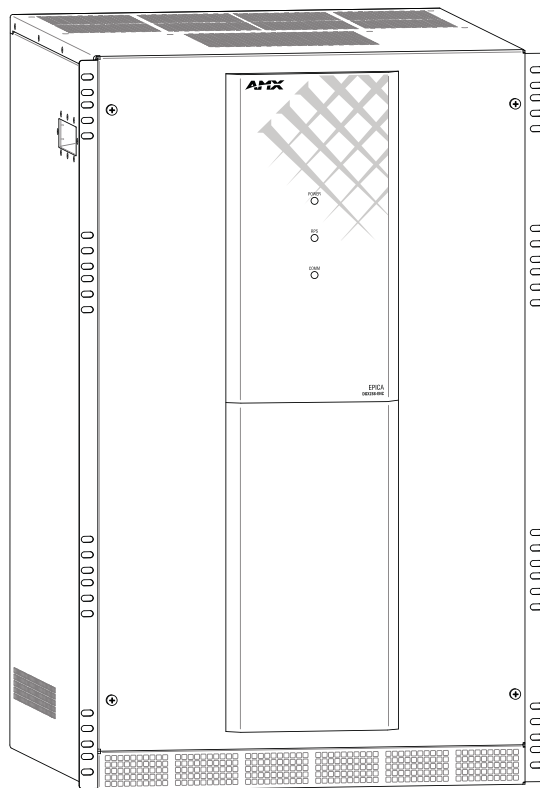# EPICA DGX 288
MATRIX SWITCHER

EPICADGX288-ENC

IMPORTANT SAFETY INSTRUCTIONS

1. READ these instructions.
2. KEEP these instructions.
3. HEED all warnings.
4. FOLLOW all instructions.
5. DO NOT use this apparatus near water.
6. CLEAN ONLY with dry cloth.
7. DO NOT block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. DO NOT install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. DO NOT defeat the safety purpose of the polarized or grounding type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wider blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. PROTECT the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. ONLY USE attachments/accessories specified by the manufacturer.
12. USE ONLY with a cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13. UNPLUG this apparatus during lightning storms or when unused for long periods of time.
14. REFER all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. DO NOT expose this apparatus to dripping or splashing and ensure that no objects filled with liquids, such as vases, are placed on the apparatus.
16. To completely disconnect this apparatus from the AC Mains, disconnect the power supply cord plug from the AC receptacle.
17. Where the mains plug or an appliance coupler is used as the disconnect device, the disconnect device shall remain readily operable.
18. DO NOT overload wall outlets or extension cords beyond their rated capacity as this can cause electric shock or fire.

The exclamation point, within an equilateral triangle, is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electrical shock to persons.

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: To reduce the risk of fire or electrical shock, do not expose this apparatus to rain or moisture.
WARNING: No naked flame sources - such as candles - should be placed on the product.
WARNING: Equipment shall be connected to a MAINS socket outlet with a protective earthing connection.
WARNING: To reduce the risk of electric shock, grounding of the center pin of this plug must be maintained.

COPYRIGHT NOTICE

LIABILITY NOTICE

AMX WARRANTY AND RETURN POLICY

WARNING: This product is intended to be operated ONLY from the voltages listed on the back panel or the recommended, or included, power supply of the product. Operation from other voltages other than those indicated may cause irreversible damage to the product and void the products warranty. The use of AC Plug Adapters is cautioned because it can allow the product to be plugged into voltages in which the product was not designed to operate. If the product is equipped with a detachable power cord, use only the type provided with your product or by your local distributor and/or retailer. If you are unsure of the correct operational voltage, please contact your local distributor and/or retailer.

EU COMPLIANCE INFORMATION

Eligible to bear the CE mark; Conforms to European Union Low Voltage Directive 2006/95/EC; European Union EMC Directive 2004/108/EC; European Union Restriction of Hazardous Substances Recast (RoHS2) Directive 2011/65/EU; European Union WEEE (recast) Directive 2012/19/EU; European Union Eco-Design Directive 2009/125/EC; European Union Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) Directive 2006/121/EC.

You may obtain a free copy of the Declaration of Conformity by visiting http://www.amx.com/techcenter/certifications.asp.

WEEE NOTICE

This appliance is labeled in accordance with European Directive 2012/19/EU concerning waste of electrical and electronic equipment (WEEE). This label indicates that this product should not be disposed of with household waste. It should be deposited at an appropriate facility to enable recovery and recycling.

US FCC COMPLIANCE NOTICE - CLASS A

NOTE: 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 it is not installed and used in accordance with the instruction manual, it 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.

US FCC AND CANADA EMC COMPLIANCE INFORMATION:

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

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CANADA ICES INFORMATION

ICES (Interference-Causing Equipment Standard): CAN ICES-3 (A)/NMB-3(A)

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 make sure 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 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.

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Other products mentioned herein may be the trademarks of their respective owners.

CHINA MARKINGS (ONLY FOR INSTALLATIONS LOCATED IN CHINA)

该设备的设计和测试是在海拔 2000 米高度以下进行的，它只适用在海拔 2000 米以下的地区．在海拔 2000 米以上使用可能会导致潜在的安全隐患．

This symbol denotes that the device is not to be used at altitudes exceeding 2000 meters.

该设备的设计和测试是在非热带气候条件进行的，它只适用在非热带气候的地区．在热带气候地区使用可能会导致潜在的安全隐患．

This symbol denotes that the device is only to be used in climate regions that are not-tropical.

CONTENTS

Product Overview and General Specifications

Applicability Notice

The information in this manual applies to the following Epica DGX 288 Matrix Switcher enclosure and Epica DGX 288 boards:

Epica DGX 288 Matrix Switcher Enclosure (17 RU)

Configuration	FG #	Model
288x288	FG1055-288	EPICADGX288-ENC (EPICA DGX 288 ENC)

This manual primarily covers system setup where input signals enter the Epica DGX 288 via a Fiber Transmitter and exit the switcher via a Fiber Receiver. For information about routing from an output board to the input board in another enclosure, see page 34 and consult the manual of the equipment being linked to.

Epica DGX 288 Matrix Switcher Standard Boards

The Epica DGX 288 Matrix Switcher currently supports two standard Epica DGX 288 board types: Multimode and Single Mode DXLink Fiber, Simplex. Each board fills one of the standard board slots and holds sixteen fiber optic transceivers: each transceiver with one input port and one output port. Within a system, a source device connected to any of the transceiver input ports can be routed to any destination device connected to any of the transceiver output ports,* including input and output ports on the same board. For specific information on DXLink Fiber Boards, see page 29. Signal support for DXLink Fiber products is determined by the transmitter(s) and receiver(s) used, not solely by the input/output board(s).

* The transceiver on the DXLink Fiber Board must match the transceiver on the DXLink Fiber unit, multimode to multimode and single mode to single mode.

IMPORTANT: *These boards are compatible only with other AMX products that support the DXLink Fiber Technology. They are not compatible with third-party optical distribution amplifiers or multimode to single mode converters.*

Epica DGX 288 DXLink™ Fiber Boards, Simplex (see page 29)

Type	FG #	Model
DXLink Multimode Fiber Input/Output Board, Simplex	FG1055-521	EPICADGX288-VIO-MMF-S
DXLink Single Mode Fiber Input/Output Board, Simplex	FG1055-520	EPICADGX288-VIO-SMF-S

* DXLink™ Fiber Boards must be used in conjunction with DXLink™ Fiber Transmitters and Receivers. For model numbers of compatible Transmitters and Receivers and complete system setup information, see page 33.

NOTE: *DXLink Fiber Simplex equipment can receive signals from and route signals to DXLink Fiber Duplex equipment. If Duplex equipment is used in a signal run with Simplex equipment, Duplex equipment should be configured to operate in Unidirectional Mode.*

Product Notes

The Epica DGX 288 Matrix Switcher supports InstaGate Pro®, SmartScale®, and HDMI with HDCP.

The Epica DGX 288 is available as a custom system, which means it can be ordered in configuration sizes that fit your installation and contain an assortment of boards in a single enclosure.

NOTE: *Because Epica DGX 288 Switchers are available as custom systems, the illustrations in this manual may differ from the model(s) you purchased.*

Features of the Epica DGX 288 Matrix Switcher

DXLink™ Fiber, Simplex

- True HDMI switching, allowing any input to be switched to any or all outputs
- Incorporates HDMI® technology in DXLink™ Fiber Boards
- HDCP 1.4 compatible
- Supports uncompressed video resolutions up to 1920x1200 @ 60 Hz, including HDTV up to 1080p
- The slot-independent DXLink Fiber Board, Simplex has 16 SFP+ transceivers, each with an input and an output port, thereby doubling the board's capacity to 32 channels per board (16 input and 16 output).
- InstaGate Pro® Technology – Easily integrate HDCP into system designs and enjoy hassle-free matrix switching to all compliant displays. No tools, no delays, and no key constraints – it just works.
- DXLink™ Fiber Boards provide transport over fiber cable.
- DXLink Fiber Receivers feature SmartScale™ Technology which automatically responds to the display's declared EDID information and scales the video to the best resolution and video parameters for that display without manual setup.

Matrix Switcher

- The available input/output range is 288x288 (comes in increments of sixteen with upgrade potential to the product's capacity).
- System self-diagnostics – power monitoring, fan control and monitoring, signal and temperature sensing. APDiagnostics software (available at www.amx.com) monitors, displays, and collects advanced diagnostic information.
- Local presets allow quick recall of a preprogrammed set of switches with a single command; multiple presets can exist within a system at the same time.
- Global presets allow quick recall of a comprehensive snapshot of all switches.
- N+1 redundant power supplies (RPS) with independent power paths for maximum reliability.
- Rack mounting ears integral to product design.

Control Ports*

- Control port (standard RS-232) for direct matrix switching control
- Control port (USB mini-B) used as a virtual COM port for serial communication with a PC

* If using baud rates at or above 19200 for serial communication with the Epica DGX 288, wait for the "T" following a command before sending subsequent commands.

Product Support

- AMX Limited Lifetime Warranty included (see www.amx.com)
- 24-hour Technical Support

Control Features of the Epica DGX 288 Matrix Switcher

Epica DGX 288 systems support BCS* (Basic Control Structure) protocol.

Several other control options are available for Epica DGX 288 systems. Multiple control methods can be used on the same system.

- Supports AMX AutoPatch's simple BCS serial control protocol
- Compatible with a number of AMX control devices
- Supports third-party controllers

* BCS commands are sent as ASCII characters through the Control (RS-232) port.

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

Common Applications

Epica DGX 288 Switchers fit in a broad range of digital and analog environments and are controllable from a variety of sources. The Epica DGX 288 routes and transmits digital video up to 300 meters on multimode fiber, or 10 kilometers on single mode fiber making it the perfect solution for government agencies, command-and-control environments, universities, hospitals, casinos, retail environments or any facility that demands the highest quality video be shared between rooms, buildings or across an entire campus or city.
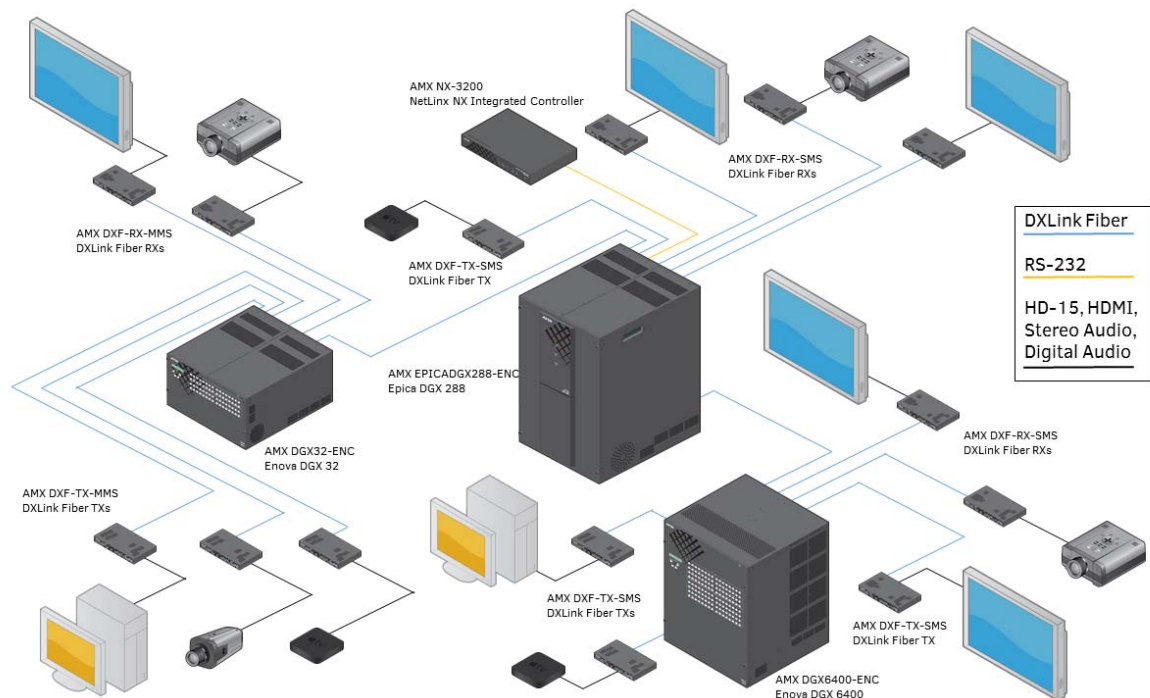
FIG. 1 Application featuring the Epica DGX 288

Front View

The enclosure, which is the structural basis of an Epica DGX 288, can be controlled using control software or an external controller (see page 13). The three LEDs on the front (FIG. 2) indicate status for power, N+1 redundant power supplies (RPS), and communication activity.
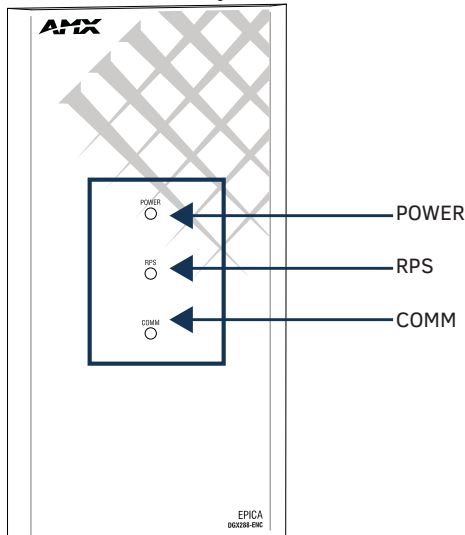
FIG. 2 Epica DGX 288 front panel LEDs

Power Indicator LED

The Power Indicator LED on the front of the enclosure indicates

- Constant Green – at least one power supply is receiving power from a source circuit
- Off – no power supplies are receiving power

N+1 Redundant Power Supply (RPS) Indicator LED

The RPS Indicator LED on the front of the enclosure indicates the status of the N+1 redundant power system within an Epica DGX 288 Matrix Switcher as follows:

- Solid Green – all four power supplies are powered on
- Flashing Green - three power supplies are powered on
- Solid Red – one or two power supplies are powered on*
- Off – none of the power supplies are receiving power

* If the enclosure receives inadequate power, the enclosure's boards will become inoperable and the system will not send or receive signals until at the system receives enough power to resume functional status.

Communication (COMM) Indicator LED

The Communication Indicator LED on the front of the enclosure is reserved for future functionality.

Rear View

Enclosure

The enclosure's appearance, as viewed from the rear, will vary depending on the number and types of input/output boards present. The Epica DGX 288 enclosure in FIG. 3 is fully loaded for 288x288 switching.
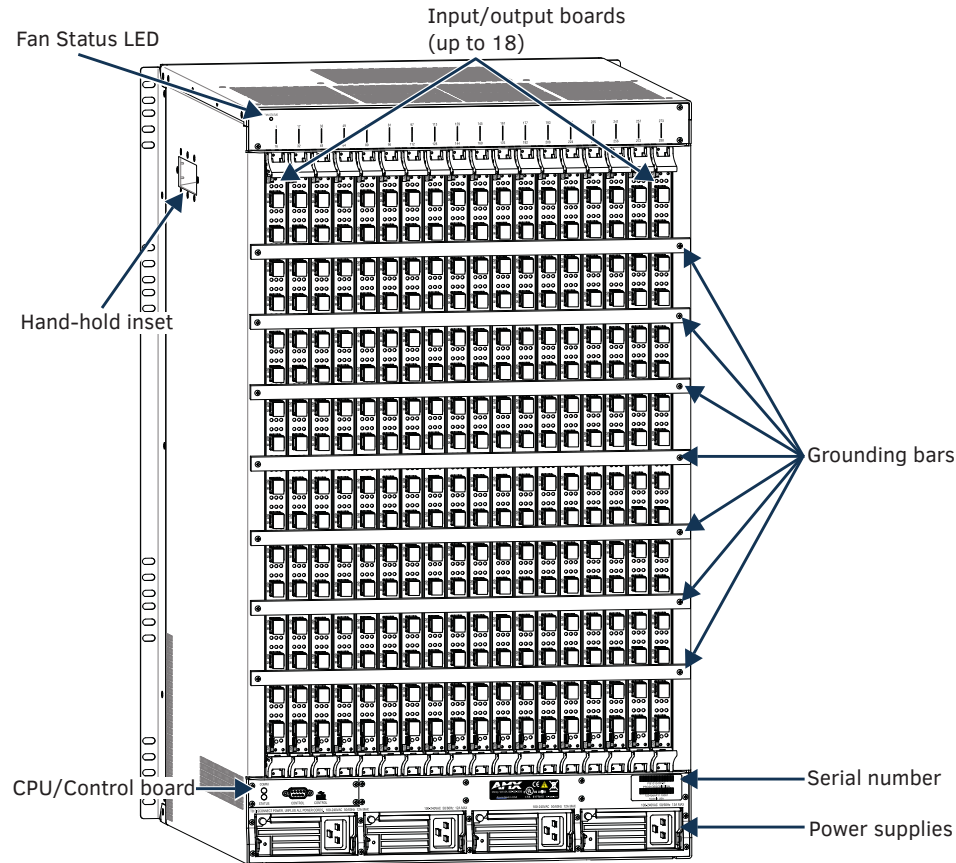
FIG. 3 Rear view of a fully loaded Epica DGX 288 enclosure

Rear View Components

- Input/output boards (some slots may be empty, depending on configuration size)
- CPU/Control board
- Four standard power supplies (fourth power supply provides redundancy)
- Fan status LED
- Serial number
- Grounding bars

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

CPU/Control Board
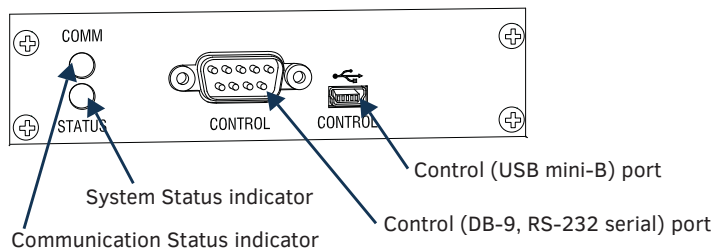
FIG. 4 CPU/Control board

The CPU/Control board is on the left rear of the enclosure.

Each CPU includes the following port and slot options:

- Control port (DB-9, RS-232) – for attaching an external serial control device (see page 23)
- Control port (USB mini-B) – for attaching an external control device (see page 25)

Each CPU includes two LED indicators:
- Communication Status LED – reserved for future functionality
- System Status LED – for system status

Power Supply Units

Each of the power supply units on the rear of the enclosure (FIG. 5) has a power receptacle that will accept all major international standard power sources. (US power cords are included with all shipments unless ordered otherwise.) Maximum power specifications are provided on the power supply receptacles. For information on applying power, see page 20.

Each power supply unit has two LED indicators:
- AC: Green LED – power is good
- DC: The DC indicator uses a tri-color LED
  - Green – power is good
  - Amber – temperature is above normal
  - Red – power supply is in a fault state

Indicator LEDs
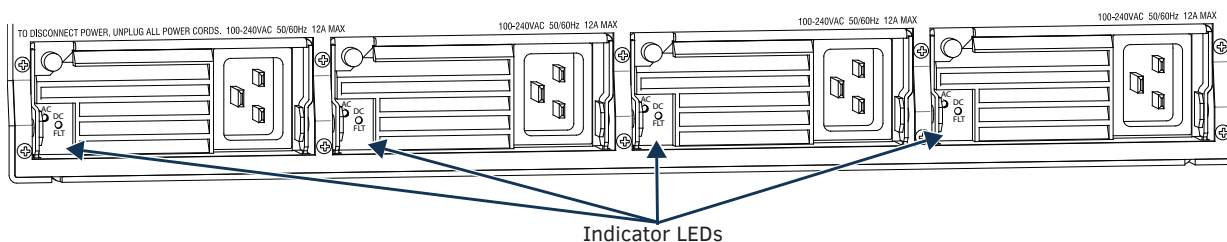
FIG. 5 Power supply receptacles

Fan Status LED

The Fan status LED uses two colors to indicate the status of eight fans within the Epica DGX 288's rear fan tray.

Fan Status LED		
Color	**Behavior**	**Indicates**
Green	Constant	Fans operating normally
Red	Blinking slowly	Failed fan condition*

* A failed fan condition is where one or more fans fall below a speed of 100 RPS.

Input/Output Boards

A single enclosure can handle a combination of signals depending on the types of boards.

Input/Output Boards and Supported Signals							
I/O Board Types	**Signal Types**	**HDMI w/HDCP**	**HDMI w/out HDCP**	**DVI-D w/HDCP**	**DVI-D w/out HDCP**	**Embedded Audio**	**3D Video**
DXLink Fiber, Simplex* - Multimode		●	●	●	●	●	●
DXLink Fiber, Simplex* - Single mode		●	●	●	●	●	●

* Signals supported by DXLink Fiber Boards depend on the type of DXLink Fiber Transmitters and Receivers used.

NOTE: *DXLink Fiber Simplex equipment can receive signals from and route signals to DXLink Fiber Duplex equipment. If Duplex equipment is used in a signal run with Simplex equipment, Duplex equipment should be configured to operate in Unidirectional Mode.*

Epica DGX 288 Inputs and Outputs
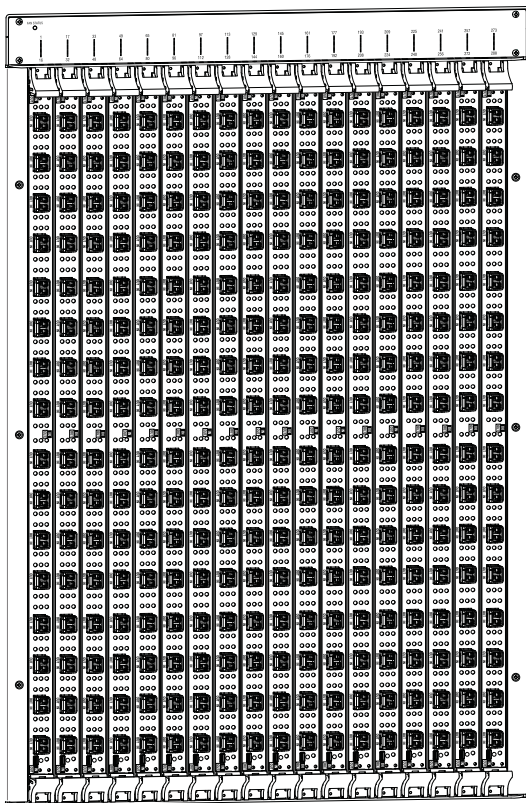
FIG. 6 DXLink Fiber Input and Output Boards (shown with grounding bars and cable management bars removed)

Epica DGX 288 enclosures have 18 vertical I/O board slots (input/output boards have sixteen transceivers, each transceiver with an input and an output port), allowing for a maximum configurations of 288x288.

For information on the DXLink Fiber Boards, Simplex included in your system, including transceiver types, cabling directions, installation considerations, and specifications, see the "DXLink Fiber Boards, Simplex" chapter on page 29.

If a system has empty board slots (which are numbered for additional inputs and outputs), the slots can be used to expand the system. For information on adding or replacing boards, contact Technical Support.

Input/Output Boards

Each DXLink Fiber Board (applies to both Multimode and Single Mode boards) has sixteen transceivers which each have one input and one output port. The ports on the boards are the attachment points for source and destination devices that connect to the system.

Connectors and Signal Types

	Supported Signals
DXLink Fiber (LC Simplex) Transceiver (Signal support depends on the type of DXLink Fiber Transmitters and Receivers used.)	• Video with embedded audio (with or without HDCP)

NOTE: *DXLink Fiber Simplex equipment can receive signals from and route signals to DXLink Fiber Duplex equipment. If Duplex equipment is used in a signal run with Simplex equipment, Duplex equipment should be configured to operate in Unidirectional Mode.*

NOTE: *Firmware upgrades are made via the USB port at the bottom of each DXLink Fiber input/output board.*

Serial Number

The serial number is normally located on the rear of the enclosure on the right (see FIG. 3 on page 10).

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

Epica DGX 288 – General Specifications

General Specifications	
Parameter	**Value**
Approvals	UL 60950-1, CSA 60950-1, IEC 60950-1, CE EN 60950-1, CCC CE EN 55032 Class A, CE EN 55024, FCC CFR Title 47 Part 15 Subpart B Class A, ICES-003 Class A, RoHS, WEEE
AC Power per Supply	100 VAC to 240 VAC single phase, 50/60 Hz
Power Capacity (max.)	5392 Watts, @ 115 VAC 10988 Watts, @ 230 VAC
Power Consumption (max.)	2578 Watts, fully loaded SFP Fiber IO
Power Factor Correction (PFC)	Supported, 0.99
Thermal Dissipation Full Capacity (max.)	18398 BTU/hr, @ 115 VAC 37492 BTU/hr, @230 VAC
Thermal Dissipation (max.)	8796 BTU/hr, fully loaded SFP Fiber IO
Operational Temperature	32° F to 104° F (0° C to 40° C)
Storage Temperature	-22° F to 158° F (-30° C to 70° C)
Operational Humidity	5% to 85% RH (non-condensing)
Storage Humidity	0 to 90% RH (non-condensing)
Dimensions	20.75 in. (52.71 cm) depth; 21.75 in. (55.25 cm) with extractors 19 in. (48.26 cm) width with rack mounting ears 29.63 in. (75.25 cm) height (17 RU)
Weight	Approximately 198 lb. (89.8 kg) per loaded enclosure
Shipping Weight	Approximately 300 lb. (136 kg) per loaded enclosure
MTBF	257,517 hrs
Per Channel Aggregate Data Rate (max.)	12.8 Gbps
Noise Level	71 dBA @ 1m (typical @ 25° C)
Airflow	Forced air (inlet on bottom front and sides; exhaust on top)
Control Port (Serial)	Bidirectional RS-232 • Baud rates of 9600 (default), 19200, 38400, 57600, 115200 • DB-9 **NOTE:** *If using baud rates at or above 19200 for serial communication with the Epica DGX 288, wait for the "T" following a command before sending subsequent commands.*
Control Port (USB)	USB Mini-B • Baud rates of 9600, 19200

NOTE: *For individual board information and specifications, see the "DXLink Fiber Boards, Simplex" chapter on page 29.*

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

Configuration Information and Control Options

Switching Configuration Information

The configuration file stored on the CPU contains routing and control information for the Epica DGX 288 Routing System.

From the factory, the configuration normally contains two virtual matrices (VMs) for switching signals:

- VM 0 = all signals (default)
- VM 1 = video signals

VM 1 routes the video and any embedded audio.* VM 0, which is exactly the same as VM 1, is also provided as an option for compatibility purposes with control software and equipment. On occasion, systems are shipped with custom programmed configurations according to customer specifications.

* Embedded audio *cannot* be routed separately in this type of system.

