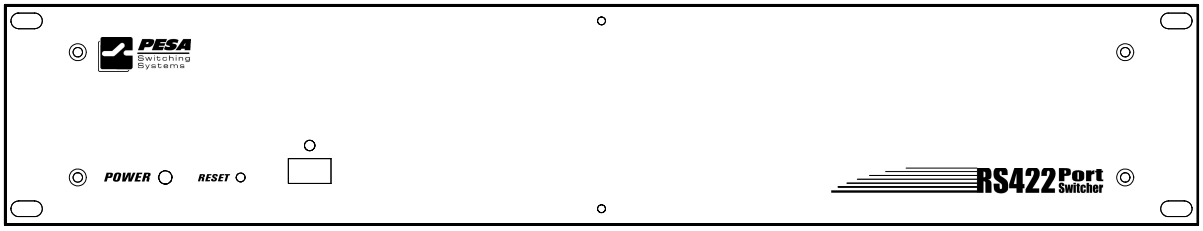
PESA Switching Systems



RS-422
Port Switcher

PESA Switching Systems, Inc.
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Part No. 81-9059-0455-0 Revision D

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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.

Table of Contents

Figures

Tables

Chapter 1 – Introduction

General

This manual provides instructions for the installation, operation, and maintenance of the PESA RS-422 Port Switcher.

Safety Warnings

Safety warnings, and other important information, are emphasized 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 PESA RS-422 Port Switcher is available with 8, 16, 24, or 32 ports and is suitable for the general purpose routing of machine control signals. This switcher can be added as another level in any 3300/3500/3500Plus system. Each port can be dynamically switched as a source or a destination.

Specifications

Power Requirements

Power Supply Input 90-265VAC, 50-60Hz
Power Supply Output 5VDC, 3A

Physical Characteristics

Height ..... 3.5 Inches (2RU) (89mm)
Width ..... 19.0 Inches (483mm)
Depth ..... 9.5 Inches (241mm)
Weight ..... 10 Pounds Max. (22Kg)

Operational Environment

Temperature ..... 0-40°C
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

Carefully unpack the equipment and compare the parts received against the packing list and Table 1. If any parts appear to be missing, please contact PESA immediately.

Table 1. 8-Port Switcher Equipment List

Part No. Description	Quantity Required
81-9017-0332-0 RS-422 Port Switcher	1 ea
Power Supply, Ault, Inc., Model No. SW300	1 ea
Line Cord, 10A, 125V, 1250 W	1 ea
Serial Cable Assembly	1 ea

Table 2. 16-Port Switcher Equipment List

Part No. Description	Quantity Required
81-9017-0331-0 RS-422 Port Switcher	1 ea
Power Supply, Ault, Inc., Model No. SW300	1 ea
Line Cord, 10A, 125V, 1250 W	1 ea
Serial Cable Assembly	1 ea

Table 3. 24-Port Switcher Equipment List

Part No. Description	Quantity Required
81-9017-0330-0 RS-422 Port Switcher	1 ea
Power Supply, Ault, Inc., Model No. SW300	1 ea
Line Cord, 10A, 125V, 1250 W	1 ea
Serial Cable Assembly	1 ea

Table 4. 32-Port Switcher Equipment List

Part No. Description	Quantity Required
81-9017-0329-0 RS-422 Port Switcher	1 ea
Power Supply, Ault, Inc., Model No. SW300	1 ea
Line Cord, 10A, 125V, 1250 W	1 ea
Serial Cable Assembly	1 ea

Installation Location

WARNING

For safety reasons, this equipment must be located near the socket-outlet or power strip so that the AC line cord plugs are easily accessible (Ref. EN60950:1992 §1.7.2).

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

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.

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.

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

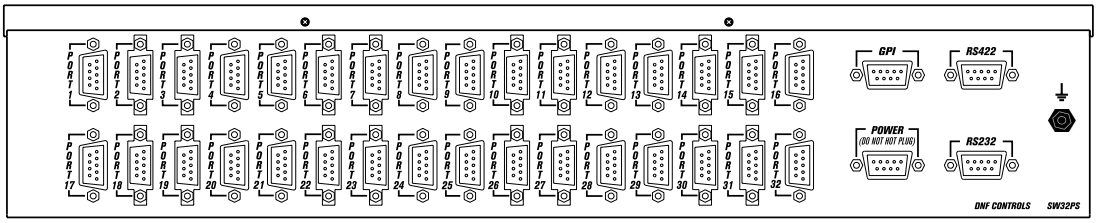


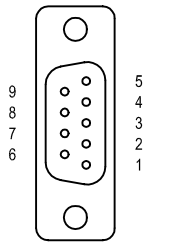
Figure 1. RS-422 Port Switcher Rear View

RS-422 Device Connectors (PORT x)

These DB9-Female connectors provide the RS-422 serial port interfaces for the devices to be switched. See Figure 2 for an orientation view showing contact locations and Figure 3 for a typical cable assembly.

