin 1 Audio +
Pin 2 Audio -
Pin 3 Audio Ground/Sheild

Audio Input Connectors (J6 and J21)

There are 16 audio input connectors located on the back of the LNS-8 Live News Switcher, two per each audio input channel forming a stereo pair. The audio connectors provide the means of connecting the audio sources to the LNS-8 Live News Switcher.

The pinout of the audio output connectors is as follows:

Pin 1 Audio +
Pin 2 Audio -
Pin 3 Audio Ground/Sheild

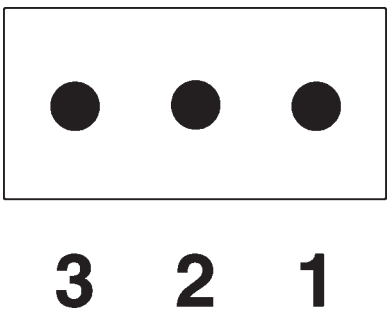


Figure 2-4 Audio Connector Pinout Diagam

2.11 LNS-8 Live News Switcher System Connections

Once the LNS-8 Live News Switcher is installed in the equipment rack, system connections can be made. Use the following guide and the sample system connection illustration, Figure 2-4, to insure that the LNS-8 Live News Switcher system connections are configured correctly.

Connection Guide

1. Connect the audio sources to the audio inputs.

2. Connect the audio destinations to the audio outputs.

3. Connect the video sources to the video inputs. Remember to terminate the loop through connector if the video signal is not looped through the LNS-8 Live News Switcher.

4. Connect the video destinations to the video outputs.

5. Connect the video reference signal to the video reference input. Remember to terminate the loop through connector if the video reference signal is not looped through the LNS-8 Live News Switcher.

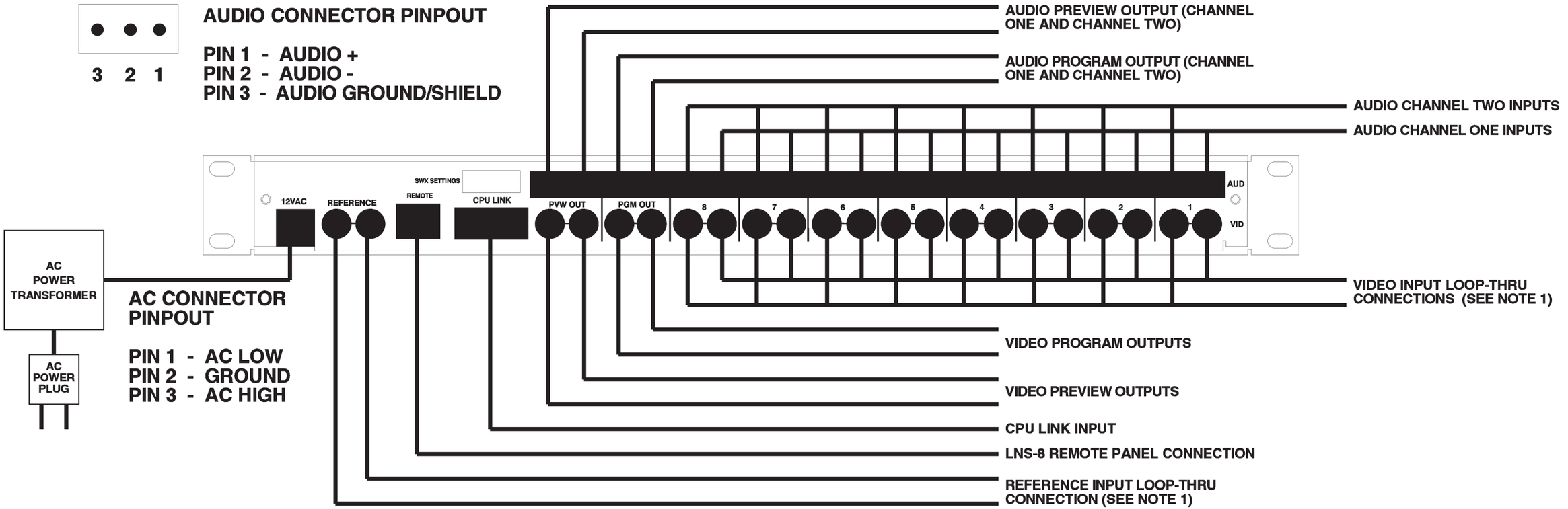
6. Connect the external RS232/RS422 control device to the CPU Link Connector.

7. Connect the LNS-8 Remote Control Panels to the Control Port Connector using RJ45 "T" Connectors where necessary. Remember no more than four control panels can be connected to each LNS-8 Live News Switcher, one local panel and three remote panels or four remote panels. **NOTE: All remote control panels must be individually powered using AC transformer either P/N 81902301120 (120VAC), P/N 81902301230 (220VAC), or P/N 81902301220 (United Kingdom).**

8. Connect the AC transformer to the 12VAC Connector.

9. Connect the AC transformer to the AC line.

The LNS-8 Live News Switcher should now be powered up and ready for operation.



NOTE 1: THE REFERENCE AND VIDEO LOOP-THRU MUST BE TERMINATED INTO 75 OHMS IF NOT CONNECTED TO ANOTHER FRAME.

Figure 2-5 Sample LNS-8 Live News Switcher System Connections

3.1 Introduction

The operation of the LNS-8 Live News Switcher consists of configuring dip switches, taking switches, and monitoring system activity through the CPU Link Device. The operation of the LNS-8 Live News Switcher also includes running diagnostics in the event of a system malfunction. The following topics are discussed in this section:

- LNS-8 Live News Switcher Configuration
- LNS-8 Live News Switcher Operation
- LNS-8 Control Panel Configuration
- LNS-8 Control Panel Operation
- LNS-8 Live News Switcher Diagnostic Tests
- Video Matrix Card Adjustments
- Audio Matrix Card Adjustments

3.2 LNS-8 Live News Switcher Configuration

The LNS-8 Live News Switcher is equipped with three 8-position DIP switches; one for configuration, one for preview bus inhibit, and one for program bus inhibit. The positions and settings of the these DIP switches are described in the following paragraphs.

Configuration Switch

The configuration dip switch is accessible through the rear panel of the LNS-8 Live News Switcher. This switch is used to configure the LNS-8 Live News Switcher and set its operational parameters. See Figure 3-1 for a detailed view of the configuration DIP switch.

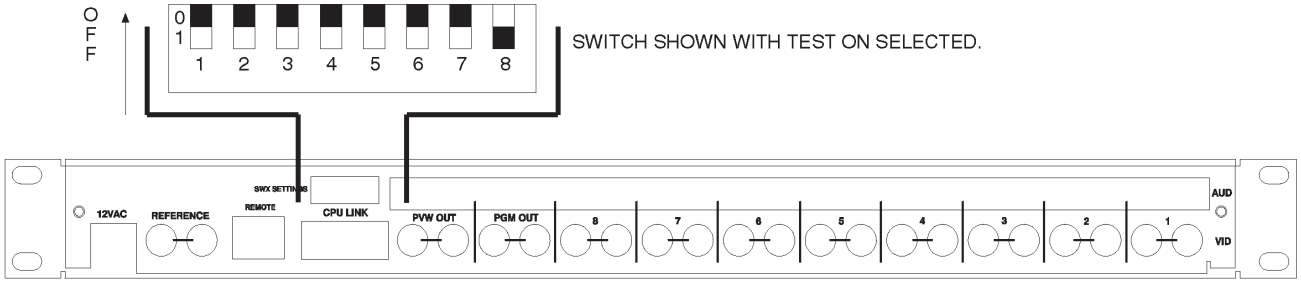


Figure 3-1 Configuration Switch Location and Detail

3.2 LNS-8 Live News Switcher Configuration Cont:

Configuration Switch Continued:

Position 1 - MASTER/SLAVE Select

OFF - The LNS-8 Live News Switcher is configured for master operation when the configuration switch Position 1 is OFF. The master LNS-8 Live News Switcher will control all panels and serial interfaces in a LNS-8 System (default mode).

ON - When Position 1 is ON the LNS-8 Live News Switcher is configured for slave operation. All LNS-8 Switchers configured for slave operation will take commands from the master router.

All systems must be configured with one and only one LNS-8 Live News Switcher configured to be the master. All serial control communications to the LNS-8 System must be input through the master unit's serial port connector. This switch is read only at power up. Subsequent changes in the switch are ignored.

Position 2 - Not Used

Position 3 - Not Used

Positions 4-6

Positions 4-6 of the configuration DIP switch control the addressing of the CPU link as follows:

POS
654

000 - Standard CPU link
001 - Multi-drop CPU link address #1
010 - Multi-drop CPU link address #2
011 - Multi-drop CPU link address #3
100 - Multi-drop CPU link address #4
101 - Multi-drop CPU link address #5
110 - Multi-drop CPU link address #6
111 - Standard CPU link address with Hayes Modem support

Position 7 - LOCK OVERRIDE

When on, switch request from CPU link override panel locks. Also used in Diagnostic Mode.

3.2 LNS-8 Live News Switcher Configuration Cont:

Configuration Switch Continued:

Position 8 - Test Select

OFF - The test mode is inactive when Position 8 is OFF.

ON - Test mode is active when Position 8 is ON. If position 7 is OFF, the test enters into its standard mode of operation. If position 7 is ON, then the test enters into the cycle test which cycles through all crosspoint connections and activates all panel LED's. Switches 7 and 8 are read only at power up. Subsequent changes in the switches are ignored until the next power cycle.

Inhibit Switches

NOTE: The audio card must be removed prior to selecting inhibit switch settings.

There are two DIP switches on the LNS-8 Video Matrix Card that inhibit certain inputs from being switched on the routing system.

Position #1 corresponds to input 1, #2 to input 2, etc. Turning the switch ON prevents the input from being switched to the output. The input cannot be switched from the control panel(s) or through the serial CPU link. There is one switch each for both the program (U21) and preview (U22) outputs.

NOTE: If all the switches are ON, Input 1 will be switched.

These switches are only read at power up. Changing the switch won't be recognized until the power is cycled on the LNS-8

3.3 LNS-8 Live News Switcher Operation

The LNS-8 Live News Switcher may be externally controlled and operated through the master router by the use of an external control device. The external control device is connected to the master LNS-8 Live News Switcher through the CPU Link Connector. The CPU Link Connector is a RS-232/422 serial connection port that utilizes standard PESA CPU link protocol. See Figure 3-2 for the location of the CPU Link Connector on the rear panel of the LNS-8 Live News Switcher.

3.3 LNS-8 Live News Switcher Operation Continued:

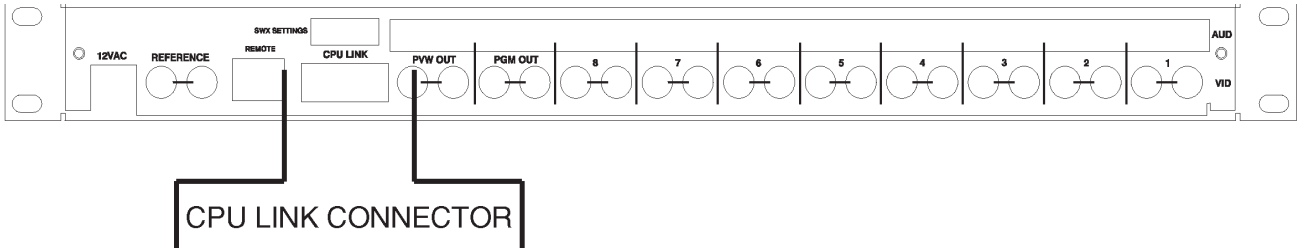


Figure 3-2 CPU Link Connector Location

Pinout

The serial communications is accessed through the 9-pin "D" connector on the back of the LNS-8 Video Matrix Card. The pinout is as follows:

RS-232

Pin 1 - Carrier Detect (Input to the LNS-8)
Pin 2 - RX (Input)
Pin 3 - TX (Output)
Pin 4 - DTR (Output)
Pin 5 - Ground
Pin 6 - DSR (Input)
Pin 7 - RTS (Output)
Pin 8 - CTS (Input)
Pin 9 - Ring Indicator (Grounded)

RS-422

Pin 1 - Ground
Pin 2 - RX+ (Input)
Pin 3 - TX- (Output)
Pin 4 - Ground
Pin 5 - Ground
Pin 6 - Ground
Pin 7 - RX- (Input)
Pin 8 - TX+ (Output)
Pin 9 - Ground

The selection of RS-232 or RS-422 is made by positioning the J3, J4, and J5 jumpers. RS-232 is active when J3 is connected to J4. RS-422 is active when jumper J4 is connected to J5.

3.3 LNS-8 Live News Switcher Operation Continued:

Message Format

The CPU link is a RS-232/422 serial interface. Data is transmitted bi-directionally at 9600 baud between the computer and the master LNS-8 Live News Switcher. The data stream consists of one start bit, eight data bits, and one stop bit. Parity is not used. The LNS-8 Live News Switcher does not utilize handshaking over the serial link. Response to the command indicates successful completion of the command.

CPU link messages are constructed in ASCII characters. The characters are standard 7 bit ASCII with the eighth bit (most significant bit) set to 0. The communications between the LNS-8 Live News Switcher and the external computer consist of a variable length buffer of characters containing the desired command, a string of data bytes, a checksum, and a terminator.

Message Format: **Command, <Data >, Checksum, Terminator**

There are no timing requirements on the transmission of characters into and out of the controller located on the video matrix card. The PESA controllers look for the termination characters in a message string and process all information that has been sent since the last terminator was received or since initialization of the CPU link communications port. This information is handled as one communications buffer.

Checksum Computation

The checksum is a number derived from each data byte for the purpose of verifying data transmission on both sides of the transmission link. A data stream being transmitted computes a checksum which is sent with the data and the termination characters. The receiving equipment generates a checksum from the received data and compares the two checksums. The checksum is calculated as follows:

1. Accumulatively add the bytes received from the CPU Link in an eight (8) bit register. Ignore any overflow (or carry). The result is an eight bit number. Save this number.

2. Create two ASCII characters for the checksum by dividing the saved number into two fields, the upper four bits and the lower four bits. Add 30 Hex to each 4-bit field. The upper four bits become the “TENS” digit; the lower four bits become the “ONES” digit. The checksum and the terminator characters are not included when adding the incoming data to compute a checksum.

3.3 LNS-8 Live News Switcher Operation Continued:

Checksum Computation Continued:

The locations now labeled “ONES” and “TENS” contain the ASCII checksum for the received data. When transmitting the checksum, the “TENS” digit is always transmitted first followed by the “ONES” digit.

Example Checksum Calculation

The command take input 5 to output 1 on a 1 level system is:
“H 0 0 1 0 0 5 6 > CR LF” where “6 >” is the checksum.
Checksum calculation first adds the value of the command characters:

‘H' 0x48	‘0’ 0x30
‘0’ 0x30	‘1’ 0x31
‘0’ 0x30	‘0’ 0x30
‘5’ 0x35	0x16e

The result has the 8 bit overflow masked out and is divided into upper and lower 4 bits. These values are then placed into the ASCII numeric range.

