



Instruction Manual

Optima SD

Distribution Matrix



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ESD Warning



To avoid ESD (Electrostatic Discharge) damage to sensitive components, make sure you are properly grounded before touching any internal materials.

When working with any equipment manufactured with electronic devices, proper ESD grounding procedures must be followed to ensure people, products, and tools are as free of static charges as possible. Grounding straps, conductive smocks, and conductive work mats are specifically designed for this purpose.

Anyone performing field maintenance on AMX AutoPatch equipment should use an appropriate ESD field service kit complete with at least a dissipative work mat with a ground cord and a UL listed adjustable wrist strap with another ground cord. These items should not be manufactured locally, since they are generally composed of highly resistive conductive materials to safely drain static charges, without increasing an electrocution risk in the event of an accident. ESD protective equipment can be obtained from 3M™, Desco® , Richmond Technology®, Plastic Systems®, and other such vendors.

Important Safety Information & Instructions

When using and installing your AMX AutoPatch product, adhere to the following basic safety precautions. For more information about operating, installing, or servicing your AMX AutoPatch product, see your product documentation.

- Read and understand all instructions before using and installing AMX AutoPatch products.
- Use the correct voltage range for your AMX AutoPatch product.
- There are no user serviceable parts inside an AMX AutoPatch product; service should only be done by qualified personnel.
- If you see smoke or smell a strange odor coming from your AMX AutoPatch product, turn it off immediately and call technical support.
- For products with multiple power supplies in each unit, make sure all power supplies are turned on simultaneously.
- Use surge protectors and/or AC line conditioners when powering AMX AutoPatch products.
- Only use a fuse(s) with the correct fuse rating in your enclosure.
- Make sure the power outlet is close to the product and easily accessible.
- Make sure the product is on or attached to a stable surface.
- Turn off equipment before linking pieces together, unless otherwise specified in that product's documentation.
- For safety and signal integrity, use a grounded external power source and a grounded power connector.
- Turn off and unplug an enclosure before adding or removing boards, unless otherwise specified in that product's documentation.
- To avoid shock or potential ESD (Electrostatic Discharge) damage to equipment, make sure you are properly grounded before touching components inside an AMX AutoPatch product.

Information et directives de sécurité importantes

Veillez vous conformer aux directives de sécurité ci-dessous lorsque vous installez et utilisez votre appareil AMX AutoPatch. Pour de plus amples renseignements au sujet de l'installation, du fonctionnement ou de la réparation de votre appareil AMX AutoPatch, veuillez consulter la documentation accompagnant l'appareil.

- Lisez attentivement toutes les directives avant d'installer et d'utiliser les appareils AMX AutoPatch.
- Le voltage doit être approprié à l'appareil AMX AutoPatch.
- Les appareils AMX AutoPatch ne contiennent aucune pièce réparable par l'utilisateur; la réparation ne doit être effectuée que par du personnel qualifié.
- Si de la fumée ou une odeur étrange se dégagent d'un appareil AMX AutoPatch, fermez-le immédiatement et appelez le Service de soutien technique.
- Veillez à ce que tous les blocs d'alimentation des appareils dotés de blocs d'alimentation multiples dans chaque unité soient allumés simultanément.
- Servez-vous de protecteurs de surtension ou de conditionneurs de lignes à courant alternatif lorsque vous mettez les appareils AMX AutoPatch sous tension.
- Placez uniquement des fusibles de calibre exact dans les boîtiers.
- Veillez à ce que la prise de courant soit proche de l'appareil et facile d'accès.
- Veillez à ce que votre appareil AMX AutoPatch soit installé sur une surface stable ou qu'il y soit fermement maintenu.
- Fermez toutes les composantes de l'équipement avant de relier des pièces, à moins d'indication contraire fournie dans la documentation de l'appareil.
- Par mesure de sécurité et pour la qualité des signaux, servez-vous d'une source d'alimentation externe mise à la terre et d'un connect d'alimentation mis à la terre.
- Fermez et débranchez le boîtier avant d'ajouter ou d'enlever des plaquettes, à moins d'indication contraire fournie dans la documentation du appareil.
- Pour éviter les chocs ou les dommages éventuels causés à l'équipement par une décharge électrostatique, veillez à ce le dispositif soit bien relié à la terre avant de toucher les composantes se trouvant à l'intérieur d'un appareil AMX AutoPatch.

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The United States Federal Communications Commission (in 47CFR 15.838) has specified that the following notice be brought to the attention of the users of this product.

Federal Communication Commission Radio Frequency Interference Statement:

“This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the booklet, How to Identify and Resolve Radio-TV Interference Problems, prepared by the Federal Communications Commission to be helpful.”

This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock N. 004-000-00345-4.

Use shielded cables. To comply with FCC Class A requirement, all external data interface cables and adapters must be shielded.

Lithium Batteries Notice

Switzerland requires the following notice for products equipped with lithium batteries. This notice is not applicable for all AMX equipment.

Upon shipment of the products to Switzerland, the requirements of the most up-to-date Swiss Ordinance Annex 4.10 of SR 814.013 will be met by providing the necessary documents and annual reports relative to the disposal of the batteries to the Swiss Authorities.

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This manual uses the following conventions and icons to draw attention to actions or conditions that could potentially cause problems with equipment or lead to personal risk.



ESD Warning: *The icon to the left indicates text regarding potential danger associated with the discharge of static electricity from an outside source (such as human hands) into an integrated circuit, often resulting in damage to the circuit.*



Warning: *The icon to the left indicates text that warns readers against actions or conditions that could cause potential injury to themselves.*



Caution: *The icon to the left indicates text that cautions readers against actions that could cause potential injury to the product or the possibility of serious inconvenience.*

Overview & General Specifications

Applicability Notice

The information in this manual applies to Optima SD (Slam Dunk) pre-engineered systems. For other types of Optima systems, see the *Optima Instruction Manual*.

Optima SD Systems

Model	Configuration	Description
FGP46-1616-560	16x16	RGBHV (500 MHz)
FGP46-1616-567	16x16	RGBHV (500 MHz)+Stereo, digital volume control
FGP46-0816-560	8x16	RGBHV (500 MHz)
FGP46-0816-567	8x16	RGBHV (500 MHz)+Stereo, digital volume control
FGP46-1212-560	12x12	RGBHV (500 MHz)
FGP46-1212-567	12x12	RGBHV (500 MHz)+Stereo, digital volume control
FGP46-1608-560	16x8	RGBHV (500 MHz)
FGP46-1608-567	16x8	RGBHV (500 MHz)+Stereo, digital volume control

APWeb (TCP/IP) Expansion Board (FG1046-313)

The Optima APWeb expansion board is used for TCP/IP control and works in all Optima SD systems. If an APWeb expansion board is ordered with the system, the board is installed before shipment. For information, see the “APWeb Expansion Board” chapter (see page 45).

Product Notes

An Optima SD system is normally sold as a stand-alone product; however, it can be linked as part of a larger system, including any other AMX AutoPatch products that are XNNet compatible. All Optima SD systems have an integral control panel and can be controlled from a variety of other sources (see page 13).

Note: Because the Optima SD system is available in four configuration sizes with or without stereo audio, the illustrations in this manual may differ slightly from the model(s) you purchased.

Optima SD Features

- Super-Flat Response (500 MHz @ +4/-3 dB)
- PureSync™ guarantees the quickest possible rise time of the sync’s leading edge, eliminating the possibility of video loss at the display
- Superior video crosstalk specifications ensure signal isolation and security
- Supports full Device Discovery through AMX’s AutoPatch Duet module (firmware v1.4.0 or higher is required)
- Digital volume control on each output
- Digital input gain control on each input to normalize audio input voltages
- Audio connections support balanced and unbalanced audio
- Audio breakaway to route audio-follow-video, video, or audio alone
- Standard RS-232 (CONTROL) port
- RJ-45 Ethernet (ENC LINK) port for linking enclosures
- Presets (local and global)
- Backed by AMX Warranty (see warranty at www.amx.com or on the *AMX AutoPatch CD*)
- 24-hour technical support

Optima SD Control Features

Optima SD systems support three protocols: BCS* (Basic Control Structure), XNNet, and TCP/IP. Several control options are available. Multiple control methods can be used on the same system.

- Intuitive CP-15 front mounted control panel featuring backlit LCD and blue light buttons, allowing quick and easy access to execute commands (including front panel security lockout)
- AMX control devices – for control programming information, see the instruction manual for the specific interface
- APControl 3.0 software – free with all systems, provides easy single-user PC control of the system
- APWeb – optional TCP/IP control via an APWeb expansion board or external APWeb module
- Supports AMX AutoPatch's simple BCS serial control protocol
- REMOTE link port – for direct connection with remote panels and SBC control pads
- Supports third-party controllers

* BCS is sent as ASCII characters through the CONTROL (RS-232) port. For information on BCS commands, see the *BCS Protocol Instruction Manual* on the *AMX AutoPatch CD* or at www.amx.com.

Note: Features and specifications described in this document are subject to change without notice.

Front View

The enclosure is the structural basis of Optima SD systems. All Optima SD systems have an integral CP-15 Control Panel for controlling the system's switches and system attributes. The control panel can also be used for system verification, redundant control, and troubleshooting. Directions for use are provided in the *CP-15 Control Panel Instruction Manual* (available on the *AMX AutoPatch CD* or at www.amx.com). For information on additional control options, see page 13.

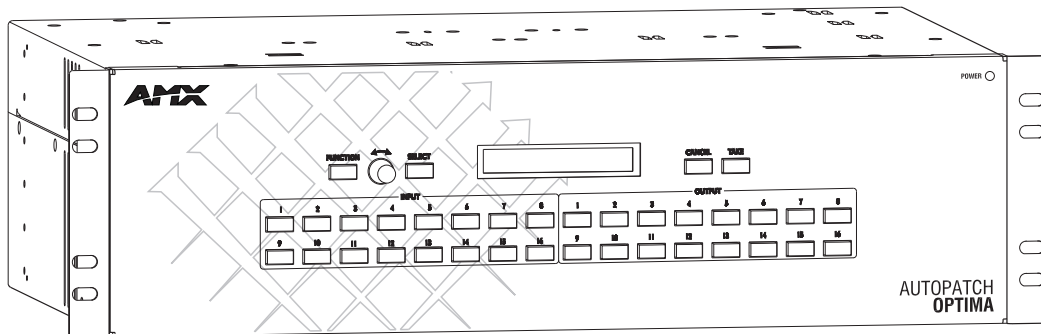


FIG. 1 CP-15 Control Panel is standard on Optima SD enclosures (16x16 illustrated)

Rear View

The enclosure's appearance, as viewed from the rear (FIG. 2), will vary depending on the configuration.

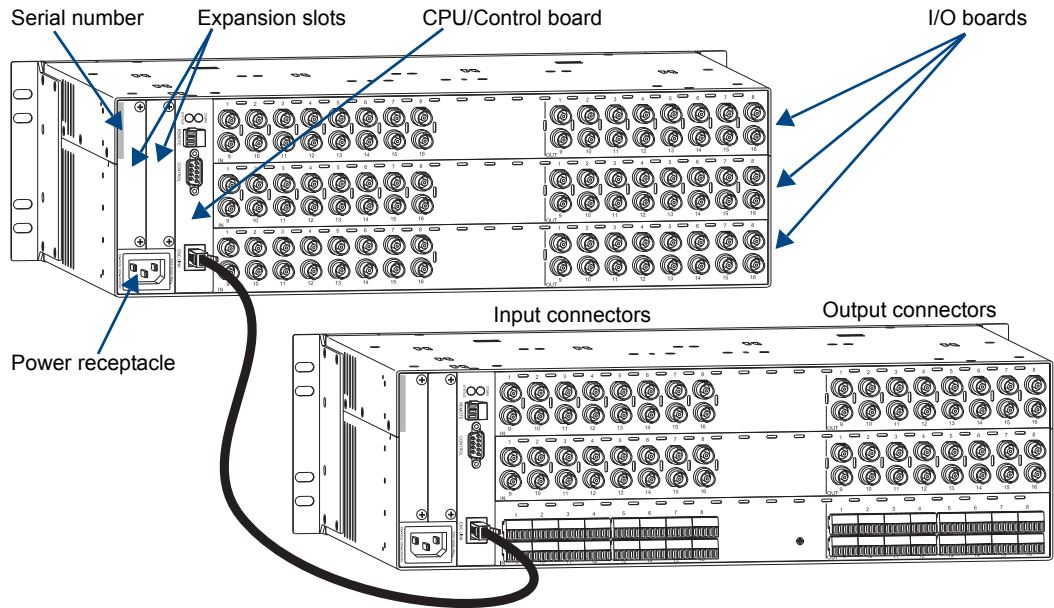


FIG. 2 Rear view 16x16 RGBHV+Stereo Optima SD system (RGB enclosure linked to HV with stereo enclosure)

Rear View Components

- CPU/Control board
- Power receptacle and specifications
- Input/output boards (number of connectors will vary depending on the system's configuration)
- Two expansion/control slots (one may contain an APWeb expansion board if pre-ordered)
- Serial number

The following sections briefly introduce the hardware on the rear of an enclosure.

CPU/Control Board

The CPU is to the left of the input connectors on the rear of the enclosure (FIG. 3).

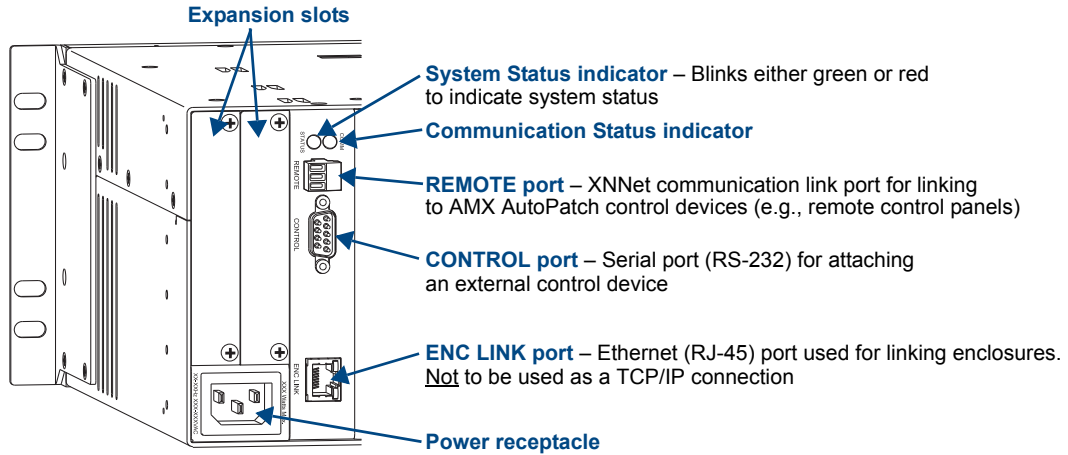


FIG. 3 CPU/Control board in Optima SD enclosure

Although primarily designed as a pre-engineered, stand-alone system, the Optima SD can be linked to other AMX AutoPatch Matrix Switchers. For information on linking between the Optima SD and other matrix switchers, see the instruction manual for the specific product.

Note: *The Comm light on the front panel indicates Ethernet traffic on the system.*

Power Receptacle & Specifications

The universal power receptacle is on the rear of the enclosure in the lower left hand corner (FIG. 3). Maximum power specifications are on the power receptacle. The power receptacle will accept all major international standard power sources. (Standard US power cords are provided for installations within the US.)

The fuse is internal and is not field serviceable. If you believe the fuse needs to be replaced, contact technical support (see page 34).

Expansion/Control Slots

Each enclosure has two expansion/control slots (FIG. 3) for expansion boards to increase functionality and add new features to your system, such as an APWeb board for control over a LAN. If an expansion boards is part of the original system, the board is installed at the factory.

For information on the APWeb expansion board, including connectors, cabling directions, and establishing the APWeb server connection (plus board installation if ordered after the original system), see page 45.

Input/Output Boards

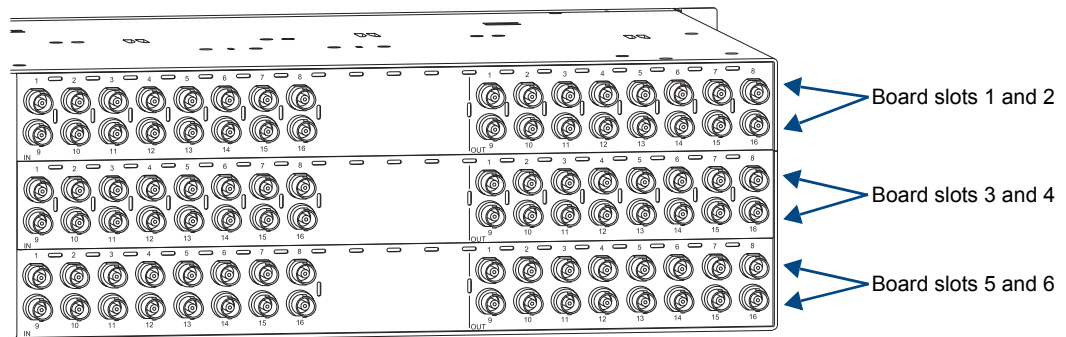


FIG. 4 Input/Output boards in an Optima SD enclosure

An Optima SD (3 RU) enclosure has six board slots. The double boards each fill two board slots and have two rows of connectors.

For information on the 500 MHz video, Hi-Z sync, and stereo audio boards included in your system, including connector types, cabling/wiring directions, and specifications, see the applicable board chapter in this manual (the chapter title specifies the board's signal type).

Input & Output Connectors

Input and output connectors are the attachment points for source and destination devices that connect to the system. Viewed from the rear of the enclosure, the inputs (sources) are on the left side of each board, and the outputs (destinations) are on the right side of the board. BNC connectors are color coded; the white connectors are inputs and the black connectors are outputs.

Input and output connectors are numbered separately on each board and read left to right. The numbers are either directly above or below the connector. This numbering pattern continues on each board (FIG. 4).

For control purposes, signals can only be routed from inputs on one board to outputs on the same board because each board in an Optima SD system has its own switching matrix.

System Serial Number

The system's serial number is normally located in two places on an enclosure.

When viewed from the rear, one serial number label is on the left expansion plate (FIG. 1 on page 9). The second serial number label is on the left side of the enclosure at the bottom edge (near the power receptacle). The label on the side will also have the enclosure number (referred to as the chassis number). The Optima SD enclosures are labeled "Chassis 1 of 2" on the enclosure with the control panel and "Chassis 2 of 2" on the other enclosure.

Before installation, we recommend recording the serial number for each enclosure in the system in an easily accessible location.

Optima SD Specifications

General Specifications	
Parameter	Value
Approvals	CE, UL, cUL
Humidity	0 to 90% non-condensing
Operational Temperature	32° F to 110° F (0° C to 43° C)
MTBF	92,000 hr.
AC Power*	100 to 240 VAC, single phase (50 Hz to 60 Hz) 3.3 A @ 115 VAC max. 1.6 A @ 230 VAC max.
Power Consumption (max.)	260 Watts per enclosure
Power Consumption (typical)	135 Watts per fully loaded enclosure
Thermal Dissipation (max.)	887 BTU/hr.
Thermal Dissipation (typical)	461 BTU/hr. per fully loaded enclosure
Dimensions	
Depth	Approximately 12 in. (30.5 cm)
Width with mounting ears	18.9 in. (48.0 cm)
Width without mounting ears	17.4 in. (44.2 cm)
Height	5.2 in. (13.2 cm), 3 RU
Weight	Approximately 12 lb. (5.44 kg) per loaded enclosure

* The fuse is internal and is not field serviceable. If you believe the fuse needs to be replaced, contact technical support (see page 34).

For information and specifications for the individual board types, see the following:

- 500 MHz Boards – see page 35
- Hi-Z Sync Boards – see page 37
- Stereo Audio Boards – see page 39

AMX reserves the right to modify its products and their specifications without notice.

Configuration Information & Control Options

Configuration Information

The configuration file is stored in the CPU and contains routing and control information for that particular model. Each system is programmed at the factory according to the model specifications (for model numbers and descriptions, see the “Applicability Notice” on page 7). Optima SD systems with audio use three virtual matrices for switching signals: VM 0 = audio-follow-video, VM 1 = video, and VM 2 = audio. Video only systems can switch signals on VM 0 or VM 1.

Important: *Unless you need to modify the system, you will not need to use XNConnect.*

A copy of the configuration file is provided on the *AMX AutoPatch CD* that is shipped with each system. The configuration software, XNConnect, is provided on the CD and can be used to further customize the configuration file (see “Appendix A – Managing Configuration Files” on page 53).

Configuration file modifications include basic tasks, such as creating local presets, customizing input and output channel names for control display (e.g., in the APWeb or APControl interface), and setting the control panel password.

Control Options

Optima SD systems support three different protocols: BCS (as ASCII characters sent through the CONTROL / RS-232 port), XNNet, and TCP/IP. Several different control options are available for Optima SD systems, and multiple control methods can be used on the same system.

Front Control Panel

The CP-15 Control Panel (standard on all Optima SD systems) controls the system's switches and attributes, as well as providing routing verification, redundant control, and troubleshooting capability. For complete information on the control panel, see the *CP-15 Control Panel Instruction Manual* on the *AMX AutoPatch CD* or at www.amx.com.