NOTE

Connect all RS-422 devices to these connectors in the manner shown, without regard as to whether they are master devices or slave devices (e.g., connect RX+ of the device to pin 2, whether it is a master device or a slave device). The port switcher, in conjunction with the control system software, will interconnect these devices into a correctly formed RS-422 bus. For more information, see "RS-422 Bus Basics" on Page 11.



Contact locations when viewed
from rear of chassis.

Figure 2. RS-422 Device Connector (PORT x)

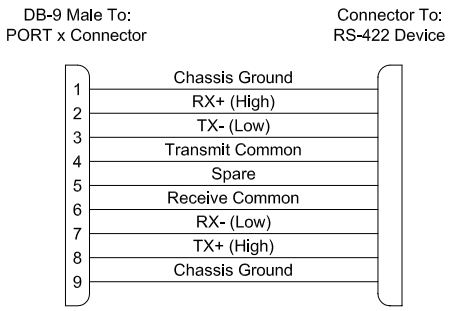


Figure 3. RS-422 Device Cable

General Purpose Input Connector (GPI)

This DB9-Female connector is reserved for future use.

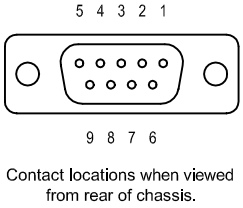


Figure 4. GPI Connector

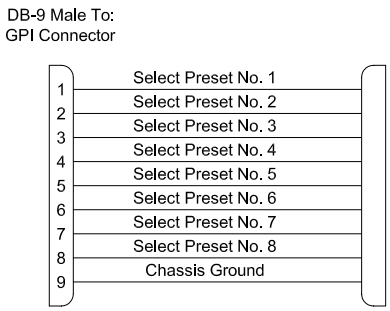


Figure 5. GPI Cable

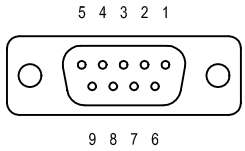
System Controller Interface Connector (RS422)

This DB9-Female connector provides the RS-422 serial communication interface using the PESA PRC Protocol (Document No. 81-9062-0316-0). See Figure 6 for an orientation view showing contact locations.

RS422 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.

NOTE

Unlike the PRC interface connector on other PESA equipment, this connector is a DB9-Female, not a DB9-Male. This requires the use of a non-standard PRC interface cable which is included with the RS-422 Port Switcher. The supplied cable has one DB9-Male connector and one DB9-Female connector.



Contact locations when viewed from rear of chassis.

Figure 6. RS-422 Connector

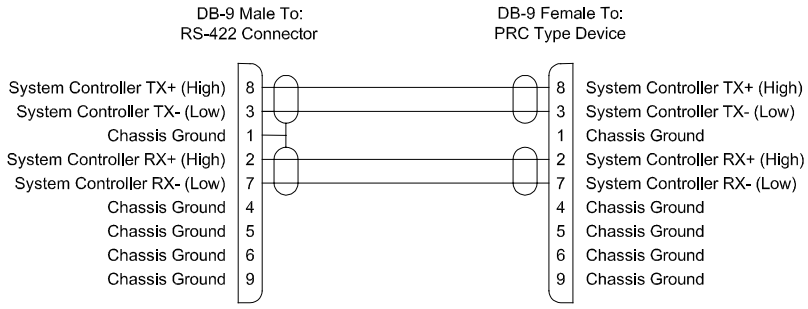


Figure 7. RS-422 Serial Cable

RS-232 Control Input Connector (RS232)

This DB9-Female connector is reserved for future use.

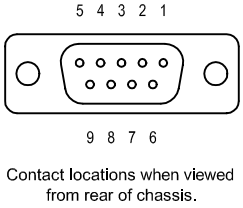


Figure 8. RS-232 Connector

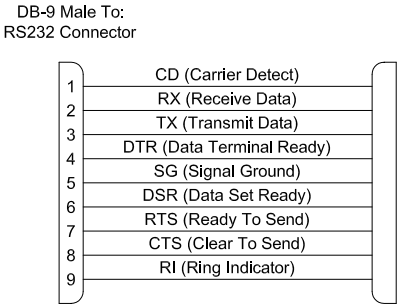


Figure 9. RS-232 Cable

Power Connector (POWER)

This DB9-Male connector is the input power connector. See Figure 10 for an orientation view showing contact locations. The power supply pigtail, constructed as shown in Figure 11, is connected to this connector.

When power is applied to the port switcher, the front panel LED will flash three times, turn off during initialization, then turn on and stay on if initialization was completed correctly.

