DA-3100
AUDIO AND VIDEO DISTRIBUTION AMPLIFIERS

(ADA-3100 AND VDA-3100)

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Document Number 81-9059-0547-0 Revision A

Printed in the United States of America.

As of publication, this product had not completed FCC compliance testing.

April 2003

About This Manual

This manual provides detailed instructions for the installation, operation, and maintenance of the PESA DA-3100 Distribution Amplifier.

Warnings, Cautions, and Notes

Warning statements identify conditions or practices that can result in personal injury or loss of life.

Caution statements identify conditions or practices that can result in damage to equipment.

Notes contain information important to the correct installation, operation, or maintenance of the equipment.

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Chapter 1 – Introduction

This manual provides detailed instructions for installing and operating the PESA DA-3100 Distribution Amplifier.

1.1 General Description

The DA-3100 Mainframe is the heart of PESA's new line of low cost distribution amplifiers. The Video Distribution Amplifier (VDA-3100) and Audio Distribution Amplifier (ADA-3100) are both available.

1.1.1 VDA-3100

The Video Distribution Amplifier VDA-3100 is housed in a 2RU chassis with ten video card slots, video, equalized video, and serial digital video signals can be distributed by selecting the appropriate plug-in cards. Up to two power supply modules can be installed in the DA-3100 Video Mainframe to allow single frame power redundancy. There is also one audio card which is used in the VDA-3100 frame, the 75 ohm AES serial digital audio distribution amplifier.

There are two versions of the VDA-3100 frame (both have ten card slots). In the VDA3100T (the non-looping version with terminating inputs), each card slot has a single terminated input and eight outputs. This VDA3100T frame is required for use with all digital DAs, but can also be used with all analog video cards. The VDA3100L (the looping version) has two input BNCs connected in parallel and eight outputs. The looping version cannot support the digital video cards since the digital cards require a terminated input.

Developed as a low cost modular frame, the VDA-3100 Video Mainframe is easily upgraded as requirements in the field change. All plug-in modules and power supplies are installed and removed from the front.

1.1.2 ADA-3100

The Audio Distribution Amplifier (ADA-3100) includes user-selectable 600 ohm or 66 ohm output impedance jumpers. Also developed as a low cost modular frame, the ADA-3100 Audio Mainframe is easily upgraded as requirements in the field change. All plug-in modules and power supplies are installed and removed from the front.

1.2 Available Cards

There are a wide variety of cards compatible with the DA-3100, both analog and digital, as listed below:

Available Models	Description
VDA3101GP	Analog Video General Purpose DA up to 150MHz, 1x8
VDA3102	Analog Video DA with EQ, 1x8
VDA3103	Analog Video DA for wideband applications to 250MHz, 1x8
VDA3105	Analog Video DA with Auto EQ, non-reclocking, 1x8
SVDA3101	SDI Video DA with Auto EQ, non-reclocking, 1x8 VDA - 3100T Frame ONLY
SVDA3101R	SDI Video DA with Auto EQ, reclocking, 1x8 - VDA-3100T Frame ONLY
HDVDA3101R	HD Video DA with Auto EQ, reclocking, 1x8 - VDA-3100T Frame ONLY
VDAC3101	Video D to A analog output monitoring card, (NTSC/PAL/RGB out)
VADD3101-10	Video A to D for NTSC/PAL to SDI, 10 bit (SMPTE 259M out)
VDAE3101-10	Video D to A for SDI to NTSC/PAL, 10 bit (NTSC/PAL/YC/RGB/YpbPr out)
ADA3102	Analog Audio Distribution Amplifier – Dual 1x4
ADA3103	Analog Audio Distribution Amplifier – Single 1x8
ADA3124	Digital Audio Distribution Amplifier – Dual 1x4 or Single 1x8 (110 ohm)
ADA3118	Digital Audio Distribution Amplifier – Single 1x8 (75 ohm unbalanced)
ADAC3102	Audio D to A Conversion, 24 bit/96 KHz
AADC3102	Audio A to D Conversion, 24 bit/96 KHz (3 AES/EBU per input channel)

