

## User's Manual



## *Matrix 12800 Series*

**Matrix 12800 Wideband, Video, Sync, and Audio Matrix Switchers**

# Precautions

## Safety Instructions • English



This symbol is intended to alert the user of important operating and maintenance (servicing) instructions in the literature provided with the equipment.



This symbol is intended to alert the user of the presence of uninsulated dangerous voltage within the product's enclosure that may present a risk of electric shock.

### Caution

**Read Instructions** • Read and understand all safety and operating instructions before using the equipment.

**Retain Instructions** • The safety instructions should be kept for future reference.

**Follow Warnings** • Follow all warnings and instructions marked on the equipment or in the user information.

**Avoid Attachments** • Do not use tools or attachments that are not recommended by the equipment manufacturer because they may be hazardous.

## Consignes de Sécurité • Français



Ce symbole sert à avertir l'utilisateur que la documentation fournie avec le matériel contient des instructions importantes concernant l'exploitation et la maintenance (réparation).



Ce symbole sert à avertir l'utilisateur de la présence dans le boîtier de l'appareil de tensions dangereuses non isolées posant des risques d'électrocution.

### Attention

**Lire les instructions** • Prendre connaissance de toutes les consignes de sécurité et d'exploitation avant d'utiliser le matériel.

**Conservé les instructions** • Ranger les consignes de sécurité afin de pouvoir les consulter à l'avenir.

**Respecter les avertissements** • Observer tous les avertissements et consignes marqués sur le matériel ou présentés dans la documentation utilisateur.

**Eviter les pièces de fixation** • Ne pas utiliser de pièces de fixation ni d'outils non recommandés par le fabricant du matériel car cela risquerait de poser certains dangers.

## Sicherheitsanleitungen • Deutsch



Dieses Symbol soll dem Benutzer in der im Lieferumfang enthaltenen Dokumentation besonders wichtige Hinweise zur Bedienung und Wartung (Instandhaltung) geben.



Dieses Symbol soll den Benutzer darauf aufmerksam machen, daß im Inneren des Gehäuses dieses Produktes gefährliche Spannungen, die nicht isoliert sind und die einen elektrischen Schock verursachen können, herrschen.

### Achtung

**Lesen der Anleitungen** • Bevor Sie das Gerät zum ersten Mal verwenden, sollten Sie alle Sicherheits- und Bedienungsanleitungen genau durchlesen und verstehen.

**Aufbewahren der Anleitungen** • Die Hinweise zur elektrischen Sicherheit des Produktes sollten Sie aufbewahren, damit Sie im Bedarfsfall darauf zurückgreifen können.

**Befolgen der Warnhinweise** • Befolgen Sie alle Warnhinweise und Anleitungen auf dem Gerät oder in der Benutzerdokumentation.

**Keine Zusatzgeräte** • Verwenden Sie keine Werkzeuge oder Zusatzgeräte, die nicht ausdrücklich vom Hersteller empfohlen wurden, da diese eine Gefahrenquelle darstellen können.

## Instrucciones de seguridad • Español



Este símbolo se utiliza para advertir al usuario sobre instrucciones importantes de operación y mantenimiento (o cambio de partes) que se desean destacar en el contenido de la documentación suministrada con los equipos.



Este símbolo se utiliza para advertir al usuario sobre la presencia de elementos con voltaje peligroso sin protección aislante, que puedan encontrarse dentro de la caja o alojamiento del producto, y que puedan representar riesgo de electrocución.

### Precaucion

**Leer las instrucciones** • Leer y analizar todas las instrucciones de operación y seguridad, antes de usar el equipo.

**Conservar las instrucciones** • Conservar las instrucciones de seguridad para futura consulta.

**Obedecer las advertencias** • Todas las advertencias e instrucciones marcadas en el equipo o en la documentación del usuario, deben ser obedecidas.

**Evitar el uso de accesorios** • No usar herramientas o accesorios que no sean específicamente recomendados por el fabricante, ya que podrían implicar riesgos.

## 安全须知 • 中文



这个符号提示用户该设备用户手册中有重要的操作和维护说明。



这个符号警告用户该设备机壳内有暴露的危险电压，有触电危险。

### 注意

**阅读说明书** • 用户使用该设备前必须阅读并理解所有安全和使用说明。

**保存说明书** • 用户应保存安全说明书以备将来使用。

**遵守警告** • 用户应遵守产品和用户指南上的所有安全和操作说明。

**避免追加** • 不要使用该产品厂商没有推荐的工具或追加设备，以避免危险。

## Warning

**Power sources** • This equipment should be operated only from the power source indicated on the product. This equipment is intended to be used with a main power system with a grounded (neutral) conductor. The third (grounding) pin is a safety feature, do not attempt to bypass or disable it.

**Power disconnection** • To remove power from the equipment safely, remove all power cords from the rear of the equipment, or the desktop power module (if detachable), or from the power source receptacle (wall plug).

**Power cord protection** • Power cords should be routed so that they are not likely to be stepped on or pinched by items placed upon or against them.

**Servicing** • Refer all servicing to qualified service personnel. There are no user-serviceable parts inside. To prevent the risk of shock, do not attempt to service this equipment yourself because opening or removing covers may expose you to dangerous voltage or other hazards.

**Slots and openings** • If the equipment has slots or holes in the enclosure, these are provided to prevent overheating of sensitive components inside. These openings must never be blocked by other objects.

**Lithium battery** • There is a danger of explosion if battery is incorrectly replaced. Replace it only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

## Avertissement

**Alimentations** • Ne faire fonctionner ce matériel qu'avec la source d'alimentation indiquée sur l'appareil. Ce matériel doit être utilisé avec une alimentation principale comportant un fil de terre (neutre). Le troisième contact (de mise à la terre) constitue un dispositif de sécurité : n'essayez pas de la contourner ni de la désactiver.

**Déconnexion de l'alimentation** • Pour mettre le matériel hors tension sans danger, déconnectez tous les cordons d'alimentation de l'arrière de l'appareil ou du module d'alimentation de bureau (s'il est amovible) ou encore de la prise secteur.

**Protection du cordon d'alimentation** • Acheminer les cordons d'alimentation de manière à ce que personne ne risque de marcher dessus et à ce qu'ils ne soient pas écrasés ou pincés par des objets.

**Réparation-maintenance** • Faire exécuter toutes les interventions de réparation-maintenance par un technicien qualifié. Aucun des éléments internes ne peut être réparé par l'utilisateur. Afin d'éviter tout danger d'électrocution, l'utilisateur ne doit pas essayer de procéder lui-même à ces opérations car l'ouverture ou le retrait des couvercles risquent de l'exposer à de hautes tensions et autres dangers.

**Fentes et orifices** • Si le boîtier de l'appareil comporte des fentes ou des orifices, ceux-ci servent à empêcher les composants internes sensibles de surchauffer. Ces ouvertures ne doivent jamais être bloquées par des objets.

**Lithium Batterie** • Il a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandé par le constructeur. Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

## Vorsicht

**Stromquellen** • Dieses Gerät sollte nur über die auf dem Produkt angegebene Stromquelle betrieben werden. Dieses Gerät wurde für eine Verwendung mit einer Hauptstromleitung mit einem geerdeten (neutralen) Leiter konzipiert. Der dritte Kontakt ist für einen Erdschluß, und stellt eine Sicherheitsfunktion dar. Dieses sollte nicht umgangen oder außer Betrieb gesetzt werden.

**Stromunterbrechung** • Um das Gerät auf sichere Weise vom Netz zu trennen, sollten Sie alle Netzkabel aus der Rückseite des Gerätes, aus der externen Stromversorgung (falls dies möglich ist) oder aus der Wandsteckdose ziehen.

**Schutz des Netzkabels** • Netzkabel sollten stets so verlegt werden, daß sie nicht im Weg liegen und niemand darauf treten kann oder Objekte darauf- oder unmittelbar dagegengestellt werden können.

**Wartung** • Alle Wartungsmaßnahmen sollten nur von qualifiziertem Servicepersonal durchgeführt werden. Die internen Komponenten des Gerätes sind wartungsfrei. Zur Vermeidung eines elektrischen Schocks versuchen Sie in keinem Fall, dieses Gerät selbst öffnen, da beim Entfernen der Abdeckungen die Gefahr eines elektrischen Schlags und/oder andere Gefahren bestehen.

**Schlitze und Öffnungen** • Wenn das Gerät Schlitze oder Löcher im Gehäuse aufweist, dienen diese zur Vermeidung einer Überhitzung der empfindlichen Teile im Inneren. Diese Öffnungen dürfen niemals von anderen Objekten blockiert werden.

**Lithium-Batterie** • Explosionsgefahr, falls die Batterie nicht richtig ersetzt wird. Ersetzen Sie verbrauchte Batterien nur durch den gleichen oder einen vergleichbaren Batterietyp, der auch vom Hersteller empfohlen wird. Entsorgen Sie verbrauchte Batterien bitte gemäß den Herstelleranweisungen.

## Advertencia

**Alimentación eléctrica** • Este equipo debe conectarse únicamente a la fuente/tipo de alimentación eléctrica indicada en el mismo. La alimentación eléctrica de este equipo debe provenir de un sistema de distribución general con conductor neutro a tierra. La tercera pata (puesta a tierra) es una medida de seguridad, no puentearla ni eliminarla.

**Desconexión de alimentación eléctrica** • Para desconectar con seguridad la acometida de alimentación eléctrica al equipo, desenchufar todos los cables de alimentación en el panel trasero del equipo, o desenchufar el módulo de alimentación (si fuera independiente), o desenchufar el cable del receptáculo de la pared.

**Protección del cables de alimentación** • Los cables de alimentación eléctrica se deben instalar en lugares donde no sean pisados ni apretados por objetos que se puedan apoyar sobre ellos.

**Reparaciones/mantenimiento** • Solicitar siempre los servicios técnicos de personal calificado. En el interior no hay partes a las que el usuario deba acceder. Para evitar riesgo de electrocución, no intentar personalmente la reparación/mantenimiento de este equipo, ya que al abrir o extraer las tapas puede quedar expuesto a voltajes peligrosos u otros riesgos.

**Ranuras y aberturas** • Si el equipo posee ranuras o orificios en su caja/alojamiento, es para evitar el sobrecalentamiento de componentes internos sensibles. Estas aberturas nunca se deben obstruir con otros objetos.

**Batería de litio** • Existe riesgo de explosión si esta batería se coloca en la posición incorrecta. Cambiar esta batería únicamente con el mismo tipo (o su equivalente) recomendado por el fabricante. Desachar las baterías usadas siguiendo las instrucciones del fabricante.

## 警告

**电源** • 该设备只能使用产品上标明的电源。设备必须使用有地线的供电系统供电。第三条线（地线）是安全设施，不能不用或跳过。

**拔掉电源** • 为安全地从设备拔掉电源，请拔掉所有设备后或桌面电源的电源线，或任何接到市电系统的电源线。

**电源线保护** • 妥善布线，避免被踩踏，或重物挤压。

**维护** • 所有维修必须由认证的维修人员进行。设备内部没有用户可以更换的零件。为避免出现触电危险不要自己试图打开设备盖子维修该设备。

**通风孔** • 有些设备机壳上有通风槽或孔，它们是用来防止机内敏感元件过热。不要用任何东西挡住通风孔。

**锂电池** • 不正确的更换电池会有爆炸的危险。必须使用与厂家推荐的相同或相近型号的电池。按照生产厂家的建议处理废弃电池。

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## **FCC Class A Notice**

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. 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. The Class A limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

**NOTE** *This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to ensure compliance with FCC emissions limits.*

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# Matrix 12800 Switchers

# 1 Chapter One

## Introduction

[About the Matrix 12800 Switchers](#)

[Features](#)

[Definitions](#)

# Introduction

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## About the Matrix 12800 Switchers

The Extron Matrix 12800 Series of switchers is a family of matrix switcher basic module enclosures (BMEs) and an optional front panel controller (FPC 5000) that allows you to create video and audio matrix systems with up to 128 inputs and 128 outputs specifically tailored to meet your requirements. The Matrix 12800 Series includes:

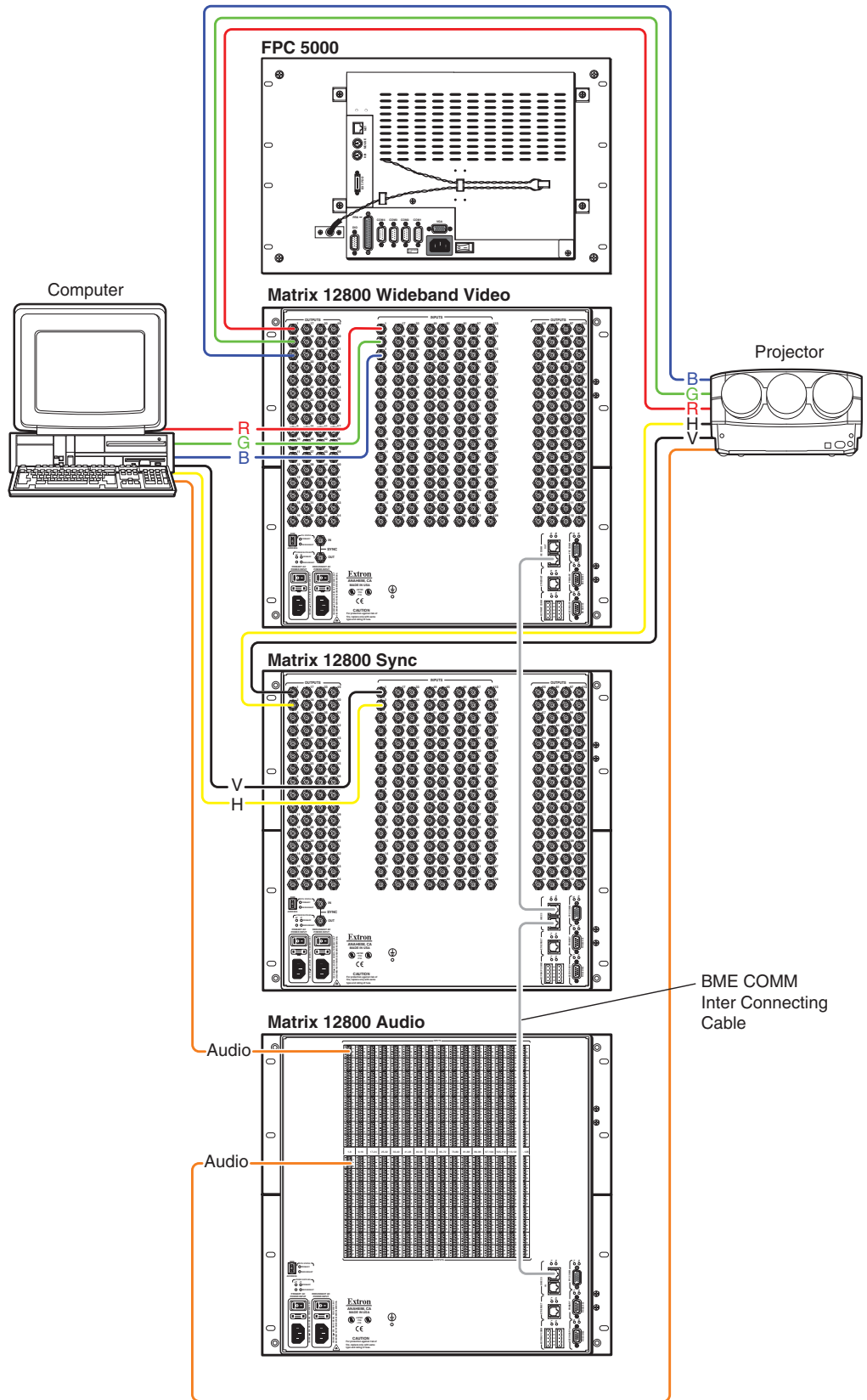
- **Wideband video switcher BME** — A rack mountable 10U switcher that routes video (red [R], green [G], and blue [B] video planes, component video, S-video, and composite video) from any input to any one or more outputs.
- **Video switcher BME** — A rack-mountable 10U switcher that routes low resolution (NTSC, PAL, or SECAM) component video, S-video, and composite video from any input to any one or more outputs.
- **Sync switcher BME** — A rack-mountable 10U switcher that routes horizontal (H) and vertical (V) or composite sync from any input to any one or more outputs.
- **Audio switcher BME** — A rack-mountable 10U switcher that routes balanced or unbalanced audio from any input to any one or more outputs.
- **FPC 5000 Front Panel Controller** — A rack-mountable device that permits front panel configuration of the inputs and outputs and control of additional system features.

Wideband (RGBHV and RGBS) video requires at least one wideband BME to handle the R, G, and B video planes and at least one sync BME to handle the H and V or the composite sync plane. A complete 128 input by 128 output RGBHV and audio matrix consists of three video switching BMEs (one each for R, G, and B), two sync BMEs (one each for H and V), and an audio switching BME with, optionally, an FPC 5000 (figure 1-1).

The rear panel of the sync or wideband video BME features a full complement of input and output BNC connectors, and the rear panel of the audio BME features a full complement of input and output captive screw connectors. The full complement of connectors permits the switcher to be upgraded or expanded to accommodate any system just by replacing or adding a new internal circuit card. The circuit cards, fans, and power supplies are hot swappable, eliminating the need to power down the matrix during field upgrades or expansion.

The microprocessor of the Matrix 12800 sync switcher BME monitors and self-diagnoses the controller circuit cards, the input/output (I/O) circuit cards, the power supplies, and the cooling fans. The dual redundant power supplies and cooling fans of the switcher ensure reliable operation 24 hours a day. If a power supply or a fan fails, the switcher can continue to operate normally without danger of overheating. The switcher provides local visual and audio indications of the failure and reports the failure via the Ethernet and RS-232/RS-422 links. A technician can then replace the hot-swappable faulty component with no interruption of a mission-critical system.

The Matrix 12800 system can be controlled with an optional FPC 5000 or via the RS-232/RS-422, telnet, or Ethernet link using a control system, a PC, or the Extron MKP 1200 remote keypad, MCP 1000 or MKP 1000 remote control panels, or both. The FPC 5000 has a large LCD touch panel that allows direct access and total control over all presets and switching functions. FPC 5000 menus provide an intuitive interface for quick and easy setup and programming. The Extron Simple Instruction Set (SIS™) is a set of basic ASCII code commands that provide simple control through a third party control system or PC without programming long, obscure strings of code.