XNConnect configuration software can be used to customize the configuration file (see page 42). However, unless you need to modify your system, you will not need to use XNConnect. If you do modify the configuration file, we recommend making a copy of it first. Configuration file modifications include creating local presets, as well as adding or managing hardware. XNConnect graphically displays the Epica DGX 288 and its control configuration. For complete information, see the XNConnect Help file.

Control Options

The following external methods of control are available.

BCS (Basic Control Structure) Protocol

The Epica DGX 288 can be controlled with an external serial controller using BCS* protocol, a command language for programming control operations and for diagnostic purposes.

- Serial control (sends and receives ASCII characters)
- Use the Control (RS-232 serial) port or use the USB Control port (as a virtual COM port); both are located on the CPU
- Commands can be entered into a terminal emulation program on a PC

* For complete information on BCS commands, see the *Programming Guide – BCS Basic Control Structure Protocol* at www.amx.com.

Third-Party Controllers

A third-party controller can be attached to an Epica DGX 288 via the RS-232 serial port. If using a third-party controller, see the controller documentation for operating instructions.

NOTE: *If using baud rates at or above 19200 for serial communication with the Epica DGX 288, wait for the "T" following a command before sending subsequent commands.*

System Diagnostic Options

APDiagnostics

APDiagnostics is a software application that monitors and displays advanced diagnostic information about the behavior of the Epica DGX 288. This application is available at www.amx.com. APDiagnostics also works with other AMX Matrix Switchers that are capable of reporting such data. For information on APDiagnostics, contact Technical Support.

Installation and Setup

DXLink Fiber Boards, Simplex

WARNING: DXLink Fiber units use laser transceivers, which are Class 1 Eye Safe per IEC 60825-1/CDRH requirements. While the Class 1 category indicates that the invisible laser used is safe, we recommend avoiding direct eye exposure when using any optical fiber products (see the OSHA directive on page 34).

Site Recommendations

When placing the enclosure, 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).

Chassis Accessibility

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

Power

IMPORTANT: *For full system power redundancy when the enclosure reaches or exceeds half of its Input/Output board capacity, we recommend powering all four of the enclosure's power supplies, each connected to a different circuit.*

The source's electrical outlet should be installed near the router, 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 20 A for 110 V or 10 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 Epica DGX 288 is 104° F (40° 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 104° F (40° C) and follow the clearance recommendation below for adequate airflow.

Airflow Restriction

Epica DGX 288 enclosures are designed to adequately dissipate the heat they produce under normal operating conditions; however, this design is defeated if 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 enclosure. The system requires a minimum of two empty rack units above (three empty rack units are recommended). Verify that the openings on the top and sides of the enclosure 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. Note that fully loaded, the Epica DGX 288 weighs approximately 198 pounds (89.8 kg).

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: We strongly recommend attaching all of the power cords to a surge protector and/or an AC line conditioner. After powering up the enclosure, apply power to the source and destination devices.

Unpacking

Epica DGX 288 systems are 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:

❑ Epica DGX 288 Matrix Switcher

❑ Four standard US power cords (if shipped within the US)

❑ Other enclosure related products, as needed

The documentation in the first box includes:

❑ *AMX Epica DGX 288 Matrix Switcher Quick Start Guide*

For orders comprising multiple enclosures, the shipping boxes are marked as "Chassis __ 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 enclosure, *inspect the shipping box 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 at www.amx.com).

❑ Once unpacking is complete, closely check the physical condition of the enclosure.

❑ Collect all documentation.

NOTE: *Please save the original shipping container 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.*

Options for System Setup with DXLink™ Fiber, Simplex

The following table contains the options in an Epica DGX 288 for using DXLink™ Fiber, Simplex Input/Output Boards in conjunction with DXLink™ Fiber, Simplex Transmitters and Receivers.

System Setup Options – Epica DGX Boards with DXLink Fiber, Simplex Units			
DXLink Fiber, Simplex Transmitters	DXLink Fiber, Simplex Boards	DXLink Fiber, Simplex Boards	DXLink Fiber, Simplex Receivers
Multi-Format MM Fiber TX →	Multimode Fiber →	Multimode Fiber →	HDMI MM Fiber RX
Multi-Format MM Fiber TX →	Multimode Fiber →	Single Mode Fiber →	HDMI SM Fiber RX
Multi-Format SM Fiber TX →	Single Mode Fiber →	Single Mode Fiber →	HDMI SM Fiber RX
Multi-Format SM Fiber TX →	Single Mode Fiber →	Multimode Fiber →	HDMI MM Fiber RX

NOTE: *In addition to the system setup options listed in the table above, optical signal flow between the Epica DGX 288 Matrix Switcher and Enova DGX enclosure (from DXLink fiber port to DXLink fiber port) is supported. Contact your AMX representative for these and other system design possibilities.*

A typical system setup for a source and destination is illustrated below and shows an Epica DGX 288 with DXLink Fiber Boards, Simplex used in conjunction with DXLink Fiber Transmitters and Receivers, Simplex.
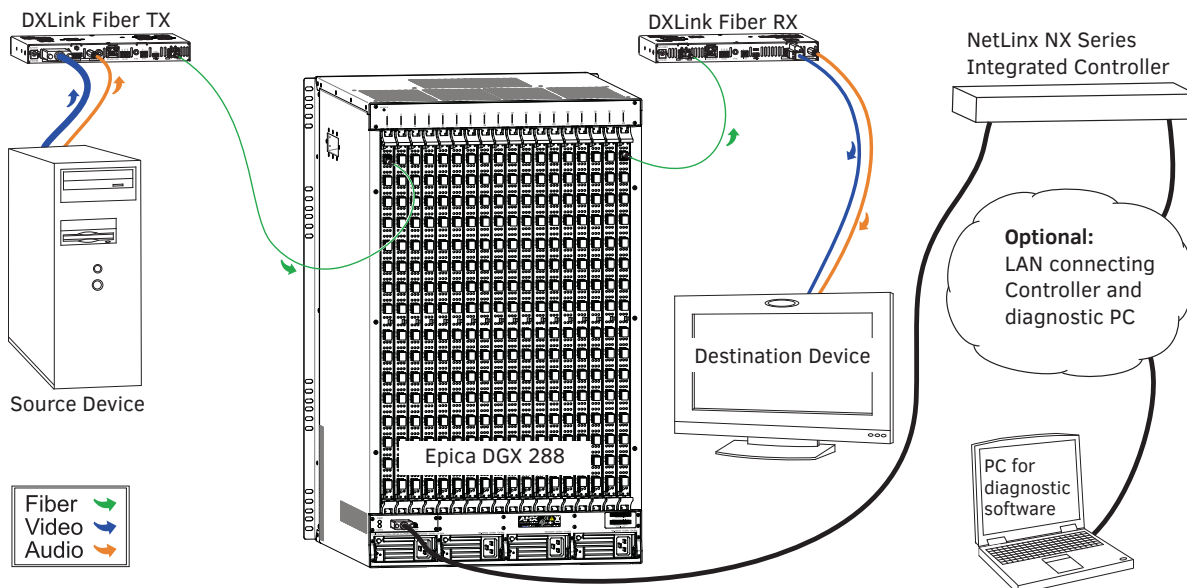
FIG. 7 Epica DGX 288 connected to source and destination devices via Transmitters and Receivers (with optional LAN connections)

Rack Installation and System Setup

Epica DGX 288s can be mounted in a standard EIA 19 in. (48.26 cm) rack.

Required Items for Rack Installation:

- ❏ Enclosure
- ❏ Standard EIA 19 in. (48.26 cm) rack
- ❏ Screwdriver
- ❏ Screws that fit your rack for mounting the enclosure
- ❏ Power cords – four provided (if shipped within the US)
- ❏ Surge-protectors or AC line conditioners – highly recommended

Optional Items for Rack Installation:

- ❏ A PC or laptop computer with a null modem cable for communication with the enclosure via the RS-232 serial (Control) port

Installation Recommendations:

- Write the serial numbers (normally located on rear of enclosure) in an easily accessible location before installing the enclosure in a rack.
- Use earth-grounded power cords with an Epica DGX 288.
- Attach all power cords to separate surge protectors and/or AC line conditioners.
- Apply power to the Epica DGX 288 before applying power to its source and destination devices.

Safety Recommendations for Laser Products

IMPORTANT: *No user serviceable parts are included inside the Epica DGX 288; service should only be done by qualified personnel.*

WARNING: DXLink Fiber units use laser transceivers, which are Class 1 Eye Safe per IEC 60825-1/CDRH requirements. While the Class 1 category indicates that the invisible laser used is safe, we recommend avoiding direct eye exposure when using any optical fiber products (see the OSHA directive on page 34).
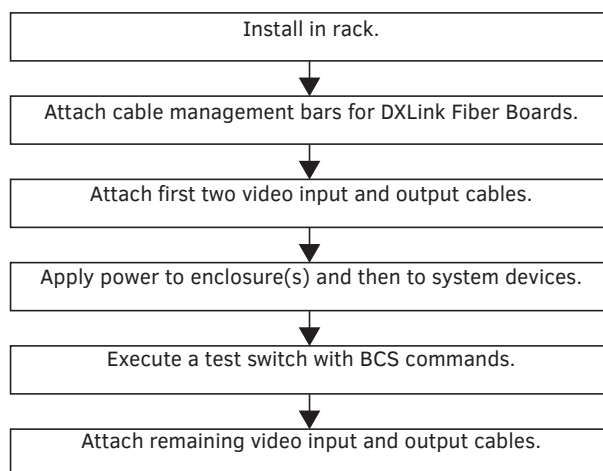
CAUTION: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Exercise caution when installing DXLink Fiber products to avoid direct eye exposure to invisible laser radiation. Follow the recommendations below whenever installing or working with fiber products.

- ❏ Be sure to apply the power only after all the fiber connections are made and no fiber ends are exposed.
- ❏ Do *not* remove dust plugs from fiber ports or the dust caps from the fiber cables until establishing connections; avoid direct eye exposure.
- ❏ Make sure all cables, including fiber cables, are correctly connected and/or terminated.
- ❏ Before you unplug a fiber cable on an input board, disconnect the power on the transmitter that is connected to the input.
- ❏ Before you unplug a fiber cable on an output board, disconnect the switch for that output port.

Installation Procedure

A flow chart showing the basic installation sequence is in FIG. 8. The procedure following the chart provides general steps with references to detailed information found in later sections of the manual.

Install in rack.
↓
Attach cable management bars for DXLink Fiber Boards.
↓
Attach first two video input and output cables.
↓
Apply power to enclosure(s) and then to system devices.
↓
Execute a test switch with BCS commands.
↓
Attach remaining video input and output cables.

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

FIG. 8 Flow chart for installation procedure

Installing an Epica DGX 288 Enclosure

To install an Epica DGX 288 enclosure in rack (requires 3 people minimum):

IMPORTANT: *Do <u>not</u> use the board extractor handles to lift the enclosure or to maneuver it into place. Use the inset lifting handles to maneuver the enclosure. We recommend using a temporary shelf for support.*

1. While the shipping box containing the enclosure is still on the pallet, cut loose and remove the outer straps.

2. Remove the cardboard tray from the top of the reusable shipping box.

NOTE: *The shipping box is mounted on wheels.*

3. Lift the shipping box off of the pallet.

CAUTION: The Epica DGX 288 weighs approximately 198 lb (89.8 kg) for a fully loaded enclosure. Ensure all parties involved in lifting the shipping box are prepared and follow local requirements as necessary for the task (e.g., wearing proper lifting attire, number of lifters, etc.).

4. Unlock the four latches on the two sides of the shipping box.

5. Lift the top of the shipping box straight up and over the Epica DGX 288 and set aside.

6. Using the bottom of the shipping box, roll the enclosure into position.

7. Select a position in the rack for the enclosure that is accessible and does not restrict airflow.

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

8. Using the inset handles, lift onto a temporary shelf (or some other type of support) in the rack.

9. Align as closely as possible and then lift into position and screw in the rack ear screws on each side.

Rack mounting screws aligned with rack
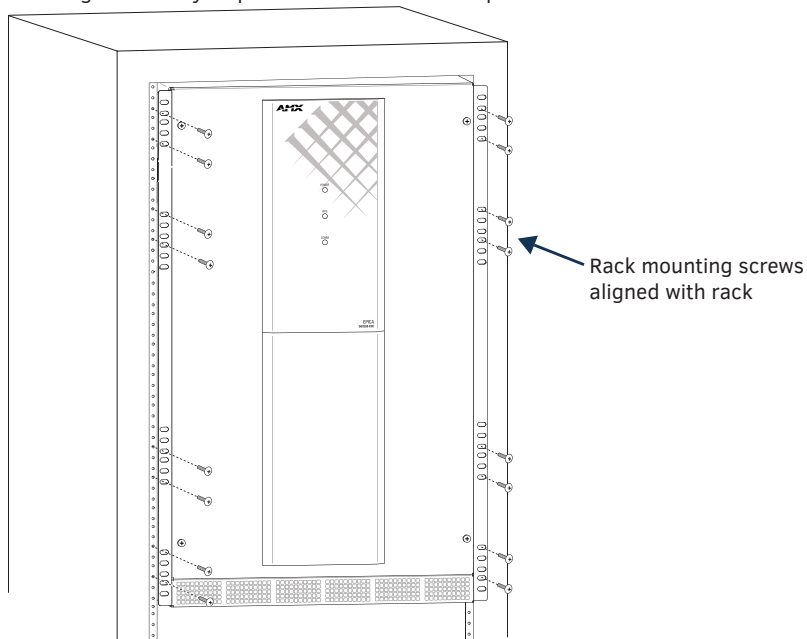
CAUTION: On systems with DXLink fiber transceivers, we recommend using the provided cable management bars or some other type of cable management system to avoid damage to the fiber cables.

10. Recommended for DXLink Fiber Boards – Attach the provided cable management bars to the input/output boards (see page 19).

11. For testing purposes, start by attaching *only* the first two source and destination devices.
    - If connecting devices to **DXLink Fiber Boards**, the boards require DXLink Fiber Transmitters and Receivers. Install the Transmitters and Receivers between the first two source and destination devices and the DXLink Fiber Boards (see "System Setup with DXLink™ Fiber, Simplex Units" on page 33 and the product's documentation).

NOTE: *DXLink Fiber Simplex equipment can receive signals from and route signals to DXLink Fiber Duplex equipment. If Duplex equipment is used in a signal run with Simplex equipment, Duplex equipment should be configured to operate in Unidirectional Mode.*

12. Attach power cords to all power receptacles on the enclosure, then apply power to the entire system (see page 20).
    We recommend using a surge protector and/or an AC line conditioner for each power supply.

13. Disconnect the factory default switch and execute a test switch to make sure the system is working properly (see page 22).

14. When the test switch works correctly, attach the remaining source and destination devices and any additional required transmitters and receivers.

NOTE: *If additional boards are required with the installation, see the instructions on page 59.*

Installation Options

Additional installation tasks may include the following:.

- Establishing external serial control (DB-9 port) – page 24
- Establishing external serial control (USB virtual COM port) – page 25
- Defining local presets – for information on local presets, see the "Managing Configuration Files" appendix on page 42
- Defining global presets – for information on defining and executing global presets, see the *Programming Guide – BCS Basic Control Structure Protocol* at www.amx.com
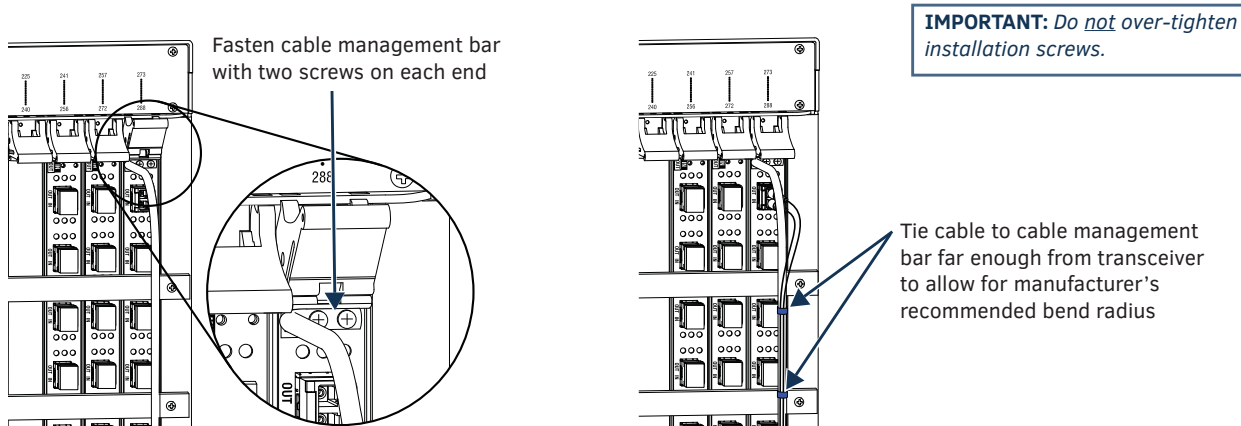
Attaching Cable Management Bars

If the enclosure has DXLink Fiber Input and Output Boards installed, cable management bars are provided.

CAUTION: Do not severely bend or kink any type of fiber cable. Irreversible damage can occur. Refer to the physical limitations (bend radius) specified for the cable by the manufacturer.

To install cable management bars:

1. Align the two screw holes on the end of the cable management bar with the two screw holes on the end of the board. (Note the position of the long part of the bar in relation to screw holes.)

Fasten cable management bar with two screws on each end

IMPORTANT: *Do not over-tighten installation screws.*

Tie cable to cable management bar far enough from transceiver to allow for manufacturer's recommended bend radius

FIG. 9 Installation of cable management bars

2. Insert and tighten the two screws at the end of the cable management bar (do *not* over tighten the screws).

3. Align, insert, and tighten the two screws at the other end of the cable management bar (do *not* over tighten).

4. Tie the cable to the cable management bar far enough from the transceiver to allow for the manufacturer's recommended bend radius.
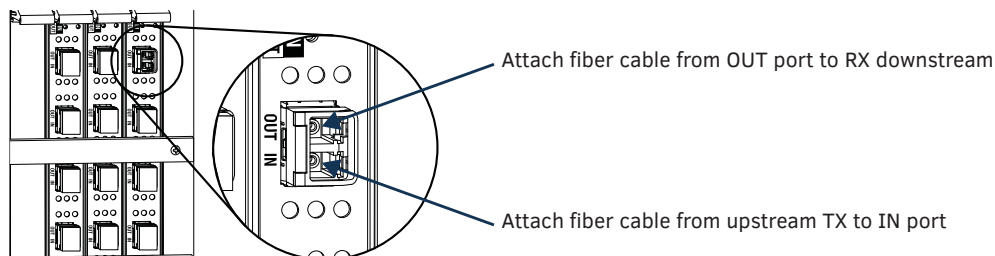
Attaching Input and Output Cables

DXLink fiber optic transceiver ports are the attachment points for source and destination devices that connect to the system. Enclosures have eighteen vertical board slots with sixteen transceivers per board (one input and one output port on each transceiver), allowing for a maximum configuration of 288x288 when using every transceiver input port to attach sources and every transceiver output port to attach destinations. For information on transceivers, cabling, and specifications for specific types of transceivers, see the "DXLink Fiber Boards, Simplex" chapter on page 15.

NOTE: *DXLink Fiber Simplex equipment can receive signals from and route signals to DXLink Fiber Duplex equipment. If Duplex equipment is used in a signal run with Simplex equipment, Duplex equipment should be configured to operate in Unidirectional Mode.*

Input and Output Signal Cables

If using cable management bars, install them before attaching the cables (see above). Before connecting all of the input and output cables and wires, attach only the ones for the first two sources and destinations (and any applicable transmitters and receivers). Complete the remaining installation tasks and then disconnect the factory default switch and execute a test switch (see page 22). When the test switch is successful, attach the remaining input and output fiber optic cables.

Attach fiber cable from OUT port to RX downstream

Attach fiber cable from upstream TX to IN port

FIG. 10 IN and OUT ports for cable connection

Applying Power and Startup

The enclosure's universal power receptacles will accept all major international standard power sources. Four US power cords are included with all shipments within the US. Maximum power specifications are on each power receptacle. Always use earth-grounded power cords / system with an Epica DGX 288.

The source electrical outlet(s) should be installed near the enclosure, 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 20 A for 110 V or 10 A for 230 V for each circuit. To avoid an overload, note the power consumption rating of all the equipment connected to the circuit breaker before applying power.

Complete Power Redundancy Setup

IMPORTANT: *For proper N+1 redundant operations, all power supplies must be powered at all times.*

To provide adequate power for an N+1 redundant application, connect each of the power supplies to its own circuit.

CAUTION: We recommend attaching each power cord to a surge protector and/or an AC line conditioner.

Power-Up Sequence

The following instructions start with attaching only two source and destination devices for the purpose of executing a test switch (after the factory default switch is disconnected).

To apply power:

1. For testing purposes, start by attaching the first two source and destination devices (attach the remaining devices in Step 11 after executing the test switch in Step 10).
    Do *not* apply power to the source and destination devices until Step 9.

2. Install the DXLink Fiber Transmitters and Receivers between the first two source and/or destination devices and the DXLink Fiber Boards (see "System Setup with DXLink™ Fiber, Simplex Units" on page 33 and the product's documentation).

3. Optional – Attach an external control device/system (see page 24).

4. Plug power cords into *all of the power receptacles* on the enclosure.
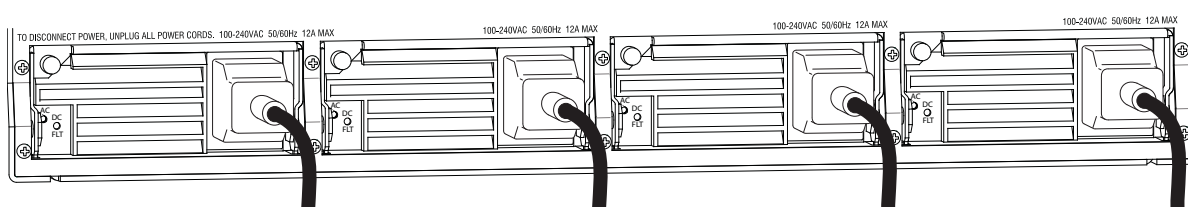
FIG. 11 Attach power cables to all four power receptacles

5. Plug the other end of each power cord into its power source (if using a power strip, turn on the power strip).

6. Wait 30 seconds.
    The RPS indicator LED on the Front Panel illuminates green (showing that all power supplies are working).
    - If one power supply is not working, the RPS indicator will flash red.
    - If two or three power supplies are not working, the RPS indicator will be a constant red (check power connections and switches).

7. Optional – Apply power to a control device/system.

8. Apply power to the DXLink Fiber TX and RX units.

9. Apply power to the source and destination devices.

10. Disconnect the factory default switch and execute a test switch (see page 22).

11. Attach the remaining sources and destinations and apply power to them.

IMPORTANT: *Whenever the system is powered down, be sure the indicator LEDs on the CPU are off and the fans have stopped before reapplying power.*

Indicator Lights at Startup

When the enclosure powers up, the indicator LEDs respond as follows:

Epica DGX 288 LED Indicators				
	LED	**Indicates**	**Normal Display**	**Cautionary**
Front	Power	Power presence	Green	Off: no power to power supplies
	RPS	N+1 Redundant power status	Solid green	• Flashing green: 3 power supplies present • Solid red: 1-2 power supplies present • Off = no power to power supplies
	Comm	Reserved for future functionality		
Rear – Power Supplies	AC Power	AC power present	Constant green	Not illuminated: AC failure
	DC Power (Tri-color LED)	• DC power present • Power supply temperature • Fault Status	Constant green	• Not illuminated: DC failure • Amber: power supply is over temperature • Red: power supply is in a fault state
Rear – CPU	Status	System status	Constant green during power up, then blinking green at 1 second on/off intervals	• Blinking red/green: an exception has been logged in IOS (validation failure) • Blinking red: dropped into IOS mode**
	LAN 100/1000 • L/A • SPD	• Cables are connected and terminated correctly • Receiving or transmitting LAN data packets	• Constant green • Blinks yellow	
Rear – Fan Tray	Status	Fan speed status	Green	Blinking red: one or more fans have slowed beyond minimum RPS threshold

* IOS (Initial Operating System) is the base layer operating system on Epica DGX 288 equipment. IOS performs functions such as hosting level run-time software applications. If unexpected critical errors are encountered within such hosted applications, system control of the equipment may be passed to the IOS layer preventing normal system operation until the error is manually cleared. Report all such errors to Technical Support (see page 28).

Power Supply Troubleshooting

IMPORTANT: *If the indicator LEDs do not respond with a normal display as stated in the table above, check power connections, before contacting Technical Support (see page 28).*

IMPORTANT: *A failed power supply should be replaced as soon as possible to maintain the system's power redundancy. For replacement information, contact Technical Support.*

❑ If a power supply's AC and DC power indicator LEDs are not illuminated:
Check to be sure the power cord is completely plugged into the enclosure and the power source.

❑ If a power supply's DC LED illuminates amber or red:
Contact Technical Support (see page 28).

CAUTION: Do not remove a failed power supply until the replacement is ready to install, unless directed to do so by Technical Support.

Executing a Test Switch

For new system installations, we recommend executing a test switch to verify the system is working correctly before attaching *all* inputs and outputs. *You must first disconnect the factory default switch of Input 1 routed to all outputs on Virtual Matrix 0 (Level 0, the default).*

You can disconnect the factory default switch and execute a test switch from one (or more) of the following:

- BCS (Basic Control Structure) commands over an external controller
- An external third-party controller (see product directions)

Before executing the test switch:

❏ Disconnect the factory default switch and make sure the first two source devices and the first two destination devices are connected to the input and output ports (for specific board information and specifications, see the board chapter in this manual).

❏ Any applicable DXLink Fiber units must also be installed (see the product's documentation).

❏ Power must be applied to the enclosure and then to the source and destination devices.

When executing a test switch, we suggest routing Input (source) 1 to Output (destination) 2 on the default virtual matrix of VM 0, unless you know the system was ordered with custom VMs.

After the test switch has executed successfully:

❏ Disconnect the test switch before finishing the installation.

BCS Commands

To enter BCS commands, the system needs to be attached to a serial control device (see page 23) and running a terminal emulation program. The settings on the PC serial communication software and the enclosure *must* correspond to each other (for setting information, see page 24).

When using a terminal emulation program, command characters are entered and sent to the enclosure's CPU. The command characters appear on the screen when the enclosure responds. When all of the entered characters appear, the command has been successfully executed.

Levels in BCS commands are the equivalent of virtual matrices for switching purposes. Level 0 (VM 0) is the default level (virtual matrix).

To disconnect the factory default switch using a BCS command:

1. Enter the following BCS command line:
   `DL0I1T`
   When the "T" appears, the factory default switch of Input 1 to all outputs on Level 0 is disconnected.

To execute the test switch using a BCS command:

1. Enter the following BCS command line:
   `CL0I1O2T`
   When the "T" appears, the test switch command routes Input 1 to Output 2 on Level 0.

If any other character(s) appear, the command was not successful. In that case, check to see if the source signal is present (visible and/or audible) at the destination.

To disconnect the test switch using a BCS command:

1. Enter the following BCS command line:
   `DL0I1O2T`
   When the "T" appears, the test switch is disconnected.

For a complete list of BCS commands and responses, see the *Programming Guide – BCS (Basic Control Structure) Protocol* at www.amx.com.

