PESA Switching Systems

3500
System Controller

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FCC Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

DECLARATION OF CONFORMITY

according to ISO/IEC Guide 22 and EN 45014

Manufacturer's Name: PESA SWITCHING SYSTEMS, INC.

Manufacturer's Address: 330A Wynn Drive
Huntsville, AL. 35805
USA

The manufacturer hereby declares that the product

Product Name: 3500 Dual System Controller

Model Number: All 3500 Dual System Controller models

conforms to the following standards or other normative documents:

Electromagnetic Emissions: **EN 50081-1:1992**
EN 55022:1995

Electromagnetic Immunity: **EN 50082-1:1992**
EN 61000-4-2:1995
EN 61000-4-3:1995
EN 61000-4-4:1995
EN 61000-4-5:1995
EN 61000-4-6:1996
EN 61000-4-8:1994
EN 61000-4-11:1994
ENV 50204:1996

Safety: **EN 60950:1992**

The product herewith complies with the requirements of: **EMC Directive 89/336/EEC**

Supplementary Information:

Test reports and compliance documents are on file at the corporate office of PESA Switching Systems, Inc. in Huntsville, Alabama, USA.

Huntsville, March 2,1999
Place and Date

Paul Ethridge
Quality Control Engineer

81905904220 REV. A

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Chapter 1 – Introduction

General

This manual provides instructions for the installation, operation, and maintenance of the PESA 3500 System Controller.

Safety Warnings

Safety warnings and other important information in this document are designated in three ways:

WARNING

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

CAUTION

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

NOTE

Notes add emphasis to information that is important for the correct installation, operation, or maintenance of the equipment.

Product Description

The 3500 System Controller is a low cost, full-featured microprocessor-based unit designed to interface with various configurations of PESA video and audio routing switchers. The 3500 System Controller, working in conjunction with Win3500 Control System software, enables users to configure and operate a routing switcher system from a standard IBM compatible PC. Both the 3500 System Controller and the Win3500 Control System software are inherently flexible and easily configured.

The 3500 System Controller utilizes the Motorola 68332 embedded microprocessor. In addition, it is equipped with 512K of non-volatile RAM, 256K of EPROM, and 256K of non-volatile memory making the 3500 System Controller a high-powered control platform for its size.

The 3500 System Controller is capable of controlling up to a 512 input by 512 output, eight level routing switcher system. Standard features include independent control of each level, audio-follow-video switching, virtual matrix mapping, and software reentry. Matrix segmentation (breakup) is also a standard feature. Matrix segmentation enables RGB, Y/C, or multiple levels of audio to be configured as smaller matrixes within a larger matrix. Multiple levels of lock priority, 128 salvo capability, full diagnostics, and all-call switching are also included in the 3500 Controller's standard features plus the ability to configure 600 sources and destinations.

The controller supports the low-cost RCP control panels manufactured by PESA. The control panels are connected via twisted pair cable and can be remotely located up to 4000 feet from the controller. The control panels communicate with the 3500 Controller over a standard RS-485 interface. Two RS422 ports and two

RS232 ports are provided for communications interface with the routing switcher system, the control system computer, and additional equipment items.

The 3500 System Controller is available as a stand-alone unit (rack mountable) or as a plug-in unit for routing switchers. The 3500 Controller is fully compatible with PESA's System 5, Lynx, Cougar, Jaguar and Tiger lines of audio and video routing switchers.

Models of the 3500 Controller

The six models of the 3500 System Controller are described in Table 1.

Table 1 3500 System Controller Basic Models

Model	Installation Location	Routing Switchers Controlled
3500	One or two may be installed in a Cougar, Jaguar, or Tiger video chassis.	PRC: Cougar, Jaguar, Tiger RM5: n/a
3500-EX	One may be installed in an RM4000 video chassis.	PRC: Cougar, Jaguar, Tiger RM5: RM4000, RM5000, Lynx
3500-S	Single: One controller in a 1RU chassis.	PRC: Cougar, Jaguar, Tiger RM5: RM4000, RM5000, Lynx
3500-D	Dual: Two controllers in a 2RU chassis.	PRC: Cougar, Jaguar, Tiger RM5: RM4000, RM5000, Lynx
3500-SE	Single Expandable: One controller installed in a 2RU chassis. Expand with Model 3500-DE.	PRC: Cougar, Jaguar, Tiger RM5: RM4000, RM5000, Lynx
3500-DE	Dual Expansion Kit: Used to add one controller to the Model 3500-SE.	PRC: Cougar, Jaguar, Tiger RM5: RM4000, RM5000, Lynx

Specifications

General

Power Requirements

Voltage ..... 8.5 ±1.5VDC

Communications

Number of RS-232 Ports 2
Number of RS-422 Ports 2
Data Rate ..... 9600 baud

Physical Characteristics

3500, 3500-EX

Installs inside a video routing switcher chassis.

3500-S

Height ..... 1RU - 1.75 Inches (45mm)
Width ..... 19 Inches (483mm)
Depth ..... 8 Inches (203mm)
Weight ..... TBD

3500-D

Height ..... 2RU - 3.5 Inches (89mm)
Width ..... 19 Inches (483mm)
Depth ..... 10 Inches (254mm)
Weight ..... TBD

Operational Environment

Temperature ..... 0-40°C
Operational Humidity ..... 1% - 90% Non-Condensing

Chapter 2 – Installation

Shipping Damage Inspection

Immediately upon receipt, all shipping containers should be inspected for damage caused in transit. If any damage is noted, save all packing material and contact both PESA and the carrier as soon as possible.

Unpacking

CAUTION

This equipment contains static sensitive devices. A grounded wrist strap and mat should be used when handling the 3500 System Controller.

Carefully unpack the equipment and compare the parts received against the packing list and Table 2 through Table 7. If any parts appear to be missing, please contact PESA immediately.

Table 2. Model 3500 (81-9097-1444-0) Equipment List

Part No. Description	Quantity Required
81-9065-1959-0 One Controller PCB with attached Mounting Tray for installation in Cougar, Jaguar, or Tiger video chassis	1 each
81-9028-0393-0 Null Modem Cable Assembly (3500 to PC)	1 each
81-9065-1961-0 Win3500 Control System Software	1 copy
81-9059-0402-0 Manual, 3500 System Controller	1 each
81-9059-0401-0 Manual, Win3500 Control System	1 each

Table 3. Model 3500-EX (81-9097-1445-0) Equipment List

Part No. Description	Quantity Required
81-9065-1974-0 One Controller PCB with attached Mounting Tray for installation in RM4000 video chassis	1 each
81-9065-1934-0 One RCP Port Interface Adapter Installs on “Series H Control” connector	1 each
81-9028-0393-0 Null Modem Cable Assembly (3500 to PC)	1 each
81-9065-1961-0 Win3500 Control System Software	1 copy
81-9059-0402-0 Manual, 3500 System Controller	1 each
81-9059-0401-0 Manual, Win3500 Control System	1 each

Table 4. Model 3500-S (81-9097-1408-0) Equipment List

Part No. Description	Quantity Required
81-9065-1974-0 One Controller PCB with attached Mounting Tray for installation in 1RU chassis	1 each
81-9065-1510-0 1RU Chassis with Backplane	1 each
81-9028-0393-0 Null Modem Cable Assembly (3500 to PC)	1 each
81-9028-0400-0 Serial Cable Assembly (3500 to PRC Type Routing Switcher)	Note 1
81-9065-1183-7 Power Cable, 3-contact plug to 3-contact plug	Note 1
81-9065-1189-2 RM5 Control Cable Assembly (3500 to RM5 Type Routing Switcher)	Note 1
81-9065-1653-0 Power Cable, 3-contact plug to 6-contact plug	Note 1
81-9065-1961-0 Win3500 Control System Software	1 copy
81-9059-0402-0 Manual, 3500 System Controller	1 each
81-9059-0401-0 Manual, Win3500 Control System	1 each
Note 1: This item is optional or may be ordered in varying quantities. Please consult your purchase order to verify that you have received the correct quantity.	

Table 5. Model 3500-D (81-9059-1407-0) Equipment List

Part No. Description	Quantity Required
81-9065-1959-0 One Controller PCB with attached Mounting Tray for installation in 2RU chassis	2 each
81-9065-1854-0 2RU Chassis with Backplane	1 each
81-9065-2048-0 PS130 Power Supply	2 each
81-9028-0393-0 Null Modem Cable Assembly (3500 to PC)	1 each
81-9028-0400-0 Serial Cable Assembly (3500 to PRC Type Routing Switcher)	Note 1
81-9028-0403-0 PS130 Power Supply Line Cord	2 each
81-9065-1189-2 RM5 Control Cable Assembly (3500 to RM5 Type Routing Switcher)	Note 1
81-9065-1653-0 Power Cable, 6-contact plug to 6-contact plug	Note 1
81-9065-TBD-0 Power Cable, 6-contact plug to 3-contact plug	Note 1
81-9065-1961-0 Win3500 Control System Software	1 copy
81-9059-0402-0 Manual, 3500 System Controller	1 each
81-9059-0401-0 Manual, Win3500 Control System	1 each
Note 1: This item is optional or may be ordered in varying quantities. Please consult your purchase order to verify that you have received the correct quantity.	

Table 6. Model 3500-SE (81-9059-1446-0) Equipment List

Part No. Description	Quantity Required
81-9065-1959-0 One Controller PCB with attached Mounting Tray for installation in 2RU chassis	1 each
81-9065-1854-0 2RU Chassis with Backplane	1 each
81-9065-2048-0 PS130 Power Supply	1 each
81-9028-0393-0 Null Modem Cable Assembly (3500 to PC)	1 each
81-9028-0400-0 Serial Cable Assembly (3500 to PRC Type Routing Switcher)	Note 1
81-9028-0403-0 PS130 Power Supply Line Cord	1 each
81-9065-1189-2 RM5 Control Cable Assembly (3500 to RM5 Type Routing Switcher)	Note 1
81-9065-1961-0 Win3500 Control System Software	1 copy
81-9059-0402-0 Manual, 3500 System Controller	1 each
81-9059-0401-0 Manual, Win3500 Control System	1 each
Note 1: This item is optional or may be ordered in varying quantities. Please consult your purchase order to verify that you have received the correct quantity.	

Table 7. Model 3500-DE (81-9059-1447-0) Equipment List

Part No. Description	Quantity Required
81-9065-1959-0 One Controller PCB with attached Mounting Tray for installation in 2RU chassis	1 each
81-9065-2048-0 PS130 Power Supply	1 each
81-9028-0403-0 PS130 Power Supply Line Cord	1 each

Installation Location

This equipment is designed to be installed in a standard 19-inch equipment rack located in an environment conforming to the specifications shown in Chapter 1. Each unit should be located as close as possible to its associated equipment to minimize cable runs.

Consideration should be given to the connection of this equipment to the supply circuit and the effect that possible overloading could have on overcurrent protection circuits and supply wiring. Refer to the nameplate ratings when addressing this concern.

Installation in Equipment Rack - Model 3500-S and Model 3500-D

This equipment is designed to be installed in a standard 19-inch equipment rack. Sufficient space must be provided behind the equipment racks to allow for control, signal, and power cables. All panel mounting holes should be utilized and mounting hardware tightened securely.

Install the equipment into the rack as follows:

1. Insert the panel assembly into the equipment rack and support the bottom of the panel assembly until all mounting hardware has been installed and properly tightened.
2. Install the bottom two panel mounting screws.
3. Install the top two panel mounting screws.
4. Install any remaining panel mounting screws.
5. Tighten all of the panel mounting screws until they are secure.

Internal Installation - Model 3500

Cougar Video Routing Switcher

Two Model 3500 System Controllers can be installed in a Cougar video routing switcher. For detailed installation information, please refer to your Cougar manual:

- 81-9059-0342-0 Cougar Analog Video Routing Switcher Manual
- 81-9059-0344-0 Cougar Digital Video Routing Switcher Manual

Jaguar Video Routing Switcher

Two Model 3500 System Controllers can be installed in a Jaguar video routing switcher. For detailed installation information, please refer to your Jaguar manual:

- 81-9059-0369-0 Jaguar Analog and Digital Video Routing Switcher Manual

Tiger Video Routing Switcher

Two Model 3500 System Controllers can be installed in a Tiger video routing switcher. For detailed installation information, please refer to your Tiger manual:

- 81-9059-0403-0 Tiger Analog and Digital Video Routing Switcher Manual

Internal Installation - Model 3500-EX

RM4000 Video Routing Switcher

One Model 3500-EX System Controller can be installed in an RM4000 video routing switcher. For detailed installation information, please refer to your RM4000 manual:

- 81-9059-0115-3 RM4000 Analog Video Routing Switcher Manual

Interface Connections

For reasons of personal safety, and to prevent damage to the equipment or cables, the following guidelines should be followed when connecting cables to this equipment.

1. Install the equipment in the rack before connecting cables.
2. All cables should be carefully strain relieved to prevent connector separation.
3. To the extent possible, separate control, signal, and power cables to minimize crosstalk and interference.
4. The liberal use of nylon cable ties to secure cables to the rack is encouraged. This will minimize the amount of force transmitted to the equipment and help route cables away from hazardous areas.
5. Route cables away from walk areas to avoid creating a safety hazard.

Model 3500-S

All interface connections are made at the rear of this equipment as shown in Figure 1.

