MVDA
Module Booklet

Operations Manual

PESA

Document No. 81-9059-0206-0 Rev D

Manual Updates:

06/17/94 Updated 1X3 and 2X2 manual modules in accordance with ECO#2272. These updates included changes to Sections 6 and 7 of the above listed modules. Added REV page.

03-01-01 Rev C: Deleted Printing Specification per ECO CE00113. GLT

03-14-01 Rev D: Deleted bills of material, drawings, and schematics per ECO CE00130. GLT

Service and Ordering Assistance

PESA Switching Systems, Inc.
330A Wynn Drive
Huntsville, AL 35805
Main Numbers:
Tel: (205) 726-9200
Fax: (205) 726-9271
Service Department Numbers:
Tel: (205) 726-9222
Fax: (205) 726-9268

Sales Office

National Sales Office
PESA Switching Systems, Inc.
35 Pinelawn Road, Suite 99E
Melville, NY 11747
Tel: (800) 328-1008
Fax: (516) 845-5023

PESA Switching Systems

NOTE

Please address all comments or suggestions concerning this or other PESA manuals to:

Publications Department
Attn: Charles E. Jaynes
(Engineering Technical Writer)
PESA Switching Systems, Inc.
330A Wynn Drive
Huntsville, Alabama 35805
(205) 726-9200 EXT. 145

PESA Switching Systems

HOW TO USE THIS MANUAL

This manual is divided into Modules; one for each type of MVDA frame configuration. Each Module explains the installation and operation of a specific MVDA frame.

Following these Modules are Appendixes explaining the SIMM cards that may be installed in the MVDA frames.

Please refer to the Module(s) and Appendix(es) descriptive of your equipment.

Table of Contents

Model 2416

Section 1. INTRODUCTION

Section 2. INSTALLATION

Section 3. OPERATION

Table of Contents

Model 2416 Continued

Section 4. FUNCTIONAL DESCRIPTION

Section 5. MAINTENANCE

Table of Contents

Model 4813

Section 1. INTRODUCTION

Section 2. INSTALLATION

Section 3. OPERATION

Table of Contents

Model 4813 Continued

Section 4. FUNCTIONAL DESCRIPTION

Section 5. MAINTENANCE

Table of Contents

Model 4822

Section 1. INTRODUCTION

Section 2. INSTALLATION

Section 3. OPERATION

Table of Contents

Model 4822 Continued

Section 4. FUNCTIONAL DESCRIPTION

Section 5. MAINTENANCE

Table of Contents

SIMM Cards

Appendix A
Unbalanced MVDA Card #81906511795

Appendix B
Balanced MVDA Card #81906510144

Appendix C
BEC3 MVDA Card #81906513064

Table of Contents

SIMM Cards Continued

Appendix D
Equalized MVDA Card #81906513502

1.1 Module Overview – MVDA 2416

This module provides detailed instructions for installing and operating the PESA MVDA 2416 Panel. This module is divided into seven sections described below.

Section 1, **INTRODUCTION**, summarizes the manual, describes the MVDA 2416, presents a list of terms, and provides the panel specifications.

Section 2, **INSTALLATION**, provides installation and setup instructions.

Section 3, **OPERATION**, describes system operation procedures.

Section 4, **FUNCTIONAL DESCRIPTIONS**, presents a description of each component.

Section 5, **MAINTENANCE**, explains procedures for maintenance.

1.2 General Description

PESA's MVDA 2416 is a high-bandwidth Video Distribution Amplifier frame. It interfaces with the PESA RM4000 and RM5000 Video Matrix Switchers, and also functions as a standalone unit.

All MVDA plug-in amplifiers are designed on miniature surface-mounted "SIMM" cards for easy installation and high product reliability. Different types of MVDA cards may be loaded into the MVDA 2416. Refer to the appropriate Appendix for the "SIMM" card information that will be ulitized in your system.

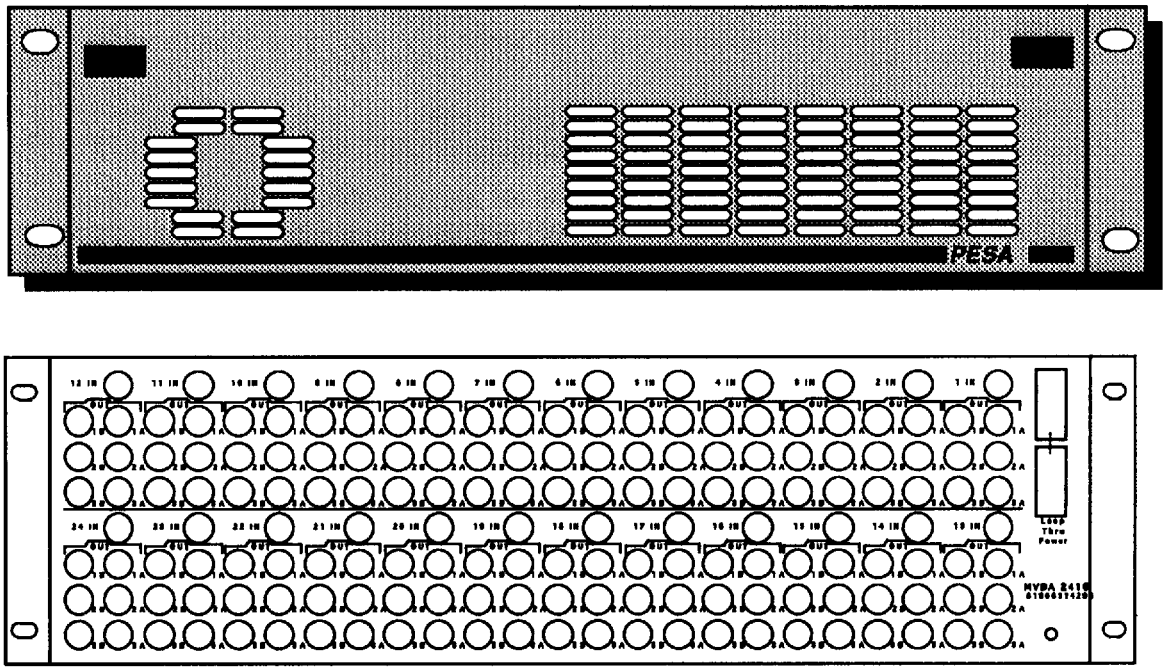

Figure 1–1 MVDA 2416 Chassis Front and Rear View

Figure 1–1 shows the MVDA 2416 chassis. It is compact and lightweight with two front door slide latches that allow easy access. A vent screen and a door-mounted fan are provided for internal cooling.

The MVDA 2416 is designed with the following features:

- Easy system installation and maintenance.
- Intermixing of amplifier configurations in a single chassis without restriction.
- Gain and frequency controls provided for each individual card.

1.3 MVDA 2416 Function

Each MVDA 2416 1x6 circuit position is a "one-in, six-out" distribution amplifier with terminating input. Each position has the ability to distribute a single source to six **RM4000** or **RM5000** routing switcher frames.

With RM4000 Switcher Frames:
The MVDA 2416 1x6 frame is designed to facilitate *output expansion* of the PESA RM4000 routing switcher. This expansion has the ability to take the system above the 40 outputs available on a single routing switcher frame. Figure 1–2 represents one video source using a single MVDA 2416 1x6 channel with RM4000 Matrix Switcher frames:

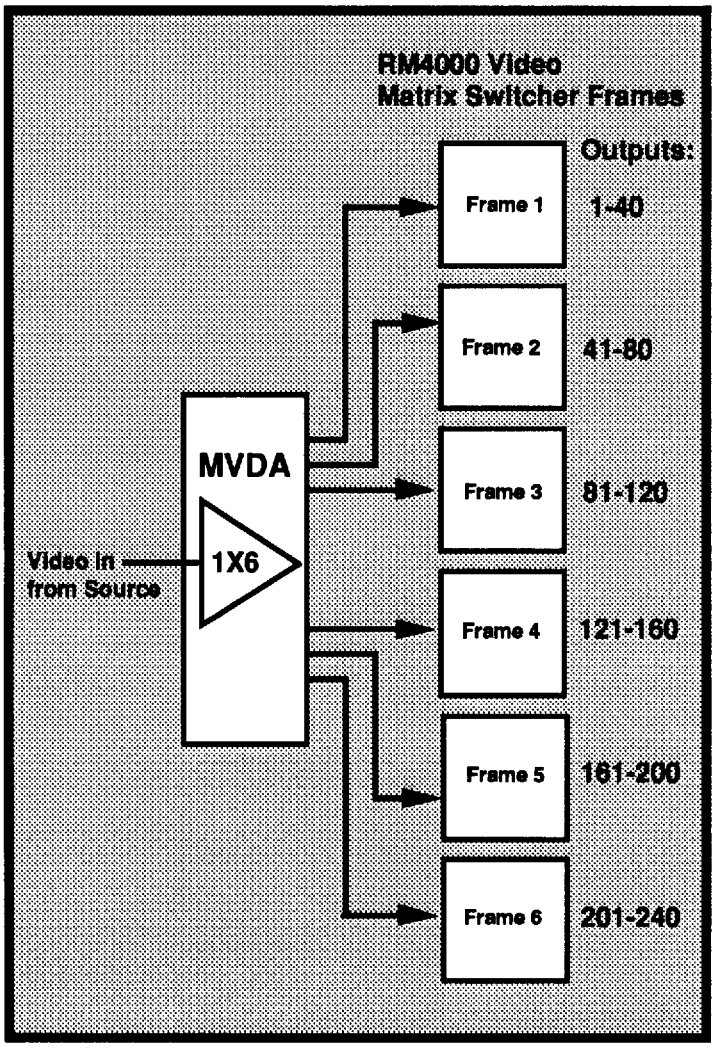

Figure 1–2 MVDA 2416–1x6 Single Channel Block Diagram with RM4000 Switcher Frames

MVDA 2416 1x6 Function (cont.)

By connecting a video source to an MVDA 2416 1x6 circuit input and using all six MVDA 2416 outputs, the following output expansion combinations are possible:

For RM4000 Switcher Frames:

- Connect MVDA 2416 1x6 output 1 to Routing Switcher frame 1: provides outputs 1 to 40.

- Connect MVDA 2416 1x6 output 2 to Routing Switcher frame 2: provides outputs 41 to 80.

- Connect MVDA 2416 1x6 output 3 to Routing Switcher frame 3: provides outputs 81 to 120.

- Connect MVDA 2416 1x6 output 4 to Routing Switcher frame 4: provides outputs 121 to 160.

- Connect MVDA 2416 1x6 output 5 to Routing Switcher frame 5: provides outputs 161 to 200.

- Connect MVDA 2416 1x6 output 6 to Routing Switcher frame 6: provides outputs 201-240.

MVDA 2416 1x6 Function (cont.)

With RM5000 Switcher Frames:

The MVDA 2416 1x6 frame is designed to facilitate *output expansion* of the PESA RM5000 routing switcher. This expansion has the ability to take the system above the 96 outputs available on a single routing switcher frame. Figure 1–3 represents one video source using a single MVDA 2416 1x6 channel with RM5000 Matrix Switcher frames:

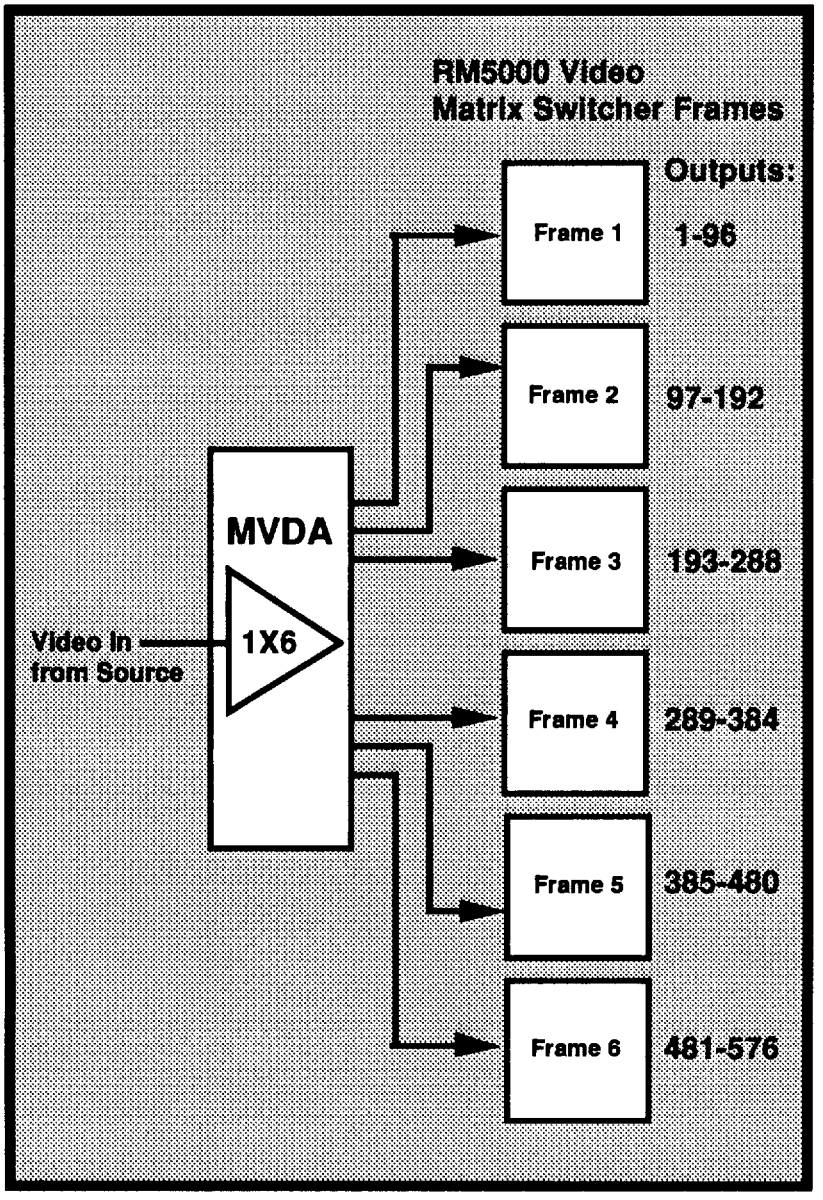

Figure 1–3 MVDA 2416– 1x6 Single Channel Block Diagram with RM5000 Switcher Frames

MVDA 2416 1x6 Function (cont.)

By connecting a video source to an MVDA 2416 1x6 circuit input and using all six MVDA 2416 outputs, the following output expansion combinations are possible:

For RM5000 Switcher Frames:

- Connect MVDA 2416 1x6 output 1 to Routing Switcher frame 1: provides outputs 1 to 96.

- Connect MVDA 2416 1x6 output 2 to Routing Switcher frame 2: provides outputs 97 to 192.

- Connect MVDA 2416 1x6 output 3 to Routing Switcher frame 3: provides outputs 193 to 288.

- Connect MVDA 2416 1x6 output 4 to Routing Switcher frame 4: provides outputs 289 to 384.

- Connect MVDA 2416 1x6 output 5 to Routing Switcher frame 5: provides outputs 385 to 480.

- Connect MVDA 2416 1x6 output 6 to Routing Switcher frame 6: provides outputs 481-576.

1.4 System Specifications

MVDA 2416 Mainframe Specifications

General

Number of Cards per frame	Maximum of 48
Connector Type	BNC

Input

Input Number	48
Input Type	75 Ohm, Terminated Differential Available
Input Return Loss	-40dB to 4.43 MHz

Output

Output Number	6 per channel
Output Return Loss	-40dB to 4.43 MHz

Mechanical Frame

Height	5.25 in.	(133.3 mm)
Width	19.00 in.	(482.6 mm)
Depth	5.00 in.	(127.0 mm)

Environmental

Temperature	0° C to 40° C
Humidity	20% to 90% Non Condensing

2.1 In This Section

This section details the MVDA 2416 installation procedures. The following topics are discussed:

- Receipt Inspection
- Location
- Chassis Mounting
- Power Connections
- Cabling
- SIMM Card Installation

2.2 Receipt Inspection

The MVDA 2416 system was inspected and tested prior to leaving the PESA factory. Upon receipt, inspect the unit for shipping damage. If damage is detected, notify the carrier immediately and hold all packing material for inspection. After unpacking, compare all parts received against the purchase order. If the unit is undamaged and all components have been received, proceed with installation.

Identify that you have received the correct MVDA frame:

- Check the rear chassis labeling. Figure 2–1 illustrates the rear panel label for *one circuit* of the MVDA 2416:

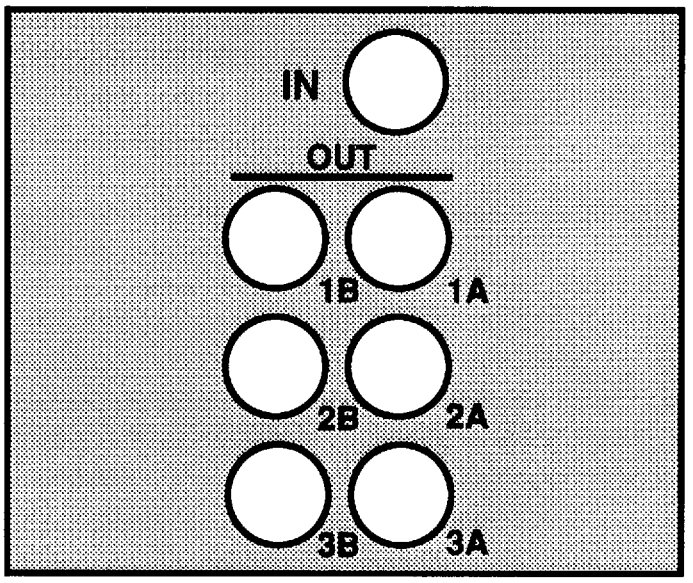

Figure 2–1 MVDA 2416–1x6 Rear Panel Silk-Screen

2.3 Location

The MVDA 2416 chassis should be positioned for convenient visual and physical access. An area should be selected where temperature does not exceed 40°C inside the equipment rack, and where air can circulate freely.

To minimize cable runs, the MVDA 2416 chassis should be located as close as possible to the associated routing switcher frames.

2.4 Chassis Installation

Figure 2–2 illustrates MVDA 2416 chassis installation:

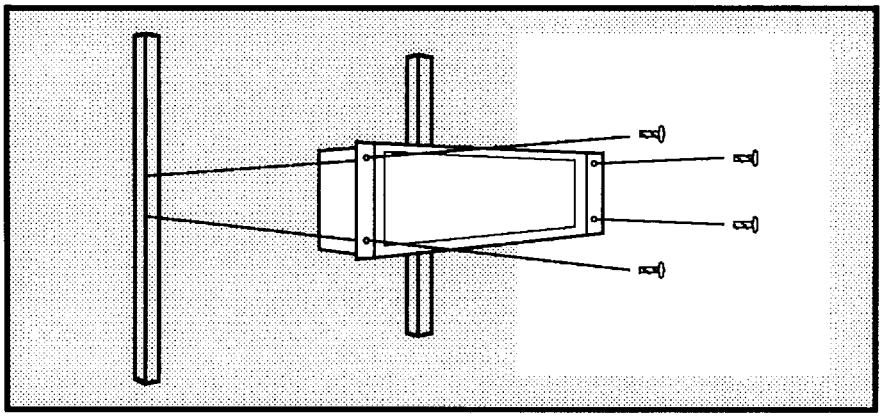

Figure 2–2 MVDA 2416 Chassis Installation

The MVDA 2416 chassis is rack mounted in a standard 19" equipment rack. Sufficient space must be provided behind the chassis to allow for coax and power cable installation. To install the chassis, follow these steps:

1. Align the chassis with the threaded or slotted openings in the rack.
2. For ease of installation, and to support the unit, install the two bottom screws first.
3. Install the two top screws.
4. Tighten all four screws securely.

2.5 Power Connections

Power for the MVDA chassis is supplied from the PS140 or the PS270 power supply mounted on the rear of the switching unit(s). Which power supply is used is determined by the switching unit in your system. An external "standalone" power supply can also be used. See Figure 2–7.

The power supply has sufficient power to drive *one* routing switcher plus *one* MVDA frame.

Figure 2–3 illustrates the power connectors on the rear panel of the MVDA chassis, located immediately to the right of circuit 1:

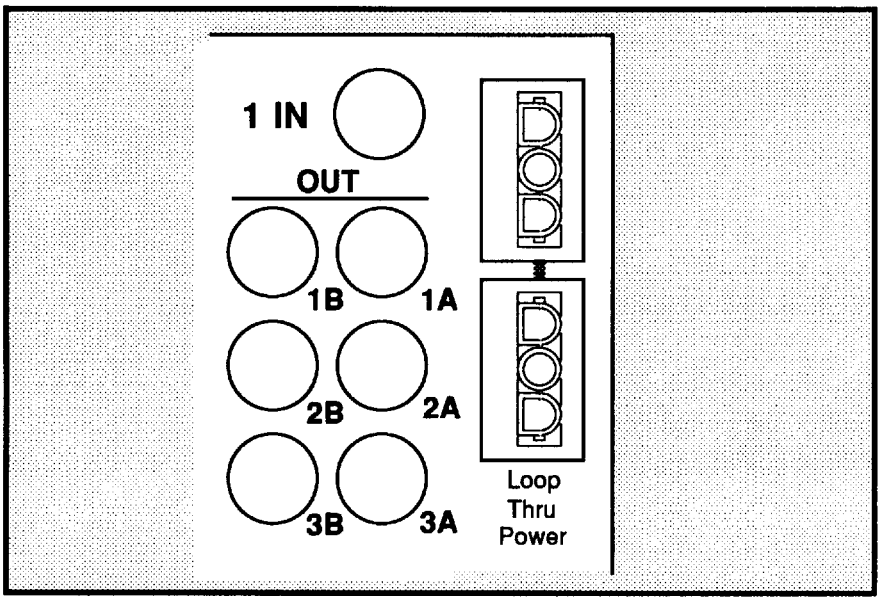

Figure 2–3 MVDA 2416 Power Connectors

Two *identical* connectors are provided so that power can be looped from one chassis to another.