**Figure 1-1 — Typical Matrix 12800 application**

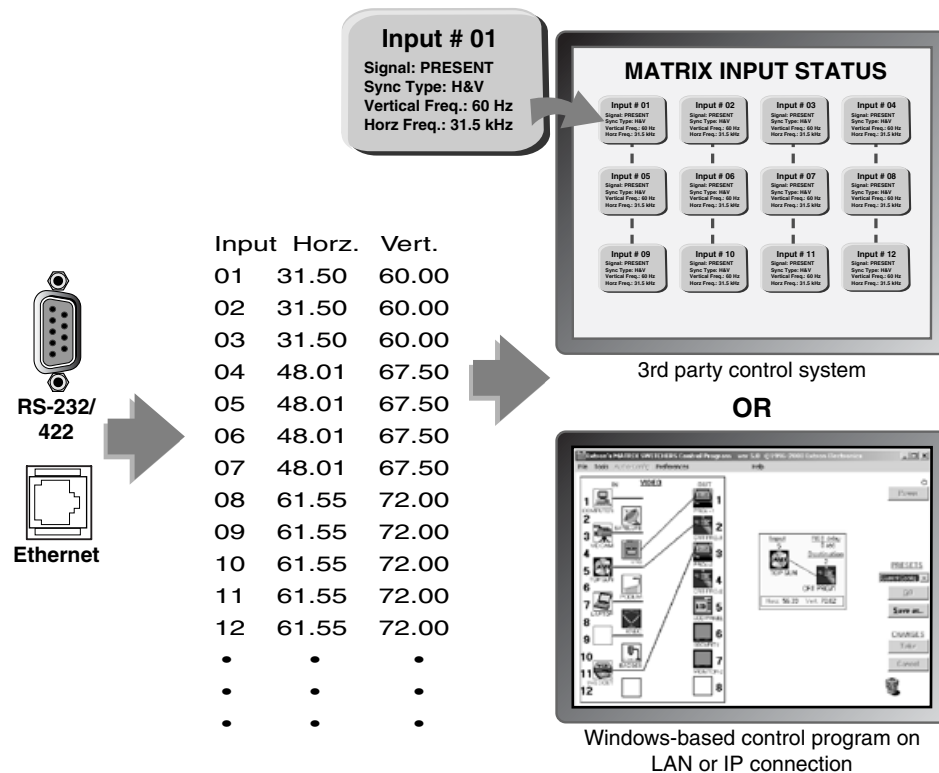
# Introduction, cont'd

## Features

**Input and output connectors** — All connectors are clearly labeled as either input or output for easy installation. With the Extron virtualization/control software, a visual map can be printed for easy representation of the virtual I/Os. This feature reduces the time required for setup and programming.

**Bandwidth** — Bandwidth is a minimum of 375 MHz (-3 dB), fully loaded. This high bandwidth allows Extron switchers to switch everything from NTSC video to high-resolution computer video.

**Digital Sync Validation Processing (DSVP™)** — In critical environments or unmanned, remote locations, it is vital to know that sources are active and switching. The exclusive Extron DSVP confirms that input sources are active by scanning all sync inputs for active signals. DSVP provides instantaneous frequency feedback for composite sync or separate horizontal and vertical sync signals via the RS-232/RS-422 port of the switcher. The frequency information can be displayed on any control system or in a Windows®-based control program on a local-area network (LAN) or internet (IP) connection (figure 1-2).



**Figure 1-2 — DSVP data display**

**Rooming** — Each Matrix 12800 system can be programmed to group multiple outputs to specific “rooms”, allowing them to have their own presets. The system can have up to 32 rooms, each of which can have up to 10 presets.

**Triple-Action Switching™ (RGB delay)** — RGB delay blanks the screen when the matrix switcher switches to a new RGB video source. The new sync signals precede the RGB signals, so there is no noise-filled scramble shown during the transition. The time delay between the RGB and sync signals is user adjustable up to five seconds via SIS and Windows program control.



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**Operational flexibility** — Operations such as input/output selection, setting of presets, and adjustment of audio levels can be performed at the front panel controller, over the primary and secondary RS-232/RS-422 links, or via the Ethernet link. The RS-232/RS-422 links allow remote control via two PCs or control systems. The Ethernet link allows multiple remote links with two levels of password protection.

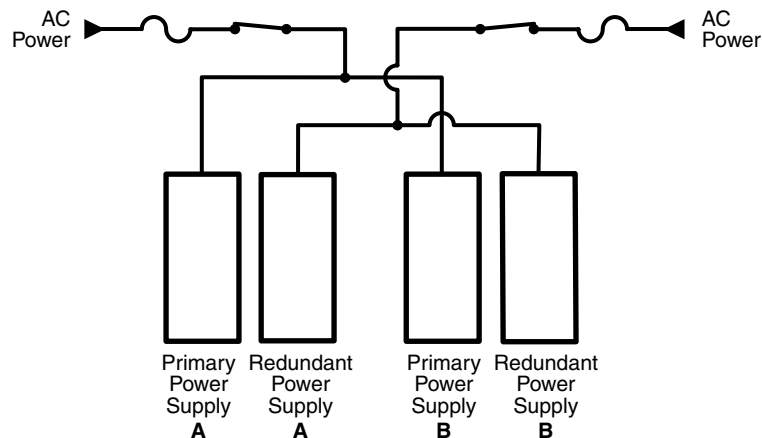
- **Front Panel Controller** — The optional FPC 5000 Front Panel Controller allows easy configuration of inputs and outputs, as well as control of additional system features.
- **Virtualization/control software** — For serial port or Ethernet remote control from a PC, Extron includes its Windows-based control software with every matrix switcher. This icon-driven software uses a drag-and-drop-point-and-click interface to make I/O configuration and other customization functions simple and convenient. The Windows-based control program also has an emulation mode that lets you create a switcher configuration file at the home office and then download it for use on site.
- **Simple Instruction Set (SIS)** — The SIS is a set of basic ASCII code commands that provide simple control through a PC or control system. Instead of programming in long, obscure strings of code, SIS makes it easy to operate the matrix using serial port or Ethernet control.
- **Remote control** — The Matrix 12800 switchers are remote controllable, using an MKP 1200 control keypad, an MCP 1000 master control panel, or both and any combination of MCP 1000 slave control panels or MKP 1000 slave control keypads, or both. Each MCP 1000 can be used for one-touch switching for a particular output and for selecting global presets. The MKP 1200 and each MKP 1000 is dedicated to an output and can be used to select a different input for that output or to select a preset.
  - The MKP 1200 is directly connected to the MCP/MKP Comm port on BME 0 of the Matrix 12800 system.
  - The MCP 1000 master control panel is connected to one of the RS-232/RS-422 ports. MCP 1000 slave control panels, MKP 1000 slave control keypads, or both are connected to the MCP 1000 master control panel. The remote control devices are easy to use and provide tactile buttons for quick selection.

## Introduction, cont'd

**Operational reliability** — The Matrix 12800 can support round-the-clock operation in mission-critical applications, using a combination of self-diagnosis, hot-swappable components, and optional redundant components.

- **Advanced computer-aided diagnostics** — The Matrix 12800 performs self diagnostics, 24 hours a day, of the I/O cards, primary and redundant power supply voltages, controller cards, cooling status, and the overall functional status of the matrix. The status can be monitored off-site for unmanned applications via the Ethernet or RS-232/RS-422 communications ports.
- **Dual redundant, hot swappable controller cards** — The primary and redundant controller cards are internally mounted. The primary and redundant controller cards can each initiate configuration changes or other matrix switcher operations. Each card has an RS-232/RS-422 port for connection of a PC or control system. Redundant controllers mean zero downtime for the system. There is no loss of functionality should one of the controller cards fail. A failed controller card is easily replaceable through the front door with no tools required. Hot swappable controllers allow the user to replace either at any time — without powering down the matrix.
- **Dual redundant, hot swappable power supplies** — The internally mounted primary and redundant power supplies are configured to automatically switch over from a primary supply to a hot redundant supply in the case of a failure.

The complete power circuit, from the plug, through the power supplies, to the insertion of the power onto the power distribution plane, is separate and redundant (figure 1-3). If the installation includes uninterruptible or completely separate power sources, the switcher remains powered up through any power interruption short of a simultaneous loss of power on both power sources.



**Figure 1-3 — Redundant power supply backs up primary**

The ready hot redundant power supplies mean zero downtime for the system and no loss of functionality should one of the primary supplies fail. Should a primary power supply fail, the redundant power supply immediately assumes the load of the failed primary supply. A failed power supply is easily replaceable through the front door at any time — without powering down the matrix, and with no tools required.

- 
- **Dual redundant, hot swappable cooling fans** — Four cooling fans are provided for ventilation and heat management. Fan and temperature sensors identify problems, which are reported locally with visual indications and remotely via the Ethernet and serial port links. Fans and the filter are easily replaceable through the front door with only a screwdriver required.
  - **Field upgradable, hot swappable modular design** — The architecture of the Matrix 12800 allows you to repair, upgrade, or expand the matrix by simply installing a new I/O module. Hot swappable components allow the user to replace any I/O module at any time — without powering down the matrix.
  - **Low mean-time-to-repair** — Full access to all of the internal modules and assemblies is available through the front door, providing easy maintenance and serviceability.

**Switching flexibility** — Individually buffered, independent matrix switched outputs. Any input can be switched to any or all outputs within a BME.

**SmartControl microprocessor** — The SmartControl microprocessor can determine how many inputs and outputs are in use and configures itself for ease of use in any application.

**Channel to channel isolation** — The Matrix 12800 Series provides excellent isolation between channels and extremely low electromagnetic emissions — perfect for minimizing signal leakage in high security or government environments.

**Presets** — The Matrix 12800 can be configured for several different applications without the need to change settings each time the application changes.

**Video genlock** — The Matrix 12800 includes broadcast quality NTSC, PAL, or SECAM video genlock capabilities that enable vertical interval switching. Vertical interval switching results in smooth, seamless transitions when switching between inputs.

**Two AC power inputs** — For added power reliability, some 24-hour environments provide two separate AC power sources, one as primary and the second as backup. The Matrix 12800 has two AC power inputs for continuous connection to both power sources.

**Password protection** — There are two levels of password protection at log-in: administrator and user. Administrators have full access to all Matrix 12800 switching capabilities and editing functions. Users can select inputs and outputs, set and recall presets, and view all settings with the exception of passwords.

**Rack mount** — The switchers are mountable in any conventional 19-inch wide rack.

### Definitions

The following terms apply to Extron Matrix Switchers, and are used throughout this manual:

**Tie** — An input-to-output connection.

**Set of ties** — An input tied to two or more outputs. (An output can never be tied to more than one input.)

**Configuration** — May consist of one tie or one or more sets of ties.

**Current configuration** — The configuration that is currently being used (also called configuration 0).

**Global memory preset** — A configuration that has been stored. The Matrix 12800 can support up to 64 global presets. When a global preset is retrieved from memory, it becomes the current configuration.

**Room** — A Room consists of a smaller subset of virtual outputs that are logically related to each other, as determined by the operator. The Matrix 12800 supports up to 32 rooms, each of which consists of from 1 to 16 virtual outputs.

**Room memory preset** — A configuration consisting of virtual outputs in a single room that has been stored. When a room preset is retrieved from memory, it becomes the current configuration. The Matrix 12800 supports up to 10 room presets per room. Selecting a room preset only changes the ties to outputs that are assigned to that room. All other ties outside the room are not affected.



# Matrix 12800 Switchers

# 2 Chapter Two

## Installation

[Installation Overview](#)

[Rack Mounting the Switcher](#)

[Rear Panel Connections and Settings](#)

[Other Settings](#)

# Installation

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## Installation Overview

The Matrix 12800 BMEs that make up a Matrix 12800 system can be installed in a rack or a cabinet, if desired. Each BME must be connected on a daisy chain to the other BMEs in the system and cannot be separated from the other BMEs by more than 25 feet (7.6 m). The BMEs can be rack- or cabinet-mounted in any order.

Give careful consideration to the location of the equipment in a room. Poor planning can result in problems. The number of cables involved can result in a cluttered appearance. Power and ventilation requirements are a consideration. Although a BME is not noisy by itself, the background noise generated by a rack of Matrix 12800 switchers could be distracting.

The following restrictions apply to installing BMEs:

- One BME must be assigned the address of BME 0.
- A sync switcher cannot be BME 0.
- Address assignments must be sequential and may not skip numbers, with the exception of the BME sequentially after the audio BME.
- An audio BME uses two virtual addresses, but is physically assigned a single number. For example, an audio BME at physical address 5 occupies virtual addresses 5 and 6. A subsequent BME should be set to physical address 7.
- Address assignments of 0 through 8 are valid; a BME that is assigned address 9 is ignored.
- A system is limited to one or two audio BMEs.

Install and set up a Matrix 12800 system for operation as follows:

- 1 Disconnect power from all of the equipment, including all video sources (such as computers or DVD players), and the devices that receive the matrix-switched video, audio, or both.
  - 2 Rack mount the switcher, if desired.
  - 3 Ground the BMEs using the ground terminal (most models).
  - 4 Set the BME addresses.
  - 5 Connect the BME COMM interconnecting cables.
  - 6 Connect one or two serial cables to the RS-232/RS-422 ports of BME 0 and to the PCs or control systems.
  - 7 Connect the AC power cables to the BMEs.
  - 8 Reseat all circuit cards. See chapter 6, “[Upgrades and Maintenance](#)”.
- NOTE** *Printed circuit cards can become dislodged from their edge connectors during shipment. Reseat all I/O and controller circuit cards before initial power up.*
- 9 Apply AC power to the BMEs and verify the BMEs power up normally.
  - 10 Load the Matrix 12800 System Virtualization Control software (see “[Virtualization/Control Software](#)”, later in this chapter).
  - 11 Virtualize the Matrix 12800 system if required (see chapter 3, “[Virtualization/Control Software](#)”).
  - 12 Connect all input and output cabling to the Matrix 12800 system.
  - 13 Connect all desired remote control panels and remote keypads and connect the switcher to the Ethernet Local Area Network (LAN), if desired.
  - 14 Set the sync termination switches, if desired.
  - 15 If using the Ethernet capability, initialize the Internet protocol (IP) parameters. See chapter 3, “[Virtualization/Control Software](#)”.

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## Rack Mounting the Switcher

The Matrix 12800 sync, wideband video, video, and audio BMEs are rack-mountable, 10U high, 17.5-inch wide (19-inch wide, including rack ears) metal enclosures. The appropriate rack mounting kit is included with the switcher. Rack mount the switcher as follows:

### UL guidelines

The following Underwriters Laboratories (UL) guidelines pertain to the installation of the Matrix 12800 switcher BME into a rack.

1. **Elevated operating ambient temperature** — If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consider installing the equipment in an environment compatible with the 122 °F (+50 °C) maximum ambient temperature (T<sub>ma</sub>) specified by Extron.
2. **Reduced air flow** — Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
3. **Mechanical loading** — Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
4. **Circuit overloading** — Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
5. **Reliable earthing (grounding)** — Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

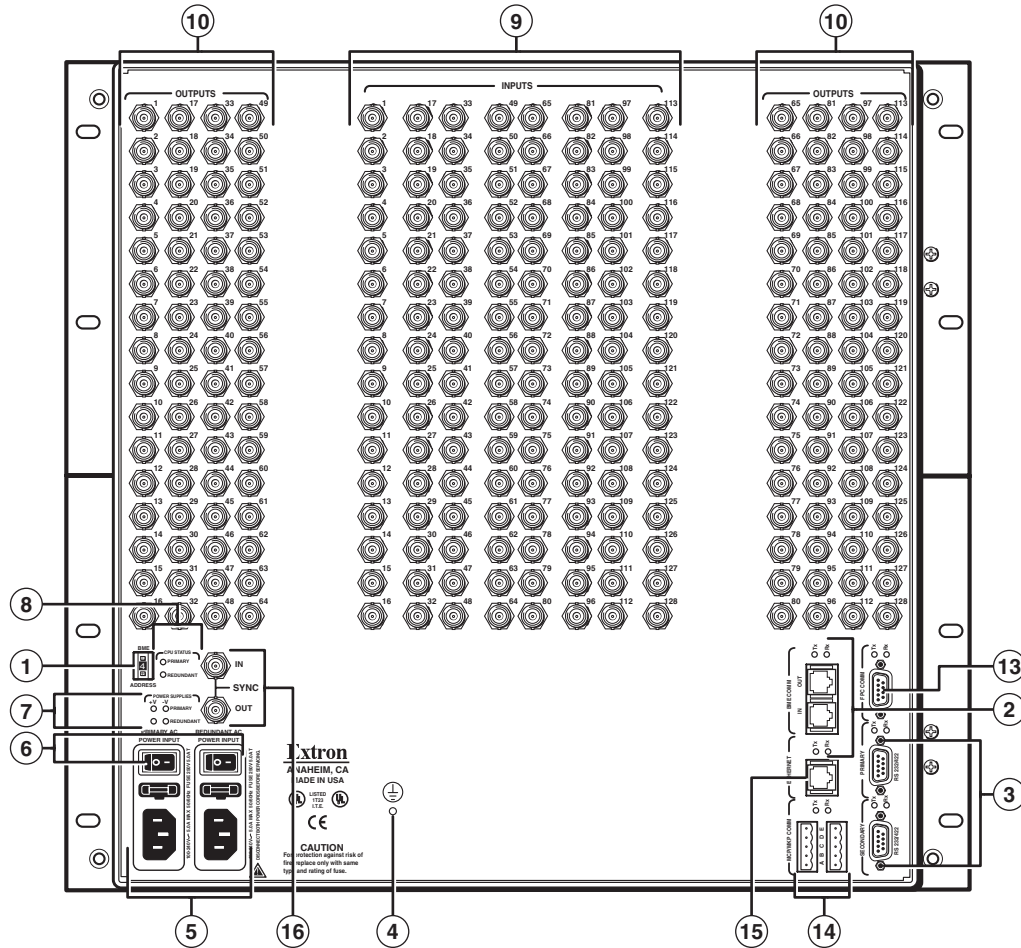
### Mounting instructions

1. Insert the switcher into the rack, align the holes in the mounting bracket with those of the rack.
2. Secure the switcher to the rack using the supplied machine screws.



## Rear Panel Connections and Settings

All connectors and switches (with the exception of the serial port protocol, baud rate, and sync termination DIP switches) are on the rear panel. Figure 2-1 shows the Matrix 12800 wideband video switcher. The sync and video switcher is housed in similar 10U enclosures. The Matrix 12800 audio switcher is housed in a similar 10U enclosure, but with 3.5 mm, 5-pole captive screw connectors.



**Figure 2-1 — Matrix 12800 wideband switcher rear panel features**

- ① BME address switch — See [page 2-5](#).
- ② BME COMM interconnect ports — See [page 2-6](#).
- ③ Primary and Secondary RS-232/RS-422 ports — See [page 2-7](#).
- ④ Ground terminal — See [page 2-8](#).
- ⑤ Primary and Redundant AC Power Input connectors — See [page 2-8](#).
- ⑥ Primary and Redundant AC Power Input switches — See [page 2-9](#).
- ⑦ Power Supplies LEDs — See [page 2-9](#).
- ⑧ CPU Status LEDs — See [page 2-9](#).
- ⑨ Wideband and sync input connectors — See [page 2-12](#).
- ⑩ Wideband and sync output connectors — See [page 2-12](#).

- ⑪ Balanced and unbalanced audio input connectors — See [page 2-13](#).
- ⑫ Audio outputs connectors — See [page 2-14](#).
- ⑬ FPC Comm port — (FUTURE CAPABILITY)
- ⑭ MCP/MKP Comm ports — See [page 2-14](#).
- ⑮ Ethernet port — See [page 2-15](#).
- ⑯ External Sync connectors — See [page 2-16](#).