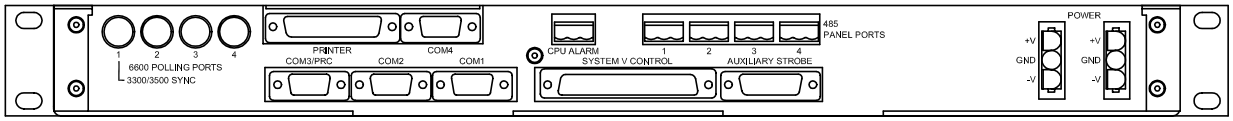


Figure 1. 3500-S Rear View

3300/3500 SYNC / 6600 POLLING PORT 1 (J1)

This BNC connector is used for an optional vertical sync signal input. If it will not be used, install a 75 Ohm terminator (Part No. 81-9029-0668-4).

6600 POLLING PORTS 2, 3, and 4 (J2, J3, J4)

These BNC connectors are reserved for future use. There is no internal connection and they do not need to be terminated.

PRINTER (J5)

This DB25-Female connector is reserved for future use. See Figure 2 for an orientation view showing contact locations.

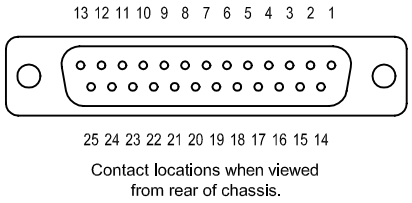


Figure 2. 3500-S J5 (PRINTER) Connector

COM 1 (J14), COM 2 (J13)

These DB9-Male connectors provide RS-232 serial communication interfaces. See Figure 3 for an orientation view showing contact locations.

- COM 1 is the primary RS-232 CPU Link and may be connected to the PC running Win3500 Control System software with a null modem cable (Part No. 81-9028-0393-0). If necessary, a cable up to 50 feet in length may be fabricated in the field as shown in Figure 4. COM 1 may only be used with the P1E protocol, and only at 9600 baud.

  COM 1 may also be connected to an external modem using an AT Serial Modem cable (Part No. 81-9028-0400-0). If necessary, a cable up to 50 feet in length may be fabricated in the field as shown in Figure 5.

- COM 2 is a secondary RS-232 CPU Link which may also be connected to a PC or external modem. COM 2 may be used with any of the protocols shown in Table 8 and may operate at either 9600 or 38400 baud. The communication rate for COM 2 is determined by settings made in the Win3500 software.

Table 8. PESA CPU Link Protocols

Protocol	Document No.
CPU Link Protocol No. 1 (P1)	81-9062-0407-0
CPU Link Protocol No. 1 Extensions (P1E)	81-9062-0408-0
Unsolicited Status Protocol (USP)	81-9062-0409-0
Truck Link Protocol (TRK)	81-9062-0410-0

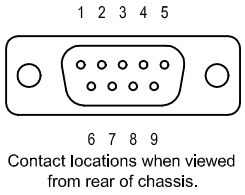


Figure 3. 3500-S J13, J14 (COM 1, COM 2) Connectors

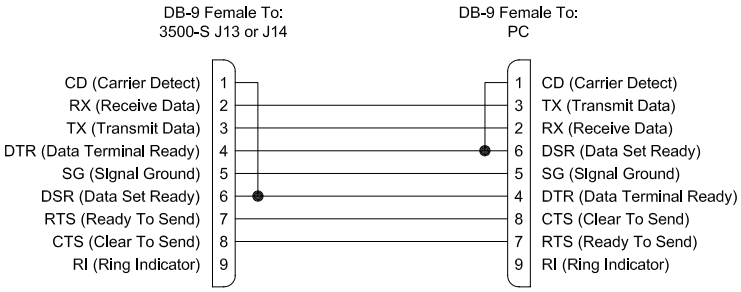


Figure 4. 3500-S RS-232 CPU Link (Null Modem) Cable

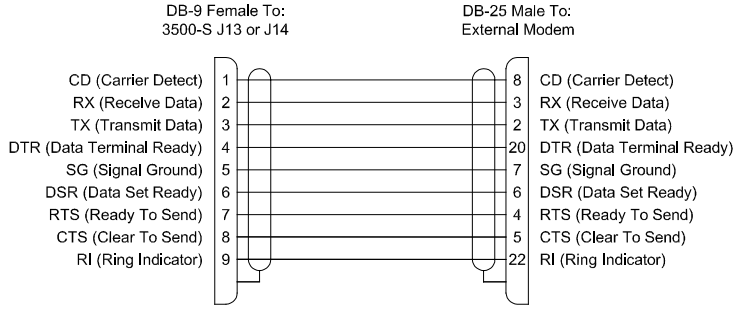


Figure 5. 3500-S RS-232 CPU Link (AT Serial Modem) Cable

COM 3/PRC (J12), COM 4 (J6)

These DB9-Male connectors provide RS-422 serial communication interfaces. See Figure 6 for an orientation view showing contact locations.

- COM 3/PRC is the communications interface to a PRC type routing switcher system and is connected to a routing switcher with an AT Serial Modem cable (Part No. 81-9028-0400-0). If necessary, a cable up to 4000 feet in length may be fabricated in the field as shown in Figure 7.
- COM 4 is an RS-422 CPU Link similar to the RS-232 CPU Link, except the cable may be up to 4000 feet in length and an RS-422 interface card must be installed in the expansion bus. COM 4 may be used with any of the protocols shown in Table 8 on page 11. If necessary, a cable may be fabricated in the field as shown in Figure 8.

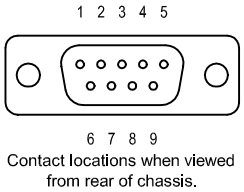


Figure 6. 3500-S J6, J12 (COM 3/PRC, COM 4) Connectors

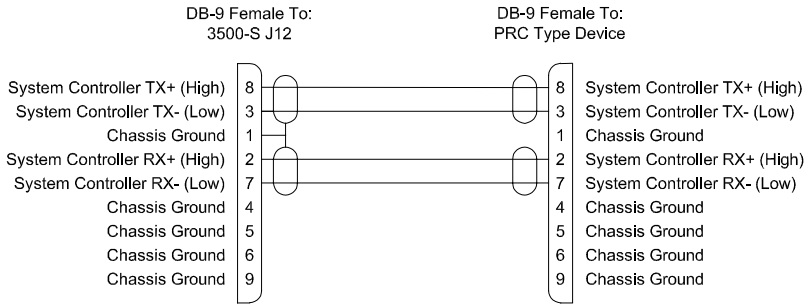


Figure 7. 3500-S RS-422 Serial Cable

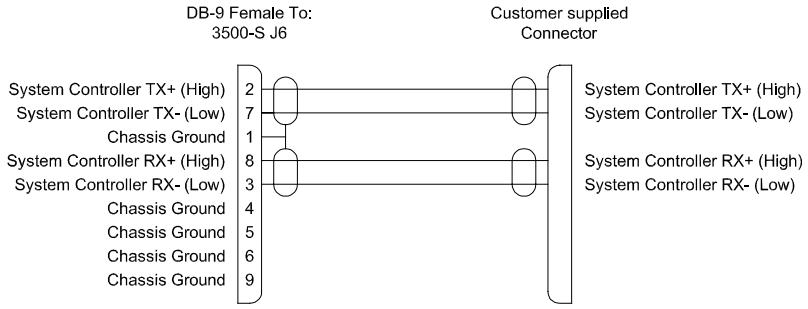
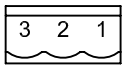


Figure 8. 3500-S RS-422 CPU Link Cable

CPU ALARM (J7)

This 3-contact connector is reserved for future use. See Figure 9 for an orientation view showing contact locations.



Contact locations when viewed from rear of chassis.

Figure 9. 3500-S J7 (CPU ALARM) Connector

485 PANEL PORTS 1-4 (J8, J9, J10, J11)

These 3-contact connectors provide RS-485 serial communication interfaces using the PESA RCP Protocol (Document No. 81-9062-0300-0). See Figure 10 for an orientation view showing contact locations.

J8, J9, J10, and J11 are connected to PESA Remote Control Panels with daisy-chained cables constructed with 3-contact connectors (Part No. 81-9029-0780-0) and shielded, twisted-pair audio cable (Part No. 81-9028-0043-2, Belden 8451, or equivalent) as shown in Figure 11. The connector body has an integral strain relief which requires the use of a nylon cable tie which is included with the connector. If this cable tie is not available, Part No. 81-9021-0028-8 may be used.

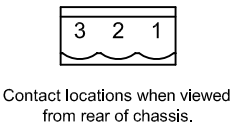


Figure 10. 3500-S J8, J9, J10, J11 (485 PANEL PORTS 1-4) Connectors

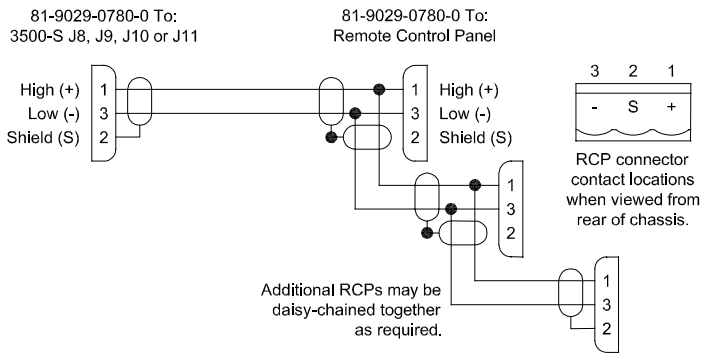


Figure 11. 3500-S RS-485 Serial Cable

SYSTEM V CONTROL (J15)

This DB37-Male connector provides the System 5 control interface and uses the RM5 Protocol (Document No. 81-9062-0155-3). See Figure 12 for an orientation view showing contact locations.

J15 is connected to a Lynx or RM5 type routing switcher with cable assembly Part No. 81-9065-1189-2). If necessary, a cable up to 8 feet in length may be fabricated in the field as shown in Figure 13. If more than one System 5 Routing Switcher will be connected to the System Controller, consult Drawing No. WI50-0262 for information on constructing a bifurcated cable.

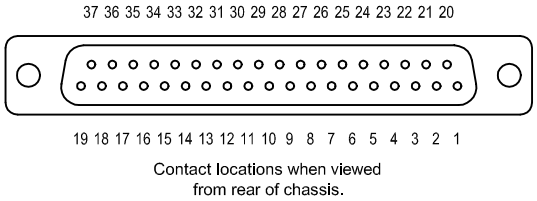


Figure 12. 3500-S J15 (SYSTEM V CONTROL) Connector

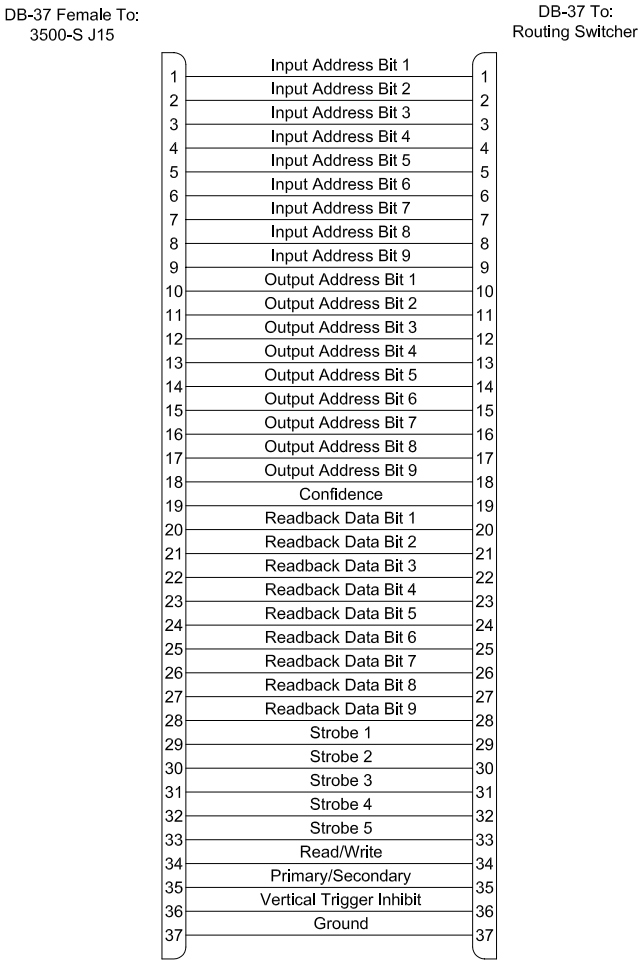


Figure 13. 3500-S RM5 Control Cable

AUXILIARY STROBE (J16)

This DB15-Male connector is reserved for future use. See Figure 14 for an orientation view showing contact locations.

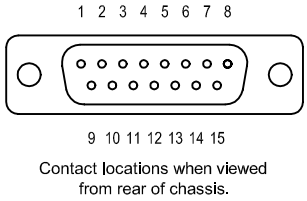


Figure 14. 3500-S J16 (AUXILIARY STROBE) Connector

POWER (J17, J18)

These 3-contact connectors are the power connectors. See Figure 15 for an orientation view showing contact locations.

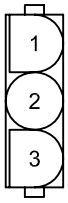
CAUTION

To avoid damage to the 3500-S System Controller, the power connectors (J17 and J18) must never be connected to any of the following:

- A Lynx, Cougar or Jaguar audio routing switcher
- An external audio power supply (PS140A or PS270A)
- An RM5000 video routing switcher or its external power supply (PS270V).