Power Connections (cont.)

Power connection depends on your individual system configuration, however, three basic choices are available:

- **Direct Power**
  Figure 2–4 illustrates the direct method, connecting the Power Supply output to the power connector on the MVDA chassis:

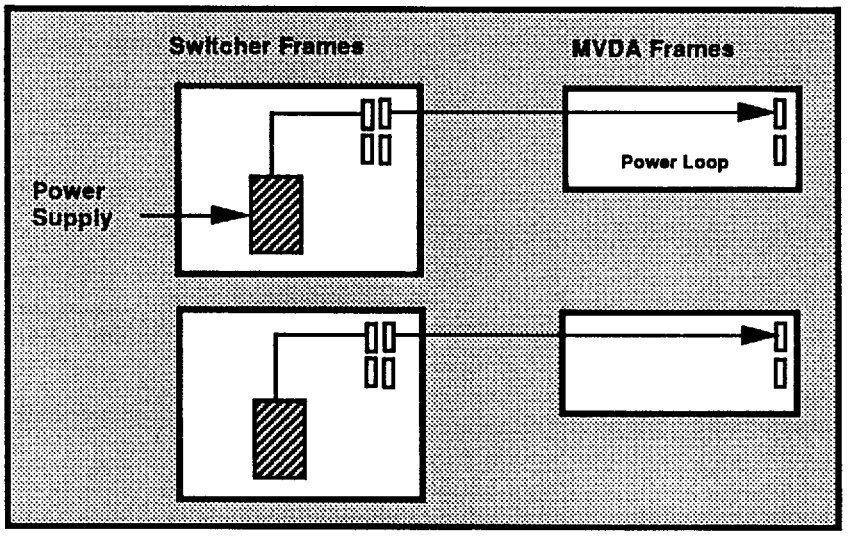

Figure 2–4 "Direct" Power Connection Method

- **Redundant Power**
  Figure 2–5 illustrates the fully redundant power connection method:

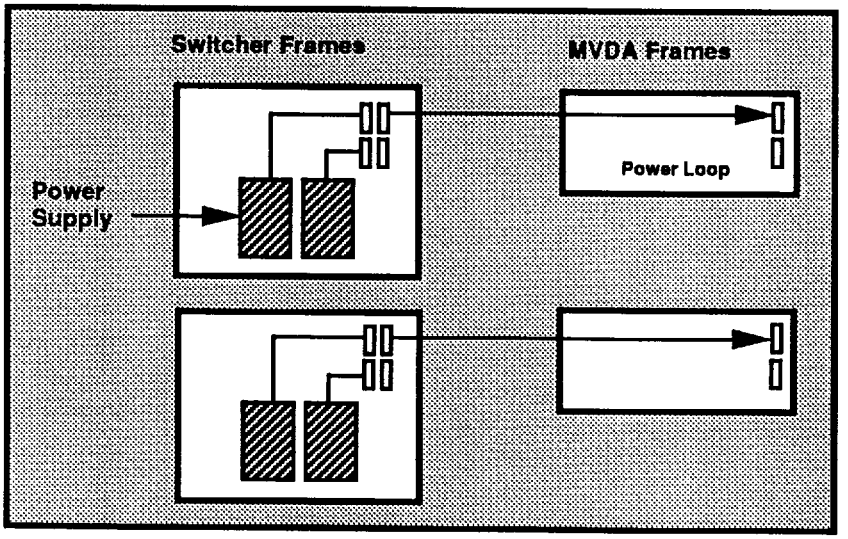

Figure 2–5 "Redundant" Power Connection Method

Power Connections (cont.)

Using the redundant method, both the primary and backup Power Supply outputs are connected to the power loop on the routing swithcer, and one power connection is made to the MVDA chassis. Should either power supply fail, the other supply takes over.

- **"N+1" Power**
  Figure 2–6 illustrated the "N+1" power connection method:

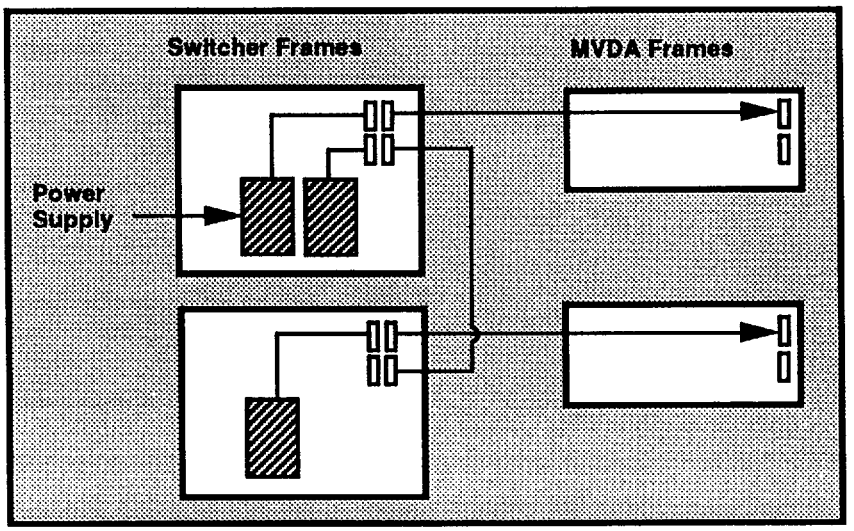

Figure 2–6 "N+1" Power Connection Method

The "N+1" power connection method places an extra power supply in the loop at the routing switcher frame, and also loops the MVDA frames together. Should any supply fail *throughout* the system, an extra supply is available.

NOTE:
Using the "N+1" method, should any power supply in the loop fail, be sure to restore "N+1" status immediately by replacing the failed supply.

Using the supplied power cable, connect power to the MVDA frame(s) as required by your system configuration. Be sure to consider power supply capacity by spreading the load to avoid overloading any single supply. In addition, ensure that the removal of a primary or redundant supply does not overload the remaining supplies.

Power Connections (cont.)

Power may also be supplied to the MVDA chassis through a rear rack mounted PS140V or PS270V power supply. If mounting a power supply on the rack, the PS140V requires mounting rack bracket #81903461549 and power cable #81906511837. The PS270V requires mounting rack bracket #81903461329 and power cable #81906514039. Connections have been furnished for redundancy and can be accomplished by adding one additional power supply to the last frame.

Figure 2–7 illustrates power connection for one or two MVDA frames with optional redundant power. **One** PS140V power supply is required for **one** MVDA frame. **Two** MVDA frames require **one** PS270 power supply. No more than two frames can be powered by a single PS270V power supply.

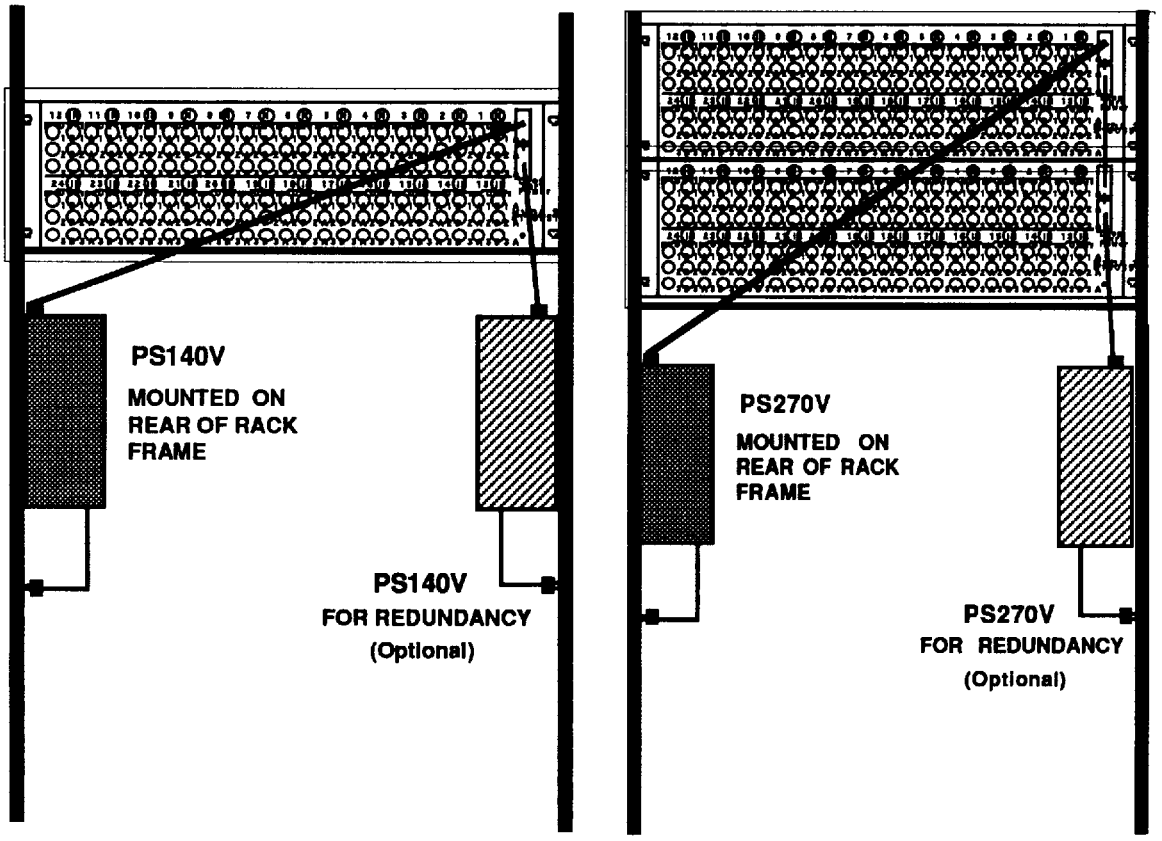

Figure 2–7 Rack Mounted Power Supplies

2.6 Cabling

NOTE:
Use only 75Ω Cable.

Use the following steps to cable the MVDA 2416 chassis:

1. Lay all cables in their intended positions, separating video cables from power cables wherever possible.
2. Connect each cable to the chassis, and provide proper support for each cable during the connection process. The use of tie-wraps is recommended, as shown below in Figure 2–8:

NOTE:
Failure to provide cable support can result in cables separating from their connectors, or broken connectors on the mainframe.

3. Connect each cable to the appropriate destination, ensuring that each cable is secured with proper support, no cable strain is evident, and no cable is placed in a hazardous position.

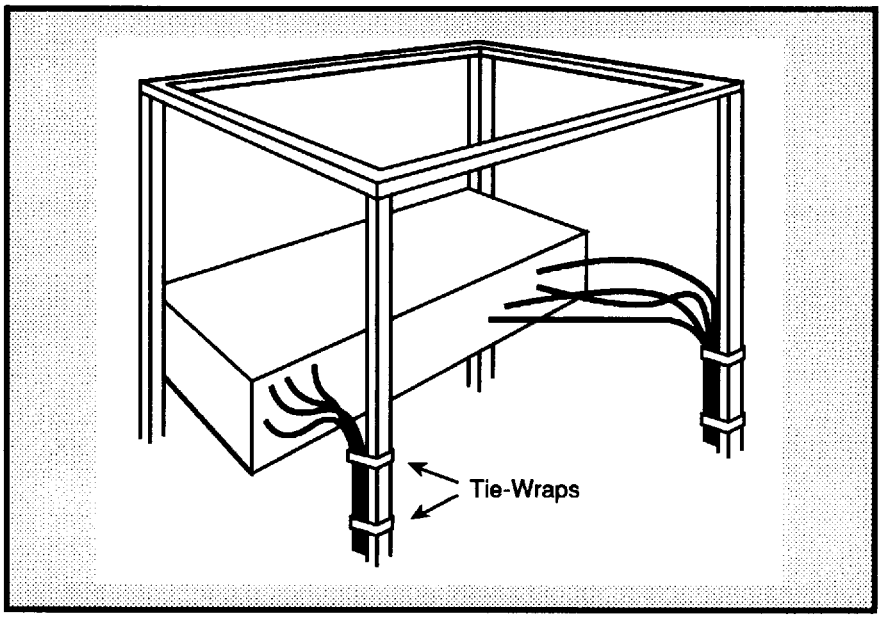

Figure 2–8 Cables Attached To Supports

2.7 SIMM Card Installation

NOTE:
As with all semiconductor equipment, electrostatic discharge can damage the MVDA system. Ensure that all tools and personnel handling individual components are properly grounded prior to SIMM removal or installation.

Use the following steps to insert a SIMM card:

1. Ensure that power is off to the MVDA chassis.

NOTE:
If power cannot be turned off due to "in use" circumstances, the card *can* be installed with power on. As detailed in the following steps, great care should be exercised to ensure that all gold contacts are carefully aligned with the socket *before* the SIMM touches any connector contacts. Momentary cross-connections made with power ON can damage the card.

2. Place the side of the SIMM card with the **radius notch** beside the socket end which contains the small barrier strip. Use the diagram Figure 2–8 for reference. The notch prevents the card from being inserted backwards.

3. Before allowing the socket's contacts to touch the card, carefully align the card so that both ends are in the connector, and the card is *exactly* parallel with the socket. Refer to (**A**) in Figure 2–9.

4. Once aligned, tilt the card to the angle shown in Figure 2–10 (**A**).

5. Maintain the angle and insert the card into the socket so that all contacts mate simultaneously (**B**).

6. Pivot the SIMM card by its base to an upright position until it snaps into place (**C**).

SIMM Card Installation (cont.)

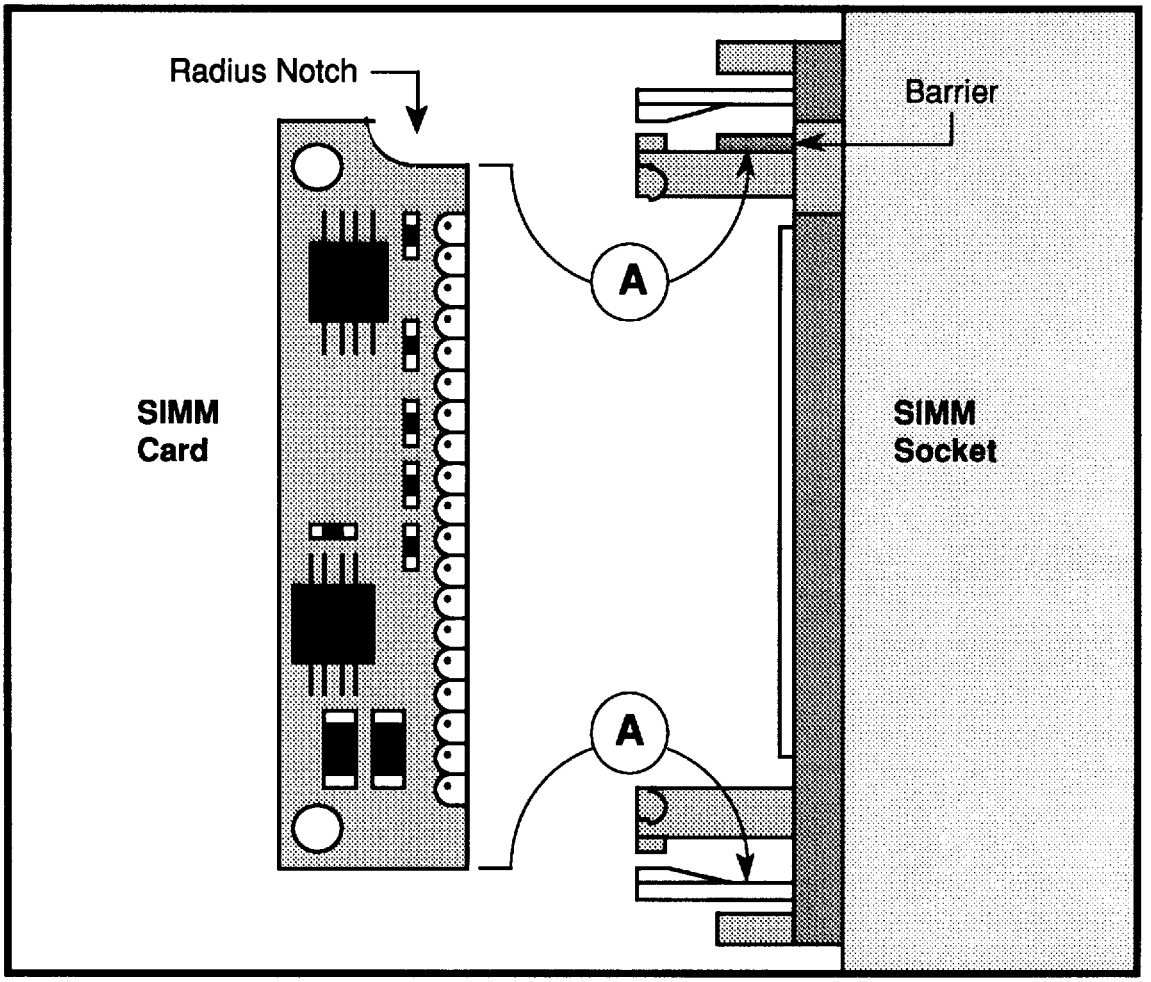

Figure 2–9 SIMM Card Alignment

SIMM Card Installation (cont.)

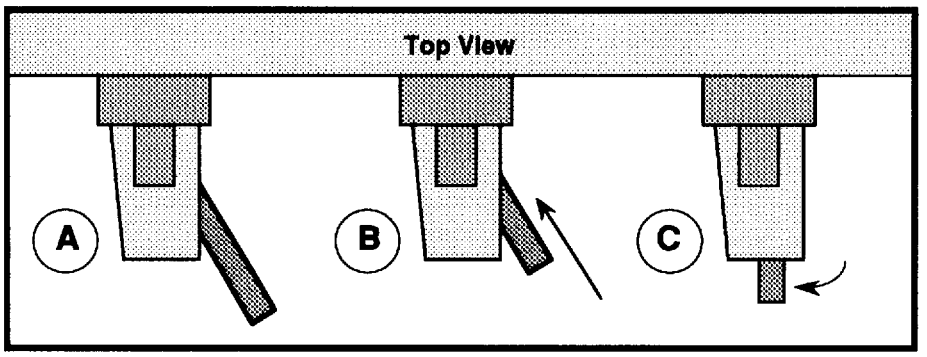

Figure 2–10 SIMM Card Installation

Because the socket contacts are spring-loaded, some pressure may be required during installation. Ensure that the end tabs on the socket posts are secured around the edges of the SIMM card.

Use the following steps to remove a SIMM card:

1. Ensure that power is off to the MVDA chassis.

NOTE:
If power cannot be turned off due to "in use" circumstances, the card *can* be removed with power on. As detailed in the following steps, great care should be exercised to ensure that the card is pulled straight out, avoiding any momentary cross-connections which can damage the SIMM card.

2. Place both thumbs on the inner edges of the socket end-tabs, and place both forefingers behind the card itself.

3. Gently pull the end tabs outward, while at the same time applying gentle pressure forward with your forefingers. Continue until the card snaps from position (**A**) to position (**B**), as shown in Figure 2–11.

SIMM Card Installation (cont.)

4. Maintain the angle, and remove the SIMM card from the socket by pulling it straight out (**C**). Ensure that you pull the card's top and bottom edges simultaneously, avoiding cross-connections.

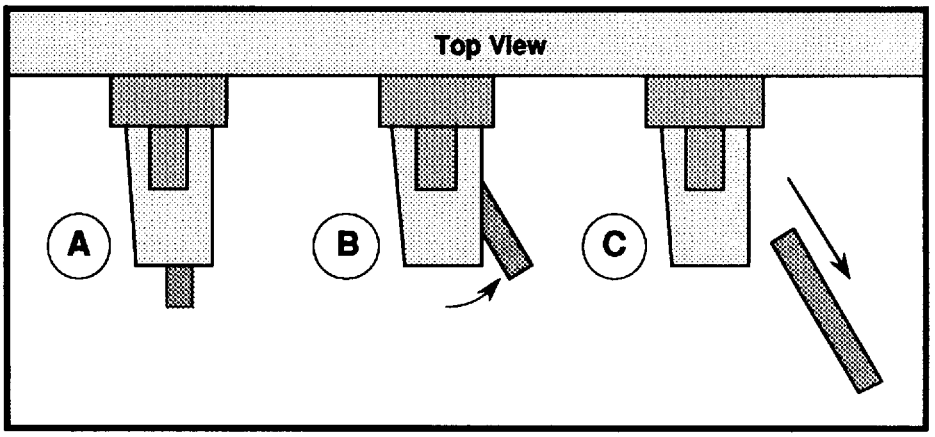

Figure 2–11 SIMM Card Removal

3.1 In This Section

This section details MVDA 2416 operations procedures. The following topics are discussed:

- Basic Operations
- Location of Backplane Adjustments

3.2 Basic Operations and Backplane Adjustments

Operation of the MVDA 2416 is completely transparent to the user once the unit is installed, cabled, and powered. No operator controls are provided.

The MVDA 2416 system is factory-set for flat gain and frequency response. Under special circumstances, however, gain and frequency for individual channel(s) may need to be adjusted so that amplifier input matches amplifier output:

• Adjust *new* amplifiers which are added to the frame. Note that *no adjustments* of the system's existing amplifiers would be required at this point.

• Adjust gain and frequency when *different* amplifier cards are plugged into a specific connector.