## Pre-virtualization operations

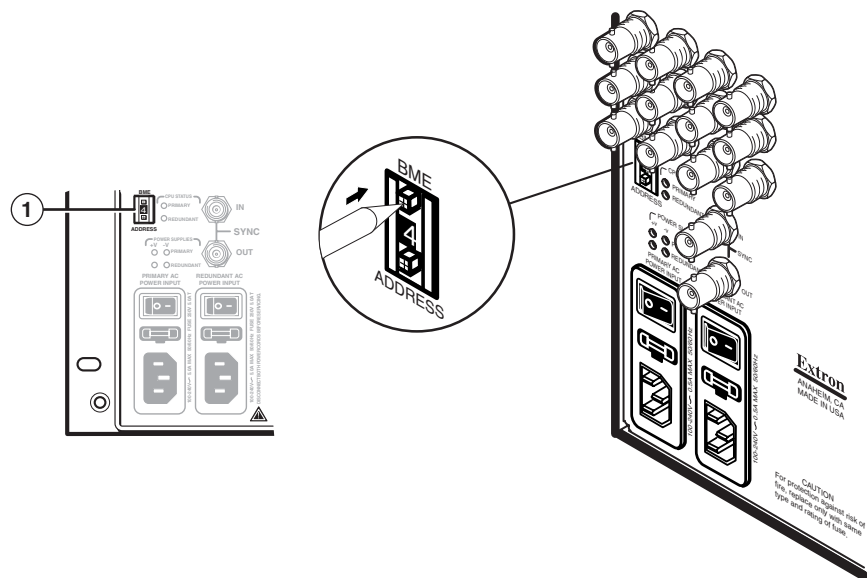
### BME settings

- ① **BME address switch** — Each BME must be set to a unique address of 0 through 8. Address 9 is invalid. The addresses used in the system must be sequential with no skipped numbers, other than as required for audio BMEs.

Audio BMEs occupy two BME addresses: the set address and the set address plus 1 (for example, if the audio BME is set to address 3, it occupies addresses 3 and 4). Set the next BME after the audio BME to the address number plus 2 of the audio BME (for example, if the audio BME is set to address 3, set the next BME to address 5).

Sync BMEs cannot be set to address 0.

To set the BME address, press the + and - buttons on the BME Address switch on the rear panel of the switcher (figure 2-2).



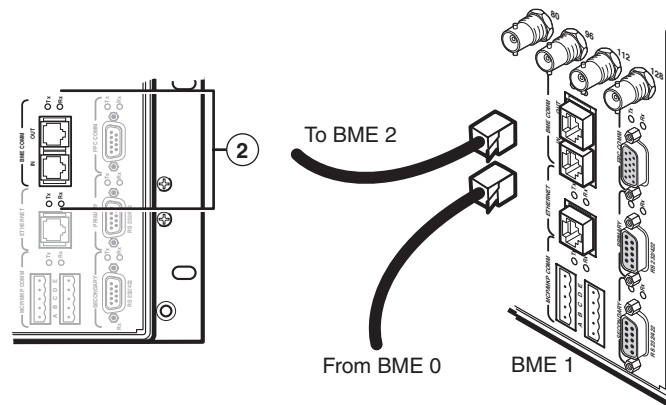
**Figure 2-2 — Setting a BME address**

## Installation, cont'd

- ② **BME COMM interconnect ports** — If the Matrix 12800 system consists of more than one BME, the BMEs must be connected together in a daisy chain using Extron-supplied RJ-45 cables.

Connect the first daisy chain from the BME Comm Out connector on BME 0 to the nearest BME Comm In connector on the BME (figure 2-3). In a rack whose BMEs are numbered sequentially, this would be BME 1. But, since not all systems are configured alike, call this module BME  $n$ .

Connect the next RJ-45 cable from the BME Comm Out connector on BME  $n$  to the BME Comm In connector on nearest unconnected BME (BME  $n+1$ ).



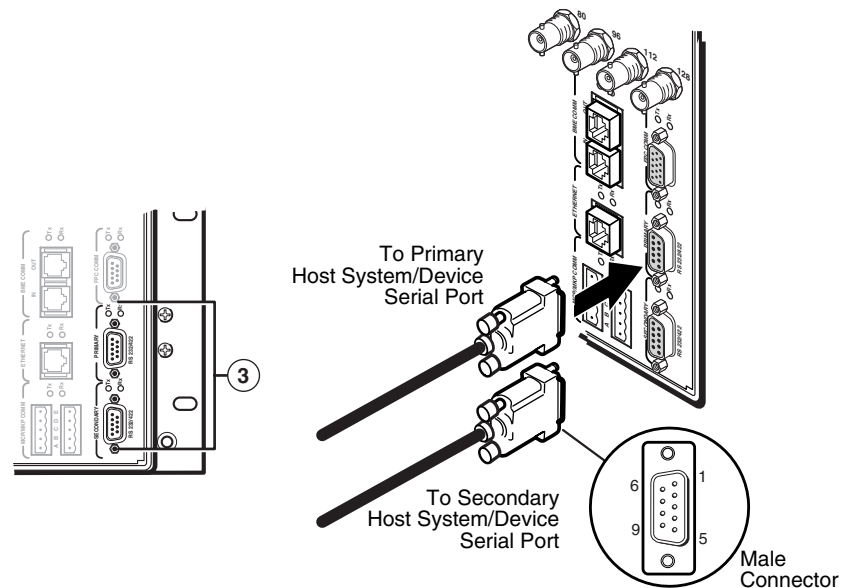
**Figure 2-3 — Daisy-chaining BMEs**

Continue connecting RJ-45 cables from the BME Comm Out connector on each daisy-chained module to the BME Comm In connector on the next module until all modules are included in the chain. When all of the BMEs are connected, each of the BMEs in the system is connected to at least one other BME via the BME Comm connectors.

## Serial ports

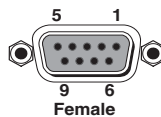
- ③ **Primary and Secondary RS-232/RS-422 ports** — For systems consisting of a single switcher or for BME 0 on a multi-BME system, connect host devices (such as computers or touch panel control systems) or MCP 1000 remote control panels (see the *MCP 1000 Remote Control Panel User Guide*) to the Primary and Secondary RS-232/RS-422 ports (figure 2-4). These 9-pin D connectors provide for serial RS-232/RS-422 control of the matrix switcher. Figure 2-5 shows how to wire the connectors.

Both ports are connected to both controller circuit cards; a redundant controller is not required to use the Secondary RS-232/RS-422 port.



**Figure 2-4 — Connecting host controllers**

Pin	RS-232	Function	RS-422	Function
1	—	Not used	TX+	Transmit data (+)
2	TX	Transmit data	TX-	Transmit data (-)
3	RX	Receive data	RX+	Receive data (+)
4	—	Not used	RX-	Receive data (-)
5	Gnd	Signal ground	Gnd	Signal ground
6	—	Not used	—	Not used
7	—	Not used	—	Not used
8	—	Not used	—	Not used
9	—	Not used	—	Not used



**Figure 2-5 — RS-232/RS-422 port pinout**

After the BMEs have been virtualized, the system can be controlled through this connection using the PC or other host system that can generate the proper commands.

The Matrix 12800 Switchers are factory configured for RS-232 control. To use the switcher under RS-422 control, you must change an internal DIP switch. See chapter 6, “[Upgrades and Maintenance](#)” for details.

The default communications rate is 9600 baud. Baud rates of 19.2, 38.4, and 115 are also available. See chapter 6, “[Upgrades and Maintenance](#)” for details. If equipped with a redundant controller, the primary and redundant controllers must be configured for the same communications protocol and transfer rates.

# Installation, cont'd

## Ground

- ④ **Ground terminal** — If the power outlets do **not** provide connections to the protective ground of the building, connect ground straps between this terminal lug on all BMEs and a hard building ground. Secure the ground straps with the nut and washer included with each BME.

**NOTE** You are responsible for providing the ground straps.

**NOTE** Some earlier BMEs do not have the ground terminal.

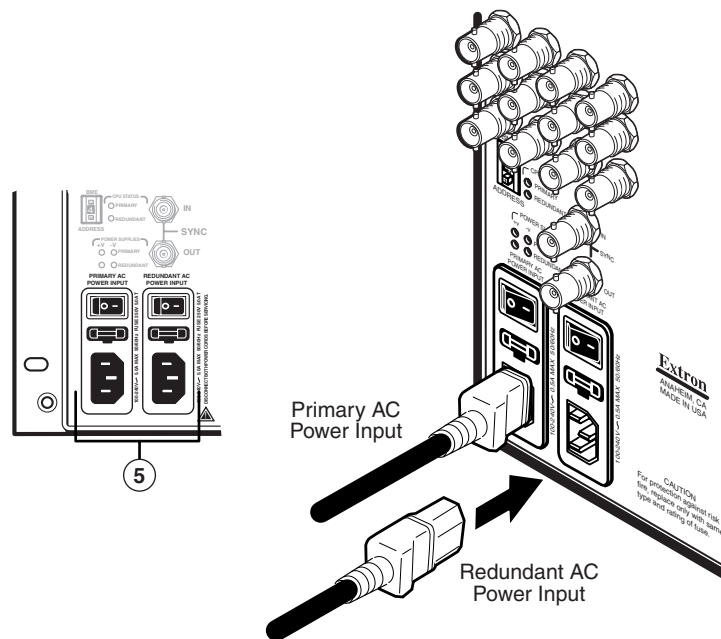
## UL guidelines for ground

**NOTE** The equipment is intended to be used in a location having equipotential bonding.

1. The building installation shall provide a means for connection to protective earth; and
2. The equipment is to be connected to that means; and
3. A SERVICE PERSON shall check whether or not the socket-outlet from which the equipment is to be powered provides a connection to the building protective earth (ground). If not, the SERVICE PERSON shall arrange for the installation of a PROTECTIVE EARTHING CONDUCTOR from the separate protective earthing terminal to the protective earth wire in the building.

## Power

- ⑤ **Primary and Redundant AC Power Input connectors** — Connect a standard IEC power cord between the rear panel Primary AC Power Input connector and a 100 to 240VAC, 50 Hz or 60 Hz power source (figure 2-6).



**Figure 2-6 — Connecting power**

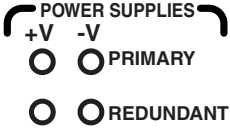
If this BME is equipped with redundant power supplies A and B, connect a second IEC power cord between the Redundant AC Power Input connector and either an uninterruptible power source or a power source that is completely independent from the primary power source.

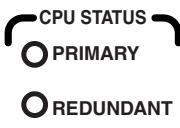
- 
- ⑥ **Primary and Redundant AC Power Input switches** — For BME 0 to recognize all of the BMEs in the daisy chain, BME 0 may not be powered on before the other BMEs. Rather, turn on BME 0 at the same time or after the other BMEs.

**NOTE** *During shipment, circuit cards can become dislodged from their edge connectors during shipment. Reseat all I/O and controller cards before initial power up. See chapter 6, “Upgrades and Maintenance”, for the applicable procedures.*

Toggle the Primary AC Power Input switch to the on (I) position to power up the BME.

If this BME is equipped with redundant power supplies A and B, toggle the Redundant AC Power Input switch to the on (I) position.

- ⑦ **Power Supplies LEDs** — On power up, observe that the +V and -V Primary LEDs light to indicate that the supplied power is within tolerance.
- 
- If this BME is equipped with redundant power supplies A and B, on power up, observe that the +V and -V Redundant LEDs light to indicate that the supplied power is within tolerance. If the primary A or B power supply fails, the Primary LEDs go out and the Redundant LEDs blink to indicate that the redundant B or A power supply is supplying the load.

- ⑧ **CPU Status LEDs** — On power up, observe that the Primary CPU Status LED blinks initially to indicate that internal startup housekeeping is occurring and then, assuming that the primary controller is the active controller, blinks to indicate that the primary controller is ready.
- 
- If this BME is equipped with a redundant controller card, observe that the Redundant CPU Status LED blinks initially and then, assuming that the redundant controller is the standby controller, lights steadily to indicate that the redundant controller is ready. If the primary controller fails, the Primary CPU Status LED goes out and the Redundant CPU Status LED blinks to indicate that the redundant controller is the active controller.

**NOTE** *Both LEDs blink at startup. After startup, the LED for the active controller blinks and the LED for the standby controller lights steadily.*

# Installation, cont'd

## Virtualization/Control Software

The Extron-supplied Matrix 12800 System Virtualization/Control software, which runs on a Windows-type computer and communicates with the matrix switcher via the Ethernet, RS-232/RS-422 ports, or each on BME 0, provides an easy way to virtualize the matrix switcher and to set up ties and sets of ties. Virtualization is required before system operation to map the virtual inputs and outputs to the physical inputs and outputs.

**NOTE** *If your Matrix 12800 switcher was previously set up for RS-232, and your computer comm port uses RS-422, you must change an internal DIP switch. See Chapter 6, "Upgrades and Maintenance", for details.*

The program is compatible with Windows 95, Windows 98, Windows NT, Windows ME, Windows 2000, and Windows XP. Updates to this program can be downloaded from the Extron Web site ([www.extron.com](http://www.extron.com)).

## Installing the software

**NOTE** *Matrix 3200 and Matrix 6400 switchers use the same software as the Matrix 12800.*

The program is contained on the Extron Software Products DVD. Install the software as follows:

1. Insert the DVD into the drive. The Extron software DVD window should open automatically (see figure 2-7). If it does not self-open, run Launch.exe from the DVD.



**Figure 2-7 — Software disk window**

2. Click the **Software** tab (figure 2-7).
3. Scroll to the desired program and click **Install** (figure 2-8).

• **Matrix 12800/6400/3200** 29-036-01 4.0 Apr 19, 2003 2784 KB **Install**  
Control software for the Matrix 3200/6400 Series: and the Matrix 12800 Series.

**Figure 2-8 — Software installation**



- 
4. Follow the on-screen instructions. By default, the installation of the Matrix Switchers Control Program creates a MTRX6400 directory, and it places the following two icons into a group folder named “Extron Electronics\Matrix Switchers”:

- Matrix Switcher 6400+12800 Control Program
- Matrix 12800 Help

### Starting the software

Click **Start > Programs > Extron Electronics > Matrix 6400+12800 Control Program** to start the program. Select the appropriate Comm port or Ethernet port, or select Emulate mode. After you select the Comm or Ethernet port, the software looks for the Matrix system, reads its configuration, and then displays it in the Matrix 12800 Control Program window.

**NOTE** *Emulate mode allows you to operate the software without having a matrix switcher connected to the PC. It can be used as a learning tool or to do advance work in your office before it is needed at the installation site.*

Virtualize the system using the detailed instructions in chapter 3, “[Virtualization/Control Software](#)”.

# Installation, cont'd

## Post-Virtualization operations

### Wideband video, low resolution video, and sync connections (wideband, video, and sync BMEs only)

- 9 Wideband and sync input and output connectors — Use worksheets, printouts from the Matrix 12800 System/Virtualization Control program, or both to determine the virtual connection on each physical input and output connection. Connect video and sync inputs and outputs to these BNC connectors.
- 10

### Audio connections (audio BMEs only)

Audio BMEs (figure 2-9) are similar in most respects to sync, wideband, and video BMEs, with the exception of 3.5 mm, 5-pole captive screw connectors for audio input and output.

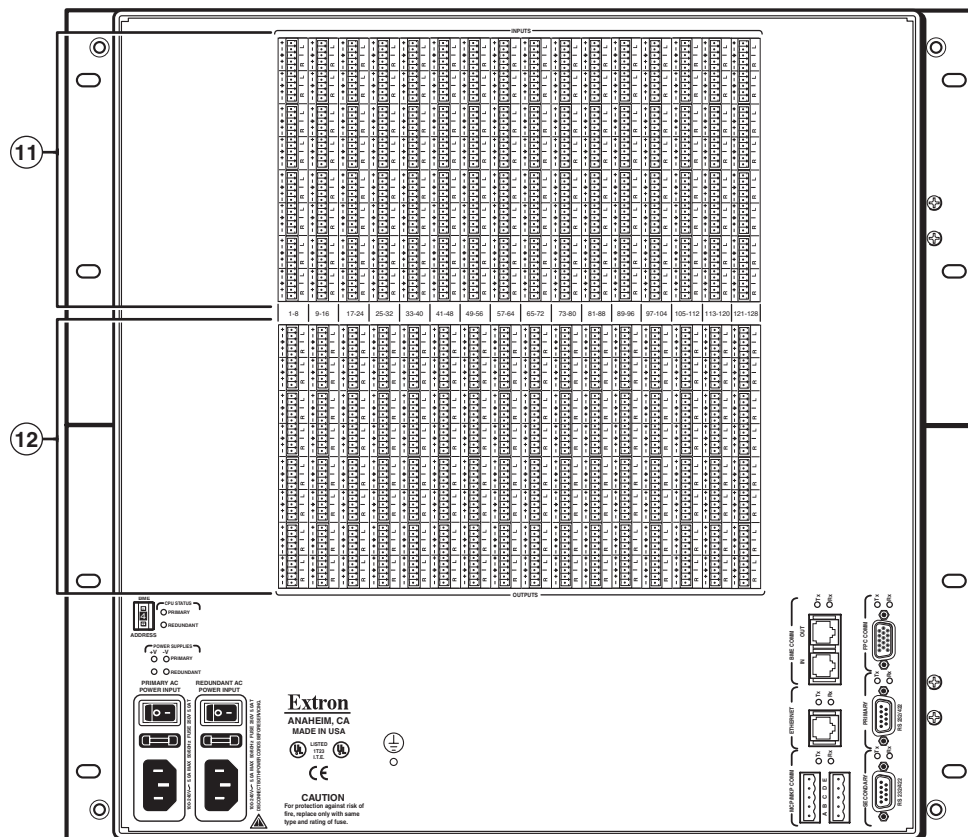


Figure 2-9 — Audio input and output connectors

### CAUTION

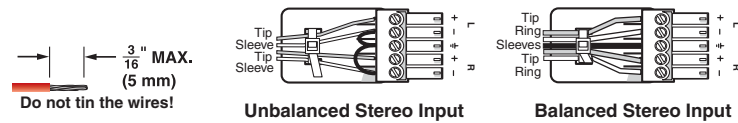
The captive screw connector can be inadvertently plugged partially into one receptacle and partially into an adjacent receptacle. This misconnection could damage the audio output circuits. Exercise care to ensure the captive screw connector is plugged into the desired input or output.

**NOTE** For audio inputs and outputs, the length of exposed wires is critical. **The ideal length is 3/16-inch (5 mm).**

- If the stripped section of wire is longer than 3/16-inch, the exposed wires may touch, causing a short circuit between them.
- If the stripped section of wire is shorter than 3/16-inch, wires can be easily pulled out even if tightly fastened by the captive screws.

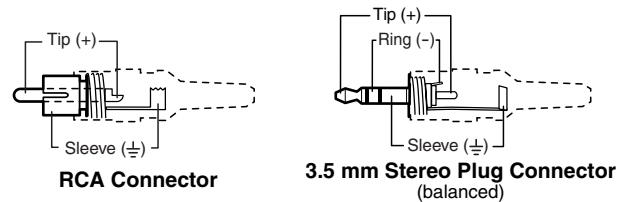
**(11) Balanced and unbalanced audio input connectors** — Each input has a 3.5 mm, 5-pole captive screw connector for balanced or unbalanced stereo audio input. Connectors are included with each Matrix 12800 audio switcher, but you must supply the audio cable

See figure 2-10 to wire a connector for the appropriate input type and impedance level. Use the supplied tie-wrap to strap the audio cable to the extended tail of the connector.



**Figure 2-10 — Captive screw connector wiring for inputs**

**NOTE** See figure 2-11 to identify the tip, ring, and sleeve when you are making connections for the switcher from existing audio cables. A mono audio connector consists of the tip and sleeve. A stereo audio connector consists of the tip, ring and sleeve. The ring, tip, and sleeve wires are also shown on the captive screw audio connector diagrams, figure 2-10 and figure 2-12.