The Model 3500-S has no internal power supply. J17 and J18 are connected in parallel. One is used for power input and the other may be used as a loop-through connector to provide power to another device. Input power may be drawn from the following sources:

- The 3500-S may obtain power from PESA system components having 3-contact power connectors by using a power cable assembly (Part No. 81-9065-1183-7) constructed as shown in Figure 16. If this cable must be constructed in the field, consult Drawing No. WI50-0172 for assembly details. This cable may be used with the following equipment:
  - RM4000 Video Routing Switcher
  - PS140V External Power Supply
  - 3500-S System Controller.
- The 3500-S may obtain power from PESA system components having 6-contact power connectors by using a power cable assembly (Part No. 81-9065-1653-0) constructed as shown in Figure 17. If this cable must be constructed in the field, consult Drawing No. WI50-0238 for assembly details. This cable may be used with the following equipment:
  - Lynx, Cougar, or Jaguar Video Routing Switchers
  - 3500-D System Controller.



Contact locations when viewed from rear of chassis.

Figure 15. 3500-S J17, J18 (POWER) Connectors

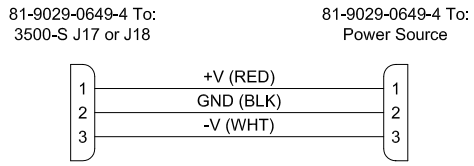


Figure 16. 3500-S Power Cable with 3-Contact Plug

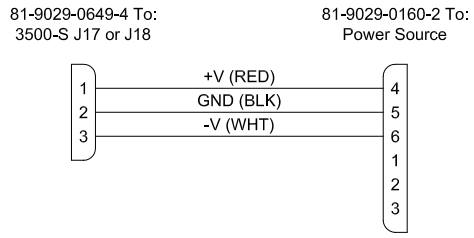


Figure 17. 3500-S Power Cable with 6-Contact Plug

Models 3500-D (and 3500-SE / 3500-DE)

All interface connections are made at the rear of this equipment as shown in Figure 18.

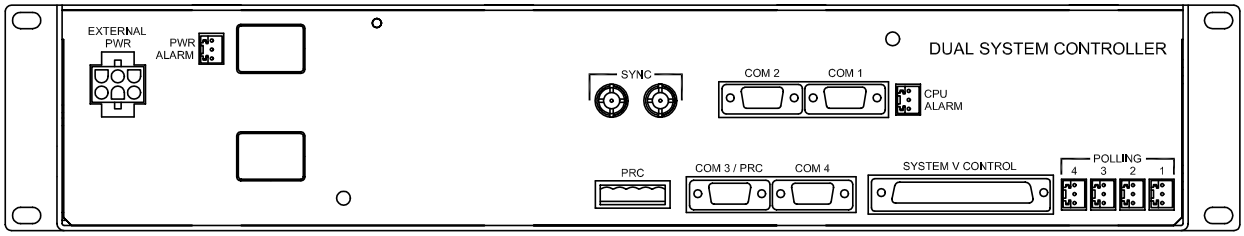


Figure 18. 3500-D Rear View

EXTERNAL POWER (J5)

This 6-contact connector is the DC power interface connector. See Figure 19 for an orientation view showing contact locations.

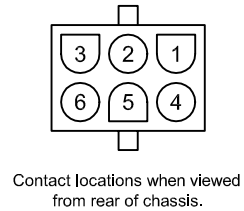
CAUTION

To avoid damage to the 3500-D System Controller, the External Power connector (J5) must never be connected to any of the following:

- A Lynx, Cougar or Jaguar audio routing switcher
- An external audio power supply (PS140A or PS270A)
- An RM5000 video routing switcher or its external power supply (PS270V).

The Model 3500-D may be configured with or without internal power supplies. If either of the internal power supplies are installed, J5 may be used to provide power to other equipment. If neither of the internal power supplies are installed, J5 is used to connect the 3500-D to an external power source. Input power may be drawn from the following sources:

- The 3500-D may obtain power from PESA system components having 3-contact power connectors by using a power cable assembly (Part No. 81-9065-1653-0) constructed as shown in Figure 20. If this cable must be constructed in the field, consult Drawing No. WI50-0238 for assembly details. This cable may be used with the following equipment:
  - RM4000 Video Routing Switcher
  - PS140V External Power Supply
  - 3500-S System Controller.
- The 3500-D may obtain power from PESA system components having 6-contact power connectors by using a power cable assembly (Part No. 81-9065-TBD-0) constructed as shown in Figure 21. If this cable must be constructed in the field, consult Drawing No. WI50-TBD for assembly details. This cable may be used with the following equipment:
  - Lynx, Cougar, or Jaguar Video Routing Switchers
  - 3500-D System Controller.



Contact locations when viewed from rear of chassis.

Figure 19. Orientation View - 3500-D J5 (EXTERNAL POWER) Connector

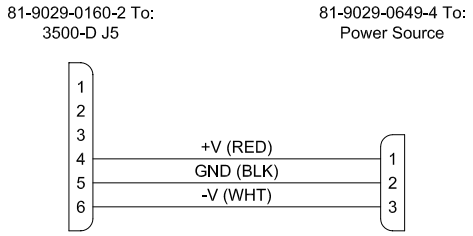


Figure 20. 3500-D Power Cable with 3-Contact Plug

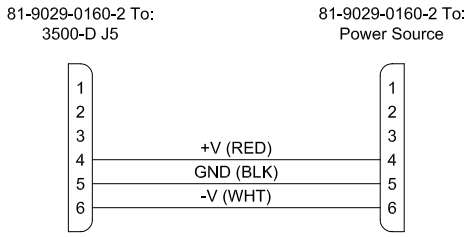


Figure 21. 3500-D Power Cable with 6-Contact Plug

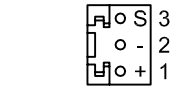
PWR ALARM (J22)

This 3-contact connector provides the interface for the Power Supply alarms. See Figure 22 for an orientation view showing contact locations.

Each of the two PS130 Power Supplies has its own internal low voltage alarm which will be enabled when the output voltage varies from 9VDC by ±12%. During an alarm condition, an optically isolated, closed circuit exists between contacts 3 and 1 for Power Supply A (top), and contacts 2 and 1 for Power Supply B (bottom). The customer supplied external alarm circuit is connected with a cable constructed as shown in Figure 23.

CAUTION

The alarm circuit connected to this connector must not exceed 12VDC or 10mA.



Contact locations when viewed from rear of chassis.

Figure 22. 3500-D J22 (PWR ALARM) Connector

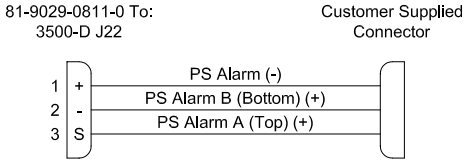


Figure 23. 3500-D PS Alarm Cable

SYNC (J16, J17)

These BNC connectors are wired in parallel and are used for an optional vertical sync signal input. The second connector is to allow the signal to be looped through the 3500-D chassis and routed to other equipment. Unused connectors must be terminated with a 75 Ohm terminator (Part No. 81-9029-0668-4).

COM 1 (J7), COM 2 (J8)

These DB9-Male connectors provide RS-232 serial communication interfaces. See Figure 24 for an orientation view showing contact locations.

- COM 1 is the primary RS-232 CPU Link and may be connected to the PC running Win3500 Control System software with a null modem cable (Part No. 81-9028-0393-0). If necessary, a cable up to 50 feet in length may be fabricated in the field as shown in Figure 25. COM 1 may only be used with the P1E protocol, and only at 9600 baud.

  COM 1 may also be connected to an external modem using an AT Serial Modem cable (Part No. 81-9028-0400-0). If necessary, a cable up to 50 feet in length may be fabricated in the field as shown in Figure 26.

- COM 2 is a secondary RS-232 CPU Link which may also be connected to a PC or external modem. COM 2 may be used with any of the protocols shown in Table 9 and may operate at either 9600 or 38400 baud. The communication rate for COM 2 is determined by settings made in the Win3500 software.

Table 9. PESA CPU Link Protocols

Protocol	Document No.
CPU Link Protocol No. 1 (P1)	81-9062-0407-0
CPU Link Protocol No. 1 Extensions (P1E)	81-9062-0408-0
Unsolicited Status Protocol (USP)	81-9062-0409-0
Truck Link Protocol (TRK)	81-9062-0410-0

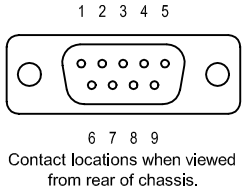


Figure 24. 3500-D J7, J8 (COM 1, COM 2) Connectors

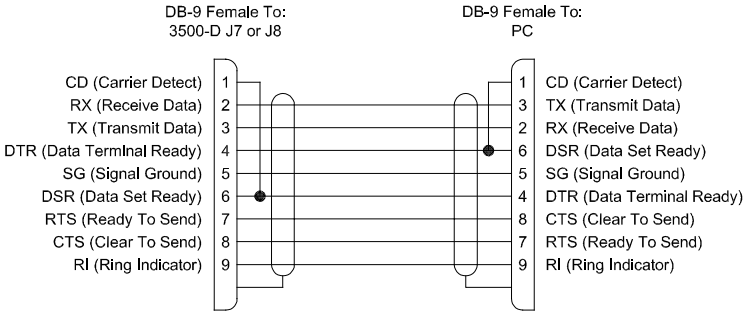


Figure 25. 3500-D RS-232 CPU Link (Null Modem) Cable

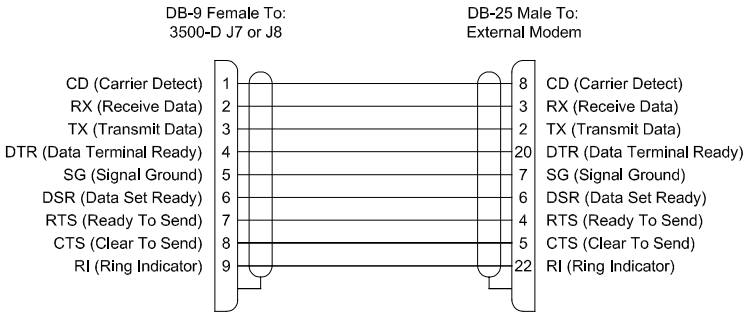


Figure 26. 3500-D RS-232 CPU Link (AT Serial Modem) Cable

COM 3/PRC (J9), COM 4 (J10)

These DB9-Male connectors provide RS-422 serial communication interfaces. See Figure 27 for an orientation view showing contact locations.

- COM 3/PRC is the communications interface to a PRC type routing switcher system and is connected to a routing switcher with an AT Serial Modem cable (Part No. 81-9028-0400-0). If necessary, a cable up to 4000 feet in length may be fabricated in the field as shown in Figure 28.
- COM 4 is an RS-422 CPU Link similar to the RS-232 CPU Link, except the cable may be up to 4000 feet in length and an RS-422 interface card must be installed in the expansion bus. COM 4 may be used with any of the protocols shown in Table 9 on page 23. If necessary, a cable may be fabricated in the field as shown in Figure 29.

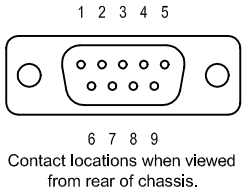


Figure 27. 3500-D J9, J10 (COM 3/PRC, COM 4) Connectors

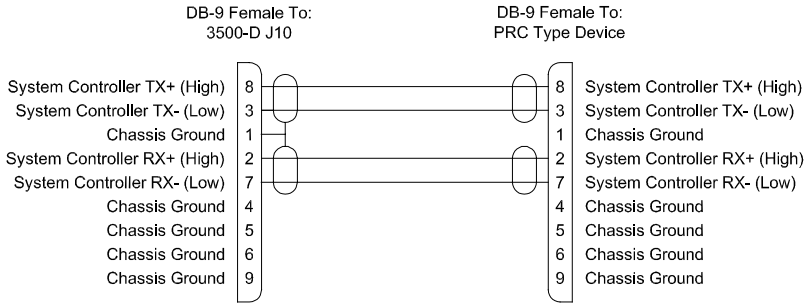


Figure 28. 3500-D RS-422 Serial Cable

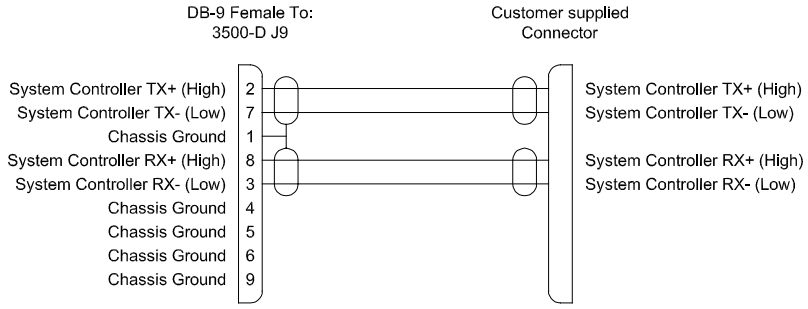


Figure 29. 3500-D RS-422 CPU Link Cable

CPU ALARM (J18)

This 3-contact connector is reserved for future use. See Figure 30 for an orientation view showing contact locations.

Contact locations when viewed from rear of chassis.