Figure 3–1 illustrates a single channel representation of the MVDA 2416 backplane, showing the location of the gain trimmers and the high frequency adjustment:

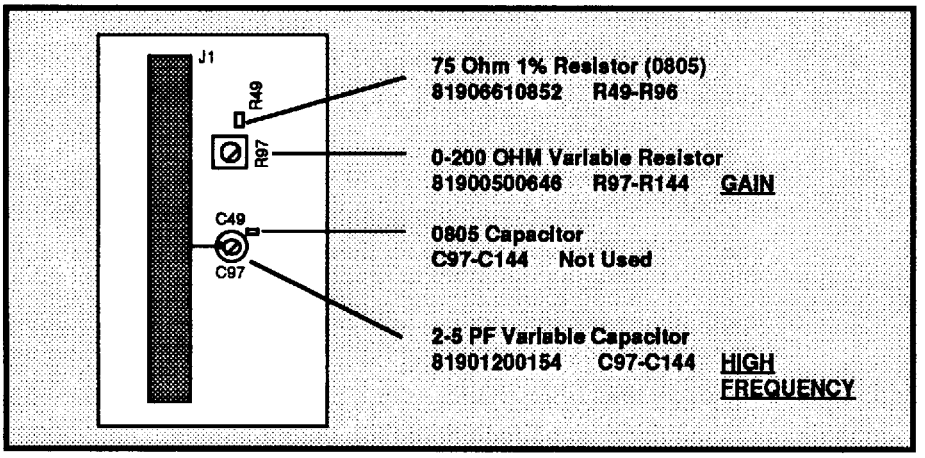

Figure 3–1 Backplane Assembly, Single Channel View

Backplane Adjustments (cont.)

When SIMM cards are installed in the MVDA 2416, they are looped together in pairs in order to provide the one input and six outputs. To make adjustments on the backplane, you must adjust **two channels** to cover all outputs. For example: To adjust the gain for all six outputs, adjust R98 to cover outputs 1A, 2A, and 3A; adjust R97 to cover outputs 1B, 2B, and 3B. High frequency adjustment is accomplished in the same manner by using C98 and C97. This configuration allows for two output adjustments per input. This feature is beneficial when using different lengths of cable. Figure 3-2 illustrates adjustment locations.

NOTE:
Refer to the specific SIMM card instructions in the Appendix section of this manual for card adjustments.

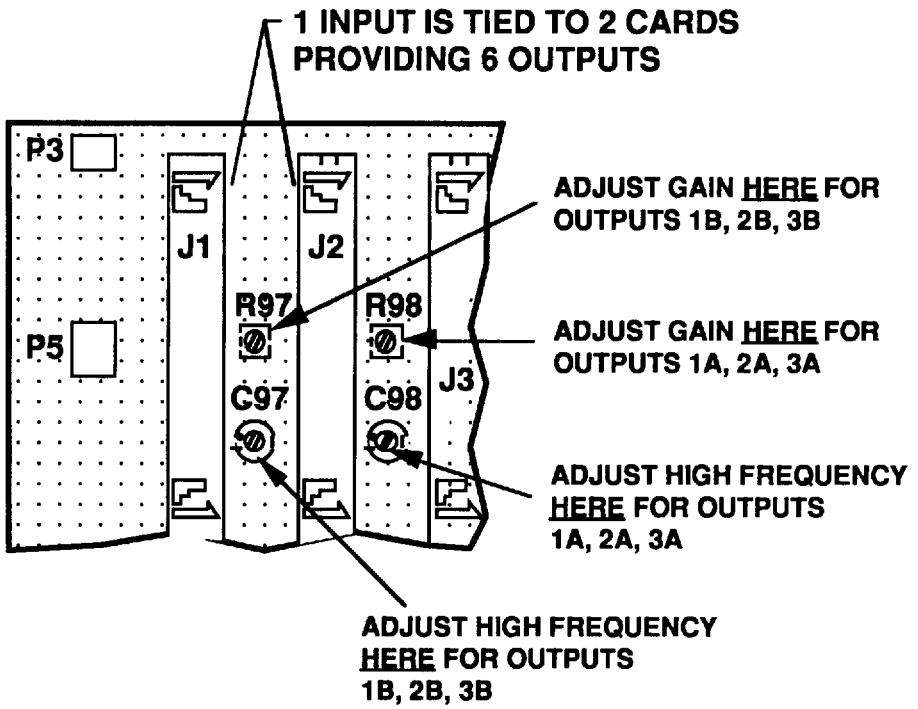

Figure 3–2 Backplane Adjustments for Gain and High Frequency

4.1 In This Section

This section provides functional descriptions of MVDA 2416 components. The following topics are discussed:

- General Information
- MVDA 2416 frame
- Power

4.2 General

The MVDA 2416 is a Video Distribution Amplifier which interfaces with the PESA RM4000 and RM5000 Video Matrix Switchers. It consists of a 3RU frame, backplane, and 48 identical circuits. Each circuit utilizes six rear-panel BNC connectors and has up to 48 SIMM cards plugged into it.

The hardware package is manufactured for high reliability, easy installation, and easy maintenance. An open vent screen and a fan in the front door provide cooling for all amplifier cards. Two slide latches hold the front door in place and allow easy access to the cards.

4.3 MVDA 2416 Frame

The MVDA 2416 includes a terminating input and six outputs for each circuit.

On the backplane assembly of the MVDA 2416, gain can be adjusted for ±1.5 dB.

Also accessible inside the chassis on the backplane are the center contacts of each rear-panel BNC connector. These contacts provide access for scope probes as required. On the MVDA 2416, the top BNC contact is input; the bottom six are outputs.

4.4 Power

Power for each MVDA 2416 mainframe is supplied from an external PS140V or a PS270V power supply. One PS140V can power one frame. One PS270V can power up to two frames.

Positioned on the left hand side of the backplane assembly are three power connector headers: a 4-pin, 6-pin, and 10-pin, used to install the plug-in fuse card.

Figure 4–1 illustrates the power connector headers for the plug-in fuse card:

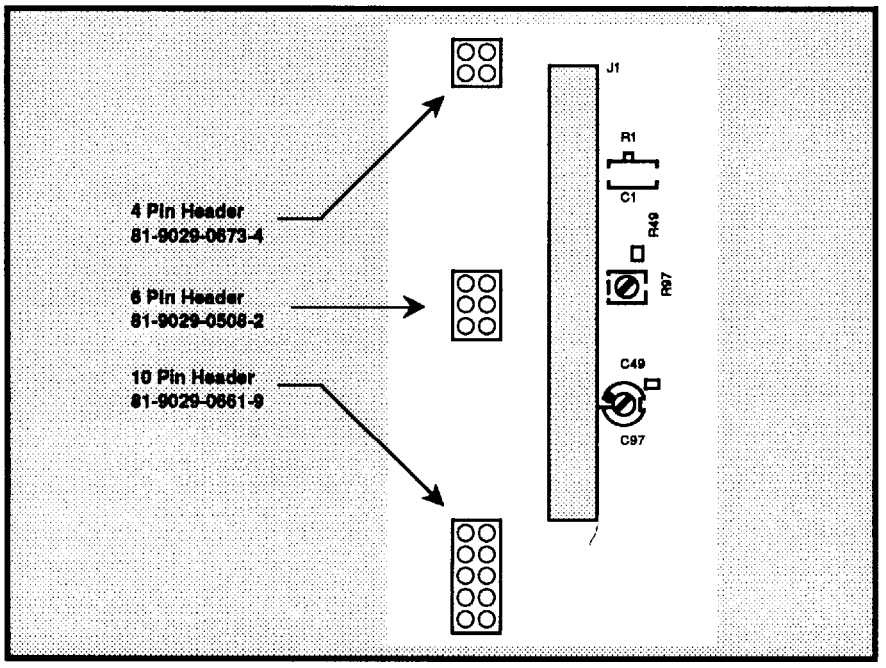

Figure 4–1 Backplane Power Headers for the Plug-In Fuse Card

4.5 Plug-In Fuse Card

The fuse card protects the MVDA 2416 frame from being damaged by a short circuit or other fault condition that might otherwise overload the frame. The fuse card is composed of four fuses each rated at 7 Amperes. Two are for the top half of the frame, and two identical fuses are for the bottom half. This prevents one fault from dissabling the entire frame. Fuses F1 (+V) and F2 (-V) are associated with the top half of the frame. Fuses F3 (+V) and F4 (-V) are associated with the bottom half of the frame.

The fuse card also provides power for the fan control card via P1. The fan control card is associated with F3 and F4.

Power to the frame should be dissconnected before removing or inserting the fuse card.

Figure 4–2 illustrates the plug-in fuse card.

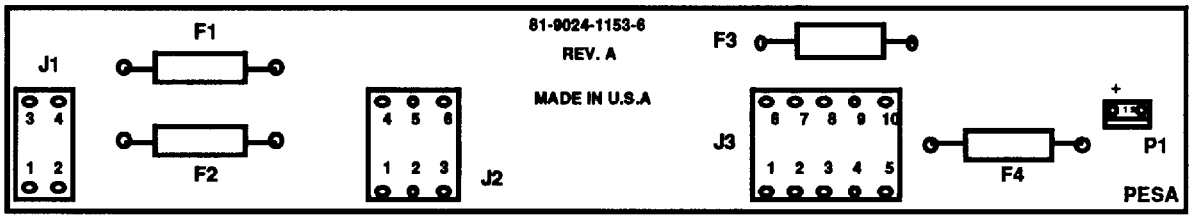

Figure 4–2 Plug-In Fuse Card

5.1 In This Section

This section discusses the recommended maintenance procedures for the system.

5.2 General

The PESA MVDA system is designed to provide extended, trouble-free service with minimum maintenance requirements. Other than the normal care which should be given to any advanced solid-state electronic device, there are few additional maintenance requirements on the unit.

If the need arises to make adjustments on the backplane or on the "SIMM" card, follow the procedures outlined in Section 3 and/or the appropriate Appendix for the type of MVDA card installed in your system.

If additional technical assistance is required, please refer to the "**Ordering Assistance, Service & Inquiries**" sheet in the front of this manual.

5.3 Preventive Maintenance

Use the following guidelines for general preventive maintenance:

- Clean the filter as required.
- Keep the inside of the frame clean, especially if your facility is subject to dust or dirt in the atmosphere. Use compressed air, an anti-static cloth, or a gentle vacuum and soft brush to clean the grille 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.

Preventive Maintenance (cont.)

- The center conductors of each BNC connector are readily accessible inside the frame, if you wish to check system input and output levels. It is recommended that a scope with a 10:1 probe is used for minimum signal disturbance.
- If a problem is suspected with an individual amplifier stage, first swap out the amplifier and re-check the system for the problem.

  If the problem can be isolated on the amplifier itself, and your facility is equipped for surface-mount device repair, proceed with repairs using the schematics provided in Section 6 of this manual.
- For replacement components or replacement amplifiers, contact PESA technical support. Refer to the "**Ordering Assistance, Service & Inquiries**" sheet in the front of this manual for details.

NOTE:
Do not repair equipment under warranty without first contacting PESA. PESA warrants the MVDA equipment against defective workmanship or materials for a period of one year from the date of purchase. Refer to the "Equipment Warranty" sheet in the front of this manual for further information.

1.1 Module Overview – MVDA 4813

This manual provides detailed instructions for installing and operating the PESA MVDA 4813 Panel. This manual is divided into seven sections as shown.

Section 1, **INTRODUCTION**, summarizes the manual, describes the MVDA 4813 product, presents a list of terms, and provides the panel specifications.

Section 2, **INSTALLATION**, provides installation and setup instructions.

Section 3, **OPERATION**, describes system operation procedures

Section 4, **FUNCTIONAL DESCRIPTIONS**, presents an in-depth description of each MVDA 4813 component.

Section 5, **MAINTENANCE**, explains procedures for maintenance

1.2 General Description

PESA's MVDA 4813 is a high-bandwidth Video Distribution Amplifier frame. It interfaces with the PESA RM4000 and RM5000 Video Matrix Switchers, and also functions as a standalone unit.

All MVDA plug-in amplifiers are designed on miniature surface-mounted "SIMM" cards for easy installation and high product reliability. Different types of MVDA cards may be loaded into the MVDA 4813 panel. Refer to the appropriate Appendix for the "SIMM" card information that will be utilized in your system.

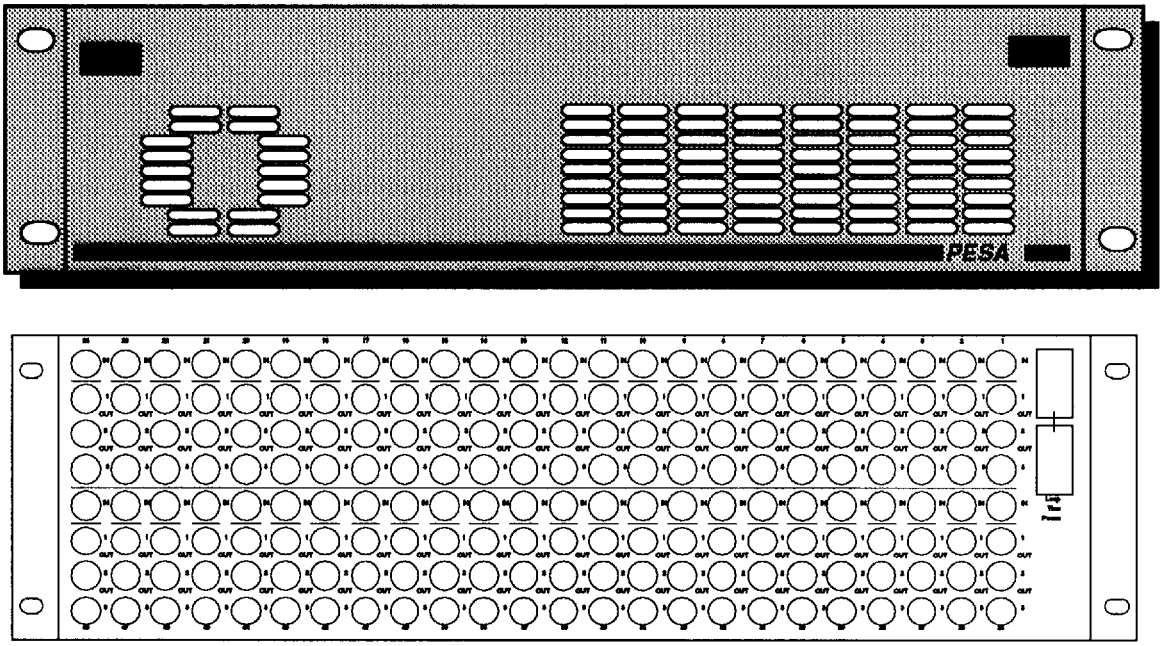

Figure 1–1 MVDA 4813 Chassis Front and Rear View

Figure 1–1 shows the MVDA 4813 chassis. It is compact and lightweight with two front door slide latches that allow easy access. A vent screen and a door-mounted fan are provided for internal cooling.

The MVDA 4813 is designed with the following features:

- Easy system installation and maintenance.
- Intermixing of amplifier configurations in a single chassis without restriction.
- Gain and frequency controls provided for each individual card.

1.3 4813 Function

Each MVDA 4813 circuit position is a "one-in, three-out" distribution amplifier with terminating input. Each position has the ability to distribute a single source to three RM4000 or RM5000 routing switcher frames.

The block diagram shown below in Figure 1–2 represents one video source using a single MVDA 4813 channel:

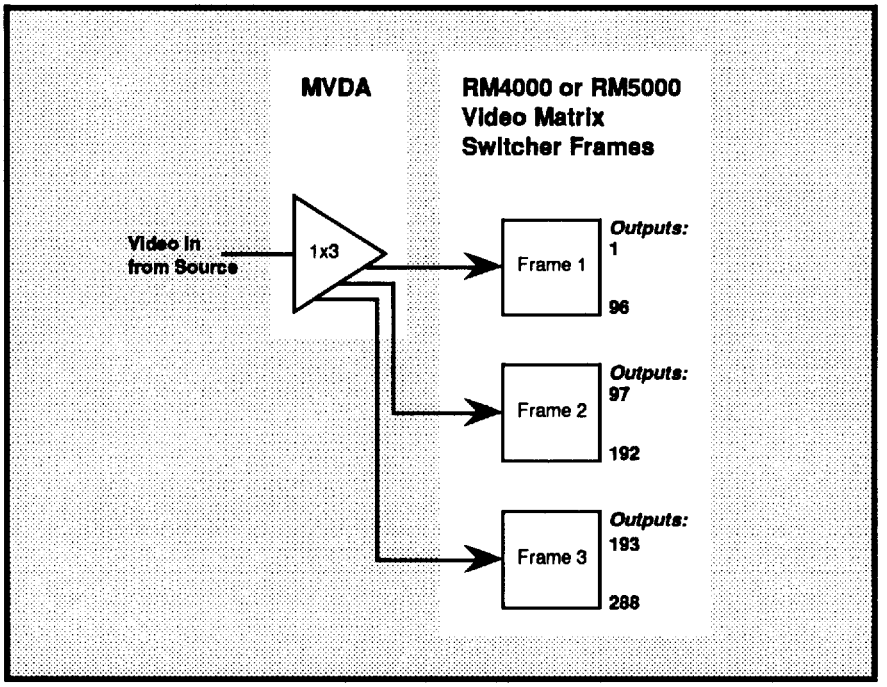

Figure 1–2 MVDA 4813 Single Channel Block Diagram

As illustrated above in Figure 1–2, the MVDA 4813 frame is designed to facilitate *output expansion* of the PESA RM4000 and RM5000 routing switchers. This expansion has the ability to take the system above the 96 outputs available on a single routing switcher frame.

4813 Function (cont.)

By connecting a video source to an MVDA 1x3 circuit input and using all three MVDA outputs, the following output expansion combinations are possible:

- Connect MVDA 1x3 output 1 to Routing Switcher frame 1: provides outputs 1 to 96.

- Connect MVDA 1x3 output 2 to Routing Switcher frame 2: provides outputs 97 to 192.

- Connect MVDA 1x3 output 3 to Routing Switcher frame 3: provides outputs 193 to 288.

1.4 System Specifications

MVDA 4813 Mainframe Specifications

General

Number of Cards per frame	Maximum of 48
Connector Type	BNC

Input

Input Number	48
Input Type	75 Ohm, Terminated Differential Available
Input Return Loss	-40dB to 4.43 MHz

Output

Output Number	3 per channel
Output Return Loss	-40dB to 4.43 MHz

Mechanical Frame

Height	5.25 in.	(133.3 mm)
Width	19.00 in.	(482.6 mm)
Depth	5.00 in.	(127.0 mm)

Environmental

Temperature	0° C to 40° C
Humidity	20% to 90% Non Condensing

2.1 In This Section

This section details the MVDA 4813 installation procedures. The following topics are discussed:

- Receipt Inspection
- Location
- Chassis Mounting
- Power Connections
- Cabling
- SIMM Card Installation

2.2 Receipt Inspection

The MVDA 4813 system was inspected and tested prior to leaving the PESA factory. Upon receipt, inspect the unit for shipping damage. If damage is detected, notify the carrier immediately and hold all packing material for inspection. After unpacking, compare all parts received against the purchase order. If the unit is undamaged and all components have been received, proceed with installation.

Identify that you have received the correct MVDA frame:

- Check the rear chassis labeling. Figure 2–1 illustrates the rear panel label for *one circuit* of the MVDA 4813:

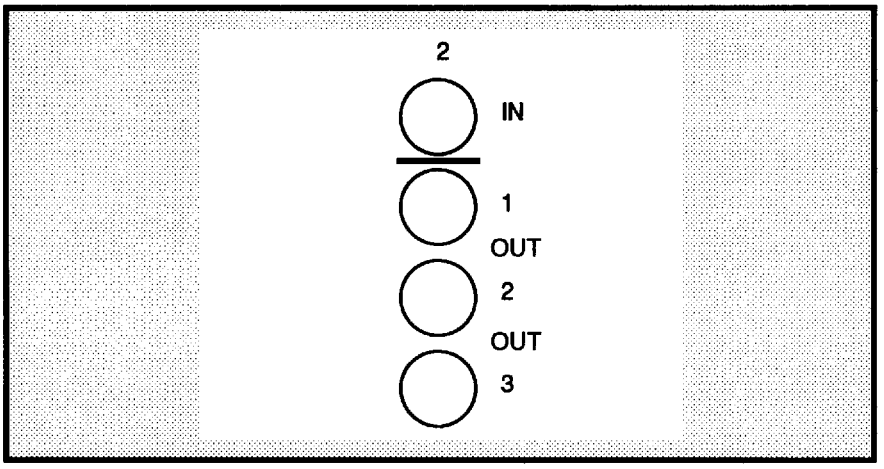

Figure 2–1 MVDA 4813 1x3 Rear Panel Labeling

2.3 Location

The MVDA 4813 chassis should be positioned for convenient visual and physical access. An area should be selected where temperature does not exceed 40°C inside the equipment rack, and where air can circulate freely.

To minimize cable runs, the MVDA 4813 chassis should be located as close as possible to the associated routing switcher frames.

2.4 Chassis Installation

Figure 2–2 illustrates MVDA 4813 chassis installation:

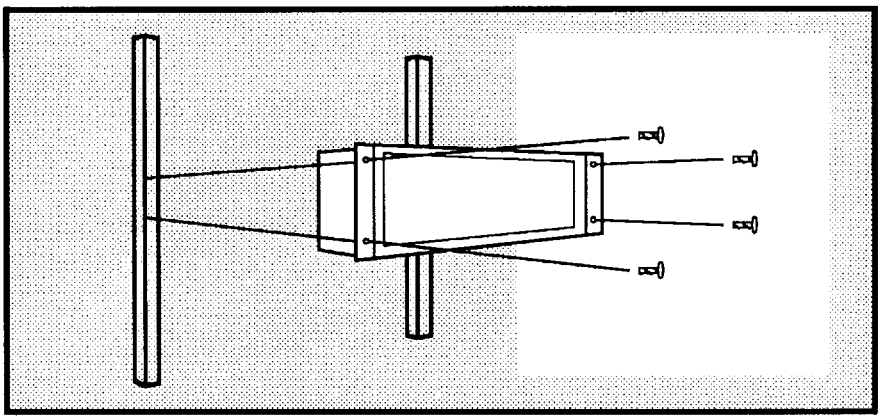

Figure 2–2 MVDA 4813 Chassis Installation

The MVDA 4813 chassis is rack mounted in a standard 19" equipment rack. Sufficient space must be provided behind the chassis to allow for coax and power cable installation. To install the chassis, follow these steps:

1. Align the chassis with the threaded or slotted openings in the rack.
2. For ease of installation, and to support the unit, install the two bottom screws first.
3. Install the two top screws.
4. Tighten all four screws securely.