NOTE: *If using baud rates at or above 19200 for serial communication with the Epica DGX 288, wait for the "T" following a command before sending subsequent commands.*

Test Switch Troubleshooting

NOTE: *Normally the Epica DGX 288 switches non-encrypted content without problems when the display is non-HDCP compliant. Be aware that when non-encrypted content is being played on a Blu-Ray player, most players pass the content on as though it was encrypted. Therefore, when a Blu-Ray player sends originally non-encrypted content as encrypted content to an Epica DGX 288 and the signal is switched to a device that does not support HDCP (via a Fiber Transmitter), the content will not display and the image will be orange.*

If the image has black bars on all sides:

If the source device is providing video at 1080p @ 60 Hz and black bars appear on all sides of the image:

- Set the resolution provided by the source device to either a different resolution or refresh rate (e.g., 1080p @ 50 Hz).

  Or

- Select a resolution and refresh rate from the PC's graphic driver control panel and be sure to select "Maintain Display Scaling" as the "Scaling" option.

If the test switch did not execute correctly:

❑ Check the Power indicator on the front of the enclosure.
   If it is not illuminated, check the power cords at the enclosure and at the power source.

❑ Verify the status of the test switch. If status returns as routed correctly, the system established a connection between the specified input and output ports within the enclosure.

   - **BCS commands:** enter "SL0O2T". If "SL0O2T(1)" appears, the test switch is routed.

❑ Check all link and signal connections on the rear of the enclosure(s) to make sure everything is physically set up correctly.

❑ If applicable – check connections on DXLink Fiber Units (also see "Troubleshooting" in the *Hardware Reference Manual – DXLink™ Fiber Transmitters and Receivers*).

❑ Check all power switches on the source and destination devices to make sure all are turned on.

❑ Depending on the board type:

   - Isolate source/destination equipment and cable problems by patching around the router using a cable adapter to check the overall signal path.
   - Check the documentation for the DXLink Transmitters and Receivers to be sure they are installed correctly. Isolate source and destination devices using the modules to bypass the enclosure to check the fiber optic cable and overall signal path.

❑ Attempt the switch again.
   If the switch still does not work, contact Technical Support (see page 28).

Attaching an External Serial Controller

Epica DGX 288 systems can be controlled externally by attaching a serial control device that uses one of the communication protocols listed below:

- BCS (Serial) – ASCII sent over a null modem serial cable via the serial Control port
- BCS (USB) – ASCII sent over a USB cable via the USB (mini-B) Control port

NOTE: *The two Control ports provide direct serial control of matrix switcher processing.*

External Serial Control Options

BCS 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. For information on BCS commands, see the *Programming Guide – BCS Basic Control Structure Protocol* at www.amx.com.

Third-Party Controllers

Third-party controllers connect to the serial port (DB-9) or USB (mini-B) port on the CPU. If using a third-party controller, see the controller documentation for setup and operating instructions.

Connecting 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 serial port (DB-9) on the enclosure's CPU. PCs are common serial controllers. Once a PC is attached to the Epica DGX 288, the system can be controlled by entering BCS commands into a terminal emulation program. The USB port can also be used for connecting serial controllers by creating a virtual COM port; see page 25.

PC Requirements for BCS

☐ Windows® Operating System

☐ Terminal emulation program

☐ Serial port or USB port

Serial Connection via Control (DB-9) Port

NOTE: *If using baud rates at or above 19200 for serial communication with the Epica DGX 288, wait for the "T" following a command before sending subsequent commands.*

RS-232 Pin Diagram

A serial connection via the Control port requires a null modem cable that matches the pin diagram in FIG. 12 for RS-232 without hardware flow control. Epica DGX 288 systems require pins 2, 3, and 5 only.
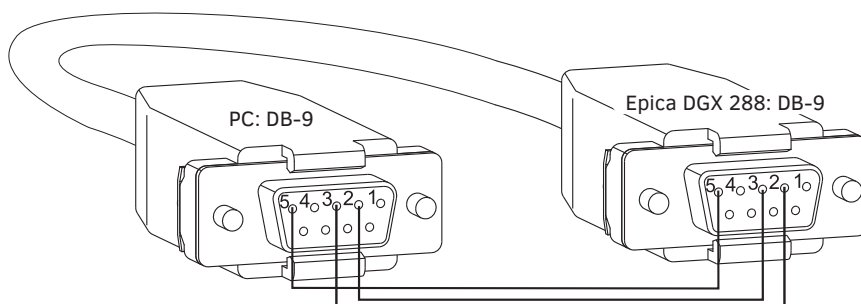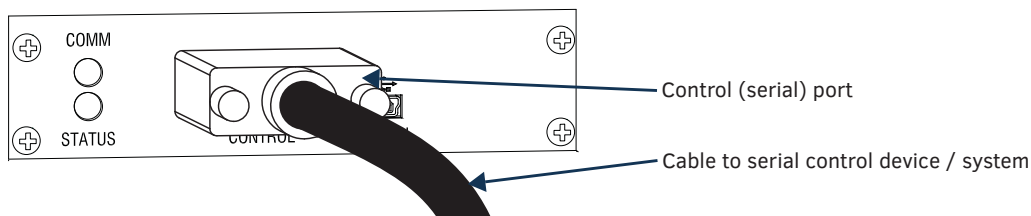

FIG. 12 RS-232 null modem cable pin diagram, no hardware flow control

Serial Port Settings

To establish external serial control via the Control (DB-9 serial) port:

1. Plug one end of the null modem serial cable into the Control port on the enclosure.

FIG. 13 Null modem serial cable connected to Control port

2. Plug the other end of the serial cable into the serial port on the serial controller.

3. If not already on, apply power first to the Epica DGX 288 and then to the source and destination devices (see "Applying Power and Startup" on page 20).

CAUTION: To avoid system damage, follow the power-up sequence on page 20. We recommend attaching all power cords to a surge protector and/or AC line conditioner.

4. Setup and run the desired method of control:
   ● AMX Controller – For control programming information, see the instruction manual for the specific interface.
   ● Terminal emulation – Open the program, set the COM port settings to match the default ones in the "Epica DGX 288 Serial Port Settings" table to the right.

5. Execute a test switch to make sure the system is working properly (see page 22).

Epica DGX 288 Serial Port Settings	
Baud Rate	9600
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

Serial Communication Settings

If you are controlling the system with a serial controller, use serial communication software and make sure the baud rate is set correctly for the system. The recommended settings (default settings) for serial communication with Epica DGX 288 enclosures are listed in the table on the previous page.

Epica DGX 288 enclosures support baud rates of 9600 (default), 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 configuration software (see the Help file).

Serial Connection via Control (USB) Port

NOTE: *If using baud rates at or above 19200 for serial communication with the Epica DGX 288, wait for the "T" following a command before sending subsequent commands.*

Controlling an Epica DGX 288 using a connection through the USB Control port requires the creation of a virtual COM port. Once created, the virtual COM port is used as if it were a standard serial connection and can connect to a control application or to a terminal emulation program (e.g., TeraTerm, PuTTY, or HyperTerminal) for BCS control.

IMPORTANT: *You must have adequate rights to install USB device drivers to the PC. Check with your System Administrator to be sure you have the required access.*
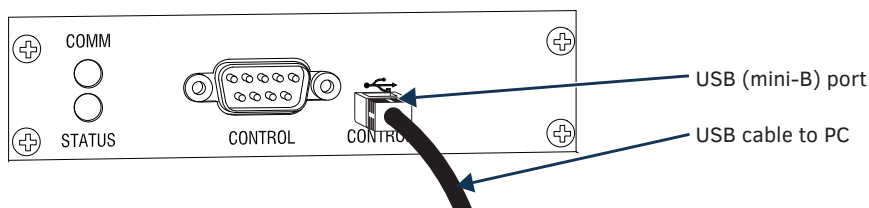
If you are establishing a new connection, complete all of the steps in the instructions starting below.
Or
If you are reconnecting after previously establishing a USB connection, complete Steps 2 and 3 and then set up and run the desired software program or utility.

To attach a PC to the USB (mini-B) port and establish a virtual COM port:

1. Download the APBridge.inf file, which is located at www.amx.com (enter APBridge in the Search AMX.com field in the upper right-hand corner of the site). No user permissions are required.
2. Apply power to the enclosure (see page 20).
3. Connect the enclosure to a PC running Windows with USB cable (FIG. 14).

USB (mini-B) port

USB cable to PC

FIG. 14 USB cable connected to USB port on Epica DGX 288 and to PC

4. If establishing a new connection, complete the remaining steps.
   Or
   If reconnecting after previously establishing a USB connection, go to Step 11 to run the desired software.

NOTE: *The following dialog boxes appear only during the initial USB connection. Once the virtual COM port has been assigned to the enclosure, the dialog boxes do not appear again. If they do appear, you have connected the USB plug to a different COM port on the PC than the initial one – either switch to the initial COM port or establish a virtual COM port for the new port on the PC.*

The Driver Software Installation window appears. Click Close.
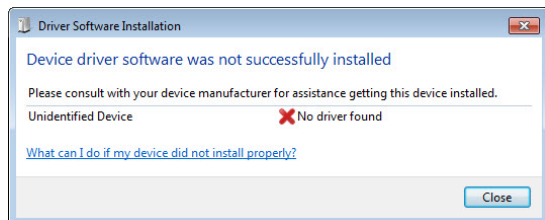
5. Open the Device Manager window (Start/Control Panel/Device Manger icon)*, open Other devices, and right-click on the Unknown device icon. Select Properties from the menu.
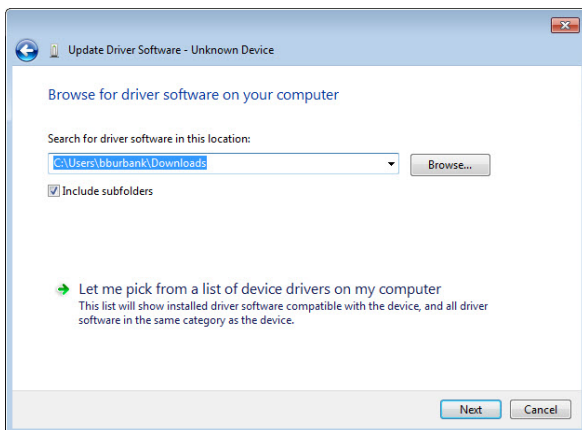The Unknown Device Properties window opens.
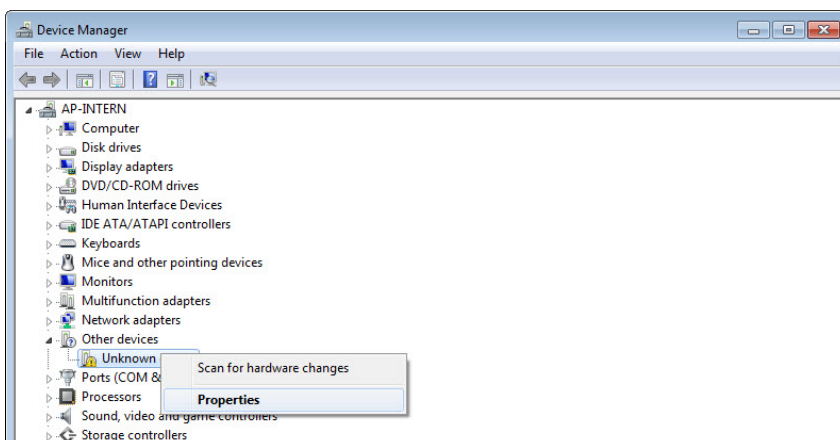
* The Device Manager may have a different location depending on the operating system and theme selected.
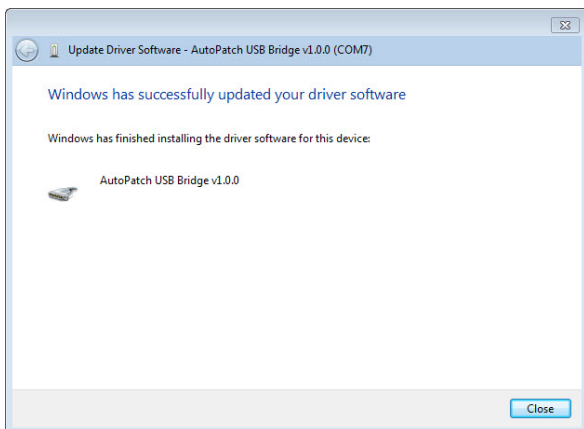
6. In the Driver tab, select the Update Driver button.

Driver tab

Update Driver button
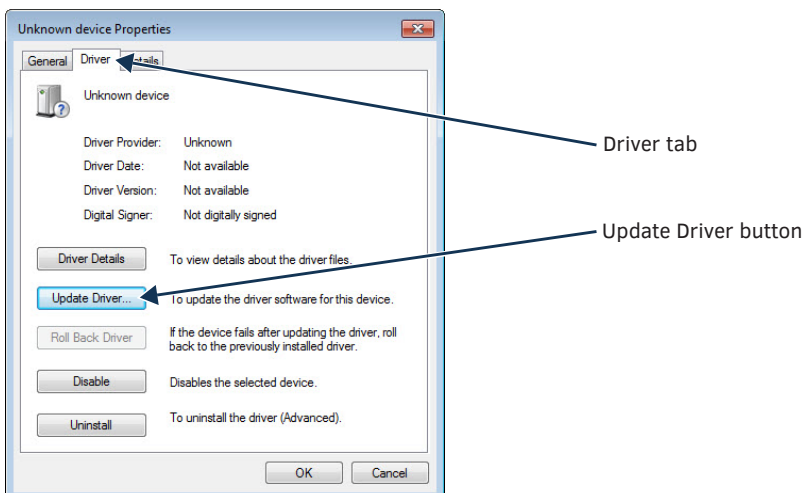
7. Browse for the APBridge.inf file and select the Next button.

Another Update Driver Software window opens. Click Close.

NOTE: *A Windows Security window may open and ask if you want to install a driver with an unverified publisher. Select the "Install this driver software anyway" option.*

8. If the AutoPatch USB Bridge port specifies the COM number, go to Step 11.
    If the port does not specify a COM number, right-click the AutoPatch USB Bridge, select Properties, and complete all remaining steps.
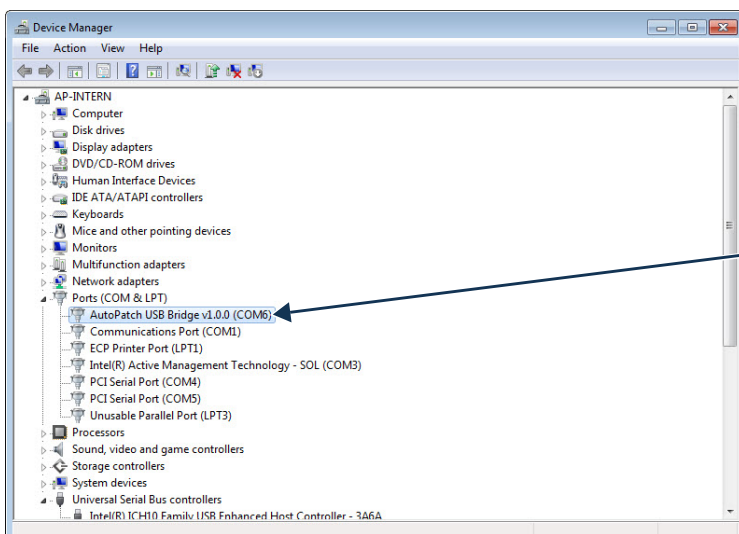
COM port number
(if not displayed, complete all remaining steps)

9. In the AutoPatch USB Bridge Properties dialog box, select the General tab.
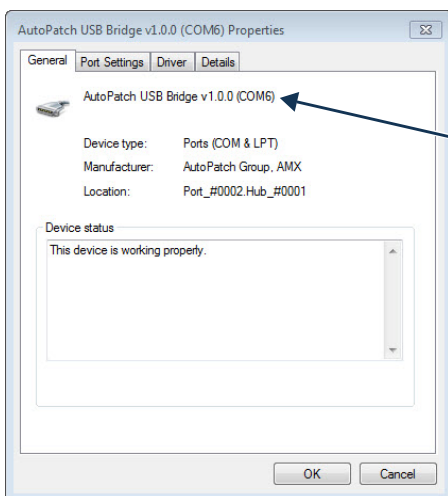
Assigned port number

10. *Make note of the COM port number assigned to the AutoPatch USB Bridge.* This port number *must* be entered when setting a connection in a software program or a terminal emulation program. The PC will always associate a specific USB connector with the assigned virtual COM port. The PC will not recognize the module if you disconnect and reconnect using a different COM port on the PC. However, it will attempt to install a new virtual COM port using the new port. If completed, the new port will be assigned a different COM number.

IMPORTANT: *You <u>must</u> identify the virtual COM port assigned to the USB connector to enable communication between the Control PC and the enclosure.*

11. Set up and run the desired application:
    - **AMX Controller** – For control programming information, see the product manual for the specific interface.
    - **Terminal Emulation** – Open the program (see "Terminal Emulation" below). Check to be sure the COM port is set for the port determined in the previous steps. Set the settings to match the default ones:
      baud rate* – 9600, data bits – 8, parity – 1, stop bits – none, and flow control – 1.

12. Execute a test switch to make sure the Epica DGX 288 is working properly (see page 22).

IMPORTANT: *If power is cycled on the enclosure, the USB connection <u>must</u> be reestablished. (1) Remove the USB cable, (2) close the software application in use, (3) reconnect the USB cable <u>to the same USB connector that was used previously</u>, and (4) reopen the application.*

Terminal Emulation

When power is applied to the enclosure, the terminal will display 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 22).

NOTE: *For additional information on establishing serial communication between the enclosure and a PC, see page 23.*

NOTE: *If using baud rates at or above 19200 for serial communication with the Epica DGX 288, wait for the "`T`" following a command before sending subsequent commands.*

Troubleshooting and Technical Support

Troubleshooting

This *Hardware Reference Manual* addresses a number of topics with troubleshooting sections and tips appearing as they apply. The sections below list each of these appearances with linked page references to troubleshooting advice. If the troubleshooting advice does not answer a particular question, the text above or below the advice should also be consulted as those areas may contain relevant material. If the manual has not addressed your particular problem, contact Technical Support.

Epica DGX 288 Hardware Troubleshooting
- DXLink Fiber Boards – page 41
- Test switches – page 22
- Power supplies – page 20

Audio and Video Troubleshooting
- Audio troubleshooting – page 41
- Video troubleshooting – page 41

AMX Software Troubleshooting
- contact Technical Support

Contacting Technical Support

If this manual has not satisfactorily answered your questions regarding the Epica DGX 288 or the system is not operating as expected, please contact your AMX representative or Technical Support. Have the serial numbers for your system and any applicable AMX accessory devices ready (the numbers are normally located on the rear of the enclosure or accessory devices).

We recommend recording your system's serial numbers 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
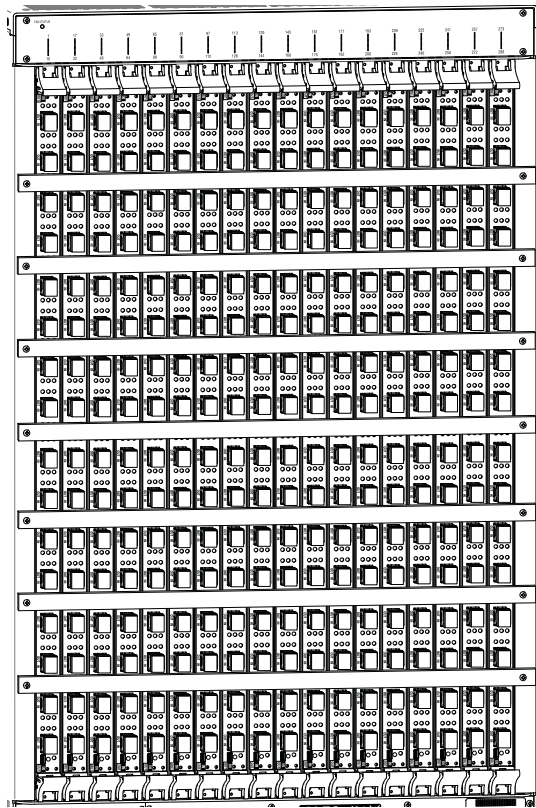- www.amx.com

DXLink™ Fiber Boards, Simplex

Applicability Notice

This chapter pertains to Epica DGX 288 Multimode and Single Mode DXLink Fiber Boards, Simplex, which handle secure, long distance data transfer. Board models are listed in the table below.

DXLink Fiber Boards, Simplex

Part #	Model Name	Model Number, Description
FG1055-521	DXLink Multimode Fiber Input/Output, Simplex	EPICADGX288-VIO-MMF–S
FG1055-520	DXLink Single Mode Fiber Input/Output, Simplex	EPICADGX288-VIO-SMF–S

NOTE: *DXLink Fiber Simplex equipment can receive signals from and route signals to DXLink Fiber Duplex equipment. If Duplex equipment is used in a signal run with Simplex equipment, Duplex equipment should be configured to operate in Unidirectional Mode.*

FIG. 15 DXLink Fiber Boards, Simplex (shown with dust plugs and grounding bars)

Enclosure's Board/Transceiver Capacity

An Epica DGX 288 enclosure can hold up to eighteen DXLink Fiber Boards with sixteen fiber optic transceivers per board. Each transceiver has two ports, an input port and an output port. Each enclosure accommodates connection configurations up to a maximum of 288x288, as well as subsets in increments of sixteen (e.g., 16x128 or 80x64).

Signal Routing

The transceiver input ports on the DXLink Fiber Boards receive signals from DXLink Fiber Transmitter units and route the signals to any or all of the transceiver output ports. The transceiver output ports are connected to DXLink Fiber Receiver units. Transceiver input ports can also receive signals from DXLink Fiber output boards in an Enova DGX and route signals out the Epica DGX 288's transceiver output ports into DXLink Fiber input boards in an Enova DGX (3 enclosure maximum route).

IMPORTANT: *DXLink Fiber Boards, Simplex* must *be used in conjunction with DXLink Fiber, Simplex units (see the compatibility table on page 30 and system setup information on page 33).*

The following signals from a DXLink Fiber unit can be sent via DXLink Fiber Boards: HDMI, DVI-D, and digital stereo audio.

IMPORTANT: *These boards are compatible* only *with other AMX products that support the DXLink Fiber Technology. They are* not *compatible with third-party optical distribution amplifiers or multimode to single mode converters.*

DXLink™ Fiber Boards, Simplex – Specifications

Applies to multimode board FG1055-521 and single mode board FG1055-520.

Compatible AMX DXLink Fiber Products

Fiber optic transceivers are self-contained modules that send and receive optical signals over fiber cable. DXLink SFP+ fiber optic transceivers* are either multimode or single mode and must be wired with the corresponding cable type.

* SFP+ = enhanced small form-factor pluggable fiber optic transceiver rated at 10 Gbps transmission data rate.

DXLink Fiber Board, Simplex – Compatibility		
Transceiver Type	DXLink Fiber Board, Simplex and Part #	DXLink Fiber, Simplex Units and Part #
Multimode	MMF-S Input/Output Board (FG1055-521)	DXF-TX-MMS (FG1010-363) DXF-RX-MMS (FG1010-563)
Single Mode	SMF-S Input/Output Board (FG1055-520)	DXF-TX-SMS (FG1010-361) DXF-RX-SMS (FG1010-561)

IMPORTANT: *The DXLink Fiber Board, Simplex and its DXLink Fiber TX, Simplex <u>must</u> have the same type of fiber optic transceiver: either multimode or single mode. The same holds true for the DXLink Fiber Board, Simplex and its DXLink Fiber RX, Simplex unit.*

NOTE: *DXLink Fiber Simplex equipment can receive signals from and route signals to DXLink Fiber Duplex equipment. If Duplex equipment is used in a signal run with Simplex equipment, Duplex equipment should be configured to operate in Unidirectional Mode.*

DXLink Fiber, Simplex – Specifications	
Parameter	Value
Compatible Signal Types	Video with embedded audio (with or without HDCP) over fiber
Signal Type Support	DXLink Single Mode or Multimode Fiber, Simplex (Connectivity between products requires matching model types, multimode to multimode or single mode to single mode. The backplane architecture of the Enova DGX 288 allows for single mode inputs to be routed to multimode outputs and vice versa.) **NOTE:** *DXLink Fiber Simplex equipment can receive signals from and route signals to DXLink Fiber Duplex equipment. If Duplex equipment is used in a signal run with Simplex equipment, Duplex equipment should be configured to operate in Unidirectional Mode.*
Transport Layer Throughput	10.3125 Gbps
Video Data Rate (max.)	4.95 Gbps
Video Pixel Clock (max.)	165 MHz
Progressive Resolution Support	480p up to 1920x1200,60 Hz
Interlaced Resolution Support	480i, 576i, 1080i
2K Resolution Support	2048x1024,47Hz; 2048x1080,60Hz; 2048x1152,60Hz; 2048x1536,24Hz • 2K formats are only compatible with DVI, HDMI, and DXLink Fiber Input/Output Boards and require the output or RX Scaler to be set in Bypass mode
Deep Color Support	24-bit
Color Space Support	RGB 4:4:4 YCbCr 4:4:4 and 4:2:2 (Input signal support is for YCbCr 4:4:4 and 4:2:2; output color-space is converted to RGB 4:4:4.)
3D Format Support	• Frame Packing 1080p up to 24 Hz • Frame Packing 720p up to 50/60 Hz • Frame Packing 1080i up to 50/60 Hz • Top-Bottom 1080p up to 24 Hz • Top-Bottom 720p up to 50/60 Hz • Side-by-Side Half 1080i up to 50/60 Hz The scaler on the corresponding DXLink Fiber RX *must* be set to Bypass mode.
Audio Format Support	Dolby TrueHD, Dolby Digital, DTS-HD Master Audio, DTS • 2 CH through 8 CH L-PCM • Dolby Digital and DTS support up to 48 kHz, 5.1 channels
Audio Resolution	16 bit to 24 bit
Audio Sample Rate	32 kHz, 44.1 kHz, 48 kHz, 96 kHz, 192 kHz
EDID Support	• EDID provided by connected DXLink Fiber Transmitter • EDID is user re-programmable at the Transmitter **NOTE:** *DXLink, Simplex boards/units do not support EDID transfer and control transport (such as Ethernet, USB, IR, and Serial Control) over fiber.*

DXLink Fiber, Simplex – Specifications	
HDCP Support	• Full matrix HDCP support (includes any input to any or all outputs) • Key Management System • AMX HDCP InstaGate Pro® Technology • Key support up to 16 destinations per output/RX, independent of source device
CEC Support	None
Fiber Transceiver Type	10G SFP+
Connectors	• 16 LC Simplex Fiber ports (with an input and an output connector on each) conforming to ANSI TIA/EIA 604-10 (FOCIS 10A) • 1 USB Mini-B (programming port)
Fiber Cable Types and Supported Length	• Single mode – 9/125 μm @ 6.21 miles (10 km) • Multimode – OM3 50/125 μm @ 984 ft. (300 m)
Optical Wavelength	• Single mode – 1310 nm • Multimode – 850 nm
Single Mode Optical Budget	7.4 dB (typical) between DXLink Fiber transceivers • Optical Modulation Amplitude (OMA): –5.2 dBm (min.) • Optical Modulation Amplitude (OMA) Sensitivity: –12.6 dBm (typical)
Single Mode Optical Transceiver Mean Output Power	–8.2 dBm to 0.5 dBm (average power)
Multimode Optical Budget	• 6.8 dB (typical) between DXLink Fiber transceivers • Optical Modulation Amplitude (OMA): –4.3 dBm (min.) • Optical Modulation Amplitude (OMA) Sensitivity: –11.1 dBm (typical)
Multimode Optical Transceiver Mean Output Power	–1 dBm (average power)
DXLink Fiber Input Port Propagation Delay	5 μs
DXLink Fiber Output Port Propagation Delay	5 μs
Safety Certifications	Class 1 Eye Safe per requirements of IEC 60825-1 / CDRH
Other AMX Equipment	
Compatible AMX Products	**Single Mode I/O Boards:** Must be used in conjunction with an Epica 288 Matrix Switcher Enclosure and a DXLink Single Mode Fiber Transmitter and/or Receiver including DXF-TX-SMS (FG1010-361) and DXF-RX-SMS (FG1010-561) **Multimode I/O Boards:** Must be used in conjunction with an Epica 288 Matrix Switcher Enclosure and a DXLink Multimode Fiber Transmitter and/or Receiver including DXF-TX-MMS (FG1010-363) and DXF-RX-MMS (FG1010-563) **NOTE:** *DXLink Fiber, Simplex equipment can be used in conjunction with Duplex Transmitters and Receivers, however the system will maintain one-way simplex functionality. Simplex infrastructure does not support control transport over fiber (such as Ethernet, USB, IR, Serial Control or EDID); although when used as part of a complete AMX-controlled solution that includes NX Control hardware, control can be provided if a supplemental independent network connection is used.*