AMX Control Devices

The Optima SD is compatible with a number of AMX control devices. For control programming information, see the instruction manual for the specific interface.

AMX Control Software

Optima SD enclosures can be controlled using AMX AutoPatch software:

- APControl 3.0 – for control and scheduling
 - Uses CONTROL (RS-232) port located on the CPU
 - Runs on a PC (serial port connection)
 - Download from the *AMX AutoPatch CD* (or from www.amx.com if your AMX account has the required permissions)
- APWeb Server (TCP/IP) – for control, diagnostics, and third-party access
 - Uses an APWeb expansion board **or** uses the CONTROL (RS-232) port located on the CPU for connecting to an APWeb Server Module
 - Accessed through a TCP/IP interface, such as, a web browser (e.g., Internet Explorer)
 - Contact AMX regarding limitations and conditions for operating an Optima SD system on a company LAN (Local Area Network)

BCS Serial Control Protocol

The Optima SD can be controlled with an external serial controller that sends and receives ASCII characters via its CONTROL (RS-232) serial port. AMX AutoPatch has developed a command language, BCS (Basic Control Structure) protocol, for programming control operations and for diagnostic purposes. BCS commands can be entered into a terminal emulation program (such as, HyperTerminal) running on a PC. For information on BCS commands, see the *BCS Protocol Instruction Manual* on the *AMX AutoPatch CD* or at www.amx.com.

Third-Party Controllers

A third-party controller can also be attached to an Optima SD enclosure. If using a third-party controller, see the controller documentation for operating instructions.

Note: *Advanced programmers who want to design their own control programs can use AMX's AutoPatch XNNet protocol. The AMX AutoPatch CD includes the XNNet Communication Library, an interface library that supports C, Java, and Visual Basic and has examples of the XNNet protocol in use.*

Installation & Setup

Site Recommendations

When placing the enclosures, follow the recommendations and precautions in this section to reduce potential installation and operation hazards.

Environment

- Choose a clean, dust free, (preferably) air-conditioned location.
- Avoid areas with direct sunlight, heat sources, or high levels of EMI (Electromagnetic Interference).
- To make control panel operations easier, mount the enclosure with the control panel in the rack at eye level.

Chassis Accessibility

Make sure the front and rear panels of the enclosures are accessible, so that you can monitor the LED indicators. Leaving adequate clearance at the rear will also allow for easier cabling and service.

Power

The source's electrical outlet should be installed near the system, easily accessible, and properly grounded. Power should come from a building branch circuit. We recommend using a dedicated line for the system's power. Use a minimum breaker current rating of 15 A for 110 V or 30 A for 230 V. To avoid an overload, note the power consumption rating of all the equipment connected to the circuit breaker before applying power.

General Hazard Precautions

These recommendations address potential hazards that are common to all installations:

Elevated Operating Temperature

The maximum rated ambient temperature for Optima SD enclosures is 110° F (43° C).

All equipment should be installed in an environment compatible with the manufacturer's maximum rated ambient temperature. In a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than the ambient room temperature.



Caution: *To protect the equipment from overheating, do not operate in an area that exceeds 110° F (43° C) and follow the clearance recommendation below for adequate airflow.*

Airflow Restriction

Optima SD enclosures are designed to adequately dissipate the heat they produce under normal operating conditions; however, this design is defeated when high heat producing equipment is placed directly above or below an enclosure.



Caution: *To prevent overheating, avoid placing high heat producing equipment directly above or below the enclosures. The system requires a minimum of one empty rack unit above and below (three empty rack units are recommended). Verify that the openings on the sides of the enclosures are not blocked and do not have restricted air flow.*

Mechanical (Rack) Loading

When installing equipment in a rack, distribute the weight to avoid uneven mechanical loading.

Circuit Overloading

When connecting the equipment to the supply circuits, be aware of the effect that overloading the circuits might have on over-current protection and supply wiring.

Reliable Earthing (Grounding)

Reliable earthing of rack-mounted equipment should be maintained. If not using a direct connection to the branch circuit (e.g., plugging into a power strip), pay particular attention to supply connections.



Caution: For proper start up, turn on all power switches for the AMX AutoPatch equipment at the same time before applying power to the source and destination devices. We recommend attaching all power cords to a surge protector and/or an AC line conditioner.

Unpacking

The Optima SD is shipped with one enclosure per shipping box. The invoice is sent separately; a packing slip is attached to the outside of each box. Each box contains the following items:

- Enclosure
- Standard US power cord (if shipped within the US)
- Rack ears (with 8 screws)
- Link cable (in the first box)
- Other enclosure products as needed

The documentation in the first box includes:

- AMX AutoPatch Optima SD Quick Start Guide
- AMX AutoPatch Linking Enclosures Quick Start Guide
- AMX AutoPatch CD*
- AutoPatch Optima Connector Guide

The shipping boxes are marked as “Box __ of __,” where the first blank is the box number and the second blank is the total number of boxes in the shipment.

Unpacking Tips

- Before fully unpacking the enclosures, *inspect the shipping boxes for any signs of damage*. If a box is partially crushed or any sides have been broken open, notify the shipping agency immediately and contact your AMX representative (see the warranty on the *AMX AutoPatch CD* or at www.amx.com).
- Once unpacking is complete, closely check the physical condition of the enclosures.
- Collect all documentation.

Note: Please save the original shipping containers and packing materials. AMX is not responsible for damage caused by insufficient packing during return shipment to the factory. Shipping boxes are available; contact your AMX representative for details.

Rack Installation & System Setup

The Optima SD enclosures can be mounted in a standard EIA 19 in. (48.26 cm) rack. Rack installation ears are included, and directions for mounting the rack ears are included in the rack installation instructions (see page 19).

Important: *The system requires at least one empty rack unit above and below each enclosure to allow adequate airflow; three empty rack units are recommended.*

Required items for rack installation:

- Enclosures (2)
- Standard EIA 19 in. (48.26 cm) rack
- Rack ears (2 sets with 8 screws per set)
- Screwdriver
- Screws that fit your rack for mounting the enclosures
- Power cords (2)
- Link cable (1)

Optional items for rack installation:

- Surge-protector – highly recommended
- A laptop computer or PC with a null modem cable
(for communication with the Optima SD via its CONTROL / RS-232 port)

Installation Recommendations

The following is a list of installation recommendations:

- Write the system's serial number in an easily accessible location before installing the enclosures in a rack. The system's serial number is located in two places on the enclosures; on the left rear and on the left side of the enclosures (near the power receptacle).
- Use an earth-grounded power cord / system with the Optima SD.
- Attach all power cords to a single surge protector and/or an AC line conditioner.
- Apply power to the Optima SD enclosures before applying power to the system's source and destination devices.

Installation Procedure

A flow chart showing the installation sequence is in FIG. 5. The procedure following provides general steps with references to detailed information found in later sections of the manual.

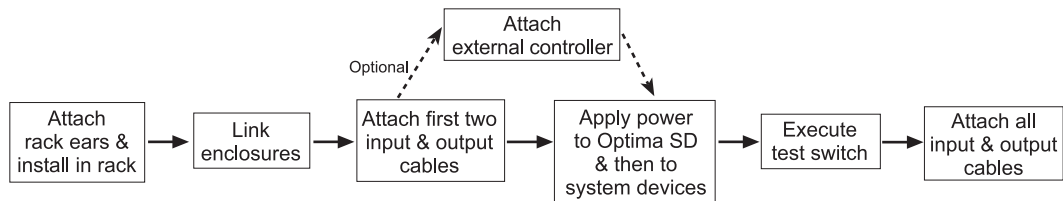


FIG. 5 Installation procedure



Caution: To prevent overheating and airflow restriction, avoid placing high heat producing equipment directly above or below the enclosures. The system requires a minimum of one empty rack unit above and below (three empty rack units are recommended). Verify that the openings on the sides of the enclosures are not blocked and do not have restricted air flow.

To install an Optima SD:

1. Attach the rack ears to the enclosures and mount the enclosures in a rack; see page 19.
2. Link the enclosures according to the information starting on page 19.
3. Following the “AutoPatch Optima Connector Guide” (shipped with each system), attach *only* the first two source and destination devices; see “Attaching Inputs & Outputs” starting on page 26. *Do not apply power* to the devices until after the Optima SD has power (Step 5).
4. Optional – Establish communication with an external control device; see page 22.
5. Apply power to the system according to the power-up procedure; see “Applying Power & Startup” on page 29.

Note: We recommend using a surge protector and/or an AC line conditioner.

6. Execute a test switch to ensure the system is working properly; see “Executing a Test Switch” on page 31.
7. When the test switch works correctly, attach the remaining source and destination devices.

Installation Options

Additional installation tasks may include creating the following:

- Control Panel Password – See page 59 in “Appendix A – Managing Configuration Files.”
- Custom Channel Names – See page 58 in “Appendix A – Managing Configuration Files.”
- Local Presets – See page 60 in “Appendix A – Managing Configuration Files.”
- Global Presets – See the *BCS Protocol Instruction Manual* on the *AMX AutoPatch CD* or at www.amx.com.

Rack Installation



Caution: To prevent overheating and airflow restriction, avoid placing high heat producing equipment directly above or below the enclosures. The system requires a minimum of one empty rack unit above and below (three empty rack units are recommended). Verify that the openings on the sides of the enclosures are not blocked and do not have restricted air flow.

To install enclosures in a rack:

Tip: Keep in mind that the optimal viewing angle for a control panel is eye level.

1. Align the holes on one of the rack ears with the empty holes on the side of the first enclosure (FIG. 6); insert and tighten each of the four screws provided.

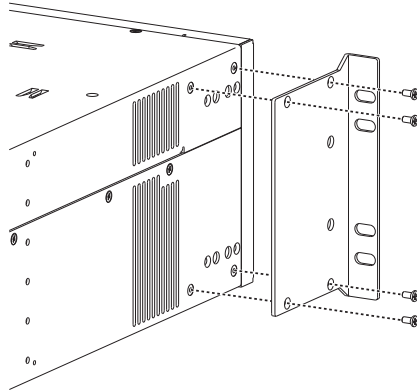


FIG. 6 Attach rack ears to sides of enclosure

2. Place the first enclosure in the rack and attach front-mounting screws to hold it firmly in place.
3. Repeat Steps 1 and 2 for the second enclosure.

Linking Enclosures

Linking enclosures allows control information to pass between them. The enclosures are linked using the Ethernet RJ-45 ports (labeled “ENC LINK”) on the CPUs; the Ethernet traffic between these ports maintains consistent control speed. In a two enclosure system, like the Optima SD, the enclosure with the control panel or external controller receives control information and passes on relevant information to the other enclosure via the links.

Important: The ENC LINK (Ethernet RJ-45) connector on the CPU is not for a TCP/IP connection.

As ordered from the factory, an Optima SD system is configured to operate as a stand-alone unit once the two enclosures are linked. The system is, however, still capable of being linked to other AMX AutoPatch Matrix Switchers. For information on linking between the Optima SD and other matrix switchers, see the instruction manual for the specific product.

Network Segments

The network segments (the physical network sections as determined by hardware) of a linked system determine the total distance between the enclosures in a linked system. The 10Base-T (RJ-45) network segment between the two Optima SD enclosures cannot exceed 100 ft. (30.5 m).



Caution: AMX AutoPatch systems should only be linked in their own isolated networks.

Important: Enclosures *must* be cabled correctly after linking. To ensure that the correct signal cables are attached to the correct enclosure, check the “AutoPatch Connector Guide” that shipped with the system, as well as the system / enclosure numbers on the rear of each enclosure.

Link Cable

AMX provides an RJ-45 crossover link cable for direct linking between Optima SD enclosures. The cable is wired to TIA/EIA-568-A on one end and TIA/EIA-568-B on the other end.

Ethernet Connector LEDs

The ENC LINK port on the CPU has two LEDs that indicate communication status when the enclosure is linked as part of an active system (FIG. 7).

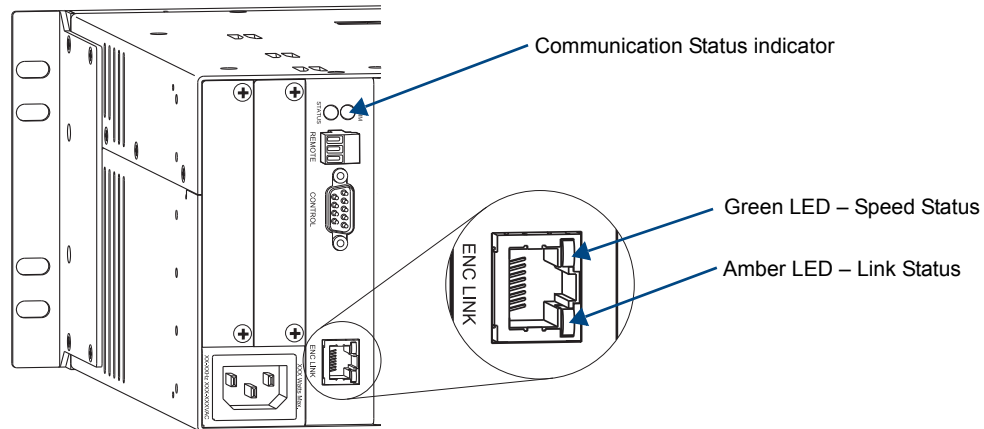


FIG. 7 Ethernet connector LEDs

The LEDs indicate the following:

- Green LED *on* – speed status is 100 Mbps
- Green LED *off* – speed status is 10 Mbps
- Amber LED *on* – link status is active

Note: The Comm (Communication Status) indicator at the top of the CPU board indicates if there is Ethernet traffic on the system.

Linking an Optima SD System

Optima SD enclosures are directly linked to each other via their ENC LINK ports (FIG. 8). The total distance between the two linked enclosures cannot exceed 100 ft. (30.5 m).

Cable Length Requirements

Network Segment	Cable Type	Maximum Distance
Between two Optima SD enclosures	RJ-45 crossover	100 ft. (30.5 m)

To link an Optima SD system:

1. Insert one end of the crossover cable into the first enclosure's ENC LINK (RJ-45) port.
2. Insert the other end of the crossover cable into the ENC LINK port on the second enclosure.

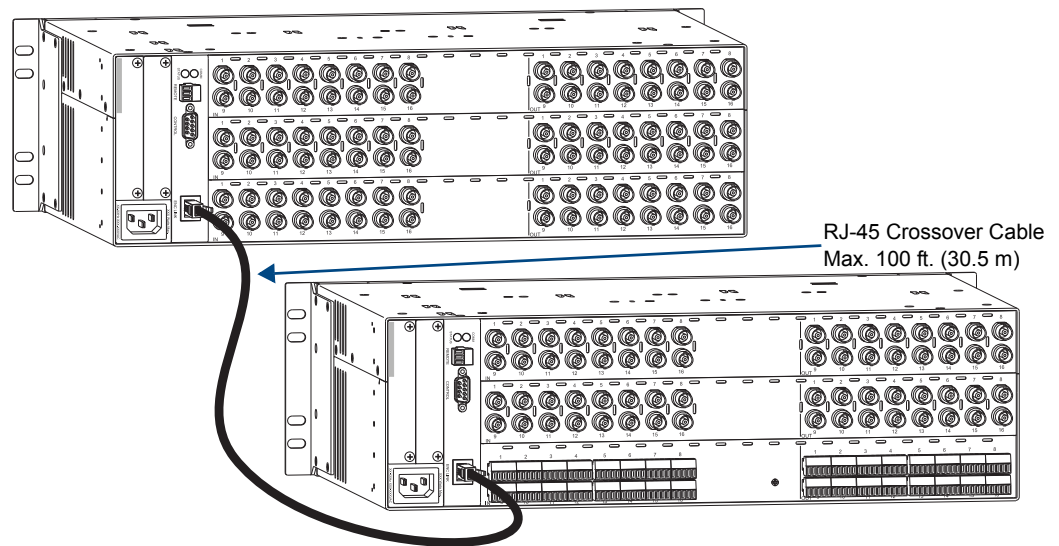


FIG. 8 Linking an Optima SD system

When power is applied, the ENC LINK port LEDs illuminate indicating communication status (see page 20).

Attaching External Controllers

The Optima SD can be controlled by attaching an external control device that uses one of the communication protocols listed below:

- **BCS (Serial)** – ASCII sent over a null modem serial cable via the CONTROL (RS-232) port
- **XNNet** – AMX AutoPatch protocol via the REMOTE port or CONTROL (RS-232) port; AMX AutoPatch control and accessory devices usually connect via the REMOTE port

Important: *The ENC LINK (Ethernet RJ-45) port on the CPU is not for a TCP/IP connection. The ENC LINK port is used for linking enclosures (see page 19).*

External Control Options

The communication protocols listed above are used for these control options:

AMX Control Devices

The Optima SD is compatible with a number of AMX control devices. For control programming information, see the instruction manual for the specific device.

AMX AutoPatch Remote Control Devices

AMX AutoPatch control devices (SBC control pads, Preset SBC control pads, and remote control panels) usually connect to the REMOTE port on the CPU board. For instructions for attaching a remote controller to the REMOTE port, see page 25. For specific information on the remote control device, see its product documentation.

APControl 3.0

APControl 3.0 software (for control and scheduling) runs on a PC connected to an Optima SD enclosure via the CONTROL (RS-232) port and is available on the *AMX AutoPatch CD*. APControl 3.0 has a setup wizard that discovers the system's configuration information.

APWeb (TCP/IP)

The APWeb Server (for control, diagnostics, and third-party access) is accessed through a TCP/IP interface, such as, a web browser (e.g., Internet Explorer). An APWeb expansion board or an APWeb Server module is required for APWeb. For setup and operation information, see the "APWeb Expansion Board" chapter on page 45 or the APWeb Server Module's documentation on the *AMX AutoPatch CD* and at www.amx.com.

Important: *Contact AMX regarding limitations and conditions for operating an Optima SD system on a company LAN.*

BCS (Serial) Control

AMX AutoPatch has developed a command language, BCS (Basic Control Structure), for executing control operations and for diagnostic purposes. BCS commands are issued via a terminal emulation program, such as Windows[®] HyperTerminal. For information on BCS commands, see the *BCS Protocol Instruction Manual* on the *AMX AutoPatch CD* or at www.amx.com.

Third-Party Controllers (Serial)

Third-party controllers connect to the CONTROL (RS-232) port on the CPU. If using a third-party controller, see the controller documentation for setup and operating instructions.

Note: *Advanced programmers who want to design their own control programs can use AMX AutoPatch XNNet protocol. The AMX AutoPatch CD includes the XNNet Communication Library, an interface library that supports C, Java, and Visual Basic and has examples of the XNNet protocol in use.*

Attaching Serial Controllers

An external serial controller is any device that can send and receive ASCII code over an RS-232 (null modem) serial cable attached to the CONTROL (RS-232) port on the enclosure's CPU. PCs are common serial controllers. Once a PC is attached to an Optima SD enclosure, the system can be controlled by running APControl software on the attached PC (see the *AMX AutoPatch CD*). The system can also be controlled by entering BCS commands into a terminal emulation program, such as HyperTerminal. For information on BCS commands, see the *BCS Protocol Instruction Manual* on the *AMX AutoPatch CD* or at www.amx.com.

PC Requirements for APControl 3.0

- Windows XP Professional® or Windows 2000®
- Java Runtime Environment (JRE): v1.4.2 or the latest version
- Minimum Hardware: 166 MHz, 128 MB RAM, 20 MB free disk space, 800x600 display
- Recommended Hardware: 2.0 GHz, 512 MB RAM, 20 MB free disk space, 1280x1024 display
- Serial port

PC Requirements for BCS

- Windows XP Professional® or Windows 2000®
- Terminal emulation program
- Serial port

To establish external serial control over a null modem serial cable:

1. Use a null modem cable that matches the pin diagram in FIG. 9 for RS-232 without hardware flow control. AMX AutoPatch equipment requires pins 2, 3, and 5 only.