2.5 Power Connections

Power for the MVDA chassis is supplied from the PS140 or the PS270 power supply mounted on the rear of the switching unit(s). Which power supply is used is determined by the switching unit in your system. An external "standalone" power supply can also be used. See Figure 2–7.

The power supply has sufficient power to drive *one* routing switcher plus *one* MVDA frame.

Figure 2–3 illustrates the power connectors on the rear panel of the MVDA chassis, located immediately to the right of circuit 1:

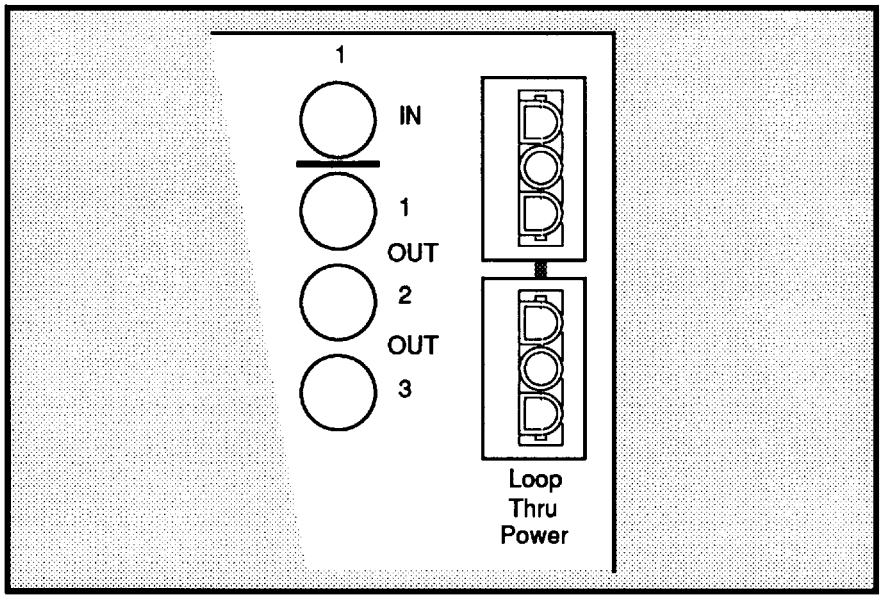

Figure 2–3 MVDA 4813 Power Connectors

Two identical connectors are provided so that power can be looped from one chassis to another.

Power Connections (cont.)

Power connection depends on your individual system configuration, however, three basic choices are available:

- **Direct Power**
  Figure 2–4 illustrates the direct method, connecting the Power Supply output to the power connector on the MVDA chassis.

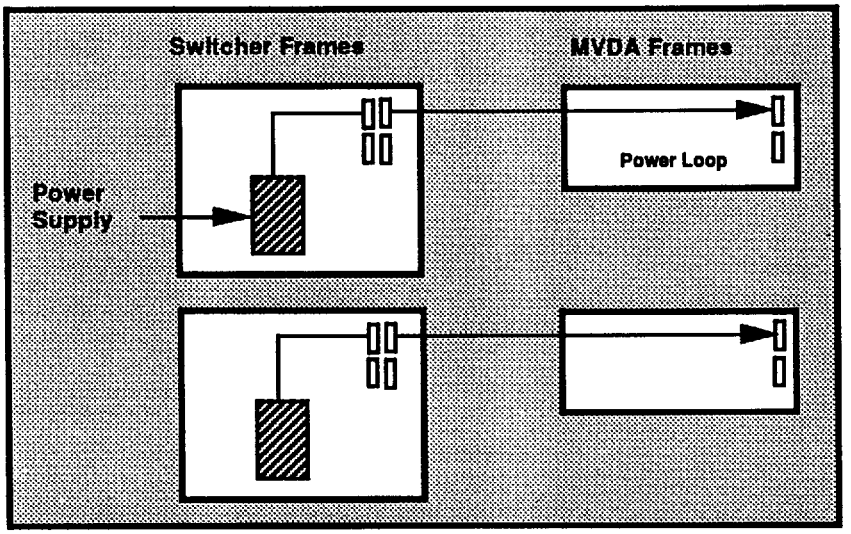

Figure 2–4 "Direct" Power Connection Method

- **Redundant Power**
  Figure 2–5 illustrates the fully redundant power connection method.

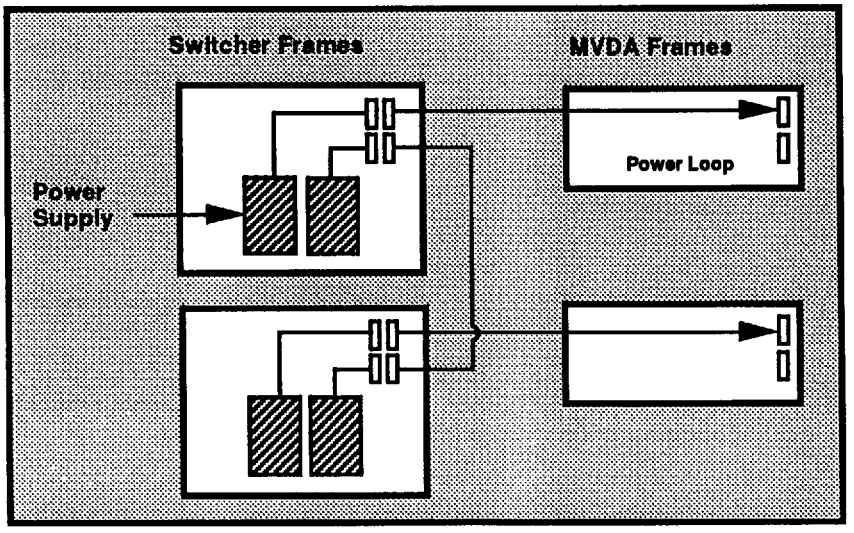

Figure 2–5 "Redundant" Power Connection Method

Power Connections (cont.)

Using the redundant method, both the primary and backup Power Supply outputs are connected to the power loop on the routing switcher, and one power connection is made to the MVDA 4813 chassis. Should either power supply fail, the other supply takes over.

- **"N+1" Power**
  Figure 2–6 illustrates the "N+1" power connection method:

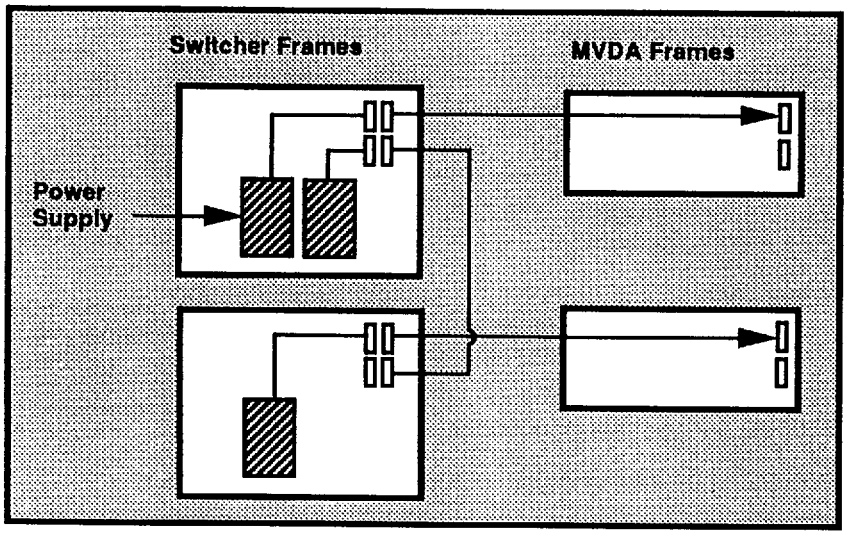

Figure 2–6 "N+1" Power Connection Method

The "N+1" power connection method places an extra power supply in the loop at the routing switcher frame, and also loops the MVDA frames together. Should any supply fail *throughout* the system, an extra supply is available.

NOTE:
Using the "N+1" method, should any power supply in the loop fail, be sure to restore "N+1" status immediately by replacing the failed supply.

Using the supplied power cable, connect power to the MVDA frame(s) as required by your system configuration. Be sure to consider power supply capacity by spreading the load to avoid overloading any single supply. In addition, ensure that the removal of a primary or redundant supply does not overload the remaining supplies.

Power Connections (cont.)

Power may also be supplied to the MVDA chassis through a rear rack mounted PS140V or PS270V power supply. If mounting a power supply on the rack, the PS140V requires mounting rack bracket #81903461549 and power cable #81906511837. The PS270V requires mounting rack bracket #81903461329 and power cable #81906514039. Connections have been furnished for redundancy and can be accomplished by adding one additional power supply to the last frame.

Figure 2–7 illustrates power connection for one or two MVDA frames with optional redundant power. **One** PS140V power supply is required for **one** MVDA frame. **Two** MVDA frames require **one** PS270 power supply. No more than two frames can be powered by a single PS270V power supply.

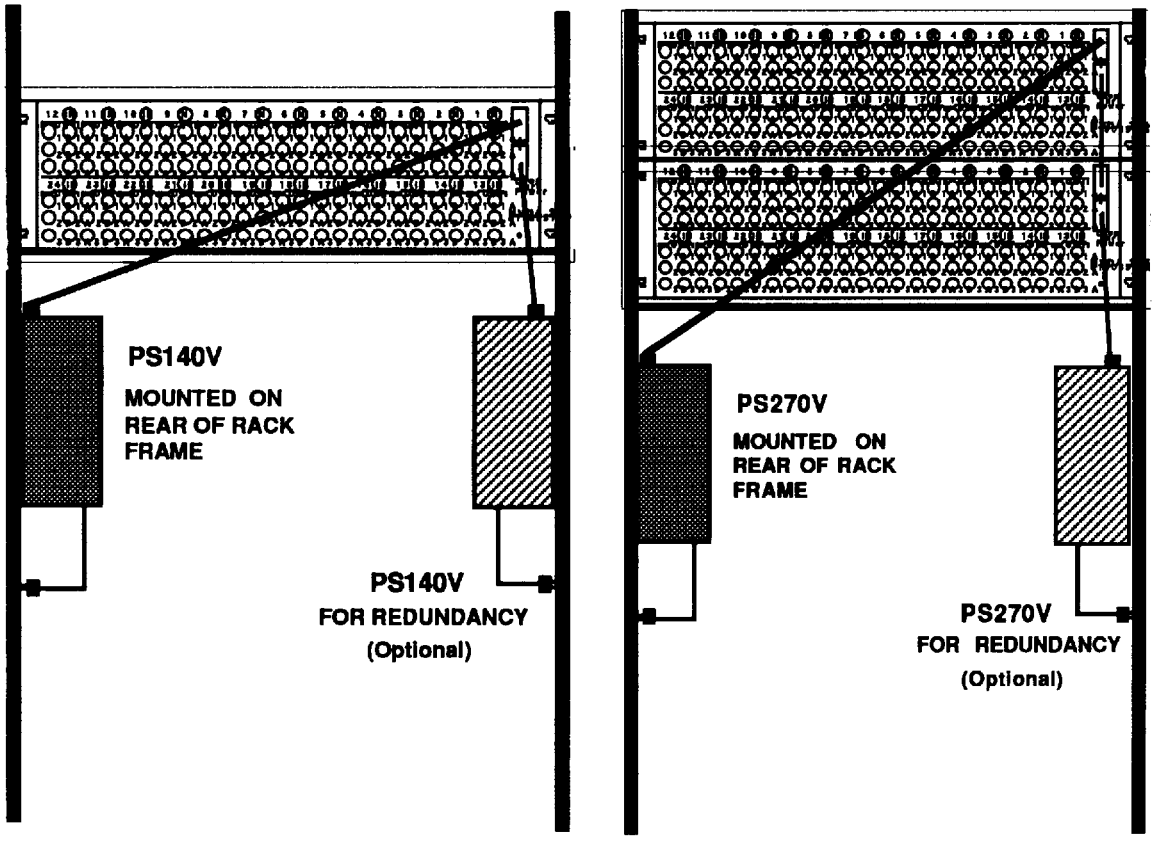

Figure 2–7 Rack Mounted Power Supplies

2.6 Cabling

NOTE:
Use only 75Ω Cable.

Use the following steps to cable the MVDA 4813 chassis:

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

2. Connect each cable to the chassis, and provide proper support for each cable during the connection process. The use of tie-wraps is recommended, as shown below in Figure 2–8:

NOTE:
Failure to provide cable support can result in cables separating from their connectors, or broken connectors on the mainframe.

3. Connect each cable to the appropriate destination, ensuring that each cable is secured with proper support, no cable strain is evident, and no cable is placed in a hazardous position.

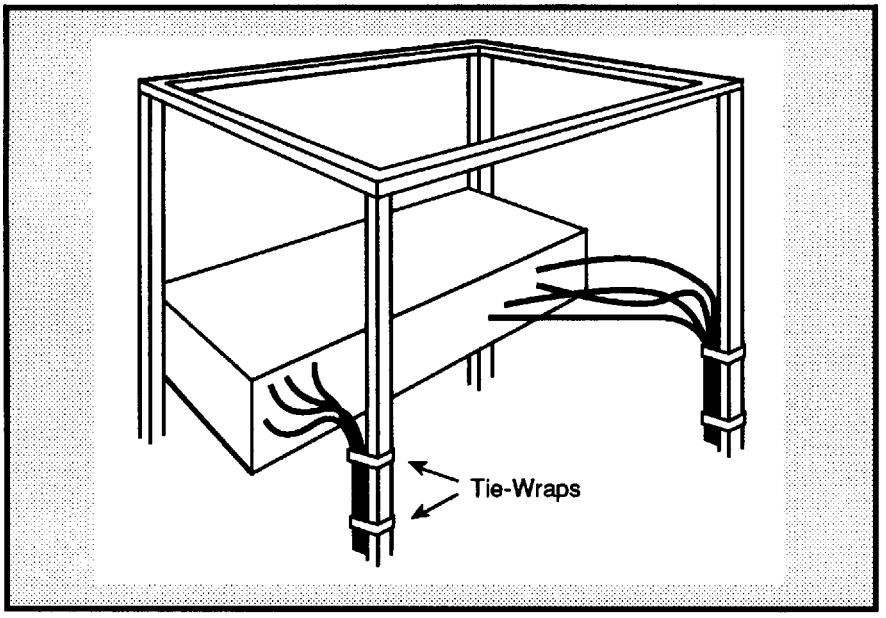

Figure 2–8 Cables Attached To Supports

2.7 SIMM Card Installation

NOTE:
As with all semiconductor equipment, electrostatic discharge can damage the MVDA system. Ensure that all tools and personnel handling individual components are properly grounded prior to SIMM removal or installation.

Use the following steps to insert a SIMM card:

1. Ensure that power is off to the MVDA chassis.

NOTE:
If power cannot be turned off due to "in use" circumstances, the card *can* be installed with power on. As detailed in the following steps, great care should be exercised to ensure that all gold contacts are carefully aligned with the socket *before* the SIMM touches any connector contacts. Momentary cross-connections made with power ON can damage the card.

2. Place the side of the SIMM card with the **radius notch** beside the socket end which contains the small barrier strip. Use the diagram shown below in Figure 2–9 for reference. The notch prevents the card from being inserted backwards.

3. Before allowing the socket's contacts to touch the card, carefully align the card so that both ends are in the connector, and the card is *exactly* parallel with the socket. Refer to (**A**) in Figure 2–9.

4. Once aligned, tilt the card to the angle shown in Figure 2–10 (**A**).

5. Maintain the angle and insert the card into the socket so that all contacts mate simultaneously (**B**).

6. Pivot the SIMM card by its base to an upright position until it snaps into place (**C**).

SIMM Card Installation (cont.)

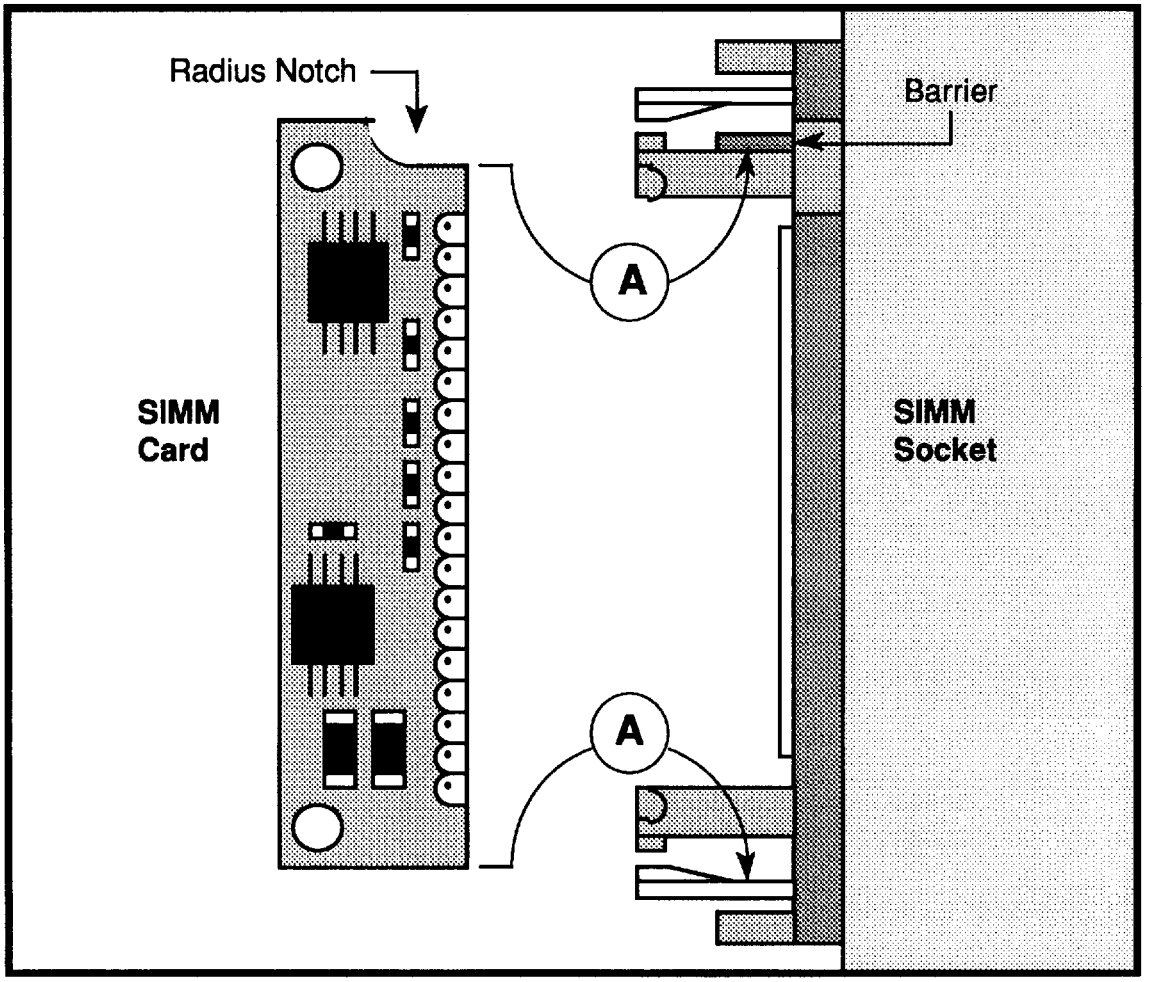

Figure 2–9 SIMM Card Alignment

SIMM Card Installation (cont.)

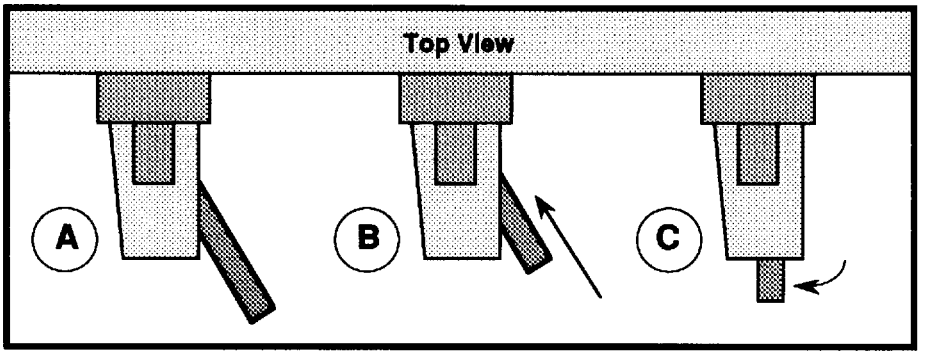

Figure 2–10 SIMM Card Installation

Because the socket contacts are spring-loaded, some pressure may be required during installation. Ensure that the end tabs on the socket posts are secured around the edges of the SIMM card.

Use the following steps to remove a SIMM card:

1. Ensure that power is off to the MVDA 4813 chassis.

NOTE:
If power cannot be turned off due to "in use" circumstances, the card *can* be removed with power on. As detailed in the following steps, great care should be exercised to ensure that the card is pulled straight out, avoiding any momentary cross-connections which can damage the SIMM card.

2. Place both thumbs on the inner edges of the socket end tabs, and place both forefingers behind the card itself.

3. Gently pull the end tabs outward, while at the same time applying gentle pressure forward with your forefingers. Continue until the card snaps from position (**A**) to position (**B**), as shown in Figure 2–11.

SIMM Card Installation (cont.)

4. Maintain the angle, and remove the SIMM card from the socket by pulling it straight out (**C**). Ensure that you pull the card's top and bottom edges simultaneously, avoiding cross-connections.