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

CTA Video Information Code (VIC) Formats

VIC #	Resolution	Refresh Rate and Aspect Ratio
VIC = 1	640x480p	59.94/60 Hz 4:3
VIC = 2	720x480p	59.94/60 Hz 4:3
VIC = 3	720x480p	59.94/60 Hz 16:9
VIC = 4	1280x720p	59.94/60 Hz 16:9
VIC = 5	1920x1080i	59.94/60 Hz 16:9
VIC = 6	720(1440)x480i	59.94/60 Hz 4:3
VIC = 7	720(1440)x480i	59.94/60 Hz 16:9
VIC = 14	1440x480p	59.94/60 Hz 4:3
VIC = 15	1440x480p	59.94/60 Hz 16:9
VIC = 16	Native 1920x1080p	59.94/60 Hz 16:9
VIC = 17	720x576p	50 Hz 4:3
VIC = 18	720x576p	50 Hz 16:9
VIC = 19	1280x720p	50 Hz 16:9
VIC = 20	1920x1080i	50 Hz 16:9
VIC = 21	720(1440)x576i	50 Hz 4:3
VIC = 22	720(1440)x576i	50 Hz 16:9
VIC = 29	1440x576p	50 Hz 4:3
VIC = 30	1440x576p	50 Hz 16:9
VIC = 31	1920x1080p	50 Hz 16:9
VIC = 32	1920x1080p	23.97/24 Hz 16:9
VIC = 33	1920x1080p	25 Hz 16:9
VIC = 34	1920x1080p	29.97/30 Hz 16:9
VIC = 39	1920x1080i	50 Hz 16:9
VIC = 41	1280x720p	100 Hz 16:9
VIC = 42	720x576p	100 Hz 4:3
VIC = 43	720x576p	100 Hz 16:9
VIC = 44	720(1440)x576i	100 Hz 4:3
VIC = 45	720(1440)x576i	100 Hz 16:9
VIC = 47	1280x720p	119.88/120 Hz 16:9
VIC = 48	720x480p	119.88/120 Hz 4:3
VIC = 49	720x480p	119.88/120 Hz 16:9

NOTE: *The Consumer Technology Association (CTA) was formerly known as the Consumer Electronics Association (CEA): the CEA 861 video standard has been renamed to CTA 861.*

Audio Data Block

Channels	Sampling Frequency
Basic Audio: 2 Channel L-PCM 32, 44.1, 48 kHz	Sampling frequency at 16, 20, or 24 bits per sample

IMPORTANT: *For information on troubleshooting audio, see page 41.*

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

System Setup with DXLink Fiber, Simplex Units

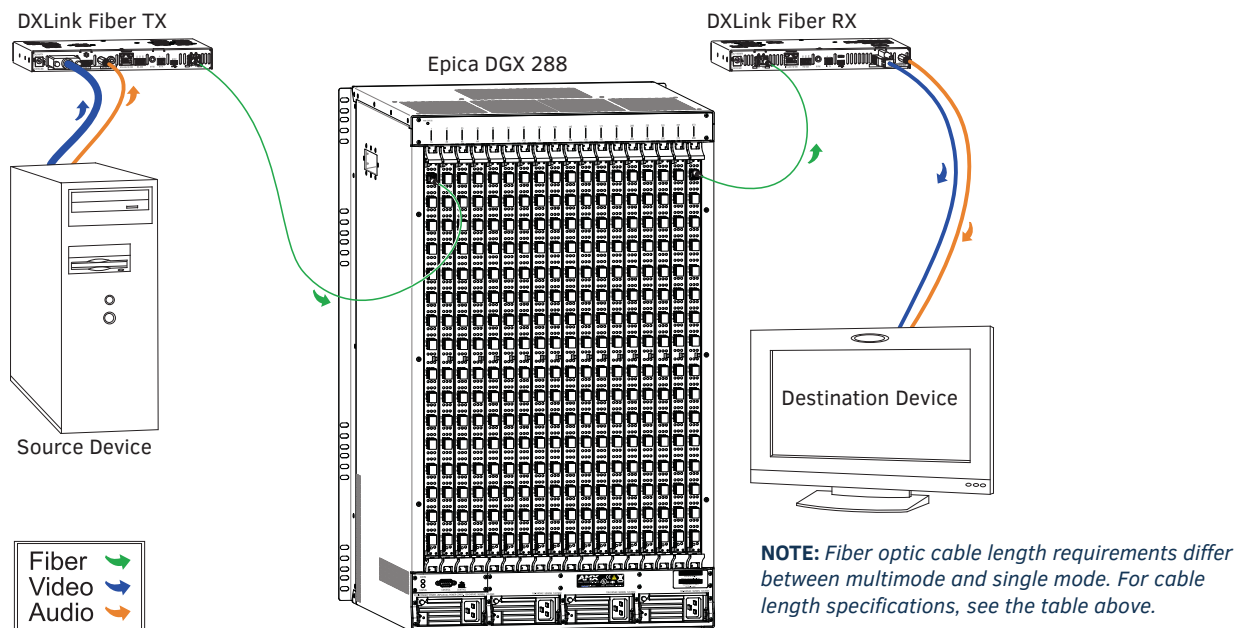**NOTE:** *For instructions on adding or replacing boards, see page 58.*

DXLink Fiber Boards, Simplex *must* be used in conjunction with DXLink Fiber TX and RX units. Compatible DXLink Fiber units are listed on page 30. For unit installation details, see the unit's Q*uick Start Guide* or *Hardware Reference Manual*.

When the TX / RX units are installed, image adjustment and EDID scaling is automatically applied. For almost every installation, the automatic features on the units result in a quality image on the monitor. If the installation has special requirements and needs additional adjustment or if you need product specifications for the modules, refer to the *Hardware Reference Manual – DXLink Fiber Transmitters and Receivers* at www.amx.com.

The distance from a DXLink Fiber TX unit to a DXLink Fiber Board can be up to the maximum specified in the table below and the same for the distance from the DXLink Fiber Board to the DXLink Fiber RX unit. The cable run length depends on the quality of the cable (see specifications in table below).

Cable / Distance	
Cable Specifications	**Maximum Distance**
Multimode – Simplex OM3 50/125 µm	984 ft. (300 m)
Single mode – Simplex 9/125 µm	6.21 miles (10 km)

The system setup in FIG. 16 illustrates DXLink Fiber Boards, Simplex used in conjunction with a DXLink Fiber, Simplex Transmitter and Receiver.

NOTE: *Fiber optic cable length requirements differ between multimode and single mode. For cable length specifications, see the table above.*

FIG. 16 DXLink Fiber Boards are used in conjunction with DXLink Fiber units

TIP: *For systems with special requirements – Before installing in the final location, place the equipment close together, so the Control PC and the destination monitor can be seen simultaneously if adjustments are necessary.*

NOTE: *DXLink Fiber Simplex equipment can receive signals from and route signals to DXLink Fiber Duplex equipment. If Duplex equipment is used in a signal run with Simplex equipment, Duplex equipment should be configured to operate in Unidirectional Mode.*

Destination Device Support Problems

Occasionally destination devices can cause problems in the system due to lack of signal support.

- **Audio** – If you experience audio problems, it may be because you are trying to pass Dolby or DTS or high PCM frequency rates and the destination device does not support them.
- **Video** – If you experience video problems, it may be because you are trying to pass a video format that the destination device does not support.

In either of these cases, re-programming the EDID (via the Transmitter) may help resolve the problem.

Connecting Switching Systems with DXLink Fiber Transceivers

Switching systems with DXLink Fiber support (i.e., Epica DGX 288 and Enova DGX) can be connected via their DXLink Fiber ports.

IMPORTANT: *This section does <u>not</u> refer to the linking of enclosures from CPU to CPU, which is not supported in the Epica DGX 288.*

IMPORTANT: *This section does not refer to embedded networks, which are not supported over DXLink Fiber, Simplex.*

In an installation with a multiple-stage switching system, the following applies:
- To avoid potential compatibility issues between hardware components, all equipment should be kept at the most recently released firmware version.
- When a DXLink Fiber input or output port on one switching system determines that it is connected to a DXLink Fiber input or output port on another switching system, the only things passed down the DXLink Fiber line are video and audio signals.
- When connecting switching systems via DXLink Fiber ports, AMX recommends no more than 3 enclosure throughputs.*

* For example, the path through 3 switchers could be: source device →DXLink Fiber Transmitter →Enova DGX 32 (out a DXLink Fiber port) →Epica DGX 288, DXLink Fiber input (out a DXLink Fiber port) →Enova DGX 6400, DXLink Fiber input (out a DXLink Fiber port) →DXLink Fiber Receiver →display device as an HDMI signal.

Attaching Cables

IMPORTANT: *Before attaching cables, be sure to set the DXLink Fiber unit's DIP switch toggles if necessary (see the "Hardware Reference Manual – DXLink Fiber Transmitters and Receivers").*

WARNING: DXLink Fiber units use laser transceivers, which are Class 1 Eye Safe per IEC 60825-1/CDRH requirements. While the Class 1 category indicates that the invisible laser used is safe, we recommend avoiding direct eye exposure when using any optical fiber products (see the OSHA directive below).

OSHA Directive

The *OSHA Technical Manual* (at https://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_6.html) under "VI. Control Measures and Safety Programs" states: "Direct exposure on the eye by a beam of laser light should *always* be avoided with any laser, *no matter how low the power.*"

Input and output channel numbers correspond to the port sets (one input port and one output port per transceiver) and are located across the top of the enclosure, above the boards. For each pair of input/output ports, numbering is consecutive from the top port set (first transceiver) of each board to the bottom port set (last transceiver) on each board, continuing from the bottom port set on the board to the top port set on the next board to the right. The numbering scheme at the top of the enclosure is the same for both input and output ports contained in each transceiver (e.g., transceiver 1 contains both input 1 and output 1, transceiver 2 contains both input 2 and output 2, etc.).

NOTE: *Instructions for attaching cable management bars are on page 19. These bars are recommended and provided with each DXLink Fiber Board.*

CAUTION: Do not severely bend or kink the fiber optic cable. Irreversible damage can occur. Refer to the physical limitations (bend radius) specified for the cable.

DXLink Fiber Optic Cable Requirements

Fiber optic cables used between separate buildings

❏ The cable must be rugged enough to endure the rigors of installation, environmental conditions (e.g., heat, cold, moisture), and comply with TIA/EIA-568-B.3 standard ICEAA-640.

*Fiber optic cables used within a common building**

❏ The cable must comply with the general requirements of TIA/EIA-568-B.1.

* "Common building" is defined as: Where the walls of the structure(s) are physically connected and the structure(s) share a single ground reference.

Transceiver Types / Cable Types / Cable Runs

The type of SFP+ fiber optic transceiver helps determine the maximum length of cable runs possible. Cable quality is also a determining factor.

SFP+ Fiber Optic Transceivers			
Transceiver Type	**Fiber Boards, Simplex**	**Required Cable Type**	**Maximum Distance**
Multimode	MMF-S Input/Output Board (FG1055-521)	OM3 50/125 µm	984 ft. (300 m)
Single Mode	SMF-S Input/Output Board (FG1055-520)	9/125 µm	6.21 miles (10 km)

NOTE: *DXLink Fiber Simplex equipment can receive signals from and route signals to DXLink Fiber Duplex equipment. If Duplex equipment is used in a signal run with Simplex equipment, Duplex equipment should be configured to operate in Unidirectional Mode.*

Tips for Fiber Optic Connections:
❑ Keep dust plugs in transceivers until you are ready to make a connection.
❑ Clean fiber optic cable ends before attaching to transceivers (be sure to follow the cable manufacturer's instructions for inspecting and cleaning the cable ends).
❑ Use gentle pressure when connecting fiber cables to transceivers (normally an audible click is heard when the connector engages).
❑ If unsure the connection is properly seated, gently tug on the transceiver.
❑ If fiber cables are removed from the transceivers, reinsert dust plugs.
❑ **Multimode transceivers only** – If you are unsure that a multimode transceiver is passing a signal, hold the unattached end of the fiber optic cable **away from you** and take a picture of it with a digital camera (or cell phone camera). The image will show a bright light if the signal is being passed (works on some digital cameras and cell phone cameras).

Connecting Inputs and Outputs

To connect DXLink Fiber inputs and outputs:

1. Recommended ─ Install the provided cable management bars (see below). We also recommend the use of soft ties (e.g., Velcro type hook-and-loop strips) instead of nylon cable ties, which can break fiber cables.

WARNING: DXLink Fiber units use laser transceivers, which are Class 1 Eye Safe per IEC 60825-1/CDRH requirements. While the Class 1 category indicates that the invisible laser used is safe, we recommend avoiding direct eye exposure when using any optical fiber products (see the OSHA directive on page 34).

2. Remove the dust plugs from the DXLink SFP+ transceiver and fiber cable connectors and save for future use.

3. Attach the fiber optic cable to the DXLink Fiber Board's fiber optic transceiver.
   (Normally an audible click is heard when the connector engages.)
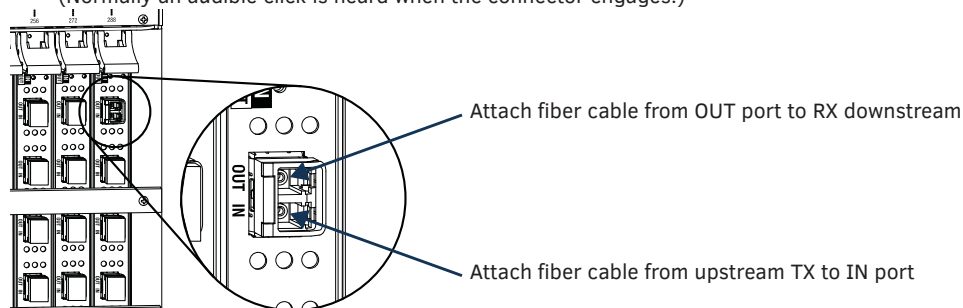

Attach fiber cable from OUT port to RX downstream

Attach fiber cable from upstream TX to IN port

FIG. 17 Transceiver input and output ports (shown without cable management bar for clarity)

DXLink Fiber transceiver with single (IN) simplex connector

DXLink Fiber transceiver with two (IN and OUT) simplex connectors

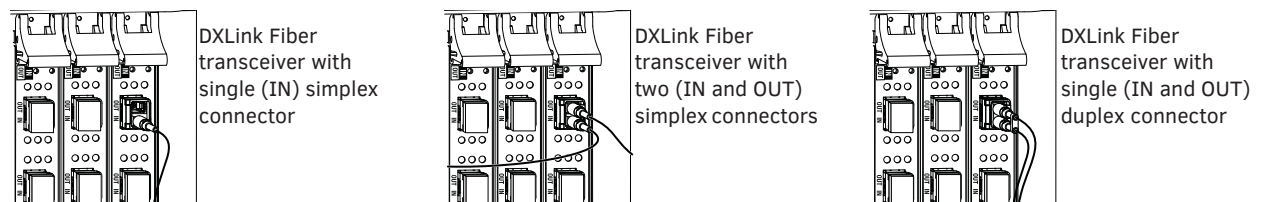DXLink Fiber transceiver with single (IN and OUT) duplex connector

FIG. 18 Transceiver cabling options (simplex and duplex connectors shown)

4. Tie the DXLink fiber cable to the cable management bar far enough below the transceiver to allow for the manufacturer's recommended bend radius.
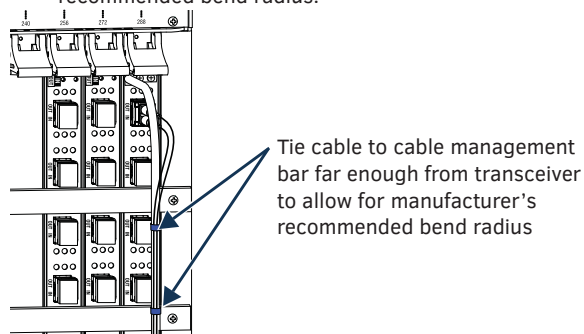

Tie cable to cable management bar far enough from transceiver to allow for manufacturer's recommended bend radius

FIG. 19 Attach cables to input and output ports (shown with cable management bar)

5. Attach the free-running end of the fiber optic cable to the transceiver on the DXLink Fiber Transmitter or Receiver.

6. Repeat the previous steps for the remaining fiber cables.

NOTE: *When fiber optic transceivers are not cabled (e.g., for shipping or storage), replace the dust plugs that originally shipped with the product.*
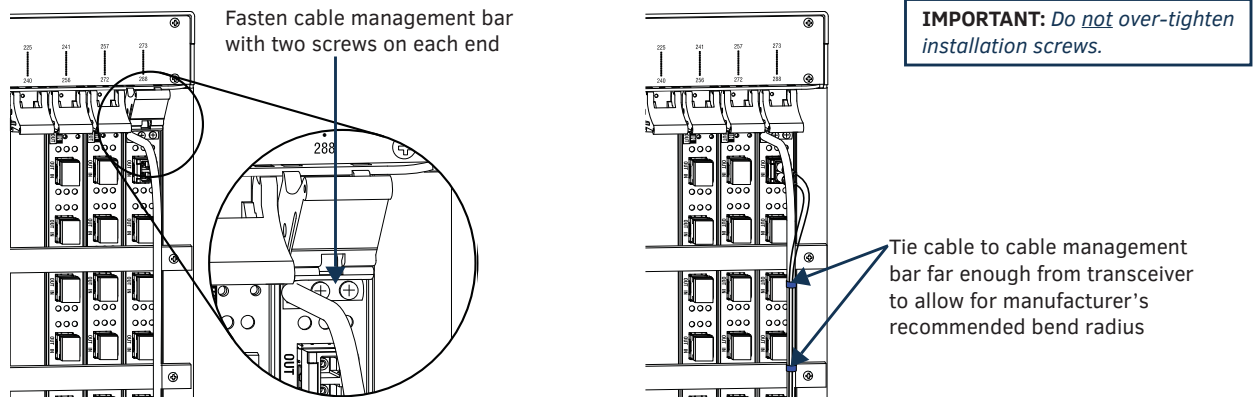
Installing a Cable Management Bar

IMPORTANT: *When cable management bars are used, they need to be installed before the cables are attached.*

CAUTION: Do not severely bend or kink the fiber optic cable. Irreversible damage can occur. Refer to the physical limitations (bend radius) specified for the cable by the manufacturer.

To install a cable management bar:

1. Align the two screw holes on the end of the cable management bar with the two screw holes on the end of the board as shown in FIG. 20. (Note the position of the long part of the bar in relation to the screw holes.)

Fasten cable management bar with two screws on each end

IMPORTANT: *Do not over-tighten installation screws.*

Tie cable to cable management bar far enough from transceiver to allow for manufacturer's recommended bend radius

FIG. 20 Installation of cable management bars

2. Insert and tighten the two screws at the end of the cable management bar (do *not* over tighten the screws).
3. Align, insert, and tighten the two screws at the other end of the cable management bar (do *not* over tighten).

TIP: *When using cable management bars with fiber boards, we recommend the use of soft ties (e.g., Velcro type hook-and-loop strips) instead of nylon cable ties, which can break fiber cables.*

4. Tie the cable to the cable management bar far enough from the transceiver to allow for the manufacturer's recommended bend radius.

Transceiver LEDs

Each transceiver has two LEDs (one for each port). Each LED flashes blue to indicate active video in or out of the port. The input side LED has an additional state where the LED remains solid blue to indicate inactive video (video is ready to be routed, but no DXLink Fiber connector is detected on the IN port).

IMPORTANT: *IMPORTANT: If a signal is routed from an input to an uncabled output, the output port emits invisible laser (Class I Eye Safe per IEC 60925-1/CDRH requirements). Proper handling requires not routing signals to uncabled outputs and/or dust plugs coving all unused ports.*

USB Connector

The USB connector on the DXLink Fiber Board can be used for upgrading or downgrading the firmware on the board (for more information, contact Technical Support.

InstaGate Pro® Technology

InstaGate Pro Technology eliminates HDCP latency (time required for authentication) and interruptions on all displays in a system. (These conditions are typically experienced when HDCP authenticates HDMI source and destination devices.) Key limitations on source devices are also eliminated by allowing them to see only a single sink key from the DXLink Fiber Transmitter's input connection. With InstaGate Pro Technology, when a source requires HDCP encrypted content, the inputs and compliant downstream devices are automatically authenticated.

- DXLink Fiber products meet HDCP standards and support InstaGate Pro Technology. For complete information on HDCP functionality for DXLink Fiber Boards, see the section "HDCP Support on Epica DGX 288 Switchers" below.
- DXLink Fiber products incorporate HDMI Technology, are HDCP 1.4 compatible, feature InstaGate Pro Technology for low-latency switching of HDCP protected content, and support computer video up to 1920x1200 and HDTV up to 1080p. The DXLink fiber transceivers also support embedded audio, both linear PCM (stereo audio) and non-linear PCM (Dolby Digital, DTS, and Dolby TrueHD, etc.).

NOTE: *Some destination devices have a longer lag time than others between receiving a signal and displaying that signal. Although InstaGate Pro significantly reduces the latency associated with HDCP authentication, it cannot reduce the inherent lag time of a device as it syncs up to the newly switched video image.*

HDCP Support on Epica DGX 288 Switchers

The Epica DGX 288 DXLink Fiber Boards provide true matrix switching for complete distribution of high resolution digital video and embedded audio from the sources to the destinations. Full HDMI support allows 1080p protected entertainment content to be switched freely, while its high resolution capabilities (1920x1200) provide the advantage of being able to use this solution to switch high resolution computer images. As a result, a single system can handle a combination of computer images and protected content.

Epica DGX 288 Switchers meet the HDCP Standard, which was established to prevent the unauthorized transfer of protected audiovisual content between devices. In addition, these switchers support InstaGate Pro, which was developed to address the special concerns that arise when protected content needs to be distributed.

The Epica DGX 288 DXLink Fiber Boards route HDCP (content-protected) and non-HDCP digital audiovisual signals. If HDCP is applied, the transmitted video is encrypted.

If the content is protected (HDCP), the DXLink Fiber TX functions as an InstaGate Pro sink and (through the DXLink Fiber RXs) handles verification of the connected individual downstream sinks / destination devices (and downstream repeaters in the path if applicable). This means that the source device only needs to authenticate the DXLink TX. Once the authentication is complete, the encrypted content begins to display on the destinations.

NOTE: *Epica DGX Boards do not support CEC.*

DXLink Fiber System Conditions

Normally, all devices used in a DXLink Fiber system are HDCP compliant. Each HDCP capable device has a unique set of confidential keys (used to encrypt and decrypt the data).

- Normally HDCP is used only when the source content is copyright protected.* Unprotected content is not affected and may be routed as desired.
- Each fiber input can be routed to any number of outputs.

* In some cases, source devices will always enforce HDCP even if the content is not protected. If the system's equipment includes this type of source device, be aware that DXLink Fiber Boards will not be able to route that source device's signal to a non-HDCP compliant display.

The content protection process for the connection between the upstream transmitter on the source device and a fiber input port (which is an RX) on the Epica DGX Switcher through a fiber output port (which is a TX) to the destination device includes four steps.

Steps in the Content Protection Process

1. The source device uses authentication protocol to verify that the DXLink Fiber TX is authorized to receive the protected content (regardless of how many destination devices the source is being routed to). The content is encrypted and transmitted.
2. The DXLink Fiber RX verifies that the display device(s) are authorized to receive the protected content (this is the part of the process in which revoked keys of the System Renewability Message list is verified). The content is encrypted and transmitted.
3. The source device periodically verifies that the fiber path is synchronized and capable of decrypting the protected content.
4. DXLink Fiber RXs periodically verify that display devices are synced and capable of decrypting the protected content.

NOTE: *If the source does not support HDCP, the display device does not need to support HDCP. The unencrypted content from the source is simply routed through the outputs to the display devices.*

Supported Number of Sinks

HDCP Source Device

The number of sinks that the source device supports is not relevant when using Epica DGX Switcher boards that support HDCP because the input port on the board is the only sink that the source device needs to authenticate.

Epica DGX Switcher

The maximum number of downstream sinks depends on the device type attached to an output (e.g., a downstream Enova DGX or DXLink RX).

Unsuccessful Transmission in System

If an Epica DGX Switcher does not successfully transmit the protected content to any of the routed sinks, it may indicate one of the following conditions:

- Non-compliant device – The sink device is not HDCP compliant or has had its authentication key revoked.*
- Fiber output (HDMI signal) sink support limit exceeded – The output port is actively routed to more than 16 downstream devices (display devices and/or repeaters) from a single output port on a DXLink Fiber RX.

* Key revocation is handled strictly by the DXLink Fiber RX. The source does not take any action with respect to revoked keys.

IMPORTANT: *Keep in mind that a "failure condition" (in which HDCP authentication fails to occur) is verified by the Epica DGX Switcher not the source device and will result in the image being orange when output by a DXLink RX or dark red when output by an HDMI Output Board.*

NOTE: *Be aware that even when you are playing un-encrypted content on a Blu-Ray player, most Blu-Ray players play all content as encrypted content. Normally, DXLink FIber products transport non-encrypted content without problems if the display is non-HDCP compliant. However, when encrypted content is sent from a Blu-Ray player through a DXLink Fiber route to a device that does not support HDCP, the content will not display and the image will be orange when output by a DXLink RX or dark red when output by an HDMI Output Board.*

Replacing an SFP+ Fiber Optic Transceiver

Both multimode and single mode transceivers on DXLink Fiber Simplex boards and on DXLink Fiber units support unidirectional communication (Unidirectional Mode).

Unidirectional communication over DXLink Fiber includes transmission of the following:

- Digital video and audio

Multimode SFP+ Fiber Optic Transceiver

The multimode SFP+ fiber optic transceiver is used on DXLink Fiber, Simplex Boards. Depending on the transceiver model, it will have a black latch or a black label on the latch top with white triangles showing signal flow direction.

The multimode SFP+ fiber optic transceiver requires multimode fiber optic cable, which allows numerous optical waves to transverse the optic core. Multimode fiber optic cable has a significantly larger optical core (which results in a higher dispersion rate) and results in comparative shorter distance runs than the single mode cable.
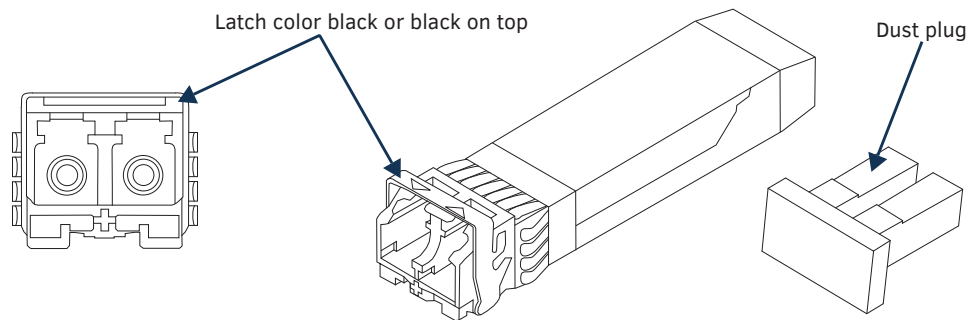
FIG. 21 Multimode SFP+ fiber optic transceiver (model with black label on latch top shown)

Single Mode SFP+ Fiber Optic Transceiver

The single mode SFP+ fiber optic transceiver is used on DXLink Fiber, Simplex Boards. Depending on the transceiver model, it will have a bright blue latch or a blue label on the latch top with white triangles showing data flow direction.