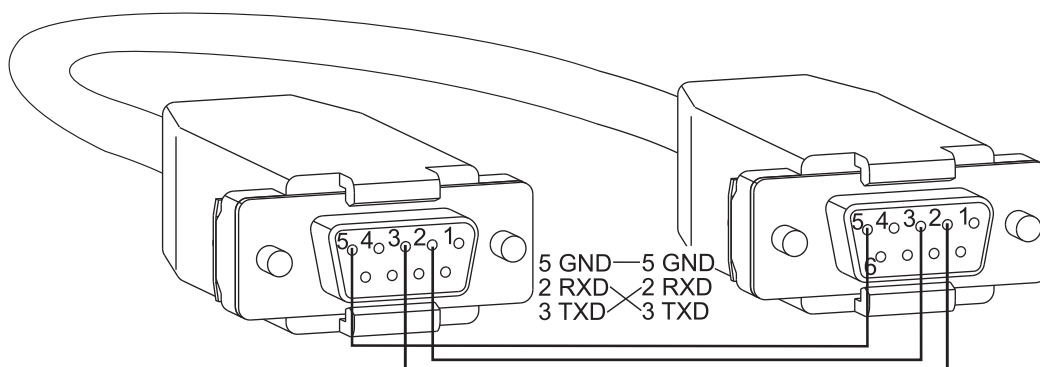


FIG. 9 RS-232 null modem pin diagram, no hardware flow control

2. Plug one end of the null modem serial cable into the CONTROL (RS-232) port on the enclosure (FIG. 10).

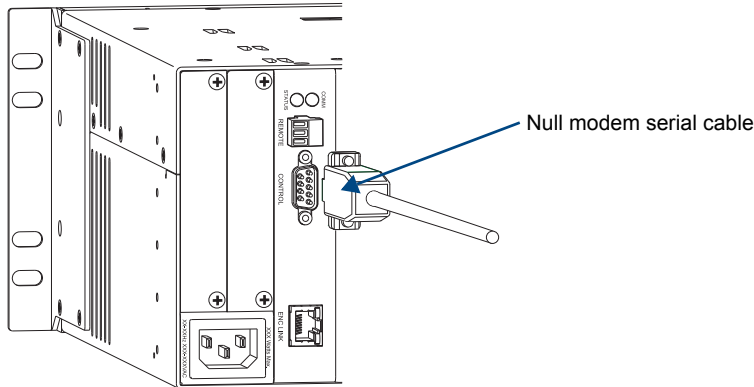


FIG. 10 Attach null modem serial cable to CONTROL port

3. Plug the other end of the serial cable into the serial port on the serial controller/device.
4. Open the serial communication software and set the port settings to match the Optima SD default settings (see table to the right). In addition to the default baud rate of 9600, Optima SD enclosures support baud rates of 19200, 38400, and 57600. The settings on the PC serial communication software and the enclosure *must* correspond to each other. If a change is required to make them match, changing the PC’s settings is preferable. If you decide to change the enclosure’s settings instead, use XNConnect (see the Help file).

Optima SD Serial Port Settings	
Baud Rate	9600
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None



Caution: To avoid system damage, follow the power-up sequence on page 29. We recommend attaching all power cords to a surge protector and/or AC line conditioner.

5. If not already on, apply power first to the Optima SD enclosures and then to the source and destination devices (see “Applying Power & Startup” on page 29).
6. Set up and run the desired method of control:
 - **AMX control devices** – For control programming information, see the instruction manual for the specific device.
 - **APControl 3.0** – Install and open the program (located on the *AMX AutoPatch CD*). Follow the setup wizard, which will discover the system’s configuration information and open the APControl Launchbar.
 - **APWeb** – See the “APWeb Expansion Board” chapter on page 45.
 - **Terminal emulation (HyperTerminal)** – Open the program, select the COM port, and check that the settings match those in the Optima SD Serial Port Settings table above (if COM port settings do not match, enter the applicable values from the table above). Click OK. A short splash screen appears.
7. Execute a test switch to ensure the Optima SD system is working properly (see “Executing a Test Switch” on page 31).

Attaching Remote XNNet Control Devices

A remote XNNet control device is any device that sends and receives XNNet protocol over the REMOTE port. AMX AutoPatch XNNet control devices include SBC control pads, Preset SBC control pads, and remote control panels.

The instructions below are for attaching a device to the REMOTE port, which is located on the CPU board. For specific product information, see the individual device's documentation.

Communication Cable Requirements

- ❑ A two-conductor, 20 AWG, 7/28 strand cable with a drain wire or shield, such as Alpha 2412C (customer supplied)
- ❑ Maximum length of cable: 1,000 ft. (305 m) total, including linked panels

To establish a REMOTE port connection with an XNNet device:

1. Attach one end of the XNNet link cable to the corresponding port on the device (see the individual product documentation).
2. On the enclosure's CPU, unplug the REMOTE connector.
3. Loosen the screws on the REMOTE connector.
4. Insert the two wires of the XNNet link cable from the device into the REMOTE connector leaving the center slot empty (FIG. 11).

Note that either wire can be inserted into either of the outer slots.

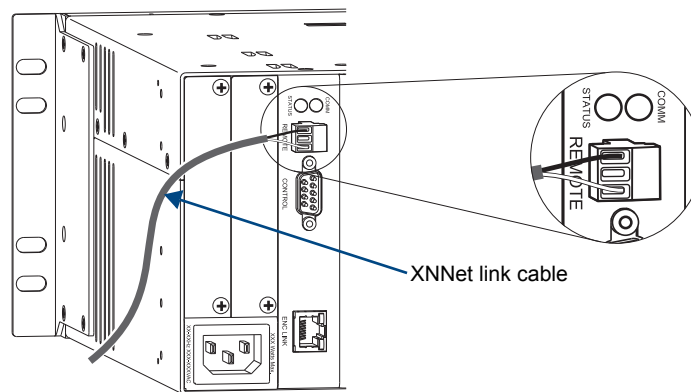


FIG. 11 Insert wires into REMOTE connector on CPU

5. Tighten both screws and plug the connector back into the CPU.
6. If not already on, apply power first to the Optima SD enclosures before applying power to the XNNet device (see “Applying Power & Startup,” page 29).
7. Execute a switch to ensure the Optima SD system is working properly (see page 31).

Attaching Inputs & Outputs

Input and output connectors are the attachment points for source and destination devices that connect to the system. Looking at the rear of each enclosure, the inputs (for sources) are on the left side of each board, and the outputs (for destinations) are on the right side of the board.

The number and type of connectors depend on the number and type of input/output boards. Input and output connectors are numbered separately. The connector numbers for each board read left to right and are either directly above or below the connectors. This numbering pattern continues on each board (FIG. 12).

For control purposes, signals can only be routed from inputs on one board to outputs on the same board because each board in an Optima SD enclosure has its own switching matrix.

When attaching input and output signal cables, refer to the sheet labeled “AutoPatch Optima Connector Guide” that shipped with the system. The guide shows where to attach each signal cable on the rear of each enclosure. The system’s serial number is in two places on the Optima SD enclosures; left rear and left side (near the power receptacle). The label on the side also has the enclosure number, referred to as the chassis number. Follow the guide exactly; the system was programmed at the factory to operate only as indicated on the “Connector Guide.”

Before connecting all input and output cables, attach only the first two inputs and outputs and execute a test switch (see page 31). When the test switch is successful, attach the rest of the input and output cables.

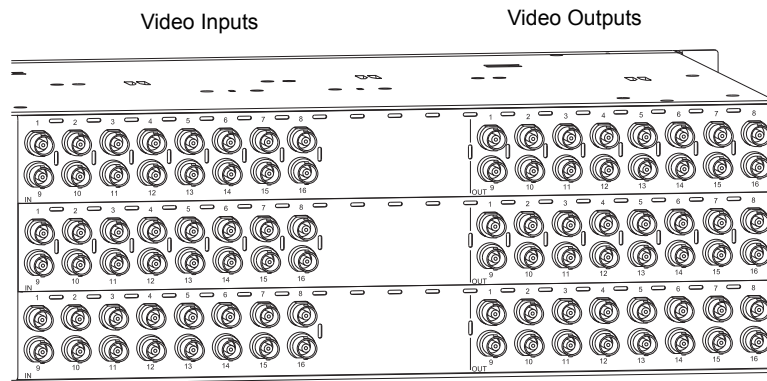


FIG. 12 Numbering starts at left for each input & output section

For board connector information and specifications, see the specific board chapter in this manual.

For information on adding or replacing boards, see “Appendix C – Replacing I/O Boards” on page 67.

Signal Types & Connectors

The signal types and connectors for an Optima SD system are:

- 500 MHz video over BNC connectors
- Hi-Z sync over BNC connectors
- Stereo audio (balanced or unbalanced) over pluggable 5-position terminal block connectors

For signal specifications for these signals, see the chapters for the individual board types: 500 MHz on page 35, Hi-Z sync on page 37, and stereo audio on page 39.

Cabling Video Connectors

The video connectors are color coded; the white BNC connectors are inputs and the black BNC connectors are outputs.

For RGBHV signals, you need to attach corresponding input and output connectors on both enclosures to route the entire signal. Three BNC connectors route the 500 MHz video signals on the enclosure with the control panel and two BNC connectors route the Hi-Z sync signals on the other enclosure. FIG. 13 below shows the 5 BNC cable connectors attached for routing the R, G, B, H, and V signals through Output 8. Follow the “AutoPatch Connector Guide” to ensure correct routing.

Before connecting all input and output video cables (and, if applicable, wires for stereo), attach the cables and wires for only the first two source and destination devices and execute a test switch (see page 31). When the test switch is successful, attach the rest of the input and output cables (and wires).

Tip: *Using lacer bars or some other type of cable management system lessens the strain from cable weight on the connectors and makes servicing the enclosures easier.*

To connect video inputs and outputs:

1. Fasten the cables onto the input and output BNC connectors (FIG. 13).

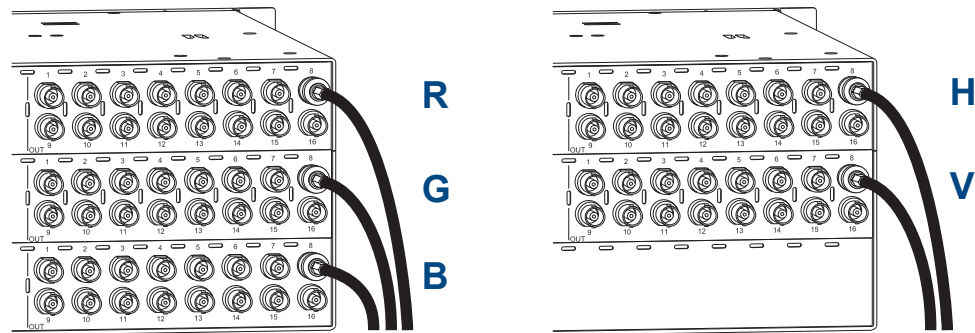


FIG. 13 Five BNC connectors are required for RGBHV signal

Wiring Stereo Audio Connectors (5-position terminal block)

The stereo audio connectors for the Optima SD are pluggable 5-position terminal block. For stereo audio signal specifications, see the “Stereo Audio Input/Output Boards” chapter (see page 39).

Wiring Sources & Destinations

Source and destination devices will require either balanced (differential) or unbalanced (single-ended) connections. FIG. 14 illustrates options for wiring between sources and input connectors and between output connectors and the destinations. More than one option can be used in the same system. For balanced and unbalanced wiring details, see FIG. 15.

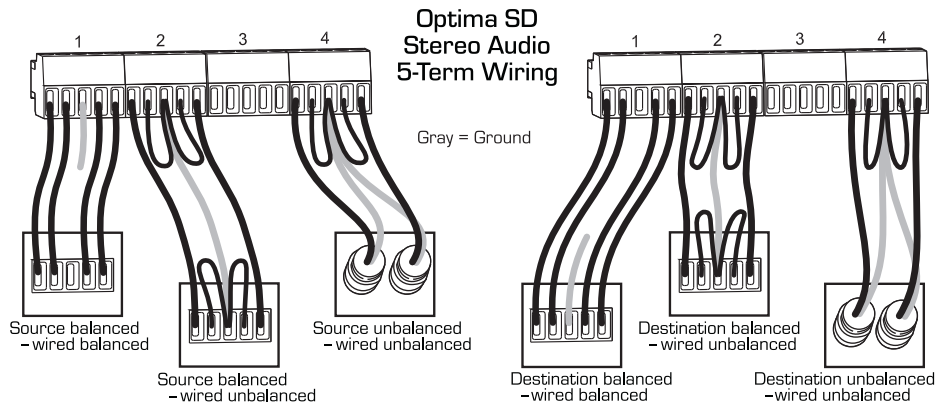


FIG. 14 Options for source-to-enclosure-to-destination 5-Term wiring

Attaching Wires

To attach stereo audio input and output wires:

1. Unscrew the clamps on the audio connector.
2. Insert the wires and firmly re-tighten the clamps to make secure connections.
 For balanced audio wire placement, see the left wiring diagram in FIG. 15.
 For unbalanced audio wire placement, see the right wiring diagram in FIG. 15.

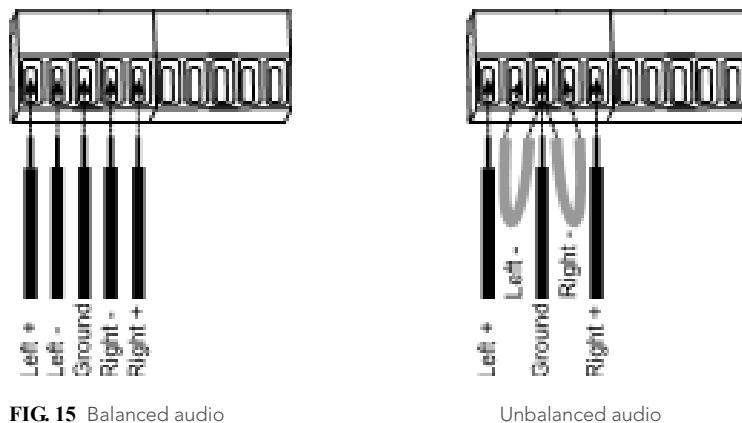


FIG. 15 Balanced audio

Unbalanced audio

Note: For stereo audio signals using twisted pair wire, connect the shield (ground) only at one end (recommend receiving end) to minimize low frequency noise.

Applying Power & Startup

The universal power receptacles on the enclosures will accept all major international standard power sources. (Standard US power cords are provided for installations within the US.) Maximum power specifications are on the power receptacle (also listed on page 12). Always use an earth-grounded power cord / system with an Optima SD system.

The source electrical outlet should be installed near the Optima SD enclosures, easily accessible, and properly grounded. Power should come from a building branch circuit. We strongly recommend using a dedicated line for the system's power. Use a minimum breaker current rating of 15 A for 110 V or 30 A for 230 V. To avoid an overload, note the power consumption rating of all the equipment connected to the circuit breaker before applying power.



Caution: *To avoid system damage, turn on all power switches for the AMX AutoPatch equipment at the same time before applying power to the system's source and destination devices. We recommend attaching all power cords to a surge protector and/or an AC line conditioner.*

Power-Up Sequence

To apply power:

1. Attach the first two source and destination devices.
Do not apply power to the source and destination devices until Step 7.
2. Optional – Attach an external controller (see page 22).
3. Plug the power cords into the power receptacles on the enclosures.
4. Plug the other end of the power cords into a power strip (we recommend a 30 A power strip) *that is turned off.*
5. Turn on the power strip.
The Power Indicator illuminates.
6. Optional – Apply power to any external control device/system.
7. Apply power to the source and destination devices.

For startup information on specific types of control *before* executing a test switch, see page 22. The system is ready for a test switch. See “Executing A Test Switch” on page 31.

Control Panel Startup

After applying power and turning on the enclosures, the LED on the control panel illuminates and displays the menu screen. The CP-15 Control Panel startup screen is illustrated in FIG. 16. The system is ready for a test switch (see page 31).

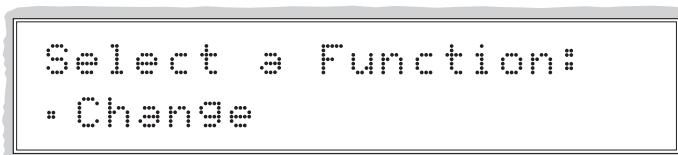


FIG. 16 Function Menu screen on CP-15 Control Panel

Note: *For instructions on checking the software version, see the “CP-15 Control Panel Instruction Manual” on the “AMX AutoPatch CD” or at www.amx.com.*

Serial Control Device Startup

If you have not already done so, attach the serial control device to an enclosure (see page 22) and open the control program.

AMX Control Devices

The Optima SD is compatible with a number of AMX control devices. For control programming information, see the instruction manual for the specific device.

APControl 3.0

If you are using APControl 3.0, install and open the program. Follow the directions in the setup wizard. From the Launchbar menu, select Views / CrossBar and click on the crosspoints to execute switches.

APWeb

For startup information, see the “APWeb Expansion Board” chapter on page 45.

HyperTerminal

When power is applied to the enclosure, HyperTerminal displays a one-line splash screen followed by Ready. The system is ready to disconnect the factory default switch and to execute a test switch (see page 31).

FIG. 17 illustrates an example of the splash screen at power up (your system’s splash screen may differ).

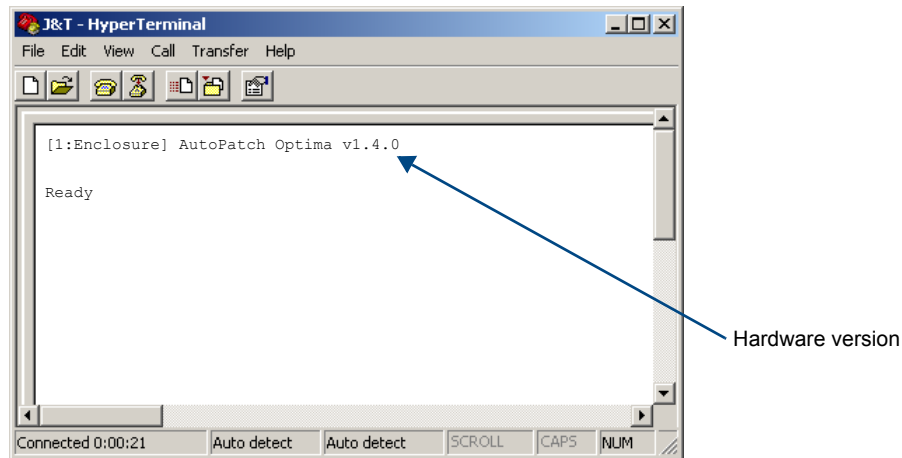


FIG. 17 Power-up splash screen in HyperTerminal

The Optima SD also displays advanced system information when diagnostic BCS commands are entered; see “Appendix B – Programmer’s Interface for System Diagnostics” on page 63.

For additional information on checking the hardware version, see page 65.

Note: AMX reserves the right to add to the contents of the splash screen at any time, without notice.

Executing a Test Switch

We recommend executing a test switch to verify the system is working properly before attaching *all* inputs and outputs. Aside from having signal cables attached, the system is ready to execute switches when it ships from the factory.

Important: *The Optima SD ships from the factory with a default switch of Input 1 to all output. Before executing the test switch, you will need to disconnect the factory default switch.*

The first two source and destination devices must be attached to the input and output connectors as indicated in the “AutoPatch Optima Connector Guide” that is shipped with each system. After the devices are connected, power *must* be applied to the enclosure first and then to the devices before executing a test switch.

A test switch can be executed from the following:

- Control panel
- AMX control device
- Control software, such as APControl 3.0 or APWeb
- BCS (Basic Control Structure) commands over an external controller
- External third-party controller

Executing a Test Switch

Before executing the test switch, make sure the first two source devices and the first two destination devices are connected to the input and output connectors.

Important: *RGBHV signals require multiple input or output connectors (see page 27). All of the signal cables for an RGBHV signal (and audio if applicable) must be attached before executing the test switch.*

When executing a test switch, we suggest routing Input (source) 1 to Output (destination) 2 on VM 0 (virtual matrix zero, which is the default).

Control Panel

Each Optima SD system comes with a CP-15 Control Panel. Instructions follow for disconnecting the factory default switch and executing a test switch from the panel.

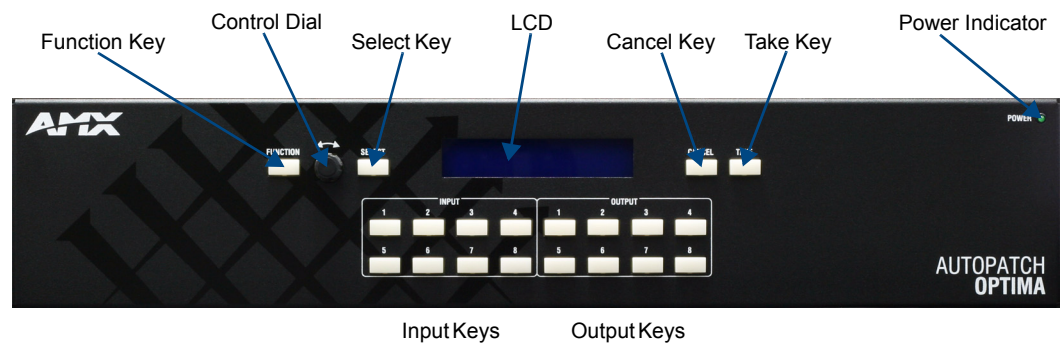
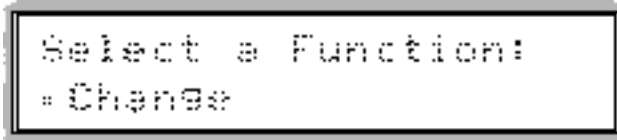


FIG. 18 Optima SD 8x8 control panel

To disconnect the factory default switch using the control panel:

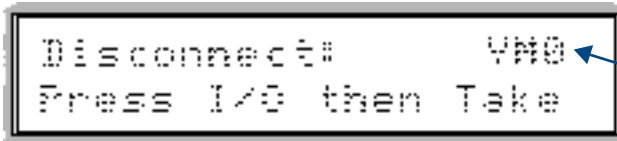
1. Press the Function Key.
The Function menu appears.