0x6 + 0x30 = 0x36 ‘6’
0xE + 0x30 = 0x3e ‘>’

Terminator

The terminator is comprised of an ASCII Carriage Return (CR) (Hex 0D) followed by an ASCII Line Feed (LF) (Hex 0A). When these two characters have been received in correct order, the controller initiates processing of the CPU link command.

Using Change Commands

The controller supports Change Router and Toggle Lock commands on the CPU Link. These commands when received by the controller are acknowledged with a reply. The replies are “G” (good), “E” (error), “L” (locked), and “N” (not allowed). The acknowledgment replies indicate only that the command was correctly or incorrectly received, NOT whether the actual switch was successful.

3.3 LNS-8 Live News Switcher Operation Continued:

Using Change Commands Continued:

When the controller receives a command to change the router, it acknowledges the command received from the computer. The act of the switch taking place may not be available until a number of vertical intervals of the video signal have passed. The controller cannot interrogate the router during the time between loading the preset registers and the next vertical interval. For this reason, the controller cannot respond immediately with a current status to the external computer.

NOTE: Router status is sent to the external computer only in response to a router status request. To determine if a change router command has properly executed, the external computer must wait for the switch at least 96 milliseconds before requesting status.

Command Descriptions

Several abbreviations are used in the following discussions to signify the different portions of the communications buffers. Refer to the following Table for a list of the abbreviations and the length of field for each buffer.

TERM	LENGTH*	DESCRIPTION
Lx	3	Level #x Input number
OUT	3	Output number
SLV	2	Salvo group number
CS	2	Checksum
@	2	Termination characters (cr/lf)
S	1	Denotes router function

*Length = number of ASCII characters in buffer.

(H) Change Router

This command is used to make a switch in the switching matrix.

Command:
H OUT L1 L2 L3 CS @

The length of the buffer is dependent on the number of configured switching levels. All levels configured must be specified in the command buffer. For break-away switching, specify a NULL input (000) on levels on which no switch is needed.

3.3 LNS-8 Live News Switcher Operation Continued:

Command Descriptions Continued:

Response:
G - command accepted and performed
N - Invalid Output Number
L - Output was locked
E - Transmission error

(J) Display Router Status (no error information)

This command tells the swatter to send the current input/output status of the switching matrix.

Command:
J CS @

Response:
E - Transmission error

L1 L2 L3 L1 L2 L3 CS @

The first group of inputs correspond to output 1 of the router, the second group to output 2, etc. The length of each group of level status depends on the number of switching levels configured in the controller. The length of the buffer depends on the total number of outputs configured in the routing switching system. It is the responsibility of the requester to count the bytes and determine which bytes represent each switching level input for each output.

(L) Change Lock

This command is used to toggle the lock status of a specified output. If the specified output is already locked, receiving this command unlocks it. If the output is unlocked, receiving this command will lock the output.

Command:
L S OUT CS @

Response:
G - Command accepted and performed
N - Invalid Output Number
E - Transmission error

3.3 LNS-8 Live News Switcher Operation Continued:

Command Descriptions Continued:

(W) Display Lock Status

This command is used to find out which outputs are locked.

Command:
W CS @

Response:
E - Transmission error

X X CS @

Where the lock/unlock/protect status display, “X” denotes:
0 - Output is unlocked
1 - Output is Locked

The displayed first byte denotes output 1 and the second denotes output 2.

(Y) Send Router Status (Single Output)

This command allows the computer to interrogate the LNS-8 controller and obtain the status of an individual output. The format for the command is:

Command:
Y OUT CS @

Response:
E - Transmission error
N - Invalid Output

OUT STAT L1 L2 L3 CS @

The STAT field is a means of maintaining compatibility with standard PESA CPU link protocol. In the case of the LNS-8 Live News Switcher, the STAT field contains no information. (The STAT field is two bytes in length.)

Restrictions:
This command always sends a minimum of two levels of information. (One level systems can disregard the second level data.)

3.4 GVG Compatible Protocol

The LNS-8 Live News Switcher accepts the GVG Ten-XL series ASCII Protocol at 9600 Baud.

The LNS-8 Live News Switcher decodes the address in the Ten-XL command. The LNS-8 Live News Switcher responds to the command using output 1 (Program) if the decoded address is equal to the LNS-8 Live News Switcher CPU address x 2. The LNS-8 Live News Switcher responds to the command using output 2 (Preview) if the decoded address is equal to the LNS-8 Live News Switcher CPU address x 2 +1.

The GVG TEN-XL commands accepted are:
The status command returns the status for the specified output.

Status Command

Start Transmission	STX	(02H)
Address MSD	'0'-'9'	(30H-39H)
Address LSD	'0'-'9'	(30H-39H)
Enquiry	ENQ	(05H)

LNS-8 Live News Switcher Response

Video XPT Status	'0'-'7'	(30H-37H)
Audio XPT Status *	'0'-'7'	(30H-37H)
P.S. Status	'3'	(33H)

Switch command takes the specified switch in the next field after the command is received.

Switch Command

Start Transmission	STX	(02H)
Address MSD	'0'-'9'	(30H-39H)
Address LSD	'0'-'9'	(30H-39H)
Desired Video XPT	'0'-'7'	(30H-37H)
Desired Audio XPT **	'0'-'7'	(30H-37H)

LNS-8 Live News Switcher Response

Video XPT Status	'0'-'7'	(30H-37H)
Audio XPT Status *	'0'-'7'	(30H-37H)
P.S. Status	'3'	(33H)

* Audio XPT status returns status for the second level of control (A1). It does not return status for the A2 level.
** The desired audio crosspoint is taken for both levels of audio on the router.

3.5 LNS-8 Control Panel Configuration

The LNS-8 Live News Switcher can communicate with up to four LNS-8 Control Panels. The LNS-8 Control Panels are designed to allow for full access of the LNS-8 Live News Switcher from each panel. Each LNS-8 Control Panel is operationally identical.

Figure 3-3 LNS-8 Control Panel Switch Locations

Addressing (S28 and S29)

Each of the four panels requires a unique address chosen from 1-8. On the back of the panel there is a DIP switch to indicate panel address. To address a panel simply turn on the DIP switch corresponding to the panel address (i.e. DIP Switch 1 for address 1, DIP switch 2 for address 2., etc.) **NOTE:** Only one DIP switch can be active at any time for proper panel operation.

Singlebus Operation (S27)

Any of the LNS-8 Control Panels can be set for singlebus operation.

By setting position 2 of the auxiliary DIP switch to ON, the panel is set to singlebus operation. The panel then controls only one output of the LNS-8 Live News Switcher.

In this mode, only the top row of keys on the panel operate. The output being controlled is set by position #1 of the auxiliary DIP switch. When position #1 is OFF, the panel is controlling output 1(Program). When position #1 is ON, the panel is controlling output 2 (Preview).

3.6 LNS-8 Control Panel Operation

The LNS-8 Control Panel has 26 keys divided into two rows with identical operation per output. The top row of keys controls the program output and the bottom row of keys controls the preview output. The keys are divided into the following user functionality:

3.6 LNS-8 Control Panel Operation Continued:

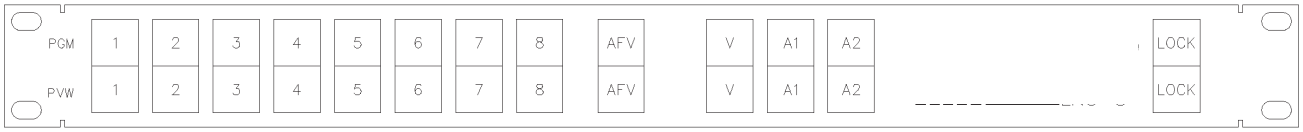


Figure 3-4 LNS-8 Control Panel Front View

Level Selection Keys (AFV, V, A1, A2)

These keys are used to determine the levels of control that each panel currently switches and for which the panel displays status. There are two modes for the levels keys: All Levels and Breakaway.

- All Level mode switches and statuses all levels. AFV switch is illuminated. V, A1, A2 keys are not illuminated in the All Level mode. All switches occur on all levels of control.

- Breakaway mode allows one or two levels to be active at any one time. Router status and switch requests affect only these levels. If all three levels are active, then the panel is not in breakaway but is in All Level mode. In breakaway mode, active level keys are illuminated.

- In configurations with only video configured, level selection keys are inactive. (The panel is always in All Level mode controlling one level.)

- Operation of the level keys is independent of the other keys.

LOCK Key

The LOCK Key indicates the lock status of the assigned output. If the key is lit, the output is locked and cannot be switched to a different input. If the key is not illuminated, the output is available for switching. Pressing the LOCK Key causes the lock state to toggle for the active output.

Source Keys

Source keys allow the user to make actual switches on the LNS-8 Live News Switcher. Pressing a source key causes a switch to be taken on the active output for the active levels if the output is unlocked.

Only one source key is continuously illuminated at any one time. It will reflect the status of the highest active level in the LNS-8 Live News Switching System. (Video in All Level mode). When more than one level is selected (All Levels or multiple breakaway) and the status of the lower levels do not match that of the highest level, the source keys corresponding to the status of the lower levels blink.

3.7 LNS-8 Live News Switcher Diagnostic Tests

The LNS-8 Live News Switcher is equipped with factory diagnostics which are used to test system functionality. These tests are run through text menu driven out of the CPU link port. Actual test decriptions are beyond the scope of this manual.

3.8 Video Matrix Card Adjustment

Though the LNS-8 Video Matrix Card is tested and adjusted before shipment from the factory readjustment may be necessary when parts are replaced or equipment configuration changes. To properly test and adjust a Video Matrix Card the following test equipment or equivalent test equipment is needed:

Digital Multimeter
Oscilloscope
High Frequency Generator
75 Ohm Termination
Network Analyzer
Sweeping Generator (with low frequency markers)
Waveform Monitor

Voltage (R29)

The voltage adjustment provides a means of adjusting the output of LNS-8 Video Matrix Card's voltage regulators. To make the voltage adjustment take the following steps:

1. Connect the digital multimeter between TP1 (+5.0V) and TP3 (Ground).

2. Set the multimeter to a range of at least 10 volts DC.

3. Adjust R29 until a +5.0V DC ±0.1V DC reading is obtained on the multimeter.

4. Disconnect the multimeter from TP1 (+5.0V) and connect it to TP2 (-5.0V). Leave the ground lead connected.

5. Verify a multimeter reading of -5.0V DC ±0.1V DC.

6. Disconnect the multimeter.

3.8 Video Matrix Card Adjustment Continued:

Gain (R106 and R114)

The gain adjustment enables the customer to adjust the level of the output signal to match the level of the input signal (unity gain). To adjust the gain of each video output (Program and Preview) take the following steps:

1. Adjust the sweep generator for a 0.7V p-p markers at 50KHz into a 75 ohm load.

2. Remove the 75 ohm load from sweep generator's output and connect the sweep generator to one of the LNS-8 Live News Switcher's video input connectors.

3. Switch the test video input to the Preview video output.

4. Connect the oscilloscope to the Preview video output and terminate into 75 ohms.

5. Adjust R106 for a 0.7V p-p display at 50KHz on the oscilloscope.

6. Disconnect the oscilloscope from the Preview video output and connect it to the Progrom video output . Terminate the output into 75 ohms.

7. Switch the test video input to the Program video output.

8. Adjust R114 for a 0.7V p-p display at 50KHz on the oscilloscope.

9. Disconnect all test equipment.

Equalization (R98 and R102)

To adjust the equalization of each of the Video Matrix Card's outputs take the following steps:

1. Connect the desired output cable (maximum cable length is 150 feet) to the LNS-8 Live News Switcher's Preview video output.

2. Connect the waveform monitor (or calibrated oscilloscope) to the far end of the output cable connected to the Preview video output. Terminate the output cable with 75 ohms.

3.8 Video Matrix Card Adjustment Continued:

Equalization (R98 and R102) Continued:

4. Adjust the sweep generator for a 20MHz sweep at 1V p-p amplitude and set the low frequency timing markers for 1MHz intervals at 1V p-p amplitude.

5. Connect the sweep generator to one of the LNS-8 Switcher's video inputs using the shortest cable possible.

6. Switch the video test input to the Preview video output.

7. Adjust R98 for the best signal quality on the waveform monitor (or calibrated oscilloscope). The adjustment of R98 should be made for least amount of signal roll-off or an even amplitude throughout the sweep. Use the low frequency timing markers as an amplitude guide.

8. Disconnect the waveform monitor and the 75 ohm termination.

9. Connect the desired output cable to the LNS-8 Switcher's Program video output.

10. Connect the waveform monitor (or calibrated oscilloscope) to the far end of the output cable connected to the Program video output. Terminate the output cable with 75 ohms.

11. Switch the video test input to the Program video output.

12. Adjust R102 for the best signal quality on the waveform monitor (or calibrated oscilloscope). The adjustment of R102 should be made for least amount of signal roll-off or an even amplitude throughout the sweep. Use the low frequency timing markers as an amplitude guide.

13. Disconnect all test equipment.

High Frequency (R97 and R101)

To adjust the high frequency response of each of the video outputs take the following steps:

1. Adjust the high frequency generator for a 0.7V p-p output at 150MHz into a 75 ohm load.

3.8 Video Matrix Card Adjustment Continued:

High Frequency (R97 and R101) Continued:

2. Remove the 75 ohm load from video generator's output and connect the video generator to one of the LNS-8 Live News Switcher's video input connectors.

3. Switch the test video input to the Preview video output number.

4. Connect the network analyzer to the Preview video output and terminate into 75 ohms.

5. Adjust R97 for the best overall reading (display) on the network analyzer. R97 should be adjusted for a balance between the best amplitude and the least amount of distortion.

6. Disconnect the network analyzer from the Preview video output and connect it to the Program video output. Terminate the output into 75 ohms.

7. Switch the test video input to the Program video output.

8. Adjust R101 for the best overall reading (display) on the network analyzer. R101 should be adjusted for a balance between the best amplitude and the least amount of distortion.

9. Disconnect all test equipment.

3.9 LNS-8 Audio Matrix Card Adjustment

Though the LNS-8 Audio Matrix Card is tested and adjusted before shipment from the factory readjustment may be necessary when parts are replaced or equipment configuration changes. To properly test and adjust the LNS-8 Audio Matrix Card the following test equipment or equivalent test equipment is needed:

Audio Generator
Audio Distortion Analyzer

3.9 LNS-8 Audio Matrix Card Adjustment Continued:

Preview Audio Outputs CMRR (R39 and R40)

The common mode rejection ratio (CMRR) adjustments provide a means to eliminate unwanted noise and hum on the audio matrix card's Preview outputs. The CMRR adjustment consists of adjusting both R39 (Preview Output 1) and R40 (Preview Output 2) for a null (lowest) reading. To adjust the CMRR take the following steps:

1. Short the high side of one of the LNS-8 Live News Switcher's audio inputs to the low side of the same input.
2. Connect the audio generator to the audio analyzer.
3. Adjust the audio generator for a 14V RMS (20V P-P) maximum signal at 60Hz on the audio analyzer.
4. Disconnect the audio generator from the audio analyzer.
5. Connect the high side of the audio generator's output to the short between the LNS-8 Live News Switcher's selected audio input high and low. Connect the low side of audio generator's output to ground.
6. Connect the audio distortion analyzer to the Preview audio output 1.
7. Switch the selected audio input to the Preview audio output 1.
8. Adjust R39 (Preview Output 1) for a null (lowest) reading on the audio distortion analyzer.
9. Disconnect the audio distortion analyzer from the Preview audio output 1.
10. Connect the audio distortion analyzer to the Preview audio output 2.
11. Switch the selected audio input to the Preview audio output 2.
12. Adjust R40 (Preview Output 2) for a null (lowest) reading on the audio distortion analyzer.
13. Disconnect all test equipment and remove the input short.