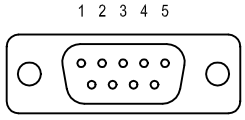
WARNING

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

CAUTION

To avoid equipment damage, the power supply cables must be connected in the following order:

1. Verify that the power supply is not connected to the AC mains.
2. Connect the DB9-Female connector on the power supply cord to the connector on the port switcher marked POWER.
3. Connect the line cord between the power supply and the AC mains



Contact locations when viewed from rear of chassis.

Figure 10. Power Connector

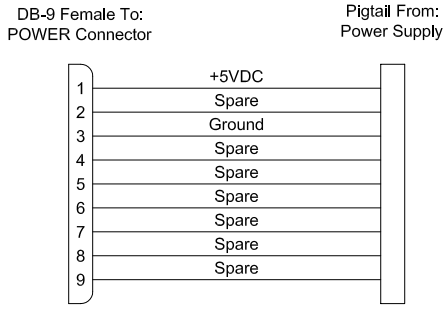


Figure 11. Power Supply Pigtail

Switch and Jumper Settings

S1 – Front Panel DIP Switch

This DIP switch is accessed by using a No. 0 Phillips screwdriver to remove the access cover on the left side of the front plate. See Figure 13 for a view showing the orientation of this switch as seen from the front of the chassis. This switch is used to:

- Enable Test Mode
- Select Strobe Assignment
- Enable/Disable Multi-Drop Mode
- Control the Classification of RS-422 Devices as Sources or Destinations

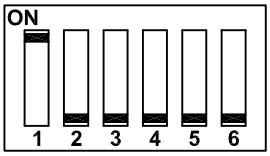


Figure 12. Front Panel DIP Switch

Table 5. Front Panel DIP Switch S1

Strobe Assignment	Switch S1-1	Switch S1-2	Switch S1-3	Switch S1-4	Switch S1-5	Switch S1-6
Test Mode Enable	OFF	OFF	OFF	OFF		
Strobe 1	ON	OFF	OFF	OFF		
Strobe 2	OFF	ON	OFF	OFF		
Strobe 3	ON	ON	OFF	OFF		
Strobe 4	OFF	OFF	ON	OFF		
Strobe 5	ON	OFF	ON	OFF		
Strobe 6	OFF	ON	ON	OFF		
Strobe 7	ON	ON	ON	OFF		
Strobe 8	OFF	OFF	OFF	ON		
Strobe 9	ON	OFF	OFF	ON		
Strobe 10	OFF	ON	OFF	ON		
Strobe 11	ON	ON	OFF	ON		
Strobe 12	OFF	OFF	ON	ON		
Strobe 13	ON	OFF	ON	ON		
Strobe 14	OFF	ON	ON	ON		
Strobe 15	ON	ON	ON	ON		
Multi-Drop Mode Enable					ON	
Multi-Drop Mode Disable					OFF	
Sources Are Slaves Mode						ON
Destinations Are Slaves Mode						OFF

Chapter 3 – Operation

General

This equipment is designed to be operated by a system controller such as the PESA 3500Plus. For detailed system operation information, please refer to the system controller manual.

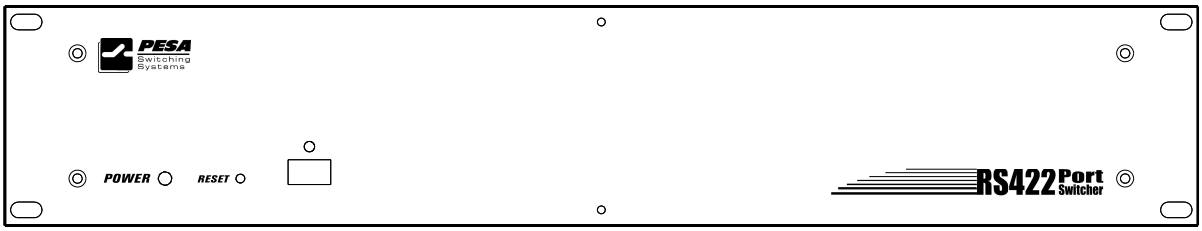


Figure 13. RS-422 Port Switcher Front View

RS-422 Bus Basics

Unlike RS-232, where signals are carried as single voltages referenced to a common ground, RS-422 uses a balanced line interface. A pair of wires is used to carry each signal, and the data is encoded as a differential voltage between the two wires.

The typical RS-422 bus consists of one master device controlling one slave device. Each device is connected to the bus with two pairs of wires. One pair handles the transmission of signals from the master device to the slave device, the other handles the transmission of signals from the slave to the master. An RS-422 bus constructed in this configuration, sometimes referred to as point-to-point, is wired as shown in Figure 14.

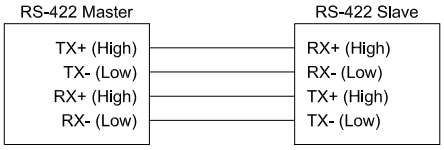


Figure 14. RS-422 Point-to-Point Bus

RS-422 Multi-Drop

Under certain circumstances, an RS-422 bus may also be constructed with one master device and multiple slave devices. This configuration is sometimes referred to as multi-drop or gang, and is wired as shown in Figure 15.