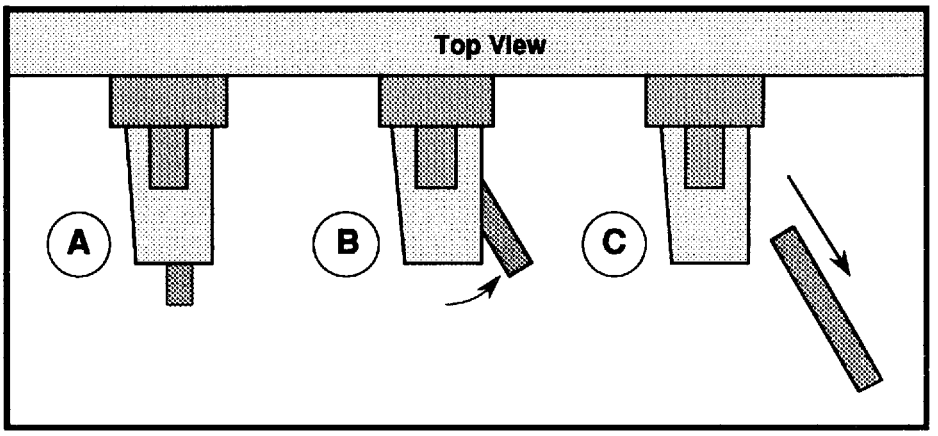

Figure 2–11 SIMM Card Removal

3.1 In This Section

This section details MVDA 4813 operations procedures. The following topics are discussed:

- Basic Operations
- Gain and Frequency Adjustments

3.2 Basic Operations and Backplane Adjustment

Operation of the MVDA 4813 is completely transparent to the user once the unit is installed, cabled, and powered. No operator controls are provided.

The MVDA 4813 system is factory-set for flat gain and frequency response. Under special circumstances, however, gain and frequency for individual channel(s) may need to be adjusted so that amplifier input matches amplifier output:

- Adjust *new* amplifiers which are added to the frame. Note that *no adjustment* of the system's existing amplifiers would be required at this point.

- Adjust gain and frequency when *different* amplifier cards are plugged into a specific connector.

Figure 3–1 illustrates a single channel representation of the MVDA 4813 backplane, showing the locations of the gain trimmers:

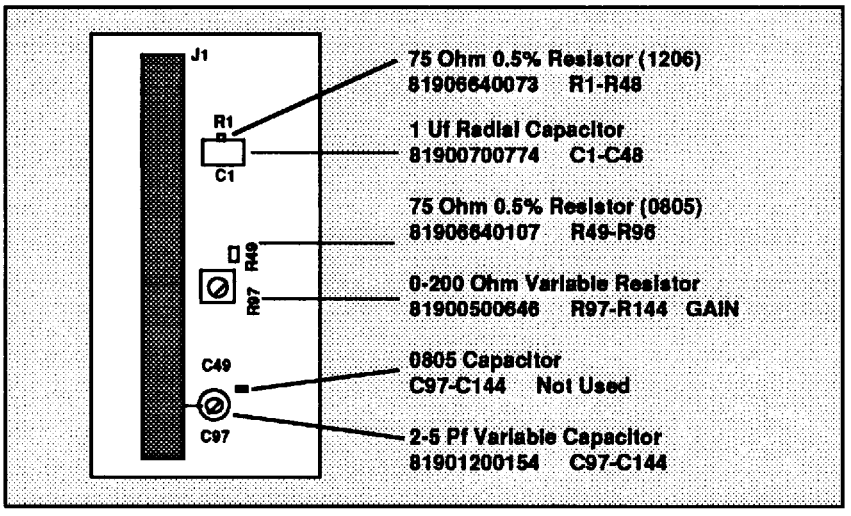

Figure 3–1 Backplane Assembly, Single Channel View

Basic Operations and Adjustments (cont.)

Both the gain and frequency trimmers affect the three outputs on the MVDA 4813 frame. Gain adjustments should be made first, followed by frequency adjustments.

Use the following procedure to adjust amplifier gain:

1. Ensure that your scope is calibrated.
2. Attach a 1v p-p signal such as multi-burst or sweep to the scope's channel A input, and using a BNC "T" connector, bring the signal to the input of the desired MVDA channel.
3. Connect the MVDA channel output to the scope's channel B input, and terminate at the scope.
4. Adjust the gain trimmer (R1–R48) for a 1v p-p output.

Use the following procedure to adjust frequency response:

1. Ensure that your scope is calibrated and set to the desired frequency range.

NOTE:
On 100 MHz amplifiers, be sure to use a wide band sweep and scope to avoid peaking high frequencies without the ability to see them.

2. Attach a multiburst or sweep signal to the scope's channel A input, and using a BNC "T" connector, bring the signal to the input of the desired MVDA channel.

3. Connect the MVDA channel output to the scope's channel B input and terminate at the scope.

4. Adjust the frequency trimmer (C49–C96) for the optimum flat envelope.

NOTE:
Refer to the specific SIMM card instructions in the Appendix section of this manual for card adjustments.

4.1 In This Section

This section provides functional descriptions of MVDA 4813 components. The following topics are discussed:

- General Information
- MVDA 4813 frame
- Power
- Plug-in Fuse Card

4.2 General

The MVDA 4813 is a Video Distribution Amplifier which interfaces with the PESA RM4000 and RM5000 Video Matrix Switchers. It consists of a 3RU frame, backplane, and 48 identical circuits. Each circuit utilizes four rear-panel BNC connectors.

The hardware package is manufactured for high reliability, easy installation, and easy maintenance. An open vent screen and a fan in the front door provide cooling for all amplifier cards. Two slide latches hold the front door in place and allow easy access to the cards.

4.3 MVDA 4813 Frame

The MVDA 4813 includes a terminating input and three outputs for each circuit.

On the backplane assembly of the MVDA 4813, gain can be adjusted for ±1.5 dB.

Also accessible on the backplane are the center contacts of each rear-panel BNC connector. These contacts provide access for scope probes as required. On the MVDA 4813, the top BNC contact is input; the bottom three are outputs.

Power is supplied to the chassis from a primary or backup Power Supply mounted on the rear panel of the RM4000 or RM5000 routing switcher. Loop-through power connectors are provided on the 4813.

4.4 Power

Power for each MVDA mainframe is supplied from a power supply which connects to the rear of the RM4000 and RM5000 routing switcher units. Please refer to the RM4000 and RM5000 Service Manuals for complete details and schematics.

Positioned on the left-hand side of the backplane assembly are three power connector headers: a 4-pin, 6-pin, and 10-pin.

Figure 4–1 illustrates the power connector headers:

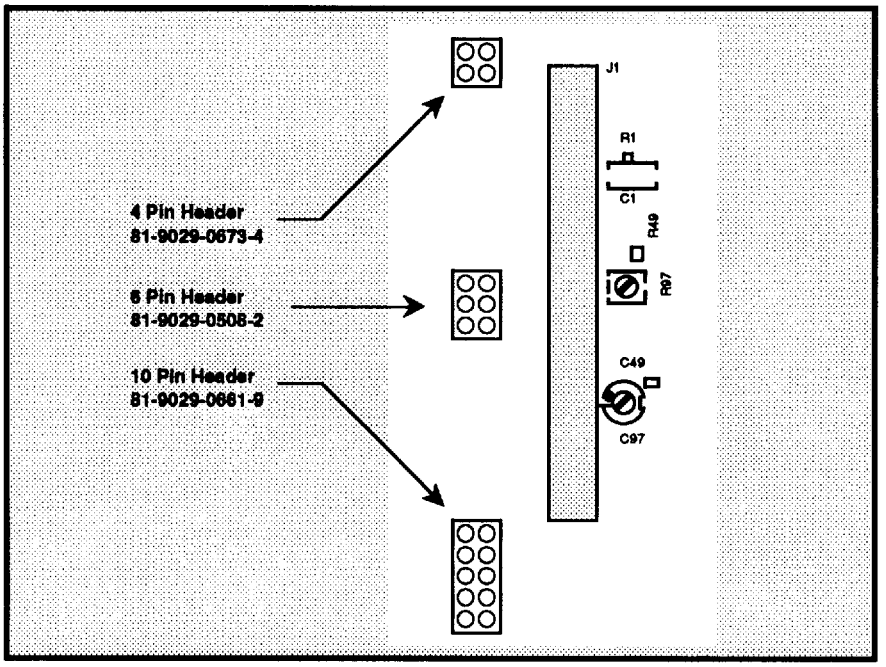

Figure 4–1 Backplane Power Headers

4.5 Plug-In Fuse Card

The fuse card protects the MVDA 4813 frame from being damaged by a short circuit or other fault condition that might otherwise overload the frame. The fuse card is composed of four fuses each rated at 7 Amperes. Two are for the top half of the frame, and two identical fuses are for the bottom half. This prevents one fault from dissabling the entire frame. Fuses F1 (+V) and F2 (-V) are associated with the top half of the frame. Fuses F3 (+V) and F4 (-V) are associated with the bottom half of the frame.

The fuse card also provides power for the fan control card via P1. The fan control card is associated with F3 and F4.

Power to the frame should be dissconnected before removing or inserting the fuse card.

Figure 4–2 illustrates the plug-in fuse card.

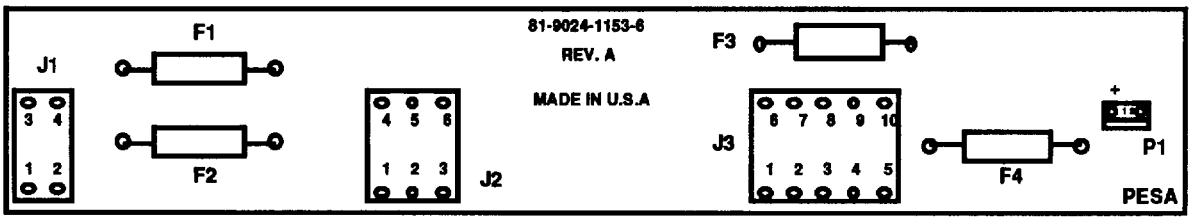

Figure 4–2 Plug-In Fuse Card

5.1 In This Section

This section discusses the recommended maintenance procedures for the MVDA 4813 system.

5.2 General

The PESA MVDA 4813 system is designed to provide extended, trouble-free service with minimum maintenance requirements. Other than the normal care which should be given to any advanced solid-state electronic device, there are few additional maintenance requirements on the unit.

If the need arises to make adjustments, follow the procedures outlined in Section 3 and/or the appropriate Appendix for the type of MVDA card installed in your system.

If additional technical assistance is required, please refer to the "**Ordering Assistance, Service & Inquiries**" sheet in the front of this manual.

5.3 Preventive Maintenance

Use the following guidelines for general preventive maintenance:

- Clean the filter as required.
- Keep the inside of the frame clean, especially if your facility is subject to dust or dirt in the atmosphere. Use compressed air, an anti-static cloth, or a gentle vacuum and soft brush to clean the grille 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.
- The center conductors of each BNC connector are readily accessible inside the frame, if you wish to check system input and output levels. It is recommended that a scope with a 10:1 probe is used for minimum signal disturbance.

Preventive Maintenance (cont.)

- If a problem is suspected with an individual amplifier stage, first swap out the amplifier and re-check the system for the problem.

  If the problem can be isolated on the amplifier itself, and your facility is equipped for surface-mount device repair, proceed with repairs using the schematics provided in Section 6 of this module.

- For replacement components or replacement amplifiers, contact PESA technical support. Refer to the "**Ordering Assistance, Service & Inquiries**" sheet in the front of this manual for details.

NOTE:
Do not repair equipment under warranty without first contacting PESA. PESA warrants the MVDA 4813 equipment against defective workmanship or materials for a period of one year from the date of purchase. Refer to the "Equipment Warranty" sheet in the front of this manual for further information.

1.1 Module Overview – MVDA 4822

This module provides detailed instructions for installing and operating the PESA MVDA 4822 Panel. This module is divided into seven sections described below.

Section 1, **INTRODUCTION**, summarizes the manual, describes the MVDA 4822, presents a list of terms, and provides the panel specifications.

Section 2, **INSTALLATION**, provides installation and setup instructions.

Section 3, **OPERATION**, describes system operation procedures.

Section 4, **FUNCTIONAL DESCRIPTIONS**, presents a description of each component.

Section 5, **MAINTENANCE**, explains procedures for maintenance.

1.2 General Description

PESA's MVDA 4822 is a high-bandwidth Video Distribution Amplifier frame. It interfaces with the PESA RM4000 and RM5000 Video Matrix Switchers, and also functions as a standalone unit.

All MVDA plug-in amplifiers are designed on miniature surface-mounted "SIMM" cards for easy installation and high product reliability. Different types of MVDA cards may be loaded into the MVDA 4822 panel. Refer to the appropriate Appendix for the "SIMM" card information that will be ulitized in your system.

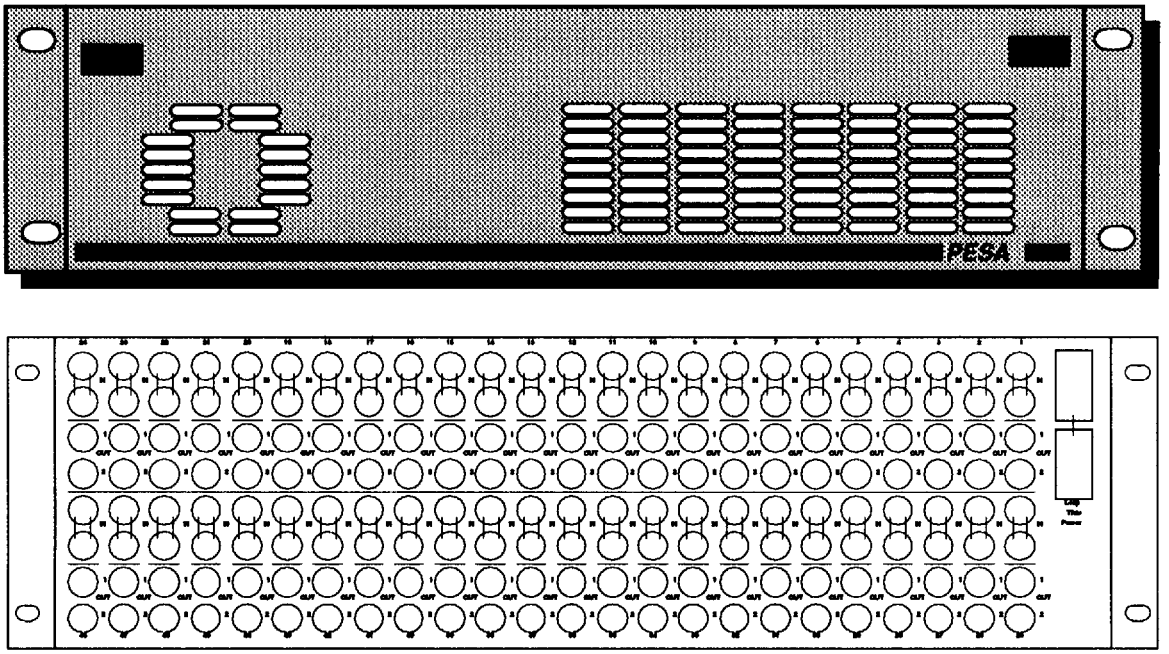

Figure 1–1 MVDA 4822 Chassis Front and Rear View

Figure 1–1 shows the MVDA 4822 chassis. It is compact and lightweight with two front door slide latches that allow easy access. A vent screen and a door-mounted fan are provided for internal cooling.

The MVDA 4822 is designed with the following features:

- Easy system installation and maintenance.
- Intermixing of amplifier configurations in a single chassis without restriction.
- Gain and equalization controls provided for each individual card.

1.3 MVDA 4822 Function

Each MVDA 4822 2x2 circuit position is a "two-in, two-out" distribution amplifier with looping input. Each position has the ability to sum two sources from two **RM4000** or **RM5000** routing switcher frames.

The block diagram shown below in Figure 1–2 illustrates the MVDA 2x2 combining separate routing switcher channel outputs into one *common* Video Matrix Switcher output:

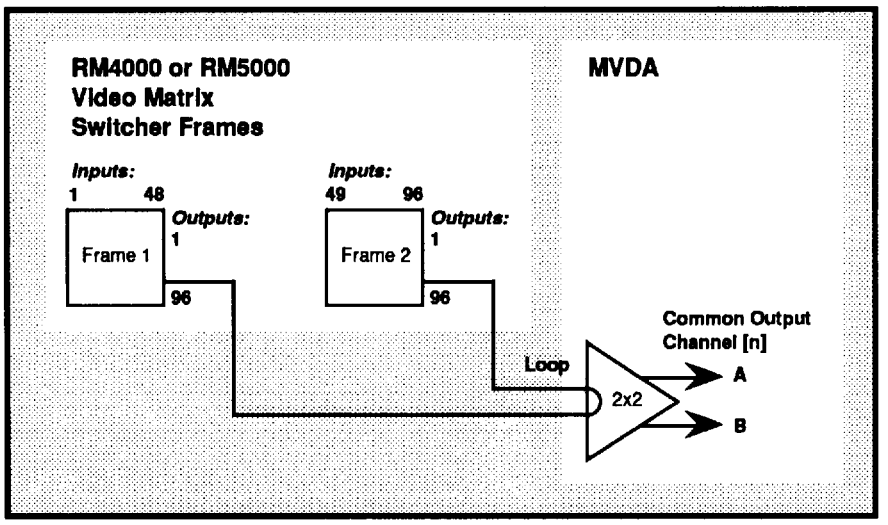

Figure 1–2 MVDA 4822–2x2 Block Diagram Expansion to 96 Inputs

As illustrated above, the MVDA 2x2 frame is a mini "combiner" designed to facilitate *input expansion* of the PESA RM4000 and RM5000 routing switchers.

The MVDA 2x2 has the ability to expand the system from the 48 inputs avalible on a single routing switcher frame to a maximum 96 inputs available on two combined frames.

MVDA 4822 Function (cont.)

Expansion *above* 96 inputs would require a configuration using *additional* MVDA 2x2 units as shown below in Figure 1–3:

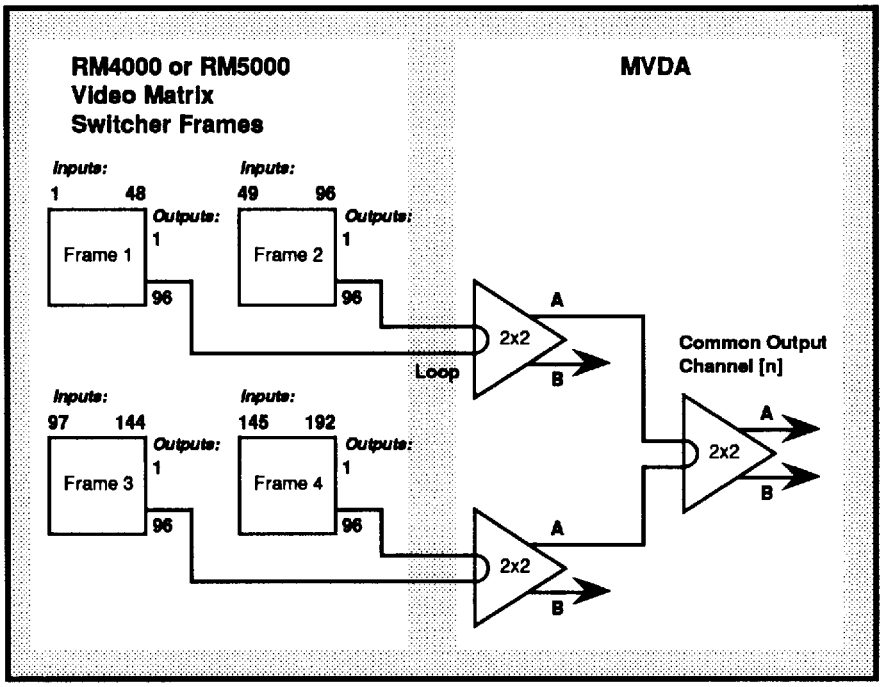

Figure 1–3 MVDA 2x2 Block Diagram
Expansion to 192 Inputs

Each MVDA 2x2 circuit position provides a looping input, with A and B common outputs. In order to provide input expansion, common outputs of routing switcher frames 1 and 2 are combined, or "summed" through the MVDA 2x2. Termination for the *active* switcher frame is supplied by the *inactive* frame via logic in the switcher frames themselves. The MVDA 2x2 taps the signal off the looped coax, and drives the output line to provide one common output.

1.4 System Specifications

MVDA 4822 Mainframe Specifications

General	
Number of Cards per frame	48
Connector Type	BNC
Input	
Input Number	48
Input Type	Looping Differential Available
Input Return Loss	-40dB to 4.43 Mhz
Output	
Output Number	2 per channel
Impedance	Source Terminated 75 Ohm
Output Return Loss	-40dB to 4.43 Mhz
Mechanical Frame	
Height	5.25 in. (133.3 mm)
Width	19.00 in. (482.6 mm)
Depth	5.00 in. (127.0 mm)
Environmental	
Temperature	0° C to 40° C
Humidity	20% to 90% Non Condensing

2.1 In This Section

This section details the MVDA 4822 installation procedures. The following topics are discussed:

- Receipt Inspection
- Location
- Chassis Mounting
- Power Connections
- Cabling
- SIMM Card Installation

2.2 Receipt Inspection

The MVDA 4822 system was inspected and tested prior to leaving the PESA factory. Upon receipt, inspect the unit for shipping damage. If damage is detected, notify the carrier immediately and hold all packing material for inspection. After unpacking, compare all parts received against the purchase order. If the unit is undamaged and all components have been received, proceed with installation.