3.9 LNS-8 Audio Matrix Card Adjustment Continued:

Program Audio Outputs CMRR (R37 and R38)

The common mode rejection ratio (CMRR) adjustments provide a means to eliminate unwanted noise and hum on the audio matrix card's Program outputs. The CMRR adjustment consists of adjusting both R37 (Program Output 1) and R38 (Program Output 2) for a null (lowest) reading. To adjust the CMRR take the following steps:

1. Short the high side of one of the LNS-8 Live News Switcher's audio inputs to the low side of the same input.

2. Connect the audio generator to the audio analyzer.

3. Adjust the audio generator for a 14V RMS (20V P-P) maximum signal at 60Hz on the audio analyzer.

4. Disconnect the audio generator from the audio analyzer.

5. Connect the high side of the audio generator's output to the short between the LNS-8 Live News Switcher's selected audio input high and low. Connect the low side of audio generator's output to ground.

6. Connect the audio distortion analyzer to the Program audio output 1.

7. Switch the selected audio input to the Program audio output 1.

8. Adjust R37 (Program Output 1) for a null (lowest) reading on the audio distortion analyzer.

9. Disconnect the audio distortion analyzer from the Program audio output 1.

10. Connect the audio distortion analyzer to the Program audio output 2.

11. Switch the selected audio input to the Program audio output 2.

12. Adjust R38 (Program Output 2) for a null (lowest) reading on the audio distortion analyzer.

13. Disconnect all test equipment and remove the input short.

4.1 Introduction

This section contains the functional descriptions of the Video Matrix Card, the Analog Matrix Card, and the Control Panel Card. This manual section is divided into the following major topics:

- Control Panel Switchcard
- Video Matrix Card
- Audio Matrix Card

4.2 Control Panel Switchcard

The circuits on the Control Panel Switchcard consist of the power, communications, mode decoder, switch scanner, and LED driver circuits. These circuits are described in the following paragraphs.

Power

The power circuits on the Control Panel Switchcard consist of U1, U2, and their associated components. U1 is responsible for providing +6VDC to the circuits on the switchcard and U2 is responsible for providing +6VDC to the LEDs on the switchcard.

Communication

The communication circuits on the Control Panel Switchcard are comprised of U10, U11, and their associated components. U11 (quad line receiver) is responsible for decoding the command and control information transmitted from the control and microprocessors circuits on the Video Matrix Card. U10 is responsible for driving the communication line back to the Video Matrix Card. The communication line back to the Video Matrix Card carries switch information from the switchcard. U5 (serial to parallel converter) then converts the serial data received from the communications circuits to parallel data for use by the switchcard.

Address Decoder

The address decoder circuit on the Control Panel Switchcard is comprised of U4, U5, and their associated components. U4 latches the panel address and S28 and S29 are used to select the desired panel address.

4.2 Control Panel Switchcard Continued:

Switch Scanner

The switch and switch scanner circuits on the Control Panel Switchcard are composed of U3, U6, U8, and U9 (8-bit shift registers) and switches S1 through S27. U3, U6, U8, and U9 are capable scanning eight switches each. U6, U8, U9 scan eight push-button switcher each and U3 scans two push-button switches plus the settings of the four position dip-switch (S27). S27 is utilized to set the control panel's auxiliary mode. When a switch is depressed or a position switched on (S27) the scan line correlating to the depressed switch is forced low. When the panel is scanned by the master frame the information is sent back to the controller.

LED Driver

The LED driver on the Control Panel Card is composed of U7, the LEDs contain in switches S1 through S26, and their associated components. U7 receives LED display information from the master controller. U6 is capable of driving 34 LEDs but currently is responsible for driving 26 LEDs.

4.3 Video Matrix Card

The circuits on the Video Matrix Card consist of the power, communication, CPU link, microprocessor, matrix (crosspoint) control, reference, input, and output circuits. The following paragraphs contain descriptions of each of these circuits. Since the input circuits are repeated eight times and the output circuits are repeated twice only one of each of these circuits will be discussed.

Power

The power supply circuit on the Video Matrix Card consists of Q1, U20, and their associated components. The input voltage is rectified by a full-wave rectifier bridge consisting of diodes D12 - D14. U20 and its associated components function as a switching power supply. Adjustment of the output of the switching power circuits is provided by adjustable resistor R29. LED1, a light emitting diode, provides a visible means of monitoring the health of the power supply circuits and the ±5VDC output voltages. The output voltages from the power supply are ±5VDC and ±20VDC. The power supply circuit provides the operational voltages for the Video Matrix Card and Audio Matrix Card.

4.3 Video Matrix Card Continued:

Communication

The control panel communication circuit on the Video Matrix Card is comprised of U4-U7 and their associated components. U4-U6 function as RS485 transceivers and U7 functions as a RS485 RX/TX port controller. All communications to and from the control panels and to slave matrix frames pass through this communications network including all communications to the local control panel if installed.

CPU Link

The CPU link circuit on the Video Matrix Card is designed to function either as a RS232 or RS422 communications buss dependent upon the position of J3-J5 jumper. If the jumper is in positions J3/J4 the CPU link functions as a RS232 buss with U19 controlling and decoding communications over the CPU link. If the jumper is in positions J4/J5 the CPU link functions as a RS422 buss with U23 controlling and decoding communications over the CPU link.

Microprocessor

The microprocessor circuit on the Video Matrix Board is responsible for all microprocessing and control functions. The microprocessor, U2, is responsible for the control of all communications lines, the CPU link, and the video and audio crosspoints. Power-on reset for the microprocessor is provided by U1 (microprocessor supervisor) and the SYSCLK is provided by U3 (a 7.3728MHz crystal). The microprocessor circuit is also responsible for reading the settings of the program inhibit (U21), preset inhibit (U22), and configuration (U32) dip-switches. U17, U18, and U16 read the settings of the dip-switches and latch the switch setting information onto the SW_OUT buss. The SW_OUT bus is then read by U2 and acted on accordingly.

Matrix Control

Control of the video matrix on the Video Matrix Card and control of the audio matrix on the Audio Matrix Card is provided by U12 through U15 on the Video Matrix Card. U8 (a serial to parallel converter) decodes the communication from the microprocessor circuit and relays switch command to U12 through U15. U12 and U13 (eight bit shift registers) control the switching of the audio matrix on the Audio Matrix Board. U14 and U15 (eight bit shift register) control the switching of the video matrix on the Video Matrix Card.

4.3 Video Matrix Card Continued:

Reference

The reference circuit (sync circuit) on the Video Matrix Card provides the vertical sync signal to the control circuits. The reference circuit consists of Q4, U33, and their associated components. When a reference signal (either a composite video or sync signal) U33, a video sync separator, separates the vertical sync signal from the composite video signal or in the case of vertical sync input passes the signal. The V SYNC output of U33 is used by the control and switching circuits on the Video Matrix Card to determine when switches will occur.

Input

The input circuits on the Video Matrix Card are repeated eight times forming two 8X2 input matrixes. Each input circuit is responsible for buffering and the crosspoint control of eight inputs. The input circuits consists of eight input buffers and two 4X1 crosspoints. The input buffers condition the video input signals and transmit the video signals to the 4X1 crosspoints.

8X1 Matrix

The 8X1 matrix circuits on the Video Matrix Card are repeated twice so only one set of output circuits will be described. Each 8X1 matrix circuit consists of two 4X1 video crosspoints and an output buffer. The video crosspoint is responsible for selection of the video signal passed onto the video output amplifier dependent upon the state of video crosspoint control lines. The output buffer selects which 4X1 crosspoint drives the output amplifier.

Program Output Amplifier

The program output amplifier circuit on the Video Matrix Card consists of U35 and its associated circuits. R101, R102, and R114 provide the means to adjust the high frequency response, equalization, and gain of the program output amplifier respectively. U35 is responsible for driving the video output lines. The video outputs are designed to operate into a 75 ohm termination.

4.3 Video Matrix Card Continued:

Preset Output Amplifier

The preset output amplifier circuit on the Video Matrix Card consists of U34 and its associated circuits. R97, R98, and R106 provide the means to adjust the high frequency response, equalization, and gain of the preset output amplifier respectively. U34 is responsible for driving the video output lines. The video outputs are designed to operate into a 75 ohm termination.

4.4 Audio Matrix Card

The circuits on the Audio Matrix Card consist of the power, input, and output circuits. The input circuits are repeated sixteen times and output circuits are repeated four so only one of each type of circuit will be discussed.

Power

The power circuits on the Audio Matrix Card are comprised of U1, U6, and their associated components. U1 is responsible for providing +19VDC to the input and output circuits on the Analog Audio Matrix Card. U6 is responsible for providing -19VDC to the input and output circuits.

Matrix

The audio matrix circuits on the Analog Audio Matrix Card are repeated four times so only one input circuit will be discussed. The audio input lines are coupled directly into a 8X1 differential multiplexer. Each 8X1 differential multiplexer is responsible for the control and switching of eight audio inputs to the audio output circuits on the Audio Matrix Card. The switching of the audio input to the audio output is dependent upon the control and switching information sent to the Audio Matrix Card from the Video Matrix Card.

4.4 Audio Matrix Card Continued:

Output

The audio output circuits on the Audio Matrix Cards are repeated four times so only one output circuit will be discussed. The audio output circuit is comprised of an balanced input, amplifier, and a differential line driver. The selected audio signal is coupled to two stages of quad operational amplifier. These two stages of quad operational amplifier form a balanced input to the third stage of the quad operational amplifier and function at unity gain. The third stage of quad operational amplifier amplifies the audio signal which is then coupled to the output differential amplifier. A variable resistor enables the adjustment of the output circuit for the best common mode rejection. The fourth stage of quad operational amplifier inverts the input to one of dual audio output amplifiers forming a balanced audio output. The dual audio output amplifiers are responsible for driving one output line in the balanced pair of audio output lines.

5.1 Maintenance

The LNS-8 Live News Switcher and the LNS-8 Control Panel and their associated circuit cards are designed and manufactured to give long, trouble free service with minimum maintenance requirements. If problems do occur, follow the troubleshooting procedure provided in this section. If additional technical assistance is required, refer to the General Assistance and Service information in the front of the manual. Section 6 contains component layout drawings and schematics for assistance in trouble-shooting and Section 7 contains the lists of replacement parts for repairing the LNS-8 Live News Switcher and the LNS-8 Control Panel and their associated circuit cards.

NOTICE

THIS EQUIPMENT CONTAINS STATIC SENSITIVE DEVICES. IT IS RECOMMENDED THAT A GROUNDED WRIST STRAP AND MAT BE USED WHILE MAKING REPAIRS OR ADJUSTMENTS.

5.2 Preventive Maintenance

Use the following guidelines for general preventive maintenance:

- Keep the inside of the equipment items clean, especially if your facility is subject to dust or dirt in the atmosphere. Use compressed air, an antistatic cloth, or a gentle vacuum to clean the frame and internal components.

- Observe proper procedures for preventing electrostatic discharge when cleaning the units, and when inserting and removing cards. Ensure that all tools and personnel handling individual components are properly grounded.

- If a problem is suspected with an individual circuit card, first swap out the card and recheck the system for the problem. If the problem can be isolated on the card itself, and your facility is equipped for component level repair, proceed with repairs using the schematics provided in Section 6 of this manual.

5.3 Test Equipment

The test equipment recommended for servicing the LNS-8 Live News Switcher and the LNS-8 Control Panel and their associated circuit cards is listed below. Equivalent test equipment may be used.

Digital Multimeter
Audio Generator
Video Generator
Oscilloscope
75 Ohm Termination
Audio Distortion Analyzer
Video Network Analyzer
Sweeping Generator
Waveform Monitor

5.4 Corrective Maintenance

The following paragraphs provide information to assist the servicing technician in maintenance of the LNS-8 Live News Switcher and the LNS-8 Control Panel and their associated circuit cards.

Factory Repair Service

If desired, equipment or boards may be returned to the factory (transportation prepaid) for repair. Refer to the General Assistance and Service information sheet in the front of this manual. Call the PESA Service Department for a RMA number before shipping an equipment item.

Note: Pack the equipment securely and label with the correct address. Proper packaging saves money. The small amount of extra care and time it takes to cushion a part or unit properly may prevent costly damage while in transit. Make certain that the address is both legible and complete. Failure to do so often results in delay or even loss.

5.4 Corrective Maintenance Continued:

Troubleshooting

The best troubleshooting tool is a familiarity with the equipment and a thorough understanding of its operation. Before troubleshooting the LNS-8 Live News Switcher or the LNS-8 Control Panel or their associated circuit cards review sections 3 and 4 of this manual. Use the functional descriptions, adjustment procedures, test procedures, and diagnostics to quickly locate problems.

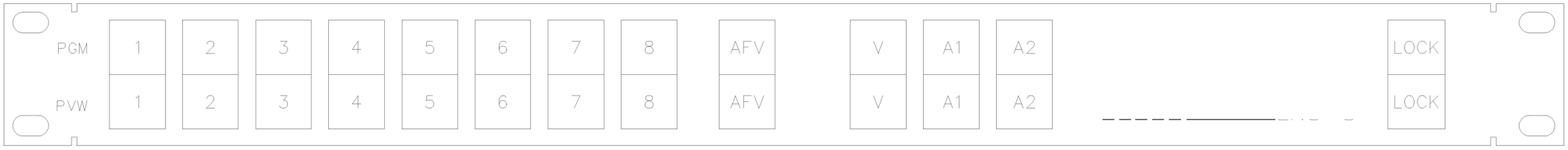
Replacement Parts

Only parts of the highest quality have been used in the design and manufacture of the LNS-8 Live News Switcher and the LNS-8 Control Panel and their associated circuit cards. If the inherent stability and reliability are to be maintained, replacement parts must be of the same quality. A replacement parts list is provided in Section 7 of this manual. When replacing parts, avoid using excessive solder on the printed circuit board. Always make sure that the solder does not short two circuits together. Be sure the replacement part is identical to the original, and is placed in exactly the same position with same lead lengths (where applicable).