2. Locate Disconnect by scrolling with the Control Dial.



3. Press the Select Key.
The system is in Disconnect Mode (all the available Input and Output Keys turn blue).



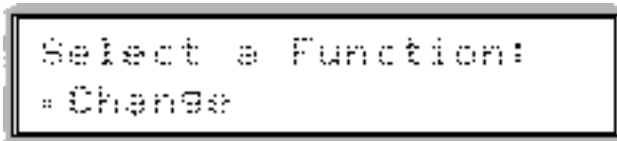
Current virtual matrix – VM 0

4. Press Input Key 1.
Input Key 1 turns white, indicating that it is selected.
5. Press the Take Key.
Input 1 is disconnected from all of the Output Keys (the keys turn blue).

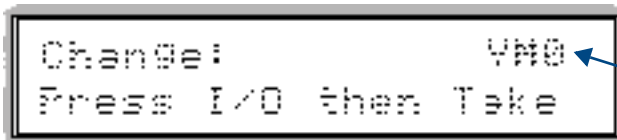
The test switch below switches Input 2 to Output 1 on VM 0.

To execute a test switch using the control panel:

1. Press the Function Key.
The Function menu appears.



2. Press the Select Key to choose Change.
The system is in Change Mode (the available Input and Output Keys turn blue).



Current virtual matrix – VM 0

3. Press Input Key 2.
Input Key 2 flashes, indicating that it is ready to switch.
4. Press Output Key 1.
Output Key 1 illuminates, indicating that it is ready to accept the switch.

5. Press the Take Key.
Input 2 switches to Output 1, and the keys turn blue.
The panel remains in Change Mode until the Function Key is pressed.

AMX Control Device

For executing and disconnecting switches using an AMX control device, see the specific control device documentation.

APControl 3.0 or APWeb

Directions for executing and disconnecting switches using APControl 3.0 are found in its Help file. For directions for executing and disconnecting switches using APWeb, see the *APWeb* documentation on the *AMX AutoPatch CD* or at www.amx.com.

BCS Commands

To enter BCS commands, the system must be attached to a serial control device (see “Attaching External Controllers” on page 22) running a terminal emulation program (such as Windows[®] HyperTerminal). The settings on the PC serial communication software and the enclosure *must* correspond to each other. For setting information, see the table on page 24.

When using HyperTerminal, command characters are entered and sent to the enclosure’s CPU. The command characters appear (echo) in HyperTerminal when the enclosure responds. When all of the entered characters appear in HyperTerminal, the command has been successfully executed.

To disconnect the factory default switch using BCS commands:

1. Enter the following BCS command line:

```
DL0I1T
```

When the “T” appears, the system has successfully executed the command (Input 1 is disconnected from all outputs).

The following test switch routes Input 1 to Output 2 on Level 0.

To execute a test switch using BCS commands:

1. Enter the following BCS command line:

```
CL0I1O2T
```

When the “T” appears, the system has successfully executed the command.

If any other characters appear, the command was not successful. Verify that the source signal is present (visible and/or audible) at the destination.

For a complete list of BCS commands and responses, see the *BCS Protocol Instruction Manual* on the *AMX AutoPatch CD* or at www.amx.com.

Troubleshooting

If the test switch did not execute correctly:

- Check the power indicator on the front of the enclosures.
If it is not illuminated, check the power cords.
- Verify the status of the test switch.
If using BCS commands, enter: `SL002T`.
If “`SL002T (1)`” appears, the test switch is routed.
If the status returns as routed correctly, the system established a connection between the specified input and output connectors within both enclosures.
- Check all link and signal connections on the rear of the enclosures to make sure everything is physically set up correctly.
- Check all power switches on the source and destination devices to make sure they are all turned on.
- Isolate source and destination equipment and cable problems by patching around the router using barrel connectors to check the overall signal path.
- Attempt the switch again.
If the switch still does not work, contact technical support (see below).

Technical Support

Before contacting technical support with a question, please consult this manual. If you still have questions, contact your AMX representative or technical support. Have your system’s serial number ready. The system’s serial number is normally located in two places on an enclosure; on the left rear and on the left side (near the power receptacle).

We recommend recording your system’s serial number in an easily accessible location.

AMX Contact Information

- 3000 Research Drive, Richardson, TX 75082
- 800.222.0193
- 469.624.8000
- Fax 469.624.7153
- Technical Support 800.932.6993
- www.amx.com

500 MHz Video Input/Output Boards

Applicability Notice

This chapter pertains to 500 MHz video input/output boards (with BNC connectors) contained in the Optima SD systems in the following table:

Signal(s)	Configuration	System Sales #
RGBHV	16x16	FGP46-1616-560
RGBHV+Stereo	16x16	FGP46-1616-567
RGBHV	8x16	FGP46-0816-560
RGBHV+Stereo	8x16	FGP46-0816-567
RGBHV	12x12	FGP46-1212-560
RGBHV+Stereo	12x12	FGP46-1212-567
RGBHV	16x8	FGP46-1608-560
RGBHV+Stereo	16x8	FGP46-1608-567

The first enclosure in each of the Optima SD systems listed above contains three 500 MHz video input/output (I/O) boards for routing the R, G, and B components of an RGBHV signal.

The second enclosure in each of the systems contains two Hi-Z Sync boards plus a stereo audio board for systems that include audio.

- For information on the Hi-Z Sync boards used to route horizontal and vertical sync signals in these systems, see the “Hi-Z Sync Input/Output Boards” chapter on page 37.
- For information on the stereo audio boards in systems which route stereo audio signals, see the “Stereo Audio Input/Output Boards” chapter on page 39.

Signals may only be routed from the inputs on a board to the outputs on the same board because each board has its own switching matrix.

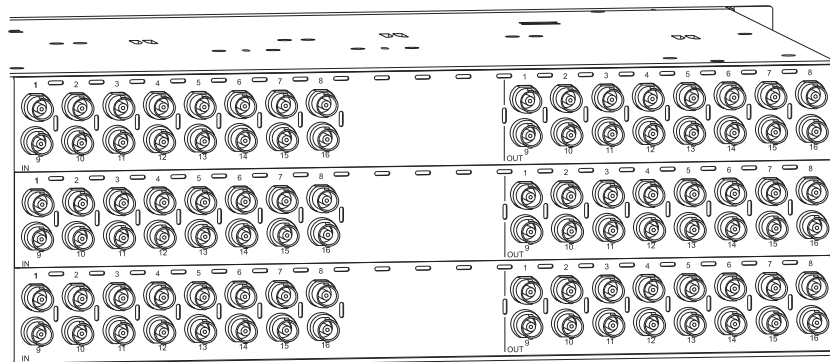


FIG. 19 500 MHz video input/output boards

Note: For instructions on replacing boards, see “Appendix C – Replacing I/O Boards” on page 67.

500 MHz Video Input/Output Boards Specifications

Applies to 500 MHz video I/O boards in the Optima SD systems listed on the previous page.

Specifications		
Parameter	Conditions	Value
Frequency Response	1 to All	+4/-3.0 dB to 500 MHz or better
Crosstalk	f = 5 MHz f = 30 MHz f = 150 MHz	<-70 dB <-60 dB <-33 dB
Signal to Noise Ratio (SNR)	V _{in} = 0.7 V, 100 IRE	>65 dB
Return Loss	f = 5 MHz	<-45 dB
Input Level (max.)		±1.5 V
Input Impedance		75 ohms
Output Level (max.)		±1.5 V
Output Impedance		75 ohms
Connector Type		BNC

AMX reserves the right to modify its products and their specifications without notice.

Attaching Cables

When attaching video input and output cables, refer to the sheet labeled “AutoPatch Optima Connector Guide” that shipped with the system. The sheet shows where to attach each cable on the rear of each enclosure. Follow the sheet exactly; the system was programmed at the factory to operate only as indicated on the sheet. For multi-enclosure systems, each enclosure will be numbered (e.g., “Chassis 1 of 2”) on a label located on the left side (near the power receptacle).

The input connectors (white BNCs) are on the left side of each 500 MHz video board, and the output connectors (black BNCs) are on the right side. Input and output connectors are numbered separately. The number of BNC connectors depends on the 500 MHz video I/O configuration.

The example in FIG. 20 shows a BNC cable attached to Output 7 on each board to route the R, G, and B components of an RGBHV signal. (The H and V components are routed on the second enclosure.)

To connect video inputs and outputs:

1. Fasten the cables onto the input and output BNC connectors per signal type (FIG. 20).

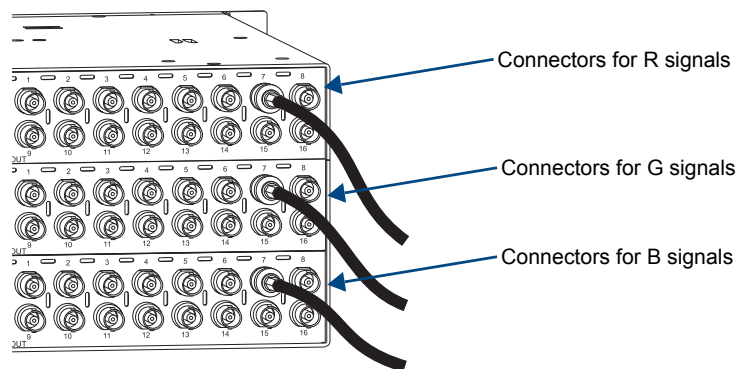


FIG. 20 Fasten cables onto input and output BNC connectors

Make sure the video cable is connected to the correct BNC connector on the correct enclosure. 500 MHz video boards look similar to Hi-Z sync boards, but the “AutoPatch Optima Connector Guide” identifies them.

Hi-Z Sync Input/Output Boards

Applicability Notice

This chapter pertains to Hi-Z sync input/output boards (with BNC connectors) contained in the Optima SD systems in the following table:

Signal(s)	Configuration	System Sales #
RGBHV	16x16	FGP46-1616-560
RGBHV+Stereo	16x16	FGP46-1616-567
RGBHV	8x16	FGP46-0816-560
RGBHV+Stereo	8x16	FGP46-0816-567
RGBHV	12x12	FGP46-1212-560
RGBHV+Stereo	12x12	FGP46-1212-567
RGBHV	16x8	FGP46-1608-560
RGBHV+Stereo	16x8	FGP46-1608-567

Optima SD systems use Hi-Z sync boards to route horizontal and vertical sync signals in conjunction with the 500 MHz video boards (see page 35). If the system supports audio, the stereo audio board (see page 39) is located below the Hi-Z sync boards.

Signals may only be routed from the inputs on a board to the outputs on the same board because each board has its own switching matrix.

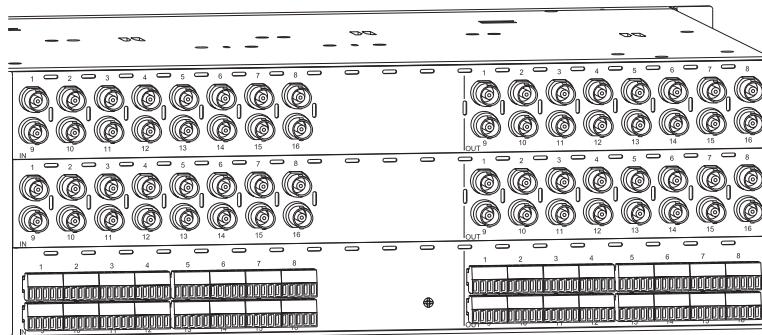


FIG. 21 Hi-Z sync input/output boards (with stereo audio board)

Hi-Z Sync Input/Output Boards Specifications

Applies to Hi-Z sync boards contained in the Optima SD systems listed above.

Specifications		
Parameter	Conditions	Value
Input Level (max.)		+5.5 V
Input Impedance		22 kohms
Output Level (max.)		+5.5 V
Output Impedance		75 ohms
In/Out Polarity	Active high or low	Output polarity follows input polarity
Output Signal Level		Unity gain
Connector Type		BNC

AMX reserves the right to modify its products and their specifications without notice.

Attaching Cables

When attaching video input and output cables, refer to the sheet labeled “AutoPatch Optima Connector Guide” that shipped with the system. The sheet shows where to attach each cable on the rear of each enclosure. Follow the sheet exactly; the system was programmed at the factory to operate only as indicated on the sheet. For multi-enclosure systems, each enclosure will be numbered (e.g., “Chassis 1 of 2”) on a label located on the left side (near the power receptacle).

The input connectors (white BNCs) are on the left side of each board, and the output connectors (black BNCs) are on the right side. Input and output connectors are numbered separately. The number of BNC connectors depends on the I/O configuration. The enclosure may also contain a stereo audio I/O board depending on the model.

To connect Hi-Z sync inputs and outputs:

1. Fasten the cables onto the input and output BNC connectors (FIG. 22).

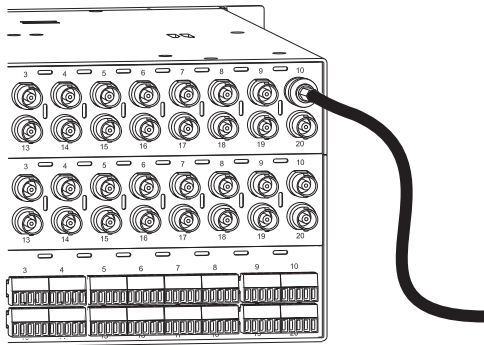


FIG. 22 Fasten cables onto input and output BNC connectors

Make sure the video cable is connected to the correct BNC connector on the correct enclosure. Hi-Z sync boards look similar to 500 MHz video boards, but the “AutoPatch Optima Connector Guide” identifies them.

Note: For instructions on replacing boards, see “Appendix C – Replacing I/O Boards” on page 67.

Stereo Audio Input/Output Boards

Applicability Notice

This chapter pertains to stereo audio input/output boards with digital gain control contained in the Optima SD systems in the following table:

Signals	Configuration	System Sales #
RGBHV+Stereo	16x16	FGP46-1616-567
RGBHV+Stereo	8x16	FGP46-0816-567
RGBHV+Stereo	12x12	FGP46-1212-567
RGBHV+Stereo	16x8	FGP46-1608-567

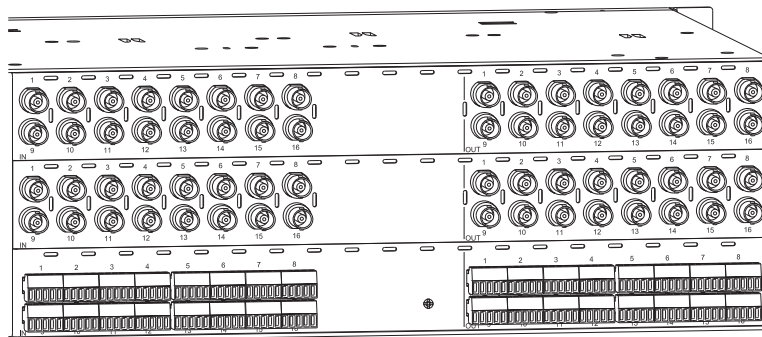


FIG. 23 Stereo audio input/output board (shown with Hi-Z sync boards)

For systems that support audio, the stereo audio board is located below the Hi-Z sync boards on the second enclosure.

Signals may only be routed from the inputs on a board to the outputs on the same board because each board has its own switching matrix.

Stereo Audio Input/Output Boards Specifications

Applies to stereo audio boards contained in the Optima SD systems listed on the previous page.

Specifications		
Parameter	Conditions	Value
Frequency Response	20 Hz to 20 kHz	<±0.2 dB
THD + Noise	f = 20 Hz to 20 kHz, Vin = -10 to +10 dBu	<0.03%
	f = 20 Hz to 20 kHz, Vin = 0 to +22 dBu	<0.01%
Crosstalk	f = 1 kHz, Vin = +20 dBu	<-110 dB
Channel Separation	f = 1 kHz, Vin = +20 dBu	>100 dB
Signal to Noise Ratio (SNR)	20 Hz to 20 kHz, Vin = +20 dBu	>120 dB
CMRR	20 Hz to 20 kHz	>80 dB
Input Level (max.)	Balanced	+22 dBu
Input Impedance		18 kohms
Input Gain Adjustment Range	Control panel or serial control	±10 dB
Output Level (max.)	Balanced	+22 dBu
Output Impedance		50 ohms
Output Volume Control Adjustment Range*	Control panel or serial control	+10 dB to -70 dB (mute)
Connector Type		Pluggable 5-position terminal block

* Total of input gain plus output gain cannot exceed +10 dB.

AMX reserves the right to modify its products and their specifications without notice.

Attaching Wires

When attaching stereo audio input and output wires, refer to the sheet labeled “AutoPatch Optima Connector Guide” that shipped with the system. The sheet shows where to attach the wires on the rear of each enclosure. Follow the sheet exactly; the system was programmed at the factory to operate only as indicated on the sheet. For multi-enclosure systems, each enclosure will be numbered (e.g., “Chassis 1 of 2”) on a label located on the left side (near the power receptacle).

The input connectors are on the left side of each stereo audio board, and the output connectors are on the right side. Input and output connectors are numbered separately. The number of stereo pair connectors depends on the configuration.

To attach stereo audio input and output wires:

1. Unscrew the clamps on the audio connector.
2. Insert the wires (FIG. 24) for wire placement for balanced and unbalanced audio) and firmly re-tighten the clamps to make proper connections.

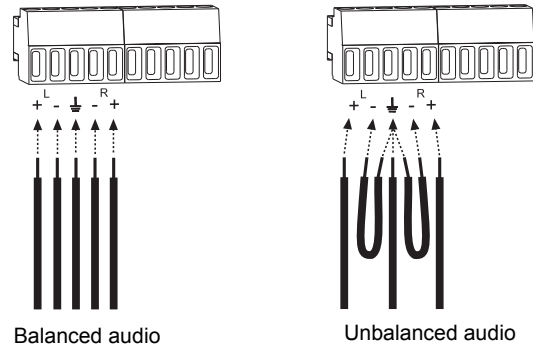


FIG. 24 Balanced & unbalanced stereo audio wiring

Note: For stereo audio signals using twisted pair wire, connect the shield (ground) only at one end (recommend receiving end) to minimize low frequency noise.

Wiring Sources & Destinations

Source and destination devices will require either balanced (differential) or unbalanced (single-ended) connections. FIG. 25 illustrates the options for wiring between the sources and the input connectors and between the output connectors and the destinations. More than one of these options can be used in the same system. For balanced and unbalanced wiring details, see FIG. 24.

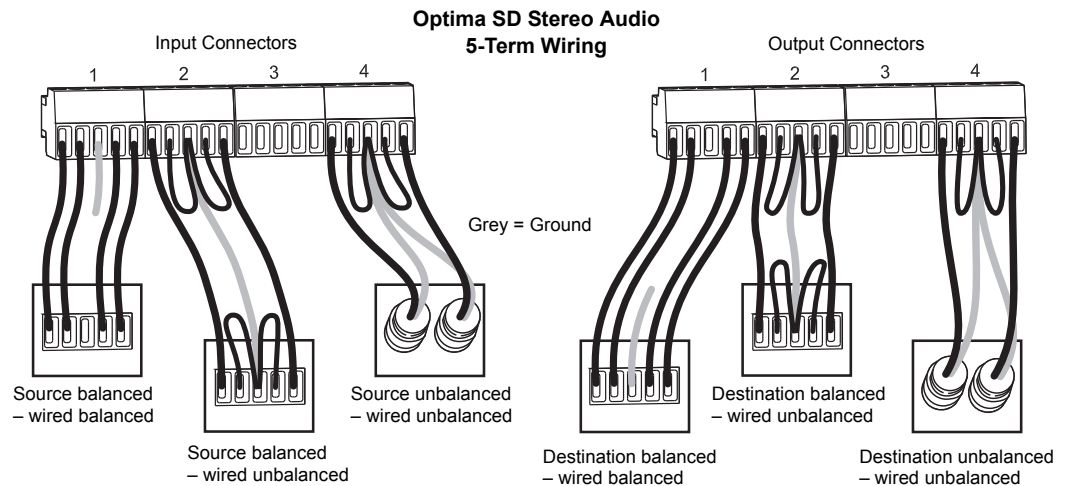


FIG. 25 Options for source-to-Optima SD-to-destination 5-term wiring

Note: For instructions on replacing boards, see “Appendix C – Replacing I/O Boards” on page 67.

Adjusting Output Volume

Volume (Digital Gain)

Output volume can be adjusted using either a control panel with volume adjustment (see the *CP-15 Control Panel Instruction Manual*) or BCS (Basic Control Structure) commands from an external controller.

BCS Volume Adjustment

Volume can be adjusted using one of three BCS command methods: Absolute, Relative, or Increment/Decrement. Directions for adjusting volume using the Absolute Method (adjusting volume to a specific decibel level) are given below. Information and instructions for the other two methods can be found in the *BCS Protocol Instruction Manual* on the *AMX AutoPatch CD* or at www.amx.com.