Identify that you have received the correct MVDA frame:

- Check the rear chassis labeling. Figure 2–1 illustrates the rear panel label for *one circuit* of the MVDA 4822:

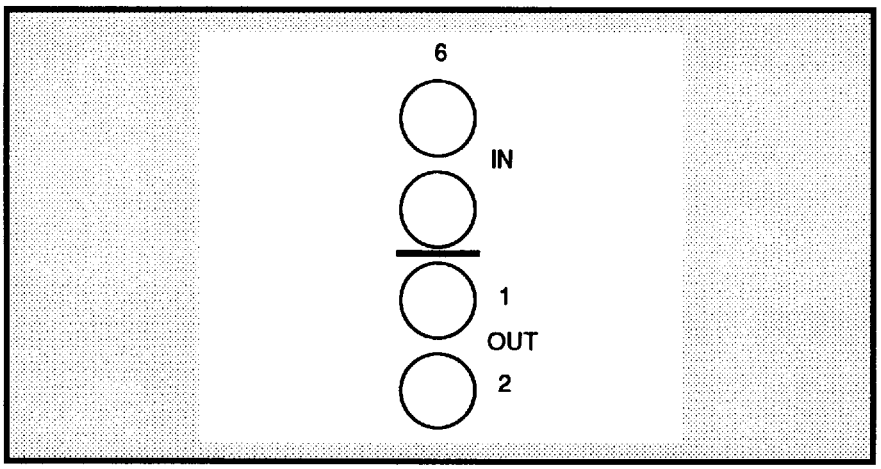

Figure 2–1 MVDA 4822 2x2 Rear Panel Label

2.3 Location

The MVDA 4822 chassis should be positioned for convenient visual and physical access. An area should be selected where temperature does not exceed 40°C inside the equipment rack, and where air can circulate freely.

To minimize cable runs, the MVDA 4822 chassis should be located as close as possible to the associated routing switcher frames.

2.4 Chassis Installation

Figure 2–2 illustrates MVDA 4822 chassis installation:

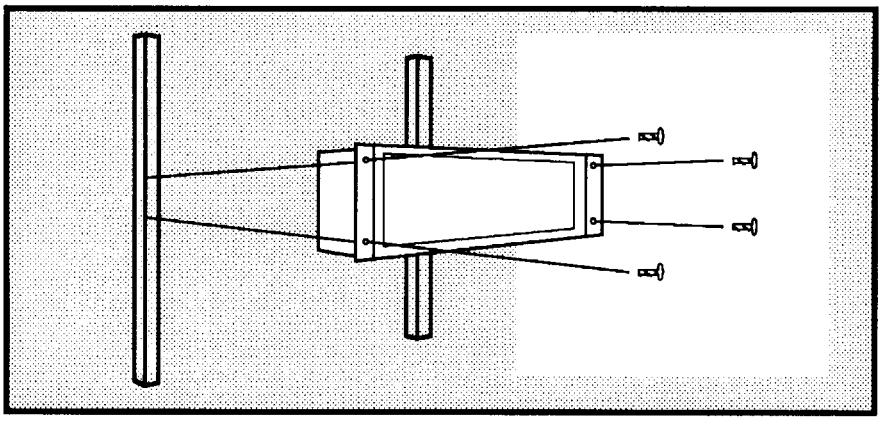

Figure 2–2 MVDA 4822 Chassis Installation

The MVDA 4822 chassis is rack mounted in a standard 19" equipment rack. Sufficient space must be provided behind the chassis to allow for coax and power cable installation. To install the chassis, follow these steps:

1. Align the chassis with the threaded or slotted openings in the rack.
2. For ease of installation, and to support the unit, install the two bottom screws first.
3. Install the two top screws.
4. Tighten all four screws securely.

2.5 Power Connections

Power for the MVDA chassis is supplied from the PS140 or the PS270 power supply mounted on the rear of the switching unit(s). Which power supply is used is determined by the switching unit in your system. An external "standalone" power supply can also be used. See Figure 2–7

The power supply has sufficient power to drive *one* routing switcher plus *one* MVDA frame.

Figure 2–3 illustrates the power connectors on the rear panel of the MVDA chassis, located immediately to the right of circuit 1:

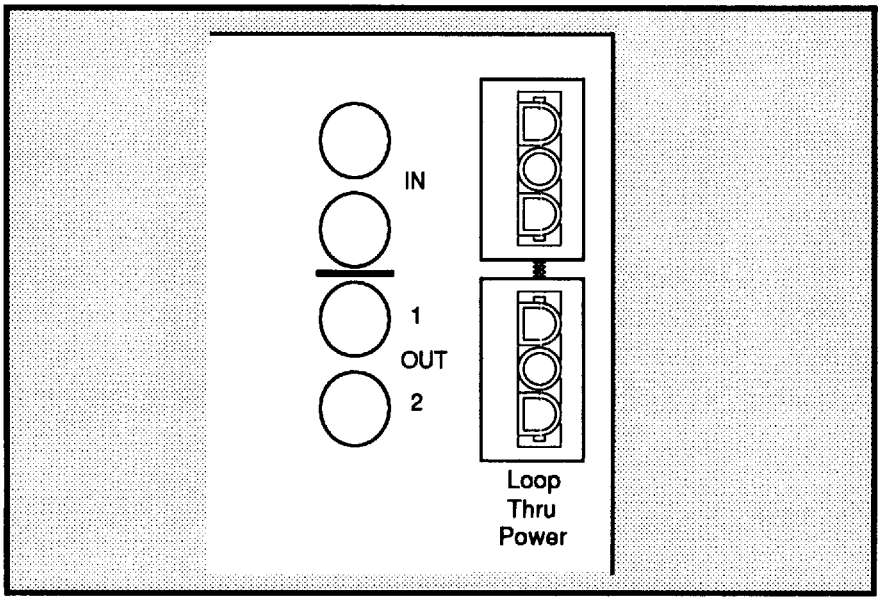

Figure 2–3 MVDA 4822 Power Connectors

Two identical connectors are provided so that power can be looped from one chassis to another.

Power Connections (cont.)

Power connection depends on your individual system configuration, however, three basic choices are available:

- **Direct Power**
  Figure 2–4 illustrates the direct method, connecting the Power Supply output to the power connector on the MVDA chassis.

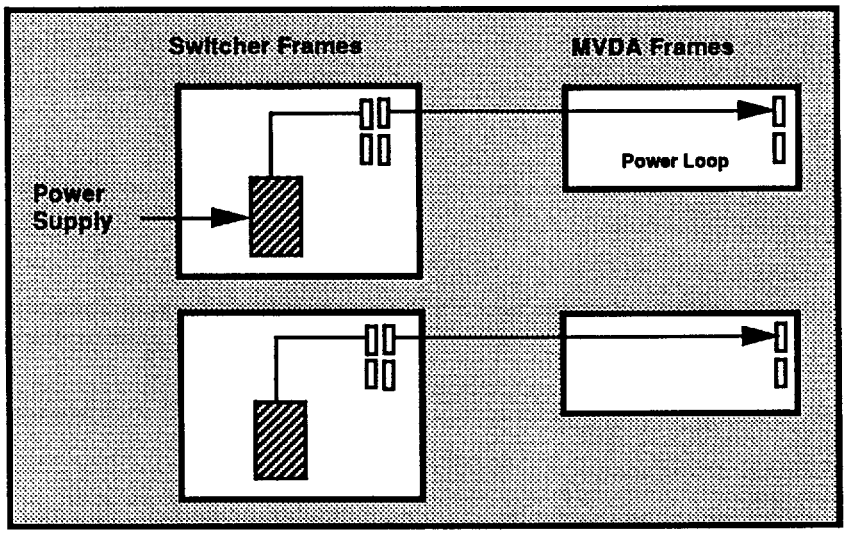

Figure 2–4 "Direct" Power Connection Method

- **Redundant Power**
  Figure 2–5 illustrates the fully redundant power connection method.

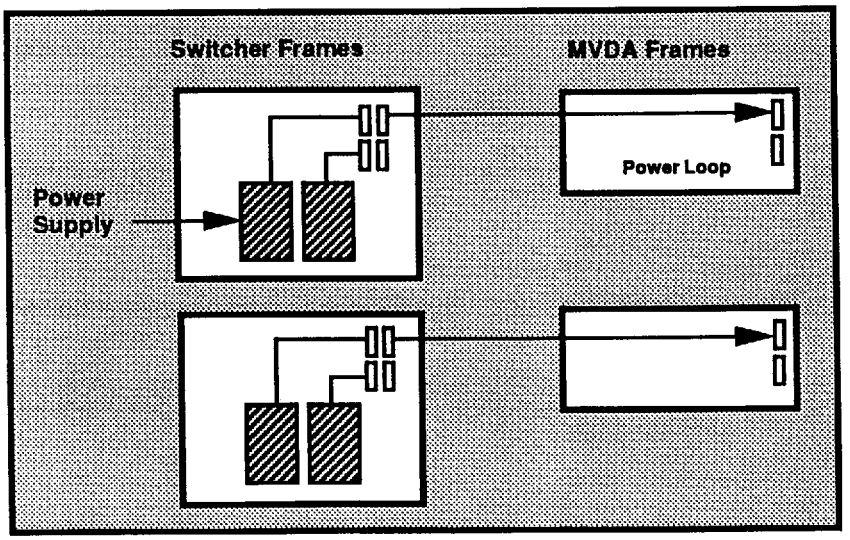

Figure 2–5 "Redundant" Power Connection Method

Power Connections (cont.)

Using the redundant method, both the primary and backup Power Supply outputs are connected to the power loop on the routing switcher, and one power connection is made to the MVDA chassis. Should either power supply fail, the other supply takes over.

- **"N+1" Power**
  Figure 2–6 illustrates the "N+1" power connection method:

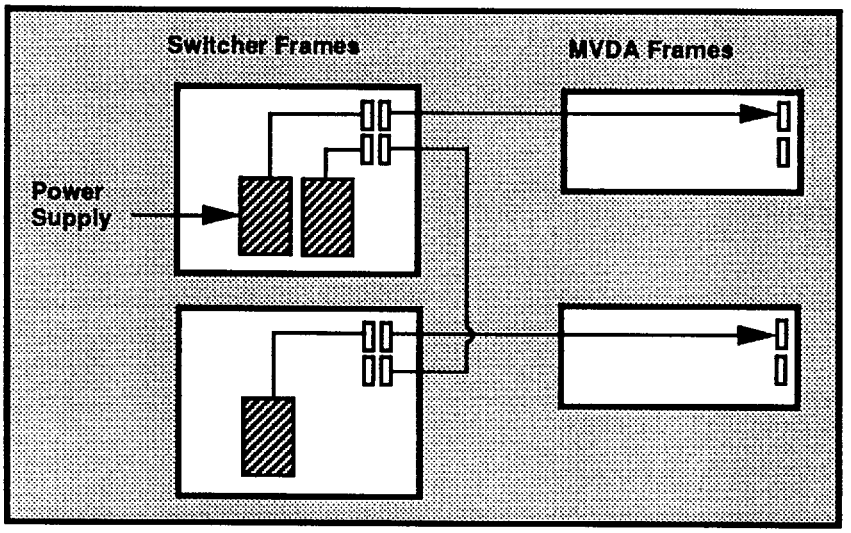

Figure 2–6 "N+1" Power Connection Method

The "N+1" power connection method places an extra power supply in the loop at the routing switcher frame, and also loops the MVDA frames together. Should any supply fail *throughout* the system, an extra supply is available.

NOTE:
Using the "N+1" method, should any power supply in the loop fail, be sure to restore "N+1" status immediately by replacing the failed supply.

Using the supplied power cable, connect power to the MVDA frame(s) as required by your system configuration. Be sure to consider power supply capacity by spreading the load to avoid overloading any single supply. In addition, ensure that the removal of a primary or redundant supply does not overload the remaining supplies.

Power Connections (cont.)

Power may also be supplied to the MVDA chassis through a rear rack mounted PS140V or PS270V power supply. If mounting a power supply on the rack, the PS140V requires mounting rack bracket #81903461549 and power cable #81906511837. The PS270V requires mounting rack bracket #81903461329 and power cable #81906514039. Connections have been furnished for redundancy and can be accomplished by adding one additional power supply to the last frame.

Figure 2–7 illustrates power connection for one or two MVDA frames with optional redundant power. **One** PS140V power supply is required for **one** MVDA frame. **Two** MVDA frames require **one** PS270 power supply. No more than two frames can be powered by a single PS270V power supply.

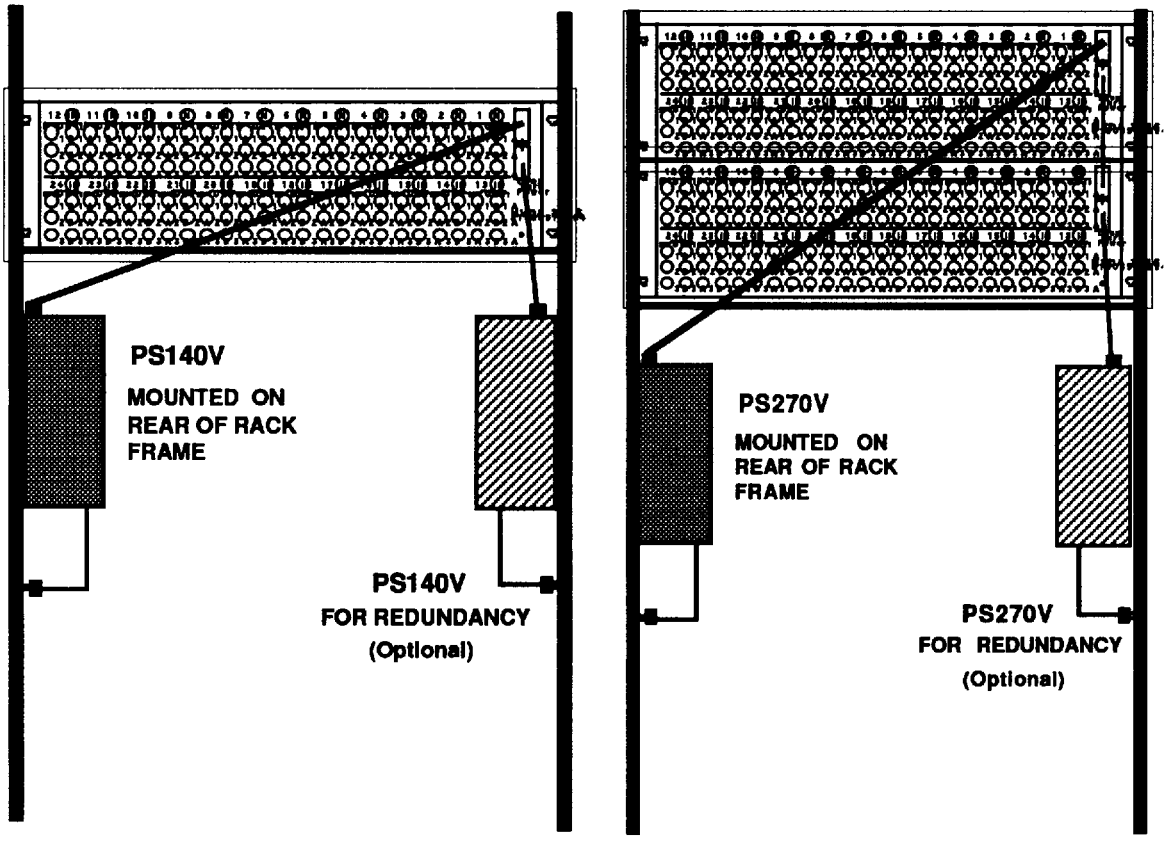

Figure 2–7 Rack Mounted Power Supplies

2.6 Cabling

NOTE:
Use only 75Ω Cable.

Use the following steps to cable the MVDA 4822 chassis:

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

2. Connect each cable to the chassis, and provide proper support for each cable during the connection process. The use of tie-wraps is recommended, as shown below in Figure 2–8:

NOTE:
Failure to provide cable support can result in cables separating from their connectors, or broken connectors on the mainframe.

3. Connect each cable to the appropriate destination, ensuring that each cable is secured with proper support, no cable strain is evident, and no cable is placed in a hazardous position.

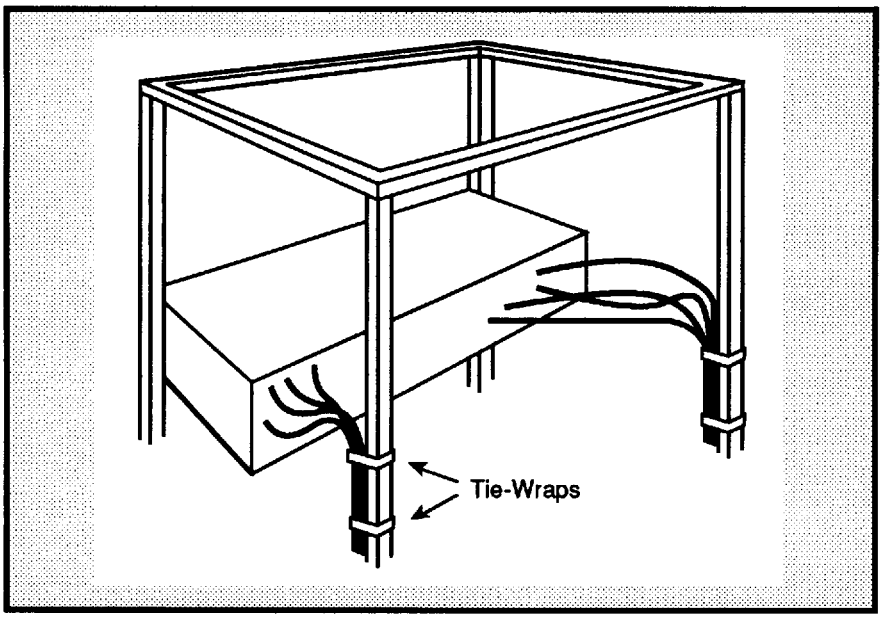

Figure 2–8 Cables Attached To Supports

2.7 SIMM Card Installation

NOTE:
As with all semiconductor equipment, electrostatic discharge can damage the MVDA system. Ensure that all tools and personnel handling individual components are properly grounded prior to SIMM removal or installation.

Use the following steps to insert a SIMM card:

1. Ensure that power is off to the MVDA chassis.

NOTE:
If power cannot be turned off due to "in use" circumstances, the card *can* be installed with power on. As detailed in the following steps, great care should be exercised to ensure that all gold contacts are carefully aligned with the socket *before* the SIMM touches any connector contacts. Momentary cross-connections made with power ON can damage the card.

2. Place the side of the SIMM card with the **radius notch** beside the socket end which contains the small barrier strip. Use the diagram shown below in Figure 2–9 for reference. The notch prevents the card from being inserted backwards.

3. Before allowing the socket's contacts to touch the card, carefully align the card so that both ends are in the connector, and the card is *exactly* parallel with the socket. Refer to (**A**) in Figure 2–9.

4. Once aligned, tilt the card to the angle shown in Figure 2–10 (**A**).

5. Maintain the angle and insert the card into the socket so that all contacts mate simultaneously (**B**).

6. Pivot the SIMM card by its base to an upright position until it snaps into place (**C**).

SIMM Card Installation (cont.)

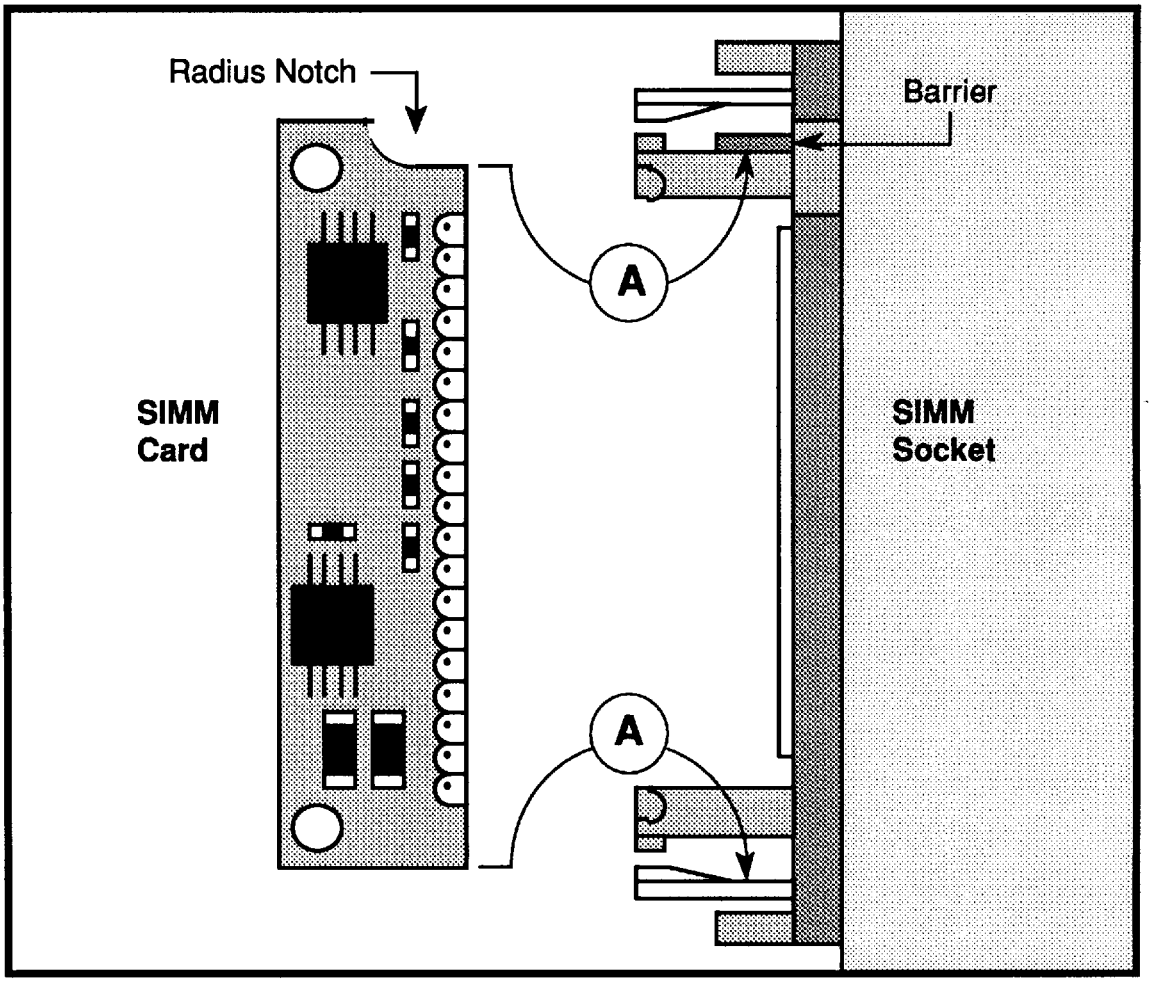

Figure 2–9 SIMM Card Alignment

SIMM Card Installation (cont.)