Figure 30. 3500-D J18 (CPU ALARM) Connector

PRC (J11)

This 5-contact connector is a loop-through connector used to provide an RS-422 serial communication interface using the PESA PRC Protocol (Document No. 81-9062-0316-0). It is wired in parallel with J9 (COM 3/PRC). See Figure 31 for an orientation view showing contact locations.

J11 may be connected to other PESA PRC type equipment with a cable assembly (Part Number 81-9028-0395-0) constructed as shown in Figure 32. If this cable must be constructed in the field, consult Drawing No. WI50-0250 for assembly details.

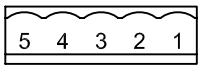


Figure 31. 3500-D J11 (PRC) Connector

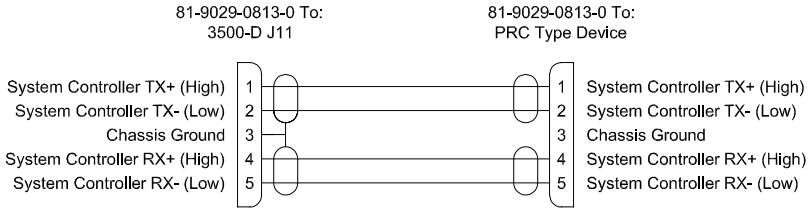


Figure 32. 3500-D RS-422 System Expansion Cable

SYSTEM V CONTROL (J20)

This DB37-Male connector provides the System 5 control interface and uses the RM5 Protocol (Document No. 81-9062-0155-3). See Figure 33 for an orientation view showing contact locations.

J20 is connected to a Lynx or RM5 type routing switcher with cable assembly Part No. 81-9065-1189-2). If necessary, a cable up to 8 feet in length may be fabricated in the field as shown in Figure 34. If more than one System 5 Routing Switcher will be connected to the System Controller, consult Drawing No. WI50-0262 for information on constructing a bifurcated cable.

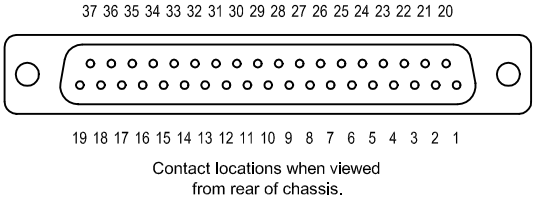


Figure 33. 3500-D J20 (SYSTEM V CONTROL) Connector

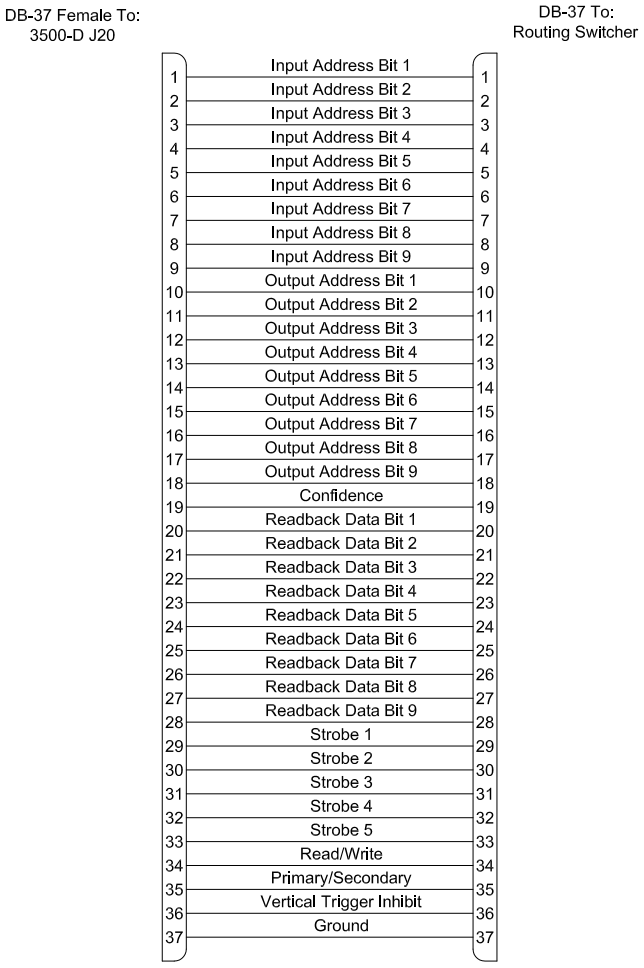


Figure 34. 3500-D RM5 Control Cable

POLLING 1-4 (J12, J13, J14, J15)

These 3-contact connectors are wired in parallel and provide RS-485 serial communication interfaces using the PESA RCP Protocol (Document No. 81-9062-0300-0). See Figure 35 for an orientation view showing contact locations.

J12, J13, J14, and J15 are connected to PESA Remote Control Panels with daisy-chained cables constructed with 3-contact connectors (Part No. 81-9029-0780-0) and shielded, twisted-pair audio cable (Part No. 81-9028-0043-2, Belden 8451, or equivalent) as shown in Figure 36.

The connector body has an integral strain relief which requires the use of a nylon cable tie which is included with the connector. If this cable tie is not available, Part No. 81-9021-0028-8 may be used.

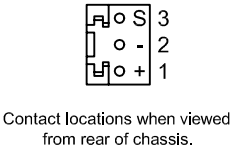


Figure 35. 3500-D J12, J13, J14, J15 (POLLING 1-4) Connectors

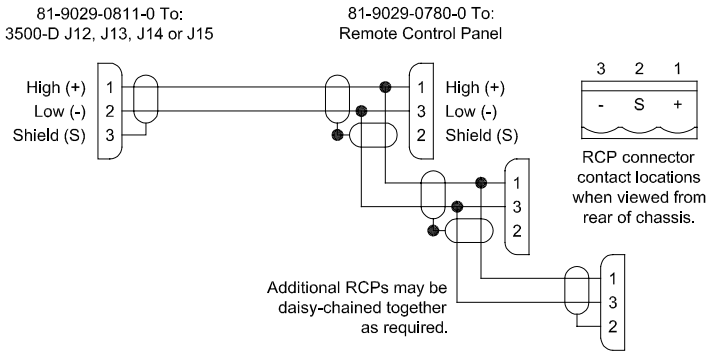


Figure 36. 3500-D RS-485 Serial Cable

PS130 Power Supply Line Cords

WARNING

Always use a grounded AC receptacle to avoid a potentially lethal shock hazard in the event of an equipment power line fault.

NOTE

This equipment will not meet FCC EMI limits unless both AC line cords are plugged into properly grounded AC receptacles.

Each PS130 Power Supply requires a line cord (Part No. 81-9028-0403-0) to connect it to the AC mains.

PC Board Switch and Jumper Settings

There are no switches or jumpers on PC boards which need to be set prior to their installation.

Subassembly Installation

Model 3500-S

The 3500-S consists of an external chassis and a 3500 System Controller board. There is no internal power supply.

3500 System Controller Board Installation

The 3500 System Controller board is installed in the chassis as follows:

1. Align the board support tray with the card guides in the chassis.
2. Carefully insert the board into the chassis until the connectors on the board make contact with the connectors on the backplane. If possible, inspect the mating connectors to ensure proper alignment.
3. Firmly push the board into the chassis until the board connectors are fully mated with the backplane connectors. If the contact insertion force seems excessive, gently push up on the bottom of the board with one hand, while pushing on the front of the board with the other.

Model 3500-D, Model 3500-SE, and Model 3500-DE

The 3500-D consists of an external chassis and two 3500 System Controller boards and two PS130 Power Supplies. It may also be ordered as the 3500-SE which has only one 3500 System Controller board and one PS130 Power Supply installed in the same chassis. The 3500-DE is the expansion kit required to convert a 3500-SE to a 3500-D.

3500 System Controller Board Installation

The 3500 System Controller boards are installed in the chassis as follows:

1. Align the support tray of the first board with the card guides in the chassis.
2. Carefully insert the board into the chassis until the connectors on the board make contact with the connectors on the backplane. If possible, inspect the mating connectors to ensure proper alignment.
3. Firmly push the board into the chassis until the board connectors are fully mated with the backplane connectors.
4. Repeat the above steps for the second board.

PS130 Power Supply Installation

NOTE

A fully configured 3500-D contains two PS130 Power Supplies connected in parallel. Either power supply is capable of powering both system controller boards, with the second power supply serving as a backup for the first. One power supply may be removed and replaced while the other is connected to the power source, and the 3500-D is operational.

The PS130 Power Supplies are installed in the chassis as follows:

1. Align the shield plate of the first power supply with the card guides in the chassis.
2. Carefully insert the power supply into the chassis until the connectors on the power supply make contact with the connectors on the backplane. If possible, inspect the mating connectors to ensure proper alignment.
3. Firmly push the power supply into the chassis until the power supply connectors are fully mated with the backplane connectors, and the power supply latch engages the corresponding slot in the chassis.
4. Repeat the above steps for the second power supply.

Chapter 3 – Operation

General

This equipment is designed to be operated by Win3500 Control System software. For detailed operational information, please consult the Win3500 manual, Part No. 81-9059-0401-0.

Figure 37 and Figure 38 show typical views of the 3500 System Controller board. The configuration shown is that used in Models 3500, 3500-D, 3500-SE, and 3500-DE. Other models use a different support tray, but are operated in the same way.

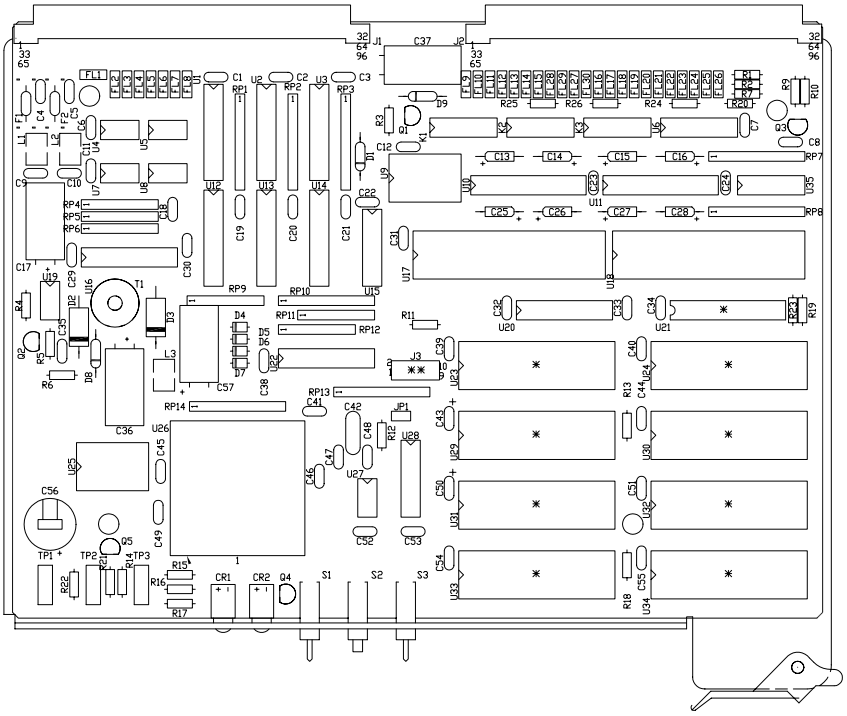


Figure 37. 3500 System Controller Board Assembly Top View

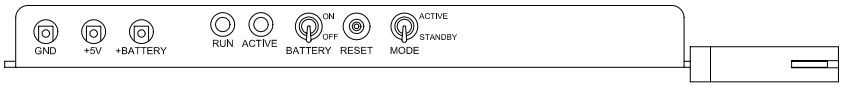


Figure 38. 3500 System Controller Board Assembly Front View

Front Panel Switches

Battery (S1)

This SPDT toggle switch is used to enable and disable the backup memory power source. Early designs of PESA system controllers used a battery for backup power. This switch was used to prevent the battery from discharging during prolonged storage.

The 3500 System Controller uses a capacitor as a backup power source which does not need to be isolated during storage. This switch should be in the ON position at all times.

Reset (S2)

This SPDT momentary pushbutton switch is used to manually reset the 3500 System Controller in the event of system failure or lockup (similar to a warm boot on a PC). To reset the controller, press and hold this switch for about three seconds.

Mode (S3)

This SPDT toggle switch is used in a dual controller system to designate which controller is the primary controller, and which is the backup controller. Set the Mode switch to ACTIVE on the primary controller, and to STANDBY on the backup controller.

In a single controller system, this switch has no effect.

LEDs

See “LEDs” on page 38.

Chapter 4 – Functional Description

General

The 3500 System Controller, working in conjunction with Win3500 Control System software, enables users to configure and operate a routing switcher system from a standard IBM compatible PC.

Microprocessor

The heart of the 3500 System Controller is the Motorola 68332 microprocessor (U26). The 68332 contains a 32-bit processor, most of the address decoder and bus interface circuitry, and several peripheral functions. The microprocessor derives all its timing from the 16 MHz master oscillator U25. The 3500 Controller provides 256 Kbytes of EPROM (U33, U34), 512 Kbytes of static RAM (U29, U30, U31, U32), and 256 Kbytes of flash ROM (U23, U24). The EPROMs contain the software instructions for the microprocessor. The RAM is used to provide dynamic data storage during controller operation and has battery backup. The flash ROMs provide non-volatile storage for configuration information.