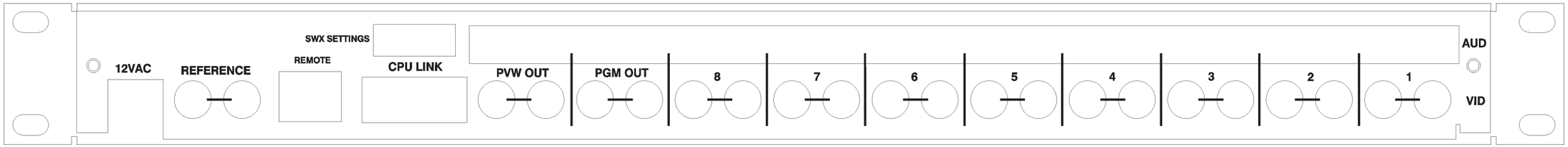
6.1 Schematics

General

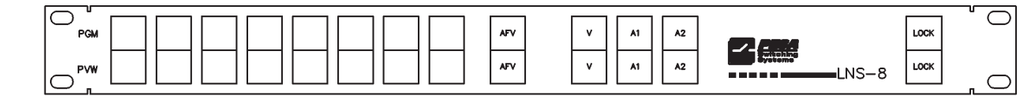
This section contains the schematic diagrams and parts location diagrams for the LNS-8 Live News Switcher . Please refer to this section when troubleshooting the equipment or replacing defective parts.



LNS-8 Live News Switcher (Front View)



LNS-8 Live News Switcher (Rear View)

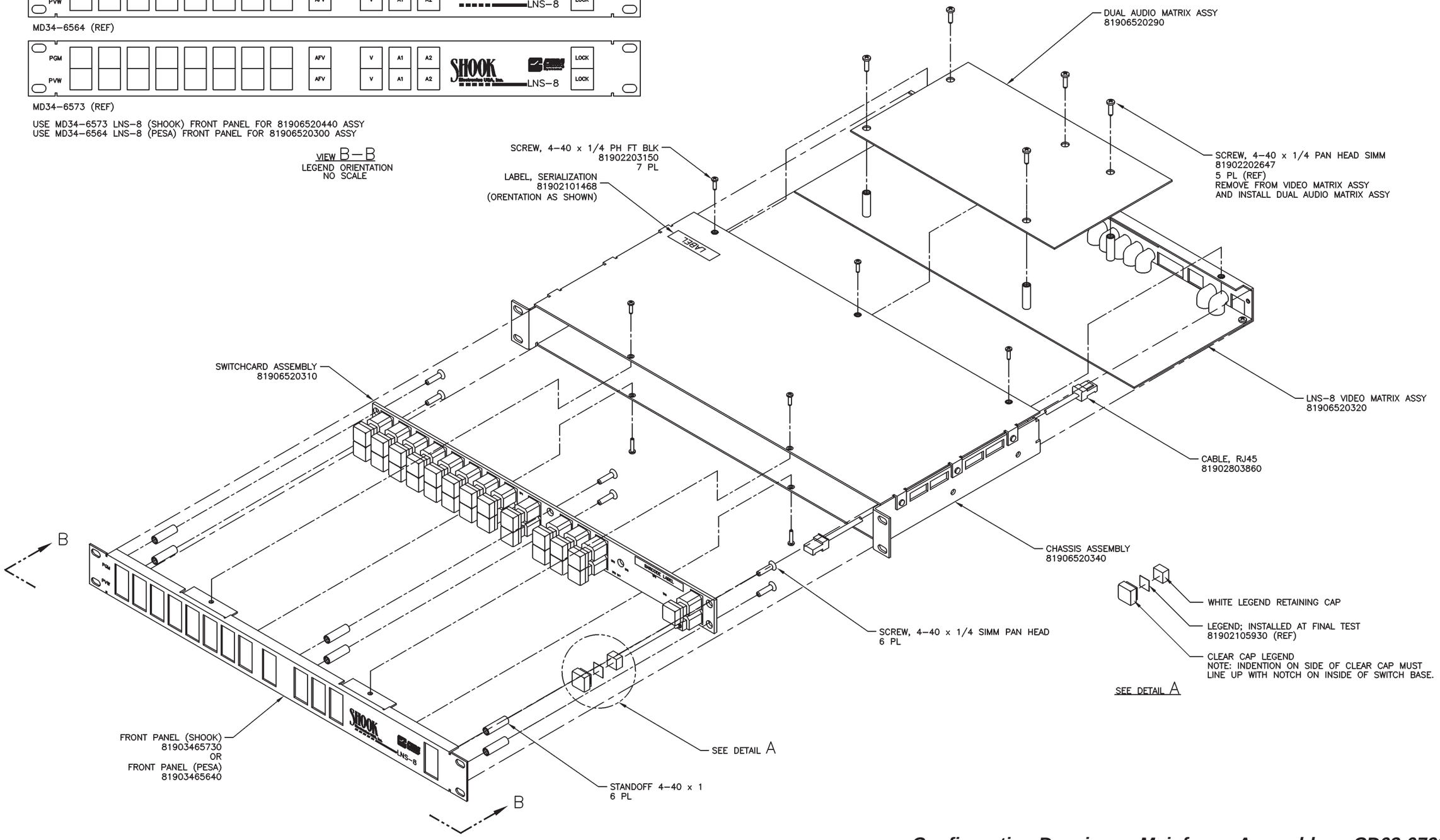


MD34-6564 (REF)

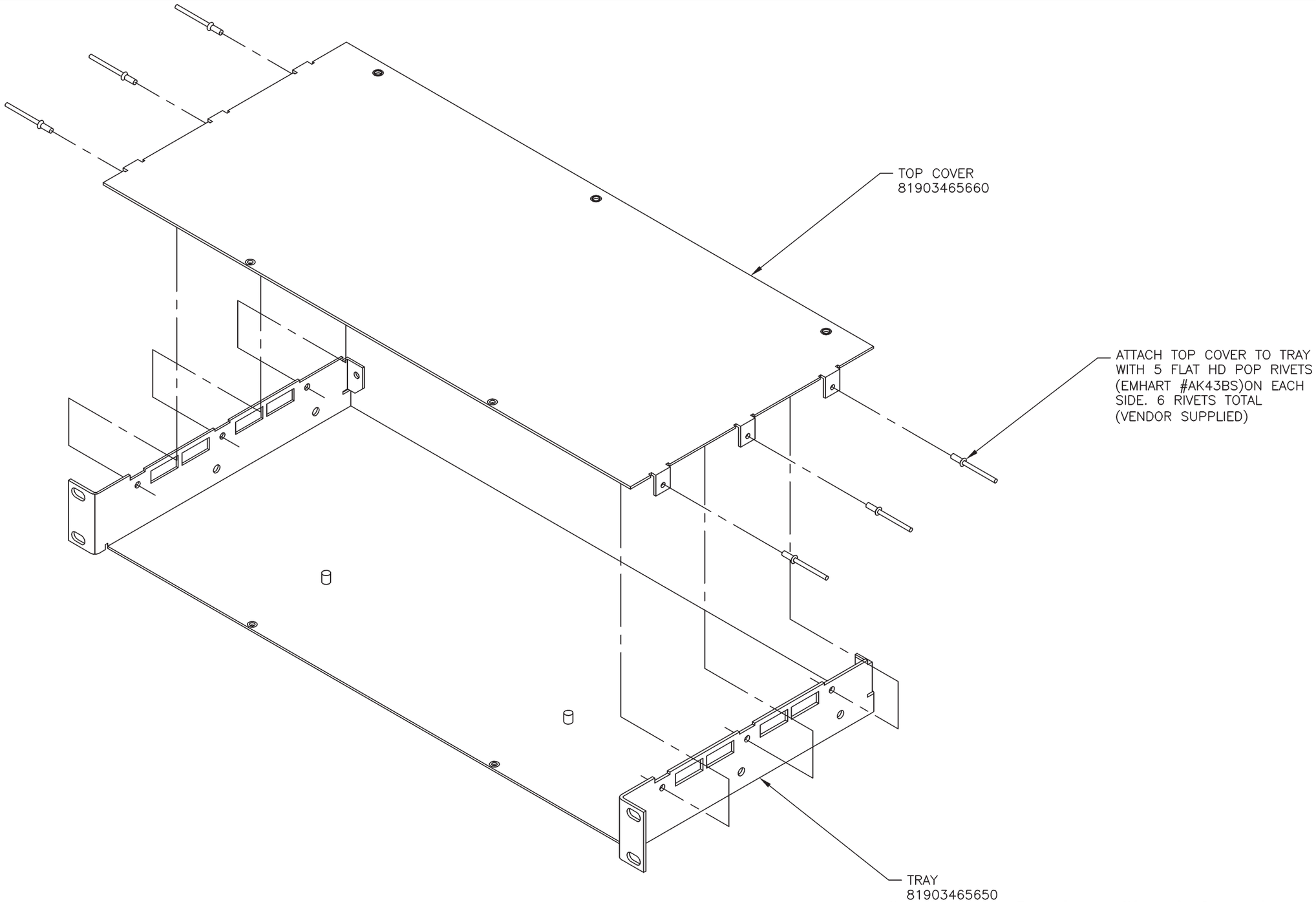
MD34-6573 (REF)