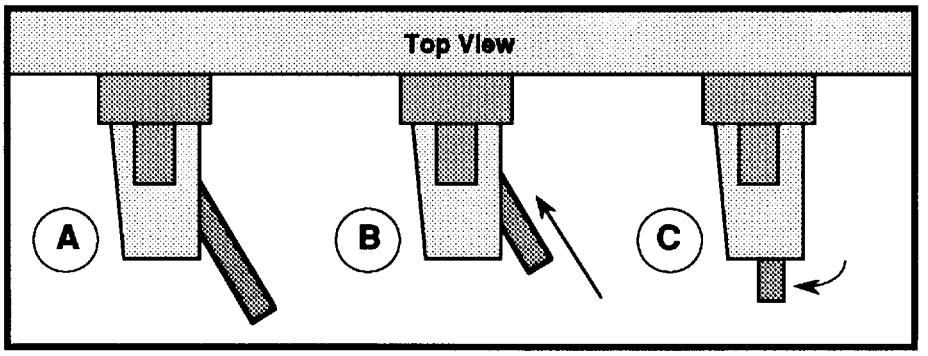

Figure 2–10 SIMM Card Installation

Because the socket contacts are spring-loaded, some pressure may be required during installation. Ensure that the end tabs on the socket posts are secured around the edges of the SIMM card.

Use the following steps to remove a SIMM card:

1. Ensure that power is off to the MVDA 4822 chassis.

NOTE:
If power cannot be turned off due to "in use" circumstances, the card *can* be removed with power on. As detailed in the following steps, great care should be exercised to ensure that the card is pulled straight out, avoiding any momentary cross-connections which can damage the SIMM card.

2. Place both thumbs on the inner edges of the socket end tabs, and place both forefingers behind the card itself.

3. Gently pull the end tabs outward, while at the same time applying gentle pressure forward with your forefingers. Continue until the card snaps from position (**A**) to position (**B**), as shown in Figure 2–11.

SIMM Card Installation (cont.)

4. Maintain the angle, and remove the SIMM card from the socket by pulling it straight out (**C**). Ensure that you pull the card's top and bottom edges simultaneously, avoiding cross-connections.

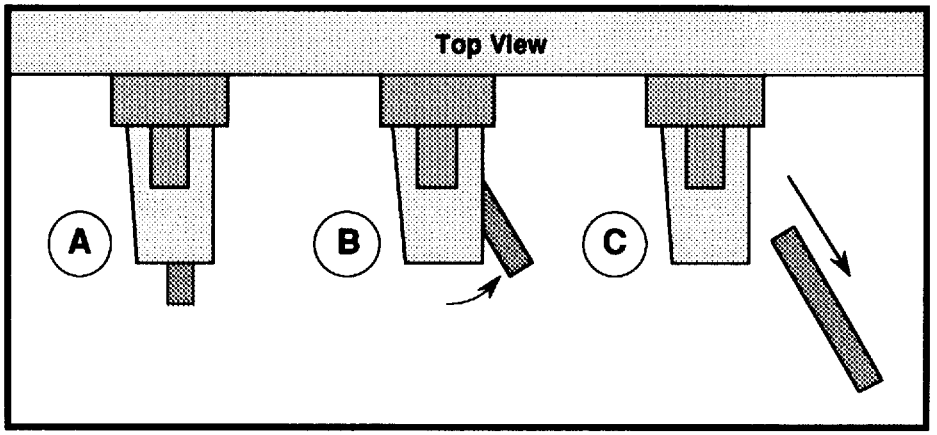

Figure 2–11 SIMM Card Removal

3.1 In This Section

This section details MVDA 4822 operations procedures. The following topics are discussed:

- Basic Operations
- Gain and Frequency Adjustments

3.2 Basic Operations and Adjustment

Operation of the MVDA 4822 is completely transparent to the user once the unit is installed, cabled, and powered. No operator controls are provided.

The MVDA 4822 system is factory-set for flat gain and frequency response. Under special circumstances, however, gain and frequency for individual channel(s) may need to be adjusted so that amplifier input matches amplifier output:

- Adjust *new* amplifiers which are added to the frame. Note that *no adjustment* of the system's existing amplifiers would be required at this point.

- Adjust gain and frequency when *different* amplifier cards are plugged into a specific connector.

Figure 3–1 illustrates a single channel representation of the MVDA 4822 backplane, showing the locations of the gain and frequency trimmers:

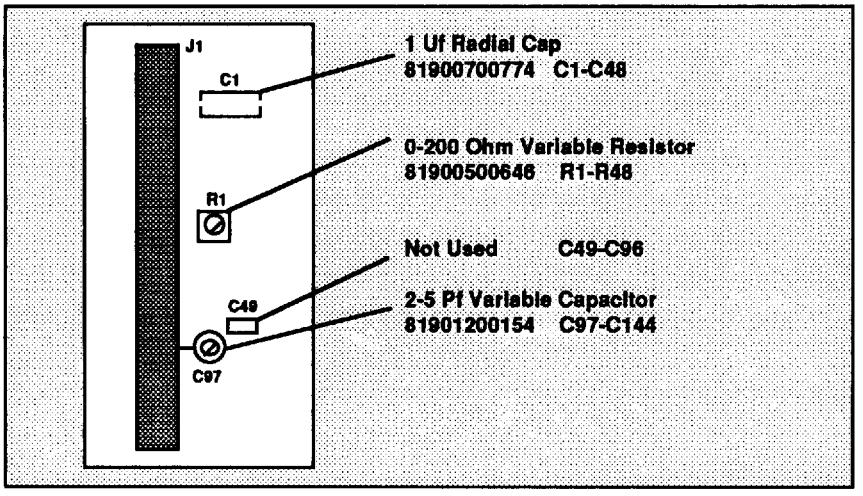

Figure 3–1 Backplane Assembly, Single Channel View

Basic Operations and Adjustments (cont.)

Both the gain and frequency trimmers affect the two outputs on the MVDA 4822 frame. Gain adjustments should be made first, followed by frequency adjustments.

Use the following procedure to adjust amplifier gain:

1. Ensure that your scope is calibrated.
2. Attach a 1v p-p signal such as multi-burst or sweep to the scope's channel A input, and using a BNC "T" connector, bring the signal to the input of the desired MVDA channel.
3. Connect the MVDA channel output to the scope's channel B input, and terminate at the scope.
4. Adjust the gain trimmer (R1–R48) for a 1v p-p output.

Use the following procedure to adjust frequency response:

1. Ensure that your scope is calibrated and set to the desired frequency range.

NOTE:
On 100 MHz amplifiers, be sure to use a wide band sweep and scope to avoid peaking high frequencies without the ability to see them.

2. Attach a multiburst or sweep signal to the scope's channel A input, and using a BNC "T" connector, bring the signal to the input of the desired MVDA channel.

3. Connect the MVDA channel output to the scope's channel B input and terminate at the scope.

4. Adjust the frequency trimmer (C97–C144) for the optimum flat envelope.

NOTE:
Refer to the specific SIMM card instructions in the Appendix section of this manual for card adjustments.

4.1 In This Section

This section provides functional descriptions of MVDA 4822 components. The following topics are discussed:

- General Information
- MVDA 4822 frame
- Power

4.2 General

The MVDA 4822 is a Video Distribution Amplifier which interfaces with the PESA RM4000 and RM5000 Video Matrix Switchers, and also functions as a standalone unit. It consists of a 3RU frame, backplane, and 48 identical circuits. Each circuit utilizes four rear-panel BNC connectors and has up to 48 SIMM cards plugged into it.

The hardware package is manufactured for high reliability, easy installation, and easy maintenance. An open vent screen and a fan in the front door provide cooling for all amplifier cards. Two slide latches hold the front door in place and allow easy access to the cards.

4.3 MVDA 4822 Frame

The MVDA 4822 functions as a 2-to-1 combiner. Each circuit includes looping input and two amplifier outputs.

On the backplane assembly of the MVDA 4822, gain can be adjusted for ±1.5 dB.

Also accessible on the backplane are the center contacts of each rear-panel BNC connector. These contacts provide access for scope probes as required. On the MVDA 4822, the top two BNC contacts are input; the bottom two are outputs.

Power is supplied to the chassis from a primary or backup Power Supply mounted on the rear panel of the RM4000 or RM5000 routing switcher. Loop-through power connectors are provided on the 4822.

4.4 Power

Power for each MVDA mainframe is supplied from a power supply which connects to the rear of the RM4000 and RM5000 routing switcher units. Please refer to the RM4000 and RM5000 Service Manuals for complete details and schematics.

Positioned on the left-hand side of the backplane assembly are three power connector headers: a 4-pin, 6-pin, and 10-pin.

Figure 4–1 illustrates the power connector headers:

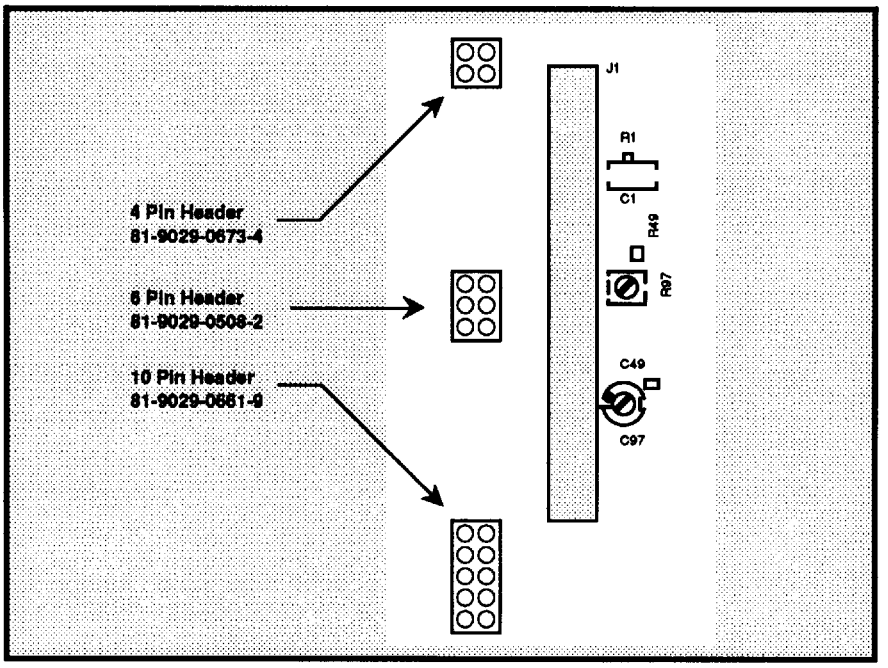

Figure 4–1 Backplane Power Headers

4.5 Plug-In Fuse Card

The fuse card protects the MVDA 4822 frame from being damaged by a short circuit or other fault condition that might otherwise overload the frame. The fuse card is composed of four fuses each rated at 7 Amperes. Two are for the top half of the frame, and two identical fuses are for the bottom half. This prevents one fault from dissabling the entire frame. Fuses F1 (+V) and F2 (-V) are associated with the top half of the frame. Fuses F3 (+V) and F4 (-V) are associated with the bottom half of the frame.

The fuse card also provides power for the fan control card via P1. The fan control card is associated with F3 and F4.

Power to the frame should be dissconnected before removing or inserting the fuse card.

Figure 4–2 illustrates the plug-in fuse card.

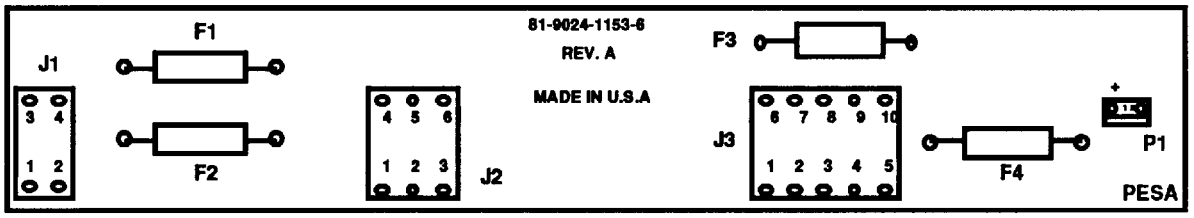

Figure 4–2 Plug-In Fuse Card

5.1 In This Section

This section discusses the recommended maintenance procedures for the system.

5.2 General

The PESA MVDA system is designed to provide extended, trouble-free service with minimum maintenance requirements. Other than the normal care which should be given to any advanced solid-state electronic device, there are few additional maintenance requirements on the unit.

If the need arises to make adjustments, follow the procedures outlined in Section 3 and/or the appropriate Appendix for the type of MVDA card installed in your system.

If additional technical assistance is required, please refer to the "**Ordering Assistance, Service & Inquiries**" sheet in the front of this manual.

5.3 Preventive Maintenance

Use the following guidelines for general preventive maintenance:

- Clean the filter as required.
- Keep the inside of the frame clean, especially if your facility is subject to dust or dirt in the atmosphere. Use compressed air, an anti-static cloth, or a gentle vacuum and soft brush to clean the grille 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.
- The center conductors of each BNC connector are readily accessible inside the frame, if you wish to check system input and output levels. It is recommended that a scope with a 10:1 probe is used for minimum signal disturbance.

Preventive Maintenance (cont.)

- If a problem is suspected with an individual amplifier stage, first swap out the amplifier and re-check the system for the problem.

  If the problem can be isolated on the amplifier itself, and your facility is equipped for surface-mount device repair, proceed with repairs using the schematics provided in Section 6 of this module.
- For replacement components or replacement amplifiers, contact PESA technical support. Refer to the "**Ordering Assistance, Service & Inquiries**" sheet in the front of this manual for details.

NOTE:
Do not repair equipment under warranty without first contacting PESA. PESA warrants the MVDA equipment against defective workmanship or materials for a period of one year from the date of purchase. Refer to the "Equipment Warranty" sheet in the front of this manual for further information.

Appendix A

Unbalanced MVDA Card – 81906511795

A.1 In This Section

This section will provide detailed information on the Unbalanced MVDA card.

- Description of Card
- Specifications
- Functional Description

A.2 Description of Card

The Unbalanced MVDA card is designed to interface with **any** PESA MVDA frame. This card is typically used for short runs with no power ground differential between devices. Each Unbalanced MVDA plug-in amplifier card is a high-impedance bridging input device which can drive three 75Ω loads. On the MVDA–2416 and the MVDA–4813 frames, all three loads are used. On the MVDA–4822 frame, only two loads are utilized.

A.3 Specifications

Coupling	Direct
Level	1v p-p Nominal 2v p-p Maximum without obvious distortion
Frequency Response	
to 7 Mhz	± 0.1 dB
to 20 Mhz	± 0.25 dB
to 100 Mhz	± 0.50 dB
Differential Phase	10-90% NTSC 0.1 Degree Max.
Differential Gain	10-90% NTSC 0.12% Max.
Tilt (50, 60 Hz field or line)	0.1%
Hum and Noise (CCIR M weighted)	-75 dB or better

Appendix A

Unbalanced MVDA Card – 81906511795

A.4 Function

The Unbalanced MVDA is typically used for short cable runs where no power differential is present. The DA input coax shield is grounded.

Figure A–1 shows a block diagram of the Unbalanced MVDA:

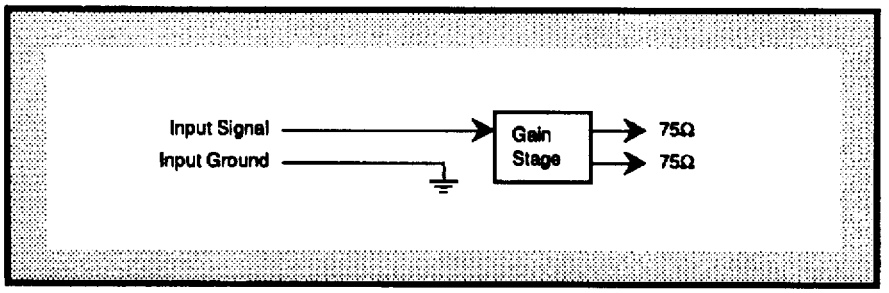

Figure A–1 Unbalanced MVDA Block Diagram

The following description refers to Schematic SC33-1082:

Input signals are delivered to the Unbalanced MVDA on connector pin 29. U2 is a high frequency op-amp with signal applied to the non-inverting input (U2 pin 3). The output is from U2 pin 6 through connector pins 1, 3, and 5. When a third output is required, an external resistor on pin 5 must be supplied. The 75Ω sending terminator resistor for connector pin 5 is located on the back-plane of the frame. U1 and U3 provide + and - 5 volts (±5%) respectively.

Appendix B

Balanced MVDA Card – 81906510144

B.1 In This Section

This section will provide detailed information on the Balanced MVDA card.

- Description of Card
- Specifications
- Functional Description

B.2 Description of Card

The Balanced MVDA card is designed to interface with **any** PESA MVDA frame.This card is typically used for long runs where you might suspect a power ground differential between locations. The input coax shield is *not* grounded, but is connected to a balanced input amplifier.

B.3 Specifications

Coupling	Direct
Level	1v p-p Nominal 2v p-p Maximum without obvious distortion
Frequency Response	
to 7 Mhz	± 0.1 dB
to 20 Mhz	± 0.25 dB
to 100 Mhz	± 1.0 dB
Differential Phase	10-90% NTSC 0.1 Degree Max.
Differential Gain	10-90% NTSC 0.12% Max.
Tilt (50, 60 Hz field or line)	0.1%
Hum and Noise (CCIR M weighted)	-75 dB or better

Appendix B

Balanced MVDA Card – 81906510144

B.4 Function

The Balanced MVDA is typically used for long cable runs where ground potential differences, due to building power circuits, may be present. The input coax shield is *not* grounded, but is connected to a balanced input amplifier.

Figure B–1 shows a block diagram of the Balanced MVDA:

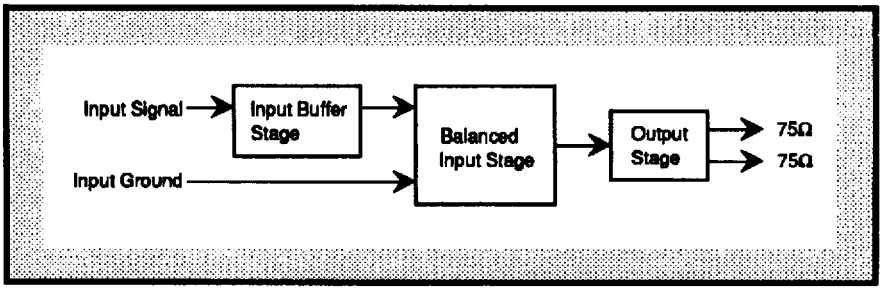

Figure B–1 Balanced MVDA Block Diagram

The following description refers to Schematic SC33-1045:

The input buffer stage, U1, provides high input impedance to the balanced input stage, U2. Resistors 7, 8, 9, and 10 are high precision 0.1% tolerance resistors that allow 60 dB attenuation of unwanted common mode signals. U3 is the output stage, which drives the line. It connects to the external gain and frequency trimmers on the assembly backplane. VR1 and VR2 are the negative and positive voltage regulators, respectively. They take in unregulated voltage from the power supply.

Appendix C

BEC3 MVDA Card – 81906513064

C.1 In This Section

This section will provide detailed information on the BEC3 card.

- Description of Card
- Specifications
- Functional Description
- Operations and Adjustments

C.2 Description of Card

The Balanced MVDA card is designed to interface with **any** PESA MVDA frame.The BEC3 is a balanced card typically used for long cable runs where ground potential differences, due to a building's power circuits, may be present. The input coax shield is *not* grounded, but is connected to a balanced input amplifier. In addition, the BEC3 card is user-adjustable capable of equalizing up to 1000 feet of coax cable. The BEC3 card is also complete with a back porch clamp that eliminates unwanted hum or noise that may be present on incoming video signals.

C.3 Specifications

Input	
Coupling	Direct (DC)
Level	1v p-p Nominal
Impedance	High Impedance > 20K Ohms
Return Loss	< -40 dB to 5 MHz
DC Level	
Signal Peak + DC Component, coax center conductor referenced to coax shield	± 2.0v Peak
Common Mode Rejection	> 60dB to 5 KHz
Common Mode Level	</= 6v p-p
Output	
Number	Three per Card
Impedance	75 ohms, source terminated
Return Loss	< -40 dB to 5 MHz
Signal Level	1v p-p, Nominal, 2v p-p maximum

BEC3 MVDA Card – 81906513064

C.3 Specifications (cont.)