Reset/Battery Backup

The reset circuit on the 3500 System Controller is centered around the MAX691 chip U28. This circuit monitors the +5V supply (U28 pin 3) and provides a low-active reset pulse (pin 15) to the controller during power-up and when the voltage drops out of range. A manual reset is provided by S2 located on the front edge of the controller card. To manually reset the controller board, press and hold S2 for 2-3 seconds, and then release. The MAX691 is also an integral part of the battery backup circuit. The IC monitors the battery voltage (pin 1) and the +5 supply (pin 3) and switches the higher of the two voltages out to VSTBY (pin 2). VSTBY is used to power the RAM chips and some internal RAM on the microprocessor. The battery voltage is provided by C56. R14 and Q5 provide charging current for the capacitor when power is applied to the board. Q5 also prevents the cap from overcharging from leakage current out of U28. The resistor divider R21/R22 sets the maximum charge voltage for C56.

Sync

The sync circuit on the 3500 System Controller board contains U27 (a video sync separator), Q3, and their associated components. The video sync separator decodes the sync signal and provides ODD/EVEN. BURST, CSYNC, and VSYNC signals.

Power

The power circuit on the 3500 System Controller board consists of U19 (a switching regulator), T1, Q2, and their associated components. The power circuit is responsible for providing a regulated +5 volts.

System 5 Bus

The 3500 System Controller provides an interface to the PESA System 5 Bus. U12, U13, and U14 are used to latch data to the System 5 bus. U1, U2, and U3 provide buffering and tri-state control for the bus. U22 is used to read data back from the System 5 bus. U15 provides chip select signals for each of the memory-mapped components.

RCP Panel Ports

The 3500 System Controller provides four RCP style panel ports. U4, U5, U7, and U8 are RS-485 transceivers that translate the internal logic levels to differential RS-485 levels and vice-versa. U16 is a memory-mapped latch that provides transmitter and receiver enable signals to the transceivers. Filters FL1-FL8 provide EMI filtering for the polling signals.

Serial Port Controller

The 3500 System Controller provides two RS232 ports and two RS422 ports. The RS232 ports may be used by an external computer to control the routing switcher system. The RS422 port is used to communicate with PRC devices. U17 and U18 are Motorola 68681 dual UARTs (universal asynchronous receiver/transmitter). The UARTs provide the interface between the microprocessor and the serial ports. They serialize data going out to the port and de-serialize incoming data. The UARTs provide baud rate generation based on the 3.6864 MHz oscillator U9. U15 provided chip selects to each UART, and U20 provided data bus isolation between the microprocessor and the UARTs.

RS232 Ports

U10 and U11 are RS232 driver/receiver circuits. They operate from +5V and use internal charge pump technology to generate +/- 10VDC for the RS232 levels. Capacitors C13, C14, C25 and C26 are part of the charge pump circuit for U10. Likewise, C15, C16, C27, and C28 are part of the charge pump for U11. The driver sections of U10 and U11 translate logic levels to RS232 levels (U10, pins 5 and 2, typical). The receiver sections translate incoming RS232 levels to logic levels (U10 pins 7 and 6, typical). Relays K1, K2, and K3 isolate the RS232 drivers from the outside world when the 3500 board is in standby (not active). EMI filtering is provided for each RS232 signal that leaves the board.

RS422 Port/PRC Port

The RS422 port on the 3500 System Controller is the PRC bus interface and is used to communicate with PRC devices. U6 contains a driver (pins 4, 13, 14, and 15) and a receiver (pins 1, 2, and 3). Serial data is sent from the UART to the driver on U6 pin 15. The driver converts the logic level to differential data on pins 13 and 14. Incoming serial data is received on U6 pins 1 and 2. R1 and R2 provide a bias to force the receiver into a known state when tri-stated. The receiver translates the differential signal to logic levels and presents received data on U6 pin 3. EMI filtering is provided on transmit and receive signals.

Dual CPU Port

The 3500 System Controller may be used in a dual configuration to provide redundant control. U21 is used to arbitrate between two 3500 System Controllers in a dual system. U35 provides buffering and isolation between the two boards. The MYACTIVE and YOURACTIVE signals are cross-coupled on the motherboard. MYACTIVE drives the other board's YOURACTIVE pin, and vice-versa. Likewise, MYSWX/YOURSWX and MYPRESENT/YOURPRESENT are cross-coupled pairs. The MYACTIVE/YOURACTIVE pair are used to indicate the active/standby state of each controller board. The MYSWX/YOURSWX pair identify the state of the active/standby switch on each controller board. The MYPRESENT/YOURPRESENT pair are used to indicate the presence of each card in a dual configuration. The CPUA/B is a signal provided by the motherboard to indicate in which slot the individual controller is installed. In addition to these control lines, a bi-directional serial communications port is connected between the two boards. This port includes the signals MISO, MOSI, SCK, PC0/SS, and PCS1.

Chapter 5 – Maintenance and Repair

Periodic Maintenance

There are no periodic maintenance requirements for this equipment.

Troubleshooting

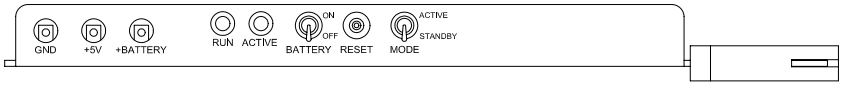


Figure 39. 3500 System Controller Board Assembly Front View

Front Panel Test Points

3500 System Controller Board

The 3500 System Controller board has three test points accessible from the front panel, GND, +5V, and +BATTERY, as shown in Figure 39.

GND (TP1)

This test point provides a convenient ground when measuring voltages at the other test points.

+5V (TP2)

The voltage measured between this test point and GND (TP1) is the output of the voltage regulation circuit and should be 5 ±0.1 VDC.

+BATTERY (TP3)

The voltage measured between this test point and GND (TP1) is the output voltage of the backup memory power source and should be >2VDC when power has been removed from the board.

LEDs

In the rare event this equipment fails to operate correctly, check the appropriate LEDs listed below for information concerning operational status.

3500 System Controller Board

The 3500 System Controller board has two LEDs, RUN and ACTIVE, as shown in Figure 39 on page 37.

LED	Color	Panel Legend	Normal State	Troubleshooting Info
CR1	GRN	RUN	ON	Indicates that input voltage to this board is within design parameters. If LED is OFF: 1. Remove and reinstall board to verify backplane connector is properly seated. 2. Check power supplies for proper operation. 3. Contact PESA Customer Service.
CR2	YEL	ACTIVE	ON	Indicates that the board is currently in active control of a routing switcher system. NOTE: In a dual controller system, the primary controller ACTIVE LED will be ON and the backup controller ACTIVE LED will be OFF. If the LED is OFF: 1. Remove and reinstall board to verify backplane connector is properly seated. 2. Ensure the board has been configured to be active. See “Mode” on page 34. 3. Contact PESA Customer Service.

PS130 Power Supply

LED	Color	Panel Legend	Normal State	Troubleshooting Info
D27	GRN	n/a	ON	Indicates that output voltage is within design parameters. If LED is OFF: 1. Check input power connections. 2. Check internal fuse (3.15A 250VAC) 3. Replace the power supply. 4. Contact PESA Customer Service.

PESA Customer Service

If the troubleshooting information above has not solved your problem, please contact the PESA Customer Service Department. Skilled technicians are available to assist you 24 hours per day, seven days per week.

Detailed contact information for the Customer Service Department is located inside the front cover of this document.

Repair

Before attempting to repair this equipment, please consult your warranty documents and/or the PESA Customer Service Department. Unauthorized repairs may void your warranty.

WARNING

The PS130 Power Supply assemblies in this equipment are not field/user serviceable. These offline switching power supplies contain internal voltages that are not isolated from the AC power source. They should only be serviced by qualified service personnel using appropriate equipment. Because of this, it is strongly suggested that power supplies be returned to the PESA Customer Service Department for service.

CAUTION

Many of the PC boards in this equipment contain large numbers of SMT (Surface Mount Technology) components. Special tools are required to replace these components without causing damage to adjacent areas. It is strongly recommended that PESA Customer Service be consulted prior to attempting to repair any of the PC boards in this equipment

Replacement Parts

Only parts of the highest quality have been used in the design and manufacture of this equipment. If the inherent stability and reliability are to be maintained, replacement parts must be of the same high quality. For this reason, we suggest that you consult our Customer Service Department before installing any parts not purchased from PESA.

Factory Service

Before returning any equipment to our factory for service or repair, please contact our Customer Service Department for an RMA number.

Detailed contact information for the Customer Service Department is located inside the front cover of this document.

PESA Documentation

IL35-1126	Drawing Tree, 3500 System Controller
WI50-0172	Wiring Diagram, Power Cable, Standard MVDA to RM5000, RM5000 Switching System
WI50-0238	Wiring Diagram, Power Cable, 24x16 Video External Power

WI50-0250	Wiring Diagram, Cougar Looping Control Cable
WI50-0262	Wiring Diagram, Cable Control Loop Through
81-9059-0402-0	Manual, 3500 System Controller
81-9062-0316-0	PESA Router Control Protocol (PRC)
81-9062-0407-0	CPU Link Protocol No. 1 (P1)
81-9062-0408-0	CPU Link Protocol No. 1 Extensions (P1E)
81-9062-0409-0	Unsolicited Status Protocol (USP)
81-9062-0410-0	Truck Link Protocol (TRK)
81-9062-0448-0	PESA Internet Remote Control Protocol (PIRC)

Glossary

(Revised: 02-19-01)

AES/EBU

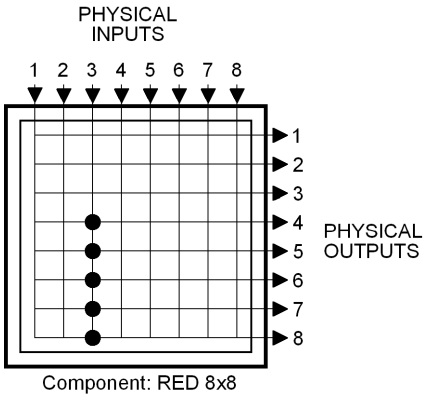
Informal name for a digital audio standard established jointly by the Audio Engineering Society (www.aes.org) and the European Broadcasting Union (www.ebu.ch).

All Call

A diagnostic procedure that causes a single physical input to be switched to a range of physical outputs, for a specified component, with a single command.

Example: Assume the existence of component RED which spans physical inputs 1 through 8 and physical outputs 1 through 8. All call could be used to switch physical input 3 to physical outputs 4 through 8 with a single command.

See also: Diagonal.



ANSI

American National Standards Institute (www.ansi.org).

Baud

The number of signaling elements that occur each second.

Below 1200 baud, only one bit of information (one signaling element) is encoded in each electrical change. At these speeds baud indicates the number of bits per second.

For example, at 300 baud, 300 bits are transmitted per second (300 bps). Assuming asynchronous communication, which requires 10 bits per character, this translates to 30 characters per second (cps).

Above 1200 baud, it is possible to encode more than one bit in each electrical change. At these speeds, data transmission rates are usually expressed in bits per second (bps) rather than baud.

For example, a 2400 bps modem conforming to CCITT V.22 operates at 600 baud.

Baud was originally a unit of telegraph signaling speed, set at one Morse code dot per second. It was proposed at the International Telegraph Conference of 1927, and named after French Engineer J.M.E. Baudot (1845-1903).

Black Burst

A composite color video signal which has sync, color burst, and black video. It is used to synchronize other video sources to the same sync and color information.

See also: House Sync.

Block

A group of contiguous crosspoints in a routing switcher which form the smallest unit on which confidence is checked.

Because of the nature of the circuits involved, individual crosspoints cannot be checked to see if they are operating correctly. Instead, the control circuitry shared by groups of crosspoints is monitored. These groups of crosspoints, called blocks, vary in size according to product type. Block size for RM5 routing switchers is 8 inputs by 2 outputs and block size for PRC routing switchers is 8 inputs by 8 outputs. If any block gives a confidence error, all crosspoints in that block are assumed to be non-functional.

Block Checking

The continuous, sequential monitoring of confidence for each block in a routing switcher.

Block checking occurs automatically and continuously but can be disabled for troubleshooting purposes.

Blocked Destination

See: Source Block.

Blocked Source

See: Source Block.

Breakaway Switch

A switch where more than one source is switched to a single destination on multiple levels.

Example: Assume the existence of two sources VTR1 and VTR2 which are defined on levels VIDEO and AUDIO, and a destination MON1 which is defined on the same levels. VTR1 is switched to MON1 on the VIDEO level and VTR2 is switched to MON1 on the AUDIO level. The signal reaching MON1 will have the video from VTR1 and the audio from VTR2.

See also: Follow Switch.

Category

The first portion of a source, destination, or reentry name.

Categories provide an easy means of classifying and grouping switching system devices.

An example of a category is VTR which could be used with the indices 1, 2, and 3 to create the source names VTR 1, VTR 2, and VTR 3.

Category names are one to six characters in length and are constructed using uppercase letters and numbers. The first character must be a letter. Embedded spaces are not permitted.

Chop

Rapidly switch two different video signals into a monitor or other piece of test equipment. This is done to compare some characteristic of the signals, usually for quality control.