The single mode SFP+ fiber optic transceiver requires single mode fiber optic cable, which allows a single optical wave to traverse through the optic core. Single mode fiber optic cable has a significantly smaller diameter optical core than multimode fiber optic cable and is generally associated with longer distance transport capabilities.
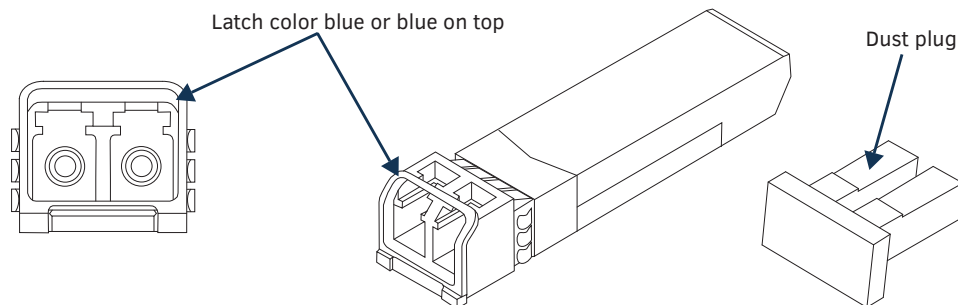
FIG. 22 Single mode SFP+ fiber optic transceiver (model with blue handle shown)

WARNING: DXLink Fiber units use laser transceivers, which are Class 1 Eye Safe per IEC 60825-1/CDRH requirements. While the Class 1 category indicates that the invisible laser used is safe, we recommend avoiding direct eye exposure when using any optical fiber products (see the OSHA directive below).

OSHA Directive

The *OSHA Technical Manual* (at https://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_6.html) under "VI. Control Measures and Safety Programs" states: "Direct exposure on the eye by a beam of laser light should *always* be avoided with any laser, *no matter how low the power.*"

Transceiver Disposal

IMPORTANT: *If disposal of transceivers is necessary, dispose of them as mandated by your area or country guidelines.*

IMPORTANT: *Adding or replacing SFP+ transceivers should be done only by personnel trained to handle ESD sensitive parts and assemblies.*

ESD WARNING: *To avoid ESD (Electrostatic Discharge) damage to sensitive components, make sure you are properly grounded before touching any internal Epica DGX 288 materials. Use an ESD wristband and cord with an alligator clip attached to a good ground source.*

NOTE: *The process for removing and replacing transceivers is the same in DXLink Fiber Boards as it is in DXLink Fiber units and the same for multimode transceivers (black latch) as it is for single mode transceivers (bright blue latch).*

In the following procedure, read each step entirely. The steps include helpful tips to avoid damage to DXLink Fiber products.

To remove and replace an SFP+ fiber optic transceiver:

1. If applicable – Label and disconnect fiber optic cables (release the locking tab on the cable connector to disconnect the cable from the transceiver) or remove dust plugs from the transceiver. If cables from adjoining transceivers or boards obstruct access, label and disconnect them as necessary.

2. Using the tip of the index finger, swing the transceiver latch open.
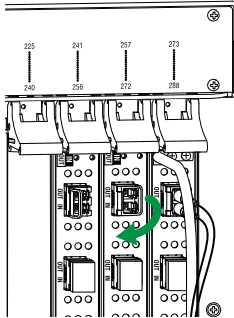
FIG. 23 Flip transceiver latch open

3. Use the handle to release and carefully pull the transceiver completely free from its socket.
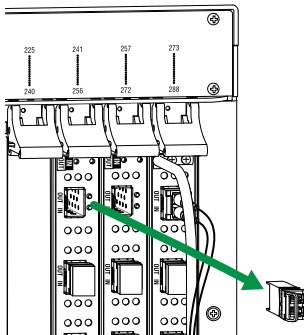
FIG. 24 Pull transceiver free from transceiver socket

4. Restore the removed transceiver's latch to an upright position and replace the dust plug that originally shipped with the transceiver. Place the transceiver in an ESD shielded bag and set aside.

TIP: *Leave the dust plug in the replacement transceiver for Step 5 to reduce the possibility of damaging the transceiver / socket.*

5. With the replacement transceiver's latch in the up (locked) position, gently insert the transceiver straight into the transceiver socket until resistance is felt (an audible click will be heard when it is fully seated).
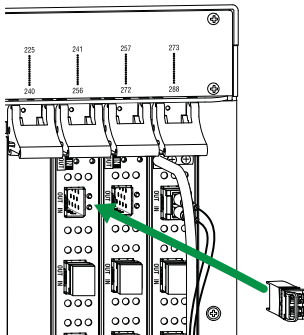
FIG. 25 Insert transceiver into transceiver socket

6. Verify proper seating by gently pulling on the transceiver with the latch in the locked position.

7. Remove the dust plug and save for future use.

8. Attach the fiber cable (see page 35).

9. Test the signal path.

Board Event Logging

As events (e.g., component or system failures) are logged, older log entries are replaced with newer log entries (with the exception of "serious" events, which are remain at the top of the event log until cleared or the system is power-cycled). Events are logged on each board, and each board must be accessed separately to view event logs for that particular board.

NOTE: *Accessing event logs should not be necessary unless the USB LED on a board is solid red or the system experiences persistent issues on a particular port/board.*

To access board event logs:

NOTE: *Accessing event logs requires the use of a virtual COM port. For instructions of creating a virtual COM port, see page 25.*

1. Connect the DXLink Fiber board to a PC running Windows via the board's USB mini-B port (FIG. 26).
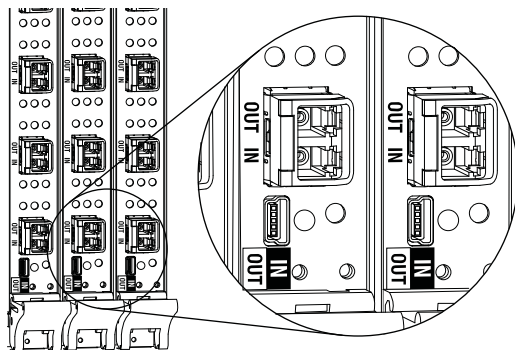
NOTE: *The USB LED illuminates solid red when the board experiences a major error. A major error may not affect user experience, but the error can be located by accessing board event logs.*

FIG. 26 DXLink Fiber board USB mini-B port

2. Open a terminal emulation program and select the previously established virtual COM port.
   Event logs appear in the emulator (see example in FIG. 27) and refresh every 5 to 10 seconds.

NOTE: *Minor errors include all events where a component of a board does not meet the minimum standard set for it in the software architecture. In nearly all cases, minor errors indicate internal issues that are resolved by the system without user action.*

FIG. 27 Example Error Log Report

3. Use the ? command to display the USB Main Menu Commands splash screen (see FIG. 28).

FIG. 28 USB Main Menu Commands splash screen

DXLink Fiber Troubleshooting

General Signal Problems

If you are experiencing general signal problems, it may be because of fiber cable quality issues. Be sure to check the "DXLink Fiber Optic Cable Requirements" section on page 34.

Audio Problems

If you are experiencing audio problems, it may be because you are trying to pass Dolby, DTS, or high PCM frequency rates and the destination device does not support them. Re-programming the EDID via the Transmitter may help resolve the problem (see the *Hardware Reference Manual – DXLink Fiber Transmitters and Receivers*).

Video Problems

If you are experiencing video problems, it may be because you are trying to pass a video format that the destination device does not support. Re-programming the EDID via the Transmitter may help resolve the problem (see the *Hardware Reference Manual – DXLink Fiber Transmitters and Receivers*).

Verify Optical Signal – Multimode Transceivers Only

If you are unsure that a multimode transceiver is passing a signal, hold the unattached end of the fiber optic cable **away from you** and take a picture of it with a digital camera (or cell phone camera). The image will show a bright light if the signal is being passed (works on some digital cameras and cell phone cameras).

Appendix A – Managing Configuration Files

Applicability Notice

This appendix applies to XNConnect version 2.12.6. XNConnect software's version information is found under its Help menu. This appendix covers the following general information on using XNConnect configuration software and basic modifications for customizing the configuration:

- Installing XNConnect (page 43)
- Discovering a system (page 44)
- Opening an .xcl configuration file (page 44)
- Navigating the interface (page 45)
- Creating local presets (page 45)
- Loading an .xcl configuration file (page 47)

For complete coverage of XNConnect including modifying virtual matrices and hardware, see the XNConnect Help file. If your configuration file needs any type of advanced modification, we *strongly recommend* contacting Technical Support to request a modified .xcl file or ask for assistance.

Standard Virtual Matrices and XNConnect

The default virtual matrix for switching signals in the Epica DGX 288 is VM 0, which routes video. For video sources that also include audio (e.g., sources with video and embedded audio routed through DXLink Fiber Boards), VM 0 routes the video and any embedded audio. Embedded audio does *not* have a separate virtual matrix for switching and *cannot* be broken away from the video in the Epica DGX 288.

VM 1, which switches exactly the same as VM 0, is also provided as an option for compatibility purposes with control software and equipment.

Additional VMs can be created and are useful in some situations. Control can be simplified by creating a separate virtual matrix for the inputs and outputs involved, e.g., if the signal from some of the equipment can only be routed to part of the destinations due to incompatible EDIDs or to provide restricted access to certain source or destinations. The XNConnect Help file contains information on creating new VMs.

CAUTION: Virtual matrix modifications are an advanced feature of XNConnect that should not be attempted unless you are extremely familiar with XNConnect and the AMX Matrix Switcher being configured.

XNConnect Overview

CAUTION: Unless you need to reload the .xcl configuration file or modify your system's configuration from the original specifications, you will <u>not</u> 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 available at <u>www.amx.com</u>. Configuration file modifications include basic tasks, such as creating local presets. Most Epica DGX 288 systems are configured automatically based on the hardware they contain; on occasion custom systems are conventionally created per the user's request.

Automatic Configuration

The configuration file for an Epica DGX 288 is automatically generated based on its installed hardware. The configuration is constructed internally with a standard virtual matrix by the CPU upon initial boot up of the system.

When a system is automatically configured, the configuration information can be accessed for modification in only one way since a configuration (.xcl) file does not exist for the system. XNConnect can be used to discover the configuration information from the CPU. The discovered configuration information can then be saved as an .xcl file. After the configuration is modified in XNConnect, the file information is loaded back onto the CPU (replacing the automatically constructed configuration). If necessary, the automatically constructed configuration can be restored (see page 47).

When discovered, an automatically constructed configuration does not show a file name until after it has been saved in XNConnect
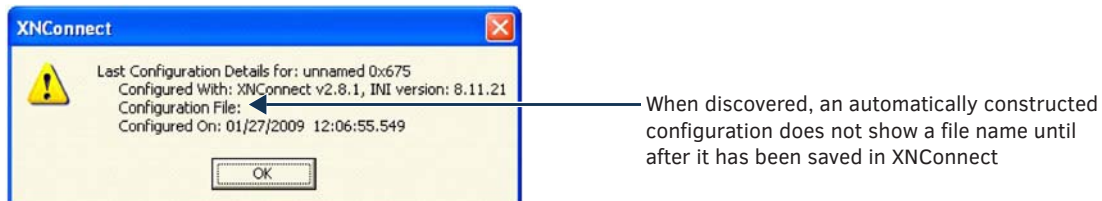
FIG. 29 Example of discovery information for automatically constructed configuration

Conventional Configuration

When an .xcl configuration file is created and saved in XNConnect and then downloaded to the enclosure's CPU before shipment, the file is considered to be conventionally configured (applies to some custom Epica DGX systems).

When a system comes with a conventionally configured .xcl file, the file can be accessed for modification in one of two ways. The first way (recommended) is to use XNConnect to discover the .xcl file on the CPU. The second way is to request a copy of the conventional (.xcl) file from Technical Support and then use XNConnect to open it. In either case, after the configuration has been modified in XNConnect, the modified .xcl file can be loaded onto the CPU (replacing the original, conventionally configured .xcl file).

Discovery shows file name for conventionally configured .xcl file
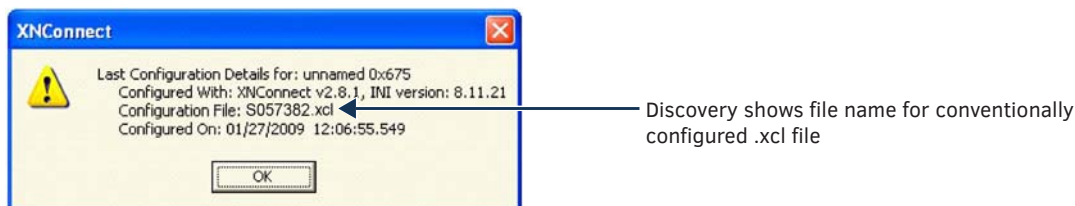
FIG. 30 Example of discovery information for conventionally configured .xcl file

Installing and Launching XNConnect

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

IMPORTANT: *Even if XNConnect is already on your PC, install the latest version from www.amx.com. We strongly recommend uninstalling the old version of XNConnect before installing a new version.*

System Requirements
❑ Windows® Operating System
❑ Serial port and RS-232 null modem cable

NOTE: *Your account must have required permissions to download XNConnect from www.amx.com.*

To install XNConnect from www.amx.com:

1.   Close all other applications currently running on your PC.

2.   From the www.amx.com/products/XNConnect.asp website page (under Application Files on the right), click XNConnect, click I Accept for the license, and then select Open to download the file.

3.   Optional – Select XNConnectReadMe_x_x_x to read about the software before installation.

4.   Click the application file (which is zipped).

5.   In the Compressed (zipped) Folders dialog box, click Extract All.

6.   Select a destination for the files.

7.   When the download is complete, click the application file and follow the directions in the installation wizard.

8.   Before using XNConnect, download and install the latest .ini file by clicking AutoPatch INI Updater
      (at www.amx.com/products/XNConnect.asp, under Matrix Switcher Tools on the right).

NOTE: *The AutoPatch INI Updater file provides XNConnect with information for new support devices and input and output boards (an account is not required).*

To launch XNConnect:

1.   From the Start menu at the lower left of the PC screen, select All Programs.

2.   Select AutoPatch Applications (or other file group you specified during the installation).

3.   Select the XNConnect folder and then select XNConnect.

Getting Started dialog box
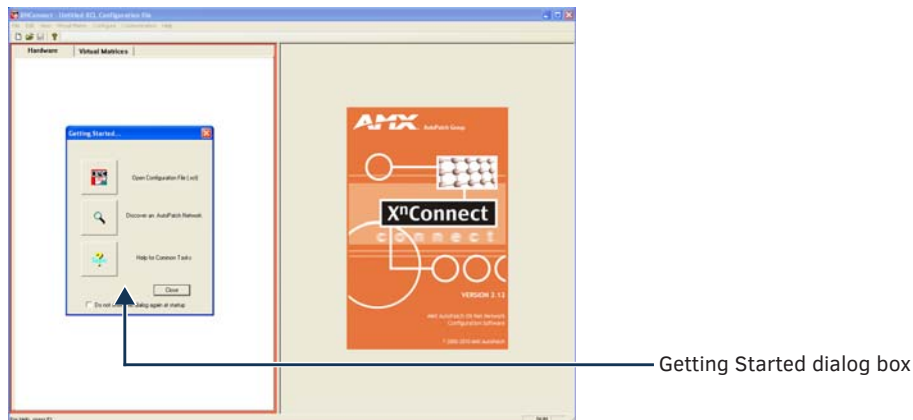
Discovering a System

When XNConnect is open, you can discover the system. This works for both automatically and conventionally configured systems. 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. We recommend disconnecting any third-party control devices from the enclosure's serial ports *before* starting the discovery process.

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.
3. (If not already open) Launch XNConnect.
4. Open the Communication menu; select Serial Port.
5. If applicable – For a serial port other than COM 1 (default), 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 Test to verify that communication has been established with the enclosure. 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 discovered 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 47).

Opening an .xcl Configuration File

If Technical Support has provided an .xcl file or if someone else has previously created an .xcl file for the system, follow the directions below to open it in XNConnect and then modify the file as desired. After modifications are complete, the new configuration information must be loaded onto the system to implement the changes (see page 47).

IMPORTANT: *Even if XNConnect is already on your PC, install the newest version from www.amx.com. We strongly recommend uninstalling the old version of XNConnect before installing the new version.*

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

To open an .xcl file:

1. Launch XNConnect.
2. From the Getting Started dialog box, click Open Configuration File. (If the dialog box does not appear, from the File menu select Open.)

Open Configuration File
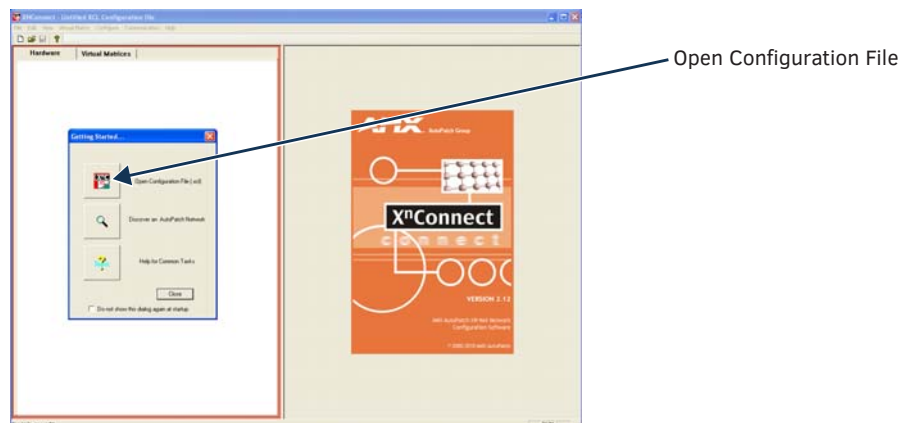
3. Use the standard Open dialog box to locate and open the .xcl configuration file.
4. From the File menu, select Save As and save an .xcl file with a new name to the PC. (We strongly recommend making a duplicate copy every time the file is modified.)

The .xcl file is ready to be modified. Whenever changes are made, the new file *must* be loaded onto the system to implement the changes (see page 47).

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 Matrices 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. 31) displays the system's hardware, such as enclosures and serial ports.

Virtual Matrices View

The Virtual Matrices view displays properties of the existing virtual matrices. Most common tasks are conducted from this view, including creating local presets.
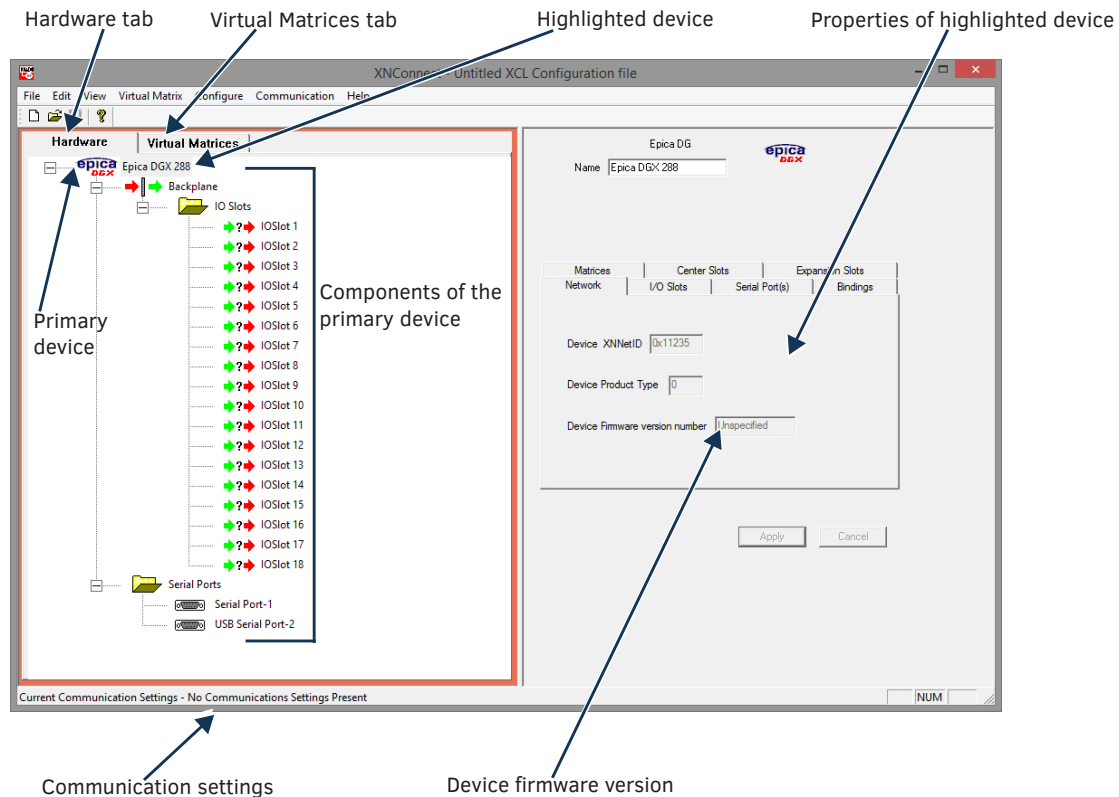
FIG. 31 XNConnect interface with Hardware tab selected

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 two creating local presets. For complete coverage of configuration related tasks, see the XNConnect Help file.

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 BCS commands entered in a terminal emulation program. The process for creating local presets involves three dialog boxes that cover managing, naming, and modifying presets.

The Epica DGX 288 supports a maximum of 64 local presets.

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

To create a new 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.
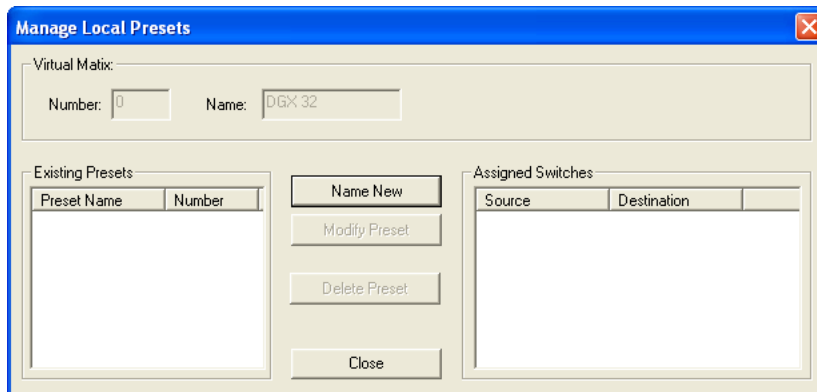
2. Click Name New.
   The Name New Preset dialog box opens.
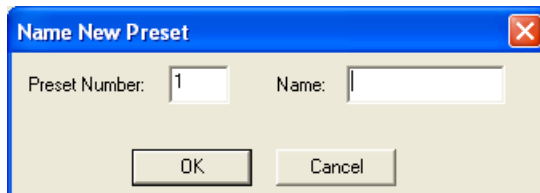
3. Optional – Enter a different preset number (local presets do not need to be numbered sequentially).

4. Enter a name for the new preset.

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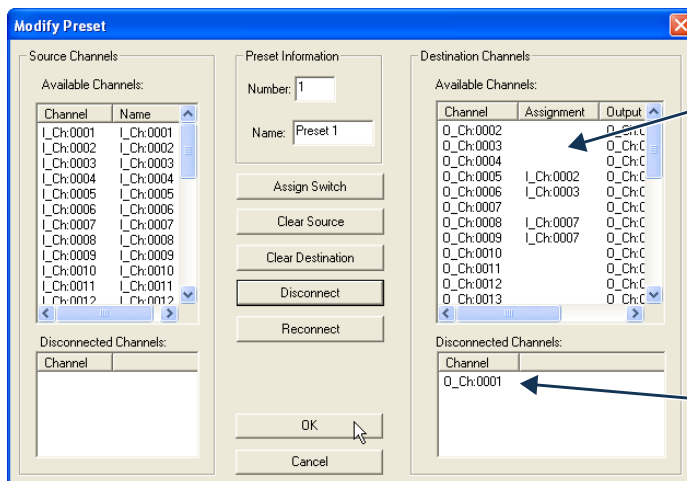
The Assignment column shows three switches that will be executed as part of Preset 1:

- Input 2 to Output 5
- Input 3 to Output 6
- Input 7 to Outputs 8 and 9

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

7. Click Assign Switch.
   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 Disconnect.
   The input or output appears in its corresponding Disconnected Channels list; the input or output will be disconnected when the local preset is executed.
   * Disconnecting an input will disconnect all outputs it is connected to.

9. Repeat Steps 6, 7, and 8 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 <u>must not</u> be actively switching when loading this information onto the system.

12. When all local presets have been defined, load the .xcl configuration file onto the system (see page 47).
    If the .xcl configuration file has been previously loaded to the system and local presets are the only modifications that have been made to the .xcl file, select Configure \ Configure Special – Virtual Matrix \ Configure All VM Local Presets.
    If the .xcl file is being loaded for the first time (assumes an automatically constructed configuration is on the CPU), select Configure \ Configure All.

13. From the File menu, select Save As and save an .xcl file with a new name to the PC.
    (We *strongly* recommend making a duplicate copy every time the file is modified.)

Loading an .xcl Configuration File

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

The two basic options for loading an .xcl configuration file are:

- Load the entire file using the "Configure All" option (see Caution below).
- Load part of the file using one of the "Configure Special" options.

To determine which configuration option to use, see "Configure Menu Commands" in the Help file.

When loading any part of an .xcl configuration file, the system *must not* be actively switching. You may want to disconnect any external controllers to make sure that no switches are executed during the loading of the file.

CAUTION: Using the "Configure All" option or the "Configure All Virtual Matrices" option will erase any global presets that have already been defined for the system (for information on defining and executing global presets, see the "Instruction Manual – BCS Basic Control Structure Protocol").

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

IMPORTANT: *The system <u>must not</u> be actively switching when loading any part of or all of the .xcl configuration file.*

1. Recommended – Disconnect any external controllers to make sure that no switches are executed during the loading of the file.
2. If you have not already done so – From the File menu, select Save As and save an .xcl file with a new name to the PC.
    (We *strongly* recommend making a duplicate copy every time the file is modified.)
3. Connect the Epica DGX 288 enclosure to the PC via the Control port (see page 24).
4. In XNConnect, open the Communication menu and 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 with a baud rate of 9600).
7. Optional – Click Test to verify that communication has been established with the Epica DGX 288. Click OK.
8. From the Configure menu, select the appropriate configuration option. For an explanation of Configure menu options, see the Help file.

The system automatically reboots (applies to non-hardware configuration options only; for hardware, select the appropriate configuration option and then select Configure > Reboot All Devices).

Appendix B – APDiagnostics

APDiagnostics Overview

APDiagnostics is a software application that monitors and displays advanced diagnostic information about the Epica DGX 288 Matrix Switcher. (APDiagnostics also works with other AMX Matrix Switchers that are capable of reporting such data.) This application is available at www.amx.com.

System Requirements

❑ Windows® Operating System

❑ Java Runtime Environment (JRE): latest version available

Installing APDiagnostics

You will need administrative rights to install APDiagnostics; contact your Network Administrator.