To adjust volume using the BCS Absolute Method:

1. Enter the Volume Absolute command using the format below. Replace the “#”s with the level number and the output number, and replace “^^^” with the decibel level. Enter the decibel level as a decimal number to the tenth place without the decimal point (e.g., -31.5 dB is entered as -315).

```
CL#O#VA^^^T
```

Example

Adjust the volume to +10 dB for Output 3 on Level 0 (VM 0) by entering the following BCS command line: `CL003VA100T`

Note: *The total through-system gain (the amount of input gain plus the amount of output gain) specified for any input to output routing path cannot exceed 10 dBr. If a volume command is entered that exceeds 10 dBr when it is combined with the gain of an input, the command will be accepted (and will be indicated in status results) but will not result in an audible difference of more than 10 dBr.*

Adjusting Digital Input Gain

If a board supports digital input gain, adjustments can be made at any time during normal operation using either a control panel with input gain adjustment (see the *CP-15 Control Panel Instruction Manual*) or BCS commands.

Inputs are set to unity gain at the factory and have a gain adjustment range of -10 dB to +10 dB.



Caution: *We strongly recommend that input gain adjustment be made only by a qualified installer or dealer.*

Adjusting input gain (the nominal level of the signal from the source device) allows source signals of varying amplitudes to be equalized before they are routed and the volume is adjusted. Equalizing source levels provides a consistent reference for volume adjustments and eliminates jumps when routing a new input to an output. Input gain adjustment is also used for equalizing amplitudes between balanced and unbalanced inputs.

To equalize input levels by adjusting input gain:

1. Route the first input (source) to an output (destination).
2. Adjust the input gain for the source to a specific dB level (see page 43).
3. Repeat for all inputs that will be routed to the same output.

Note: *The total through-system gain (the amount of input gain plus the amount of output gain) specified for any input to output routing path cannot exceed 10 dBr. If an input gain command is entered that exceeds 10 dBr when it is combined with the gain (volume) of an output, the command will be accepted (and will be indicated in status results) but will not result in an audible difference of more than 10 dBr.*

To adjust digital input gain using the BCS Absolute Method:

1. Enter the command below. Replace the “#”s with the level and input number(s) and replace “^^^” with the decibel level. Enter the decibel level as a decimal number to the tenth place without the decimal point (e.g., -5 dB is entered as -50).

```
CL#I#VA^^^T
```

Example

Adjust the input gain of Input 4 to +10 dB on Level 2 (VM 2) by entering the following BCS command line: CL2I4VA100T

Note: *Alternative methods for adjusting input gain with BCS commands can be found in the “BCS Protocol Instruction Manual.”*

APWeb Expansion Board

Applicability Notice

This chapter pertains to the Optima 3 RU APWeb expansion board, FG1046-313, which works in Optima SD systems.

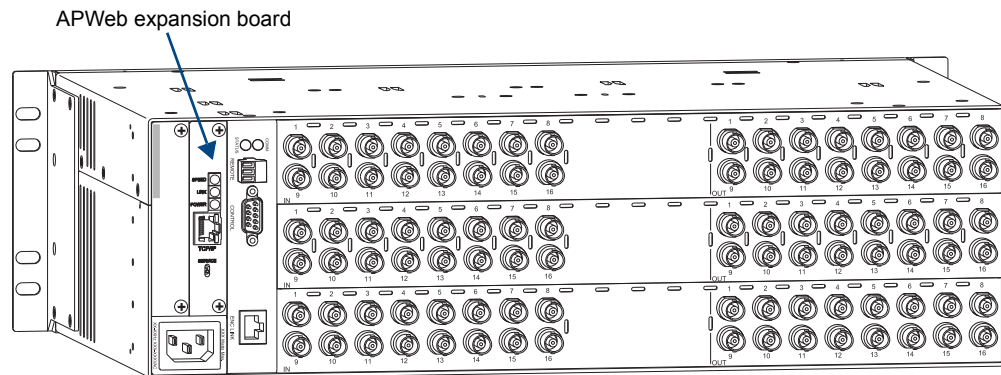


FIG. 26 APWeb expansion board

Overview

An APWeb board can be ordered pre-installed in an Optima SD enclosure or as an upgrade for an existing Optima SD enclosure. The APWeb board is located in one of the two expansion slots to the left of the CPU (FIG. 26). The Optima SD is configured to work as a single system and, as such, requires only one APWeb board.

The APWeb board connects to a LAN using an RJ-45 cable. Any PC-based Internet browsing software can then access the APWeb server. The APWeb server allows remote control and diagnostics of the system. It also offers a Telnet service that allows for direct BCS control via a standard terminal interface. For setup and operation details for the APWeb server, see the *APWeb Instruction Manual* on the *AMX AutoPatch CD* or at www.amx.com.

In addition, the APWeb board functions as a Tunneling Access Point (TAP). As a TAP, it can be used to configure the system with XNConnect (the communication setting in XNConnect must be changed; see the Help file) and can also be used to control a system using any software that supports XNNet protocol over TCP/IP (e.g., third party controllers).

The APWeb Board

The APWeb board has a TCP/IP Ethernet link connector, three indicator LEDs, and a Service switch.

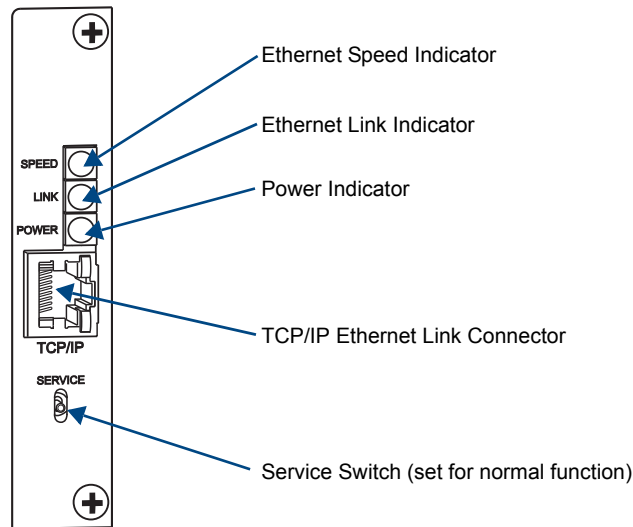


FIG. 27 The APWeb board

TCP/IP Ethernet Link Connector

The APWeb board has a TCP/IP Ethernet (RJ-45) link connector that handles Ethernet 10/100 connections for 10 Mbps (megabits per second) and 100 Mbps. This connection is compatible with most Ethernet based LANs.

Important: *Do not use this connector for linking enclosures.*

Indicator LEDs

Above the TCP/IP connector are three green indicator LEDs, which indicate the following:

Ethernet Speed Indicator

- On* – speed status is 100 Mbps
- Off* – speed status is 10 Mbps

Ethernet Link Indicator

- On* – link status is active

Power Indicator

- On* – system is receiving power

Note: *The two small rectangular LEDs on the RJ-45 connector are not used on this product.*

Service Switch

Below the TCP/IP connector is a Service switch that can be used to override system security if the username and password are lost. The *APWeb Instruction Manual* includes instructions for restoring the default username and password.

The switch can also be used to upgrade the APWeb board firmware. Do *not* attempt to update the firmware unless directed to do so by technical support.



Caution: *For security purposes, firmware upgrades cannot be performed remotely.*

System Setup

The system setup example in FIG. 28 illustrates an Optima SD enclosure with an APWeb expansion board connected to a LAN. Both computers in the illustration have access to the Optima SD. If only one computer will be used, the APWeb board can be connected directly to the computer's network card.

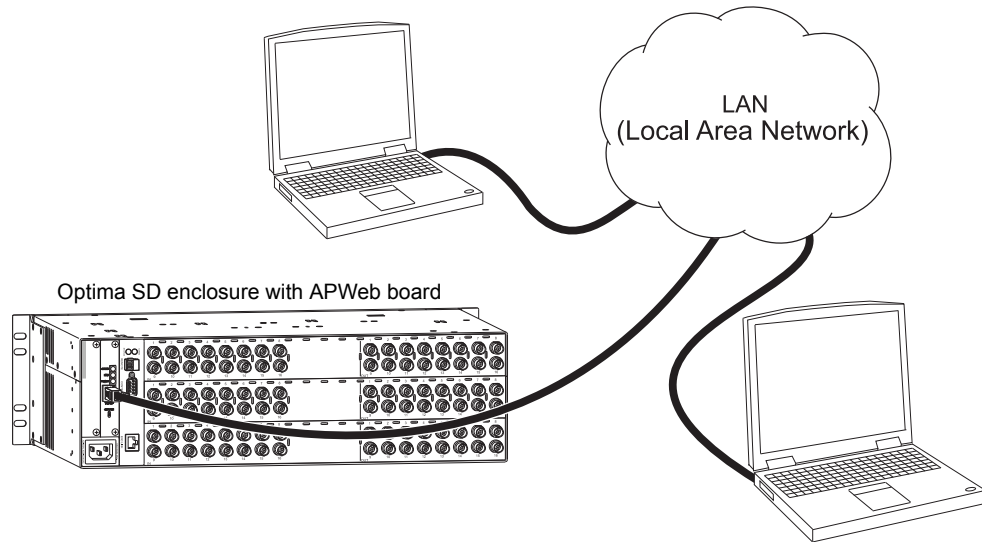


FIG. 28 Optima SD enclosure with APWeb board connected to a LAN (second enclosure not shown)

Important: *AMX AutoPatch systems should only be linked in their own isolated networks.*

Adding an APWeb Board

If the APWeb board has been pre-installed, go directly to the instructions on page 49 for cabling and applying power to the enclosure.

If the APWeb board was ordered to upgrade a system, complete the steps below and then see the instructions on page 49 for cabling and applying power.



ESD Warning: To avoid ESD (Electrostatic Discharge) damage to sensitive components, make sure you are properly grounded before touching any internal Optima SD materials. Use an ESD wristband and cord with alligator clip attached to a good ground source.

Note: The APWeb board can be installed in either enclosure and into either of the expansion slots.

To add an APWeb board to an enclosure:

1. Unplug the power cords on both enclosures in the system.
2. Remove the screws holding the expansion plate.
3. Remove the expansion plate.
4. Insert the APWeb board into the empty expansion slot, aligning the board between the upper and lower guides inside the slot, pushing until the board is flush with the rear of the enclosure (FIG. 29).

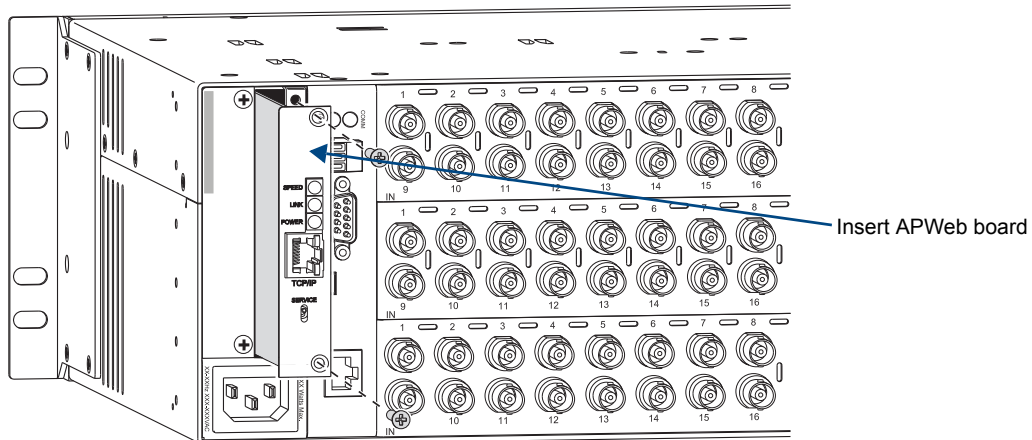


FIG. 29 Insert APWeb board into expansion slot and replace screws

5. Replace the screws.
6. For cabling instructions, including the power-up sequence, see page 49.

Cabling & Applying Power

After installing the APWeb board, connect it to a LAN or a Network Interface Card (NIC) in a PC. During the initial setup (see below), the APWeb board discovers the system. After the initial setup, it does not need to rediscover the system (even if power is cycled). If connecting to a PC, the PC's settings may need to be changed (contact your Network Administrator).

Cable Requirements

- LAN Connection – Use an RJ-45 straight-through patch cable.
- PC Connection (NIC Card) – Use an RJ-45 crossover cable.

Connecting to a LAN or a PC

Important: AMX AutoPatch systems should only be linked in their own isolated networks.

To connect the APWeb board to the LAN or PC:

1. Complete the installation of the Optima SD enclosure(s) according to the installation procedure in the “Installation & Setup” chapter (see page 18). *Do not apply power until Step 4 below.*
2. Insert one end of the RJ-45 cable into an active LAN connection or a NIC.
3. Insert the other end of the cable into the TCP/IP (RJ-45) jack on the APWeb board (FIG. 30).

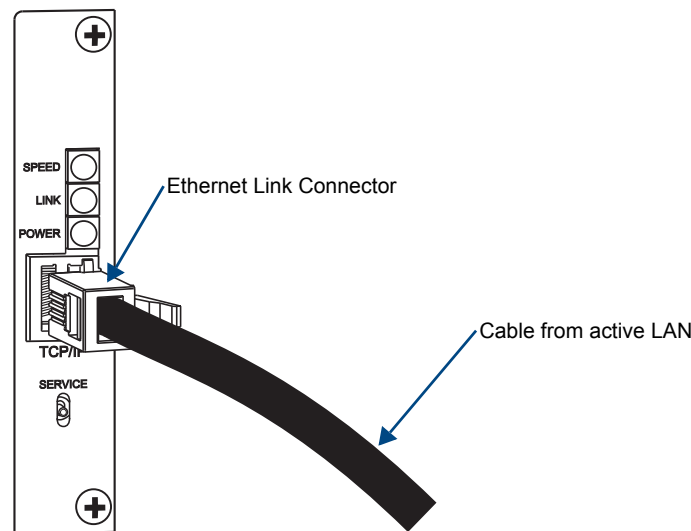


FIG. 30 Fasten the Ethernet link connector

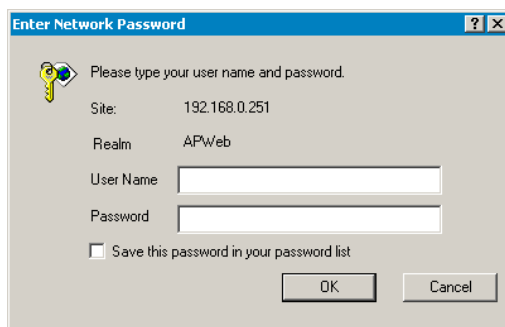
4. Apply power to the enclosures. Apply power to the attached source and destination devices last.
5. Check the indicator LEDs (see page 46).
6. Allow 20 to 60 seconds for discovery, then test the connection (see page 50).

Testing the Connection

The connection between the APWeb board and the LAN should be tested to complete the setup. The instructions below open the APWeb site to the user's Home page, which has limited access to the APWeb server. If you need full access to configuration and security settings, see the *APWeb Instruction Manual* on the *AMX AutoPatch CD* or at www.amx.com.

To test the connection:

1. Launch a browser on your computer.
2. Type `http://192.168.0.251` (default address) in the address bar and press Enter. The Enter Network Password dialog box opens. If the dialog box does not open, see the Troubleshooting section below and contact your network administrator.
3. Enter the case-sensitive default user name **none** and password **none**.



4. Click OK. APWeb opens.
5. For setup and operation details for the APWeb server, see the *APWeb Instruction Manual*.

Troubleshooting

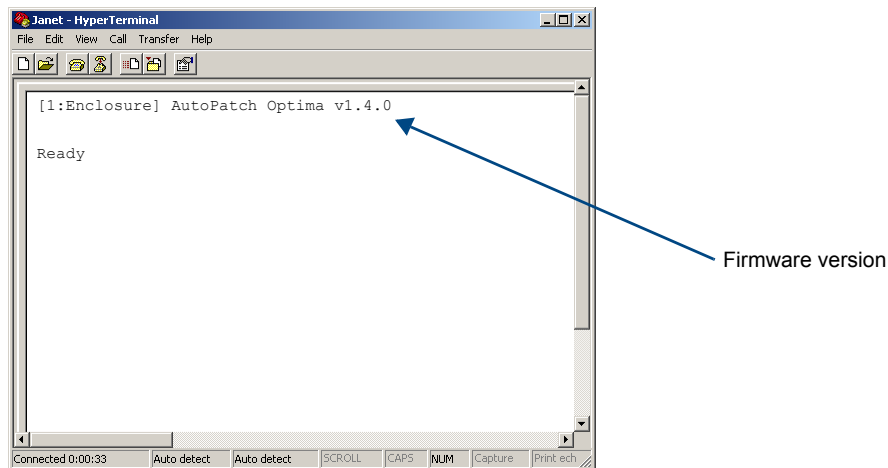
If the Enter Network Password dialog box does not open:

- Check all power, signal, and link connections; check to be sure the entire system is powered.
- Check the Power LED on the APWeb board (see page 46) to be sure it is illuminated.
- Check the cable type (see cable requirements on page 49). We recommend connecting the APWeb board directly to a PC for testing purposes.
- Ping the system. At the DOS prompt enter: `ping 192.168.0.251`
- Verify that the APWeb's IP address is included in the "Bypass Proxy Server" list in the Internet Options for the attached PC. If not, add the address in the Exceptions field in the Proxy Setting dialog box.
- Try connecting to the APWeb server again.
- If the problem persists, contact technical support (see page 34).

Troubleshooting strategies for other types of concerns can be found on the next two pages.

If APWeb opens but appears to be stalled (the message “Waiting to detect AutoPatch system on the network” displays for more than 30 seconds):

- Connect the PC directly to a serial port* on one of the enclosures with a null modem cable.
- Open HyperTerminal (or other terminal emulation program).
- Power cycle the Optima SD; the splash screen appears with the firmware version number.
- Verify that the firmware version is 1.2.0 or greater (see the graphic below).



- If the version reported is *not* 1.2.0 or greater (required for compatibility with an APWeb expansion board), contact technical support (see page 34) for a firmware upgrade.

* The serial port settings on the PC must be set at: baud rate – 9600, data bits – 8, stop bit – 1, parity – none, and flow control – none.

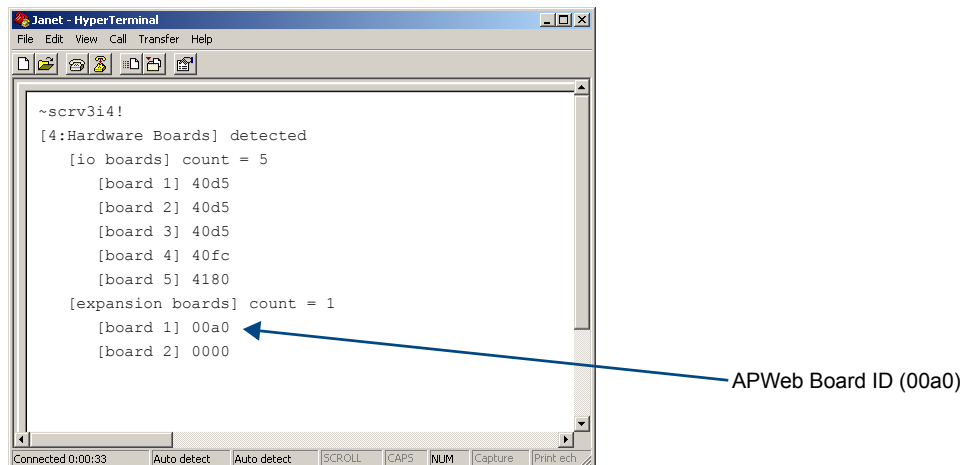
If the firmware version is compatible:

- Try reestablishing the connection.

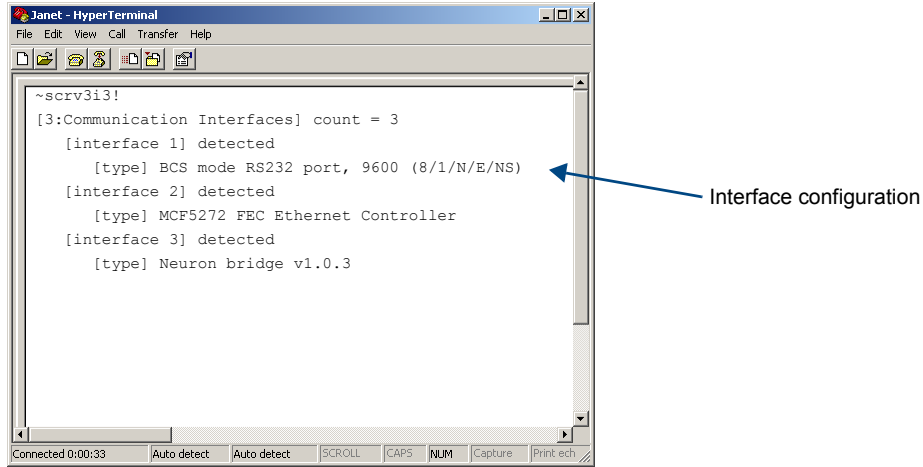
If the problem persists:

Verify and record the following information and contact technical support (see page 34).

- Enter the diagnostic command `~scrV3i4!`
Verify that the board ID number for the APWeb expansion board is displayed under the expansion boards line. The ID number will be a combination of four digits and characters, e.g., 00a0 (0000 indicates an empty expansion slot). The order that the ID number is listed indicates its position, e.g., listed first means it’s next to the CPU board.