Chop Rate

The parameter used to control the switching rate when chopping two signals. The signal switching rate is determined as follows:

$$\frac{\text{Video Frame Rate (Frames/Second)}}{\text{Chop Rate}} = \text{Signal Switching Rate (Switches/Second)}$$

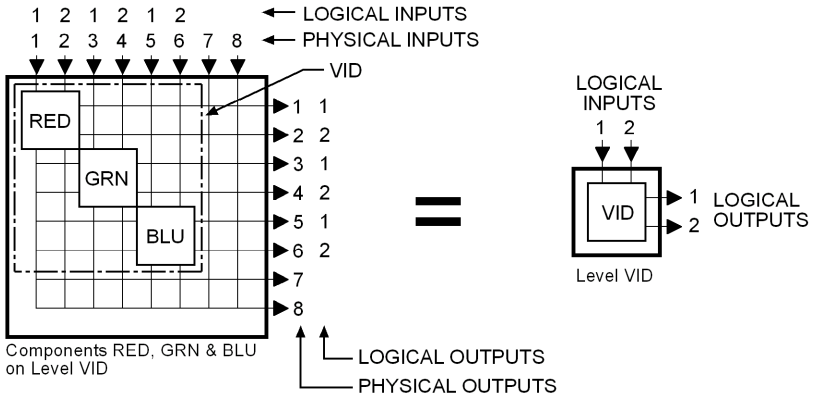
For example, a chop rate of 1 used with NTSC signals (30 Frames/Second) will cause the signals to be switched 30 times per second. A chop rate of 60 used with the same signals will cause them to be switched every two seconds.

Component

The most basic signal element which can be switched by a single crosspoint. For example, in RGB video, “Red”, “Green”, and “Blue” are components; in stereo audio, “Left” and “Right” are components

In Matrix Space, components of like type are usually grouped together into rectangular matrices of crosspoints having contiguous inputs and outputs. These matrices are also referred to as components and are grouped together into levels.

The example below shows a 2x2 RGB video level made up of three components, “RED”, “GRN”, and “BLU”.



As a general rule, users control the switching of levels, but component switching is handled automatically by the switching system. In the example above, a user could specify a single logical switch, such as VID Input 1 to VID Output 2. This would result in the control system software taking three physical switches by activating crosspoints (1,2), (3,4), and (5,6).

Component names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

Composite Video

A type of video signal which contains luminance, chrominance, blanking, and synchronizing information. NTSC, PAL, and SECAM are composite video signals, as opposed to RGB video which is not.

See also: Vertical Sync Signal.

Confidence

A property of a block that indicates whether or not the circuitry controlling the crosspoints in the block is functioning correctly.

When block checking determines that a block is not functioning correctly, the block is said to have a confidence error.

Confidence Error

See Confidence.

Configuration

A collection of system definitions that define the environment in which the system controller operates.

The files which comprise a configuration are stored on a PC as either .dbf format files or text files. Each configuration requires its own separate subdirectory.

Configuration names may have up to 32 alphanumeric characters.

Configuration Lock

A security measure enabled when a configuration is being uploaded or downloaded.

A configuration lock is used to ensure that only one user at a time may download a configuration to the controller.

Control Panel

See: Panel.

CPU Link

A bi-directional, communications interface on a system controller. A CPU link has two components: a serial port (RS-232 or RS-422), and a communications protocol to govern how the port is used.

Crosspoint

The circuitry and components on a printed circuit board which constitute a single physical switch.

See also: Physical Switch.

Data Key

A user configurable control panel key, whose assigned function is used when the panel is in any mode except Salvo Select Mode.

Many control panels have user configurable keys. Each key can be assigned two functions, one as a data key and one as a salvo key. When the keys are pressed, the data key functions are used except when the panel is in salvo mode.

Data Key List

A named list of the functions assigned to each data key on a panel.

Multiple panels may share a data key list as long as they are the same type of panel. Different panel types may not use the same data key list.

Data key list names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

Default Destination

The destination for which status will be displayed when power is applied to a panel, or when a new configuration is downloaded to the controller.

Although not mandatory, it is recommended that a default destination be selected for each panel.

Destination

One or more logical outputs (limited to one per level), on one or more levels, which are switched together as a group.

Destination names are constructed using one category followed by 0, 1 or 2 indices. If no index is selected, the default “00” (which is not displayed) will be used.

Destination Block

See: Source Block.

Destination Group

See: Destination.

Destination Include List

A named list of the destinations a specific control panel is authorized to control.

A destination include list may be shared by multiple panels.

The default destination assigned to a panel may be controlled even if it is not on the destination include list.

Destination include list names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

Destination Number

A number assigned to each destination by the controller and used by CPU Protocol 1.

Destination numbers are also assigned to reentries.

Destination Status

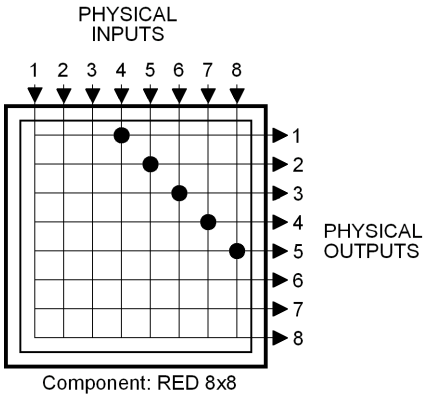
See: Status.

Diagonal

A diagnostic procedure that causes a range of physical inputs to be switched to a range of physical outputs, in a diagonal pattern starting from a specified coordinate and continuing until the either the inputs or outputs are exhausted, for a specified component, with a single command.

Example: Assume the existence of a component RED which spans physical inputs 1 through 8 and physical outputs 1 through 8 on a routing switcher. A diagonal with a starting input of 4 and a starting output of 1 would cause the following physical switches to be taken: (4,1), (5,2), (6,3), (7,4), and (8,5).

See also: All Call.



EIA

Electronic Industries Alliance (www.eia.org).

Follow Switch

A switch where a single source is switched to a single destination on all levels.

Example: Assume the existence of a source VTR1 which is defined on levels VIDEO and AUDIO, and a destination MON1 which is defined on the same levels. VTR1 is switched to MON1 on both the VIDEO level and AUDIO level. The signal reaching MON1 will have the video and audio from the same source, VTR1.

This is the most common manner in which switches are taken on a routing switcher.

See also: Breakaway Switch.

House Black

See: House Sync.

House Sync

A composite color video signal which has sync, color burst, and black video. It is used to synchronize other video sources to the same sync and color information.

Index

The last portion of a source, destination, or reentry name.

Indices provide an easy means of differentiating similar switching system devices.

Each source, destination or reentry name may use 0, 1 or 2 indices. If no index is used, “00” is the default but is not displayed. An example of indices are 1, 2, and 3 which could be used with the category VTR to create the destination names VTR 1, VTR 2, VTR 3, VTR 12, and VTR 22.

Indices are one character in length and are constructed using uppercase letters and numbers. The character 0 (zero) is a default index which may not be changed or deleted.

Input Offset

In matrix space, the amount by which the origin of a component on strobe x, is offset from the origin of strobe x, measured along the input axis.

The coordinates of crosspoints in matrix space are determined by the strobe they reside on, and their input and output numbers. They are given in the form (input,output) on strobe x. The origin of a component (a matrix of crosspoints) is designated by the point which falls nearest the origin of its strobe (1,1). In Figure A below, the 3x4 component bounded by coordinates (3,2), (5,2), (5,5), and (3,5) has its origin at (3,2).

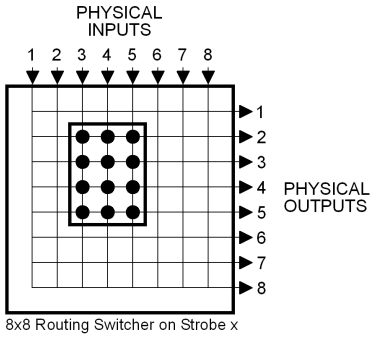


Figure A

Input offset is the amount by which the origin of a component is offset from the origin of its strobe, measured along the input axis. A component whose origin coincides with that of its strobe (1,1) will have an input offset of 0. The component shown in Figure A above, has an input offset of 2.

When multiple routing switchers are assigned to the same strobe, the input and output connectors are renumbered to provide a unique coordinate for each crosspoint. Crosspoint coordinates are then determined in the same manner as above. The component shown in Figure B below, has its origin at (12,7) and an input offset of 11.

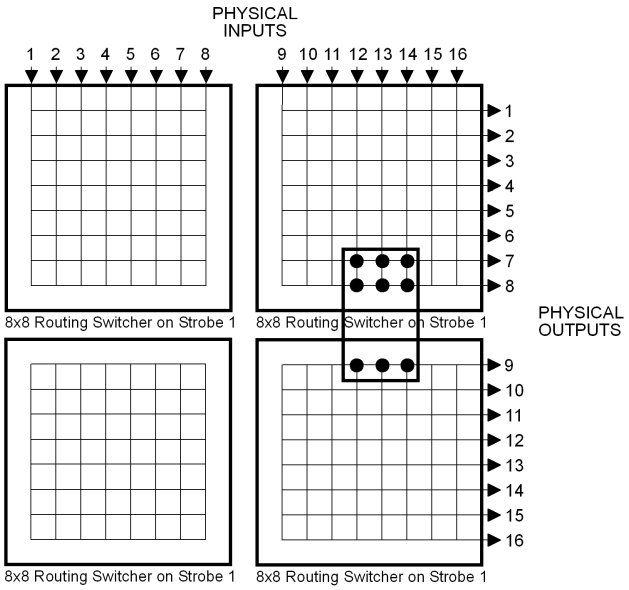


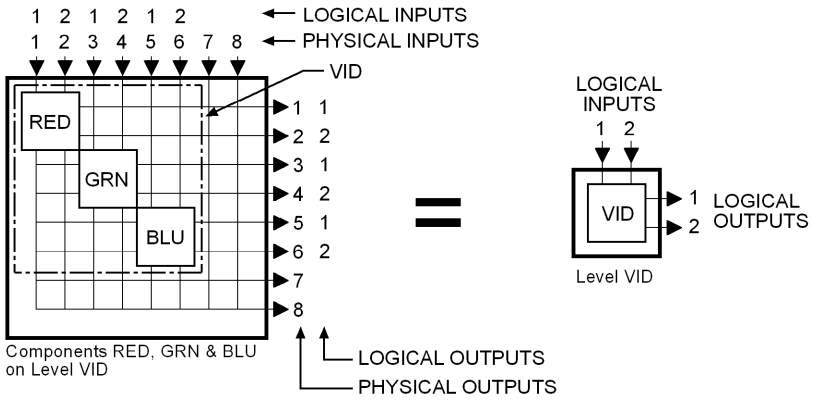
Figure B

Level

A group of related components that are switched together.

A level is sometimes referred to as a level of control and is the basic granularity seen by a user. The components which comprise a level will always be switched together except when performing diagnostic operations.

The example below shows a 2x2 RGB video level made up of three components, “RED”, “GRN”, and “BLU”, all of which are switched together at the same time.



As a general rule, users control the switching of levels, but component switching is handled automatically by the switching system. In the example above, a user could specify a single logical switch, such as VID Input 1 to VID Output 2. This would result in the control system software taking three physical switches by activating crosspoints (1,2), (3,4), and (5,6).

Level names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

Level Order

A property assigned to a level which controls the order of display when levels are displayed on a control panel or addressed in CPU link protocols.

Levels of Control List

A named list of the levels a specific control panel is authorized to control.

Multiple panels may share a levels of control list.

Levels of control list names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

Local Modem

A modem connected to a PC running control system software such as Win3500Plus.

See also: Remote Modem.

Lock

A property placed on a destination that prevents all panels and ports from taking a switch on that destination, including the panel or port that locked it.

Locks may be cleared by any panel or port that has the same requester code and lock priority as the panel that locked the destination, that has a higher lock priority, or that has a lock priority of 0 (zero).

See also: Lock Priority, Protect.

Lock Priority

A property of panels and ports which allows them to be grouped with other panels or ports for the purpose of establishing lock and protect authority.

The lower the lock priority number, the higher the priority. Panel lock priorities not explicitly defined automatically default to “0” which gives absolute authority to clear any lock or protect on the system.

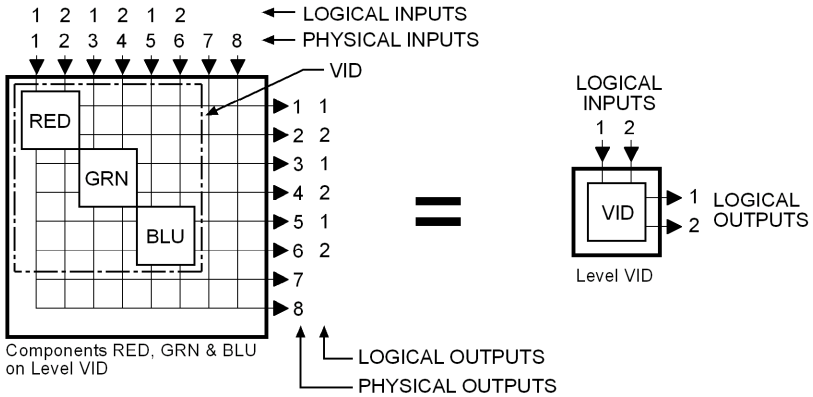
See also: Lock, Protect.

Logical Input

One or more physical inputs which are switched together as a group.

Logical inputs and outputs are switched level-by-level. Since each level may have more than one component, switching a single logical input or output may involve switching more than one physical input or output.