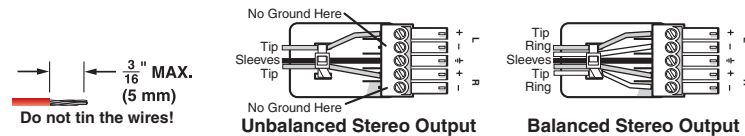
**Figure 2-11 — Typical audio connectors**

The audio level for each input can be individually set, via the front panel controller, either RS-232/RS-422 port, or the Ethernet port, to ensure that the level on the output does not vary from input to input. See the *Matrix 12800 Switcher Front Panel Controller User Guide*, and see chapter 3, “[Virtualization/Control Software](#)”, chapter 4, “[Programming Guide](#)”, and chapter 5, “[Web Operations](#)” in this manual.

## Installation, cont'd

- ⑫ **Audio outputs connectors** — These 3.5 mm, 5-pole captive screw connectors output the selected unamplified, line level audio. Connect audio devices, such as an audio amplifier or powered speakers.

See figure 2-12 to properly wire an output connector. Use the supplied tie-wrap to strap the audio cable to the extended tail of the connector.



**Figure 2-12 — Captive screw connector wiring for audio output**

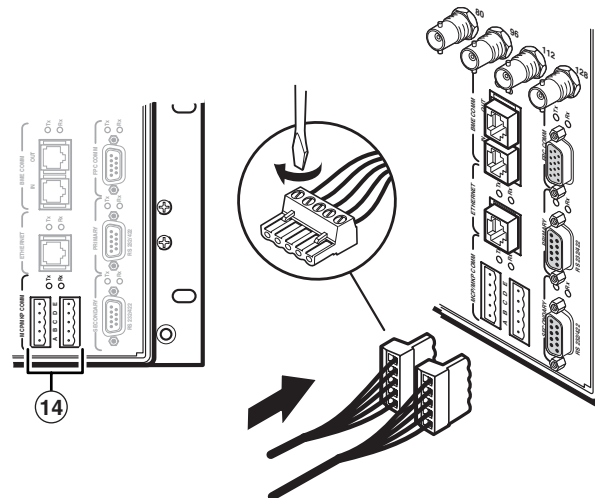
**CAUTION** For unbalanced audio, connect the sleeves to the ground contact. **DO NOT** connect the sleeves to the negative (-) contacts.

**NOTE** By default, the audio gain of each output is set to 0 dB (unbalanced) and 6 dB (balanced). To reduce this setting by 6 dB (-6 dB [unbalanced], 0 dB [balanced]), see “[Setting the default audio gain](#)” in chapter 6, “[Upgrades and Maintenance](#)”.

By default, the audio output follows the video switch. Audio breakaway, is available via the front panel, either RS-232/RS-422 port, or the Ethernet port. See the *Matrix 12800 Switcher Front Panel Controller User Guide*, and see chapter 3, “[Virtualization/Control Software](#)”, chapter 4, “[Programming Guide](#)”, and chapter 5, “[Web Operations](#)” in this manual.

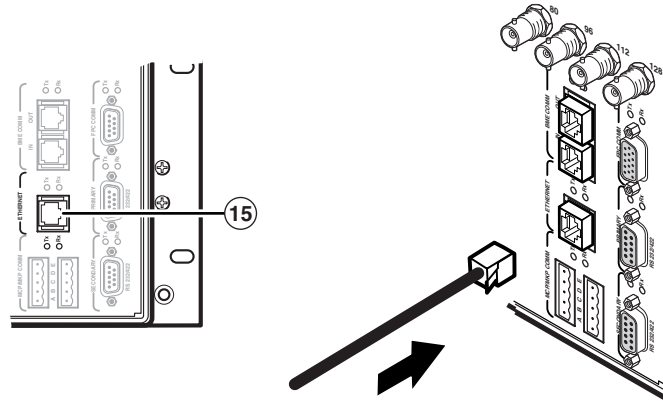
### Remote control panel, front panel controller, and Ethernet connections

- ⑬ **FPC Comm port** — (FUTURE CAPABILITY)
- ⑭ **MCP/MKP Comm ports** — For systems consisting of a single switcher or for BME 0 on a multi-BME system, if desired, connect an MKP 1200 remote keypad to either of these 3.5 mm, 5-pole captive screw connectors (figure 2-13). See the *MKP 1200 User Guide*, for details.



**Figure 2-13 — Connecting a control keypad**

- ⑮ **Ethernet port** — For systems consisting of a single switcher or for BME 0 on a multi-BME system, if desired connect the Matrix 12800 either directly to an FPC 5000 Front Panel Controller or to an Ethernet LAN via this RJ-45 connector (figure 2-14). If you are connecting to a LAN, you can still use an FPC 5000 as one of the other nodes of the LAN.



**Figure 2-14 — Connecting to the Ethernet**

#### Cabling and RJ-45 connector wiring

It is vital that your Ethernet cables be the correct cables, and that they be properly terminated with the correct pinout. Ethernet links use Category (CAT) 5e or CAT 6, unshielded twisted pair (UTP) or shielded twisted pair (STP) cables, terminated with RJ-45 connectors. Ethernet cables are limited to a length of 328 feet (100 m).

**NOTE** Do not use standard telephone cables. Telephone cables do not support Ethernet or Fast Ethernet.

*Do not stretch or bend cables. Transmission errors can occur.*

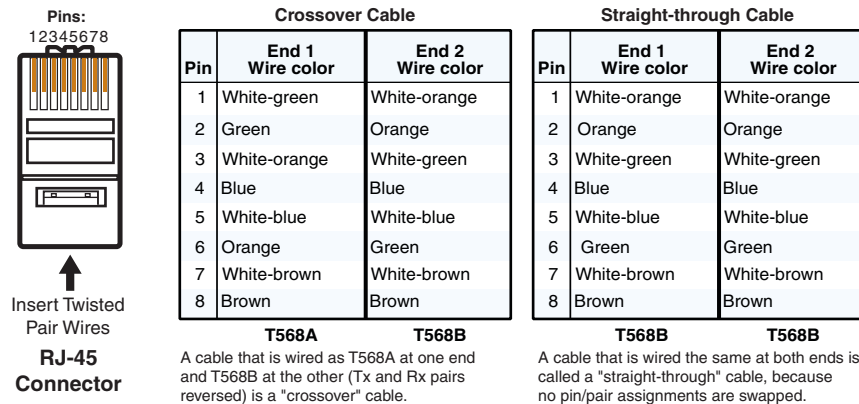
The cable used depends on your network speed. The switcher supports both 10 Mbps (10Base-T — Ethernet) and 100 Mbps (100Base-T — Fast Ethernet), half-duplex and full-duplex, Ethernet connections.

- 10Base-T Ethernet requires CAT 3 UTP or STP cable at minimum.
- 100Base-T Fast Ethernet requires CAT 5e UTP or STP cable at minimum.

The Ethernet cable can be terminated as a straight-through cable or a crossover cable and must be properly terminated for your application (figure 2-15, on the next page).

- **Crossover cable** — Direct connection between the computer and the matrix switcher.
- **Patch (straight) cable** — Connection of the matrix switcher to an Ethernet LAN.

# Installation, cont'd



**Figure 2-15 — RJ-45 connector and pinout tables**

## External sync connections (wideband and video BMEs only)

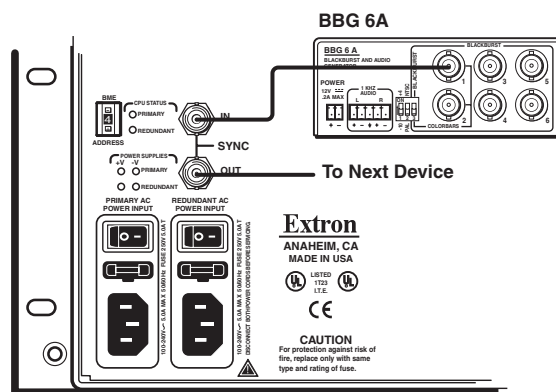
For NTSC, PAL, or SECAM video, when the switcher switches between inputs, the resulting change in image should be seamless, or clean. The Matrix 12800 switcher can use an external signal to synchronize switching during the vertical interval. Without the external sync locking feature, switching between inputs can result in a brief rolling (sync loss) or a brief change in the picture size.

**NOTE** External sync only works for inputs that have been virtualized as NTSC, PAL, or SECAM video only, not for inputs virtualized as RGB video.

⑩ **External Sync In connector** — Connect an external sync signal to this BNC connection for genlocking the video signal in broadcast or other sync-critical applications.

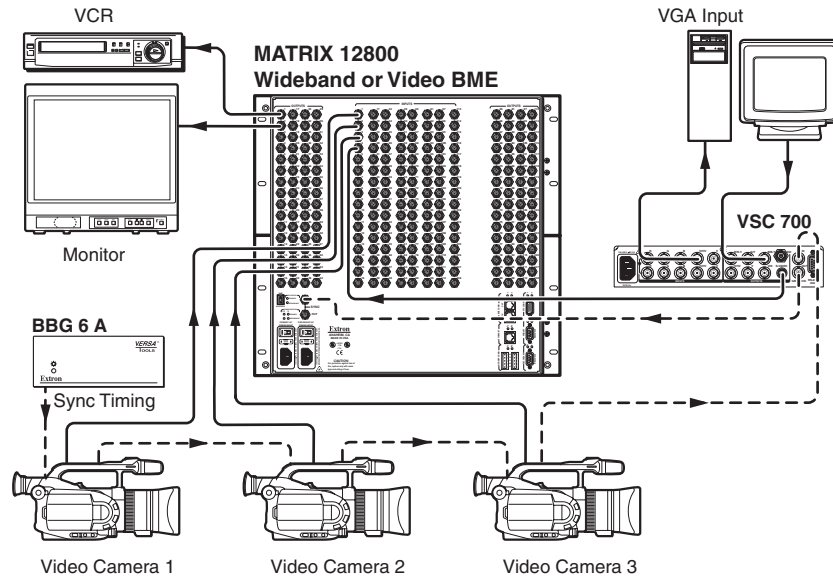
**External Sync Out connector** — Connect any downstream equipment that requires genlocking to this BNC connector to route the external sync signal throughout the system in broadcast or other sync-critical applications.

Figure 2-16 shows a basic external sync configuration. The Ext Sync In connector receives a timing signal. The Out connector allows the signal to be passed on to another video device, if required.



**Figure 2-16 — Simple external sync connection example**

Figure 2-17 shows another configuration, in which the timing source passes through three video cameras and a video scan converter before connecting to the switcher. This type of video camera is capable of synchronizing with the external timing source for video editing applications.



**Figure 2-17 — Multiple device external sync connection example**

If no external sync timing source is connected to the switcher, switching occurs immediately.



### Other Settings

#### Serial port protocol switches

The controller card has a DIP switch that allows you to select between the RS-232 and RS-422 protocol for the rear panel RS-232/RS-422 ports. RS-232 is the default setting. See [“Swapping the serial port protocol \(RS-232/RS-422\)”](#) in chapter 6, “Upgrades and Maintenance”, to select a different serial port protocol.

#### Baud rate switches

The controller card has two DIP switches that allow you to select among 9600, 19200, 38400, and 115200 baud for the rear panel RS-232/RS-422 ports. 9600 baud is the default setting. See [“Changing the serial port baud rate”](#) in chapter 6, “Upgrades and Maintenance”, to select a different baud rate.

#### Sync termination switches

Each input card supports 32 (two columns on the back panel) physical inputs. In a sync BME, the first eight physical inputs on each input card are equipped with sync termination DIP switches. Each switch provides the option of selecting either 510 ohms or 75 ohms. See [“Changing the Sync Termination”](#) in chapter 6, “Upgrades and Maintenance”, to tailor the sync termination for non-TTL input sync.

The physical inputs with sync termination switches are:

- Inputs 1 through 8 on input card 1
- Inputs 33 through 40 on input card 2
- Inputs 65 through 72 on input card 3
- Inputs 97 through 104 on input card 4

The 75 ohms position is required only for an input with non-TTL sync, greater than 5V p-p. The normal position is 510 ohms. The switches provide a way to condition non-TTL sync levels greater than 5V p-p, enabling the sync to be properly passed from the input to all selected outputs.

**NOTE** *An input that produces an out-of-sync display, a display that is rolling vertically, tearing horizontally, or both, could indicate a non-TTL sync input. A device that is known to output non-TTL sync levels (greater than 5V p-p) should be connected to one of the inputs with sync termination switches, and the switches for that input should be set to the 75 ohm position. If you're not sure, check the specifications in the user guide for the input device.*

#### IP parameters initialization

The Matrix 12800 System Virtualization/Control software, which runs in a Windows-type computer and communicates with the matrix switcher via the RS-232/RS-422 ports or the Ethernet port on BME 0, provides an easy way to create or edit the IP parameters required for WAN or LAN control of the switcher.

See [“Ethernet protocol settings”](#) in chapter 3, “Virtualization/Control Software”.

**NOTE** *If your Matrix 12800 switcher was previously set up for RS-232, and your computer comm port uses RS-422, you must change an internal DIP switch. See chapter 6, [“Upgrades and Maintenance”](#), for details.*



## Matrix 12800 Switchers

# Chapter Three

## Virtualization/Control Software

Explaining Virtual I/O Switching

Virtualization/Control Program

Special Characters

# Virtualization/Control Software

---

## Explaining Virtual I/O Switching

A Matrix 12800 system consists of from one to nine BMEs, each of which can have as many as 128 inputs and 128 outputs. It is usually desirable to have certain inputs switch together as a set, to *follow* each other. For example, if the system consists of a 128 x 128 video BME and a 128 x 128 audio BME, you want your video images on your video monitors to match the audio from the sound system (for example, video and audio from a DVD). You would want the video and audio to follow each other when they are switched to another display. This type of switching requires the two BMEs to communicate with each other so that they both switch to the correct inputs simultaneously. In the traditional and simplest configuration, hardware is usually designed to switch both BMEs to the same input.

S-video presents an example in which *follow* is always required. The luminance (Y) and chrominance (C) signals must be switched as a pair of signals. Traditional hardware does this by causing the paired signals to follow each other, either in a single box made only for S-video or by using two composite video switchers and forcing them to follow each other.

A better solution would be to have a single video matrix switcher box that can be field-programmed to be either an S-video switcher, a composite video switcher, or some combination of both. That is what the Extron Virtualization/Control software does; it groups *physical input* connectors and *physical output* connectors together into *virtual inputs* and *virtual outputs*, each of which switches from one (composite video) to seven (RGBHV and stereo audio) *virtual planes*. The software then downloads the *virtual map* to the system memory of the Matrix 12800.

Assume a Matrix 12800 video switcher and a Matrix 12800 audio switcher; to support the S-video example above, the Virtualization/Control software can map (logically split) the video switcher into a Y plane and a C plane, and the audio switcher into two (left and right channels) audio planes. This creates a system with up to 64 virtual inputs and 64 virtual outputs in 4 virtual planes (Y, C, and left and right channel audio). (The limit of 64 inputs and outputs comes from splitting the 128 x 128 video BME into 2 halves.) In this example, half of the audio BME is not included in the virtual map since only 64 of the 128 ports are used, so the configuration would be more cost-effective with a 64 x 64 audio BME.

As an alternative, using the same Matrix 12800 video and audio switchers, the software can map the system into a composite video matrix consisting of up to 128 virtual inputs by 128 virtual outputs in 3 virtual planes (video and audio).

The software can also map the same two switchers into a component video system consisting of up to 42 virtual inputs by 42 virtual outputs in 5 virtual planes (Y, R-Y, B-Y, and left and right audio). In this configuration two physical input BNCs and two physical output BNCs are not used. As in the S-video example, the audio plane would be served more cost-effectively using a 64 x 64 audio BME.

Lastly, the software can map the same two switchers into a 25-input-by-25-output component video system, a 20-input-by-20-output S-video system, and a 13-composite-input-by-13-composite-output system, each with audio (58 virtual inputs by 58 virtual outputs). In fact, the video switcher can be subdivided to accommodate any combination of video formats so long as the total number of virtual inputs and virtual outputs does not exceed the number of physical inputs and outputs (up to 128 x 128).

The number of physical input connectors required can be calculated with the equation  $V_i * V_p = P_i$ , where  $V_i$  is the number of virtual inputs,  $V_p$  is the number of virtual planes, and  $P_i$  is the number of physical inputs required. The equation for output connectors is  $V_o * V_p = P_o$ .

The largest possible system consists of three 128 x 128 video BMEs, two 128 x 128 sync BMEs, and one 128 x 128 audio BME. This system can then be mapped to become a matrix with 128 virtual inputs and 128 virtual outputs in seven virtual planes (R, G, B, H, V, left-channel audio, and right-channel audio).

All of these configurations are established by creating a virtual map with the Virtualization/Control software and downloading the virtual map to the BME. The Virtualization/Control software is included with each switcher.

Note that the number of virtual planes identifies how many *physical* input (or output) connectors are switched for each *virtual* input switched. The following table shows how the *physical* and *virtual* inputs and outputs differ in a video BME in the 64 x 64 S-video matrix and 42 x 42 component video virtual matrix examples above. In either example, the audio BME (not shown) has *physical* input 1 as *virtual* input 1, 2 as 2, and so on.

#### S-video

<i>Physical input</i>	<i>Virtual S-video input</i>	<i>Physical output</i>	<i>Virtual S-video output</i>
1 (Y)	1	1 (Y)	1
2 (C)		2 (C)	

3 (Y)	2	3 (Y)	2
4 (C)		4 (C)	

5 (Y)	3	5 (Y)	3
6 (C)		6 (C)	

#### Component video

<i>Physical input</i>	<i>Virtual component video input</i>	<i>Physical output</i>	<i>Virtual component video output</i>
1 (Y)	1	1 (Y)	1
2 (R-Y)		2 (R-Y)	
3 (B-Y)		3 (B-Y)	

4 (Y)	2	4 (Y)	2
5 (R-Y)		5 (R-Y)	
6 (B-Y)		6 (B-Y)	

### Virtualization/Control Program

The Extron-supplied Matrix 12800/6400/3200 Virtualization/Control software runs in a Windows-type computer and communicates with the matrix switcher via the primary or secondary RS-232/RS-422 ports or the Ethernet port on BME 0. The software provides an easy way for you to virtualize the matrix switcher and to establish rooming presets. Virtualization is required before system operation to map the virtual inputs and outputs to the physical inputs and outputs and download the map to the memory of the Matrix 12800.

**NOTE** *If your Matrix 12800 switcher was previously set up for RS-232, and your computer comm port uses RS-422, you must change an internal DIP switch. See chapter 6, "Upgrades and Maintenance", for details.*

The Virtualization/Control program also provides an interactive graphical interface that allows you to perform all of the functions available at the optional Front Panel Controller (FPC). The control portion of the software can be used for full control of the system or for initial programming of the system. Settings to the matrix switcher are stored in the memory of the switcher, so once the system is virtualized, there is no requirement to ever run the Virtualization/Control program again.