Figure 1. DA-3100 Front View

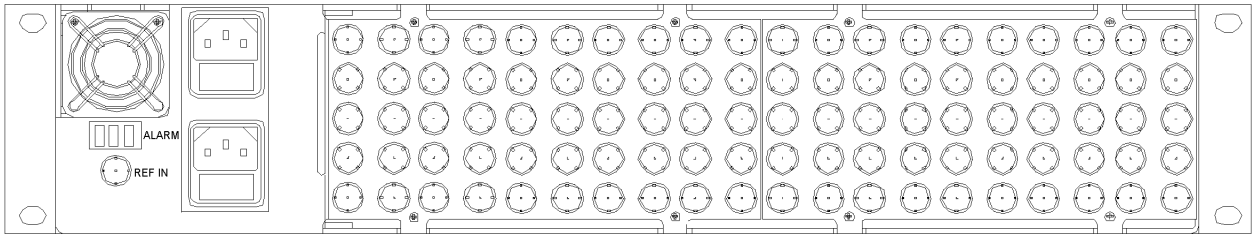


Figure 2. VDA-3100L Looping Frame Rear View

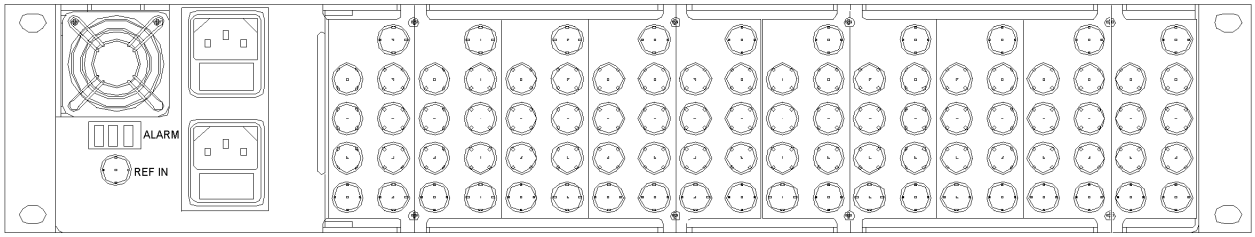


Figure 3. VDA-3100T Terminating Frame Rear View

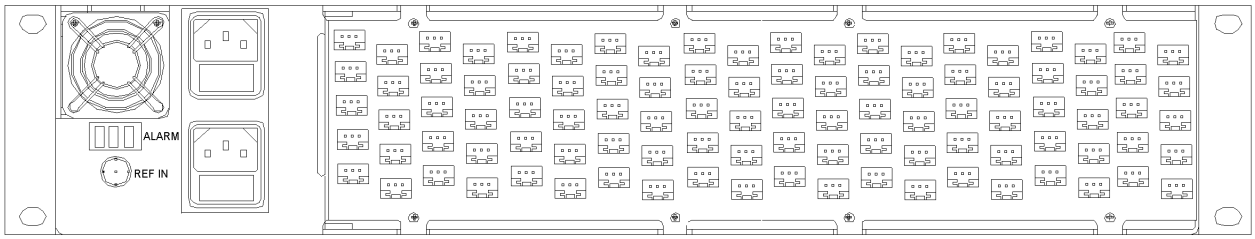


Figure 4. ADA-3100 Audio Frame Rear View

1.3 VDA-3100 Video Mainframe Specifications

INPUT CHARACTERISTICS

VDA3100L:

Input Type.....Looping Inputs

VDA3100T:

Input Type..... Terminating Inputs

OUTPUT CHARACTERISTICS

Number .....8 Per Channel

Connector Type.....BNC

CARD SLOTS

Number .....10 Per Chassis

ENVIRONMENTAL - Operational

Temperature .....0°C to 40°C

Humidity ..... 10-90% Non-Condensing

POWER SUPPLIES

Number ..... 1 (Standard)
2 (Optional)

MECHANICAL

Dimensions 2RU

19" W X 10" D 3.5" H

(482.6mm X 254.1mm X 89mm)

POWER

AC Voltages.....100-130V, ±10%, 47-63Hz (US)
200-250V, ±10%, 47-63Hz (OUS)
Power .....Apx. 45VA

1.4 Board Specifications

1.4.1 ADA3102 Specifications

Features:

- HiZ or 600 Ohm input impedance
- 66 Ohm/600 ohm output impedance
- 8 outputs (ADA-3101)
- 4 outputs (ADA-3102)