For example, a RGB input signal represents three physical inputs because it is connected to three input connectors on the routing switcher. However, since all three components (R, G, and B) are switched together as a level, it is a single logical input.



Logical inputs are numbered sequentially, level-by-level, beginning with 1. Input numbers are assigned in the same order as the physical inputs to the component(s) of the level. Since a routing switcher may be configured to have more than one level, it may have more than one logical input designated as number 1. However, within each level, every logical input will have a unique number. Logical outputs are numbered in the same manner. Logical input/output numbering is handled automatically by the control system software as components are configured.

See also: Physical Input.

Logical Output

See: Logical Input.

Logical Switch

The control system software command that switches a logical input to a logical output.

See also: Physical Switch.

Matrix Breakup

The division of a single physical matrix into one or more components.

Matrix breakup allows complex signal types to reside within a single physical matrix. For example, a video matrix is often broken into R, G, and B components.

Matrix breakup is a software function handled by the control system software.

Matrix Space

A three-dimensional mathematical model of the crosspoints in a switching system.

The coordinates of crosspoints in matrix space are given in the form (input,output) on strobe x.

When a switching system is physically made up of only one routing switcher, the crosspoint coordinates are the same as the input and output connector numbers, and the resulting matrix space has only two dimensions. For example, the coordinates of the crosspoint indicated in Figure A is (4,2) on strobe 1.

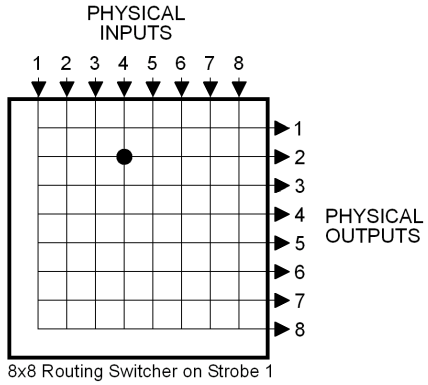


Figure A

Two-dimensional matrix space can also be composed of the crosspoints located in multiple routing switchers. The input and output connectors on the additional routing switchers are renumbered as required to ensure that each crosspoint can be identified by a unique (input,output) coordinate. When switching systems are constructed in this manner, matrix space size is no longer constrained by routing switcher size. The switching system shown in Figure B consists of four 8x8 routing switchers assigned to the same strobe. The coordinates of the indicated crosspoint are (12,14) on strobe 1.

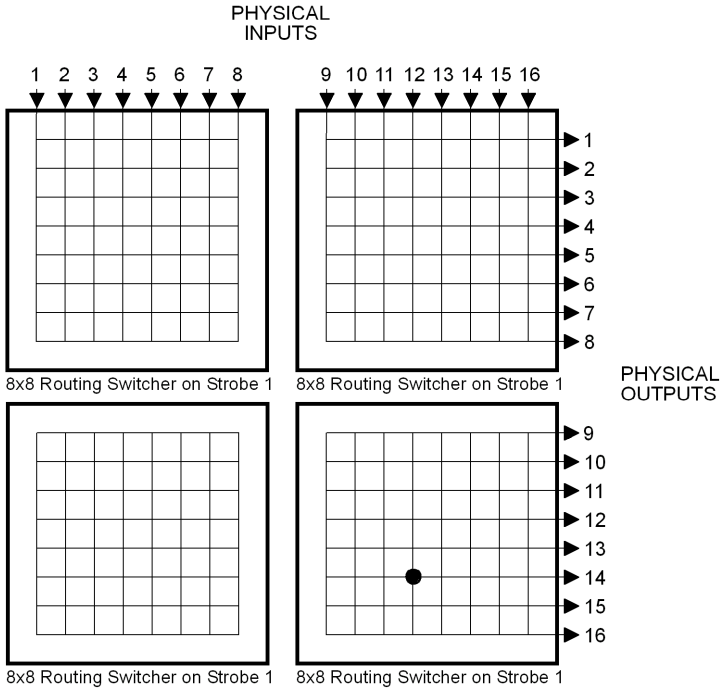


Figure B

Strobe numbers are used to introduce a third dimension into matrix space. Every routing switcher in a switching system is assigned to a strobe. In systems using more than one strobe (and, therefore having three-dimensional matrix space), crosspoint coordinates are given in the form (input,output) on strobe x. In Figure C, the coordinates of the indicated crosspoint in the left routing switcher are (4,2) on strobe 1. The coordinates of the crosspoint on the right are (4,2) on strobe 2.

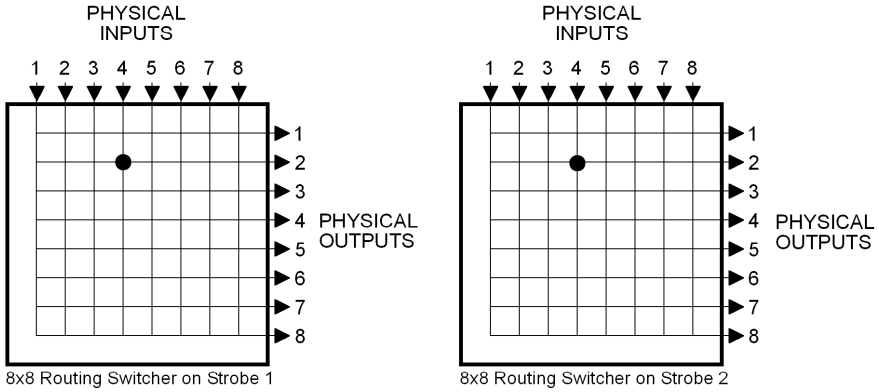


Figure C

NTSC

National Television Standards Committee. The NTSC was responsible for setting television and video standards in the United States. The NTSC standard for television defines a composite video signal with a refresh rate of 60 half-frames (interlaced) per second. Each frame contains 525 lines and can contain 16 million different colors.

See also: PAL, SECAM.

Output Offset

In matrix space, the amount by which the origin of a component on strobe x, is offset from the origin of strobe x, measured along the output axis.

The coordinates of crosspoints in matrix space are determined by the strobe they reside on, and their input and output numbers. They are given in the form (input,output) on strobe x. The origin of a component (a matrix of crosspoints) is designated by the point which falls nearest the origin of its Strobe (1,1). In Figure A below, the 3x4 Component bounded by coordinates (3,2), (5,2), (5,5), and (3,5) has its origin at (3,2).

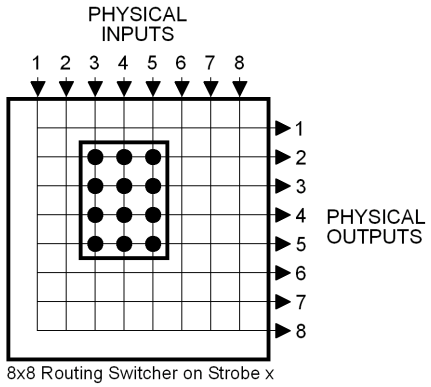


Figure A

Output offset is the amount by which the origin of a component is offset from the origin of its strobe, measured along the output axis. A component whose origin coincides with that of its strobe (1,1) will have an output offset of 0. The component shown in Figure A above, has an output offset of 1.

When multiple routing switchers are assigned to the same strobe, the input and output connectors are renumbered to provide a unique coordinate for each crosspoint. Crosspoint coordinates are then determined in the same manner as above. The component shown in Figure B below, has its origin at (12,7) and an output offset of 6.

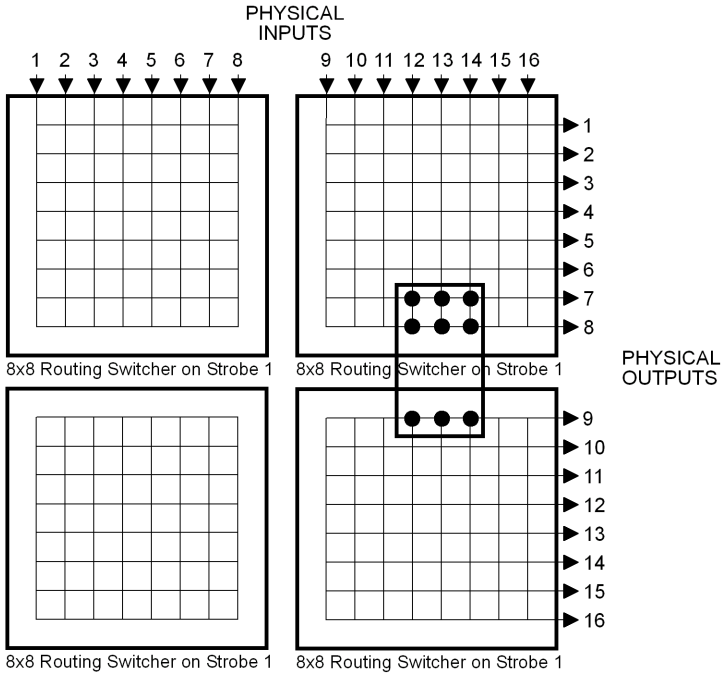


Figure B

PAL

Phase Alternating Line, the dominant television standard in Europe. The United States uses a different standard, NTSC. Whereas NTSC delivers 525 lines of resolution at 60 half-frames per second, PAL delivers 625 lines at 50 half-frames per second.

See also: NTSC, SECAM.

Panel

A user interface, usually mounted in a standard 19” rack, containing alphanumeric displays, push buttons, LEDs, etc. Sometimes referred to as a control panel.

A panel is used to control a switching system by taking switches, obtaining status, etc.

Panel names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

Panel Address

A unique identifier, set by DIP switch on every panel, which allows the system controller to differentiate between panels.

Panel Name

An optional identifier for a control panel.

Individual panels are identified by panel address. Because of this, a panel name is not required when configuring a panel.

Panel names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

Password

Each User Account and Configuration may be protected with an eight-character, upper case, alphanumeric password.

PC

Personal computer. Typically used to run control system software such as Win3500Plus.

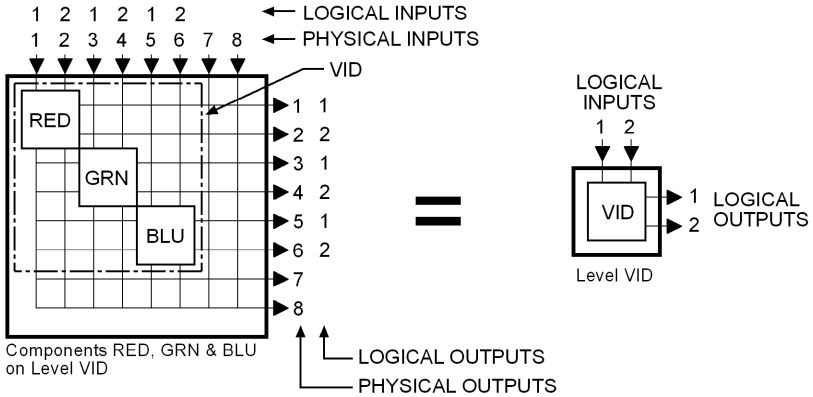
PESA control system software is designed to operate on any IBM® compatible personal computer (AT® or later) with a Microsoft Windows™ operating system (3.1, 95, 98, or NT).

Physical Input

The electrical signal coming from a device connected to an input connector on a routing switcher.

Physical inputs and outputs are the electrical signals passing through the input and output connectors of a routing switcher. Each connector represents one input or output.

For example, a RGB input signal would represent three physical inputs since it would be connected to three input connectors on the routing switcher.



Physical inputs are numbered sequentially beginning with 1, and have the same number as the corresponding input connector on the routing switcher. This includes connectors which have been renumbered with input offset when multiple routing switchers have a common strobe. Physical outputs are numbered in the same manner.

See also: Logical Input.

Physical Switch

The hardware that switches a physical input to a physical output. Sometimes referred to as a crosspoint.

See also: Logical Switch, Crosspoint.

Physical Output

See: Physical Input.

Port

Any of the serial communications bus interface connectors on a system controller.

Port names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter. Port names are optional because a port is identified by its address.

PRC Device

A device designed to be compatible with the PESA Routing Control protocol (PRC).

Ocelot, Cougar, Jaguar, Tiger, and Cheetah routing switchers are PRC devices.

See also: RM5 Device.

Protect

A property placed on a destination that prevents all panels and ports from taking a switch on that destination, unless taken from a panel or port that has the same requester code as the panel or port that protected it.

Destination protection may be cleared by any panel or port that has the same requester code and lock priority as the panel or port that protected the destination, that has a higher lock priority, or that has a lock priority of 0 (zero).

See also: Lock, Lock Priority, Requester Code.

Protect Priority

See: Lock Priority.

Protocol

The format to be used when sending data between two devices.

Protocol names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

Readback

Information received from a routing switcher reporting which physical input is currently switched to a specified physical output.

To ensure that the configuration in the controller, and the actual state of the physical switches in a routing switcher agree, the routing switcher can be made to read back the status of each physical output. Where the routing switcher reports a different physical input from that expected by the controller, a readback error is declared.

Readback Error

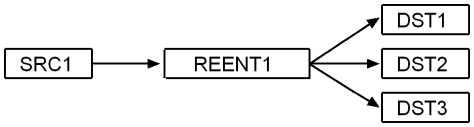
See Readback.

Reentry

An entity which exists as both a source and destination at the same time, whose function is to facilitate switching a single source to multiple destinations, with a single logical switch.