The control portion of the Virtualization/Control Program operates in four programming methods:

- **Remote control and programming** in real time via either RS-232 port or the Ethernet port.
- **Saving system settings** for later restoration to the same system (backup) or copying to (programming) another system. Multiple configurations (programs) can be saved to a disk. Any of the configurations can be quickly reloaded later, providing an unlimited number of possible setups.
- **Creating program byte-strings** for application to a matrix switcher through a control system.
- **Emulation (off-line) programming** of the system settings for copying to the system at a later time or in another location. Emulation mode allows you to create programs and configurations for possible matrix hardware configurations without being connected to such a system.

The Virtualization/Control program is compatible with Windows 95, Windows 98, Windows NT, Windows ME, Windows 2000, and Windows XP. Updates to this program can be downloaded from the Extron Web site ([www.extron.com](http://www.extron.com)).

To load a demonstration set of ties, presets, and rooms to your matrix (or to emulate one) restore the configuration from the DEMO12800.mtx file that was installed with the software. Use the NEW.ini file to clear all settings in a unit.

## Creating a virtual I/O switching system (map)

The following detailed example uses the Virtualization/Control software to create a virtual I/O switching system within the physical hardware. This process generates and uploads a virtual map to the Matrix 12800 hardware.

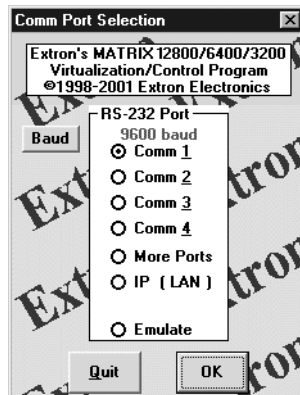
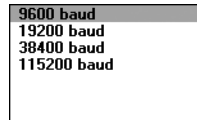
The physical Matrix 12800 system consists of from one to nine BMEs, each of which can have as many as 128 inputs and 128 outputs in 1 to 7 virtual planes.

Create a virtual I/O switching map as follows:

1. Ensure that all BMEs that are part of the system have been connected to each other and their BME numbers have been set correctly. Connect a serial cable between the PC and the Primary RS-232/RS-422 port on BME 0. Power up the Matrix 12800 system. See chapter 2, "[Installation](#)".
2. On the PC, click **Start > Programs > Extron Electronics > Matrix 6400+12800 Control Program** to start the program. The Comm Port Selection window (figure 3-1) appears, asking you to select the appropriate PC Comm port, the Ethernet port, or to select Emulate mode. For this example, select an RS-232 port, but do not click **OK** yet.
3. Check the baud rate displayed in the comm port selection window. If you need to change the baud rate, click the Baud button and double-click the desired baud rate.

Available rates are 9600, 19200, 38400, and 115200. The default is 9600.

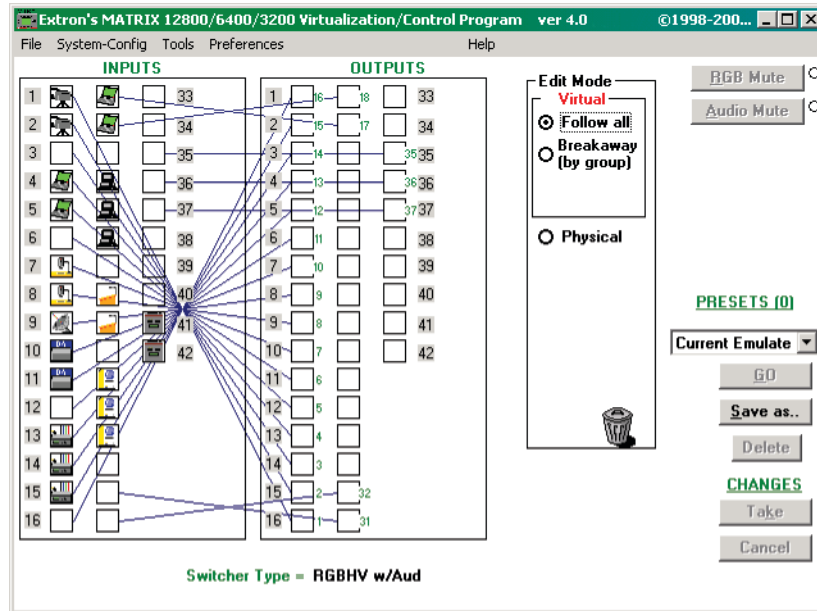
Click **OK**.



**Figure 3-1 — Comm port selection**

## Virtualization/Control Software, cont'd

After you select the Comm port and click **OK**, the software looks for the Matrix system and reads its hardware configuration, the type and size of each BME. The software then reads all of the current settings, such as the ties, presets, and virtual map, and displays a graphical representation of the ties in the program window (figure 3-2).

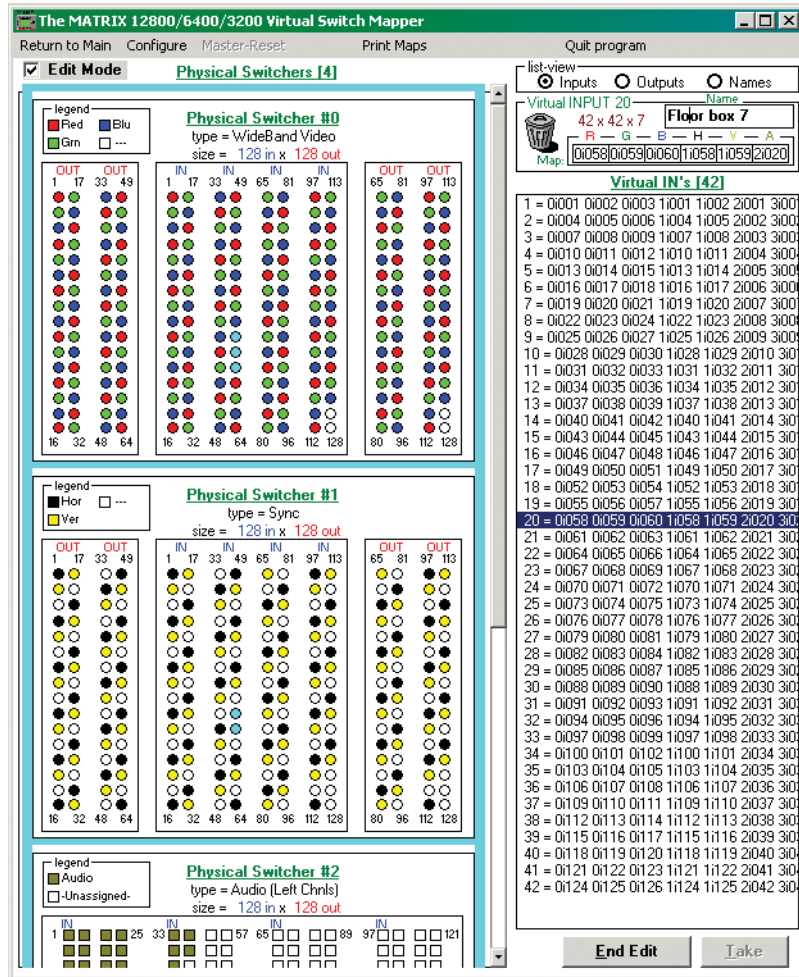


**Figure 3-2 — Main screen with ties**

**NOTE** If this is a new system that has not been virtualized yet or one that has had its map cleared, the graphical representation and all information shown on the Virtual Map screen is invalid at this point.

If you clicked **Emulate**, to create a program for a system in advance without being connected to it, you have to define the number and type (video, sync, or audio) of BMEs, the number of inputs, and the number of outputs for the Matrix 12800 system you are emulating. See "[Programming the matrix offline \(emulate mode\)](#)" in this chapter.

- On the menu bar, click **System-Config** to show the Virtual Map screen (figure 3-3).



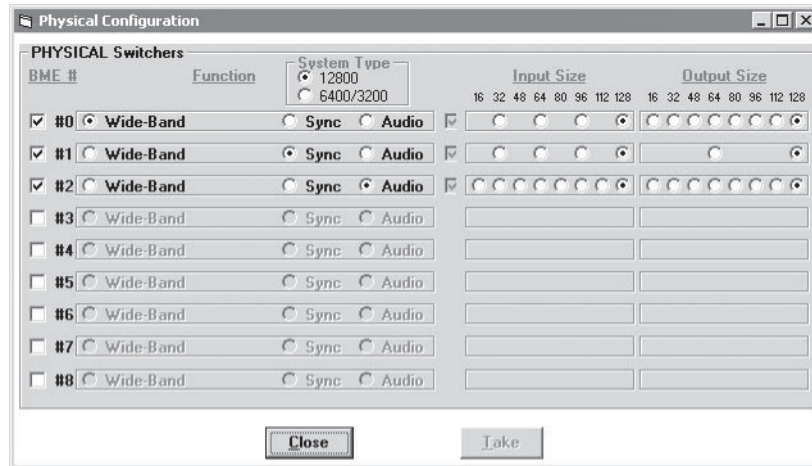
**Figure 3-3 — Virtual Map screen**



## Virtualization/Control Software, cont'd

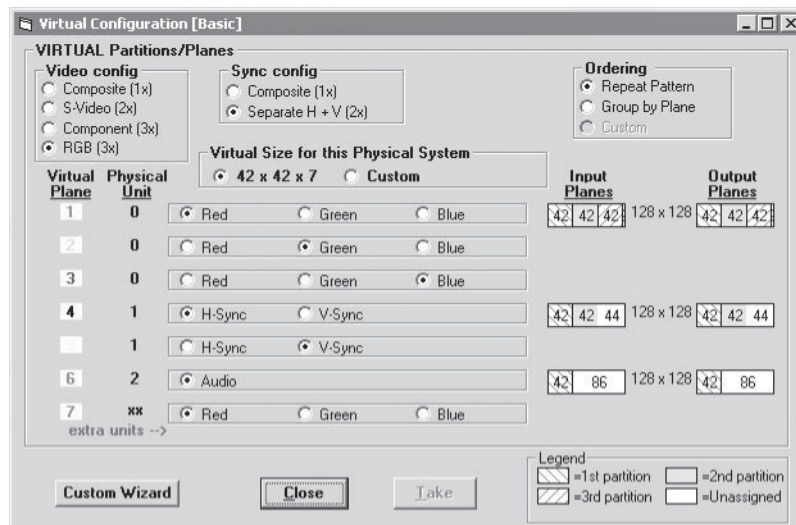
- On the menu bar, click **Configure** > **Physical Switchers** to show the Physical Configuration screen (figure 3-4). Check this screen to ensure that all BMEs were seen on program startup and that their type and size is reported correctly.

Click the **Close** button to return to the Virtual Map screen.



**Figure 3-4 — Physical Configuration screen**

- On the menu bar, click **Configure** > **Virtual Switcher-Basic** to show the Virtual Configuration screen (figure 3-5). This screen shows how the software has mapped the physical system into a virtual system. There are several variables that you can change on this screen that affect the number of virtual planes and inputs and outputs that are available and how they are presented.



**Figure 3-5 — Virtual Configuration screen**

- a. If a sync BME was found, you can specify, in the Sync Config box, whether the Virtualization/Control program is to map the system using Composite sync (one plane) or Separate H + V sync (two planes).
- b. In the Ordering box, you can specify whether the program is to organize the map assignments in a repeating pattern or grouped by plane. A repeated pattern sequentially assigns all of the planes appropriate to a specific BME to the physical connectors, for example 1-R (red), 2-G (green), 3-B (blue), 4-R, 5-G, 6-B, 7-R, 8-G, 9-B... in a wideband BME and 1-H (horizontal sync), 2-V (vertical sync), 3-X (unused), 4-H, 5-V, 6-X, 7-H, 8-V, 9-X... in a sync BME. A grouped pattern groups all the virtual inputs and outputs together by plane, for example 1-R, 2-R, 3-R, ...43-G, 45-G, 46-G, ...122-B, 123-B, 124-B...
- c. Specify the ordering of the planes by clicking on the radio button for each color plane or sync plane. For example, you can change the order of a wideband BME from RGB to BGR.

**NOTE** *Changes made on the Virtual Configuration screen do not take effect until you click the **Take** button. Click the **Close** button without **Taking** to restore the variables to their initial settings.*

*Because changes on this screen can change the virtual map, once you have started making ties, saving presets, creating rooms, or naming your virtual inputs, you should no longer make any changes on this screen.*

- d. Click the **Take** button to make any changes take affect and click the **Close** button to exit the Virtual Configuration screen.
7. On the Virtual Map screen (figure 3-3), examine the physical layout of the BMEs and how the virtualization process assigned the physical input and output connectors to various virtual planes.  
If desired, return to the Virtual Configuration screen (click **Configure** > **Virtual Switcher-Basic**, figure 3-5) and adjust the mapping.
  8. If the virtual map looks correct, you can optionally assign or edit names (up to 12 characters long) to any of the virtual inputs and outputs from the Virtual Map screen at any time.
    - a. Click the **Edit Mode** check box.
    - b. Click the **List-View Names** radio button.
    - c. Scroll through the Port Name listing and select the desired virtual input or virtual output.
    - d. Type or edit the name for the virtual input or virtual output in the Name field.
    - e. Press the Tab key on the keyboard to exit the Name field.
    - f. To add or edit the name of another virtual input or output, return to step 8c.  
After the last name has been added or edited, click the **Take** button.
    - g. Click the **End Edit** button.

**NOTE** *You can also read and edit the names from the optional FPC, see the Matrix 12800 Front Panel Controller User Guide.*

9. If you plan to use room presets, you need to group certain virtual outputs as rooms, see [“Creating rooms within the system”](#) in this chapter.

## Virtualization/Control Software, cont'd

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10. If desired, on the Virtual Map screen menu bar, click **Print Maps** to create a hard copy map of the virtual system. If you send the map to a color printer (select the printer by clicking on **File > Select printer** on the main screen), the map prints with the red plane mapped in red, the green plane in green, the blue plane in blue, the horizontal plane in black, the vertical plane in yellow, and the audio plane in olive.

The printed virtual map is invaluable as a wiring guide during installation, or as a reference at any time. See chapter 2, "[Installation](#)".

11. On the Virtual Map screen menu bar, click **Return to Main** to return to the main screen (figure 3-2). Note that the number of inputs and outputs on the main screen matches the number of inputs and outputs that were created by the virtualization.

The system virtualization is now complete and the virtual map has been stored in BME 0. Unless the map is destroyed (the memory of the BME is corrupted), or the system configuration changes (the size, type, or number of BMEs changes), there is no need to run the Virtualization/Control program again. The program can, however, be run for the control functions (such as establishing ties and setting audio gain and attenuation) at any time.

### Reassigning virtual I/O connectors

The Virtual Map screen lets you make simple corrections to the virtual map to reflect actual physical input and output connections.

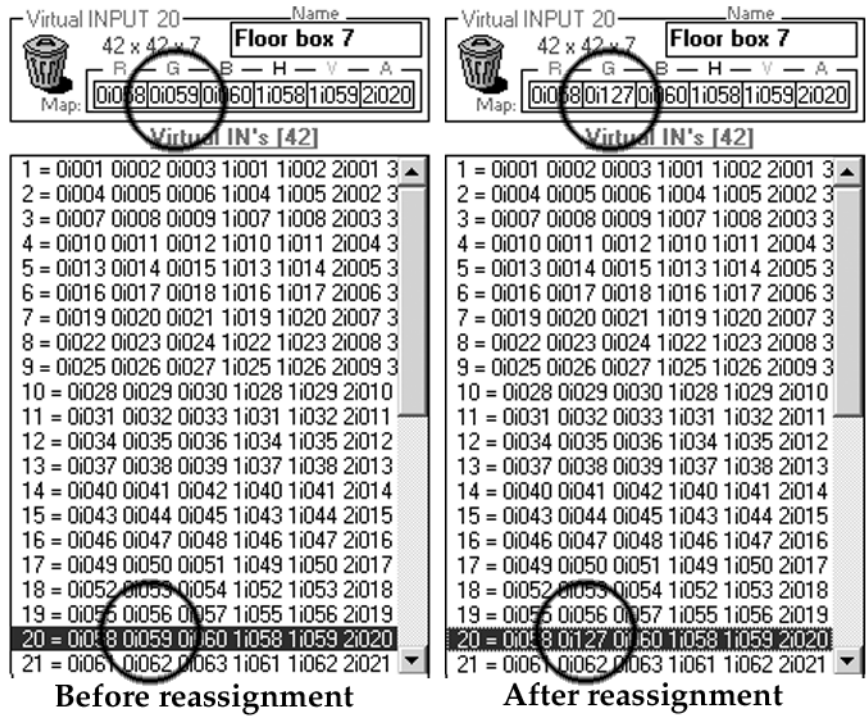
Assume a 42-input x 42-output system consisting of one wideband, one sync, and one audio BME (figure 3-3); the wideband BME has 126 inputs and 126 outputs, leaving 2 input BNCs and 2 output BNCs unmapped. Further assume that a cable in the middle of the bundle, say the virtual input 20 green video plane cable, breaks. If the switcher is mapped in a repeating pattern (RGBRGB...RGB), physical input connector 59 has the bad cable connected.

Depending on the cables used and how the cables are arranged in the system, removing the cable connected to physical input connector 59 could entail removing numerous cables that block connector 59. Removing so many cables risks further cable damage or reconnecting the cables to the wrong connectors.

A different solution is to map one of the unused physical input connectors as the virtual input 20 green video plane cable. Mapping an unused connector eliminates the need to remove all of the cables, including the cable on input connector 59.

Each video plane on the Virtual Map screen is represented by a different color. In an RGB matrix, the R, G, and B BNCs are represented by red, green, and blue circles. Unused connectors are shown in white. You can select a virtual input on the Virtual Map screen, either by clicking on one of the BNC connectors for that input or by selecting a specific virtual input in the Virtual Ins or Virtual Outs Map field, the boxed list to the right of the screen (figure 3-6). When a virtual input is selected, all of the associated connectors for the selected virtual input, on all BMEs on the Virtual Map screen turn light blue.

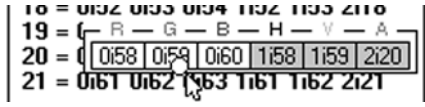
When a virtual input or output is selected, the Virtual I/O Map field identifies the physical connectors for each virtual plane on all BMEs for a selected virtual input or output. The field identifies each physical connector with a 5-character code. On the *Before reassignment* view of figure 3-6, the virtual input 20 green video plane connector is coded 0i059, which translates to BME **0**, input connector **059**. If the **List-View Inputs** radio button is selected, the Virtual Ins list field displays the same information.



**Figure 3-6 — Virtual map and list fields of Virtual Map screen**

Map an unused connector to replace a current connector on the Virtual Map screen as follow:

1. Click the **Edit Mode** box to enable mapping.
2. Click and begin dragging the unused connector. When you start dragging the connector, the Virtual I/O Map field moves down the screen to the entry for the connector in the list field (figure 3-7).



**Figure 3-7 — Dragging and dropping a connector**

3. Drop the connector into the Virtual Ins or Outs Map field in the appropriate frame.

The connector on the map from which you dragged turns white to indicate that the connector is now unused. The connector indicator for the location to which you dragged turns pale blue to indicate that it is now part of the virtual plane. The Virtual Ins or Outs Map field entry for the virtual plane that you reassigned changes to reflect the new physical connector for that virtual interface. On the *After reassignment view* of figure 3-6, the reassigned virtual input 20 green video plane connector is coded 0i127, which translates to BME 0, input connector 127.