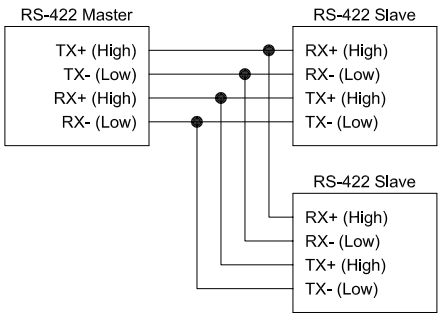


Figure 15. RS-422 Multi-Drop Bus

The transmit circuit of the master device is connected to the receive circuits of the slave devices. All the slaves continuously monitor this part of the bus and react in unison to commands issued by the master. Any required command responses are transmitted by the slaves to the receive circuit of the master device.

In order for this configuration to work, only one slave device can transmit to the master device at any given time. This may be accomplished by one of the following methods:

- Using addressable slave devices with tri-state capability. This requires all slave transmit circuits to be disconnected from the bus (tri-stated). When individually addressed by the master device, a slave will temporarily connect its transmit circuit to the bus, transmit its data, and then disconnect again.
- Only connecting the transmit circuit of one of the slave devices to the master device receive circuit when constructing the system cables.
- Using a switch to connect only one slave device transmit circuit at a time to the master device receive circuit.

In the case of the PESA RS-422 Port Switcher, this problem has been solved by using the last method. The port switcher automatically selects the transmit circuit of only one slave device, and connects it to the master device receive circuit. The slave device selected is the last one switched by the port switcher.

Multi-Drop Mode (Switch S1-5)

Use front panel DIP switch S1-5 (Table 5) to either enable or disable multi-drop mode.

When multi-drop mode is enabled, multiple slave devices are permitted on each RS-422 bus. When multi-drop mode is disabled, the RS-422 buses are limited to one master device and one slave device. This is sometimes referred to as a point-to-point configuration.

Disabling multi-drop mode offers an advantage in systems where each RS-422 bus will have only one slave device. Consider the case where a master device is connected to Port 1 and slave devices are connected to Ports 2 and 3. The master device will only be used to control one of the slave devices at any given time.

The following commands are then given:

- Switch Port 1 to Port 2
- Switch Port 1 to Port 3

When multi-drop mode is enabled, the result of these two commands is that Port 1 is connected to both Port 2 and Port 3. The connection between Port 1 and Port 2 was not broken when the second command was issued. The only way to disconnect Port 2 from Port 1 is to switch an unused master device port to Port 2 as a third command.

When multi-drop mode is disabled, the result of the above two commands is that Port 1 is only connected to Port 3. The connection between Port 1 and Port 2 was automatically broken before the connection was made between Port 1 and Port 3. When multi-drop mode is disabled, a master device can never be connected to more than one slave device at a time.

Classification of RS-422 Devices as Sources or Destinations (Switch S1-6)

When configuring the control system software, master devices will be referred to as sources, and slave devices will be referred to as destinations, when front panel DIP switch S1-6 (see Table 5) is set to OFF. This is the normal mode of operation.

Port Allocation

The available ports must be divided up and allocated to either master devices (inputs/sources), or slave devices (destinations/outputs). This is required so the control system software can properly interconnect the devices (i.e., connect RX+ of a master device to TX+ of a slave device, etc.).

For example, an 8-port switcher might use two ports for master devices, and the remaining six ports for slave devices, making a 2x6 switching matrix as shown on the left in Figure 16. The same 8-port switcher could also be configured as a 4x4 matrix as shown on the right in Figure 16.

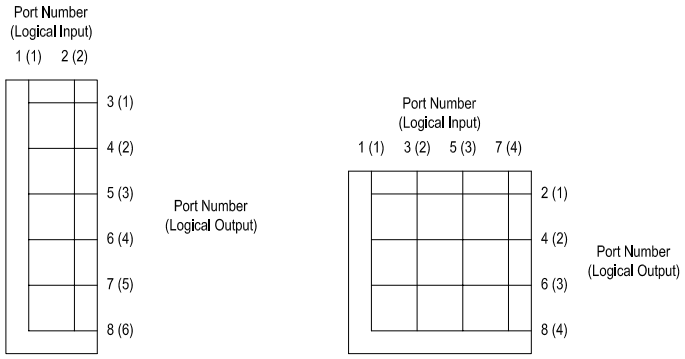


Figure 16. Sample Port Allocation for 8-Port Switcher

Once port allocation is complete, and the matrix size has been established, level configuration may be performed in the control system software.

Strobe Assignment (Switches S1-1 through S1-4)

Use front panel DIP switches S1-1 through S1-4 (Table 5) to assign a strobe number to this equipment. The strobe number assigned with the DIP switch must match the strobe number entered in the control system software when performing component configuration.