Input Characteristics

- Level +30dBm Max
- Coupling DC
- Type Balanced
- Common mode level ±20V
- Connector type 3-pin, 2-part detachable
- Impedance jumper on card HiZ or 600 ohms
- Common mode rejection >90dB @ 60 Hz; >60dB to 20KHz

Output Characteristics

- Level +30dBm @ 66 ohms
- Impedance jumper on card 66 ohms balanced
- Coupling DC
- DC on outputs <±20mV max
- Connector type 3-pin, 2-part detachable
- Output isolation – module to module > 1000dB 20 Hz to 20 KHz

1.4.2 ADA3103

Features

- HiZ or 600 ohm input impedance
- 66 ohm/600 ohm output impedance
- 8 outputs (ADA-3101)
- 4 outputs (ADA-3102)

Input Characteristics

- Level +30dBm max
- Impedance jumper on card
- Coupling DC
- Type Balanced HiZ ot 600 ohms
- Connector type 3-pin, 2-part detachable
- Common model level +20V
- Common mode rejection >90dB @ 60 Hz; >60dB to 20KHz

Output Characteristics

- Level +30dBm @ 66 ohms
- Impedance jumper on card 66 ohms balanced
- Coupling DC
- DC on outputs <±20mV max
- Connector type 3-pin, 2-part detachable
- Output isolation – module to module > 1000dB 20 Hz to 20 KHz

1.4.3 ADA3124

Features

- Reclocked and equalized
- Dual 1x4 or 1x8 configuration
- Analog headphone monitoring

Digital Input Characteristics

- Input level 2-7V p-p
- Impedance 75 ohm unbalanced or 110 ohm balanced, selectable

Digital Output Characteristics

- Impedance 75 ohm unbalanced or 110 ohm balanced, selectable
- Jitter <20ns
- Standard AES-3

1.4.4 HDVDA3101-R

Features

- Conforms to SMPTE 259M
- Automatic input EQ
- 8 outputs/card

Input Characteristics

- Standard SMPTE 259M
- Impedance Coax version: 75 ohms internally terminated
- Return loss >15dB to 1.5 GHz
- Signal amplitude 800mV ±10%
- DC offset ±0.5V
- Rise and fall times <270pS

Output Characteristics

- Standard SMPTE 292M
- Impedance Coax version: 75 ohms internally terminated
- Return Loss >15dB to 1.5 GHz
- Signal amplitude 800mV ±10%
- DC offset ±0.5V
- Rise and fall times <270pS

1.4.5 SDVDA3101

Features

- Conforms to SMPTE 259M
- Automatic input EQ
- 8 outputs/card

Input Characteristics

- Standard SMPTE 259M
- Impedance 75 ohms
- Return loss >15dB to clock frequency
- Signal level 800mV ±10%
- DC offset ±0.5V
- Equalization automatic

Output Characteristics

- Standard SMPTE 292M
- Impedance 75 ohms
- Return loss >25dB to clock frequency
- Signal level 800mV ±10%
- DC offset 0V ±0.5V
- Rise and fall times 400-700pS (20 to 80% amplitude)
- Overshoot <10% of amplitude (all outputs terminated)

1.4.6 SDVDA3101-R

Features

- Conforms to SMPTE 259M
- Automatic input EQ
- Reclocking
- 8 outputs/card

Input Characteristics

- Standard SMPTE 259M
- Impedance 75 ohms
- Return loss >15dB to clock frequency
- Signal level 800mV ±10%
- Equalization automatic

Output Characteristics

- Standard SMPTE 292M
- Impedance 75 ohms
- Return loss >25dB to clock frequency
- Signal level 800mV ±10%
- DC offset 0V ±0.5V
- Rise and fall times 400-700pS (20 to 80% amplitude)
- Overshoot <10% of amplitude (all outputs terminated)

1.4.7 VDA3101GP

Features

- Bandwidth up to 1280X1024 @75Hz (about 150MHz)
- Handles inputs over 2V p-p to over 40 MHz
- 8 outputs

Input Characteristics

- Level 1V p-p nominal
- Type Differential
- Return loss >50dB to 10 MHz, >30dB to 150 MHz
- Impedance 75 ohms or High-Z
- Coupling DC or AC
- Common mode rejection > 55dB to 10 khz @ 4V p-p

Output Characteristics

- Level 1V p-p nominal
- Impedance 75 ohms
- Return Loss >50dB to 10 MHz, >25dB to 150 MHz