- Enter the diagnostic command `~scrV3i3!`
 Verify that one of the [type] lines displays the following configuration:
 BCS mode RS232 port, 9600 (8/1/N/E/NS)
 or
 BCS mode RS232 port, 9600 (8/1/N/NE/NS)



If APWeb opens, but the Home page displays a message that says, “There is no VM configuration information available”:

- Log on APWeb using the default Network Administrator’s user name and password (found in the *APWeb Instruction Manual*).
- Click the Configuration link. Verify that Force VM Discovery is turned *on*.
- If Force VM Discovery is not on, check it *on* and click the Reboot button.
- If the problem persists, contact technical support (see page 34).

Appendix A – Managing Configuration Files

Applicability Notice

This appendix applies to XNConnect version 2.8.0. XNConnect's version information is found under its Help menu. Version 2.8.0 supports full Device Discovery through AMX's AutoPatch Duet module (firmware v1.4.0 or higher is required).

This appendix covers the following general information on using XNConnect and basic modifications for customizing the configuration:

- Installing XNConnect (see page 54)
- Discovering a system (see page 55)
- Opening an .xcl configuration file (see page 56)
- Navigating the interface (see page 57)
- Customizing channel names/labels (see page 58)
- Setting the control panel password (see page 59)
- Creating local presets (see page 60)
- Loading an .xcl configuration file (see page 62)
- Device Discovery Support (see page 62)

For information on advanced configuration modifications, see the XNConnect Help file.

Overview

Important: *Unless you need to modify the system, you do not need to use XNConnect. We recommend making a copy of the current file every time the file is modified.*

XNConnect can be used to modify a system's configuration information which contains routing and control information. XNConnect is provided on the *AMX AutoPatch CD* shipped with each system. Configuration file modifications include basic tasks, such as creating local presets, setting the control panel password, and customizing input and output channel names for control display (e.g., in the APWeb or APControl interface).

Optima SD systems with audio use the standard set of 3 virtual matrices for switching signals: VM 0 = audio-follow-video, VM 1 = video, and VM 2 = audio. Video only systems use VM 0 or VM 1.

Conventional Configuration

An Optima SD system is conventionally configured when an .xcl configuration file (created in XNConnect) is downloaded to the CPU before shipment (applies to all Optima SD systems).

When a system is conventionally configured, the .xcl file can be accessed for modification in one of two ways. Either use XNConnect to discover the .xcl file on the CPU, or use XNConnect to open a copy of the .xcl file. The .xcl file copy is provided on the *AMX AutoPatch CD* (MyXCL folder) included in shipment. In either case, after the configuration is modified in XNConnect, it is loaded back onto the CPU (replacing the original .xcl file).

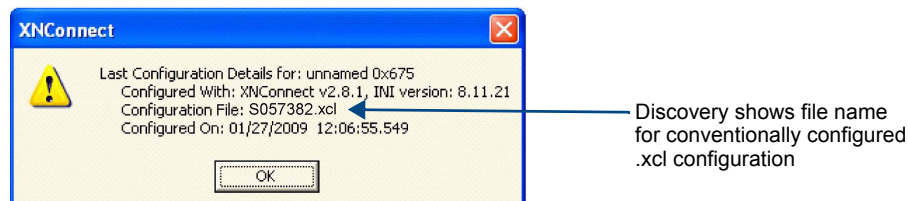


FIG. 31 Example of discovery information for conventionally configured .xcl file

AMX AutoPatch CD Information

If you cannot locate the *AMX AutoPatch CD* that shipped with your system and your AMX account has the required permissions, you can download the newest version of XNConnect from **www.amx.com**. An INI file Updater for updating XNConnect is available on the AMX website under Tech Center \ AutoPatch Tools; an account is not required. If you need an .xcl configuration file that is compatible with your system, either discover the system (see page 55) or contact technical support (see page 34) and provide your system's serial number.

Installing & Launching XNConnect

Use XNConnect software *only* if you need to customize or change the configuration information from the original specification.

Even if XNConnect is already on your PC, install the newest version that shipped on the CD that came with your system. We *strongly* recommend uninstalling the old version of XNConnect before installing a new version.

System Requirements

- Windows 2000[®], Windows NT[®], or Windows XP Professional[®]
- 233 MHz processor
- Minimum of 128 MB of RAM
- 20 MB of available hard drive space
- 800x600 screen resolution (1024x768 is recommended)
- Serial port and RS-232 null modem cable

To install XNConnect from the AMX AutoPatch CD:

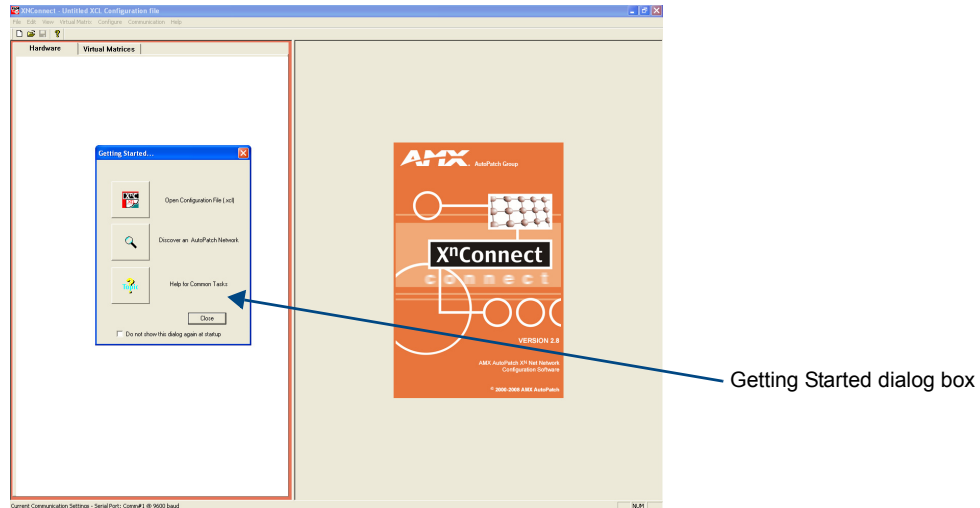
1. Close all other applications currently running on your PC.
2. Insert the *AMX AutoPatch CD* into your CD drive to start automatically.
If the CD does not autorun, explore the CD folder and double-click the Index.html file.
3. Select Software and find XNConnect.
4. Optional – Select Release Notes to read about the software before installation.
5. Select Install.
6. Follow the directions in the subsequent dialog boxes.

Note: *If your AMX account has the required permissions, the newest version of XNConnect can be downloaded from **www.amx.com**. An AutoPatch INI Updater file can also be found on the AMX website under Tech Center \ AutoPatch Tools for updating XNConnect with information for new support devices and I/O boards (an account is not required).*

To launch XNConnect:

1. From the Start menu, select Programs.
2. Select AutoPatch Applications (or other file group you specified during the installation).
3. Select the XNConnect folder.

4. Select XNConnect.
The XNConnect program opens.



When XNConnect is open, use either of the following options for accessing the configuration:

- Discover the system; see below.
- Open the copy of the .xcl configuration file located on the *AMX AutoPatch CD*; see page 56.

Discovering a System

The discovery process queries the attached system for configuration information and properties, including information regarding assigned signals and virtual matrix definitions. The discovery process may take several minutes to complete.

To discover a system:

1. Disconnect any third-party control devices from the enclosure's serial (CONTROL) port.
2. Connect the enclosure* to the PC (see page 23).
3. (If not already open) launch XNConnect (see page 54).
4. Open the Communication menu; select Serial Port.
5. Open the Communication menu again; select Change Comm Settings. Check the settings for the selected port and adjust if necessary (the default is Com 1, baud rate 9600).
6. Optional – Click the Test button to verify that communication has been established with the Optima SD system. Click OK.
7. From the File menu, select Discover System (the discovery may take a few minutes).
8. From the File menu, select Save to save the discovered configuration information to the PC.
9. From the File menu, select Save As and save an .xcl file with a new name to the PC.
(We recommend making a duplicate copy every time the file is modified.)

The configuration file is ready to be modified. Whenever changes are made, the new file *must* be loaded onto the system to implement the changes (see page 62).

* Either of the Optima SD enclosures can be connected to the PC as long as they are linked together.

Opening a Configuration File

The process of modifying a configuration file starts by opening it with XNConnect. After the modifications are complete, the new configuration information *must* be loaded onto the system to implement the changes.

Important: *Even if XNConnect is already on your PC, install the newest version that shipped on the same CD as the configuration file. We strongly recommend uninstalling the old version of XNConnect before installing a new version.*



Caution: *Use XNConnect only if you need to reload the configuration file or modify your system's configuration from the original specification. Make a copy of the .xcl file every time it is modified.*

To open an .xcl file:

1. Launch XNConnect (see page 54).
2. From the Getting Started dialog box, click Open Configuration File.
(If the dialog box does not appear, from the File menu select Open.)
3. Use the standard Open dialog box to locate and open the .xcl configuration file. The default location is in the MyXCL folder on the *AMX AutoPatch CD*.
4. From the File menu, select Save As and save a duplicate copy of the modified file with a new name to the PC. (We *strongly* recommend making a duplicate copy every time the file is modified.)

The .xcl file is ready to be modified. After changes are made, the new file *must* be loaded onto the system to implement the changes (see page 62).

Navigating the Interface

XNConnect displays configuration information in two panes. The graphics are located in the left pane, and the properties of the currently selected graphic are in the right pane. At the top of the left pane are two tabs, Hardware and Virtual Matrices, for accessing the Hardware and Virtual Matrix views (see below). To see the details and components of a device or a virtual matrix, click the plus “+” symbol to the left of the device or the virtual matrix.

Most configuration file modifications involve entering information in a series of dialog boxes that are accessed by right-clicking a hardware device or virtual matrix icon and selecting an option from the shortcut menu. If you have a question regarding an open dialog box, press the F1 key for Help.

Hardware View

The Hardware view (FIG. 32) displays the system’s hardware, such as enclosures and serial ports. This is the view used when setting the control panel password (see page 59).

Virtual Matrix View

The Virtual Matrix view displays properties of the existing virtual matrices. Most common tasks are conducted from this view, including customizing channel names and creating local presets.

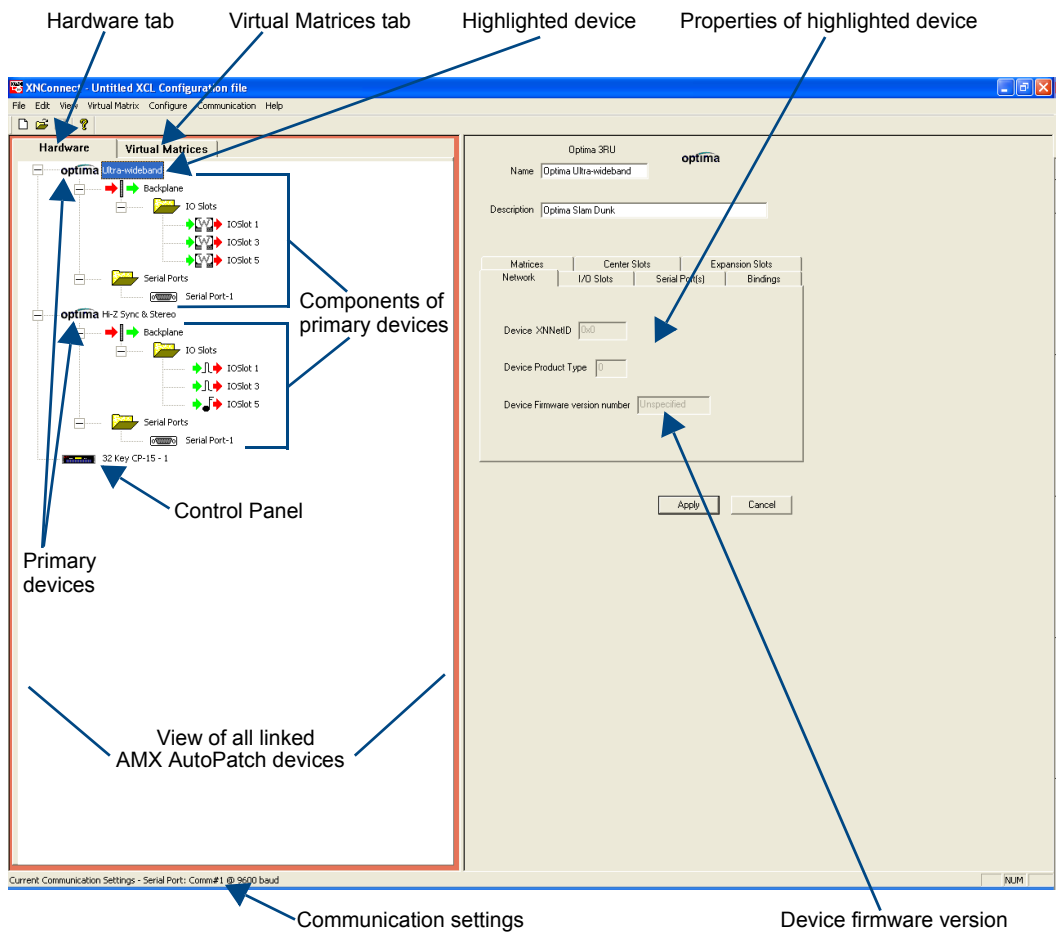


FIG. 32 XNConnect interface showing Hardware view

Multiple Signal Paths

In Optima SD systems, each matrix is a signal path. When you select a connector in the virtual matrix view, the properties box in the right pane indicates the signal and the signal path for the connector. If the signal has multiple signal paths (e.g., stereo audio signals), each of the signals will be displayed and each signal path will display an appended number. In the example shown (FIG. 33), the connector for input six contains two signal paths for a stereo audio signal:

- A_IN_038.1 for the “Al” (audio left) signal path
- A_IN_038.2 for the “Ar” (audio right) signal path

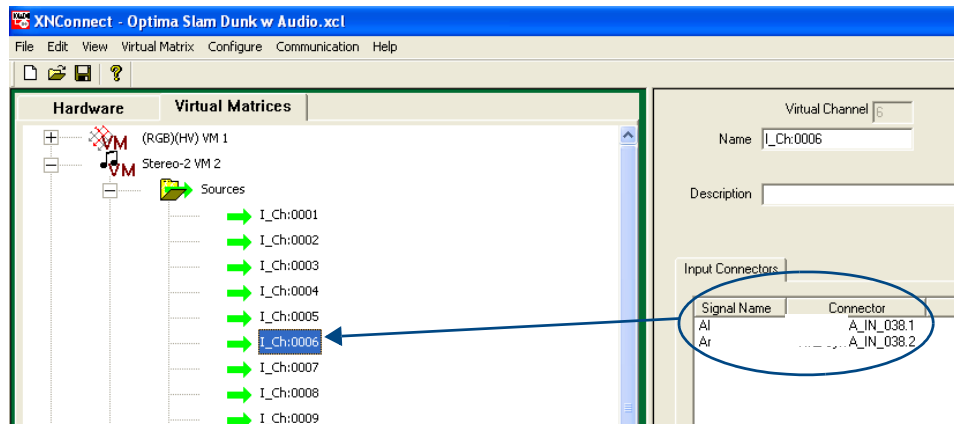


FIG. 33 Input connector properties showing two signal paths for one stereo audio connector

Modifying an .xcl Configuration File

Modifying an .xcl configuration file with XNConnect involves entering information in a field or in a series of dialog boxes. A brief look at the contents in the Help file provides a quick overview of the possible modifications.

This section provides instructions for three common tasks: modifying channel names, setting the control panel password, and configuring local presets. For complete coverage of configuration related tasks, see the XNConnect Help file.

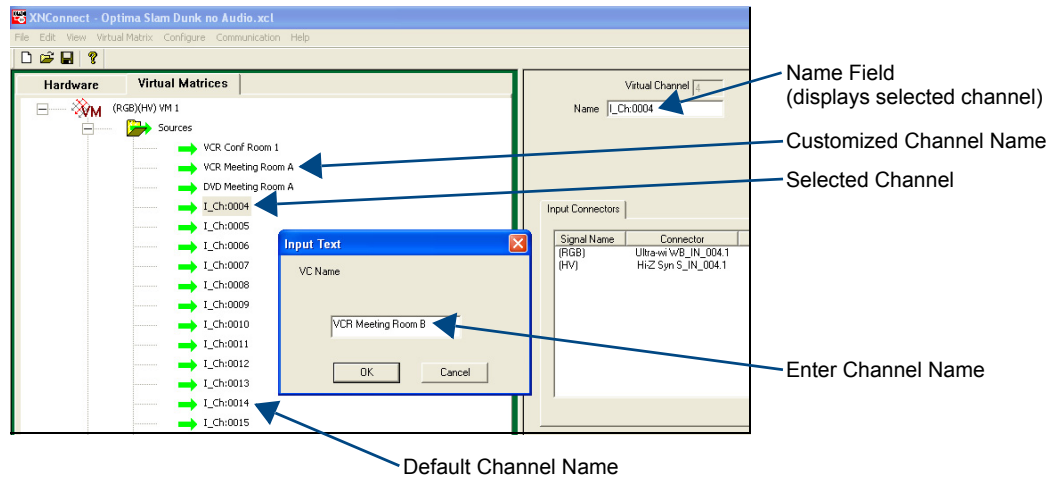
Modifying Source & Destination Channel Names

If the system is using APWeb or APControl for control, the names for the source and destination channels displayed in the XBar or CrossBar (respectively) can be customized in XNConnect. The custom names (labels) can be up to 23 characters and cannot contain the following characters: ‘ “ \ = ? < >

To customize the channel names:

1. In the Virtual Matrices view, click the “+” to the left of the Virtual Matrix.
2. Click the “+” to the left of the Sources or Destinations folder.
3. Right-click the channel you want to rename and select Change Name from the shortcut menu.

4. Enter the new name in the Input Text dialog box and click OK.
The new channel name appears in the Name field.



Note: If a channel is in more than one VM (virtual matrix), you must repeat Step 4 for the channel in each of the VMs.

5. Customize additional channels by repeating Steps 3 and 4.
6. Load the .xcl configuration file onto the system (see page 62).
7. From the File menu, select Save As and save a duplicate copy of the modified file with a new name to the PC. (We *strongly* recommend making a duplicate copy every time the file is modified.)



Caution: The system must not be actively switching when loading this information onto the system.

Setting the Control Panel Password

The Optima SD has a control panel which can be locked and unlocked (see the *CP-15 Control Panel Instruction Manual*, available on the *AMX AutoPatch CD* or at www.amx.com). Using XNConnect, you can customize a password consisting of five digits between 1 and 8 that are entered on the control panel using a combination of five of the first eight Input Keys (keys can be used multiple times).

The system connected to the PC must be powered up before the password can be loaded to the control panel. If not already connected, complete the first five steps of the instructions for “Discovering a System” on page 55.

To set the password and load it to the control panel:

1. Discover the system (see page 55) or open the .xcl file (see page 56).
1. In the Hardware view, right-click the CP-15 Control Panel icon.
(If the control panel’s icon is not displayed, double-click the Optima SD icon.)
2. Select Set Password from the drop-down menu.
The Set Control Panel Password dialog box opens.



3. Enter a single digit between one and eight (inclusive) in each field.
4. Check the box for Configure Password Immediately.

Important: *If you use the Configure menu instead of checking the box, the only option that will load password information is Configure \ Configure Special - Hardware \ Configure All Passwords.*

5. Click OK.
The updated password information is immediately loaded to the control panel, and the new password sequence *must* be used to lock and unlock the control panel.
6. From the File menu, select Save As and save a duplicate copy of the modified file with a new name to the PC. (We *strongly* recommend making a duplicate copy every time the file is modified.)

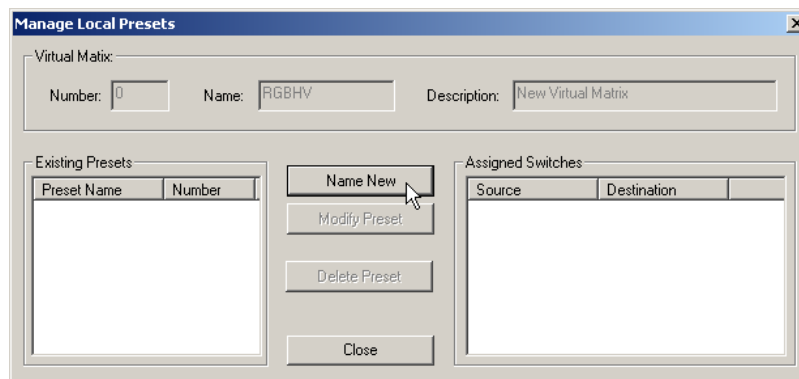
Creating Local Presets

A local preset is a predetermined collection of switches on the same virtual matrix to be routed simultaneously. Executing a local preset affects only those inputs and outputs specified, not the whole system. Local presets are defined using XNConnect and can be executed using a control panel (local or remote) or using BCS commands as part of a macro in APControl 3.0 or APWeb or entered in a terminal emulation program. The process for creating local presets involves three dialog boxes that cover managing, naming, and modifying presets. The Optima SD supports a maximum of 16 local presets.