Chapter 4 – Maintenance and Repair

CAUTION

This equipment contains static sensitive devices. A grounded wrist strap and mat should be used when handling the internal circuit cards.

Periodic Maintenance

This unit does not require any periodic maintenance.

Troubleshooting

Subassembly LEDs

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

Front Panel

LED	Color	Schematic Legend	Normal State	Troubleshooting Info
1	RED	N/A	ON	Indicates that power is on. If LED is OFF: 1. Check input power connections. 2. Check front panel DIP switches S1-1 through S1-4. LED will be OFF when unit is in test mode. 3. Contact PESA Customer Service. When power is first applied, this LED will flash three times, pause during initialization, then turn on and stay on if initialization was successful. Intermittent flashing after a successful initialization indicates active communication with the system controller.

Test Mode

Test Mode is entered by setting front panel DIP switches S1-1 through S1-4 as shown in Table 5 on Page 10. All PORT x connectors may be tested as follows:

1. Set front panel DIP switches S1-1 through S1-4 to OFF. The front panel LED will turn off.
2. Connect a standard serial cable with DB9-Male connector on each end, between the rear panel connector marked "RS422", and any device port connector (PORT x). The front panel LED will flash if the device port connector is functioning correctly.
3. Repeat step 2 for all "Port x" connectors to be tested.
4. Return front panel DIP switches S1-1 through S1-4 to the desired strobe setting.

The test is accomplished by sending one byte of data out of the "RS422" connector, looping it through the "Port x" connector being tested, and routing it back in the "RS422" connector. The received byte is then compared to the byte originally transmitted. If they are the same the LED blinks. If they are different, or if there is a time out, the LED will stay off.

Reset Button

Pressing the front panel reset button will reset the software and reinitialize the CPU, RAM, and all ports. During the reinitialization process, all ports will be disconnected. After this is complete, all connections will be restored from data stored in non-volatile RAM.

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.

CAUTION

This equipment may contain 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-xxxx	Drawing Tree, RS-422 Port Switcher - TBD
WI50-xxxx	Wiring Diagram, TBD
81-9059-0455-0	Manual, RS-422 Port Switcher
81-9062-0316-0	Specification, PESA Router Control Protocol (PRC)

Glossary

(Revised: 02-19-01)

AES/EBU

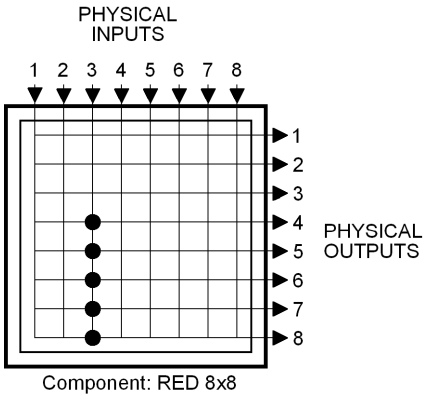
Informal name for a digital audio standard established jointly by the Audio Engineering Society (www.aes.org) and the European Broadcasting Union (www.ebu.ch).

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:

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

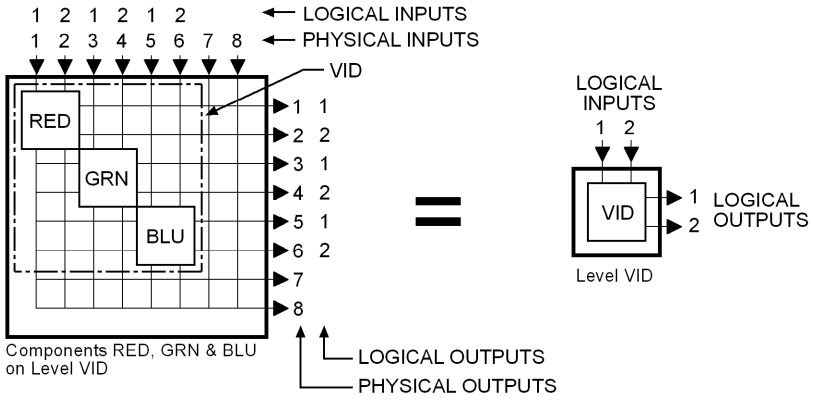
For example, a chop rate of 1 used with NTSC signals (30 Frames/Second) will cause the signals to be switched 30 times per second. A chop rate of 60 used with the same signals will cause them to be switched every two seconds.

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

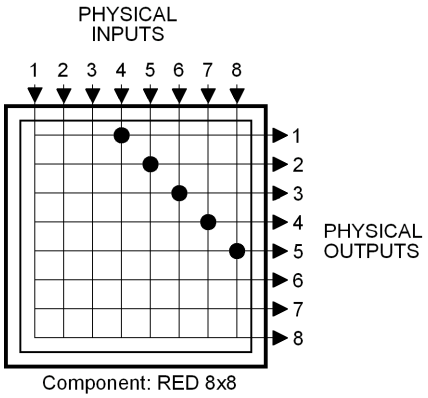
See: Status.