## Virtualization/Control Software, cont'd

4. When you are finished editing the virtual map, click the **Take** button to accept the changes.

If you decide that you do not want these changes, click **Return to Main** without **Taking** to reject the changes.

5. Click the **End Edit** button to exit the edit mode.

You can also drag and drop a connector to the trash can in the Virtual Map screen to delete it from the map.



Unassigned virtual planes for a specific virtual input or virtual output are identified in the Virtual Ins or Outs Map field by dashes (---). If a change that you make eliminates a required virtual plane for a specific input or output (for example trashing the R plane from an RGBHV virtual input), the Virtual I/O Map field prefaces the virtual input or output with an exclamation point (!) and the equals sign changes to a tilde (~) (figure 3-8).

```
17 = 0i043 0i050 0i051 1i043 1i050 2i017
18 = 0i052 0i053 0i054 1i052 1i053 2i018
!19 ~ --- 0i056 0i057 1i055 1i056 2i019 3iC
20 = 0i058 0i127 0i060 1i058 1i059 2i020
```

**Figure 3-8 — Missing physical connector for a virtual plane**

### Creating rooms within the system

A room as defined in the Matrix 12800 is a group of virtual outputs that are logically associated with each other. A typical association is to group all of the video outputs in a virtual room, such as 3 video monitors and a VCR, all located in the security desk of a building. The Matrix 12800 supports up to 32 rooms, each of which consists of from 1 to 16 virtual outputs. Each room can be named using up to 12 characters. Each room can have up to 10 presets assigned to it. Unlike the 64 global presets, room presets only affect the virtual outputs associated with that room; they do not change other connections in the matrix. A limited number of outputs grouped together simplifies the use of presets and makes them particularly useful in conjunction with MKP 1200 keypads.

**NOTE** Rooms exist only to support room presets.

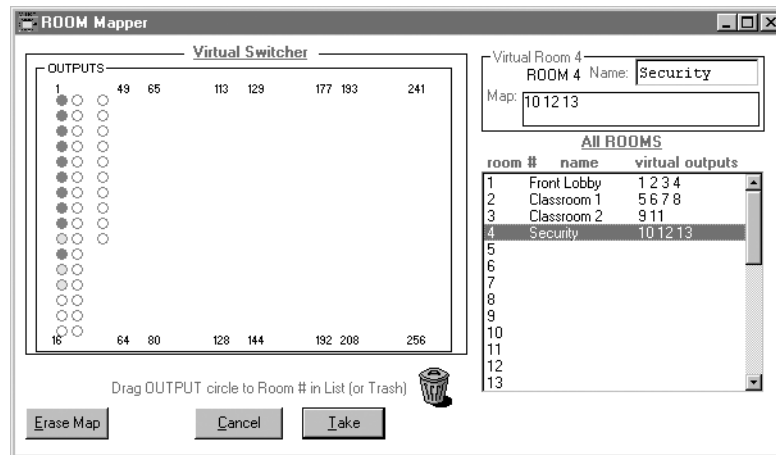
Create rooms as follows:

1. Ensure that all BMEs that are part of the system have been connected to each other and their BME numbers have been set correctly. Ensure that the system has been virtualized before creating any rooms (see “[Creating a virtual I/O switching system \(map\)](#)” in this chapter).
2. On the PC, click **Start > Programs > Extron Electronics > Matrix 12800 Control Program** to start the program. Select the appropriate PC Comm port or the Ethernet port or to select Emulate mode (figure 3-1).

After you select the Comm port or the Ethernet port and click OK, the software looks for the Matrix system and reads its hardware configuration, the type and size of each BME. The software then reads all of the current settings, such as the ties, presets, and virtual map, and displays a graphical representation of the ties in the program window (figure 3-2). The program also reads the appropriate .ini file (saved from the last session) to draw any icons assigned to each I/O.

**NOTE** If you clicked *Emulate* to create a program for a system in advance without being connected to it, you need to define the number and type (video, sync, or audio) of BMEs, the number of inputs, and the number of outputs for the Matrix 12800 system you are emulating. See “*Programming the matrix offline (emulate mode)*” in this chapter.

3. On the menu bar, click **System-Config** to show the Virtual Map screen (figure 3-3).
4. On the menu bar, click **Configure > Room Configuration** to show the Room Mapper screen (figure 3-9).



**Figure 3-9 — Room Mapper screen**

5. Assign virtual outputs to rooms by dragging and dropping the output circles from the Virtual Switcher Out field to the list on the right of the screen.  
To remove a virtual output from a room, drag and drop the output circle from the Virtual Switcher Out field to a different room in the list. Drag the output circle to the trash can on the bottom of the screen if the output is no longer to be assigned to any room.
6. If desired, assign or edit names for each room as follows:
  - a. Select the desired room in the list.
  - b. Type or edit the name for the virtual input or virtual output in the Name field.
  - c. Press the Tab key on the keyboard to exit the Name field.
  - d. To add or edit the name of another room, return to step 6a.
7. After the room has been programmed and the last name has been added or edited, click the **Take** button.
8. Click the **Close** button to exit the Room Mapper screen.
9. On the Virtual Map screen menu bar, click **Return to Main** to return to the main screen (figure 3-2).



## Virtualization/Control Software, cont'd

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### Remote controlling the Matrix 12800 system

BME 0 saves the settings in non-volatile memory, so once the system is virtualized, there is no requirement to ever run the Virtualization/Control program again. However, the Matrix 12800 can be remotely operated from a PC, running the Virtualization/Control software, connected to either of the RS-232/RS-422 ports or the Ethernet port on BME 0. Use the Virtualization/Control software to control the matrix as follows:

1. Ensure that all BMEs that are part of the system have been connected to each other and their BME numbers have been set correctly. Ensure that the system has been virtualized before creating any rooms (see [“Creating a virtual I/O switching system \(map\)”](#) in this chapter).
2. On the PC, click **Start > Programs > Extron Electronics > Matrix 12800 Control Program** to start the program. Select the appropriate PC Comm port or the Ethernet port or to select Emulate mode (figure 3-1).

After you select the Comm port or the Ethernet port and click **OK**, the software looks for the Matrix system and reads its hardware configuration, the type and size of each BME. The software then reads all of the current settings, such as the ties, presets, and virtual map, and displays a graphical representation of the ties in the program window (figure 3-2). The program also reads the appropriate .ini file (saved from the last session) to draw any icons assigned to each I/O.

**NOTE** *If this is a new system that has not been virtualized yet or one that has had its map cleared, the graphical representation and all information shown on the Virtual Map screen are invalid at this point.*

*If you clicked **Emulate** to create a program for a system in advance without being connected to it, you need to define the number and type (video, sync, or audio) of BMEs, the number of inputs, and the number of outputs for the Matrix 12800 system you are emulating. See [“Programming the matrix offline \(emulate mode\)”](#) in this chapter.*

The main screen shows the current switcher configuration.

3. As desired, create ties, work with presets, or assign icons. See [“Ties”](#), [“Presets”](#), or [“Icons and captions”](#) on the following pages.
4. When you are ready to exit the program, click **File > Exit**.

If you have edited any of the configurations or assigned names or icons to the virtual inputs and outputs, the program prompts you to save changes before closing. Changes are written to the file Mtrx12800.ini, unless you specify a different file. This file allows you to completely restore all of the information that you have created in the current session.

## Ties

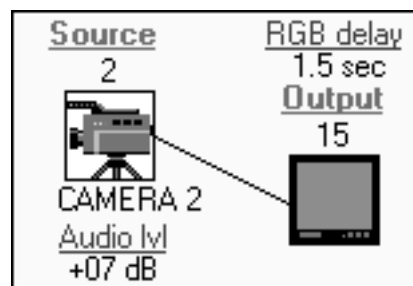
Ties appear as solid lines in various colors on main screen of the Virtualization/Control program. The different colors indicate different follow and breakaway configurations. If both video and audio are tied, the tie is indicated in blue. If video only is tied, the tie is indicated in magenta. An audio-only tie is indicated in brown.

To create a tie, drag and drop from an input box to an output box. Observe that the tentative tie is indicated on the screen by a dashed line. To confirm the tie, click the **Take** button. The dashed line turns solid to indicate that the tie has been created. To cancel a tentative tie before taking it, click the **Cancel** button.

To change the input tied to an output, simply drag and drop from the desired input to the output and then click **Take**. The old tie is automatically deleted.

To delete an individual tie, drag and drop from an output back to the tied input and then click **Take**. To delete all ties for a specific input, drag and drop from the input to the trash can and then click **Take**.

In complex systems, the sheer number of ties can make it difficult to distinguish a specific tie. If you leave the mouse pointer over an input or output for a few seconds, an informational box pops up (figure 3-10). The box identifies the virtual input, the virtual output, any audio gain or attenuation value, and any RGB delay. If icons have been assigned to the input and output, those are displayed.



**Figure 3-10 — Informational pop-up box**

To have audio follow video for every tie created, click the **Follow all** radio button in the Edit Mode-Virtual box.

If you click the **Edit Mode-Virtual Breakaway (by group)** radio button, two checkboxes appear, one for RGB or video (depending on video format) and one for audio. Clicking in the checkboxes to select or deselect video or audio determines whether you are tying video, audio, or both the next time you drag and drop.

If you click the **Edit Mode-Virtual Breakaway (by plane)** radio button, a checkbox for each video and audio plane in the system appears. Click in the boxes to select or deselect the each plane and you can tie individual planes.

If you click in the **Edit Mode-Physical** box, you can view the physical ties by resting the mouse cursor over an input or output. An informational box similar to the one shown in figure 3-10 appears.



## Virtualization/Control Software, cont'd

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### Presets

After you have created all of the ties that are needed for a specific task, the configuration can be saved as either a global or room preset. The Matrix 12800 can support up to 64 global presets and up to 10 room presets in each of up to 32 rooms. To create room presets, you must have already created rooms and assigned outputs to the rooms, see “[Creating rooms within the system](#)” earlier in this chapter.

#### Save a preset

1. On the main screen, click the **Rooms** drop-down box and select either **Global (All rooms)** or one of the rooms that you have already created. If you select a room, note that the number of ties shown is reduced to reflect only the outputs that are assigned to that room.
2. Click the **Save as** button.
3. Enter a number in the Save current settings as Preset box (or accept the number displayed in the box — the program selects the lowest unused preset number) and click **OK**.
4. If desired, enter a name (up to 12 characters) in the next Save current settings as Preset box and click **OK**.

#### Recall or delete a preset

1. On the main screen, click the **Presets** drop-down box. Scroll down as necessary and select the desired global or room preset.
2. Observe that the connections for that preset appear as tentative ties (dashed lines).
3. Click the **Go** or the **Delete** button to accept or delete the preset.

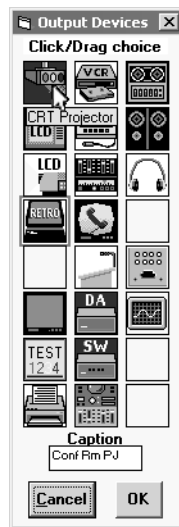
If you accepted the preset, observe that the broken lines become solid, indicating that those ties have been created. The preset becomes the current configuration.

If you deleted the preset, click **OK** to confirm that you wish to delete the preset. The current configuration does not change.

## Icons and captions

For your convenience, you can assign a device icon, a name, or both to any of the virtual inputs or outputs using the devices palette. The icons are saved by the program, not sent to the switcher.

To access the Devices screen (figure 3-11), right-click the desired I/O port or on the menu bar click **Tools > Assign Device Icons**.



**Figure 3-11 — Devices screen**

To assign a descriptive icon to an input or output, drag and drop the desired icon from the palette to the target I/O box on the main screen. To change the icon, drag and drop the new icon. To delete an icon, drag and drop a blank space to the I/O box on the main screen. The changes to the main screen display take place immediately.

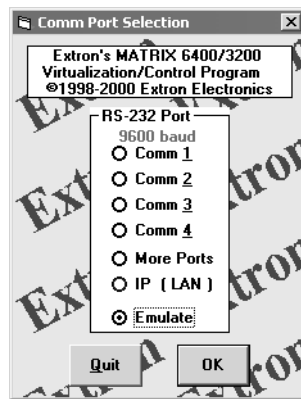
Each input or output selected also includes a field that displays the current name (if any) and gives you the opportunity to edit the name. Press the Tab key after entering or editing an I/O name.

Click the **OK** button to exit the devices palette.

### Programming the matrix offline (emulate mode)

The Virtualization/Control program provides an emulation mode, in which you can build and save a configuration file off-line, without connection to a Matrix 12800 system. This file can be programmed into a switcher via the RS-232/RS-422 port using the Matrix 12800/6400/3200 Virtualization/Control program. Emulation mode is ideal for creating virtual inputs and outputs, rooms, and presets in advance of an installation and then downloading them on-site. The emulation mode can also be used to generate the RS-232 strings needed to program a control system to the matrix system. Lastly, emulation mode allows you to program a hardware configuration that differs from the current configuration.

1. On the PC, click **Start > Programs > Extron Electronics > Matrix 12800/6400/3200 Control Program** to start the program. When prompted for a port, select **Emulate** (figure 3-12) and click **OK**.



**Figure 3-12 — Emulate mode selection**

2. The program prompts for a source file to open. The file opened serves as a source from which to restore the settings of an existing configuration (the source file). Typical choices for this file include Mtrx12800.ini (to edit the last real-time configuration), Demo12800.mtx (to view some examples), and new.ini (to start from an empty configuration). Select the desired file and click the **Open** button.

This source file is only read by the program, and is not altered as the system is configured. The file is optional and rather than selecting a file from this prompt, you can just click the **Cancel** button.

3. The program prompts for a filename to which to save the results of edits made in emulation mode (the destination file). This file is required for the program to start, and it is the file that you will ultimately download to the matrix switcher. You should assign this file a meaningful name and the .mtx file extension, such as Job1127.mtx. Click the **Save** button. If you select a filename that already exists, the program asks if you want to overwrite the file. Click the **Yes** button.
4. The Physical Configuration screen (figure 3-4, on page 3-8) appears. If you opened a blank startup file, such as new.ini, or if you opened the startup file for a matrix with a different configuration, you must identify the type and size of the BMEs in the system. Otherwise, examine this screen to ensure that it accurately represents your system.
  - a. If you made changes, click the **Take** button.
  - b. Click the **Close** button.

- 
5. If you have not virtualized the system represented by your startup file, the Virtual Configuration screen appears (figure 3-5). This screen shows how the software has mapped the physical system into a virtual system. There are several variables that you can change on this screen that affect the number of virtual planes and inputs and outputs that are available and how they are presented. See step 5 in “[Creating a virtual I/O switching system \(map\)](#)”.

When you are satisfied with the virtual map, click the Take button to make any changes take affect, exit the Virtual Configuration screen, and display the main screen (figure 3-2).

After you have selected the Emulate mode and taken the virtual map, the software displays all of the current settings, such as the ties, presets, icons, and the virtual map in the program window (figure 3-2).

Once you have started the Virtualization/Control program in emulation mode, the software operates exactly as if the PC is connected to a Matrix 12800 system, except that any changes that you make are saved to the destination file rather than issued to the switcher.

A typical emulation operation might consist of multiple editing sessions:

- **Session A, connected to a Matrix 12800 system** — Use this session to create a virtual map of the system (rather than creating a virtual map in emulation mode in step 5, above).
- **Session B, in emulation mode** — If you virtualized the system in session A, above, open Mtrx6400.ini as the source file in step 2, above, to edit the configuration of the switcher established in session A.

— OR —

If you created an emulated virtual map in step 5, above, open the destination file from step 3 of that emulation session as the source file in step 2, above.

Specify a job-specific destination file in step 3.

- **Session C (and subsequent sessions), in emulation mode** — Open the job-specific destination file you specified in session B, above, as the source file in step 2, above, for each subsequent emulation mode editing session.

Specify the same job-specific file as destination file in step 3, above, as the one you opened as the source file.

- **Session D, connected to a Matrix 12800 system** — Restore the configuration from the destination file that you specified in Session C to program the Matrix 12800 system from the emulation.

If you have edited any of the configurations or assigned icons or names, when you exit the program, the program prompts you to save the changes. These changes, if saved, are written to the file Mtrx12800.ini for use in your next editing session. The information in the file also allows you to fully restore a Matrix 12800 system to all of the settings from the current session.

### Saving and restoring matrix settings

In on-line (as opposed to emulation mode) operation, the Virtualization/Control program reads the source file, Mtrx12800.ini, upon startup. The program reads the file to display the icons, because these items do not cause any changes in the system configuration (programming) and provide convenience to the user. Mtrx12800.ini contains all of the information needed to fully restore (program) the settings of the Matrix 12800 system.

The File menu on the main screen menu bar provides the following functions:

- **Save MATRIX settings as ...** — Saves all Matrix 12800 settings to the destination file (typically \*.mtx) on the hard drive of the PC.
- **Restore MATRIX settings from ...** — Restores all Matrix 12800 settings from the destination file (typically \*.mtx) on the hard drive of the PC.
- **Save this-session's settings** — Saves all Matrix 12800 settings to the source file. In on-line mode, by default, this file is Mtrx6400.ini.
- **Restore last-session's settings** — Restores all Matrix 12800 settings from the source file. In on-line mode, by default, this file is Mtrx12800.ini.

Both of the **Restore** functions in the File menu cause a full restoration of the attached Matrix system, providing an easy method to switch between (reprogram) matrix configurations. The **Restore last-session's settings** function allows you to set your matrix configuration back to the settings in effect when you first started the Virtualization/Control program (effectively cancelling any edits and changes without leaving the program).

Both of the **Save** functions in the File Menu create a complete .ini file for future restoration to an attached system. By default, the **Save MATRIX settings** as function uses the .mtx file extension, but any name and file extension can be used when saving or restoring a file. The **Save this-session's settings** function is not normally needed, since the program prompts you to create a file upon exiting the program if any edits were performed.

## Creating program byte strings

The Matrix 12800 system can be controlled and programmed from a control system, via the RS-232/RS-422 port. The control systems need to be taught what bytes to send to the system to communicate with the Matrix system. Chapter 4 of this manual, “[Programming Guide](#)”, details the Extron Simple Instruction Set (SIS) and how to build these byte strings using a pencil and paper. The Virtualization/Control program makes this job much easier by building the strings for you. Generate the byte strings as follows:

1. Create all the Matrix system settings (program) in either Emulate mode or on-line.
2. To see the strings, on the menu bar, click **Tools > Show RS-232 Strings** to show the Program Strings screen (figure 3-13).

The strings that can be viewed produce the current ties, presets, audio configuration, and RGB delay settings.