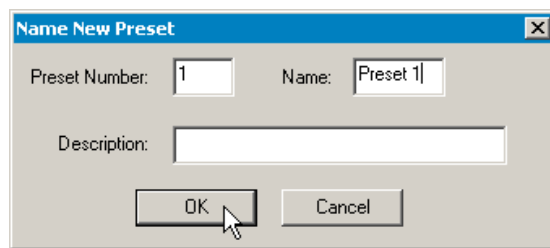
The instructions below are for creating a local preset. For detailed information on modifying and deleting local presets, see the XNConnect Help file.

To create a new local preset:

1. In the Virtual Matrices view, right-click the virtual matrix the preset will be created for and select Manage Local Presets from the shortcut menu.
The Manage Local Presets dialog box opens.

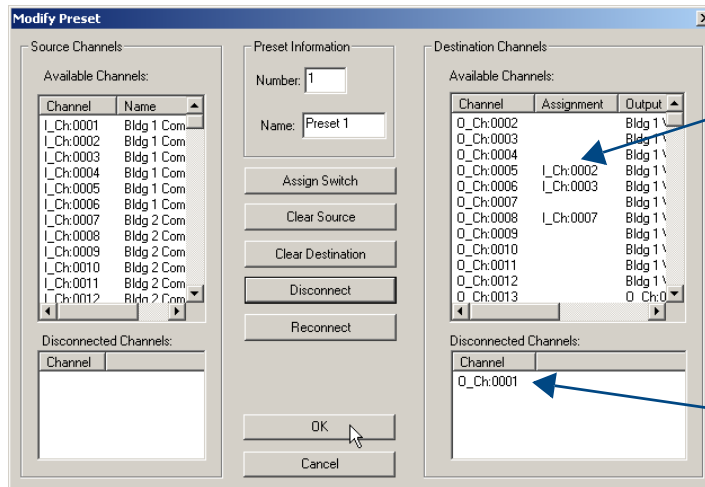


2. Click the Name New button.
The Name New Preset dialog box opens.



3. Optional – Enter a different preset number (local presets do not need to be numbered sequentially).

4. Enter a name for the new preset (descriptions are optional and do not display outside of XNConnect).
5. Click OK.
The Modify Preset dialog box opens.
6. For the first switch, click the source channel (input) and one or more destination channels (outputs).
Select multiple destination channels by holding down the Control key while selecting the channels.



The Assignment column shows three switches that will be executed as part of Preset 1:

- Input 2 to Output 5
- Input 3 to Output 6
- Input 7 to Output 8

The Disconnected Channels box shows that Output 1 will be disconnected as part of Preset 1.

7. Click the Assign Switch button.
The input appears in the Assignment column of the Destination Channels list; the switch will execute when the local preset is executed.
8. Disconnect inputs* or outputs as part of the local preset by selecting either the source or destination channel and clicking the Disconnect button.
The input or output appears in its corresponding Disconnected Channels list; the input or output will be disconnected when the local preset is executed.
9. Repeat Steps 7, 8, and 9 for all switches and/or disconnects to be included in the preset.

Note: For information on the other buttons and preset modifications, press F1 while the Manage Local Presets dialog box is open.

10. After all switches for the preset have been assigned, click OK and then close the Manage Local Presets dialog box.
11. Define additional local presets by repeating the steps.



Caution: The system must not be actively switching when loading this information onto the system.

12. Load the .xcl configuration file onto the system (see page 62).
If local presets are the only modifications that have been made to the file, select Configure \ Configure Special – Virtual Matrix \ Configure All VM Local Presets.
13. From the File menu, select Save As and save a duplicate copy of the modified file with a new name to the PC. (We *strongly* recommend making a duplicate copy every time the file is modified.)

* Disconnecting an input will disconnect *all* outputs it is connected to.

Loading an .xcl Configuration File

Once modifications have been made to the configuration file, the new file must be loaded onto the system's CPU for the changes to be implemented.

Important: *When loading any part of a configuration file, the matrix switcher must not be actively switching.*

We recommend disconnecting any external controllers to ensure that no switches are executed during the loading of the file.



Caution: *Using the Configure All option will erase any global presets (see the “BCS Protocol Instruction Manual” on the “AMX AutoPatch CD” or at www.amx.com) that have already been defined for the system.*

To load an .xcl configuration file to the enclosure's CPU:

1. Disconnect any external controllers to ensure that no switches are executed during the loading of the file. *The Optima SD must not be actively switching when loading a configuration file.*
2. From the File menu, select Save As and save a duplicate copy of the modified file with a new name to the PC. (We *strongly* recommend making a duplicate copy every time the file is modified.)
3. Connect the Optima SD enclosure to the PC (see page 23).
4. In XNConnect, open the Communication menu; select Serial Port.
5. Open the Communication menu again; select Change Comm Settings.
6. Check the settings for the selected port and adjust if necessary (the default is Com 1, baud rate 9600).
7. Optional – Click the Test button to verify that communication has been established with the Optima SD.
Click OK.
8. From the Configure menu, select Configure All.*

* The Configure All option will *not* load password information. For instructions on loading password information, see page 59.

Device Discovery Support

XNConnect v2.8.0 supports Device Discovery (firmware v1.4.0 or higher is required). Typically the default configuration string generated by XNConnect is all that is necessary. However, certain conditions may warrant a custom string, such as the need to limit the VMs that are available for control by the AMX control device. Or a need may exist to limit the features available for a system, e.g., omitting the ability to adjust input gain, but leaving support for output volume. To customize the configuration string, see the XNConnect Help topic “Device Discovery Config String Input.”

Appendix B – Programmer's Interface for System Diagnostics

System Component Information

The Optima SD displays system information in its splash screen* for diagnostic purposes. The information indicates the current status and well-being of the system components.

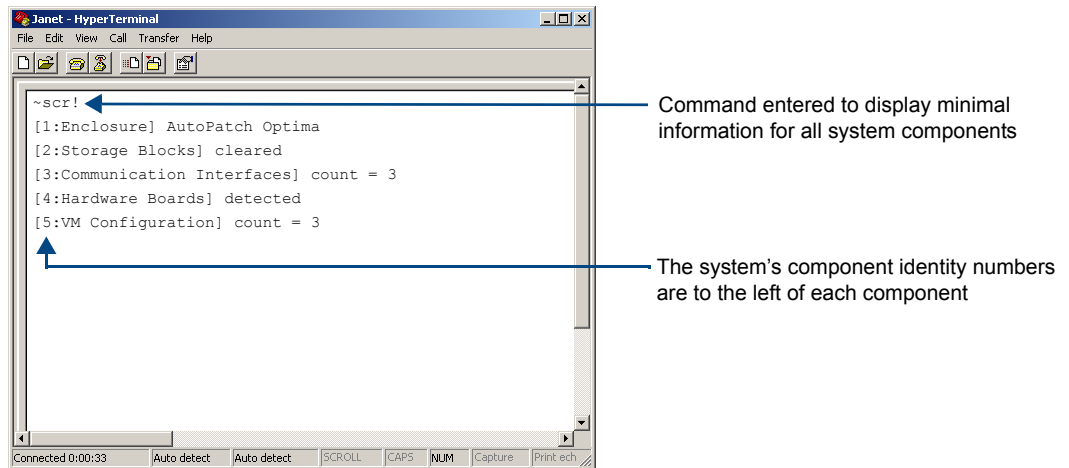


FIG. 34 Example of Optima SD splash screen

The splash screen can be accessed using a terminal emulation program, such as HyperTerminal (see page 30). One of four verbosity** settings is specified, which provides either a list of the five system components with minimal information (FIG. 34) or a level of detailed information on one of the five components. Only one verbosity setting and one component setting can be entered in a command. The order in which the verbosity and component settings are entered is interchangeable.

Note: *In a multi-enclosure system, the splash screen displays information only for the enclosure that is connected directly to the PC.*

* AMX reserves the right to add to the contents of the splash screen at any time, without notice.

** Verbosity (i.e., wordiness) refers to the amount of information provided; the higher the verbosity setting, the more information is displayed.

Verbosity Settings

The verbosity (*v*) settings (*v0*, *v1*, *v2*, *v3*) correspond to the level of detail that will be displayed, with *v0* being the lowest level of detail and *v3* being the highest level.

Component Settings

Detailed information for a single system component can be specified by using its identity (*i*) number setting (*i0* through *i5*) in the following table. Minimal information for all five components can be specified by using the identity number *i0*.

Component	Identity Number
All Components	<i>i0</i>
Enclosure	<i>i1</i>
Storage Blocks	<i>i2</i>
Communication Interfaces	<i>i3</i>
Hardware / Boards	<i>i4</i>
VM Configuration	<i>i5</i>

Default Settings

- At system boot, the `~scrv0i1!` setting is displayed (FIG. 17 on page 30).
- If the verbosity setting is omitted, the verbosity level will be the lowest (*v0*).
- The component setting must be included; otherwise, entering any of the verbosity settings alone will result in a display equivalent to `v0i0`.
- If both settings are omitted during a query (`~scr!`), the information displayed will be at the lowest verbosity level for all components (`v0i0`) (FIG. 34 on page 63).

Using BCS to Access System Diagnostic Information

Instructions are provided for accessing the lowest level of verbosity for all components and for accessing a specific level of verbosity for a specific component.

To access the lowest level of verbosity for all components:

1. Enter `~scr!` or `~scrv0i0!`

Note: *Either of these commands provides a “menu” of the identity numbers and their corresponding components (FIG. 34 on page 63).*

Only one verbosity setting and one component setting can be entered in a command. The order in which the verbosity and component settings are entered is interchangeable.

To access a specific level of verbosity for a specific component:

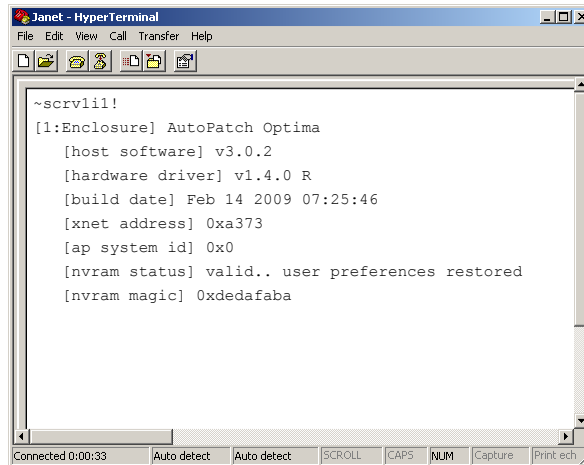
1. Enter `~scr` (to access the splash screen).
2. Enter the verbosity level setting *v#* and the component’s identity setting *i#*.
Either may be specified first.
3. Enter `!` (to send the command).

Example

`~scrv3i5!` or `~scri5v3!` (Either displays the highest level of detail for the VM Configuration.)

Splash Screen Examples

Following are four examples of splash screen information that could be displayed when different verbosity/component settings are specified. Depending on the amount of detail provided, you may need to scroll to see the entire display. Use the first example to check the host software (IOS) version and the hardware driver (apcode) version.

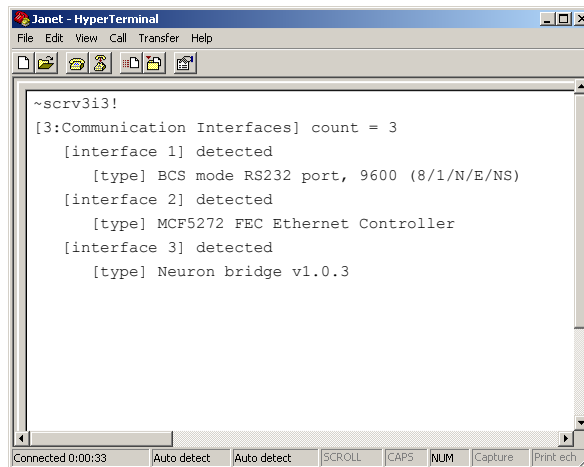


```

Janet - HyperTerminal
File Edit View Call Transfer Help
~scrvi1!
[1:Enclosure] AutoPatch Optima
  [host software] v3.0.2
  [hardware driver] v1.4.0 R
  [build date] Feb 14 2009 07:25:46
  [xnet address] 0xa373
  [ap system id] 0x0
  [nvram status] valid.. user preferences restored
  [nvram magic] 0xdedafaba
Connected 0:00:33  Auto detect  Auto detect  SCROLL  CAPS  NUM  Capture  Print ech

```

FIG. 35 Display for v1i1 (verbosity 1, component 1)



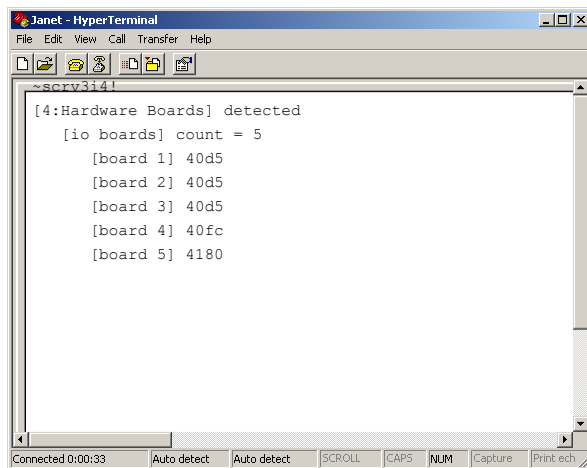
```

Janet - HyperTerminal
File Edit View Call Transfer Help
~scrv3i3!
[3:Communication Interfaces] count = 3
  [interface 1] detected
    [type] BCS mode RS232 port, 9600 (8/1/N/E/NS)
  [interface 2] detected
    [type] MCF5272 FEC Ethernet Controller
  [interface 3] detected
    [type] Neuron bridge v1.0.3
Connected 0:00:33  Auto detect  Auto detect  SCROLL  CAPS  NUM  Capture  Print ech

```

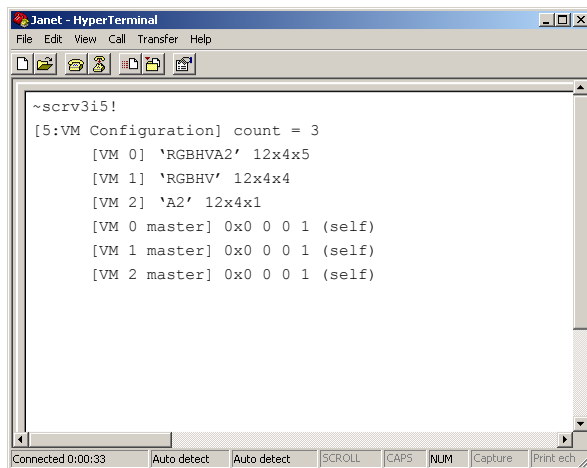
FIG. 36 Display for v3i3 (verbosity 3, component 3)

Splash Screen Examples (continued)



```
Janet - HyperTerminal
File Edit View Call Transfer Help
~serv3i4!
[4:Hardware Boards] detected
  [io boards] count = 5
    [board 1] 40d5
    [board 2] 40d5
    [board 3] 40d5
    [board 4] 40fc
    [board 5] 4180
Connected 0:00:33  Auto detect  Auto detect  SCROLL  CAPS  NUM  Capture  Print ech
```

FIG. 37 Display for v3i4 (verbosity 3, component 4)



```
Janet - HyperTerminal
File Edit View Call Transfer Help
~serv3i5!
[5:VM Configuration] count = 3
  [VM 0] 'RGBHVA2' 12x4x5
  [VM 1] 'RGBHV' 12x4x4
  [VM 2] 'A2' 12x4x1
  [VM 0 master] 0x0 0 0 1 (self)
  [VM 1 master] 0x0 0 0 1 (self)
  [VM 2 master] 0x0 0 0 1 (self)
Connected 0:00:33  Auto detect  Auto detect  SCROLL  CAPS  NUM  Capture  Print ech
```

FIG. 38 Display for v3i5 (verbosity 3, component 5)

Appendix C – Replacing I/O Boards

This appendix covers the procedure to replace or add an Input/Output (I/O) board in an Optima SD enclosure.

The number of input and output signals an enclosure can switch is determined by the number and type of connectors on each board and by the number of boards. An Optima SD 3 RU enclosure holds two or three double boards. An I/O board can be replaced or an I/O board can be added to an enclosure with an empty board slot to expand a system's capabilities.

Expansion boards (e.g., APWeb) can also be added to an enclosure. For installation instructions for an expansion board, see the chapter for the specific board.

Important: *Replacing or adding boards should only be done by personnel trained to handle ESD sensitive parts and assemblies.*

Items Required

- I/O board
- Phillips #1 screwdriver
- ESD wristband and cord with alligator clip

Configuration Requirements

- When a board is replaced with the same type of board, the configuration file does not need to be updated.
- When a new board is added to a previously empty board slot, the configuration file must be updated. A CD has been included with an updated configuration file, which *must* be uploaded to the system (see page 74) for the new board to work.



ESD Warning: *To avoid ESD (Electrostatic Discharge) damage to sensitive components, make sure you are properly grounded before touching any internal Optima SD materials. Use an ESD wristband and cord with alligator clip attached to a good ground source.*

Before starting:

- Unplug the power cord on the rear of the enclosure.
- Label and disconnect all cables (including the link cable between enclosures).
- If the enclosure is in a rack, remove it and place on the work surface.

Removing I/O Boards

To remove an I/O board:

- 1 1a: Remove the five screws indicated (four on top and one on the side).
1b: Remove the rack ear indicated (four screws).
Stand the enclosure on this side for Steps 2 and 3.

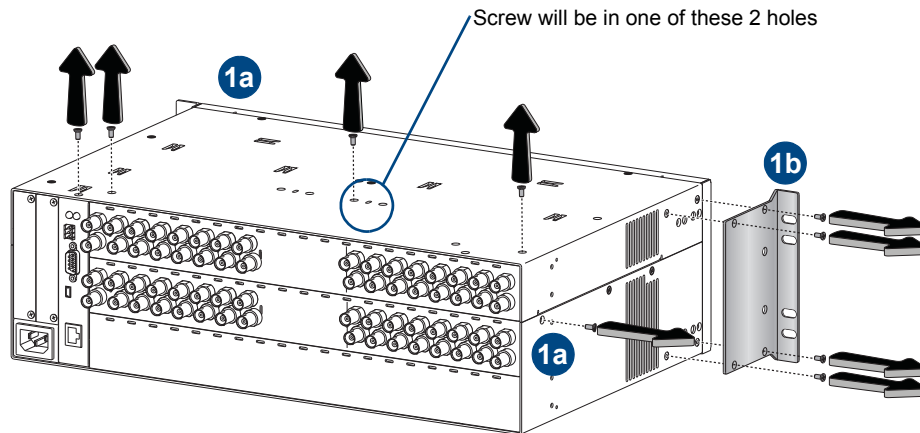


FIG. 39 Remove 5 screws & rack ear (4 screws)

- 2 2a: Remove the three screws indicated.
2b: Remove expansion plate (two screws).

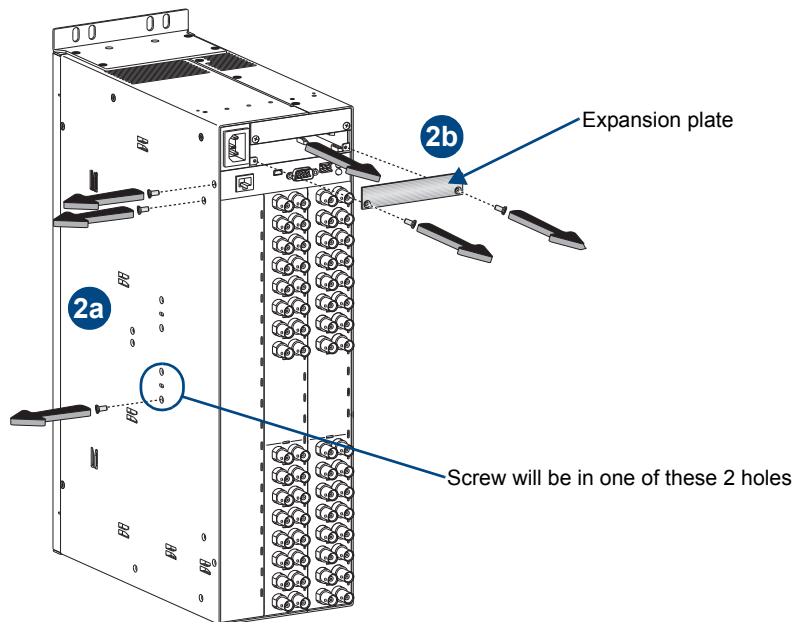


FIG. 40 Remove 3 screws & expansion plate (2 screws)

- 3** 3a: Carefully pull the CPU/board unit straight out of the enclosure frame.
 3b: Pull up on the CPU board, wiggling slightly to loosen it from the board unit. Tip the board unit to the left for Step 4.