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).

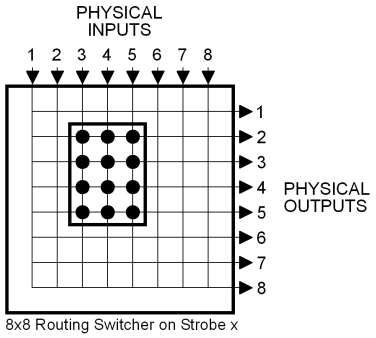


Figure A

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.

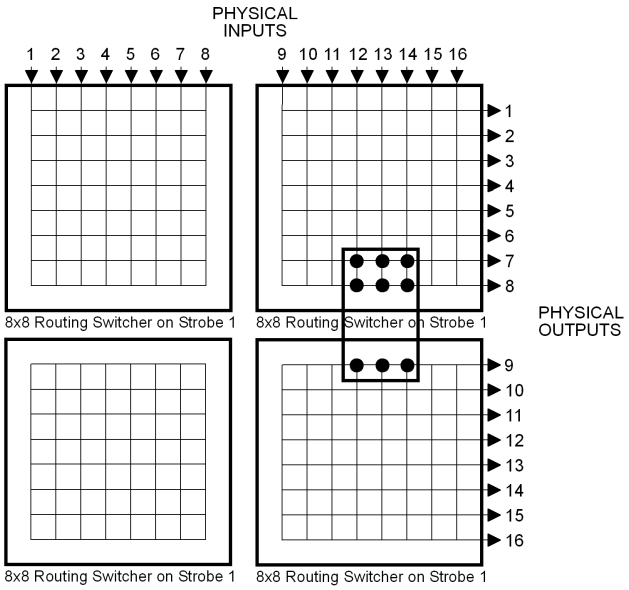


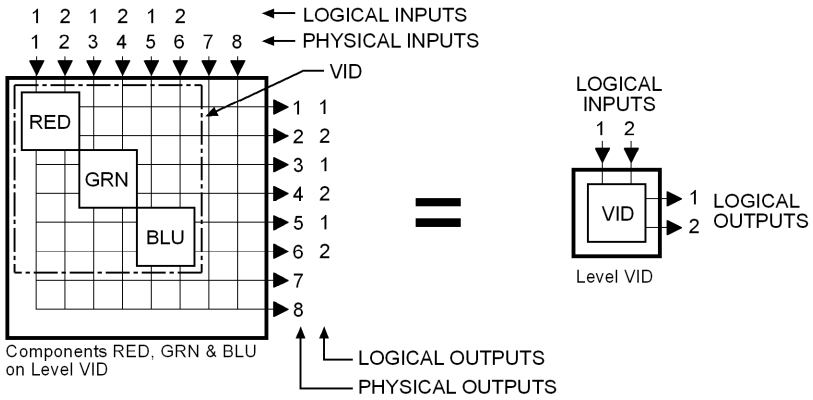
Figure B

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.

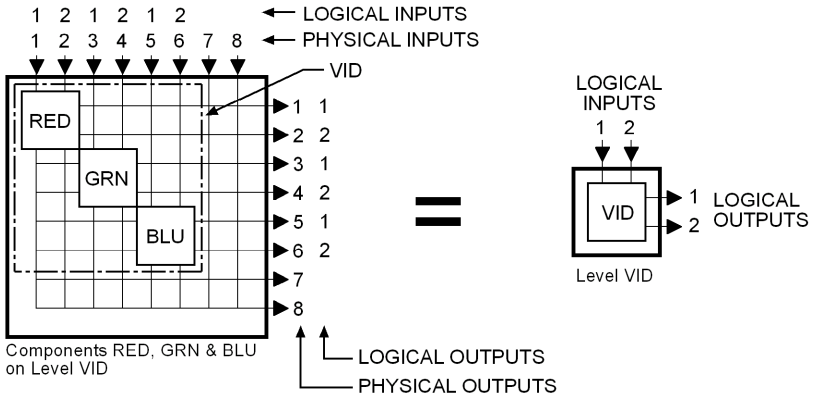
See also: Lock, Protect.

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.

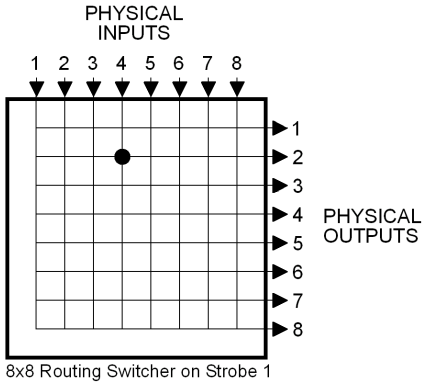


Figure A

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.