USE MD34-6573 LNS-8 (SHOOK) FRONT PANEL FOR 81906520440 ASSY
USE MD34-6564 LNS-8 (PESA) FRONT PANEL FOR 81906520300 ASSY

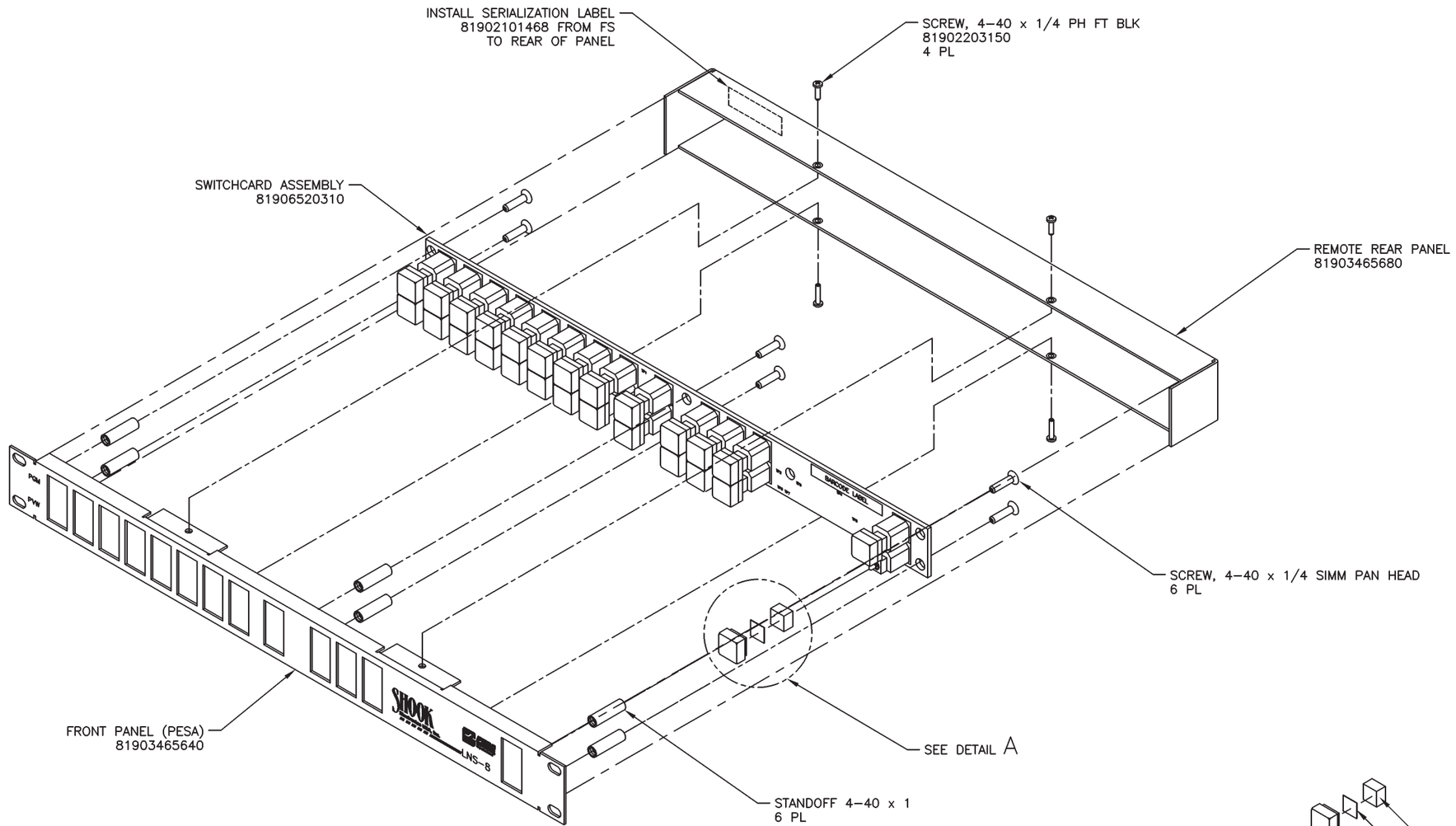
VIEW B-B
LEGEND ORIENTATION
NO SCALE

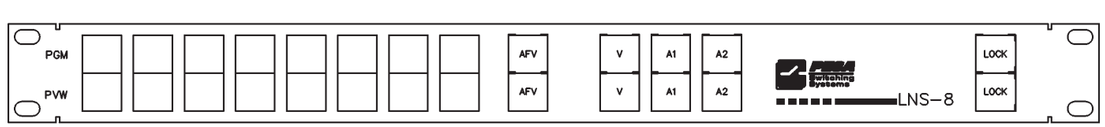


Configuration Drawing • Mainframe Assembly • CD63-0792

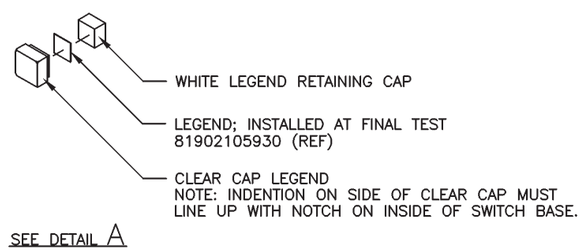


Configuration Drawing • Chassis Assemby • CD63-0794



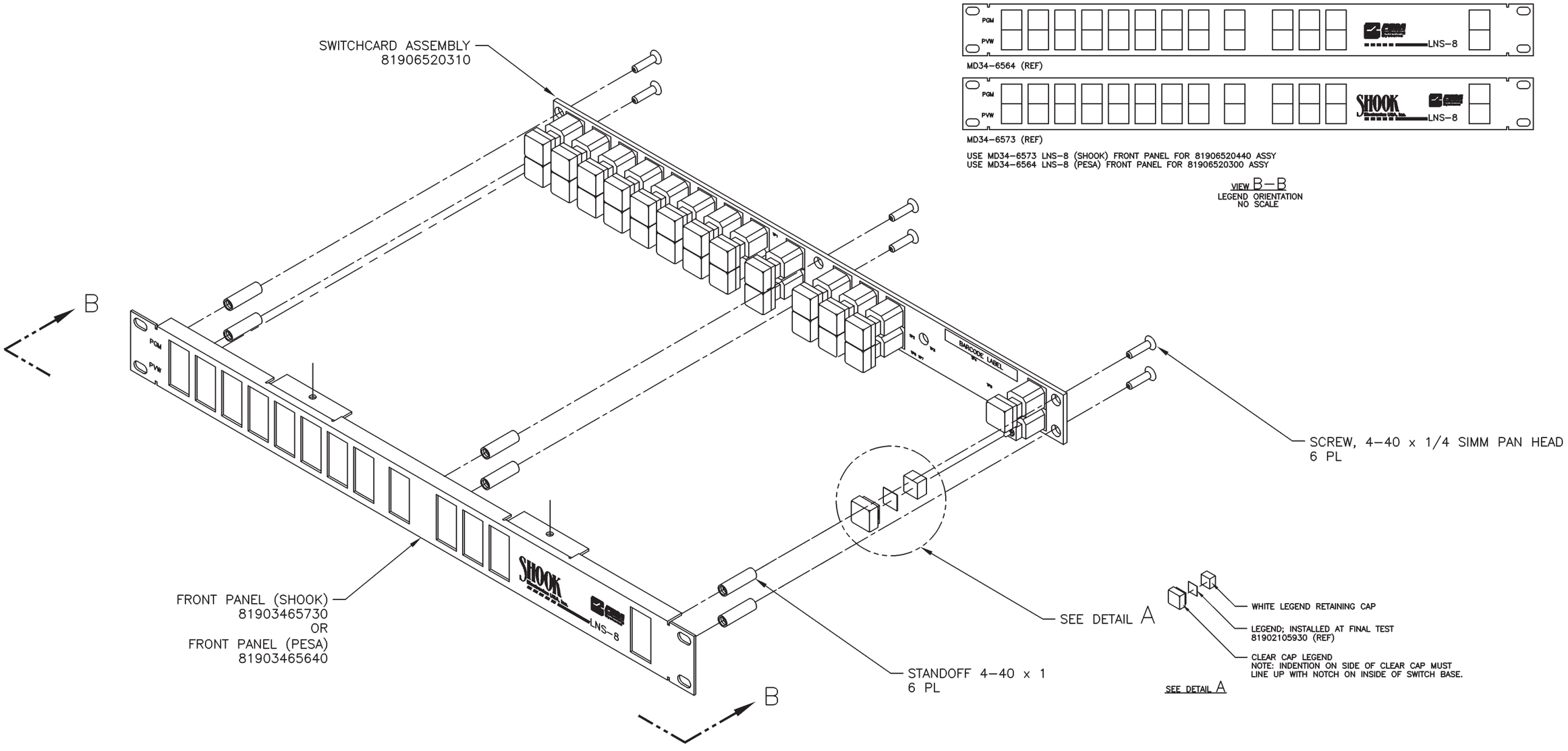


LEGEND ORIENTATION
NO SCALE

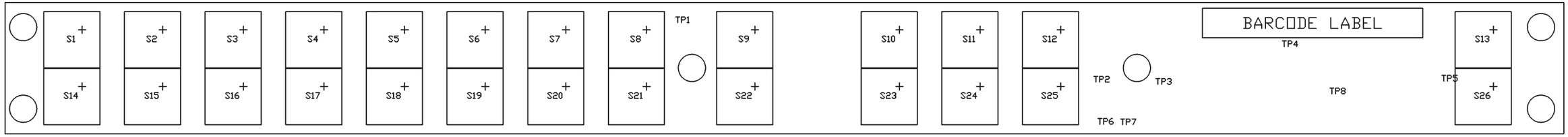


SEE DETAIL A

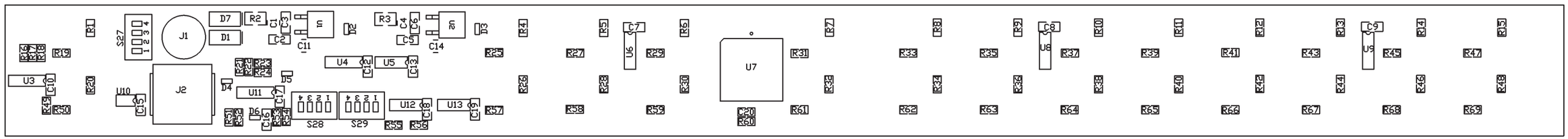
Configuration Drawing • LNS-8 Remote Control Panel • CD63-0795



Configuration Drawing • LNS-8 Local Control Panel • CD63-0793

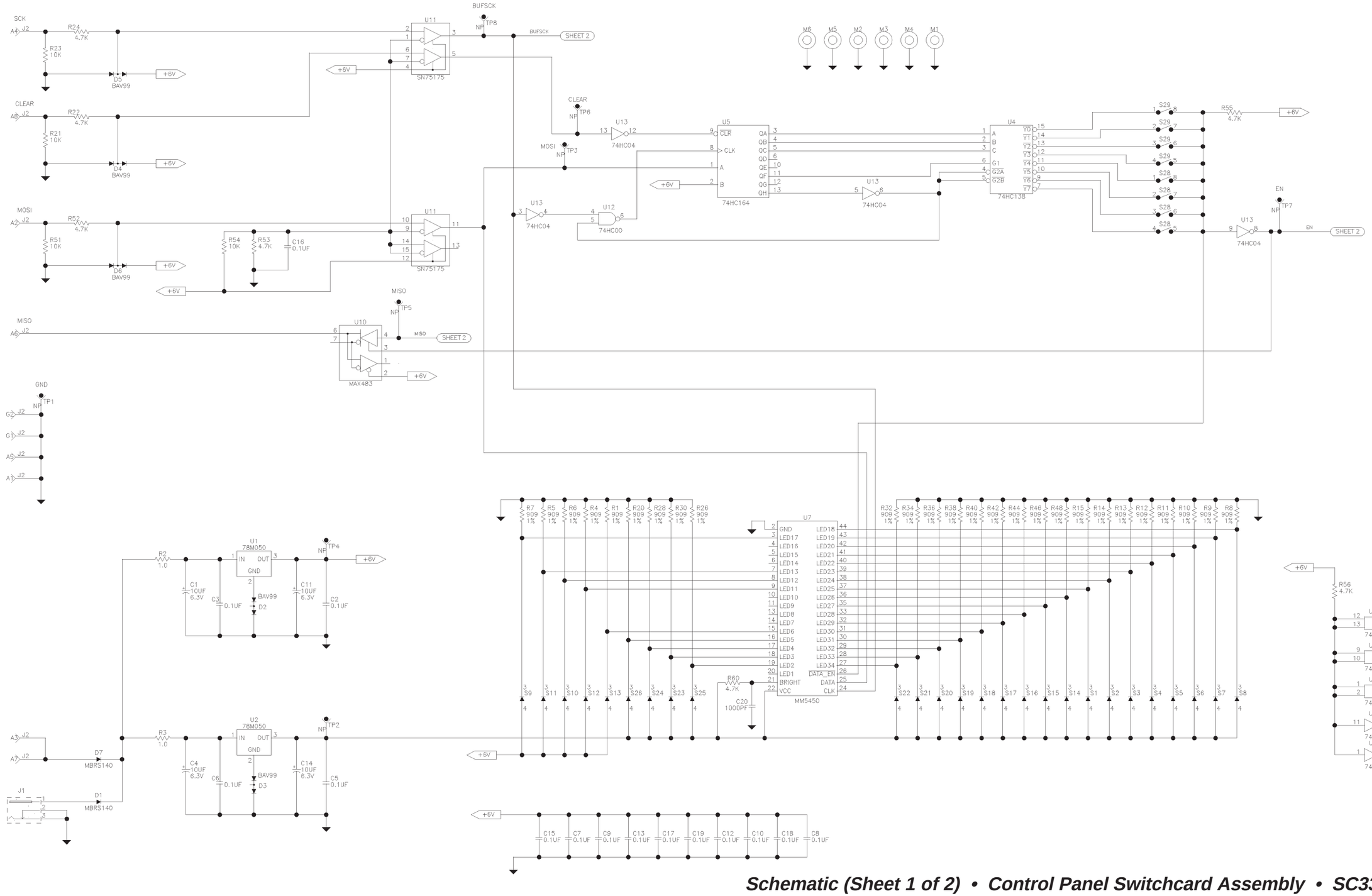


COMPONENT SIDE

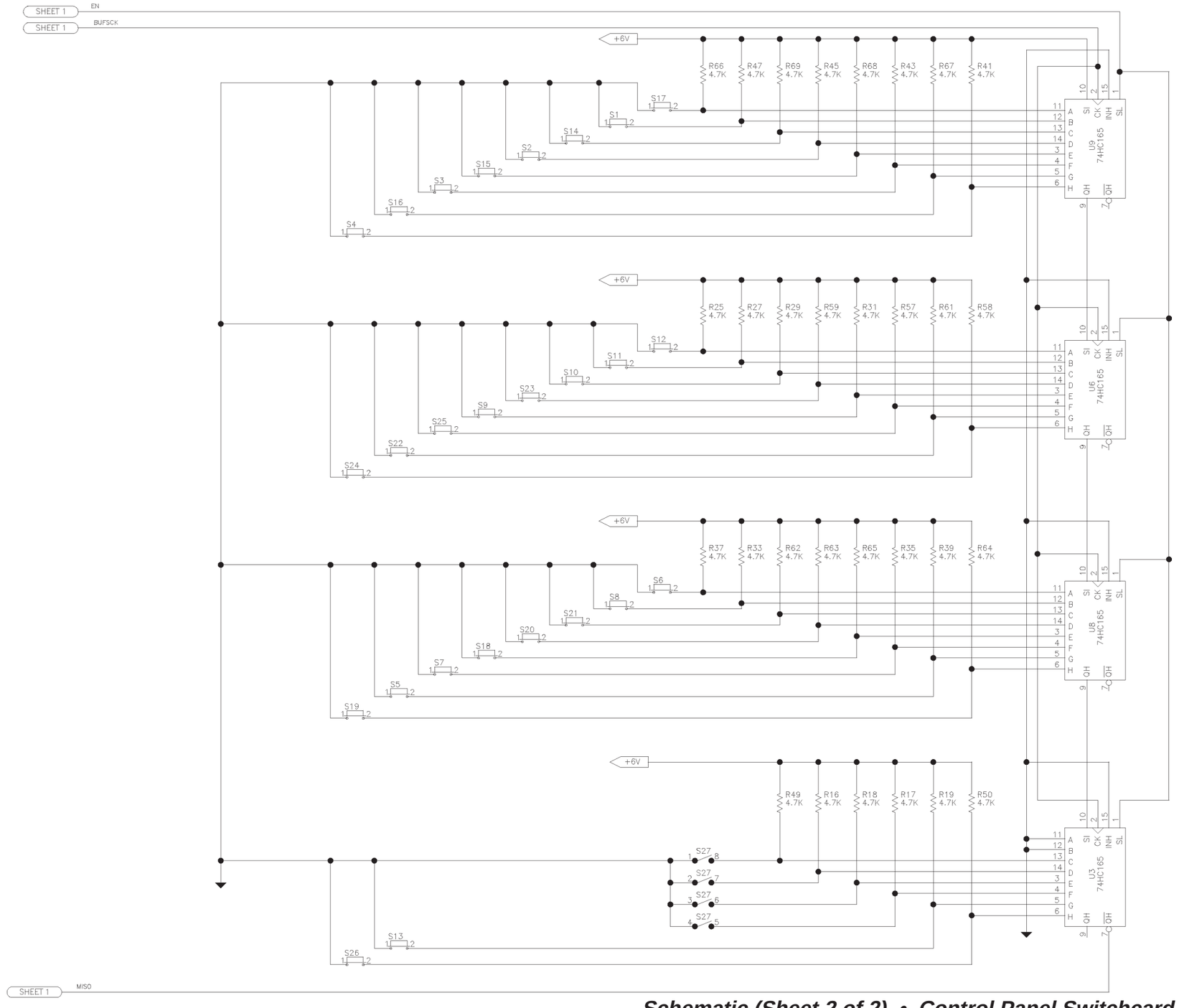


SOLDER SIDE

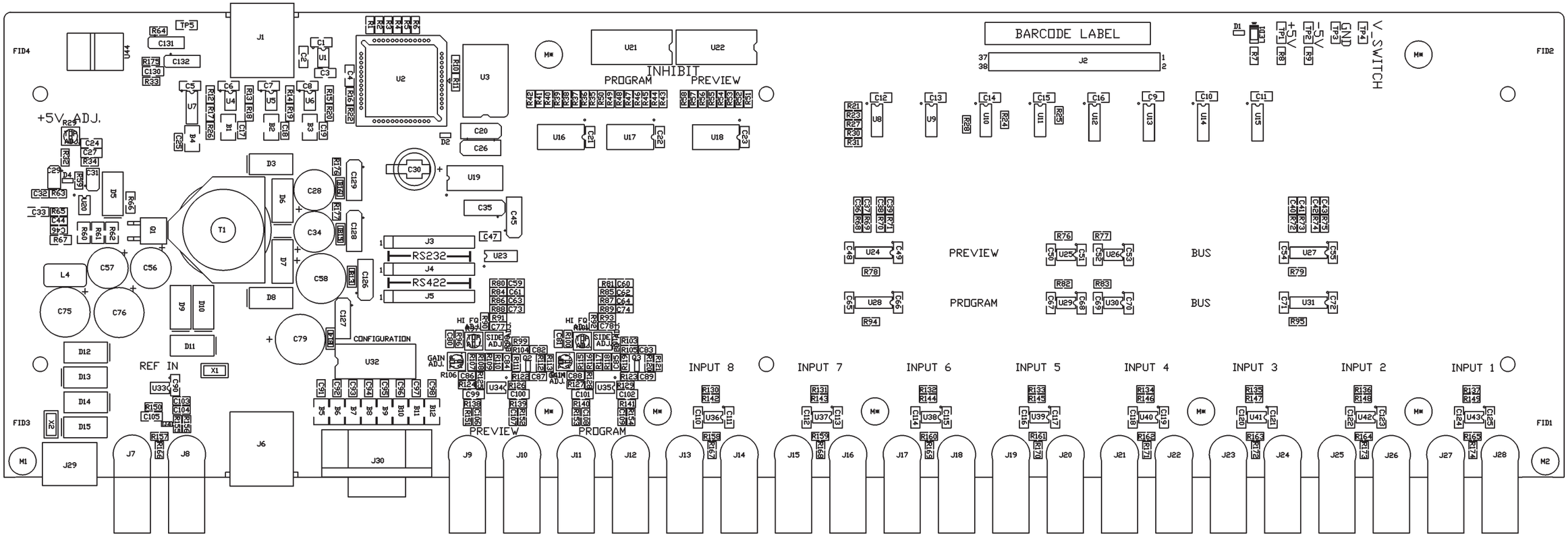
Component Assembly • Control Panel Switchcard Assembly • CA25-1426