1.4.8 VDA3102

Features

- 1500’ EQ min., 1700’ EQ typ. (Approx. –1dB to 25 MHz)
- 3000’ EQ min. (VDA 3102E), 3400’ typ. (Approx. –1dB to 20 MHz)
- 8 outputs/card plus front panel BNC
- 650’ pre-EQ

Input Characteristics

- Level 1V p-p nominal; 2V p-p max (w/o obvious distortion)
- Common mode rejection >70dB @ 60 Hz; >40dB to 5 MHz
- Return Loss >-55dB to 5 MHz
- Coupling AC, DC, Selectable
- Type Differential
- Impedance HiZ or 75 ohms looping

Output Characteristics

- Impedance 75 ohms
- Return Loss >55dB to 5 MHz
- Coupling Direct DC
- Level 1V p-p nominal; 2V p-p max (w/o obvious distortion)
- DC on outputs <±20mV max (w/o clamp); <±10mV (with clamp)

1.4.9 VDA3103

Features

- 250 MHz bandwidth with EQ
- 275 MHz bandwidth without EQ
- 8 outputs/card with front panel BNC

Input Characteristics

- Level 1V p-p nominal
- Impedance 75 ohms looping
- Return Loss >45dB to 5 MHz
- Coupling DC (Direct)
- Type Balanced (Differential)
- Common mode rejection >65dB @ 60 Hz

Output Characteristics

- Level 1V p-p nominal
- Impedance 75 ohms
- Return Loss >50dB to 5 MHz
- Coupling DC (Direct)
- DC on outputs <±20mV max
- Isolation >50dB to 20 MHz
- Equalization 0 to 100 meters Belden 8281 or equivalent to 250 MHz

1.4.10 VDA3105

Features

- High level DA (0 to ±5V)
- H&V sync DA
- 8 outputs/card with front panel BNC

Input Characteristics

- Level 10V p-p centered at 0V
- Impedance 75 ohms looping
- Coupling DC (Direct)
- Type balanced (differential)
- Common mode rejection 60dB
- Return loss >40dB to 5 MHz

Output Characteristics

- Level ±5.0V p-p centered at 0V
- Impedance 75 ohms
- Coupling direct DC
- DC on outputs <±20mV max
- Isolation >40dB to 5 MHz
- Equalization 0 to 200 ft. Belden 8281

1.4.11 VDAC3101

Features

- Converts 270 MB/s component SDI input into analog outputs
- Front card edge provides additional composite analog output
- Four rear panel analog outputs, configurable as all NTSC/PAL-B composite, two composite and one Y/C, or one composite and one component
- Built-in color bar generator for set-up
- Provides 4 re-clocked, buffered SDI outputs
- 10 bit D-A, 8 bit encoding

Performance

- Signal-to-noise >56dB (weighted luminance to 10 MHz)
- Luminance frequency response 12 bits at 27 MHz
- Differential Gain <1.5%
- Differential phase <1.5 degrees
- K factor (2T) <1.0%
- Output level adjustment (internal) ±20%

1.4.12 ADA3118

Features

- Reclock and equalized
- 8 output
- Analog headphone monitoring

Digital Input Characteristics

- Input level 2-7V p-p
- Impedance 75 ohm unbalanced

Digital Output Characteristics

- Impedance 75 ohm unbalanced
- Jitter <±20ns
- Standard AES-3

1.4.13 ADAC3102

Features

- Two AES/EBU transformer coupled inputs
- Two stereo analog outputs per AES/EBU input
- 24 bit/96 KHz D-A converters for superior performance
- Supports LR swap, invert, sum, and difference modes via jumper selection
- Selectable 66 or 600 ohm output impedance dual analog headphones

Analog Output Characteristics

- Level +30dBm @66 ohms; +24dBm @600 ohms
- Impedance selectable 66 or 600 ohms

Digital Input Characteristics

- Input level 2-7V p-p
- Impedance 75 ohm unbalanced or 110 balanced, selectable
- Type transformer coupled
- Supported sample rates 28 to 96 KH

1.4.14 VADD3101-10

Features

- Excellent quality 10-bit NTSC/PAL to SDI decoder
- Automatic NTSC/PAL selection
- Composite, and Y/C inputs