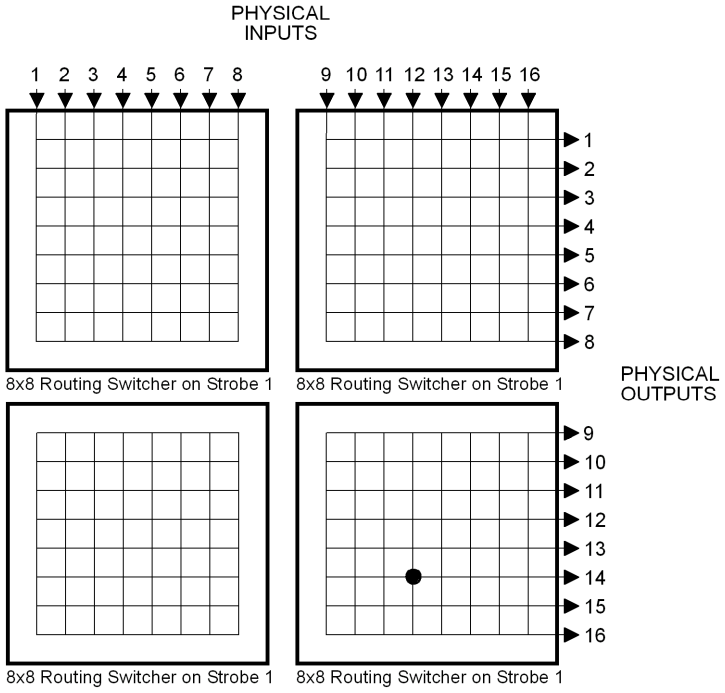


Figure B

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.

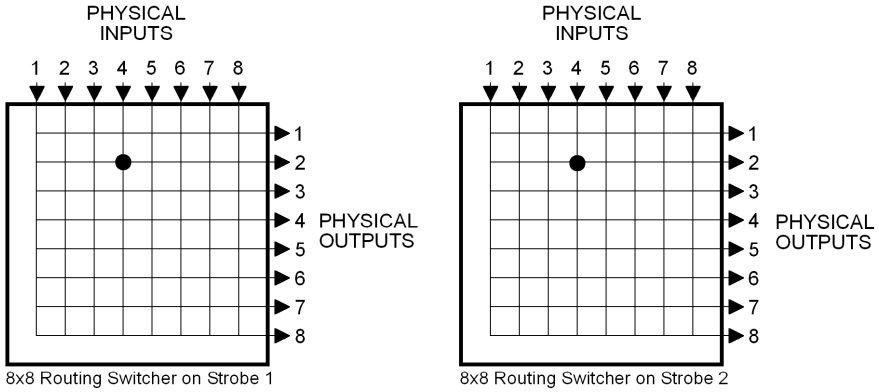


Figure C

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).

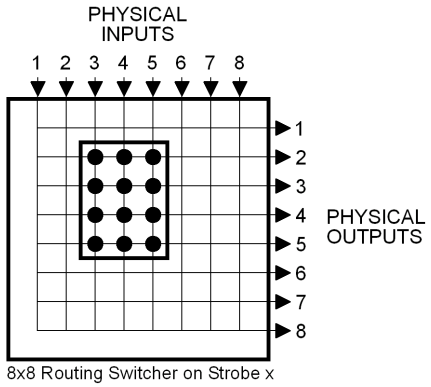


Figure A

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.

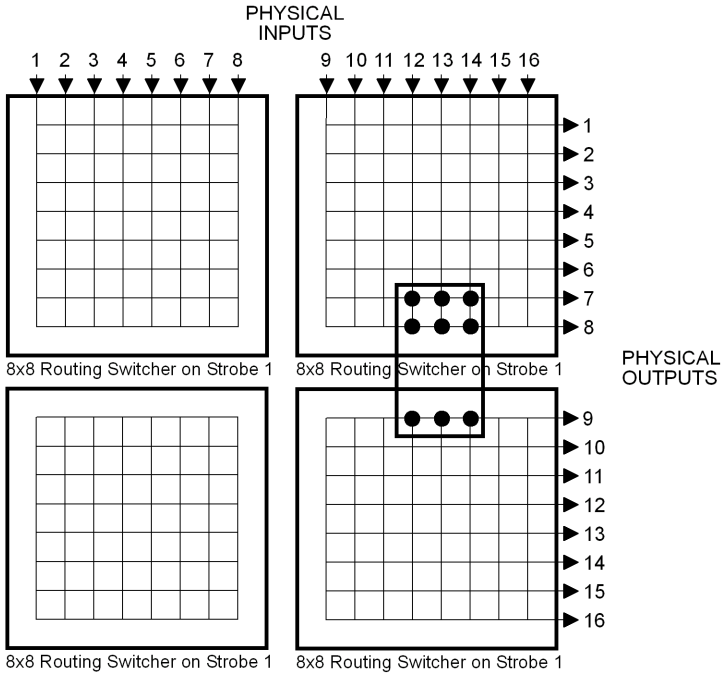


Figure B

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.