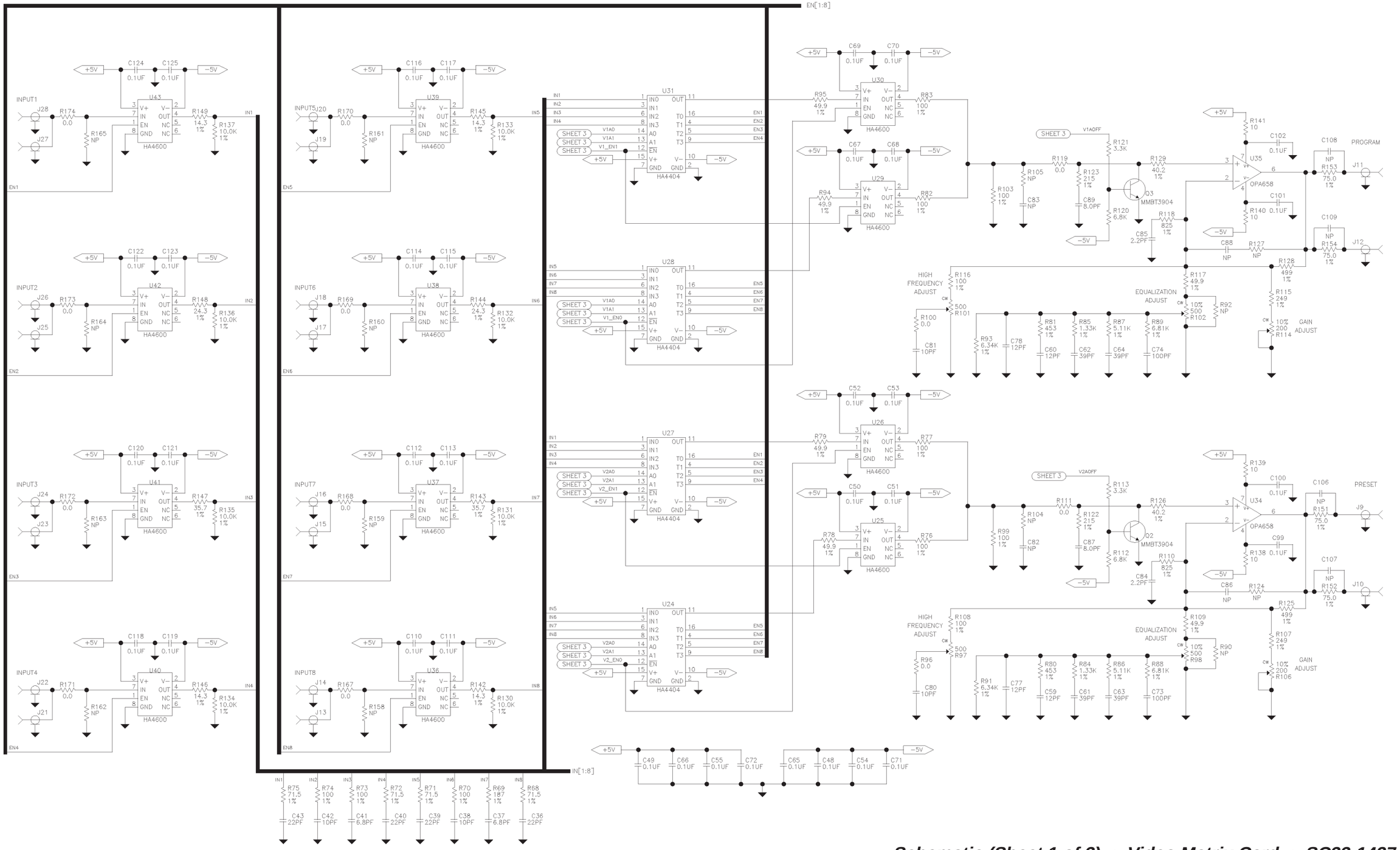


Schematic (Sheet 1 of 2) • Control Panel Switchcard Assembly • SC33-1426

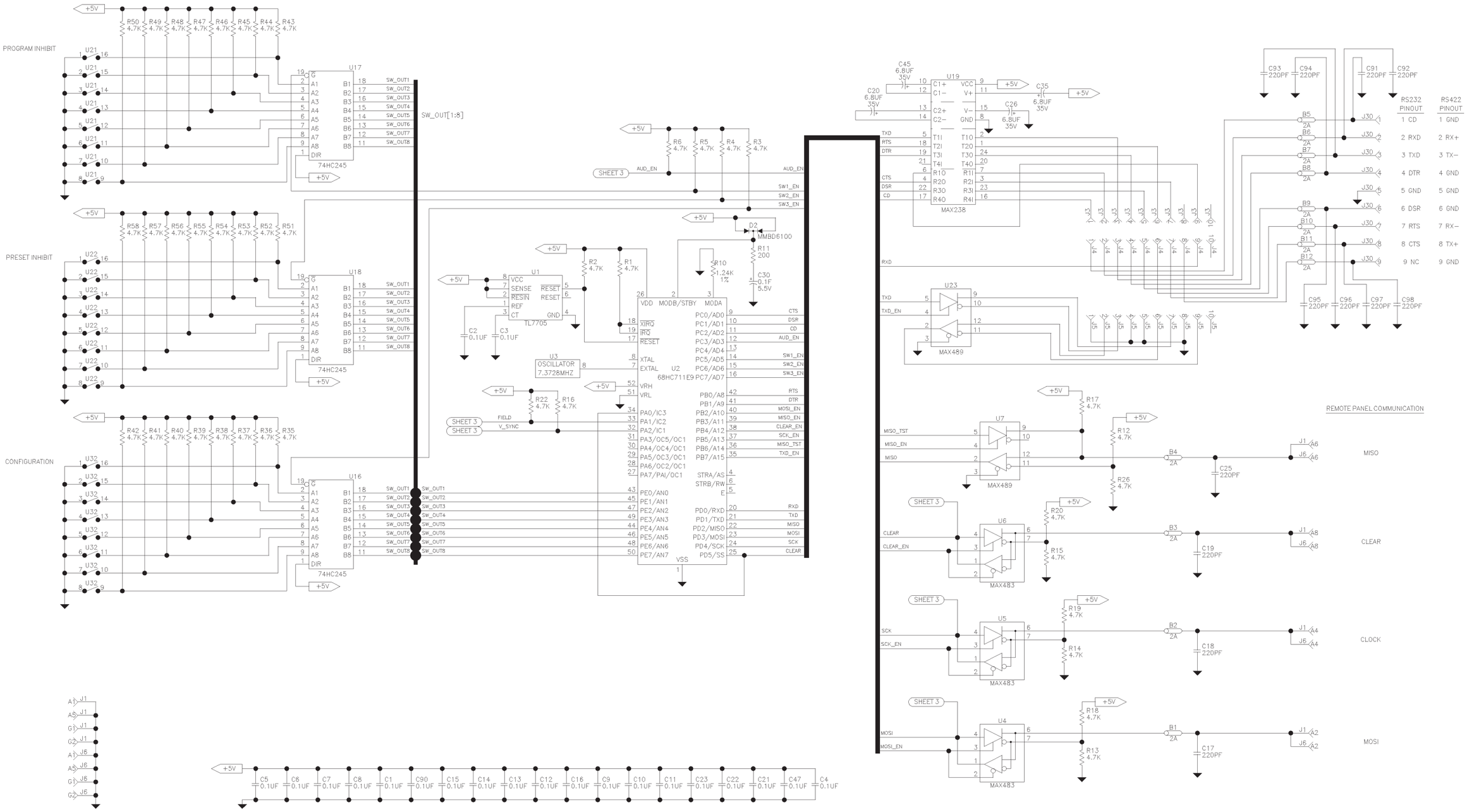


Schematic (Sheet 2 of 2) • Control Panel Switchcard Assembly • SC33-1426

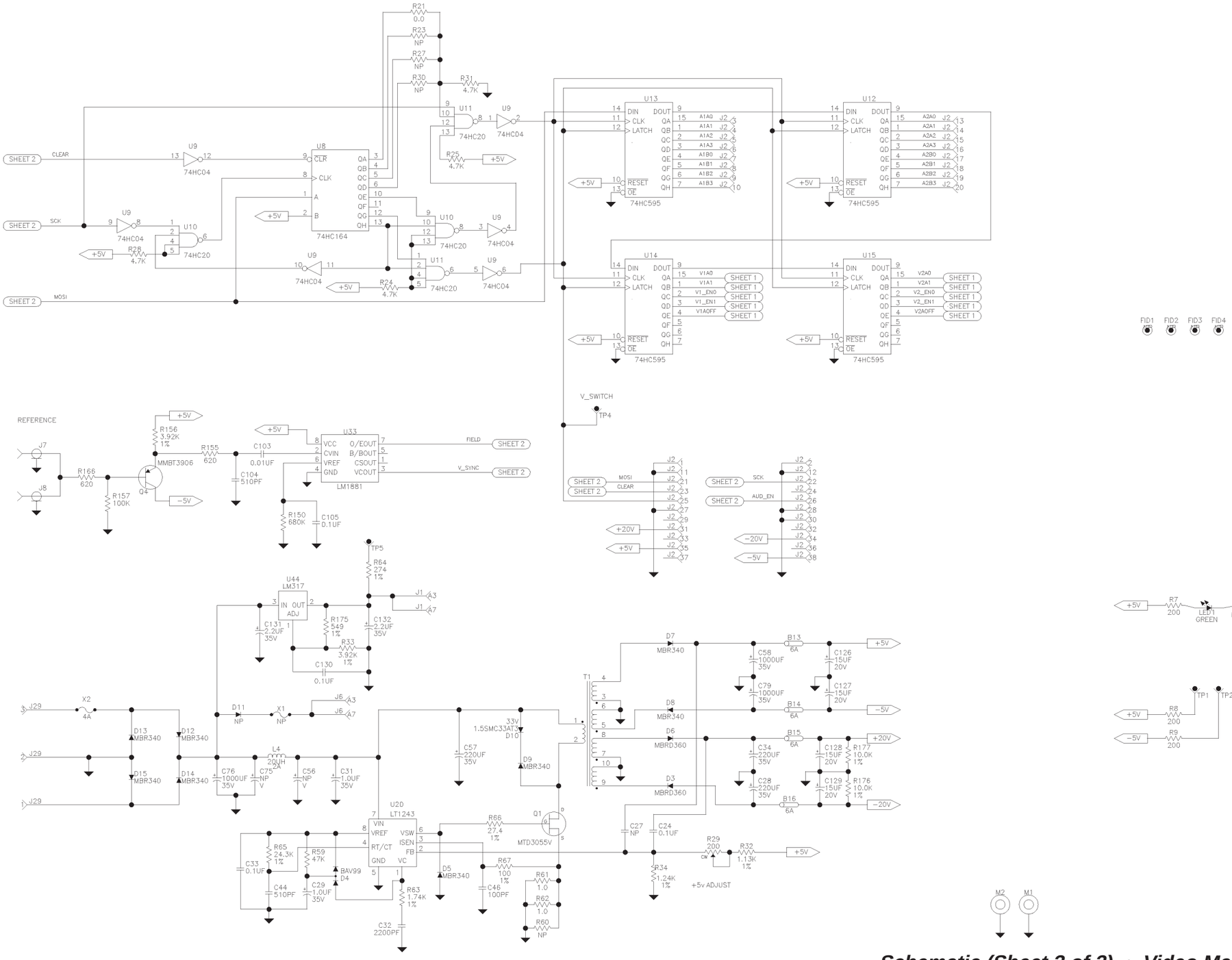

BARCODE LABEL
J2
V_SWITCH
+5V
-5V
GND
+5V ADJ.
REF IN
CONFIGURATION
INHIBIT
PROGRAM
PREVIEW
PREVIEW
PROGRAM
BUS
BUS
INPUT 8
INPUT 7
INPUT 6
INPUT 5
INPUT 4
INPUT 3
INPUT 2
INPUT 1
RS232
RS422
HI FQ ADJ
SIDE ADJ.
GAIN ADJ.
FID1
FID2
FID3
FID4



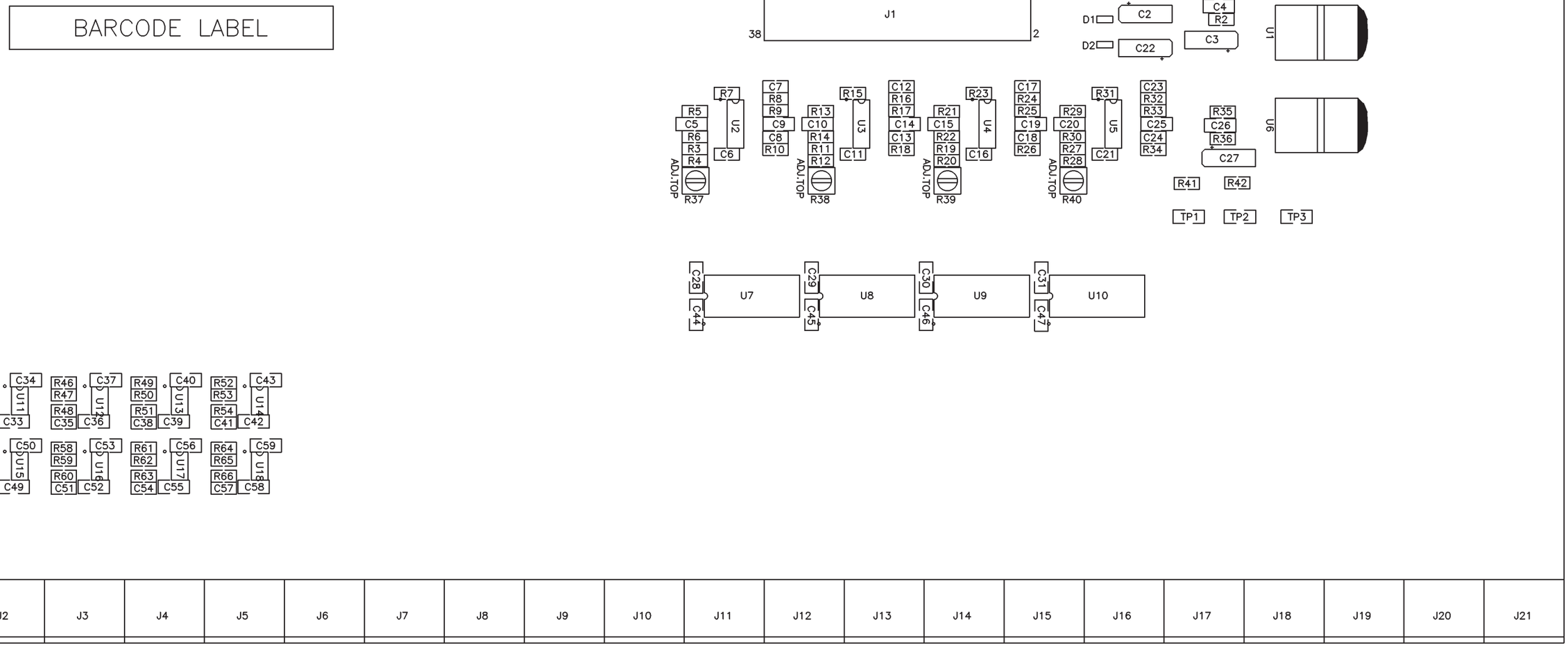
Schematic (Sheet 1 of 3) • Video Matrix Card • SC33-1427