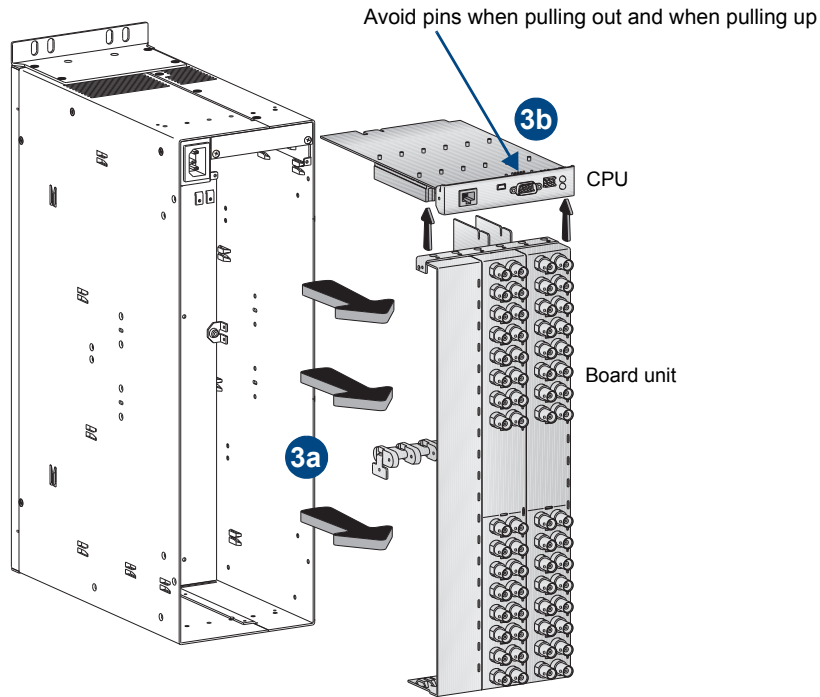


FIG. 41 Pull CPU/board unit straight out & remove CPU

- 4** 4a: Remove the side screw.
 4b: Remove the side slide-key. Stand the board unit on the slide-key end for Steps 5 and 6.

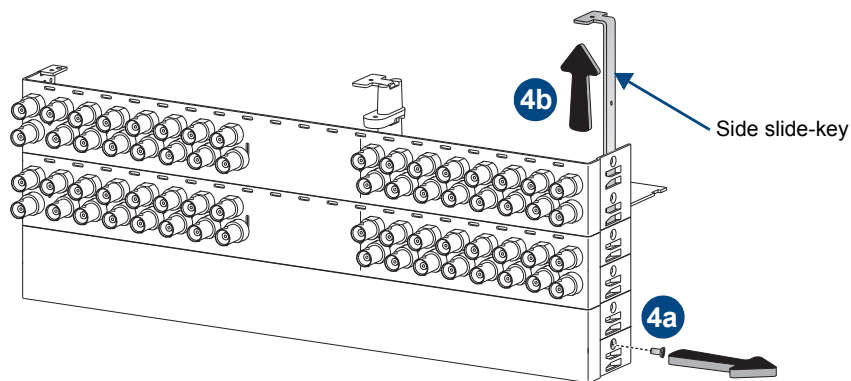


FIG. 42 Remove screw & side slide-key

- 5 Remove the two center slide-keys.

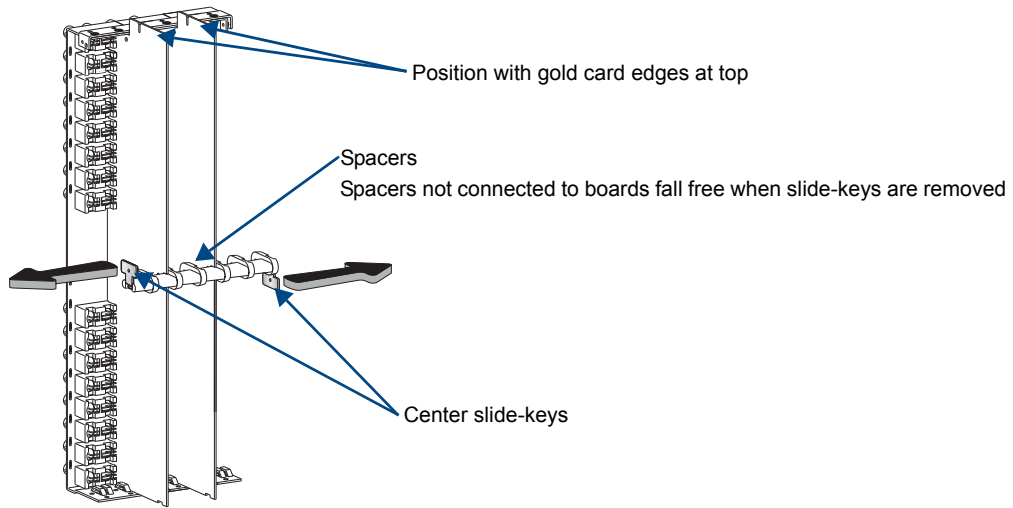


FIG. 43 Remove center slide-keys (2)

- 6a: Remove the two screws indicated.
- 6b: Remove the board and place in an ESD approved static shield bag and set aside.

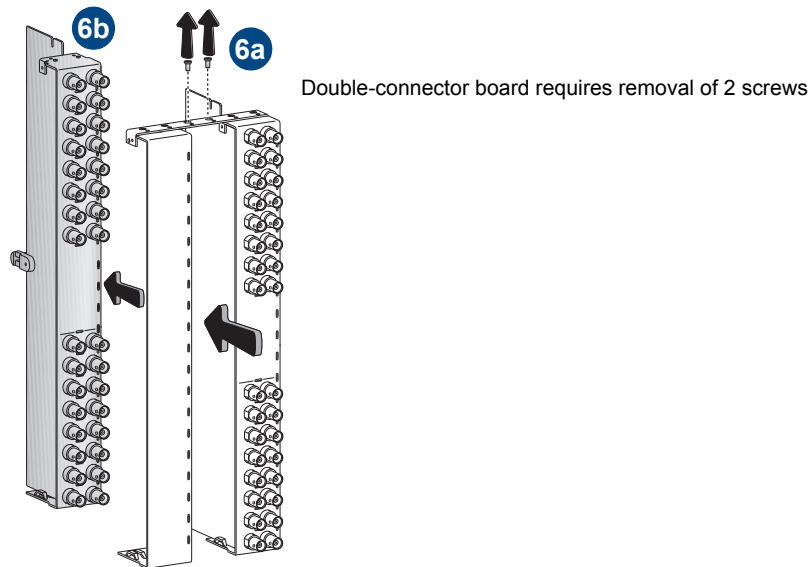


FIG. 44 Remove 2 screws & board

Important: Be sure to install the new board in the correct slot (see the "AutoPatch Optima Connector Guide"). The board's location must match the system's configuration information. If a board is installed in the wrong slot, signal routing is affected.

Replacing I/O Boards

To install a replacement I/O board:

- 1 1a. Insert the new board.
- 1b. Replace the two screws indicated. Tip the board unit to the left.

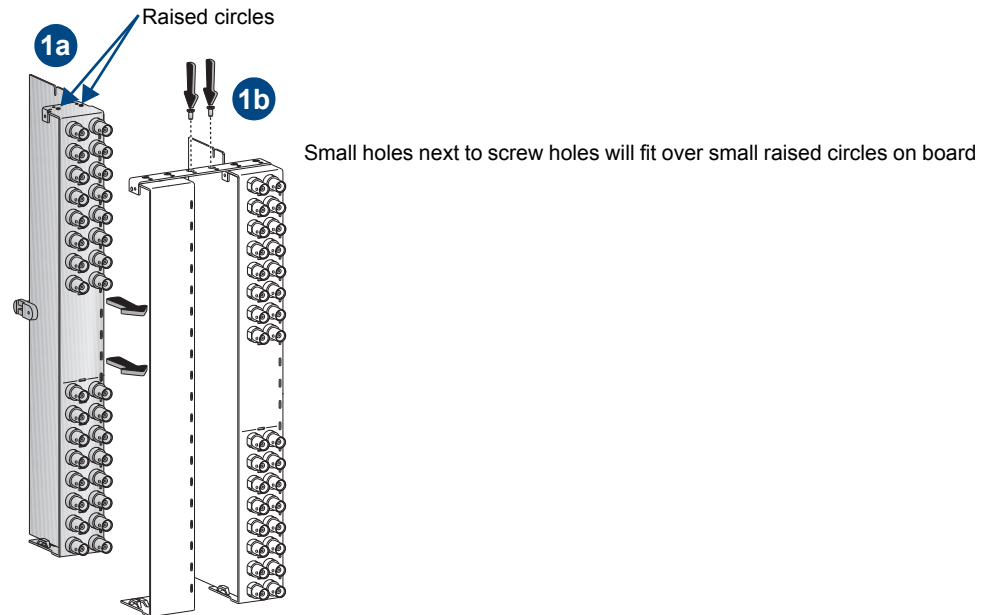


FIG. 45 Insert new board(s) & replace 2 screws

- 2 2a. Replace the side slide-key.
- 2b. Replace the side screw.
- 2c. Line up the connectors on the CPU unit with the gold card edges on the board unit and push the units together until they snap into place. Stand the CPU/board unit on its slide-key end for Step 3.

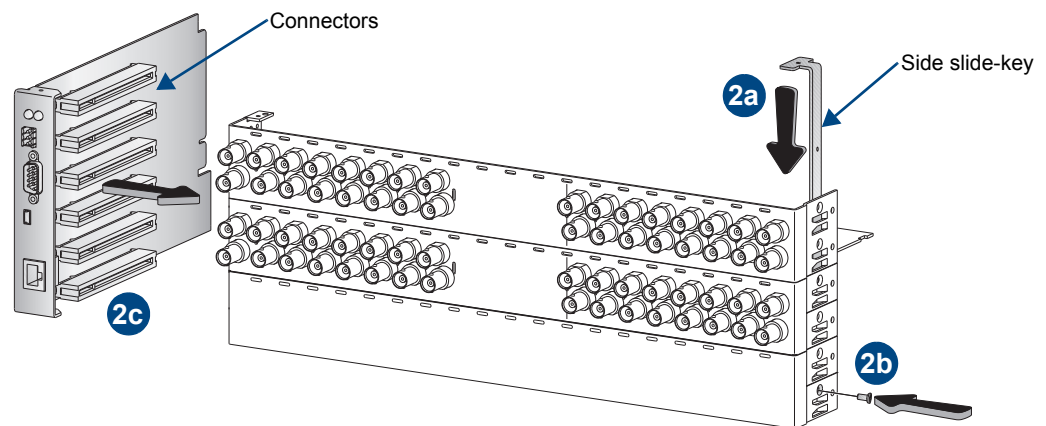


FIG. 46 Replace side slide-key & side screw; push board unit into place

- 3 3a. Insert the left slide-key (tab up) through the spacers, adding spacers as needed.
- 3b. Insert the right slide-key (tab down) under the left key and through the spacers.

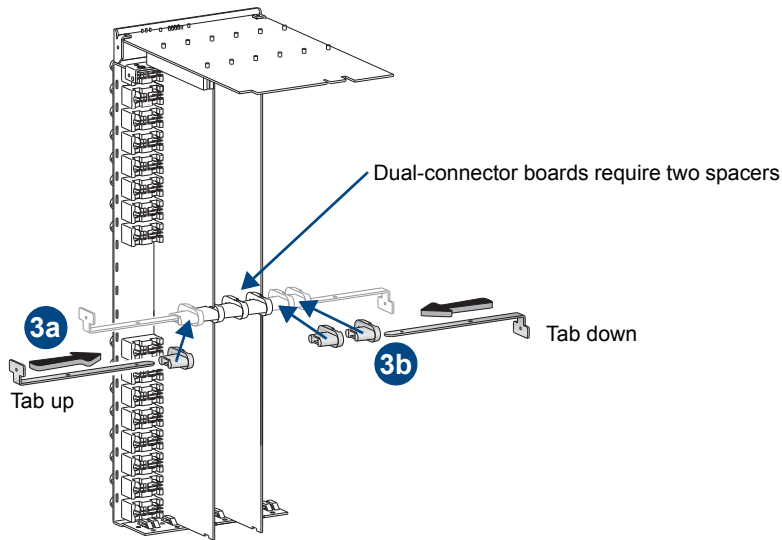


FIG. 47 Insert left & right slide-keys through spacers

Note: The number and placement of spacers varies per enclosure size and configuration. Dual-connector boards require two spacers. Boards will be parallel when spacers are placed correctly.

- 4 Line up the edge of the CPU on the board guide and push the CPU/board unit in until it snaps into place.

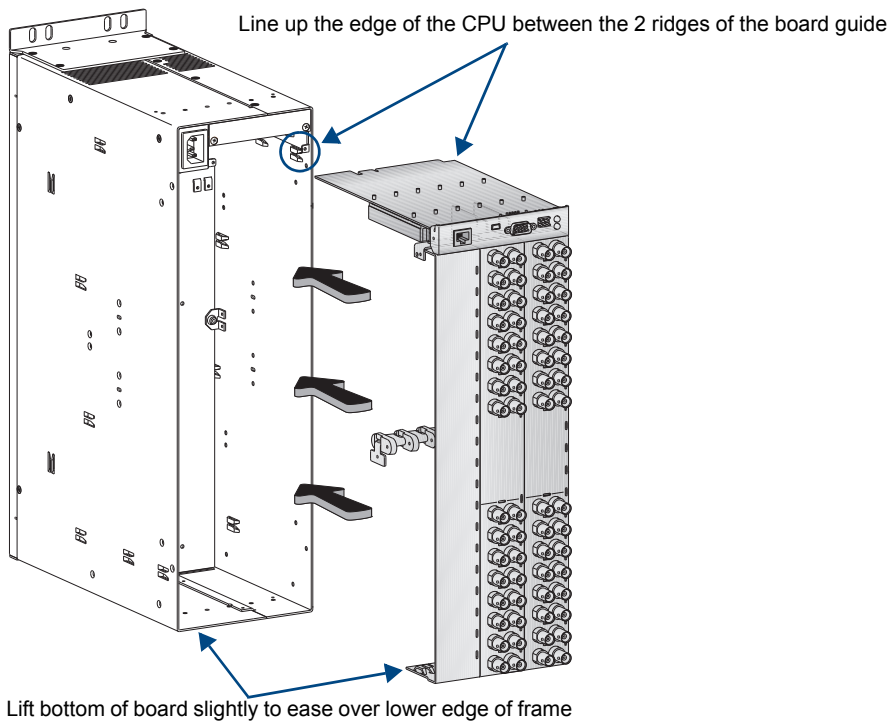


FIG. 48 Push CPU/board unit into place

- 5** 5a. Replace the three screws indicated.
5b. Replace the expansion plate (requires two screws).

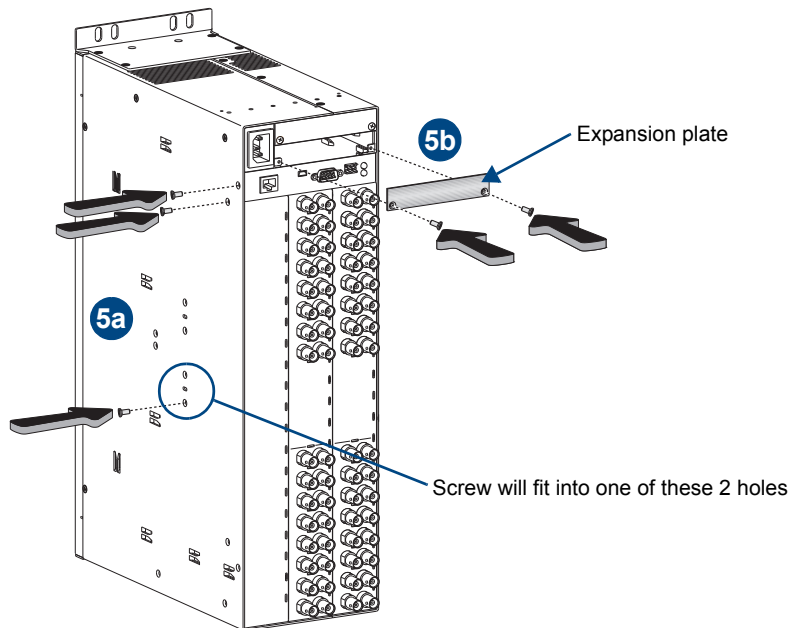


FIG. 49 Replace 3 screws & expansion plate (2 screws)

- 6** 6a. Replace the five screws indicated (four on top and one on the side).
6b. Replace the rack ear (requires four screws).

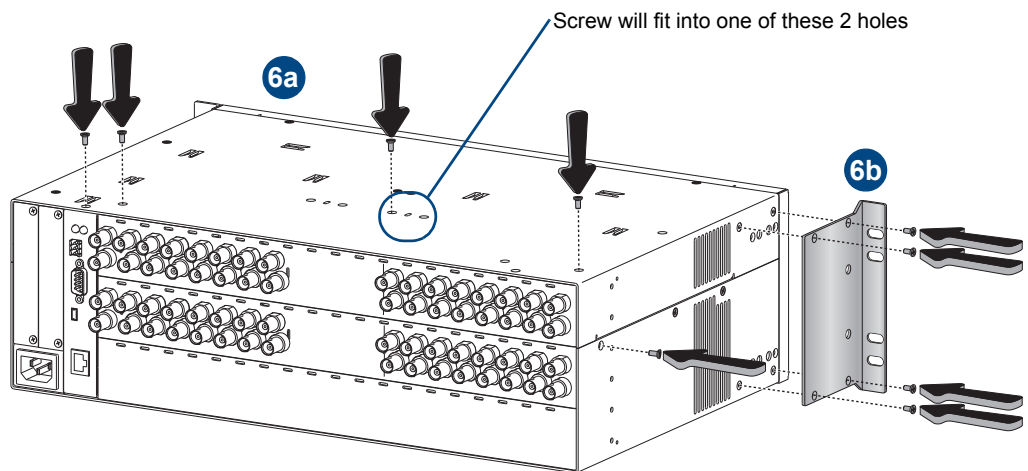


FIG. 50 Replace 5 screws & rack ear (4 screws)

Important: If the slot was previously empty or if the board type has changed, the system's configuration file must be updated before signals can be routed on the new board (see page 74).

Updating the System Configuration

The configuration file stored in the CPU may or may not need to be updated, depending on the type of board being installed.

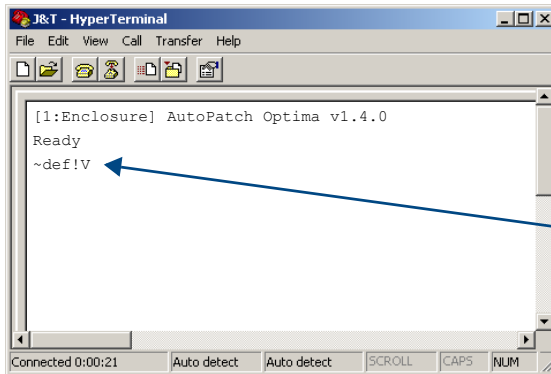
- When an I/O board is replaced with the same type of board, the configuration file will not need to be updated.
- When an I/O board is added to a previously empty slot (an upgrade) in a system, or if the replacement is a different type of board, the system's configuration file *must* be updated before the board will work. If the system requires a new configuration file, the file is provided on a CD and needs to be loaded using XNConnect configuration software.

Note: We recommend keeping a copy of the former configuration file for reference.

Important: When loading any part of a configuration file, the matrix switcher must not be actively switching. You may want to disconnect any external controllers to ensure that no switches are executed during the loading of the file.

To update the system configuration (if applicable):

1. Attach a PC to the enclosure's CONTROL (RS-232) port with an RS-232 null modem cable.
2. Open a terminal emulation program (such as HyperTerminal) and set the port settings to: baud rate = 9600, data bits = 8, stop bit = 1, parity = none, and flow control = none.
3. Plug in the enclosure.
A short splash screen appears (the first two lines in FIG. 51).
4. Enter ~def!
Wait until a "v" appears (FIG. 51) to verify that the command is successful (this may take a few minutes), then exit the program.



Note: Your splash screen may differ. AMX reserves the right to change the contents and/or formatting of the splash screen without notice.

Enter ~def! and wait for the v

FIG. 51 Short splash screen in HyperTerminal

5. Install XNConnect from the *AMX AutoPatch CD* sent with the new board. (If XNConnect is already installed on the PC, we *strongly* recommend uninstalling the old version before installing a new version).
6. Open XNConnect.
7. From the File menu, select Open.
8. From the Communication menu, select Change Comm Settings. Check the settings for the selected PC port and adjust if necessary (the default is Com 1, baud rate 9600).
9. Using the standard File Open dialog box, locate and open the .xcl configuration file that was sent with the new board.
The default location for the file is at C:\AutoPatch\Configuration Software<Version>\MyXCL folder.

- 10.** For XNConnect version 2.4.0 and greater – from the Configure menu, select Configure All.
The system automatically reboots all devices.

Or

For XNConnect versions prior to 2.4.0 – from the Configure menu, select Reboot All Devices.
- 11.** Execute a test switch (see page 31) that includes a signal routed on the new board to ensure the system is working correctly.

If the test switch does not execute correctly, contact technical support (see page 34).



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