Reentries are virtual entities that exist in the control software only. Their creation and use does not require any physical modification to the switching system hardware.

Example: Assume the existence of source SRC1 and destinations DST1, DST2, and DST3. Reentry REENT1 is created and switched to the three destinations. With a single logical switch, SRC1 can now be switched to REENT1 and the signal will arrive at all three destinations at the same time.



A reentry is assigned both a source number and a destination number.

Reentry names are constructed using one category followed by 0, 1 or 2 indices. If no index is selected, the default “00” (which is not displayed) will be used.

Remote Modem

An external modem connected to a system controller.

The remote modem must be an external type capable of being configured to automatically answer incoming calls. Because the system controller does not output any modem configuration information, the remote modem must be completely transparent to the controller. The only modems tested by PESA for use as remote modems are the Practical Peripherals PM288MT II and the U.S. Robotics Sportster 28.8 using the following initialization strings:

PM288MT II: AT S0=2 Q1 X4 &C1 &D0 &K3 &S1 &W0 &Y0

Sportster 28.8: AT &F1 S0=2 &H1 &R2 &I0 L2 Q1 &C1 &D0 Y0 &W0

For more information about these modems and their initialization strings, see the Practical Peripherals web site at http://www.practical.com/ or the U.S. Robotics web site at http://www.usr.com/. Before using any other type of remote modem, please consult with PESA Customer Service.

See also: Local Modem.

Requester Code

A property of panels and ports which allows them to be grouped with other panels or ports for the purpose of establishing lock and protect authority.

Panel requester codes not explicitly defined automatically default to the panel address.

See also Lock, Lock Priority, Protect.

RM5 Device

A device designed to be compatible with the System 5 (RM5) control protocol.

The RM4000, RM5000, and Lynx routing switcher families are RM5 devices.

See also: PRC Device.

Salvo

A group of predefined logical switches taken in the same vertical interval.

Example: Assume the existence of two sources, CART1 and CART2; and three destinations, MON1, VTR1, and VTR2. All of these sources and destinations are defined on two levels, AUD and VID.

By pressing a single control panel key, the user desires to take the following switches: audio and video from CART1 to MON1; audio from CART2 and video from CART1 to VTR1; and audio and video from CART2 to VTR2.

Destination (Salvo Entry)	Level: AUD	Level: VID
MON1	CART1	CART1
VTR1	CART2	CART1
VTR2	CART2	CART2

Salvo SAL1 is created which will consist of three salvo entries (one salvo entry per destination in the salvo). Each salvo entry is then configured to switch the selected sources on the appropriate levels. Once salvo SAL1 is assigned to a salvo key on the control panel, the user will be able to take all the specified switches with the press of a single key.

All switches in a salvo are taken within the same vertical interval.

Salvo names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

Salvo Entry

One or more logical switches assigned to a specific destination that is part of a salvo.

Salvo entry names are the same as the destination they are associated with.

Salvo Include List

A named list of the salvos a specific control panel is authorized to control.

A salvo include list may be shared by multiple panels.

Salvo include list names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

Salvo Key

A user configurable control panel key, whose assigned function is used when the panel is in salvo select mode.

Many control panels have user configurable keys. Each key can be assigned two functions, one as a data key and one as a salvo key. When the keys are pressed, the data key functions are used except when the panel is in salvo mode.

When a panel is in salvo select mode, a salvo will be executed immediately when the salvo key is pressed.

Salvo Key List

A named list of the functions assigned to each salvo key on a panel.

Multiple panels may share a salvo key list as long as they are the same type of panel. Different panel types may not use the same salvo key list.

Salvo key list names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

SECAM

Sequential Couleur Avec Memoire, the line sequential color system used in France, Russia, Eastern Europe, and some Middle Eastern countries. Like PAL, SECAM is based on a 50 Hz power system, displaying interlaced lines at 50 fields per second. The color information is transmitted sequentially (R-Y followed by B-Y, etc.) for each line and conveyed by a frequency modulated sub carrier that avoids the distortion arising during NTSC transmission.

See also: NTSC, SECAM.

Serial Port

See: Port.

Shared Input

A logical input which is used by more than one source.

Note that shared outputs are not permitted.

See also: Source Block.

SMPTE

Society of Motion Picture and Television Engineers (www.smpte.org). A professional organization that recommends standards for the television and film industries.

Soft Destination Key

See: Soft Key.

Soft Key

A special type of data key whose assigned function may be changed locally by a panel user.

Control system software is used to designate a data key as either a soft source key or a soft destination key. The assignment of a specific source or destination to the soft key may then be made with either the control system software, or locally at the panel by using Store Mode.

Soft Source Key

See: Soft Key.

Source

One or more logical inputs (limited to one per level), on one or more levels, which are switched together as a group.

Source names are constructed using one category followed by 0, 1 or 2 indices. If no index is selected, the default “00” (which is not displayed) will be used.

Source Block

A means of ensuring that a particular source will not be switched to a specific destination, inadvertently or without adequate permission.

When configuring a switching system, it may be desirable to use source blocking to restrict the switching of certain logical inputs. This may be done while configuring either sources or destinations.

Since a blocked source may contain a logical input that is shared (used by more than one source), care should be taken to ensure that all sources using the logical input are blocked from the destination to be protected.

Source Group

See: Source.

Source Include List

A named list of the sources a specific control panel is authorized to control.

A source include list may be shared by multiple panels.

Source include list names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

Source Number

A number assigned to each source by the controller and used by CPU Protocol 1.

Source numbers are also assigned to reentries.

Status

A list of all sources on all levels currently switched to a selected destination.

Sometimes also used to refer to the operational state of the control system (lock status, switch status, and panel status).

Status Level

The default level to be used when displaying the status of a destination receiving signals from multiple sources, on a panel in all levels mode (ALL LEVS).

One function of the LCD display on a panel is to show which source is currently switched to a selected destination. This is known as destination status. Although more than one source can be switched to a single destination (limited to one source per level), the status display can only show one source at a time. When the panel is in all levels mode (ALL LEVS), Status Level is used to designate a default level to be used when displaying status. Only the source on this default level will be displayed. On panels which do not have LCD displays, this is indicated by a continuous, bright, pushbutton light.

If one or more other sources are also switched to the destination (on other levels), an octothorp (the "#" symbol) will be appended to the source name. The other source names can be viewed by toggling each level key in turn to show, level-by-level, which source has been switched to the destination. On panels which do not have LCD displays, this is indicated by an alternating bright/dim push button light.

Status Method

One of two possible ways to display status when a panel is in all levels (ALL LEVS) mode and the destination is not defined on the Status Level.

When a panel is in all levels mode (ALL LEVS), the status shown will be the source on the Status Level assigned to that panel. If the destination is not defined on the Status Level, Status Method is used to control the resulting display:

If DEF (Default Method) is selected, NO XXXXX will be displayed where XXXXX is the Status Level assigned to the panel.

If GRP (Group Method) is selected, the controller will examine every level sequentially, starting with the level designated as Level Order 1. The source switched on the first level found where the destination is defined, will be displayed as the destination status.

Stop Bit

In asynchronous communications, a bit that indicates that a byte of data has just been transmitted.

Every byte of data is preceded by a start bit and followed by a stop bit.

Strobe

The third dimension of matrix space.

Every routing switcher in a switching system is assigned a strobe. This is usually accomplished by setting a DIP switch on the back of the routing switcher. Strobes do not have to be unique and, in larger systems, each strobe might be associated with several routing switchers.

In many switching systems, strobes are used to group levels of the same type together. For example, video may be on Strobe 1, audio on Strobe 2, etc.

Sync Reference

A vertical sync signal used to ensure that switching occurs in the vertical interval of a video signal.

Sync Reference names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

See also: Vertical Sync Signal.

System 5 Device

See: RM5 Device.

TIA

Telecommunications Industry Association (www.tiaonline.org).

Tieline

A special type of logical switch that allows a logical input on one level to be switched to a logical output on a different level.

Example 1 - Switch a signal from analog camera ANCAM into an analog-to-digital converter (A/D) and then into digital video tape recorder DIGVTR: (Figure A) Connect a cable between the appropriate output connector of the analog routing switcher and the input of the A/D, and a cable between the output of the A/D and the appropriate input connector on the digital routing switcher. Configure levels ANAVID and DIGVID and tieline TLINE1 to connect them. Configure destination DIGVTR on level DIGVID. Configure source ANCAM on level ANAVID to use tieline TLINE1. ANCAM may now be switched to DIGVTR with a single logical switch even though they are on different levels.

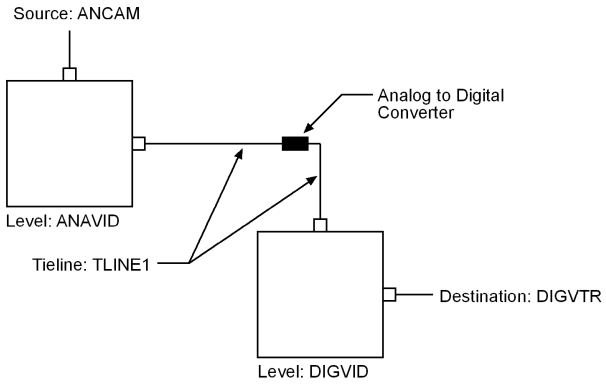


Figure A

Example 2 - Switch a signal from camera CAM1 (connected to a routing switcher in Room A) to video tape recorder VTR1 (connected to a routing switcher in Room B): (Figure B) Connect a cable between the appropriate output connector of the routing switcher in Room A and the appropriate input connector on the routing switcher in Room B. Create levels VIDA and VIDB and configure a tieline connecting the output of VIDA to the input of VIDB. Define source CAM1 on level VIDA and destination VTR1 on level VIDB. CAM1 may now be switched to VTR1 with a single logical switch even though they (and their respective routing switchers) are located in two separate rooms.

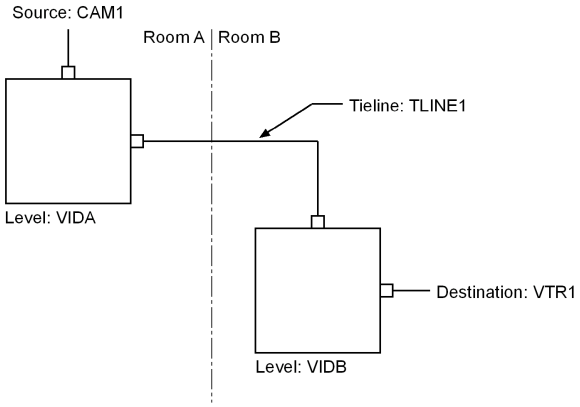


Figure B

Tieline names are one to eight characters in length and are constructed using uppercase letters, numbers, and spaces. The first character must be a letter.

User Account

A set of privileges and an optional user password saved as a user name.

User accounts provide a means of restricting access to certain system functions on a user-by-user basis.

User Name

An eight-character string consisting of upper case letters, numbers, spaces, and some symbols:

Permitted: ! @ # $ % ^ & * _ + - = [ ] \ : " ; ’ < > . ? /

Forbidden: { } | , ( )

User Password

An eight-character string consisting of letters, numbers, and spaces. A User Password may begin with either a number or a letter. Leading spaces are discarded.

Vertical Interval

The portion of the video signal in which image information is absent to allow for the video device to prepare for the next frame of information.

Vertical Sync Signal

A short pulse generated at the beginning of each video timing frame which tells the video monitor when to start a new video timing field. For switching purposes, the vertical sync signal may be derived from house sync.

See also: Sync Reference.

Vertical Trigger

See: Vertical Sync Signal.

Video Timing Field

A package of information that contains information required to complete a full scan across a video monitor. There are two types of video fields denoted as odd and even.

Video Timing Frame

A package of information that contains all the information required to draw an image on a video device. Generally considered with respect to NTSC and PAL signals where the information is transmitted over a fixed time frame. A frame consists of two video timing fields denoted odd and even.

Working Directory

The location on the PC hard drive where control system software such as Win3500Plus is installed.

If the default settings of the Win3500Plus installation program were used, this will be c:\win3500p for 16-bit versions of the Microsoft Windows OS, and c:\program files\win3500p for 32-bit versions. Configurations may not be saved in the working directory or any subdirectory of the working directory.

Rev.	Date	Description	By
A	08-30-97	Initial release.	C. Jaynes
B	11-03-99	Added FCC statement and DoC per ECO-3279. Revised to reflect current version of software per ECO-3069 and ECO-3070. Revised J20 connector legend in accordance with ECO-3390. Revised and expanded per ECO-3449.	G. Tarlton
C	02-16-00	Revised Figure 1 per ECO-3412. Revised Figures 9, 20, 21, 26, 28, 31 and 32 per ECO-3572. Updated glossary.	G. Tarlton
D	N/A	Not Released – Agile Conversion	D. Buie
E	N/A	Not Released – Agile Conversion	D. Buie
F	N/A	Not Released – Agile Conversion	D. Buie
G	N/A	Not Released – Agile Conversion	D. Buie
H	N/A	Not Released – Agile Conversion	D. Buie
I	02-28-01	Synchronized revision level with Agile per ECO CE00159.	D. Buie
J	02-28-01	Deleted Printing Specification per ECO CE00160.	D. Buie
K	02-28-01	Deleted bills of material, drawings, and schematics per ECO CE00161.	D. Buie
L	03-20-01	Complete revision. Incorporated RS-422 cable information per ECO CE00034.	D. Buie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