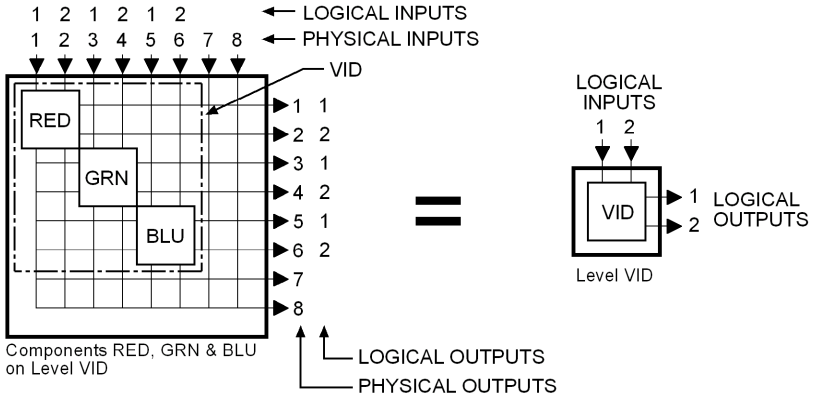
PESA control system software is designed to operate on any IBM® compatible personal computer (AT® or later) with a Microsoft Windows™ operating system (3.1, 95, 98, or NT).

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

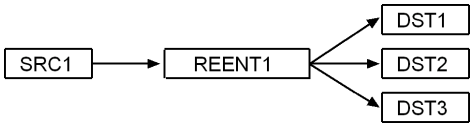
See Readback.

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.

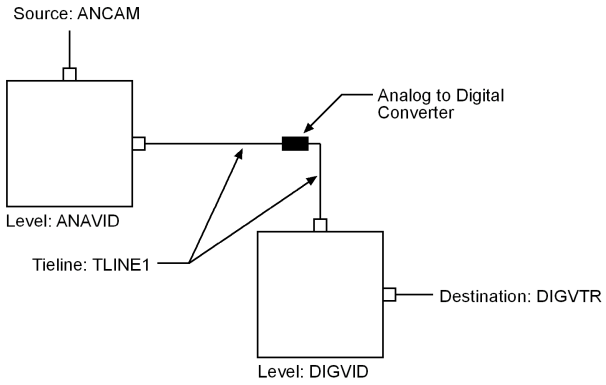


Figure A

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.

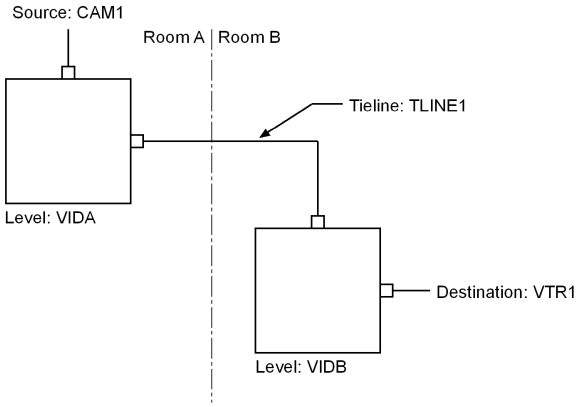


Figure B

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.

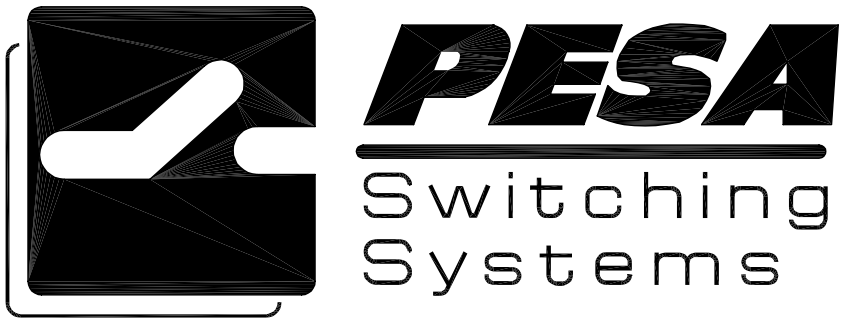
Working Directory

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.

Revision History

Rev.	Date	Description	By
A	01-20-00	Initial Release	G. Tarlton
B	04-25-00	Updated information pertaining to Test Mode and Reset Button; revised description and instructions for use of included serial cable assembly; and updated Glossary per ECO-3632	G. Tarlton
C	02-28-01	Deleted Printing Specification per ECO CE00160.	G. Tarlton
D	03-20-01	Complete revision. Incorporated RS-422 cable information per ECO CE00034.	D. Buie


PESA
Switching
Systems