To install APDiagnostics using the serial port:

1. Attach a null modem serial cable without hardware flow control to the Control (DB-9 serial) port on the Epica DGX 288. Use a null modem cable that matches the pin diagram below for RS-232.
    Epica DGX 288 equipment requires pins 2, 3, and 5 only.
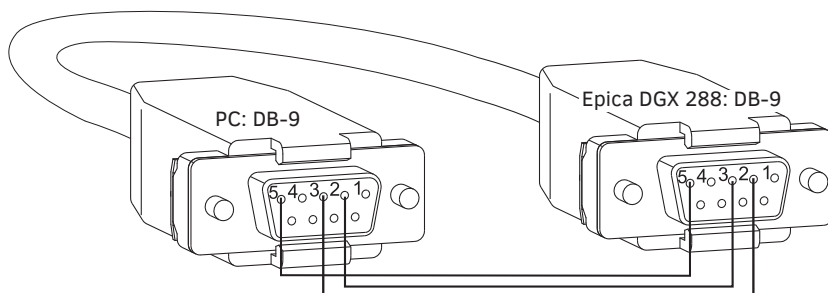
2. Attach the other end of the null modem cable to a PC.
3. Use serial communication software to make sure the PC's baud rate is set correctly for the system. The recommended (default) settings for serial communication for the Epica DGX 288 are listed in the table to the right.
4. From the www.amx.com/products/APDiagnostics.asp website page (under Matrix Switcher Tools on right), click APDiagnostics and select Save to download the file.
5. Optional – Select APDiagnosticsReadMe_x_x_x to read about the software before installation.
6. Click the application file (which is zipped).
7. In the Compressed (zipped) Folders dialog box, click Extract All.
8. Select a destination for the files.
9. When the download is complete, click the application file and follow the directions in the installation wizard.
10. Before using APDiagnostics, download and install the latest Bounds.ini file by clicking AutoPatch INI Updater (also at www.amx.com/products/APDiagnostics.asp).
11. Open APDiagnostics in Acquisition mode (default).
12. Select Comm / Settings.
13. Select the Serial Port tab and set the Comm ID and baud rate (9600).
14. Click Accept.

Epica DGX 288 Serial Port Settings	
Baud Rate	9600
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

Modes

This program can be opened in one of two modes: Acquisition (default) or Emulation.

Acquisition Mode

NOTE: *Only a single instance of the application can run on a PC when in Acquisition mode.*

Acquisition mode is used to gather and display real-time diagnostic data from an Epica DGX 288 attached to the PC running APDiagnostics. For this mode to be used effectively, we recommend using a dedicated PC because the Epica DGX 288 *must* be connected to your PC via a Control (DB-9 serial) port *and the program must be running continuously to acquire data*. This data consists of system-critical operating parameters, as well as general information about hardware and control configuration. As the data is gathered, it is automatically archived on the host PC's hard-drive. The three distinct types of files maintained by APDiagnostics are: date-stamped log files, .acp (packet) files, and activity files. The archived files can be emailed to Technical Support for trend analysis and troubleshooting or can be opened by APDiagnostics in Emulation mode for analysis.

Emulation Mode

This mode is an "off-line" mode used to process and display data that was gathered from an actual system while in Acquisition mode. This mode allows the user to "play back" the system's behavior during a specified period of time for trend analysis and troubleshooting.

Main Screen and Menus
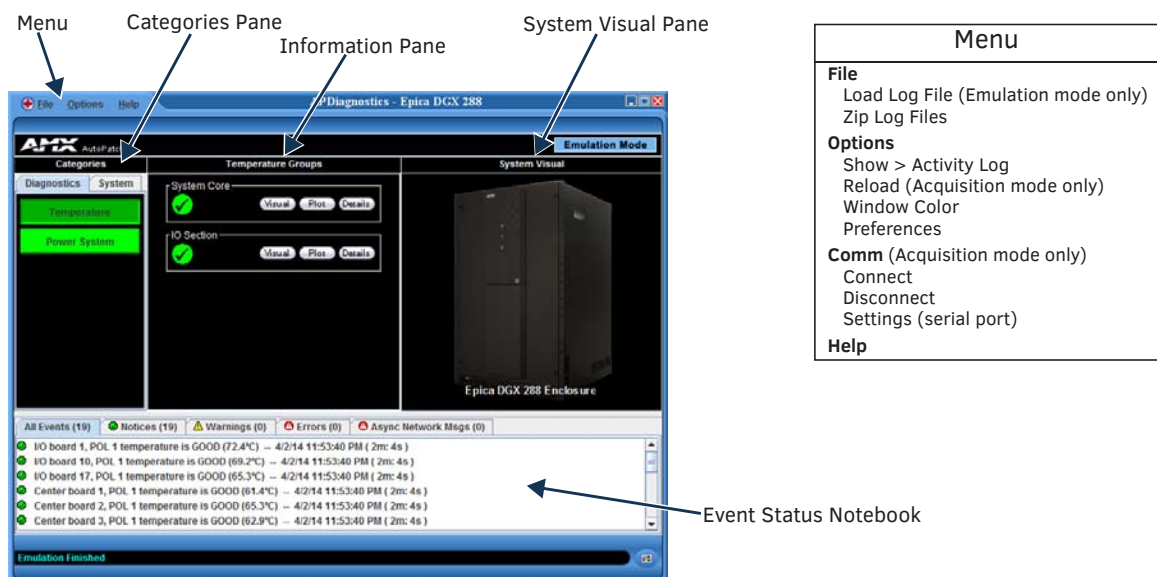
FIG. 32 Main screen in Emulation mode (the Comm menu option is not available in this mode)

NOTE: *Custom window colors can be applied to the Main Screen. For instructions on modifying the Main Screen's color, see the APDiagnostics Help file.*

Categories Pane

The Categories pane is the left-most pane in the Main Screen and presents the highest-level information about the overall system status. The Categories pane has two tabs: Diagnostics and System.

When maximum and minimum levels of operation for various components in the system are exceeded, APDiagnostics flags that information as warnings or errors (depending on the data received) by changing the color of the Categories buttons in the Categories pane to yellow for warning or red for error and by displaying the information as Warnings or Errors in the Event Status Notebook.

Diagnostics Tab
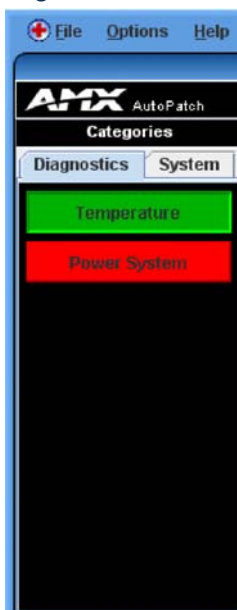
The two buttons on the Diagnostics tab (Temperature and Power System) will turn green, yellow, or red indicating Good, Warning, or Error state, respectively. A yellow for warning or red for error button indicates that the maximum or minimum levels of functioning for various components in the system has been exceeded. This allows you to "drill down" into that particular system for more detailed information about the state of its lowest-level constituents.

To display diagnostic information for Temperature and Power System groups:

1. In the Categories pane, select the Diagnostics tab.
2. Click either the Temperature or Power System button. Visual, Plot, and Details buttons display in the Information pane (see page 51).

System Tab
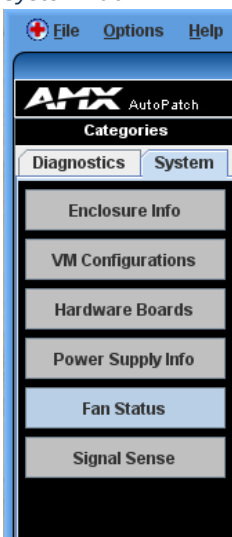
The six buttons on the System tab offer general information for the following:

- Enclosure Info
- VM Configurations
- Hardware Boards
- Power Supply Info
- Fan Status*
- Signal Sense (for inputs and outputs)

To display general information for a particular component:

1. In the Categories pane, select the System tab.
2. Click one of the buttons on the System tab.
   The details display in the Information pane (see page 51).

* A fan should be replaced if the speed drops significantly lower than its setting value, indicating that it will eventually fail. If a fan has failed completely, its speed will be reported as 0 RPM.

Information Pane
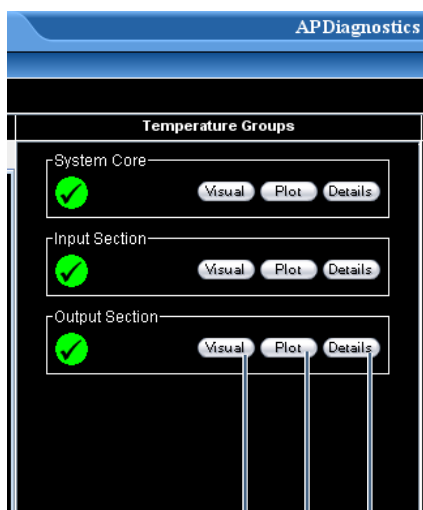
The Information pane is the center panel in the Main Screen and offers the next level of "drill down" into the system status. Information pane buttons access information for each of the specific group components listed. The type of information displayed in the Information pane depends on which tab is active in the Categories pane and which Categories button is selected.

To display diagnostic information:

1. In the Categories pane, select the Diagnostic tab.
2. Select either the Temperature or Power System buttons as applicable.
3. In the Information pane:

a. Click Visual to display visual details on the enclosure in the System Visual pane.

For more information, see page 53.

b. Click Plot to display a Plot View with a graph of data points for information being gathered (Acquisition mode) or already gathered (Emulation mode) for a specific component. The data is date stamped as it is added to the graph.

For more information, see page 52.
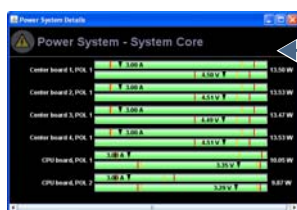
c. Click Details to display a set of analog status meters each representing current data for its associated component.
The meters provide an analog representation of a component's current value with respect to its Warning and Error setpoints.
If the value is below its minimum or exceeds its maximum Warning or Error setpoint, the color of the meter changes from green (Good) to yellow (Warning) or red (Error), making problem areas easy to identify at a glance.

Information Pane Plot Views

A Plot Views window displays a graph of data points for the components for which it is associated.
The graph has a legend at the right and is time-stamped in intervals across the bottom. The amount of historical data points presented in the graph can be determined by changing the settings in the Application Preferences dialog box (see page 54).

Legend items in a Plot View are selectable; doing so will filter the view so that only the selected items are displayed. Furthermore, if only a single item is selected, its Warning and Error setpoint values will also display in the window for reference.

TIP: *For a hard copy of a graph, save as a .png file, then print the .png. For information on changing the viewing of the graph, see the APDiagnostics Help file.*
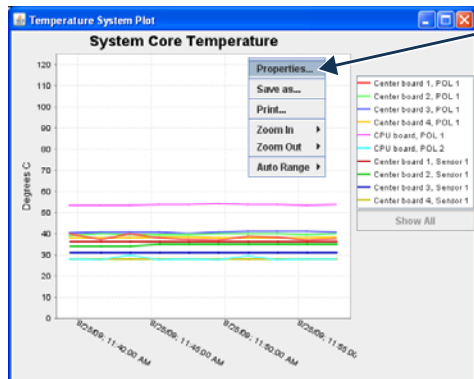
To access graph options:

1. Right-click on the graph and select a shortcut menu item.

Properties – opens a Chart Properties dialog box with three tabs: Title, Plot, and Other.

Save as – opens a standard Save dialog box.

Print – opens a standard Page Setup dialog box.

Zoom In – provides options to zoom in on Both Axes, Domain Axis, or Range Axis.

Zoom Out – provides options to zoom out on Both Axes, Domain Axis, or Range Axis.

Auto Range – provides options for auto display of Both Axes, Domain Axis, or Range Axis.

To display System information:

1. In the Categories pane, select the System tab.
2. Click the desired System button to display its corresponding details in the Information pane:
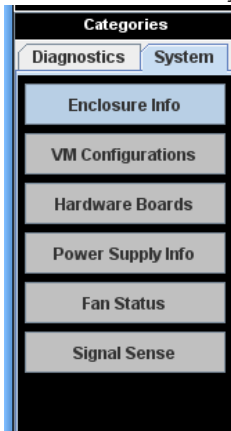
- **Enclosure Info** – XNNet ID, Firmware Version, Host IOS Version, and FW (Firmware) Build Date.
- **VM Configurations** – A table with the VM Name, VM Number, Inputs, and Outputs.
- **Hardware Boards** – A table with board numbers for Input/Output boards and Center boards (Center boards are internal and handle switching).
- **Power Supply Info** – Model number, Serial number, Revision, and Service Hours for each power supply. (If a power supply is listed as "not reporting," either it is not physically present or it is not being reported by the enclosure.)
- **Fan Status** – A table indicates Fan #, Speed (RPS), and Health with an icon for wellbeing (green check mark, yellow !, or red !).
- **Signal Sense** – A table indicates whether a signal is present on each of the input and output channel connections on the switcher. The signal may or may not be routed, but the source device must be connected and powered on for the table to indicate that the signal is present.

NOTE: *The Signal Sense table does not show crosspoint status.*

System Visual Pane
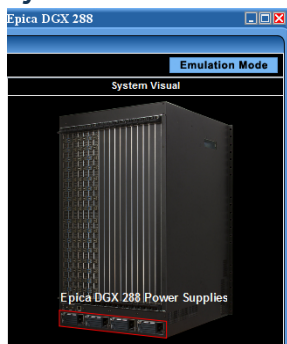
The System Visual pane is the right-most panel in the Main Screen and presents a simple graphic representation of the different groups being monitored by the application.

To display an appropriate image in System Visual pane:

1. In the Categories pane, select the Diagnostics tab.
2. Click either the Temperature or Power System button.
3. In the Information pane, click Visual for the applicable Temperature Groups or Power System Groups (Power Supplies are illustrated in the graphic to the left).

Event Status Notebook

The Event Status Notebook is the panel with five tabs at the bottom of the Main Screen. The tabs in the Event Status Notebook provide current data (Acquisition mode) or previous data (Emulation mode).

The Notebook provides updated status entries as the system is being monitored, providing a snapshot glance of the most recent state of the system.
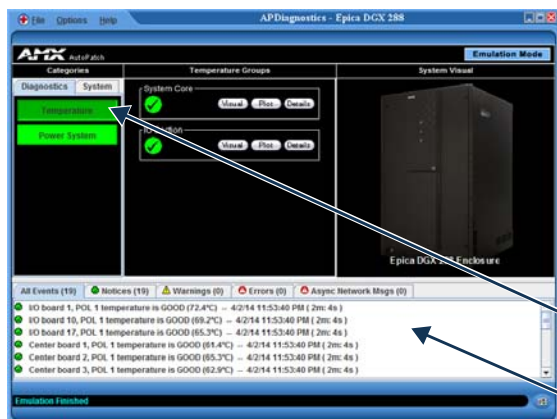
When components in the system exceed their maximum and minimum levels of operation, APDiagnostics flags that information as warnings or errors depending on the data received. APDiagnostics changes the color of the Categories buttons in the Categories pane (top arrow) to yellow for warning or red for error and displays the information as Warnings or Errors in the Event Status Notebook (bottom arrow).

The information displayed in the Event Status Notebook is sorted under the following tabs: All Events, Notices, Warnings, Errors, and Async Network Msgs (Messages).
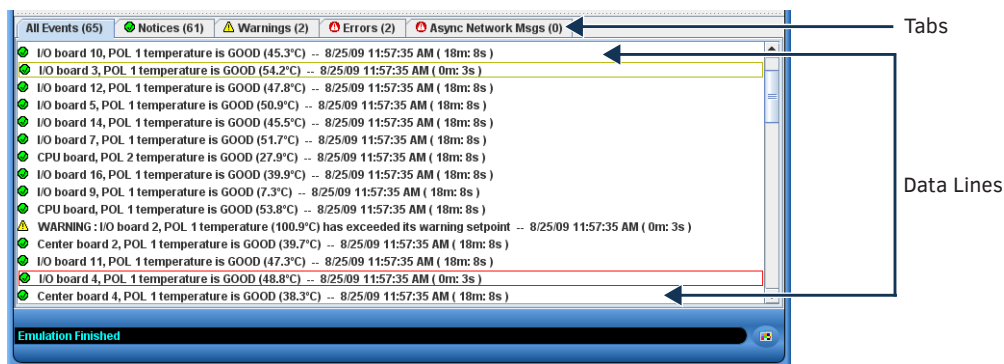
NOTE: *A yellow or red outline around a data line indicates that the component was previously in a Warning or Error state.*

To view information in the Event Status Notebook:

1. Click the applicable tab:
   - **All Events –** comprehensive and sequential listing of all Notices, Warnings, and Errors
   - **Notices (green checkmark)** – data list collected indicating a status of "Good"
   - **Warnings (yellow !)** – data list collected that indicates the Warning set point (high or low) has been exceeded
   - **Errors (red !) –** data list collected that indicates an Error state, i.e., has surpassed or exceeded its allowable maximum or minimum set point
   - **Async Network Msgs (red !) –** list of asynchronous messages received from the connected enclosure that indicate a condition that may need to be addressed
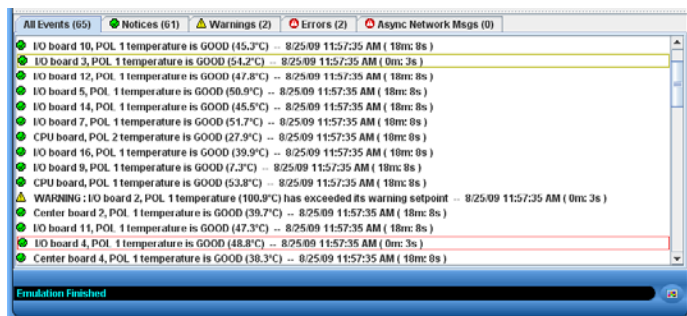
Data lines display for every component that is queried and provide:
- "Green checkmark" (Notice) or "yellow !" (Warning) or "red !" (Error)
- Component description (e.g., Center board 2, POL 2 power)
- General status description (e.g., GOOD, has surpassed . . ., has exceeded . . ., etc.)
- Date/time stamp for the event (e.g., 8/03/15 5:15:50 PM)
- Elapsed time in minutes and seconds that the component has been in that state (e.g., 7m:25s)

To access a data line context menu:

1. Select and then right-click a data line in a list. The context menu options are:
   - Show Graph – opens a Plot View of the data points for that component
   - Icon/Date/time stamp* (information only; not selectable) – indicates the most recent time that the component was in that respective state
   - Reset Selected Item*
   - Reset All Items

* These menu items only appear when a data line is outlined in yellow or red.

Types of Files

The following three types of files are zipped and archived. The file name for each includes the date and time zipped: for example, Diagnostic_03.02.09_14.24.50.zip (zipped on March 2, 2009 at 2:24:50 pm).

- **Log (.apd, .zip)** – contains all data displayed in the APDiagnostics interface in text format. Can be loaded when the program is opened in Emulation mode to view data for trend analysis and troubleshooting; see page 56.
- **Packet (.acp)** – contains all system activity data (packet transactions between APDiagnostics and the enclosure) in libpcap format. Advanced users can open .acp files with a packet/network analyzer, such as "Analyzer" (http://analyzer.polito.it/).
- **Activity (.log)** – displays system activity in the Activity Log dialog box in text format.

Application Preferences
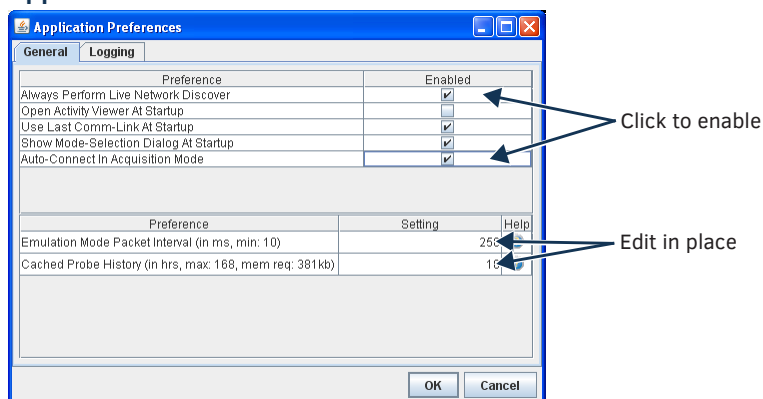
To access the Application Preferences dialog box and set preferences:

1. Select Options > Preferences.
   The Preferences dialog box has two tabs: General and Logging.

## General Tab

To set general application preferences:

1. For the upper set of preferences, click the applicable Enabled check boxes.
   - Always Perform Live Network Discover* (selected by default)
   - Open Activity Viewer at Startup
   - Use Last Comm-Link at Startup (selected by default)
   - Show Mode-Selection Dialog at Startup (selected by default)
   - Auto-Connect in Acquisition mode (selected by default)

2. For the lower set of preferences, edit information in place (Help boxes appear).
   - Emulation Mode Packet Interval
   - Cached Probe History

3. Click OK.

* If this preference is "off," the program will use the last XNNet ID stored in its registry (and expects that enclosure to be present).

When processing a set of archived files in Emulation mode for analysis, you can control how fast or slow the files are processed by adjusting the "Emulation Mode Packet Interval" setting on the General tab of the Application Preferences dialog box. If you are viewing graphs while the data is being processed, specifying a larger interval value will allow the program to be more responsive as the Plot Views can be processor intensive in the face of fast playbacks.

IMPORTANT: *APDiagnostics keeps a cache of historical data points in memory for status of all components that it monitors. These data points can then be displayed in the Plot Views for trend analysis. You can control the amount of system memory APDiagnostics will use for this historical data by setting the "Cached Probe History" value on the General tab. (The Max. Cached Probe History is 168 hours. For default values, see the dialog box.) Large history sets may impede performance of the application, so set this value in accordance with the resources available on the target PC.*

Logging Tab
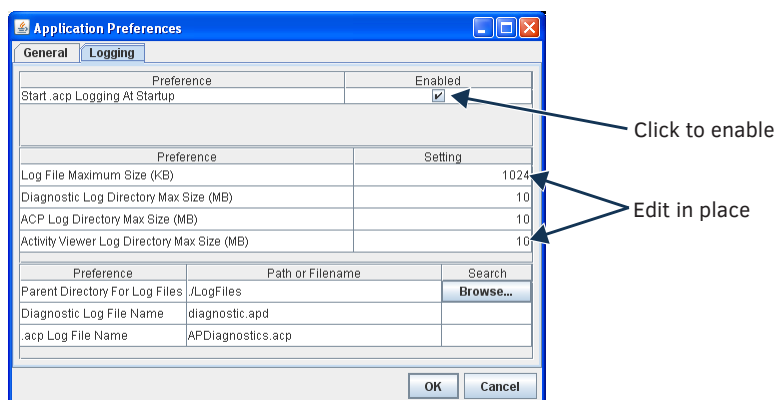
*To set the preference for Start .acp Logging At Startup:*

1. Click the Enabled check box.

2. Click OK.

To change settings:

1. Edit in place (for default values, see the dialog box):
   - Log File Maximum Size*
   - Diagnostic Log Directory Max Size
   - ACP Log Directory Max Size
   - Activity Log Viewer Directory Max Size

2. Click OK.

* Log files are automatically zipped when the maximum size specified in this field is reached. This size value applies to all three log file types.

TIP: *The amount of disk space allocated for archived files can be controlled by specifying the amount of disk space to allocate for each of three file types that are generated and archived while APDiagnostics is running in Acquisition mode. You can also specify how big the active Log file should get before it is archived and a new one is started. These parameters are specified on the Logging tab.*

Browse parent directory for log files
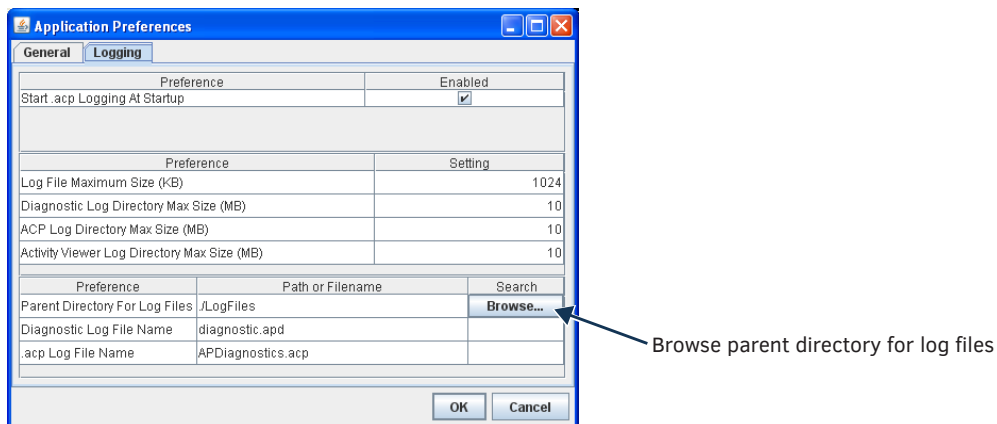
To specify the root level folder for storing all Log files:

1. Browse the parent directory for log files.

    Once specified, the files are stored as follows:

    - .apd files in a subfolder named "diagnostic"
    - .acp in a subfolder named "acp"
    - .log files in a subfolder named "activity"

NOTE: *The "Diagnostic Log File Name" and the ".acp Log File Name" can be changed by editing in place, but cannot have a specified path.*

Zip Log Files

In the event that you need to zip a set of files and send them to Technical Support, use the Log File Zip Utility dialog box to create a single archive file to email.
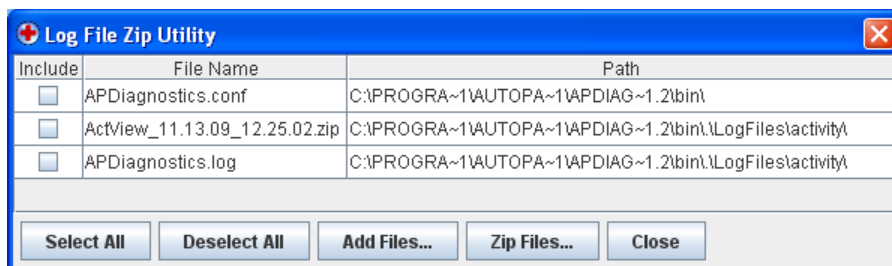
To zip log files:

1. Select File > Zip Log Files.
2. Under Include, click the check box for each of the files needing zipped.
    - Click individually or use any of the first three option buttons along the bottom.
    - Select multiple, consecutive files by holding down the Shift key and clicking the first and last files in a range of files.
    - Select multiple, nonconsecutive files by holding down the Control key and clicking on individual files.
3. Click Zip Files.
4. Click Close.

Load Log Files (Emulation Mode Only)

To load log files:

1. Select File > Load Log File.
2. From the Open dialog box, navigate to the location the application is storing the .apd files (the default location is LogFiles > Activity in the installation directory).
3. Open the desired .apd and/or .zip file(s). The Status bar at the bottom indicates which file is being processed (for example, "Processing file 2 of 3").

Activity Log

A diagnostics window where all activity is logged in detail keeps track of the application's activity while it is running. The logging can be paused and resumed as required. The logged information can also be deleted (Clear Pad). The level of logging can be specified as: Critical, General (default), or Detailed.
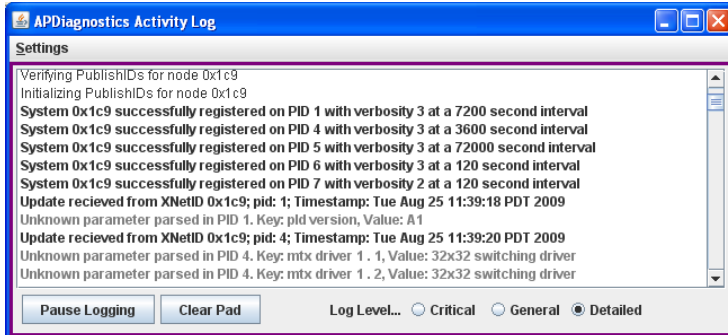
To select options in the Activity Log:

1.   Select Options > Show > Activity Log.

2.   Click Pause Logging or Clear Pad as needed (change Log Level if desired).

Communications

APDiagnostics communicates with a single enclosure at a time in Acquisition mode. (Only a single instance of the application can run on a PC when in Acquisition mode.)