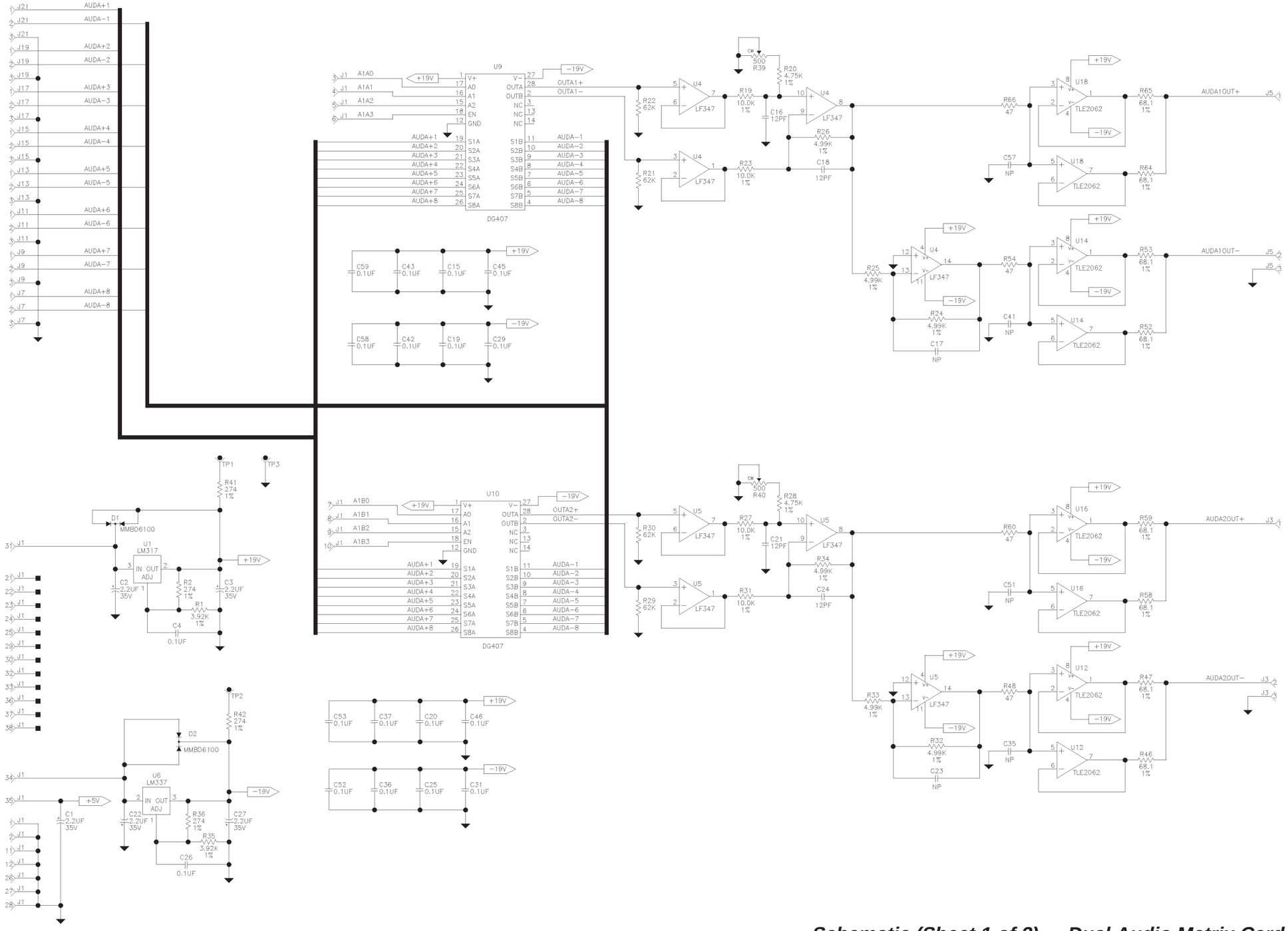
Schematic (Sheet 2 of 3) • Video Matrix Card • SC33-1427



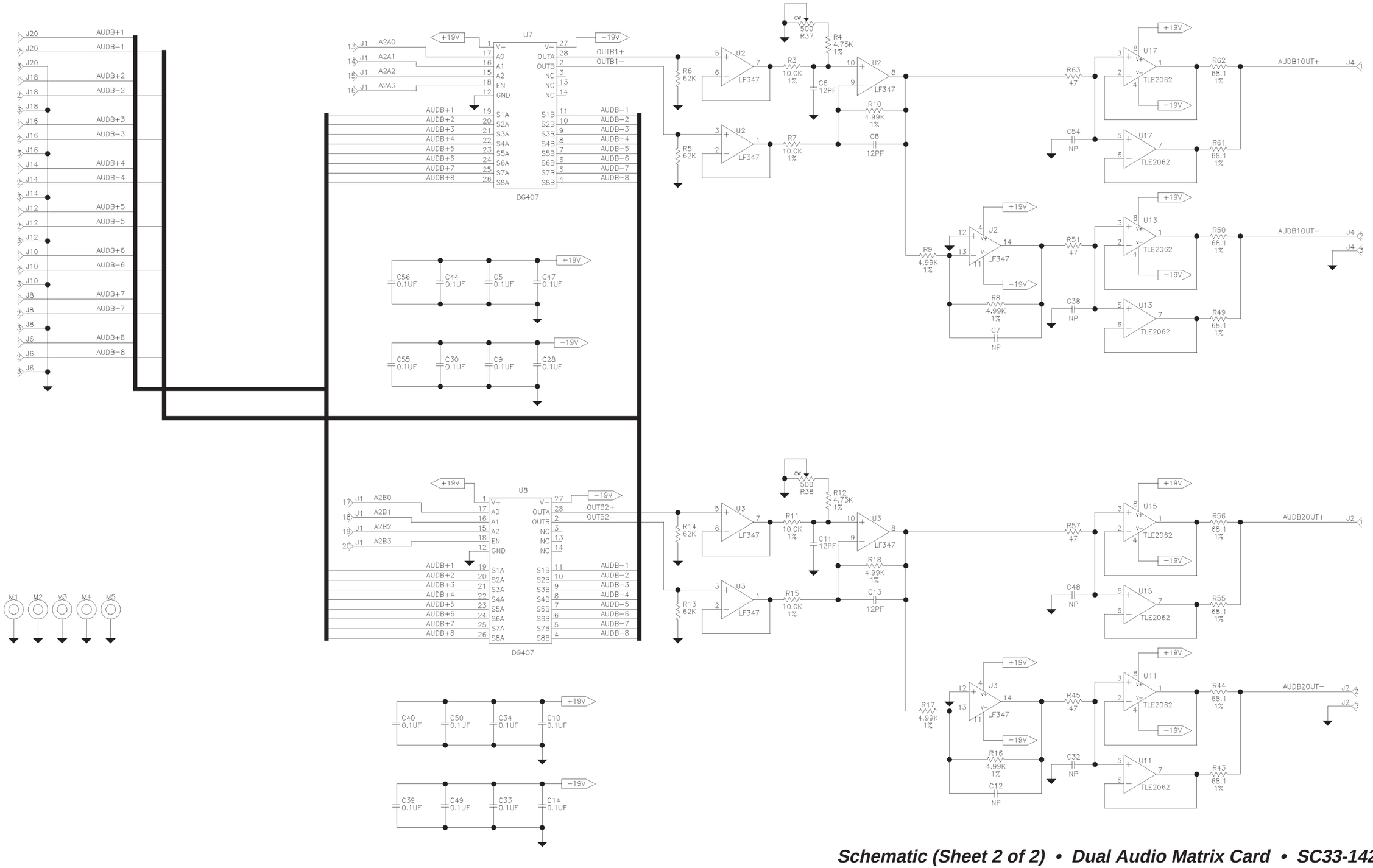
Schematic (Sheet 3 of 3) • Video Matrix Card • SC33-1427



COMPONENT SIDE



Schematic (Sheet 1 of 2) • Dual Audio Matrix Card • SC33-1425



Schematic (Sheet 2 of 2) • Dual Audio Matrix Card • SC33-1425

7.1 Parts List

General

The Parts List in this section have been grouped according to each assembly associated with the LNS-8 Live News Switcher. Refer to each list by name of card, board, or section of the equipment requiring replacement parts.

LNS-8 Routing Switcher Mainframe - 81906520300

81902000298	STANDOFF 1x4-40 ROUND	6	EA
81902101468	LABEL EQUIP SERIALIZATION	1	EA
81902105930	LEGEND SET, LNS-8 PANEL	1	EA
81902202647	SCREW 4-40x1/4 SIMM PANHD	8	EA
81902203150	SCREW 4-40X1/4 PH FT BLK	7	EA
81902803860	CABLE RJ-45 8 COND 1 FT.	1	EA
81902907800	CONN 3 POS w/STRAIN RELIE	20	EA
81903465640	LNS-8 PESA FRONT PANEL	1	EA
81905904070	MANUAL LNS-8	1	EA
81906520280	SOFTWARE ASSY LNS-8 BIOS	1	EA
81906520290	LNS-8 DUAL AUDIO MATRIX	1	EA
81906520310	LNS-8 SWITCHCARD ASSEMBLY	1	EA
81906520320	LNS-8 VIDEO MATRIX ASSY	1	EA
81906520340	LNS-8 CHASSIS ASSEMBLY	1	EA
CD63-0792	DOC LNS-8 MAINFRAME ASSY	0	EA

LNS-8 Chassis - 81906520340

81902203150	SCREW 4-40X1/4 PH FT BLK	1	EA
81903465650	LNS-8 TRAY	1	EA
81903465660	LNS-8 TOP PANEL	1	EA

LNS-8 Remote Control Panel - 81906520350

81902000298	STANDOFF 1x4-40 ROUND	6	EA
81902101468	LABEL EQUIP SERIALIZATION	1	EA
81902202647	SCREW 4-40x1/4 SIMM PANHD	6	EA
81902203150	SCREW 4-40X1/4 PH FT BLK	4	EA
81903465640	LNS-8 PESA FRONT PANEL	1	EA
81903465680	LNS-8 REMOTE REAR PANEL	1	EA
81906520310	LNS-8 SWITCHCARD ASSEMBLY	1	EA

LNS-8 Panel Switchcard - 81906520310

81901606870	IC 5450 34 SEG LED DRVR	1	EA	U7
81902101930	LENS ASSY BKC-6	26	EA	REF:S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 S13 S14 S15 S16 S17 S18 S19 S20 S21 S22 S23 S24 S25 S26
81902105050	LABEL BARCODE 1.5"x0.25"	1	EA	
81902414260	PCB LNS-8 SWITCHCARD ASSY	1	EA	
81902600584	SWITCH PB T-5K-M-NO	26	EA	S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 S13 S14 S15 S16 S17 S18 S19 S20 S21 S22 S23 S24 S25 S26
81902907460	CONN POWER JACK PCB MOUNT	1	EA	J1
81902907830	CONN RJ45 TOP ENTRY	1	EA	J2
81903200301	LED YELLOW U-BRITE	26	EA	REF: S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 S13 S14 S15 S16 S17 S18 S19 S20 S21 S22 S23 S24 S25 S26
81906600820	RESISTOR 4.7K 5% 0805 SMT	37	EA	R16 R17 R18 R19 R22 R24 R25 R27 R29 R31 R33 R35 R37 R39 R41 R43 R45 R47 R49 R50 R52 R53 R55 R56 R57 R58 R59 R60 R61 R62 R63 R64 R65 R66 R67 R68 R69
81906600903	RESISTOR 10K 5% 0805 SMT	4	EA	R21 R23 R51 R54
81906611892	RESISTOR 909 OHM 1% 0805	26	EA	R1 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13 R14 R15 R20 R26 R28 R30 R32 R34 R36 R38 R40 R42 R44 R46 R48
81906640320	RESISTOR 1 OHM 5% 1210	2	EA	R2 R3
81906700091	CAP 1000PF 50V CERAM 0805	1	EA	C20
81906730015	CAP 0.1MF 50V CERMIC 1206	15	EA	C2 C3 C5 C6 C7 C8 C9 C10 C12 C13 C15 C16 C17 C18 C19
81906770060	CAP 10MF 6.3V TANT CASE B	4	EA	C1 C4 C11 C14
81906800164	DIODE BAV99 50ma SOT-23	5	EA	D2 D3 D4 D5 D6
81906800540	DIODE 40V 1A STKY SMB	2	EA	D1 D7
81906810171	IC SMT,74HC04 (SOIC-14)	1	EA	U13
81906810247	REG 78M050 +5V DPAK SMT	2	EA	U1 U2
81906810340	IC 74HC00 QUAD AND SO SMT	1	EA	U12
81906810850	IC SERIAL TO PARALLEL	1	EA	U5
81906810880	IC RS485 TRANSCEIVER	1	EA	U10
81906810980	IC QUAD LINE RECEIVER	1	EA	U11
81906811040	IC 74HC138 3 TO 8 DECODER	1	EA	U4
81906811280	IC 74HC165 SO-16	4	EA	U3 U6 U8 U9
81906920030	SWITCH DIP 4 POS GULLWING	3	EA	S27 S28 S29
CA25-1426	DOC LNS-8 SWITCHCARD ASSY	0	EA	
NOT-PLACED	ITEMS NOT PLACED ON EBOM	0	EA	TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8
SC33-1426	D0C LNS-8 SWITCHCARD ASSY	0	EA	