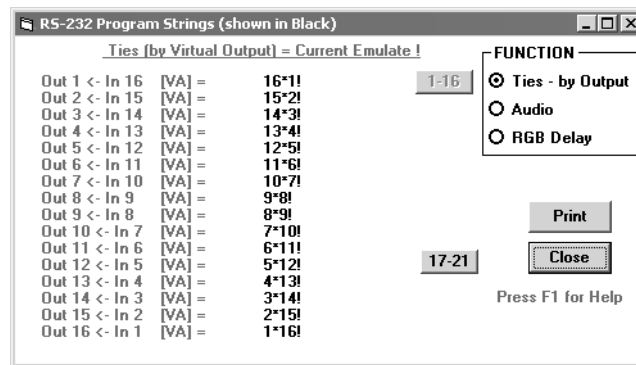


Figure 3-13 — RS-232 Program Strings screen

## Ethernet operation

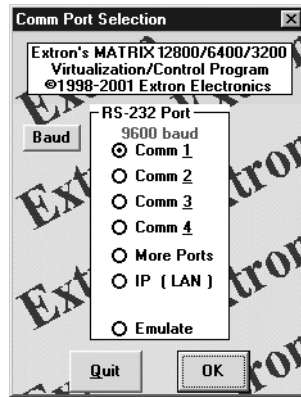
When a Matrix 12800 is connected to an Ethernet WAN or LAN, any number of users can operate it, locally or remotely, using the Virtualization/Control program. See “[Remote control panel, front panel controller, and Ethernet connection](#)” in chapter 2, “Installation”, for Ethernet installation details

Connection to the Matrix switcher via the Ethernet is password protected. There are two levels of password protection: administrator and user. Personnel logged on as an administrator have full access to all Matrix 12800 switching capabilities and editing functions. Personnel logged on as a user can create ties, create and recall presets, set RGB and audio mutes, and view all settings with the exception of passwords. If the same passwords or no password is required for logging on, all personnel log on with administrator privileges. Fields and functions that exceed user privileges are grayed out in the Virtualization/Control program when the operator is logged on as a user.

## Virtualization/Control Software, cont'd

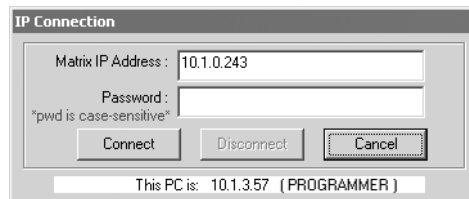
### Logging on to the switcher via the Ethernet

1. On the PC, click **Start > Programs > Extron Electronics > Matrix 12800/6400/3200 Control Program** to start the program.
2. When prompted for a port, select **IP [LAN]** (figure 3-14) and click **OK**.



**Figure 3-14 — Ethernet mode selection**

3. The IP connection window appears (figure 3-15).



**Figure 3-15 — Address and password entry**

- a. Examine the Matrix IP Address field in the IP Connection window. The field displays the last Matrix IP Address entered.

**If the IP address is correct:** Proceed to step 3b.

**If the address is not correct:** Click in the Matrix IP Address field and enter the IP address. Proceed to step 3b.

**NOTE** *If the local system administrators have not changed the value, the factory-specified default, 192.168.254.254, is the correct value for this field.*

- b. If the switcher is password protected, click in the Password field and enter the appropriate administrator or user password.
- c. Click **Connect**.

If you logged on using the administrator password, the Windows program connects you to the switcher with all of the administrator rights and privileges.

If you logged on using the user password, the Windows program connects you to the switcher with only user capabilities.

If an incorrect password was entered, the program beeps and returns to the password entry display.

4. The Virtualization/Control Control Program window (figure 3-2) appears.

## Ethernet protocol settings

The IP settings/options screen (figure 3-16) provides a location for observing and, if connected via the RS-232/RS-422 link or if logged on via the Ethernet port as an administrator, editing settings unique to the Ethernet interface. Access this screen by clicking **Tools > IP Options**. See appendix A, “[Ethernet Connection](#)”, for basic information about IP addresses. None of the fields on this screen can be edited while logged on as a user.

**NOTE** *Editing variables on the IP settings/options screen while connected via the Ethernet port can immediately disconnect the user from the Matrix 12800. Extron recommends editing the settings on this screen using either RS-232/RS-422 port and protecting the Ethernet access to this screen by assigning an administrator password to qualified and knowledgeable personnel only.*

The screenshot shows the 'IP Settings / Options' window. The fields are as follows:

- Matrix IP Address: 192.168.254.254
- Gateway IP Address: 192.168.0.0
- Hardware Address: 10-12-13-14-15-16
- Extron Name/Descriptor: Matrix 12800
- Subnet Mask: 255.255.0.0
- Date: Fri, 02 Nov 2001
- Time (GMT): 22:51:11 GMT
- Administrator Password: admin
- User Password: user
- Mail Server IP Address: 192.168.2.25
- User Name: folklore.net
- Password: Zoro

	E-mail Addressee	None	Fail	Fixed	Both	Fans	Power Supply	Cntrl	I/O Cards	All
1	JSmith@folklore.net	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Pocahontas@folklore.net	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	MStandish@folklore.net	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

This PC is: 10.1.4.48 (PROGRAMMER) [Cancel] [Take]

**Figure 3-16 — IP settings/options screen**



# Virtualization/Control Software, cont'd

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## Address and Name fields

The **Matrix IP Address** field contains the IP address of the connected matrix switcher. This value is encoded in the flash memory in the switcher.

The **Gateway IP Address** field identifies the address of the gateway to the controlling PC to be used if the matrix switcher and the mail server are not on the same subnet.

The **Subnet Mask** field is used to determine whether the matrix switcher is on the same subnet as the controlling PC when you are subnetting. For more information, see "[Subnetting — A Primer](#)", in Appendix A, "Ethernet Connection".

The **Mail Server IP Address** field displays the IP address of the mail server that handles the e-mail for the facility in which the Matrix 12800 is installed.

Valid addresses consist of four 1-, 2-, or 3-digit numeric subfields, properly called octets, separated by dots (periods). Each field can be numbered from 000 through 255. Leading zeroes, up to 3 digits total per field, are optional. Values of 256 and above are invalid.

The default addresses are as follows, but if these conflict with other equipment at your installation, you can change the addresses to any valid value:

- IP address           192.168.254.254
- Subnet mask        255.255.0.0
- Gateway address   0.0.0.0

**NOTE** *Editing the addresses while connected via the Ethernet port can immediately disconnect the user from the Matrix 12800. Extron recommends editing this field using one of the RS-232/RS-422 ports and protecting the Ethernet access by assigning an administrator password to qualified and knowledgeable personnel only.*

The **Extron Name/Descriptor** field contains the name of the matrix switcher. This descriptor can be changed to any valid name, up to 12 alphanumeric characters.

The **Mail Server User Name** field displays the domain name of the Matrix 12800 e-mail server (such as folklore.net in the examples throughout this chapter). Standard domain conventions (xxx.com) apply.

**NOTE** *The following characters are invalid or not recommended in the Extron Name/Descriptor field: {space} + ~ , @ = ' [ ] { } < > ' " ; : | \ and ?.*

Edit any of these fields as follows:

1. Click in the desired field. The graphic cursor becomes a text cursor.
2. Edit the address or name as desired.
3. Press the Tab key on the keyboard or click in another field to exit the field.
4. Click the **Take** button to make the address change take affect.

---

### Date and Time (GMT) fields

The **Date** field displays the current date in the Greenwich Mean Time (GMT) zone.

The **Time (GMT)** field displays the current time in the GMT zone.

If desired, adjust either of these values as follows:

1. Click in the desired field. The field changes to an editable field appropriate to the value being change and the graphic cursor becomes a text cursor.
  - The **Date** field becomes a set date field, with the date in the format (M)M/(D)D/YYYY. Leading zeroes are not shown. Date:
  - The **Time (GMT)** field becomes a set time field, with the time in the format HH:MM:SS (00:00:00 to 23:59:59). Time (GMT):
2. Edit the field as desired to set the proper value. For time, remember to use 24-hour time. Leading zeroes are optional.
3. Press the Tab key on the keyboard or click in another field to exit the edited date field.
4. Click the **Take** button to make the edited change take affect.

### Administrator Password, User Password, and Mail Server Password fields

The **Administrator Password** field displays the password required to log on to the matrix switcher via the Ethernet port with all of the rights and privileges of an administrator.

The **User Password** field displays the password required to log on to the matrix switcher via the Ethernet port as a user, without all of the rights and privileges of an administrator.

The **Mail Server Password** field displays the password that the Matrix 12800 uses to log on to the e-mail server.

Passwords are case sensitive and are limited to 12 upper-case and lower-case alphanumeric characters. A carriage return is indicated by **¶**

While you are logged on as a user, both password fields are masked with asterisks (\*\*\*\*\*) as a security measure.

**NOTE** *Editing the Administrator Password field while connected via the Ethernet port can immediately disconnect the user from the switcher. Extron recommends editing this field using one of the serial ports and protecting the Ethernet access to this screen by assigning an administrator password to qualified and knowledgeable personnel only.*

**NOTE** *When the control program is connected to the switcher via either RS-232/RS-422 port, the administrator and user password fields are not masked. If a password has been inadvertently changed to an unknown value, you can look up and, if desired, change a password in this window without knowing the current password.*

**NOTE** *An administrator password must be created before a user password can be created.*

**NOTE** *The following characters are invalid or not recommended in passwords: {space} + ~ , @ = ' [ ] { } < > ' " ; : | \ and ?.*

## Virtualization/Control Software, cont'd

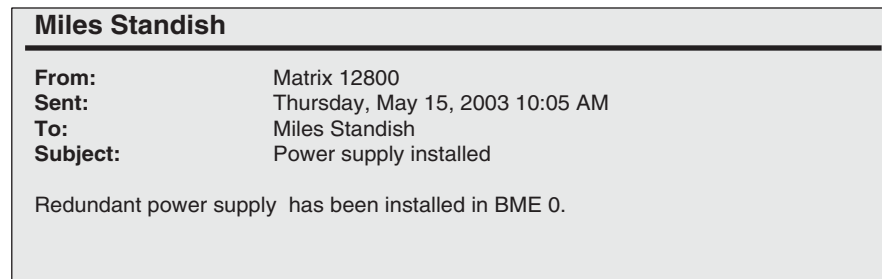
---

Edit any of these password fields as follows:

1. Click in the desired Password field. The pointer tool becomes a text cursor.
2. Edit the case-sensitive password as desired.
3. Press the Tab key on the keyboard or click in another field to exit the Password field.
4. Click the **Take** button to make the password change take effect.

### E-mail Addressee fields

The nine E-mail Addressee fields permit the administrator to identify the e-mail addresses of the personnel to whom the Matrix 12800 e-mails notification of its failure and repair status. The radio buttons and check boxes associated with each address field permit the administrator to specify specific e-mail requirements for each recipient. Figure 3-17 shows a typical e-mail from the switcher.



**Figure 3-17 — Typical Matrix 12800 e-mail**

Edit these fields and controls as follows:

1. Click in the desired E-mail Addressee field. The graphic cursor becomes a text cursor.
2. Edit the e-mail address as desired. Standard e-mail address conventions (nnnnn@xxx.com) apply.
3. Press the Tab key on the keyboard or click the mouse in another field to exit the e-mail addressee field.
4. In the square check boxes associated with each addressee, select the Matrix 12800 modules for which the addressee is to be e-mailed.
5. In the round radio buttons associated with each addressee, select whether the addressee is to be e-mailed regarding failures, fixes, both, or not be notified. The **None** radio button is handy for temporarily removing personnel from the e-mail list when they are unavailable, such as on travel or vacation.
6. Click the **Take** button to make the e-mail address changes take affect.

## Windows buttons and drop boxes

The buttons and drop boxes on the right side of the program window perform the following functions:

**RGB Mute** — Toggles the video mute on and off.

**Audio Mute** — Toggles the audio mute on and off.

**Room menu** — Displays a list of up to 32 rooms. You can select a room from the list to display it in the window.

**NOTE** *A Room is a subset of outputs that are logically related to each other, as determined by the operator. The switcher supports up to 32 rooms, each of which can consist of from 1 to 16 outputs.*

**Presets menu** — Displays a list of up to 32 global presets and up to 320 room presets (32 rooms x 10 presets per room). You can select a preset from the list to display it in the window and either activate it (**Go**) or delete it (**Delete**)

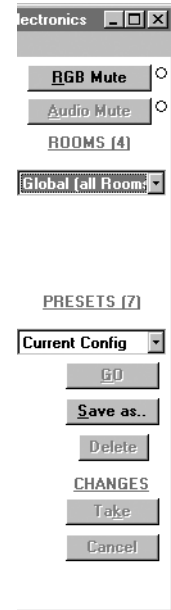
**Go** — Activates the selected preset as the current configuration.

**Save as** — Allows the current set of ties to be saved as a preset. Enter the preset number when prompted to do so.

**Delete** — Deletes the selected preset.

**Changes - Take** — Allows you to save to file any changes made to the displayed configuration.

**Changes - Cancel** — Returns to the previous screen, undoing any changes you have made.



## Main screen menu bar options

The following drop down menus and menu selections are available from the main screen menu bar:

### File menu

**Save MATRIX settings as ...** — Saves all Matrix 12800 settings to the destination file (typically \*.mtx) on the hard drive of the PC.

**Restore MATRIX settings from ...** — Restores all Matrix 12800 settings from the destination file (typically \*.mtx) on the hard drive of the PC.

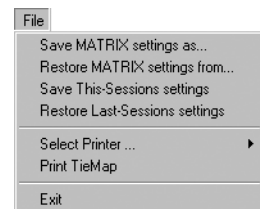
**Save this-session's settings** — Saves all Matrix 12800 settings to the source file. In on-line mode, by default, this file is Mtrx6400.ini.

**Restore last-session's settings** — Restores all Matrix 12800 settings from the source file. In on-line mode, by default, this file is Mtrx6400.ini.

**Select printer** — Selects the target printer.

**Print tie map** — Prints the tie set that is displayed on the screen.

**Exit** — Closes the Virtualization/Control Program.



### System-Config selection

Displays the Virtual Map screen, which graphically presents the virtual map and allows you to make changes to the map.

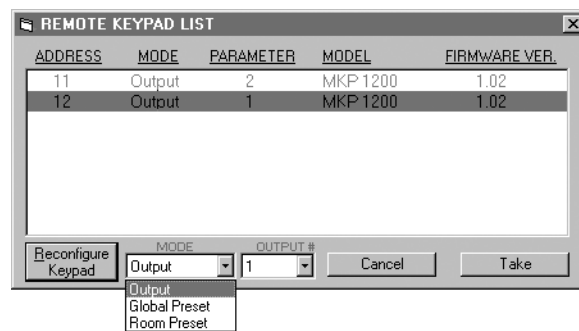


# Virtualization/Control Software, cont'd

## Tools menu

**Edit/View Config** — Displays the Virtual Map screen, which graphically presents the virtual map and allows you to make changes to the map.

**List Remote Keypads** — Shows the status of all possible MKP 1200 Remote Keypads. Information displayed includes: address, mode, parameter, model and firmware version (figure 3-18). To configure a keypad, select it, click the **Reconfigure Keypad** button. Use the Mode drop-down box to select Output mode, **Global Preset** mode, or **Room Preset** mode. Use the Output # drop-down box to change the output number. See the *MKP 1200 User Guide*, for details.



**Figure 3-18 — Remote Keypad screen**

**Assign Device Icons** — Displays the complete set of input and output device icons. You can drag any of these icons to the input and output boxes.

**Edit Device Palette** — Allows you to add your own device icon graphics.

**RGB Delay settings** — Displays the RGB Delay & Mute Adjust screen, from which you can view and adjust the switching interval setting for each input.

**Audio Gain settings** — Displays the audio gain level setting for a single input or for all inputs and allows you to change it.

**Mute-Outputs settings** — Displays the RGB Delay & Mute Adjust screen, from which you can mute video, audio, or both for each input.

**View Input Frequencies** — Displays the input horizontal and vertical frequencies for each input (DSVP).

**Upgrade System** — Starts the system upgrade wizard, which takes you through the steps to save the current Matrix 12800 settings to the hard drive of the controlling computer before you revirtualize your system.

**IP options** — Allows you to set IP options (see “[Ethernet protocol settings](#)” on page 3-23).

**HTML file manager** — Displays a list of HTML files installed on the switcher and allows you to upload custom files from a PC connected to the switcher.

**Name Presets** — Allows you to assign a name to each of the 32 global presets.

**Show RS-232 Strings** — Displays the ASCII commands that are used by the current configuration. You can refer to these commands for RS-232 programming.

**Initialize** — Initializes and clears any or all of the following: ties, presets, audio configuration, preset titles, icon names, and icons.

## Preferences menu

**Immediate Changes** — Causes changes to take effect immediately.

**Hold/Verify Changes** — Delays implementation of changes until the Changes – Take button is pressed.

**Show all tie-lines** — Causes the main screen to display all ties at once, as shown in figure 3-2.

**Show 1 input's tie-lines** — Because the Show all tie-lines selection can be confusing, this selection removes all of the tie lines from the main screen. The main screen shows all of the ties for one input only when you rest the mouse cursor over that input or one of its outputs.

**Hide Virts ties w/Physical** — Hides the virtual ties when you select the Edit Mode Physical display.

**Show Virts ties w/Physical** — Shows the virtual ties when you select the Edit Mode Physical display.

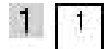
**Frequency-read Options** — Allows you to enable or disable periodic DSVP input frequency reads.

**Limit ties to same Video Type** — Limits ties to the same video type (RGBHV, component, and the like).

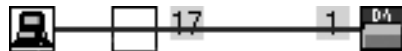
**Icons in I/O Boxes** — Displays icons, if assigned, in the virtual input and virtual output boxes on the main screen.



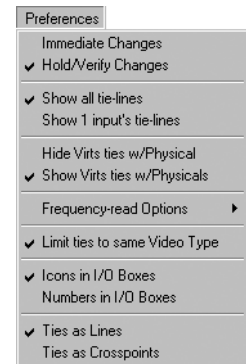
**Numbers in I/O Boxes** — Displays virtual input numbers in the virtual input boxes and virtual output numbers in the virtual output boxes.



**Ties as Lines** — Displays ties as lines (figure 3-19).

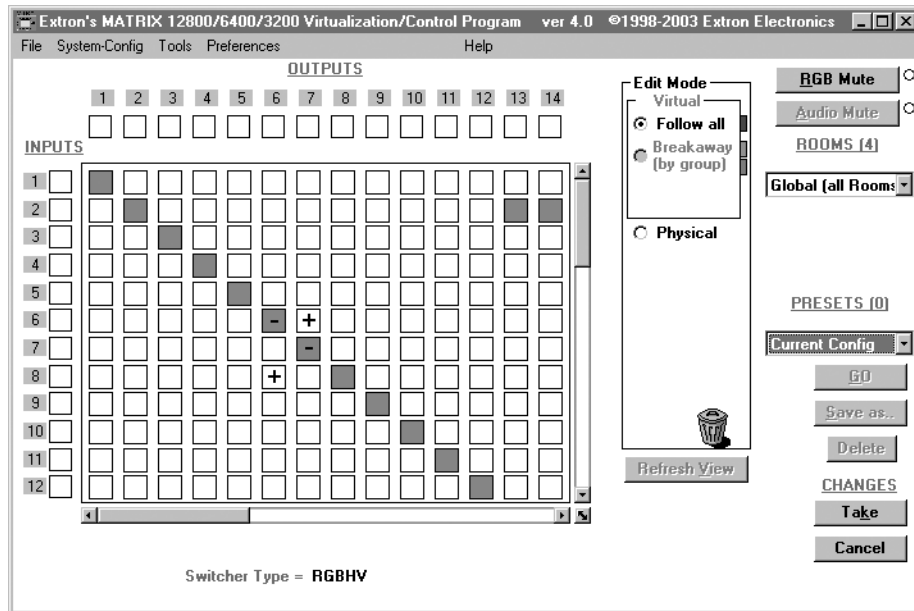


**Figure 3-19 — Ties shown as lines**



# Virtualization/Control Software, cont'd

**Ties as Crosspoints** — Displays ties as a matrix of inputs and outputs (figure 3-20). Made ties are indicated as blue (video and audio) boxes or boxes of the applicable color for each video plane. Ties that will take effect when you click on the **Take** button are indicated by +. Ties that will be broken when you click on the **Take** button are indicated by -.