NOTE: *The Comm menu item is available only in Acquisition mode because communication with a system is not required to run APDiagnostics in Emulation mode.*

The communication link can be disconnected at anytime (thus freeing up the COM port for use by other applications) and then reconnected when needed. The program will reset itself when the reconnection occurs.

To change the Comm Settings (in Acquisition mode only):
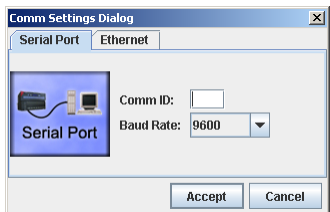
1.   Select Comm > Settings. The Comm Setting Dialog box opens.

2.   Select the Serial Port tab and enter the Comm ID and baud rate (default 9600).

3.   Click Accept.

Appendix C – Adding or Replacing Boards

Applicability

This appendix covers the removal and replacement procedure for the Epica DGX 288 boards listed in the table below.

DXLink Fiber Boards, Simplex

Part #	Model Name	Model Number, Description
FG1055-521	DXLink Multimode Fiber Input/Output, Simplex	EPICADGX288-VIO-MMF-S
FG1055-520	DXLink Single Mode Fiber Input/Output, Simplex	EPICADGX288-VIO-SMF-S

NOTE: *DXLink Fiber Simplex equipment can receive signals from and route signals to DXLink Fiber Duplex equipment. If Duplex equipment is used in a signal run with Simplex equipment, Duplex equipment should be configured to operate in Unidirectional Mode.*

Procedure Overview

IMPORTANT: *Adding or replacing boards should only be done by personnel trained to handle ESD sensitive parts and assemblies.*

ESD WARNING: *To avoid ESD (Electrostatic Discharge) damage to sensitive components, make sure you are properly grounded before touching any internal Epica DGX 288 materials. Use an ESD wristband and cord with an alligator clip attached to a good ground source.*

Items Required

❑ Epica DGX board(s)

❑ ESD wristband and cord with alligator clip

❑ PC with terminal emulation program

Safety Recommendations for Laser Products

WARNING: DXLink Fiber uses a Class 1 laser product to send signals. While the Class 1 category indicates that the invisible laser used is safe, we recommend avoiding direct eye exposure when using any optical fiber product (see the OSHA directive on page 34).

CAUTION: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

IMPORTANT: *No user serviceable parts are included inside Epica DGX 288 enclosures; service should only be done by qualified personnel.*

Exercise caution when installing DXLink Fiber products to avoid direct eye exposure to invisible laser radiation. Follow the recommendations below whenever installing or working with these fiber products.

❑ Be sure to apply the power only after all fiber connections are made and no fiber ends are exposed.

❑ Do *not* remove dust plugs from DXLink Fiber ports or the dust caps from the fiber cables until establishing connections; avoid direct eye exposure.

❑ Make sure all cables, including fiber cables, are correctly connected and/or terminated.

❑ Before you unplug a fiber cable on a DXLink Fiber Board, disconnect the power on the TX or RX unit that is connected to the board.

Adding or Replacing a Board

IMPORTANT: *When replacing a board, be sure to install the new board in the same slot that held the original board to make sure the switching commands are correct after you reconnect the source or destination devices.*

In almost all cases, Epica DGX 288s are configured to accommodate a full enclosure's worth of boards and do *not* require modification to the configuration file when a board is added. If you cannot execute switches with the new board after it has been installed, the configuration file may need to be updated; see "Board Troubleshooting" on page 60.

CAUTION: Cable management bars are not to be used as handles to remove or install boards.

In the following procedure, read each step entirely. The steps include helpful tips to avoid damage to the enclosure's internal cables and connectors.

To remove and replace an Epica DGX 288 board:

1. Disconnect all AC power cords. Make sure that none of the power supply LEDs are illuminated.
2. If applicable – Label and disconnect all cables on the board being replaced. If cables from adjoining boards obstruct access, label and disconnect them as necessary.
3. **Remove cable management bars –** Loosen and remove the two screws at each end of each cable management bar.
4. **Remove grounding bars –** Loosen and remove the screw at each end of each grounding bar.
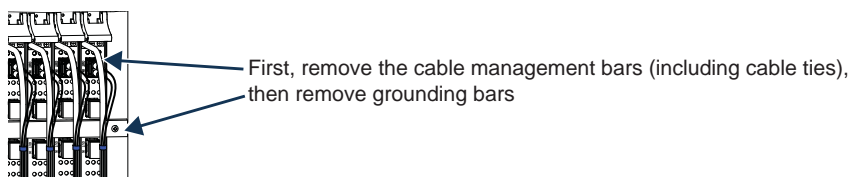

First, remove the cable management bars (including cable ties), then remove grounding bars

FIG. 33 Remove cable management and grounding bars

5. **Remove current board or blank board plate** – Push on the board's extractor handles as far as they will go (about a 45° angle). With the handles extended, pull the board straight out of the board slot. Place the board in an ESD bag and set aside.
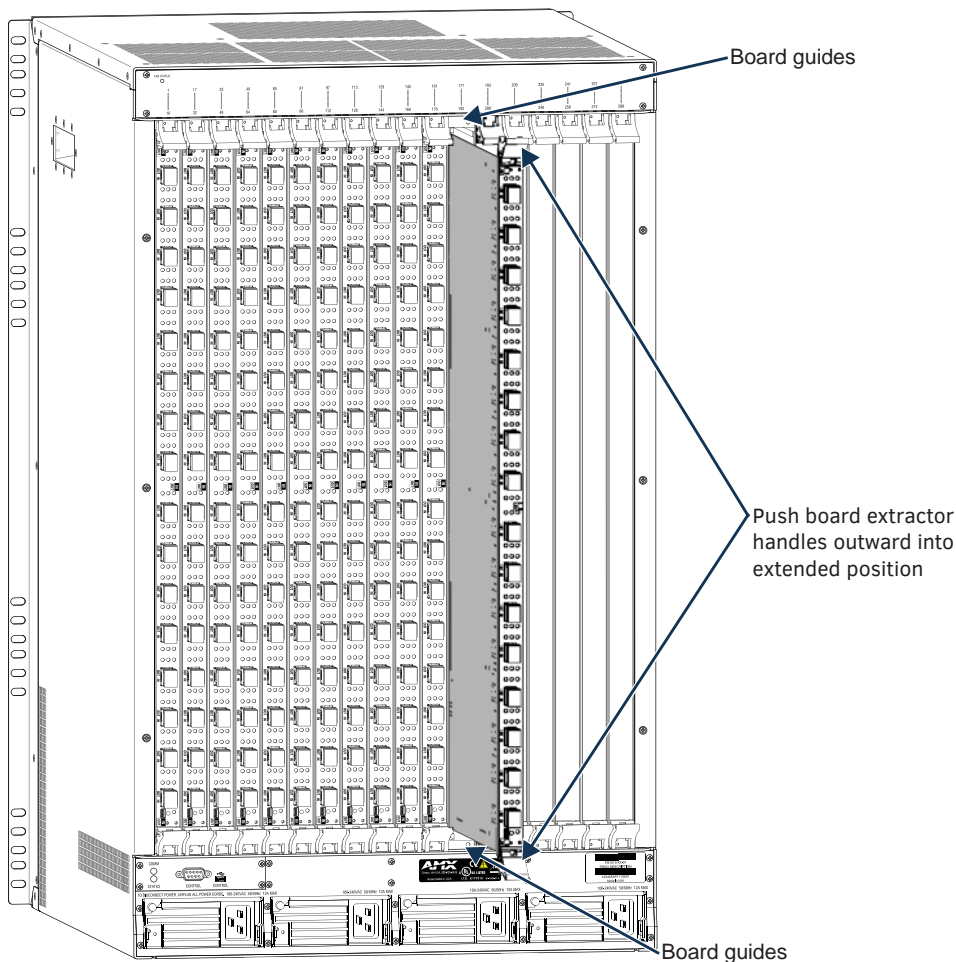

Board guides

Push board extractor handles outward into extended position

Board guides

FIG. 34 Push out on extractor handles and then pull board straight out

CAUTION: Each Epica DGX board has an EMI gasket along one edge of the faceplate. Handle the boards carefully to avoid dislodging or damaging the gasket on the board being installed and the gasket on the adjacent board or blank plate.

CAUTION: For DXLink Fiber Boards, do not remove dust plugs from the fiber transceivers until Step 8.

6. With the board's extractor handles in the extended (unlocked) position, line up the board's edges on the board guides that are along the top and bottom of the board slot (FIG. 34).

7. Begin pushing the board into the slot until each extractor handle starts to engage the metal extractor plate (the extractor handles move into their folded positions).
    When the extractor handles start to lift, flip the handles toward the center of the board until they snap into their folded (locked) positions, which firmly seats the board.

8. Plug all AC power cords back into the power supplies.

9. Verify that the system recognizes the board:
    a. Attach a PC to the serial port on the enclosure with an RS-232 null modem cable (pinout for PC to enclosure: 5 GND to 5 GND, 2 RXD to 3 TXD, and 3 TXD to 2 RXD).
    b. Open a terminal emulation program.
    c. Set the COM port and baud rate (the default baud rate for the Epica DGX 288 is 9600).
    d. Click Connect.
    e. Enter `~scri4v3!`
    f. Check to be sure the new board is included in the input or output boards list (FIG. 35). If not, re-seat the board and enter the command again. (*Do not disconnect the terminal program until after Step 9 is successful.*)
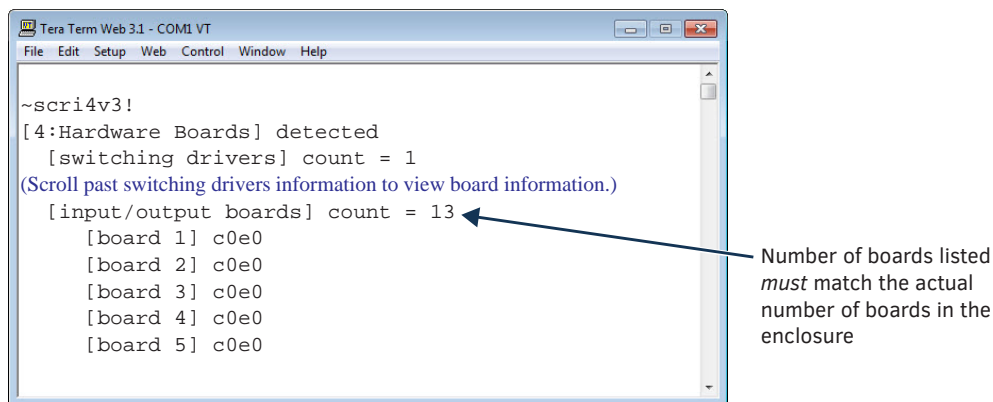
FIG. 35 Splash screen showing boards in the system (Epica DGX 288 example with 8 input boards)

10. Attach cables to the board's connectors* and reconnect any other cables that were disconnected in Step 2.

11. Reattach grounding bars and cable management bars (tie cables to cable management bars).

12. Execute a test switch using a connection on the new board to be sure that video is present at the destination.
    If the test switch does not work, see "Board Troubleshooting" on the page below.

* If you need cabling information, see the "DXLink Fiber Boards, Simplex" chapter in this manual.

IMPORTANT: *If for any reason a board slot is left empty, be sure to attach a blank plate to cover it.*

Additional Board Information

DXLink Fiber Boards, Simplex

For information on DXLink Fiber Boards and system setup with DXLink Fiber Transmitters and Receivers, see page 29.

Board Troubleshooting

If you cannot execute switches with the new board after it has been installed, the first thing to do is verify the system's configuration by entering `~scri5v3!` in a terminal emulation program (FIG. 36). This command retrieves information on the crosspoint size of the virtual matrices (VMs), which determine the routing of signals.

NOTE: *The configuration file is automatically generated by the system based on its hardware – input and output boards, CPU, etc.*

From the factory, the automatically generated configuration contains two VMs: VM 0 = all signals (default) and VM 1 = video signals.

The crosspoint size for each VM is set at 288x288 based on having a fully loaded enclosure (eighteen boards) with sixteen transceivers per board (one input and one output port on each transceiver).
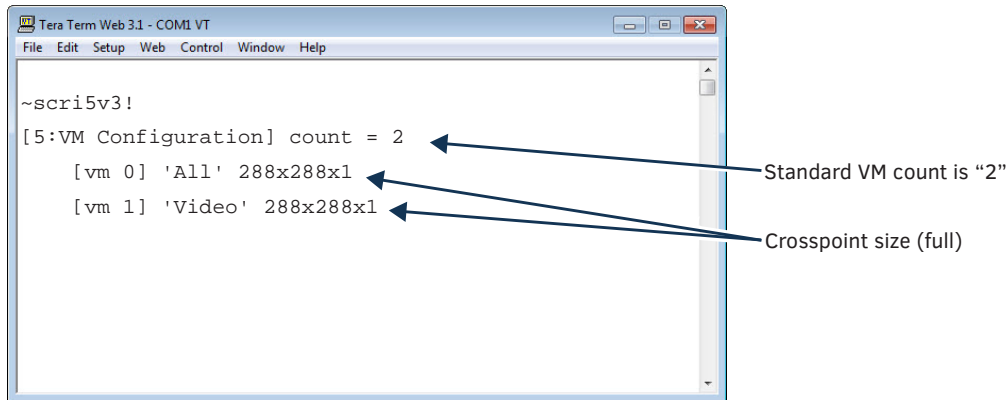
FIG. 36 Splash screen information indicating a standard configuration file for an Epica DGX 288

If the crosspoint size is less than full (e.g., 112x112) and the new board increases the size past the size indicated on the splash screen, then the system was customized for a non-standard crosspoint size that is not large enough to accommodate the new board. The configuration file *must* be updated before the new board will work (see "Updating the Configuration File" below).

If the crosspoint size is large enough to accommodate the new board and you still cannot execute switches, contact Technical Support (see page 28).

Updating the Configuration File

If the configuration file requires updating (as explained in the previous section), read both choices listed to determine how to proceed.

- If the system's configuration file has *not* been modified since it was shipped from the factory, enter ~def! in a terminal emulation program to establish the default configuration of 288x288 with two VMs.
- If the original configuration has been modified in any way (e.g., local presets were added), we recommend sending a copy of the modified file to Technical Support (see page 28), so they can add support for the board change to the modified file before you download the file to the CPU (downloading requires XNConnect software; see page 47).

Appendix D – Upgrading Board Firmware

Applicability

This appendix covers using the Firmware Upgrade Tool (FUT) to upgrade I/O board firmware.

The firmware on the Epica DGX 288 DXLink Fiber Input/Output Boards (Multimode and Single Mode) can be upgraded in the field using Firmware Upgrade Tool v1.2.4 or later (available at www.amx.com).

IMPORTANT: *You must have adequate rights to install the Firmware Upgrade Tool. Before proceeding, check with your System Administrator to be sure you have the required access.*

If you need to update the firmware to a version which is not available from the product's page at www.amx.com, contact technical support for the upgrade file (see page 28).

PC Requirements

❑ Windows 7 or Windows 10 Professional®

❑ USB Mini-B cable*

❑ Download the Firmware Upgrade Tool (at www.amx.com, search for "Firmware Upgrade Tool")

❑ Download the most recent Firmware Field Upgrade Package (at www.amx.com, on the product's page, on the right side under Firmware Files)

* The USB port is used as a virtual COM port for serial communication.

Upgrade Information

The system remains operational during the upgrade procedure below and does not interrupt signals through the system until after the firmware transfer has been completed. After the transfer has completed, the board automatically reboots (the Reboot When Done option *must* be selected in the FUT) and begins upgrading the board with the loaded file (USB LED blinks during upgrade and stops when upgrade in complete).

Fiber Board USB LED

The USB indicator LED at the bottom of the DXLink Fiber Board blinks red during firmware upgrade. The blinking red LED is normal during upgrade and indicates that the board is actively processing the upgrade.

If upon rebooting following an upgrade, the LED turns solid red, the upgrade has been unsuccessful (or was interrupted by a lost power event). Resolve the unsuccessful upgrade by re-sending the firmware file to the board.

Before Upgrading the Firmware:

❑ Connect the DXLink Fiber Board to be upgraded to the PC via the USB Mini-B port on the DXLink Fiber Board

❑ Establish a virtual COM port (see page 25)

To upgrade the firmware:

1. On the PC, open the Firmware Upgrade Tool.
2. Under Port Selection, select the COM port being used. (If unsure of the correct COM port, navigate through Start/Control Panel/Device Manager icon, expand the Ports tree, and note the AutoPatch USB Bridge COM port assignment.)
3. Click Browse to search for the firmware file to be uploaded.
4. To prompt the board to upgrade using the loaded file, select Reboot When Done.
5. Click Send File to upgrade the firmware on the connected board.
   The progress of the upgrade displays in the Upload Status field. Status is also indicated in the Status bar at the bottom. The success of the upgrade or any errors that occur will be reported.*
6. When the process is complete, click Exit.

* If an incorrect file has been selected or if the upgrade has failed, the USB LED illuminates solid red. To recover (in either case), browse to select the correct file and resend.

NOTE: *If a board does not automatically reboot once the firmware file has been loaded to it (e.g., the Reboot When Done option was not selected in the FUT when the file was sent), remove and reapply power to the enclosure. All boards that had not previously rebooted will now reboot and upgrade themselves using the new firmware version.*

Appendix E – CPU Replacement

Applicability

This Appendix provides instructions for removing and installing an Epica DGX 288 CPU board. The procedure can be done while the enclosure is in a rack, but the system *must* be powered down.

TIP: If a CPU board was ordered as a spare to keep on hand in case replacement is necessary, we recommend setting up the system as desired with custom board settings and any configuration file modifications. Then save the files (.xcl configuration file), remove the CPU, install the spare CPU, and load the settings to it.

Removal and Installation

CAUTION: *Do not remove a CPU board until you are ready to install the replacement, unless directed to do so by Technical Support.*

Items Required

❑ Epica DGX 288 replacement CPU board

❑ Phillips #1 screwdriver

❑ ESD wristband and cord with alligator clip

IMPORTANT: *If you customized board settings during installation or have modified the original configuration file, save back-up copies of those files before removing the CPU.*

Configuration and Board Settings Requirements

- The replacement CPU board will ship with the factory configuration file loaded. Configuration files modified since the original installation must be reloaded to the system after replacing the CPU board (for information, see page 47).
- After installation, custom board settings that were stored on the original CPU may need to be restored (for instructions, see page 47).

CPU board
(at far left below input boards)
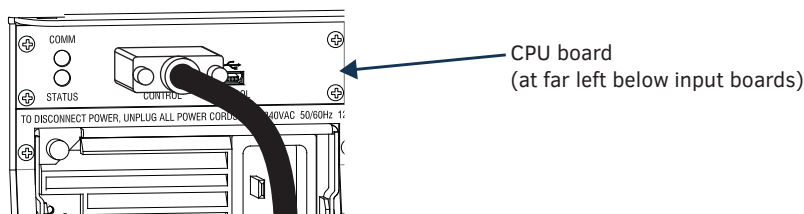
FIG. 37 CPU board

ESD WARNING: To avoid ESD (Electrostatic Discharge) damage to sensitive components, make sure you are properly grounded before touching any internal Epica DGX 288 materials. Use an ESD wristband and cord with alligator clip attached to a good ground source.

To remove and replace an Epica DGX 288 CPU board:

1. Turn off all AC power to the enclosure. Check to be sure none of the power supply LEDs are illuminated.

2. If a USB cable is connected to the CPU, disconnect it now.
    If a serial (DB-9) cable is connected to the serial port, leave the cable's connector attached.

3. Remove the four screws on the left and right edges of the CPU faceplate (FIG. 38).
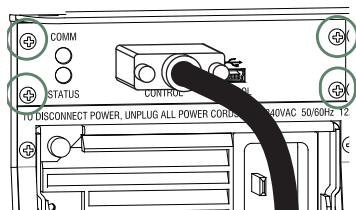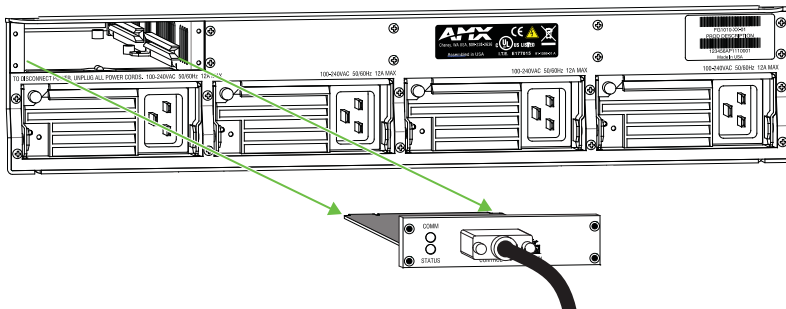

FIG. 38 Remove 4 screws

4. If not already attached, attach a serial (DB-9) cable to the serial port on the CPU board and use the cable's connector as a handle to carefully pull the CPU board straight out of the enclosure (FIG. 39).


FIG. 39 Use a serial cable to pull board out

5. Unplug the serial cable and remove the faceplate from the CPU board. Set faceplate aside.

6. Place the CPU board in an ESD approved static shield bag and set aside.

7. Slowly slide the replacement CPU board into the empty slot, being careful to align it in the board guides along both sides of the slot (FIG. 40).
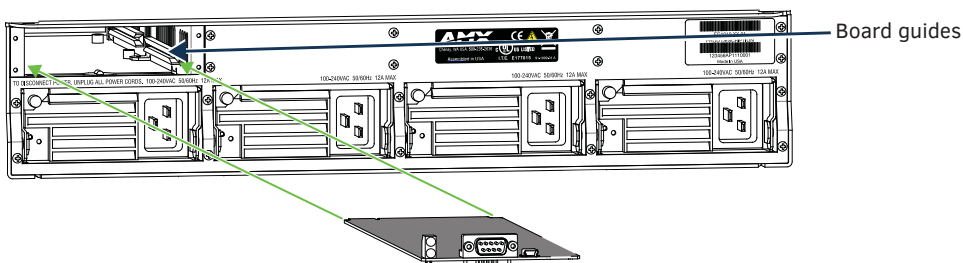
Board guides

FIG. 40 Align board with board guides and slide in

8. Push the CPU board into the enclosure firmly enough to be sure a good electrical connection can be established (avoid pushing on the connectors). When fully inserted, the front of the CPU should allow just enough room for the faceplate to fit around it and to sit flush with the back metal.

9. Reattach the faceplate with the four screws that were removed in Step 3.

10. Apply power to the enclosure.

11. Check the Status LED on the CPU (FIG. 41) for indications of normal display (see table below).

System Status Indicator
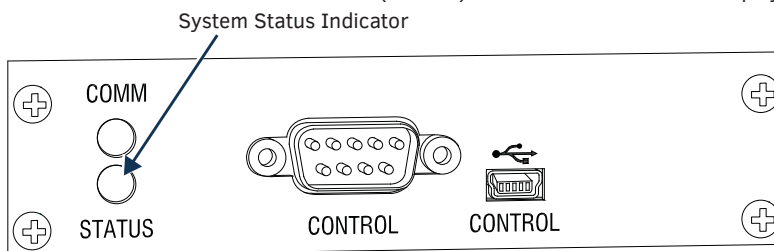
FIG. 41 CPU LED indicators

Indicator	Normal Display	Cautionary Display
System Status	Green during boot up of system (approx. 10 to 30 sec., depending on load) Blinking green when ready	Blinking red/green: an exception has been logged in IOS* (validation failure) Blinking red: dropped into IOS

* IOS (Initial Operating System) is the base layer operating system on AMX equipment. IOS performs functions such as hosting higher level run-time software applications. When unexpected critical errors are encountered with such hosted applications, system control of the equipment may be passed to the IOS layer preventing normal system operation until the error is manually cleared. Please report all such errors to Technical Support (see page 28).

12. Attach cables to the CPU (serial and/or USB).

13. Execute a test switch to be sure the system is working correctly.
     If you are unfamiliar with this system, see the Epica DGX 288 Matrix Switcher Hardware Reference Manual at www.amx.com.

14. If necessary – Restore configuration settings (see page 47).

Troubleshooting

❑ Repeat the installation procedure starting on page 63 to see if reseating the CPU establishes the connection.

❑ Check the LEDs for indications of normal display.

If the CPU LEDs do not display normal indications, contact Technical Support (see page 28).

Restoring Settings

Configuration File

The replacement CPU will have the factory configuration file loaded.

If the system's original configuration file has not been modified, the system is ready to work, but may still need board settings reestablished (see "Custom Board Settings" below).

If the system's configuration file was modified since installation:

- If a copy was made of the modified file, download the modified file according to the directions in the Epica DGX 288 Hardware Reference Manual at www.amx.com.

- If a copy was not made of the modified file, you will need to modify the file again and download it.

Appendix F – Fan Replacement

Applicability

This Appendix provides instructions for removing and installing individual fans or fan assemblies in an Epica DGX 288.

Procedure Overview

The Epica DGX 288 Matrix Switcher has four fan assemblies: three on the front side and one on the rear side of the enclosure. To determine which fan(s) to replace, see page 67.
The procedure for replacing front fans or fan assemblies requires removing the front panel, swapping out the fan or fan assembly, and replacing the front panel. The procedure for replacing a rear fan assembly requires removing the rear fan assembly and swapping it with the replacement fan assembly. Replacement procedures can be done with the enclosure in a rack, but the system must be powered down.

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

Items Required

☐ Replacement fan or fan assembly for an Epica DGX 288

☐ Phillips #1 screwdriver

☐ ESD wristband and cord with alligator clip

Locations of fans in the Epica DGX 288

There are four locations for fans in the Epica DGX 288, three of which are on the front side of the enclosure (behind the front panel) and one of which is on the rear side of the enclosure. With the front panel has been removed, the intake fan assembly is a set of four individual fans (all of which can be replaced individually) mounted to a single assembly. The lower center fan sits directly above the intake fan assembly and draws air upwards from the intake fan assembly towards the upper center fan. The upper center fan sits behind chimney metal and expels heated air upwards through the top vents of the enclosure. The rear fan assembly is a tray of 8 fans (which is replaceable as a whole fan assembly only) which sits in the top rear of the enclosure and expels heated air upwards through the top vents of the enclosure.