Input Characteristics

- NTSC/PAL composite BNC
- Y/C, 2X BNC
- RGB. 3X BNC

Output Characteristics

- 4 SDI, SMPTE 259M BNCs
- A/D Converters: 10-bit, 2X oversampling
- Frequency: Resp. ±25dB to 5 MHz
- Size: Fits PESA VDA3100T frames
- Power: 7W

1.4.15 AADC3102

Features

- Two stereo analog input channels
- Three AES/EBU outputs per input channel
- 24 bit/96 KHz A-D converters for superior performance
- Dual analog headphone
- Selectable 75 or 110 ohm output impedance
- Supports LR swap, invert, sum and different modes via jumper selection

Analog Input Characteristics

- Input level +30dBm max.
- Impedance 600 or 30k ohm, selectable
- Return loss >35dB to 5.75 MHz

Digital Output Characteristics

- Impedance 75 ohm unbalanced or 110 ohm balanced, selectable
- Standard AES-3
- Supported sample rates 28 to 96 KHz

1.4.16 VDAE3101-10

Features

- Excellent quality 10-bit Serial Digital to Analog conversion
- Full 10-bit data path, 4X oversampling
- Simultaneous component and composite analog outputs
- Digital noise reduction

Input Characteristics

- SDI (SMPTE 259M), BNC

Output Characteristics

- YpbPr, Betacam, RGB (all with 3 BNCs) YC with 2 BNCs and NTSC/PAL with 1 BNC
- Size: Fits PESA VDA3100T frames
- Power: 7W

Chapter 2 - Installation

2.1 Introduction

This section details DA-3100 Video Mainframe installation procedures. The following topics are discussed:

- Receipt Inspection
- Unpacking
- Location
- Mounting
- Cabling
- Plug-In Video Card Installation
- Video Power Supply Installation
- Front Panel Installation
- Rear Panel Connectors
- DA-3100 Mainframe System Connections

The DA-3100 contains static sensitive devices. Care should be used when it is necessary to handle the internal circuit cards. It is recommended that a ground wrist strap and grounding mat be used before attempting any equipment installations.

2.2 Receipt Inspection

The DA-3100 Mainframe was 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 DA-3100 Mainframe is comprised of a frame, a backplane, up to two power supplies, and up to ten distribution boards. 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 DA-3100 Mainframe 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 DA-3100 Mainframe is rack mounted in a standard 19" equipment rack. DA frames are usually installed in the bottom of racks, making adjustments difficult. A new front edge gain pot that can be "tweaked" by hand solves this problem. Sufficient space must be provided behind the rack to allow for the video and power cables. 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 DA-3100 Mainframe's bottom while installing it in the rack. Figure 5 illustrates chassis installation in the equipment rack.

To install a DA-3100 Mainframe 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.

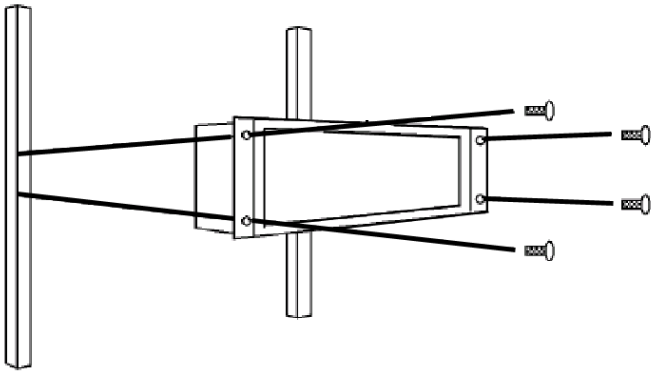


Figure 5. Chassis Installation

2.6 Cabling

Considerable weight will be added to the rear panel of the DA-3100 Mainframe by the video cables and power cables. 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 DA-3100 Mainframe should be installed in the equipment rack prior to attaching cables.