LNS-8 Video Matrix Card - 81906520320

81901000075	CAP 1000MF 35V ELECTRO RD	3	EA	C58 C76 C79
81901000720	CAP SWX REG 35V 1.7A RAD	3	EA	C28 C34 C57
81901000840	CAP 0.1F 5.5V	1	EA	C30
81901603738	REG LM317T 1.2V-37V ADJST	1	EA	REF: U44
81901606830	IC 7.3728 MHZ OSCILLATOR	1	EA	U3
81901900191	HEATSINK TO-220 CUSTOM	1	EA	REF: U44
81902000264	STANDOFF 5/8x4-40 ROUND	5	EA	
81902105050	LABEL BARCODE 1.5"x0.25"	1	EA	
81902105210	CIR-O-GUIDE .324x.078 THK	6	EA	
81902200070	NUT 4-40 HEX	1	EA	REF: U44
81902201177	SCREW 4-40x3/8 FLAT HEAD	1	EA	REF: U44
81902201409	SCREW 4-40x1/4 FLT HD PHI	5	EA	
81902202647	SCREW 4-40x1/4 SIMM PANHD	9	EA	
81902301080	INDUCTOR 20uH 2A TOROIDAL	1	EA	L4
81902301290	TRANSFORMER CUSTOM BOBCAT	1	EA	T1
81902414270	PCB LNS-8 VID MATRIX ASSY	1	EA	
81902600725	SWITCH 8 POLE DIP R/A	3	EA	U21 U22 U32
81902600816	SHUNT DIP 10 POS .3 CNTR	1	EA	
81902905538	CONN 3 POS R/A PC MT	1	EA	J29
81902906270	CONN 10 POS SIP SOCKET	3	EA	J3 J4 J5
81902907810	CONN BNC RITE ANGLE PC MT	22	EA	J7 J8 J9 J10 J11 J12 J13 J14 J15 J16 J17 J18 J19 J20 J21 J22 J23 J24 J25 J26 J27 J28
81902907820	CONN RJ45 RIGHT ANGLE	2	EA	J1 J6
81902907850	CONN 38 PIN 2 ROW SPACER	1	EA	J2
81902908040	CONN 9 PIN D R/ANGLE MALE	1	EA	J30
81903465720	LNS-8 REAR PANEL	1	EA	
81906600184	RESISTOR 10 OHM 5% 0805	4	EA	R138 R139 R140 R141
81906600499	RESISTOR 200 OHM 5% 0805	4	EA	R7 R8 R9 R11
81906600614	RESISTOR 620 OHM 5% 0805	2	EA	R155 R166
81906600783	RESISTOR 3.3K 5% 0805 SMT	2	EA	R113 R121
81906600820	RESISTOR 4.7K 5% 0805 SMT	45	EA	R1 R2 R3 R4 R5 R6 R12 R13 R14 R15 R16 R17 R18 R19 R20 R22 R24 R25 R26 R28 R31 R35 R36 R37 R38 R39 R40 R41 R42 R43 R44 R45 R46 R47 R48 R49 R50 R51 R52 R53 R54 R55 R56 R57 R58
81906600866	RESISTOR 6.8K 5% 0805 SMT	2	EA	R112 R120
81906601067	RESISTOR 47K 5% 0805 SMT	1	EA	R59
81906601133	RESISTOR 100K 5% 0805 SMT	1	EA	R157
81906601331	RESISTOR 680K 5% 0805 SMT	1	EA	R150
81906601521	RESISTOR 0.0 OHM 5% 0805	13	EA	R21 R96 R100 R111 R119 R167 R168 R169 R170 R171 R172 R173 R174
81906610160	RESISTOR 14.3 OHM 1% 0805	4	EA	R142 R145 R146 R149
81906610381	RESISTOR 24.3 OHM 1% 0805	2	EA	R144 R148

LNS-8 Video Matrix Card - 81906520320 Continued:

81906610548	RESISTOR 35.7 OHM 1% 0805	2	EA	R143 R147
81906610597	RESISTOR 40.2 OHM 1% 0805	2	EA	R126 R129
81906610680	RESISTOR 49.9 OHM 1% 0805	6	EA	R78 R79 R94 R95 R109 R117
81906610830	RESISTOR 71.5 Ohm 1% 0805	4	EA	R68 R71 R72 R75
81906610852	RESISTOR 75.0 OHM 1% 0805	4	EA	R151 R152 R153 R154
81906610977	RESISTOR 100 OHM 1% 0805	11	EA	R70 R73 R74 R76 R77 R82 R83 R99 R103 R108 R116
81906611230	RESISTOR 187 OHM 1% 0805	1	EA	R69
81906611290	RESISTOR 215 OHM 1% 0805	2	EA	R122 R123
81906611357	RESISTOR 249 OHM 1% 0805	2	EA	R107 R115
81906611397	RESISTOR 274 OHM 1% 0805	1	EA	R64
81906611603	RESISTOR 453 OHM 1% 0805	2	EA	R80 R81
81906611640	RESISTOR 499 OHM 1% 0805	2	EA	R125 R128
81906611680	RESISTOR 549 OHM 1% 0805	1	EA	R175
81906611850	RESISTOR 825 OHM 1% 0805	2	EA	R110 R118
81906611980	RESISTOR 1.13K 1% 0805	1	EA	R32
81906612020	RESISTOR 1.24K 1% 0805	2	EA	R10 R34
81906612050	RESISTOR 1.33K 1% 0805	2	EA	R84 R85
81906612163	RESISTOR 1.74K 1% 0805	1	EA	R63
81906612490	RESISTOR 3.92K 1% 0805	2	EA	R33 R156
81906612601	RESISTOR 5.11K 1% 0805	2	EA	R86 R87
81906612690	RESISTOR 6.34K 1% 0805	2	EA	R91 R93
81906612720	RESISTOR 6.81K 1% 0805	2	EA	R88 R89
81906612882	RESISTOR 10K 1% 0805 SMT	10	EA	R130 R131 R132 R133 R134 R135 R136 R137 R176 R177
81906613250	RESISTOR 24.3K 1% 0805	1	EA	R65
81906630439	RESISTOR 27.4 OHM 1% 1206	1	EA	R66
81906630970	RESISTOR 100 Ohm 1% 1206	1	EA	R67
81906640320	RESISTOR 1 OHM 5% 1210	2	EA	R61 R62
81906650015	POT 500 OHM SMT VERTICAL	2	EA	R97 R101
81906650031	POT SMT 200 OHM VERTL 20%	1	EA	R29
81906650056	POT 200 OHM VERT 1TRN 10%	2	EA	R106 R114
81906650180	POT 500 OHM 10% 4mm 1-TRN	2	EA	R98 R102
81906700018	CAP 12PF 50V CERAMIC SMT	4	EA	C59 C60 C77 C78
81906700059	CAP 6.8PFD 50V CERAM,0805	2	EA	C37 C41
81906700109	CAP 10PF 50V CERAM 0805	4	EA	C38 C42 C80 C81
81906700125	CAP 2.2PF CERAM 50V 0805	2	EA	C84 C85
81906700166	CAP 100PF 50V CERAMC 0805	3	EA	C46 C73 C74
81906700174	CAP 510PF 50V CERAM 0805	2	EA	C44 C104
81906700232	CAP 8PF CERAMIC 2% 0805	2	EA	C87 C89
81906700320	CAP 220PF NPO 0805 CERAMC	12	EA	C17 C18 C19 C25 C91 C92 C93 C94 C95 C96 C97 C98
81906700350	CAP 22PF CERAMIC 0805 NPO	4	EA	C36 C39 C40 C43
81906700500	CAP 39PF CER NPO 5% 0805	4	EA	C61 C62 C63 C64
81906700540	CAP 0.01mf 50V CERM 0805	1	EA	C103
81906720008	CAP SMT,2200PF,50V,CERMAC	1	EA	C32

LNS-8 Video Matrix Card - 81906520320 Continued:

81906730015	CAP 0.1MF 50V CERMIC 1206	61	EA	C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15 C16 C21 C22 C23 C24 C33 C47 C48 C49 C50 C51 C52 C53 C54 C55 C65 C66 C67 C68 C69 C70 C71 C72 C90 C99 C100 C101 C102 C105 C110 C111 C112 C113 C114 C115 C116 C117 C118 C119 C120 C121 C122 C123 C124 C125 C130
81906770029	CAP 6.8MF 35V TANTLM 7343	4	EA	C20 C26 C35 C45
81906770037	CAP TANTLM,SMT,2.2MFD/35V	2	EA	C131 C132
81906770100	CAP 1mf 35 VOLTS TANTALUM	2	EA	C29 C31
81906770130	CAP 15uF TANT SMT D CASE	4	EA	C126 C127 C128 C129
81906800016	TRANS SMT,MMBT3904LT1	2	EA	Q2 Q3
81906800024	DIODE SMT,MMBD6100,SOT23	1	EA	D2
81906800065	TRANS SMT,MMBZ5234B	1	EA	D1
81906800107	TRANS SMT,MMBT3906L	1	EA	Q4
81906800164	DIODE BAV99 50ma SOT-23	1	EA	D4
81906800230	DIODE MBR340 40V 3A SHTTK	8	EA	D5 D7 D8 D9 D12 D13 D14 D15
81906800410	TRANSIENT SUPPRESSOR 33V	1	EA	D10
81906800570	DIODE MBR360 SCHTTKY 3A	2	EA	D3 D6
81906800600	TRANS MTD3055V TMOS SMT	1	EA	Q1
81906810106	IC LM1881 VID SYNC SEPART	1	EA	U33
81906810171	IC SMT,74HC04 (SOIC-14)	1	EA	U9
81906810550	IC 74HC245 OCTL TRANSCEVR	3	EA	U16 U17 U18
81906810830	IC RS232 4 RCVR/4 TRNSMTR	1	EA	U19
81906810850	IC SERIAL TO PARALLEL	1	EA	U8
81906810860	IC 8 BIT SHIFT REGISTER	4	EA	U12 U13 U14 U15
81906810880	IC RS485 TRANSCEIVER	3	EA	U4 U5 U6
81906810890	IC RS485 RECVR/TRANSMITTR	2	EA	U7 U23
81906810920	IC HA4404 4x1 CROSSPOINT	4	EA	U24 U27 U28 U31
81906810930	IC TL7705 MICRO SUPERVISR	1	EA	U1
81906810990	IC BUFFER HA4600 SO-8	12	EA	U25 U26 U29 U30 U36 U37 U38 U39 U40 U41 U42 U43
81906811210	IC 74HC20 DUAL 4-IN NAND	2	EA	U10 U11
81906811220	IC OPA 658U OP-AMP WIDEBD	2	EA	U34 U35
81906811480	IC LT 1243 PWM SMT	1	EA	U20
81906900040	FUSE 4A SMT FAST BLOW	1	EA	X2
81906940040	SOCKET 52 PIN PLCC SMT	1	EA	REF: U2
81906950040	BEAD INDUCTOR SMT	12	EA	B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12
81906950070	BEAD FERRITE SMT 6A 1806	4	EA	B13 B14 B15 B16
81906960010	LED SMT GREEN 1206	1	EA	LED 1
81906970020	SMT TESTPOINT 1206	5	EA	TP1 TP2 TP3 TP4 TP5

LNS-8 Video Matrix Card - 81906520320 Continued:

CA25-1427	DOC LNS-8 VID MATRIX ASSY	0	EA	
NOT-PLACED	ITEMS NOT PLACED ON EBOM	0	EA	R23 R27 R30 R60 R90 R92 R104 R105 R124 R127 R158 R159 R160 R161 R162 R163 R164 R165 C27 C56 C75 C82 C83 C86 C88 C106 C107 C108 C109 D11 X1
SC33-1427	DOC LNS-8 VID MATRIX ASSY	0	EA	

LNS-8 Dual Audio Matrix Card - 81906520290

81901603738	REG LM317T 1.2V-37V ADJST	1	EA	U1
81901605543	REG LM337T	1	EA	U6
81902105050	LABEL BARCODE 1.5"x0.25"	1	EA	
81902414250	PCB LNS-8 DUAL AUDIO MATX	1	EA	
81902905538	CONN 3 POS R/A PC MT	20	EA	J2 J3 J4 J5 J6 J7 J8 J9 J10 J11 J12 J13 J14 J15 J16 J17 J18 J19 J20 J21
81902907890	CONN 37 PIN DUAL PASS THU	1	EA	J1
81906600341	RESISTOR 47 OHM 5% 0805	8	EA	R45 R48 R51 R54 R57 R60 R63 R66
81906601083	RESISTOR 62K 5% 0805 SMT	8	EA	R5 R6 R13 R14 R21 R22 R29 R30
81906610810	RESISTOR 68.1 OHM 1% 0805	16	EA	R43 R44 R46 R47 R49 R50 R52 R53 R55 R56 R58 R59 R61 R62 R64 R65
81906611397	RESISTOR 274 OHM 1% 0805	4	EA	R2 R36 R41 R42
81906612490	RESISTOR 3.92K 1% 0805	2	EA	R1 R35
81906612570	RESISTOR 4.75K 1% 0805	4	EA	R4 R12 R20 R28
81906612593	RESISTOR 4.99K 1% 0805	12	EA	R8 R9 R10 R16 R17 R18 R24 R25 R26 R32 R33 R34
81906612882	RESISTOR 10K 1% 0805 SMT	8	EA	R3 R7 R11 R15 R19 R23 R27 R31
81906650015	POT 500 OHM SMT VERTICAL	4	EA	R37 R38 R39 R40
81906700018	CAP 12PF 50V CERAMIC SMT	8	EA	C6 C8 C11 C13 C16 C18 C21 C24
81906730015	CAP 0.1MF 50V CERMIC 1206	34	EA	C4 C5 C9 C10 C14 C15 C19 C20 C25 C26 C28 C29 C30 C31 C33 C34 C36 C37 C39 C40 C42 C43 C44 C45 C46 C47 C49 C50 C52 C53 C55 C56 C58 C59
81906770037	CAP TANTLM,SMT,2.2MFD/35V	5	EA	C1 C2 C3 C22 C27
81906800024	DIODE SMT,MMBD6100,SOT23	2	EA	D1 D2
81906810940	IC DG407 DIF 8x1 MUX SMT	4	EA	U7 U8 U9 U10
81906810950	IC LF347M QUAD OPAMP SMT	4	EA	U2 U3 U4 U5
81906811100	IC DUAL AUDIO LO PWR	8	EA	U11 U12 U13 U14 U15 U16 U17 U18
81906970020	SMT TESTPOINT 1206	3	EA	TP1 TP2 TP3
CA25-1425	DOC LNS-8 DUAL AUD MATRIX	0	EA	
NOT-PLACED	ITEMS NOT PLACED ON EBOM	0	EA	C7 C12 C17 C23 C32 C35 C38 C41 C48 C51 C54 C57
SC33-1425	DOC LNS-8 DUAL AUD MATRIX	0	EA	

Power Pack (120VAC) - 81906520460

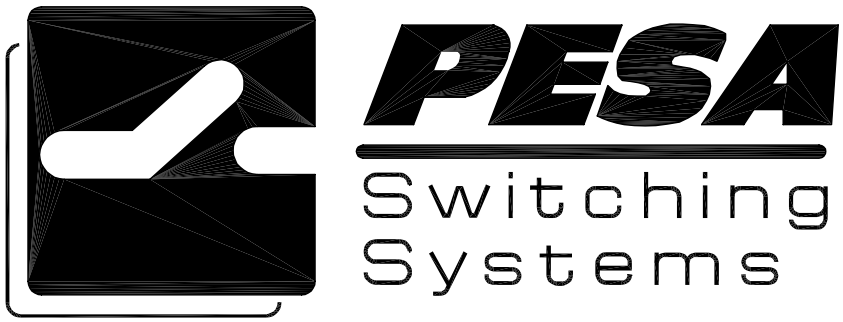
81902300987	TRANSFORMER 12V 20VA 48X1	1	EA
81902907800	CONN 3 POS w/STRAIN RELIE	1	EA
WI50-0266	DOC PWR PACK LNS-8 120V	0	EA

Power Pack (220VAC) - 81906520450

81902301019	TRANSFORMER 220v-12v 20A	1	EA
81902907800	CONN 3 POS w/STRAIN RELIE	1	EA
WI50-0265	DOC PWR PACK LNS-8 220V	0	EA

Revision History

Rev.	Date	Description	By
A	01-15-98	Initial Release	C. Jaynes
B	03-23-98	Revised per ECO.	C. Jaynes
C	N/A	Not released –Agile Conversion	G. Tarlton
D	03-05-01	Synchronized revision level with Agile per ECO CE00172	G. Tarlton
E	03-05-01	Deleted Printing Specification per ECO CE00113.	G. Tarlton


PESA
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Systems