Rear fan assembly (in back)

Upper center fan (behind cowling)

Lower center fan (behind intake fan assembly)

Intake fan assembly
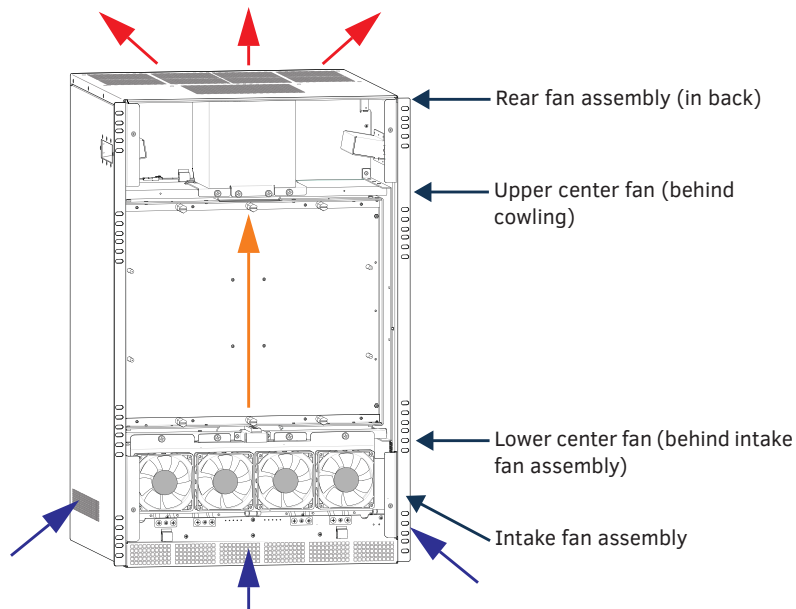
Epica DGX 288 Airflow:
1) Air is drawn into the enclosure by the intake fan assembly through vents on the front and sides
2) Air is drawn through the lower center fan across the I/O boards and pulled through the upper center fan
3) Air is expelled from the enclosure by the rear fan assembly through the top vents

**FIG. 42** Epica DGX 288 airflow diagram (front panel removed)

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

Determining which Fan to Replace

NOTE: *If APDiagnostics is not installed on your control PC, do so now. Instructions for downloading and installing APDiagnostics are available on page 48.*

To check fan status in APDiagnostics:

1.   In the Categories pane on the left, select the System tab.

2.   Click the Fan Status button.

3.   In the center pane, view the Health column in the Fan Status table (FIG. 43).

- A green check mark icon indicates good.
- A red "!" icon indicates an error.
- A yellow "!" icon indicates a warning.
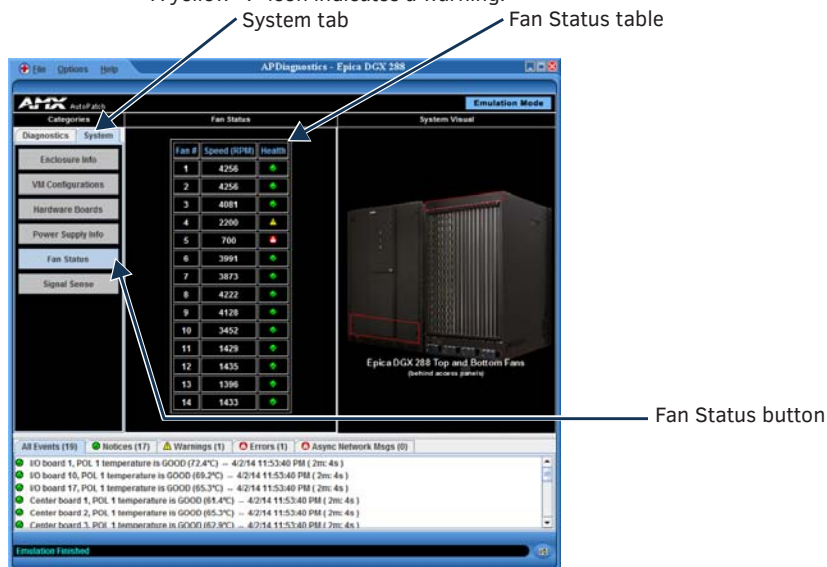
FIG. 43 Fan Status table for Epica DGX 288 showing good (green), warning (yellow), and error (red) fan "health"

4.   Check the lower Center fan – Fan 1 (replacement instructions on page 69)

5.   Check the upper Center fan – Fan 2 (replacement instructions on page 68)

6.   Check the rear fan assembly – Fan 3 through Fan 10 (replacement instructions on page 71)

7.   Check the intake fans – Fan 11 through Fan 14 (replacement instructions on page 70)

8.   Make a note of the fan numbers, speed, and "Health."

IMPORTANT: *A fan or fan assembly should be replaced if the Health for any of the fans displays a red Error "!" icon or a yellow Warning "!" icon (the latter indicates that the fan will eventually fail). If a fan has failed completely, its speed is reported as 0 RPM.*

Removing the Front Panel

NOTE: *The front panel <u>must</u> be removed to access the intake fan assembly, lower center fan, or upper center fan.*

1. Turn off all AC power to the enclosure.
2. Loosen the four captive screws on the front panel of the enclosure.

Captive screws
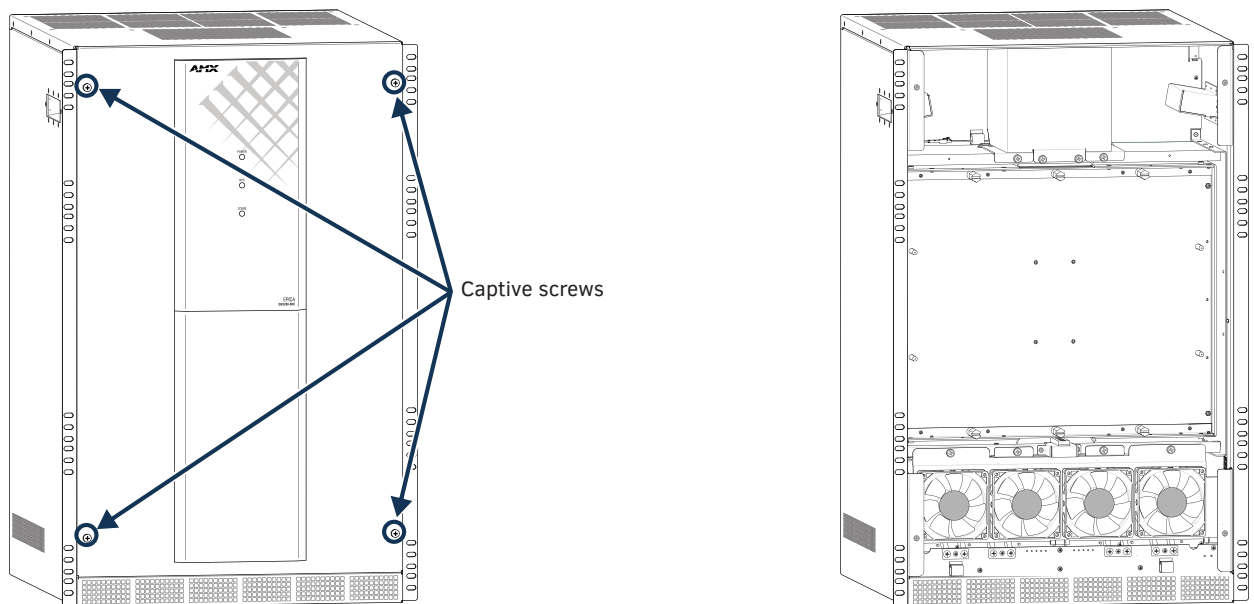
FIG. 44 Enclosure with front panel (left) and without front panel (right)

3. Pull the front panel 4-6 inches away from the enclosure.
4. Disconnect the power and communication cable from the back of the control panel and set the panel aside.

Removing and Installing the Upper Center Fan

CAUTION: *<u>Do not</u> remove a fan assembly until you are ready to install the replacement, unless directed to do so by Technical Support.*

In the following procedure, read each step entirely. The steps include helpful tips to avoid damage to the enclosure's internal cables and connectors.

NOTE: *Before you start, determine which fan assembly to replace, see page 67.*

1. Turn off all AC power to the enclosure and remove the front panel (see page 68).
2. Locate and remove the cowling from the upper center fan:
    a. Loosen the two captive screws holding the cowling in place.
    b. Pull the cowling free from the enclosure and set aside.
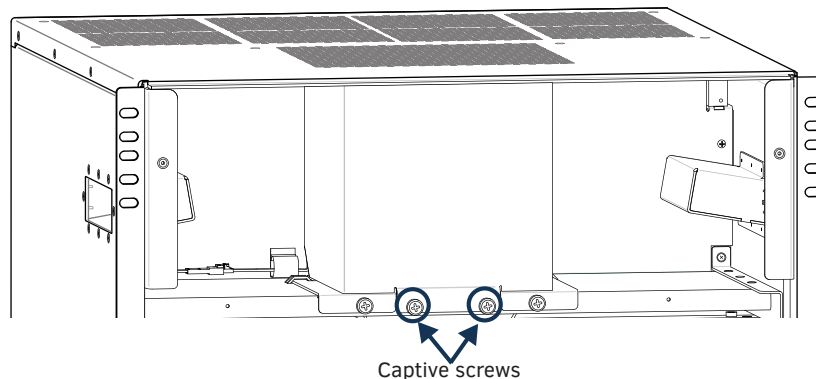
Captive screws

FIG. 45 Upper center fan cowling

3. Remove the upper center fan:
    a. Disconnect the fan wire connector.
    b. Loosen the two captive screws holding the upper center fan in place.

c. Pull the fan free from the enclosure and set aside.
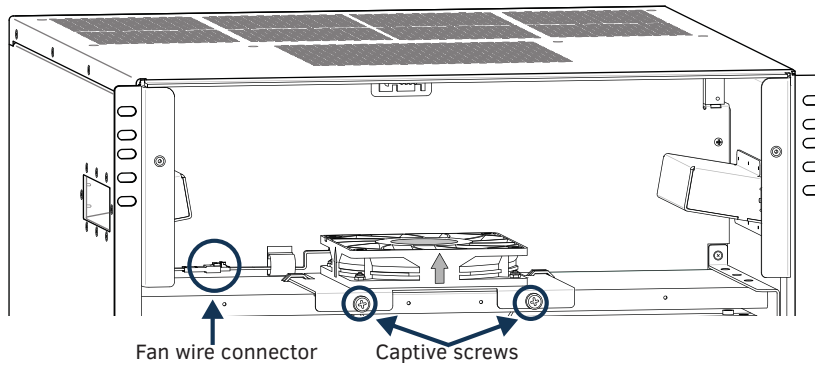
FIG. 46 Upper center fan wire connector and captive screws

4. Install replacement fan:
   a. Slide replacement fan into position and tighten the two captive screws.
   b. Connect the fan wire connector.
5. Replace upper center fan cowling and enclosure front panel.
6. Restore AC power to enclosure.

Removing and Installing the Lower Center Fan

CAUTION: *Do not remove a fan assembly until you are ready to install the replacement, unless directed to do so by Technical Support.*

In the following procedure, read each step entirely. The steps include helpful tips to avoid damage to the enclosure's internal cables and connectors.

NOTE: *Before you start, determine which fan assembly to replace, see page 67.*

1. Turn off all AC power to the enclosure and remove the front panel (see page 68).
2. Loosen the two captive screws holding the intake fan assembly in place and lower the fan assembly into its open position (see FIG. 47).
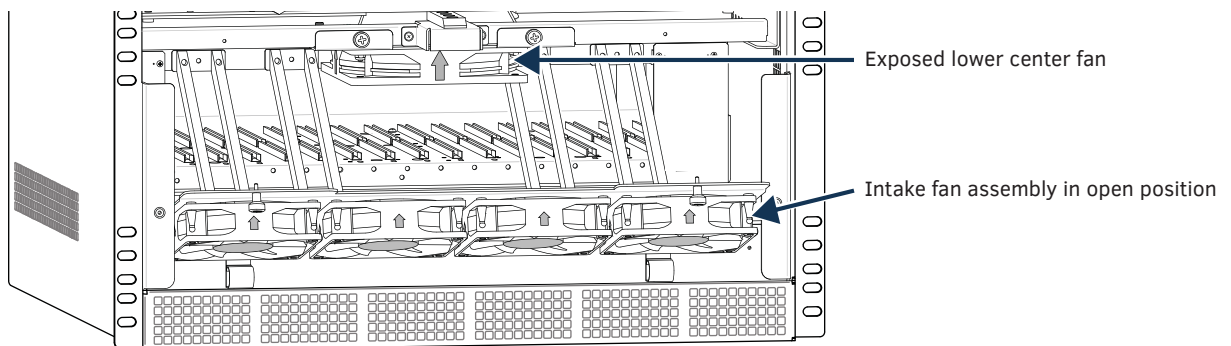
FIG. 47 Intake fan assembly in open position

3. Remove the lower center fan:
   a. Disconnect the fan wire connector.
   b. Loosen the two captive screws holding the lower center fan in place.
   a. Pull the fan free from the enclosure and set aside.
4. Install replacement fan:
   a. Slide replacement fan into position and tighten the two captive screws.
   b. Connect the fan wire connector.
5. Return the intake fan assembly to its closed (operational) position and tighten the captive screws.
6. Replace the enclosure front panel and tighten the captive screws.
7. Restore AC power to enclosure.

Removing and Installing Fans in the Intake Fan Assembly

CAUTION: *Do not remove a fan assembly until you are ready to install the replacement, unless directed to do so by Technical Support.*

In the following procedure, read each step entirely. The steps include helpful tips to avoid damage to the enclosure's internal cables and connectors.

NOTE: *Before you start, determine which fan assembly to replace, see page 67.*

1. Turn off all AC power to the enclosure and remove the front panel (see page 68).
2. Identify the fan that needs to be replaced (see FIG. 48).
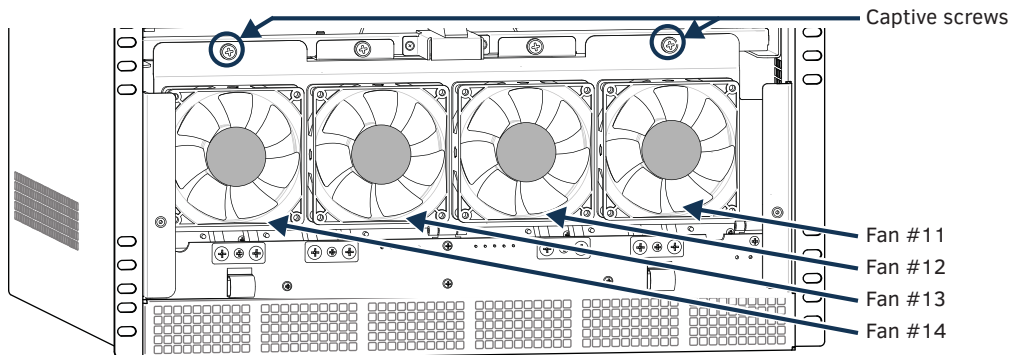
FIG. 48 Intake fan assembly captive screws and fan numbering

3. Loosen the two captive screws holding the intake fan assembly in place.
4. Lower the fan assembly into its open position (see FIG. 49).
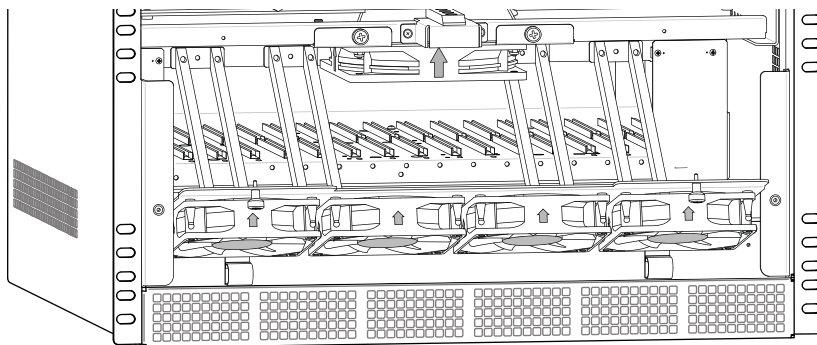
FIG. 49 Intake fan assembly in open position

5. Remove the fan from the assembly:
    a. Pinch the "head" end of the rubber fan mount and pull the mount free of the fan assembly. Remove remaining rubber fan mounts.
    b. Disconnect the fan wire connector (trace wires from fan to connection point).
    c. Pull the fan free from the enclosure and set aside.
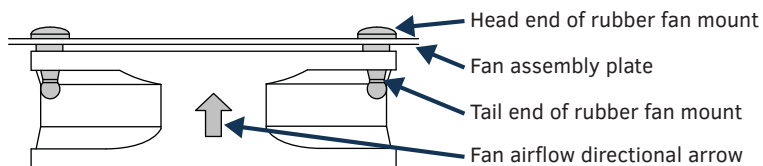
FIG. 50 Fan replacement diagram

6. Install replacement fan in assembly:
    a. Pull "tail" end of each of the four rubber fan mounts through the holes in the fan assembly plate.
    b. Align replacement fan with fan mounts (with arrow on fan pointing into the enclosure) and pull mounts through mounting holes on the replacement fan until the fan is held tightly against the fan assembly plate.
    c. Connect the fan wire connector.
7. Return the intake fan assembly to its closed (operational) position and tighten the captive screws.
8. Replace the enclosure front panel and tighten the captive screws.
9. Restore AC power to enclosure.

Removing and Installing the Rear Fan Assembly

CAUTION: *Do not remove a fan assembly until you are ready to install the replacement, unless directed to do so by Technical Support.*

In the following procedure, read each step entirely. The steps include helpful tips to avoid damage to the enclosure's internal cables and connectors.

NOTE: *Before you start, determine which fan assembly to replace, see page 67.*

To remove and install an Epica DGX 288 rear fan assembly:

NOTE: *If any of the fans from Fan 3 through Fan 10 need to be replaced, the* <u>entire</u> *rear fan assembly must be replaced.*

1. Turn off all AC power to the enclosure.
2. Remove the four screws that hold the rear fan cover in place and set the cover aside.
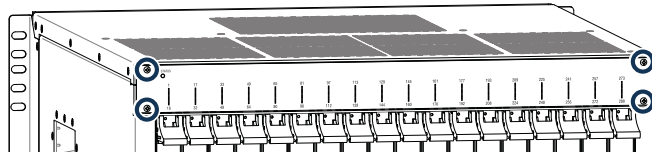
Remove all 4 screws from the rear fan cover and remove rear fan cover plate.
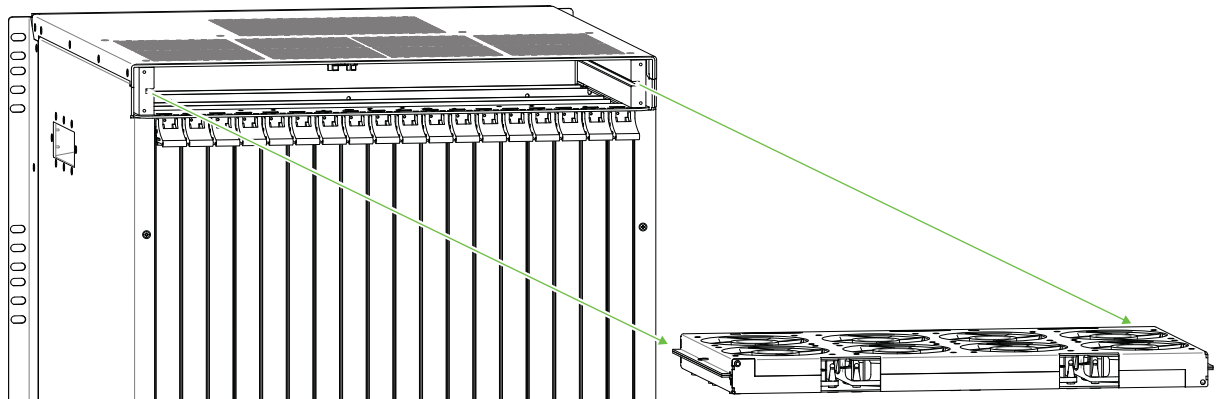
FIG. 51 Remove the rear fan cover

3. Grasp the metal plate between the two access slots (use thumb and index finger on each hand to pinch the metal).
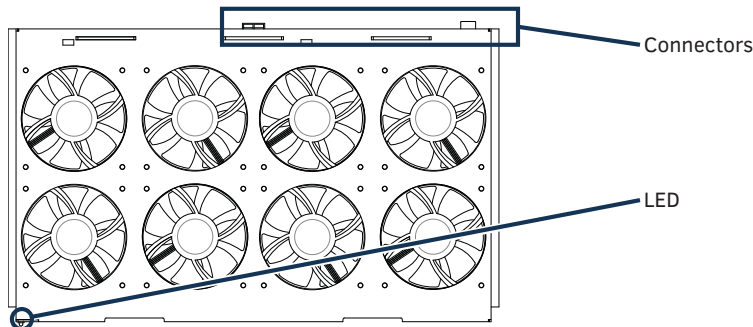

Access slots
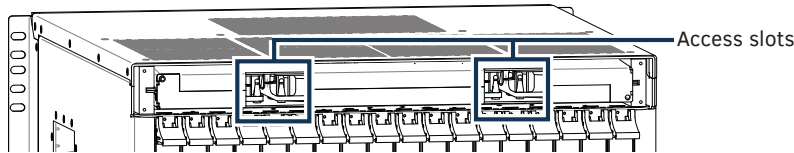
FIG. 52 Grasp the rear fan assembly

4. Pull the assembly straight out from the rear fan slot and set aside.

FIG. 53 Remove fan assembly

5. Locate the connector card and LED sides of the replacement fan assembly.

Connectors

LED

FIG. 54 Locate components on the replacement fan assembly

6. With the LED side of the fan assembly facing toward yourself (LED towards your left), slowly push the fan assembly into the rear fan slot until the connector card is firmly seated and the metal of fan assembly is recessed enough to reattach the rear fan cover.

7. Replace the rear fan cover plate and reattach all four screws.

8. Restore AC power to the enclosure.

Troubleshooting

If a fan is not running or the enclosure is not powered:

❑ Check the power connections on the enclosure and at the AC power strip or power source.

❑ Check APDiagnostics to confirm fan speed improvement/connection.

❑ Try re-seating the fan assembly.

Appendix G – Power Supply Replacement

Applicability

This Appendix provides instructions for removing and installing a power supply for an Epica DGX 288. We recommend that the system be powered down; however, the procedure can be done while the enclosure is in a rack and with power applied.

CAUTION: *Do not remove a failed power supply until you are ready to install the replacement, unless directed to do so by technical support. Epica DGX 288 enclosures are able to operate normally if one of the Redundant Power Supplies (RPS) fails.*

Items Required

❑ Epica DGX 288 replacement power supply
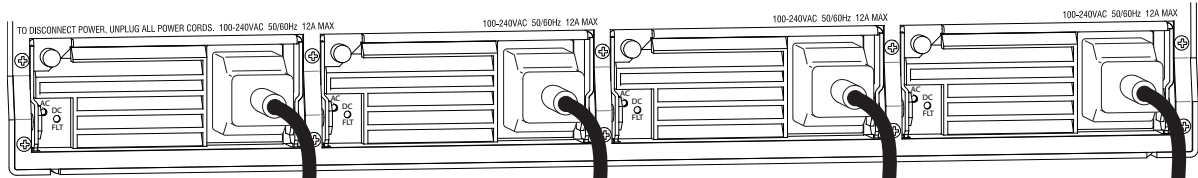
❑ ESD wristband and cord with alligator clip

FIG. 55 Epica DGX 288 power supplies

Power Supply Removal and Installation

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

To remove and replace an Epica DGX 288 power supply:

IMPORTANT: *Before powering down, be sure to check the LEDs on the power supplies to confirm which power supply needs to be replaced.*

1. Turn off all AC power to the enclosure.

CAUTION: *Wait until the fans have stopped and the LEDs on the power supply are off before proceeding with Step 2.*

2. Loosen the captive screw on the power supply's handle. Flip the handle down and use it to pull the power supply completely out of the enclosure.

    ● Be careful *not* to angle the power supply up when removing it – the power supply *must be level* with the floor of the power supply slot.
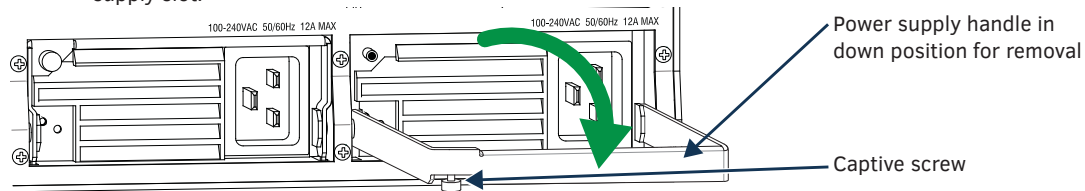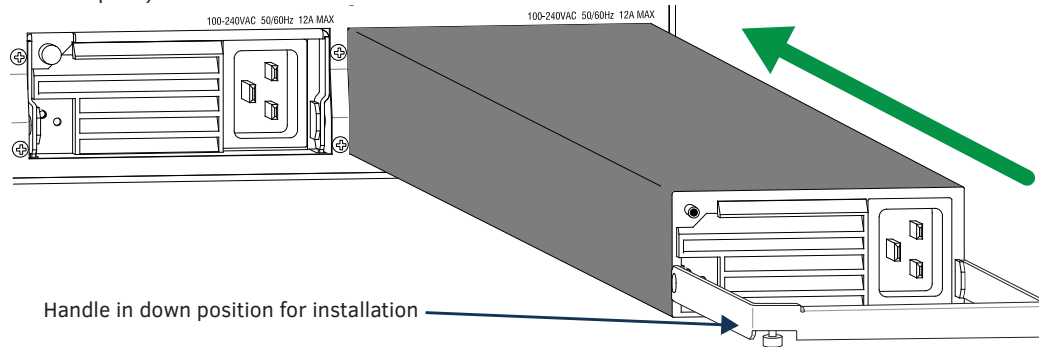

Power supply handle in down position for removal

Captive screw

FIG. 56 Loosen captive screw; flip handle down; pull power supply out of enclosure

3. Place the failed power supply in an ESD approved static shield bag and set aside.

4. Loosen the captive screw on the replacement power supply and flip the handle down (FIG. 56). Slowly slide the power supply into the empty slot.

    ● Be careful to align the power supply on the sides.

    ● Be careful *not* to angle the power supply up when inserting it – the power supply *must be level* with the floor of the power supply slot.

5. Push the power supply into the enclosure firmly enough to ensure a good electrical connection.
   When fully inserted, the front of the power supply should fit flush with the faceplate (only the handle extends past the faceplate).

100-240VAC 50/60Hz 12A MAX

100-240VAC 50/60Hz 12A MAX

Handle in down position for installation

FIG. 57 Position handle; push replacement power supply in

6. Return handle to upright position and tighten the captive screw.

7. **If necessary –** Replace additional power supply.

8. Apply power to all power supplies.

50/60Hz 12A MAX

100-240VAC 50/60Hz 12A MAX

DC Power/Fault LED
AC Power LED
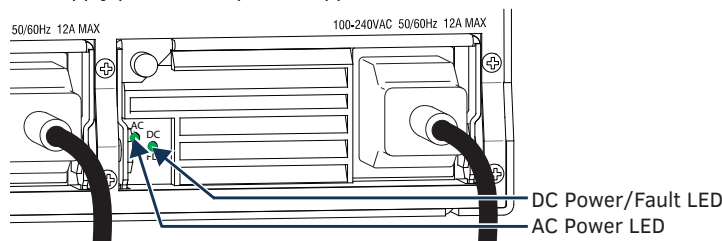
FIG. 58 LED indicators on power supplies

9. Check the LEDs on the new power supply for indications of normal operation.

POWER SUPPLY LED STATES			
LED	Indicates	Normal Display	Cautionary Display
AC	AC power presence	Constant green	Not illuminated: AC failure
DC Power (Tri-color LED)	• DC power present • Power supply temperature • Fault Status	Constant green	• Not illuminated: DC failure • Amber: power supply is over temperature • Red: power supply is in a fault state

10. Verify that the Power and RPS (Redundant Power Supply) LEDs on the enclosure's front panel are a constant green (normal display); this may take a few minutes after power is applied. If the RPS LED is flashing green or solid red (cautionary display), one or more power supplies are not receiving power or have failed.

If the LEDs on the front of the enclosure and two LEDs on the power supply do not display normal indications after a few minutes, see the following section for troubleshooting tips.

Power Supply Troubleshooting

Power Requirements

Epica DGX 288 Matrix Switchers require all power supplies to be functioning normally with full redundancy.

Check List for Troubleshooting

❑ Cycle power by unplugging and re-plugging the AC power cords.

❑ Check the AC power cords to be sure they are securely connected to both power supplies and sources of power.

❑ Repeat the replacement procedure to see if re-seating the power supply establishes the connection.

❑ Contact Technical Support (contact information on page 28).

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