NOTE **It is <u>strongly</u> recommended that you utilize Belden 8281 (or equal) 75 ohm cable for all video cabling.**

NOTE **Do not use 50 ohm cable, as this will produce standing waves and oscillations.**

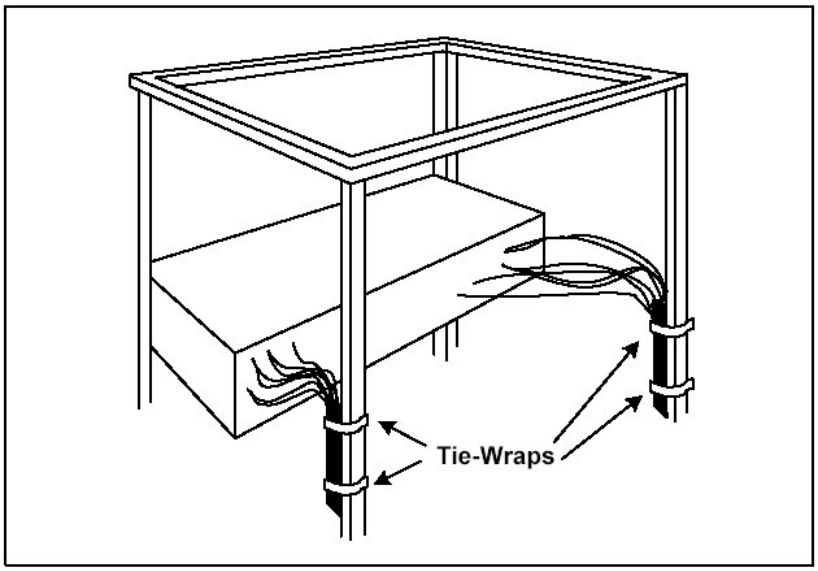


Figure 6. Cabling

Use the following rules when cabling the DA-3100 Mainframe:

1. Lay all cables in their intended positions, separating audio and video from power cables wherever possible.
2. Provide proper support for each cable during the cabling process. The use of tie-wraps is recommended, as in Figure 6.

2.7 Plug-In Card Installation

To install a card in the DA-3100 Mainframe follow these steps.

1. Align the card with a set of circuit card guides in either the center or left-hand compartment of the frame.
2. Carefully push the card into the frame until the circuit card connector makes initial contact with the backplane connector. At this point, firmly but carefully push the card into the frame while making sure the connectors are properly aligned. Continue pushing the card until it is in place and the connectors are firmly mated.
3. Repeat steps 1 and 2 for each card to be installed.

2.8 Power Supply Installation

Power is supplied to the DA-3100 Mainframe through an internally mounted Power Supply. Power can also be supplied by an internally mounted secondary power supply or from an external power supply through the external power supply connector. External power supplies must be diode isolated from the internal power supplies. An 1N5821 or equivalent type diode may be used for this purpose. See Figure 6 for an illustration of the isolation diode installation. Each Power Supply provides ±9-16 volts unregulated DC.

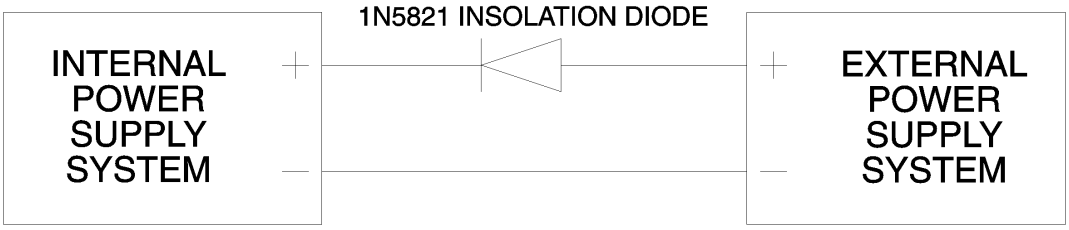


Figure 7. Isolation Diode Installation

In a redundant external power configuration, it should be noted that the DA-3100 Mainframe does not differentiate between the supply intended as primary power and the supply intended as backup. Therefore, consideration should be given to avoid overloading the power supplies by having less than one supply per frame in multi-frame configurations.

To install a Power Supply in the DA-3100 Mainframe follow these steps.

1. Align the primary Power Supply with the upper set of circuit card guides in the right-hand side of the frame.
2. Carefully push the Power Supply into the frame until the power supply connector makes initial contact with backplane power connector. At this point, firmly but carefully continue pushing the Power Supply into the frame while making sure the connectors are properly aligned. Continue pushing the Power Supply until it is in place and the connectors are firmly mated.
3. If a redundant power supply is to be installed, align it with the lower set of circuit card guides in the right-hand side of the frame and repeat step 2.