DC Variation	< ± 20 mV without clamp < ± 5 mV with clamp
Gain Adjustment Range	± 1.5 dB
Gain Setability	< .05 dB
Gain Stability	
Over a 24 hour. time period, after 15 minute. warm-up	± .1 dB, DC to 8 MHz
Isolation	
Output to Output	> 40 dB to 5 MHz
Card to Card	> 70 dB to 5 MHz

General

Frequency Response with EQ	
to 5 MHz	±0.1 dB
to 15 MHz	±0.5 dB
to 35MHz	±1.0 dB
Slew Rate:	> 200v/microsecond
Environmental:	
Operating Temperature	0°C to 40°C
Non-Operating Temperature	-25°C to 70°C
Humidity - Non Condensing	20% to 90%

Power

External Unregulated	± 7.5 VDC Minimum ± 10.0 VDC Maximum ± 9.0 VDC Nominal < 2.3 Watts Maximum per card

Non-Linear Distortions

Differential Phase

Post Equalization (1v, p-p)
Test assumes 10-90% @ 3.58 MHz and 12.5-87.5% @ 4.43 MHz

@ 3.58 MHz	< .10°
@ 4.43 MHz	< .12°

BEC3 MVDA Card – 81906513064

C.3 Specifications (cont.)

Differential Gain

Post Equalization (1v, p-p)
Test assumes 10-90% @ 3.58MHz
and 12.5-87.5% @ 4.43MHz

@ 3.58 MHz	< .10%
@ 4.43 MHz	< .12%

Hum and Noise (no weighing)

to 5MHz	< -67 dBm
to 10 MHz	< -65 dBm

Pulse and Bar Response (No Equalization)

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

Chrominance/Luminance

Delay Inequality	<± 10nS
Gain Inequality	<± 0.1 dB

Clamp Specification

Compliance Range
The peak excursions of the input, excluding the video signal, must not exceed ± 2v reference to ground </= ± 2v Peak

Clamping Speed 10 lines of video to correct maximum step

Equalization (Standard)

Adjustment Range	0 to 1000'
Adjustment Type	Combination (Discrete Steps + Variable)

Cable Type

Belden 8281 or Equivalent

Appendix C

BEC3 MVDA Card – 81906513064

C.4 Function

Each BEC3 plug-in amplifier card is a high-impedance bridging input device which can drive three 75Ω loads. Each amplifier includes two regulators, a "+" regulator and a "–" regulator. The BEC3 is capable of passing signals up to 35 MHz.

The BEC3 is a balanced card typically used for long cable runs where ground potential differences, due to a building's power circuits, may be present. The input coax shield is *not* grounded, but is connected to a balanced input amplifier.

Figure 4.1 illustrates a block diagram of the BEC3 card.

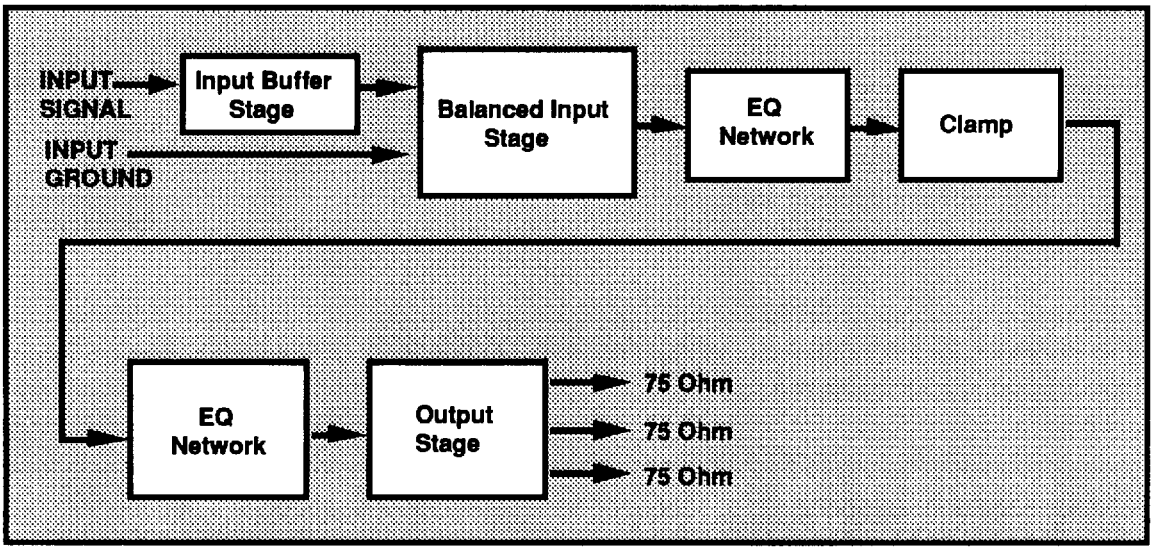

Figure 4.1 Balanced MVDA-BEC3 Block Diagram

The following description refers to Schematic SC33-1119.

The input buffer stage, U1 provides high input impedance to the balanced input stage, U2. Resistors R5-R8 are high precision 0.1% tolerance resistors that allow 60 dB attenuation of unwanted common mode signals.

After the input stage, the signal passes through the equalization network for the 0-500 or 500-1000 foot range. This equalization network is controlled by the equalization switch.

C.4 Function (cont.)

Next, the signal is input into U3, which contains the sample and hold circuit used for signal clamping. U3 also receives input from U4, which monitors the video signal and generates the required signals to allow the sample and hold amplifier to clamp at the appropriate intervals of the composite video signal. The clamp will not function without the presence of an NTSC or PAL composite video signal. To pass other signals, such as component video, the clamp must be turned off via the clamp switch.

From the output of U3, the video enters the second equalization network that allows continuous equalization from 0-500 feet. U5 is the output stage, and connects to the external gain potentiometer on the assembly backplane.

Voltage is supplied to all IC's (except U3) via VR1 and VR2, which are the positive and negative voltage regulators, respectively. They take in unregulated voltage from the power supply. Voltage to U3 is supplied through transistors Q1 and Q2, which are connected to the input positive and negative voltages, respectively.

The BEC3 card has a back porch clamp, also called a DC restore amplifier, to restore the video signal to an average DC offset of 0 volts. It is used to get rid of unwanted DC offset and/or hum and noise that may be present on incoming video signals. The amount of DC and noise the clamp will remove is listed in the specifications. The clamp circuit only operates with composite video.

The equalizer is used to restore the amplitude of the video signal to its original level after the signal has been attenuated by coax video cable. The BEC3 will post equalize up to 1000 feet of Belden 8281 (or equivalent).

Appendix C

BEC3 MVDA Card – 81906513064

C.5 Operations and Adjustments

The MVDA BEC3 card has user adjustments that will be set by the factory and adjusted by the user as necesary. In addition, there are backplane adjustments that must be made. The backplane adjustments are the same on all MVDA configurations

The factory settings for the card will be as follows:

- Clamp Off
- No Equalization (0' of cable)

The user will need to adjust the settings as required.

Figure 3.1 illustrates a single channel representation of an MVDA backplane. **Refer to the appropriate Module in this manual that describes the MVDA configuration utilized in your system for exact adjustment locations.**

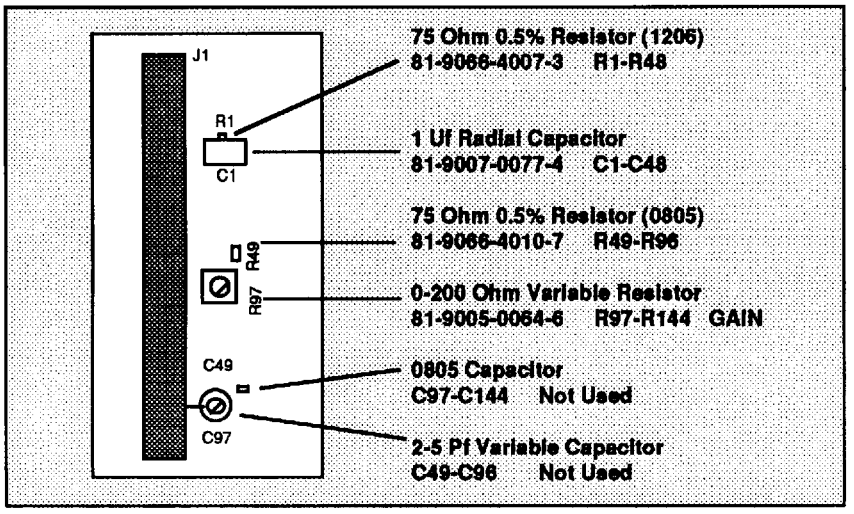

Figure 3.1 Backplane Assembly, Single Channel View

BEC3 MVDA Card – 81906513064

C.5 Operations and Adjustments (cont.)

Gain trimmers affect the outputs on the MVDA frames. Gain adjustments should be made first, followed by equalizer, and clamp adjustments. The equalizer and clamp adjustments may be set independantly as they have no effect on each other.

Use the following procedure to adjust **amplifier gain**:

1. Ensure that your scope is calibrated.
2. Attach a 1v p-p signal such as multi-burst or sweep to the scope's channel A input, and using a BNC "T" connector, bring the signal to the input of the desired MVDA channel.
3. Connect the MVDA-BEC3 channel output to the scope's channel B input, and terminate at the scope.
4. Adjust the gain trimmer for a 1v p-p output.

The BEC3 equalizer card is a user-adjustable feature, capable of equalizing up to 1000 feet of coax cable. The equalizer is set via a 3-position miniature rotary switch and a 200 Ω potentiometer, both located on the BEC3 card. The switch (SW2) is used to select the cable equalization range between 0-500 feet and 500-1000 feet. The potentiometer (R36) is used to adjust the equalization within each range. The equalization must be set using appropriate test equipment since there is no scale reference on the continuous adjustment potentiometer. However, approximate adjustments may be made by estimating the position of the adjustment, which is nearly linear, that is, 50% of pot adjustment equals 50% of equalization, this would be 75' of cable.

The BEC3 card also has a DC offset nulling potentiometer that is set at the factory, and will not require adjustment by the user.

Use the following procedure to adjust **equalization**.

1. To select 0-500 feet range - turn the equalization switch fully clockwise or fully counter clockwise.

2. To select 500-1000 feet range - the equalization switch will be in the center position.

BEC3 MVDA Card – 81906513064

C.5 Operations and Adjustments (cont.)

The clamp is turned on and off via the clamp switch, a 3-position rotary switch.

Use the following procedure to adjust the **clamp**.

1. To turn the clamp on - turn the clamp switch fully clockwise.

2. To turn the clamp off - turn the clamp switch fully counter clockwise.

NOTE:
The center position of the clamp switch is not a valid setting. The BEC3 will not operate properly while set in this position.

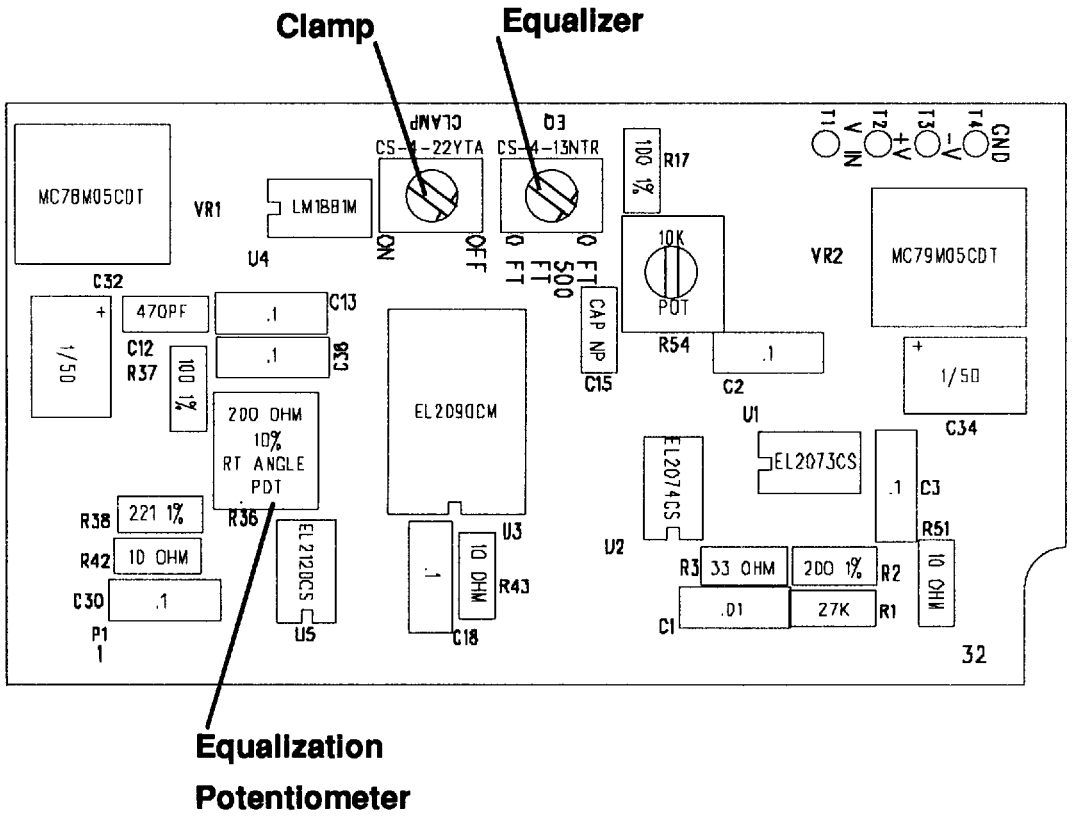

Figure C.2 BEC3 Card Adjustments

Appendix D

Equalizing MVDA Card – 81906513502

D.1 In This Section

This section will provide detailed information on the 150' Equalizing MVDA card.

- Description of Card
- Specifications
- Functional Description
- Operations and Adjustments

D.2 Description of Card

The 150' Equalizing card is designed to interface with **any** PESA MVDA frame. This card is an unbalanced card typically used on the input or output of a switcher to equalize short (up to 150') cable runs. The potentiometer on the card is used to adjust for cable lengths from 0-150' of 8281 type cable. Each Equalizing MVDA plug-in amplifier card is a high-impedance bridging input device which can drive three 75Ω loads. On the MVDA–2416 and the MVDA–4813 frames, all three loads are used. On the MVDA–4822 frame, only two loads are utilized.

D.3 Specifications

<u>Input</u>	
Coupling	Direct (DC)
Level	1v p-p Nominal
Impedance	High Impedance > 20K Ohms
Return Loss	< -40 dB to 5 MHz
<u>Output</u>	
Number	Three per Card
Impedance	75 ohms, source terminated
Return Loss	< -40 dB to 5 MHz
Signal Level	1v p-p, Nominal, 2v p-p maximum
DC Variation	< ± 20 mV
Gain Adjustment Range	± 1 dB

Appendix D

Equalizing MVDA Card – 81906513502

D.3 Specifications (cont.)

Gain Setability	< .05 dB
Gain Stability	
Over a 24 hour. time period, after 15 minute. warm-up	± .1 dB, DC to 8 MHz
Isolation	
Output to Output	> 40 dB to 5 MHz
Card to Card	> 70 dB to 5 MHz

General

Frequency Response with EQ	
to 5 MHz	±0.1 dB
to 15 MHz	±0.5 dB
to 100MHz	±1.0 dB
Slew Rate:	> 200v/microsecond
Environmental:	
Operating Temperature	0°C to 40°C
Non-Operating Temperature	-25°C to 70°C
Humidity - Non Condensing	20% to 90%

Power

External Unregulated	± 7.5 VDC Minimum
	± 10.0 VDC Maximum
	± 9.0 VDC Nominal

Non-Linear Distortions

Differential Phase	
Pre or Post Equalization (1v, p-p)	
Test assumes 10-90% @ 3.58 MHz and 12.5-87.5% @ 4.43 MHz	
@ 3.58 MHz	< .10°
@ 4.43 MHz	< .12°

Appendix D

Equalizing MVDA Card – 81906513502

D.3 Specifications (cont.)

Differential Gain

Pre or Post Equalization (1v, p-p)	
Test assumes 10-90% @ 3.58MHz and 12.5-87.5% @ 4.43MHz	
@ 3.58 MHz	< .10%
@ 4.43 MHz	< .12%

Hum and Noise (no weighing)

to 5MHz	< -69 dBm
to 10 MHz	< -67 dBm

Pulse and Bar Response (No Equalization)

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

Chrominance/Luminance

Delay Inequality	<± 1nS
Gain Inequality	<± 0.1 dB

Equalization (Standard)

Adjustment Range	0 to 150'
Adjustment Type	Single Turn Potentiometer

Cable Type

Belden 8281 or Equivalent

Appendix D

Equalizing MVDA Card – 81906513502

D.4 Function

The 150' Equalizing MVDA plug-in amplifier card is a high-impedance bridging input device which can drive three 75Ω loads. Each amplifier includes two regulators, a "+" regulator and a "-" regulator. The 150' Equalizing card is capable of passing signals up to 100 MHz.

The 150' Equalizing card is an unbalanced card typically used for short cable runs where ground potential differences, due to a building's power circuits, will not be present. The input coax shield *is* grounded.

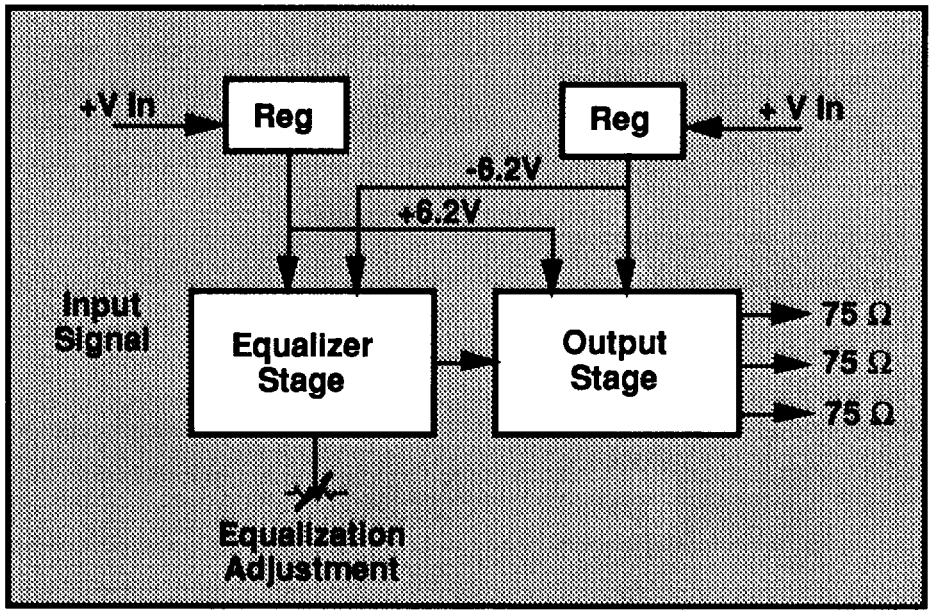

Figure D–1 Equalizing Card Block Diagram

The following description refers to Schematic SC33-1134:

The input is to U1 , an operational amplifier which provides the required gain for the equalization. U2 is an operational amplifier which provides the gain required to drive the outputs.

Appendix D

Equalizing MVDA Card – 81906513502

D.5 Operations and Adjustments

The 150' Equalizer card has user adjustments that will be set by the factory and adjusted by the user as necessary. In addition, there are backplane adjustments. These backplane adjustments are the same on all MVDA configurations.

The factory settings will be as follows:

- No Equalization (0' of cable)
- Unity Gain

The user will need to adjust the settings as required.

Figure D–2 illustrates a single channel representation of an MVDA backplane, showing the locations of the gain trimmers. **Refer the the appropriate Module in this manual that describes the MVDA configuration utilized in your system for exact adjustment locations.**

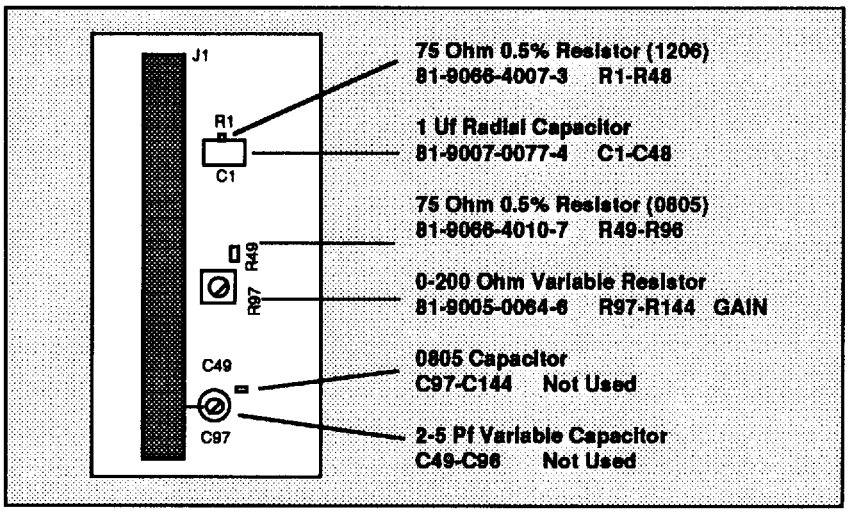

Figure D–2 Backplane Assembly, Single Channel View

Appendix D

Equalizing MVDA Card – 81906513502

D.5 Operations and Adjustments (cont.)

Gain trimmers affect the outputs on the MVDA frames. Gain adjustments should be made first, followed by equalizer adjustments. The equalizer adjustment may be set independantly.

Use the following procedure to adjust **amplifier gain**:

1. Ensure that your scope is calibrated.
2. Attach a 1v p-p signal such as multi-burst or sweep to the scope's channel A input, and using a BNC "T" connector, bring the signal to the input of the desired MVDA channel.
3. Connect the MVDA channel output to the scope's channel B input, and terminate at the scope.
4. Adjust the gain trimmer on the backplane (R97 - R144) for a 1v p-p output.

The 150' Equalizer card is a user-adjustable feature, capable of equalizing up to 150 feet of coax cable. The equalizer is set via a potentiometer located on the card. The equalization must be set using appropriate test equipment since there is no scale reference on the continuous adjustment potentiometer. However, approximate adjustments may be made by estimating the position of the adjustment, which is nearly linear, that is, 50% of pot adjustment equals 50% of equalization, this would be 75' of cable.