2.9 Front Panel Installation

To install the access door (front panel) of the DA-3100 Mainframe refer to Figure 8 and follow these steps:

1. Align the front panel to the front of the DA-3100 Mainframe.
2. Now slide the front panel onto the mainframe assembly until the slide locks snap into place.

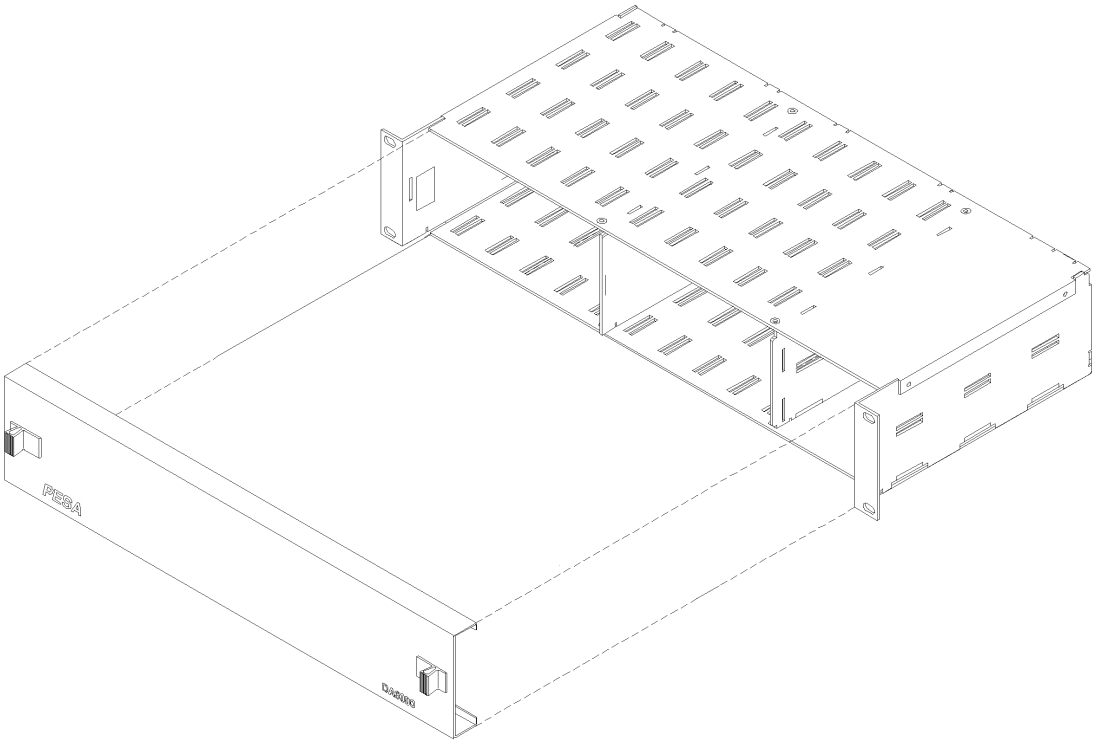


Figure 8. Front Panel Installation

2.10 Rear Panel Connectors

2.10.1 Alarm Connector

The alarm connector is disabled when Power Supplies are utilized to power the DA-3100 Mainframe (standard configuration) except when SDVDA3101 Boards are installed. The fan circuit is also disabled. When power supplies are utilized to power the DA-3100 Mainframe (optional configuration) the fan circuit is enabled and the alarm circuit, contained in power supply circuitry, acts as a switch to trigger an optional external alarm in the event of a failure in the power supply or of the external 110VAC (220VAC for the international version) source. The SDVDA3101 Board's alarm circuitry acts as a switch to trigger an optional external alarm in the event of an equalization loss. The alarm circuits supply a contact closure but do not provide an operational voltage for the external alarm. The alarm connector, located on the backplane, allows connection of the external alarm.

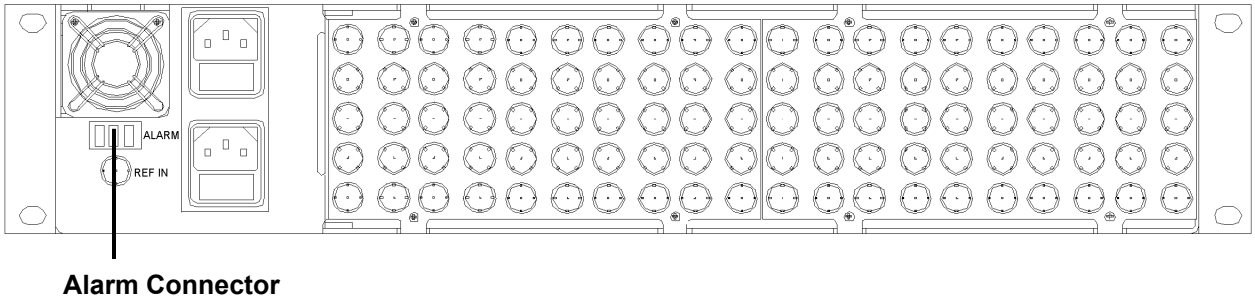


Figure 9. Alarm Connector

2.10.2 Video Input and Output Connectors

There are ten video loop-through connectors located on the rear panel of the DA-3100 Mainframe. There are also ten groups of video output connectors located on the rear panel. Each of these groups contain eight video output connectors.

2.11 DA-3100 Mainframe System Connections

Once the DA-3100 Mainframes are installed in the equipment racks, system connections can be made. Use the following guide and the sample system connections illustration, Figure 11, to insure that the DA-3100 Mainframe system connections are hooked up correctly.

2.11.1 Connection Guide

1. Connect the audio or video sources to the inputs. The video inputs are loop through connectors and can be daisy chained. The end of each video input daisy chain must be terminated with a 75 ohm termination.
2. Connect the audio or video outputs to the audio or video destinations.
3. Connect the primary power supply to the AC line.
4. If a redundant internal AC power supply is utilized, connect it to the AC line.

5. If a backup power supply is to be included in the system configuration, connect it to the DC input/output connector and then connect it to the AC line.

The DA-3100 Mainframe should now be powered up and ready for operation.

Chapter 3 – Maintenance

3.1 Maintenance

The DA-3100 Mainframe, the boards, and the Power Supplies 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.

3.2 Preventive Maintenance

Use the following guidelines for general preventive maintenance:

- Keep the inside of the frame clean, especially if your facility is subject to dust or dirt in the atmosphere. Use compressed air, an antistatic cloth, or an antistatic vacuum to clean the frame and internal components.
- Observe proper procedures for preventing electrostatic discharge when cleaning the unit, 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 Video Distribution Board, first swap out the board and recheck the system for the problem.

3.3 Corrective Maintenance

The following paragraphs provide information to assist the servicing technician in maintenance of the DA-3100 Mainframe, the boards, and the power supplies.

3.3.1 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 on the front of this manual. Call the PESA Service Department for a RMA number before shipping an equipment item.

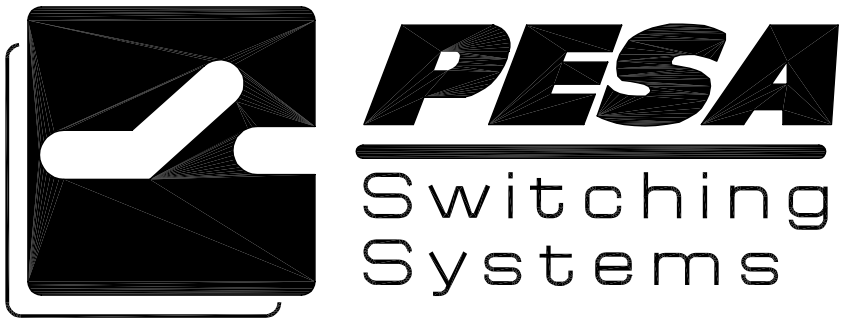
3.3.2 Troubleshooting

The best troubleshooting tool is a familiarity with the equipment and a through understanding of its operation. If all of the video outputs from a VDA-3100 Video Mainframe are missing, check the Power Supply System and the power supply line fuses. If some of the video outputs from a VDA-3100 Video Mainframe are missing, check the operation and adjustment of the individual Video Distribution Board whose outputs are missing.

<u>Do not</u> attempt to repair equipment that is in warranty. If the equipment is in warranty follow the procedures found under Factory Repair Service.

3.3.3 Replacement Parts

Only parts of the highest quality have been used in the design and manufacture of the DA-3100 Mainframe, the boards, and the power supplies. If the inherent stability and reliability are to be maintained, replacement parts must be of the same quality. 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.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