**Figure 3-20 — Ties shown as crosspoints**

## Virtual map screen menu bar options

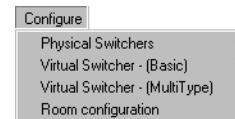
The following drop-down menus and menu selections are available from the virtual map screen menu bar:

### Return to main

Exits the Virtual Map screen and returns to the main screen.

### Configure menu

**Physical Switchers** — Displays the Physical Configuration screen, from which you can view and change the type and size of all BMEs in the system.



**Virtual Switcher - (Basic)** — Displays the Virtual Configuration screen, from which you can view and change the virtual plane assignment, the virtual size, how the virtual planes are ordered, and the sync format for each BME.

**Virtual Switcher - (MultiType)** — Displays the Virtual Configuration Wizard screen, which provides a simpler means of virtualizing the system when multiple video types are present in the system.

**Room Configuration** — Displays the Room Mapper screen, from which you can assign outputs to specific rooms for the purposes of creating room presets.

---

## Special Characters

Certain characters are reserved for specific functions. The switcher does not accept these characters as part of preset names, the name of the switcher, passwords, or locally created file names.

The switcher rejects or Extron does not recommend the following characters:

{space} ~ @ = ' [ ] { } < > ' " semicolon (;) colon (:) | \ and ?.



# Virtualization/Control Software, cont'd

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## Matrix 12800 Switchers

# 4 Chapter Four

## Programming Guide

[RS-232/RS-422 Ports](#)

[Ethernet \(LAN\) Port](#)

[Host-to-Switcher Instructions](#)

[Switcher-Initiated Messages](#)

[Switcher Error Responses](#)

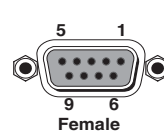
[Using the Command and Response Tables](#)

[Special Characters](#)

# Programming Guide

## RS-232/RS-422 Ports

The rear panel RS-232/RS-422 connectors (figure 4-1) of the matrix switcher BME 0 can be connected to the serial port output of a host device such as a computer running the HyperTerminal utility or a control system. This connection makes Simple Instruction Set (SIS) control of the switcher possible from the computer or host via the RS-232/RS-422 link.



Pin	RS-232	Function	RS-422	Function
1	—	Not used	TX+	Transmit data (+)
2	TX	Transmit data	TX-	Transmit data (-)
3	RX	Receive data	RX+	Receive data (+)
4	—	Not used	RX-	Receive data (-)
5	Gnd	Signal ground	Gnd	Signal ground
6	—	Not used	—	Not used
7	—	Not used	—	Not used
8	—	Not used	—	Not used
9	—	Not used	—	Not used

**Figure 4-1 — RS-232/RS-422 connector pin arrangement**

**NOTE** The Matrix 12800 Switchers are factory configured for RS-232 control. To use the switcher under RS-422 control, you must change an internal DIP switch. See [“Swapping the serial port protocol \(RS-232/RS-422\)”](#) in chapter 6, [“Upgrades and Maintenance”](#), for details.

The default communications rate is 9600 baud. Baud rates of 19200, 38400, and 115200 are also available, see [“Changing the serial port baud rate”](#), in chapter 6, [“Upgrades and Maintenance”](#). The protocol is 8-bit, 1 stop bit, no parity, and no flow control.

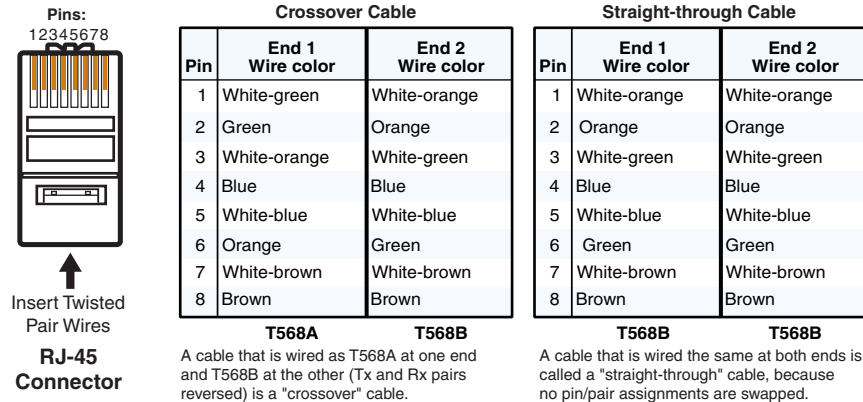
## Ethernet (LAN) Port

The rear panel Ethernet connector (figure 4-2) on the matrix switcher BME 0 can be connected to the an Ethernet LAN or WAN. Communication between the switcher and the controlling device is via Telnet (a TCP socket using port 23). This connection makes SIS control of the switcher possible using a computer connected to the same LAN or WAN. The SIS commands and behavior of the product are identical to the commands and behavior the product exhibits when you are communicating with it via a serial port.

### Ethernet connection

The Ethernet cable can be terminated as a straight-through cable or a crossover cable and must be properly terminated for your application (figure 4-3).

- **Crossover cable** — Direct connection between the switcher and a controlling computer
- **Patch (straight) cable** — Connection of the switcher to an Ethernet LAN



**Figure 4-3 — RJ-45 Ethernet connector pin assignments**

### Default IP addresses

To access the Matrix 12800 switcher via the Ethernet port, you need the Matrix IP Address, and may need the subnet mask and the gateway address. If the IP address has been changed to an address comprised of words and characters, you can determine the actual numeric IP address using the ping (ICMP) utility (see appendix A, "Ethernet Connection", for more details). If the addresses have not been changed, the factory-specified defaults are:

- IP address                      192.168.254.254
- Subnet mask                    255.255.0.0
- Gateway address              0.0.0.0

### Establishing a connection

Establish a network connection to BME 0 as follows:

1. Open a TCP socket to port 23 using the IP address of the BME.

**NOTE** *If the local system administrators have not changed the value, the factory-specified default, 192.168.254.254, is the correct value for this field.*

The BME responds with a copyright message including the date, the name of the product, firmware version, part number, and the current date and time.

**NOTE** *If the BME is not password-protected, the device is ready to accept SIS commands immediately after it sends the copyright message.*

**NOTE** *If the BME is password-protected, a password prompt appears below the copyright message.*

2. If the BME is password protected, enter the appropriate administrator or user password.


If the password is accepted, the BME responds with *Login User* or *Login Administrator*.

If the password is not accepted, the *Password* prompt reappears.

### Number of connections

The BME can have up to 200 simultaneous TCP connections, including all http sockets and Telnet connections. When the connection limit is reached, the switcher accepts no new connections until some have been closed. No error message or indication is given that the connection limit has been reached. To maximize performance of an IP Link device, the number of connections should stay low and unnecessary open sockets should be closed.

### Host-to-Switcher Instructions

The switcher accepts commands through either of the RS-232/RS-422 ports or the Ethernet port of BME 0. SIS commands consist of one or more characters per command field. They do not require any special characters to begin or end the command character sequence. Each switcher response to an SIS command ends with a carriage return and a line feed (CR/LF = ) which signals the end of the response character string. A string is one or more characters.

---

## Switcher-Initiated Messages

When a local event such as a power-up occurs, the switcher responds by sending a message to the host. The switcher-initiated messages are listed below (underlined).

←(C) Copyright 2003, Extron Electronics Matrix12800, Vx.xx,date and time←

The BME initiates the copyright message when it is first powered on or when connection via Internet protocol (IP) is established. "Vx.xx" is the firmware version number. "date and time" is the date and time of the connection and is only reported when the connection is made via the Ethernet port.

←Password:←

The BME initiates the password message immediately after the copyright message when the controlling system is connected using TCP/IP or Telnet and the switcher is password protected. This message means that the switcher requires an administrator or user level password before it performs the commands entered via this link. The switcher repeats the password message response for every entry other than a valid password until a valid password is entered.

←Login Administrator←

— or —

←Login User←

The BME initiates the login message when a correct administrator or user password has been entered. If the user and administrator passwords are the same, the switcher defaults to administrator privileges.

←All Configuration Memory Cleared←

The BME initiates the memory cleared message when a system reset has occurred.

The BME does not expect a response from the host, but, for example, the host program might request a new status.

## Switcher Error Responses

When the BME receives an SIS command and determines that it is valid, it performs the command and sends a response to the host device. If the switcher is unable to perform the command because the command is invalid or contains invalid parameters, the switcher returns an error response to the host. The error response codes are:

- E01 — Invalid input channel number (too large)
- E10 — Invalid command
- E11 — Invalid preset number
- E12 — Invalid output number (too large)
- E13 — Invalid value (out of range)
- E14 — Illegal command for this configuration
- E17 — Timeout (caused only by direct write of global ties presets)
- E20 — Invalid BME number
- E21 — Invalid room number
- E22 — Busy
- E24 — Privilege violation (Ethernet, Extron software only)
- E25 — Device not present

# Programming Guide, cont'd

## Using the Command and Response Tables

The [command and response tables](#) begin on page 4-8. Lower case letters are acceptable in the command field except where indicated for the gain and attenuation commands. The table below shows the hexadecimal equivalent of each ASCII character used in the command and response table.

ASCII to Hex Conversion Table		Esc 1B	CR 0D	LF 0A												
Space →	20	!	21	"	22	#	23	\$	24	%	25	&	26	'	27	
	(	28	)	29	*	2A	+	2B	,	2C	-	2D	.	2E	/	2F
	0	30	1	31	2	32	3	33	4	34	5	35	6	36	7	37
	8	38	9	39	:	3A	;	3B	<	3C	=	3D	>	3E	?	3F
	@	40	A	41	B	42	C	43	D	44	E	45	F	46	G	47
	H	48	I	49	J	4A	K	4B	L	4C	M	4D	N	4E	O	4F
	P	50	Q	51	R	52	S	53	T	54	U	55	V	56	W	57
	X	58	Y	59	Z	5A	[	5B	\	5C	]	5D	^	5E	_	5F
	`	60	a	61	b	62	c	63	d	64	e	65	f	66	g	67
	h	68	i	69	j	6A	k	6B	l	6C	m	6D	n	6E	o	6F
	p	70	q	71	r	72	s	73	t	74	u	75	v	76	w	77
	x	78	y	79	z	7A	{	7B		7C	}	7D	~	7E	DEL	7F

Symbols are used throughout the table to represent variables in the command and response fields. Command and response examples are shown throughout the table.

### Symbol definitions

**NOTE** Input and output numbers in commands may be entered as either 1-, or 2-, or 3-digit numbers. All input and output numbers are specified as 3-digit numbers in the response.

↵ = CR/LF (carriage return/line feed) (hex 0D 0A)

← = Carriage return (no line feed, hex 0D)

• = Space character

**Esc** = Escape key (hex 1B)

**X1** = Input number (for tie)

000 – maximum number of inputs  
(768 virtual inputs, 128 physical inputs)  
(000 = no tie)

**X2** = Output number

001 – maximum number of inputs  
(768 virtual inputs, 128 physical inputs)

**X3** = BME number

0 – 8

**X4** = Mute status

0 = off, 1 = on

**X5** = Input number

001 – maximum number of inputs  
(768 virtual inputs, 128 physical inputs)

**X6** = Audio gain

0 – 9 (1 dB per step)

**X7** = Numeric dB value

–24 to +09 (34 steps of gain or attenuation)

**X8** = Audio attenuation

1 – 24 (1 dB per step)

**X9** = Global preset number

64 maximum (0 = current configuration)

**X10** = Room number

32 max. (Each can have up to 10 presets (**X12**s) assigned.)

**X11** = Name (for presets, inputs, and outputs)

12 characters maximum  
Upper- and lower-case alphanumeric characters and  
+ \_ : = / and space are valid.

**NOTE** The following characters are invalid or not recommended in the name: ~ , @ ' [ ] { } < > ' " ; | \ and ?.

**X12** = Room preset number

10 maximum

**X13** = Sync frequency

xxx.xx (frequency in Hz (V) or kHz (H))

**X14** = Keypad number

1 – 128

**X15** = Firmware version number to second decimal place (x.xx)

**X16** = Keyboard mode

001 = output mode                      003 = room preset mode  
002 = global preset mode

**X17** = Keypad variable

If **X16** = 001, then

**X17** = output number

If **X16** = 002, then

**X17** = room number

If **X16** = 003, then

**X17** = {meaningless}

**X18** = RGB delay

Delay in ½ second increments (10 [5.0 seconds] maximum)

**X19** = Signal type:

	Unassigned	No audio	Stereo	Left mono
Unassigned	00			
RGB		01	11	21
RGBS		02	12	22
RGBHV		03	13	23
Composite video		04	14	24
S-video		05	15	25
Component video		06	16	26
Audio only			17	27

**X20** = Virtual input or output

$nxyyy$ , where  $n$  = BME number  
 $x$  = input or output  
 $yyy$  = BNC connector  
 Example: 4i003 (BME 4, input connector 003)

**X21** = Input size

The number of physical inputs

**X22** = Output size

The number of physical outputs

**X23** = BME type

0 = non existent                      3 = sync  
 1 = wideband video                  4 = stereo audio  
 2 = low res video                    5 = mono audio

**X24** = Number of BMEs

1 through 8

**X25** = Input map size

The number of virtual inputs

**X26** = Output map size

The number of virtual outputs

**X27** = Video and audio mute:

0 = no mutes                      2 = audio mute  
 1 = video mute                    3 = video and audio mute

**X28** = Fan or power supply status

0 = not installed                    2 = failed  
 1 = installed and working

**X29** = Card status

0 = not installed                    3 = failed, both rails  
 1 = installed and working        4 = failed, negative rail  
 2 = failed, positive rail



# Programming Guide, cont'd

## Command and response table for SIS commands

Command	ASCII command (host to switcher)	Response (switcher to host)	Additional description
<b>Create ties</b>			
<p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• Commands can be entered back-to-back in a string, with no spaces. For example: 1*1!02*2&amp;02*04%4*6\$.</li> <li>• The quick multiple tie and tie input to all output commands activate all I/O switches simultaneously.</li> <li>• The matrix switchers support 1-, 2-, and 3-digit numeric entries (1*1, 02*02, or 003*003).</li> <li>• There can be up to 768 virtual inputs and outputs.</li> </ul> <p><b>NOTE</b> The &amp; tie command for RGB and the % tie command for video can be used interchangeably on the matrix switcher.</p>			
Tie input <b>X1</b> to output <b>X2</b> , video and audio <i>Example:</i>	<b>X1</b> * <b>X2</b> ! 1*3!	Out <b>X2</b> •In <b>X1</b> •All← Out003•In001•All←	Tie the input <b>X1</b> video and audio to output <b>X2</b> . Tie input 1 video and audio to output 3.
Tie input <b>X1</b> to output <b>X2</b> , RGB video only <i>Example:</i> (see 2nd Note, above)	<b>X1</b> * <b>X2</b> & 10*4&	Out <b>X2</b> •In <b>X1</b> •RGB← Out004•In010•RGB←	Audio breakaway switching. Tie input 10 RGB to output 4.
Tie input <b>X1</b> to output <b>X2</b> , video only <i>Example:</i> (see 2nd Note, above)	<b>X1</b> * <b>X2</b> % 7*5%	Out <b>X2</b> •In <b>X1</b> •Vid← Out005•In007•Vid←	Audio breakaway switching. Tie input 7 video to output 5.
Tie input <b>X1</b> to output <b>X2</b> , audio only <i>Example:</i>	<b>X1</b> * <b>X2</b> \$ 12*8\$	Out <b>X2</b> •In <b>X1</b> •Aud← Out008•In012•Aud←	Audio breakaway switching. Tie input 12 audio to output 8.
Tie BME <b>X3</b> input <b>X1</b> to output <b>X2</b> <i>Example:</i>	<b>X1</b> * <b>X2</b> * <b>X3</b> ! 118*67*2!	Out <b>X2</b> •In <b>X1</b> •BME <b>X4</b> ← Out067•In118*•BME02←	Tie physical input 118 to physical output 67 in BME 2.
Quick multiple tie <i>Example:</i>	<b>Esc</b> +Q <b>X1</b> * <b>X2</b> !... <b>X1</b> * <b>X2</b> \$← <b>Esc</b> +Q3*4!4*5%6*6\$←	Qik← Qik←	Tie input 3 video and audio to output 4, tie input 4 video to output 5, and tie input 6 audio to output 6.
Tie input to all outputs, video and audio <i>Example:</i>	<b>X1</b> *! 5*!	In <b>X1</b> •All← In005•All←	Tie input 5 video and audio to all outputs.
Tie input to all outputs, RGB only <i>Example:</i> (see 2nd Note, above)	<b>X1</b> *& 8*&	In <b>X1</b> •RGB← In008•RGB←	Audio breakaway switching.
Tie input to all outputs, video only <i>Example:</i> (see 2nd Note, above)	<b>X1</b> *% 10*%	In <b>X1</b> •Vid← In010•Vid←	Audio breakaway switching.
Tie input to all outputs, audio only	<b>X1</b> *\$	In <b>X1</b> •Aud←	Audio breakaway switching.

**NOTE** **X1** = Input number  
**X2** = Output number  
**X3** = BME number

000 – maximum number of inputs (000 = untied)  
001 – maximum number of outputs  
0 – 9

## Command and response table for SIS commands (continued)

Command	ASCII command (host to switcher)	Response (switcher to host)	Additional description
<b>Read ties</b>			
<b>NOTE</b> The & view tie command for RGB and the % view tie command for video can be used interchangeably on the matrix switcher.			
Read video and audio output tie	[X2]!	[X1]←	Video and audio input [X1] tied to output [X2].
Read RGB output tie	[X2]&	[X1]←	RGBHV input [X1] tied to output [X2].
Read video output tie	[X2]%	[X1]←	Video input [X1] tied to output [X2].
Read audio output tie	[X2]\$	[X1]←	Audio input [X1] tied to output [X2].
<b>Video mute commands</b>			
RGB or video mute	[X2]*1B	Vmt[X2]*1←	Mute output [X2] RGB (video off).
RGB or video unmute	[X2]*0B	Vmt[X2]*0←	Unmute output [X2] RGB (video on).
View RGB or video mute	[X2]B	[X4]←	1 = mute on, 0 = mute off.
Global RGB or video mute	1*B	Vmt1←	Mute all RGB outputs.
Global RGB or video unmute	0*B	Vmt0←	Unmute all RGB outputs.
<b>Audio input gain and attenuation</b>			
<b>NOTE</b> The set gain (G) and attenuation (g) commands are case sensitive. The increment, decrement, and read level commands are not case sensitive.			
Set input audio gain to + dB value	[X5]*[X6]G	In[X5]•Aud[X7]←	
Example:	1*2G	In001•Aud+02←	Set input 1 audio gain to +2 dB.
Set input audio attenuation to - dB value	[X5]*[X8]g	In[X5]•Aud[X7]←	
Increment level	[X5]+G	In[X5]•Aud[X7]←	Increase audio level by 1 dB.
Example:	5+G	In005•Aud+03←	Increment audio input 5 level from +2 dB to +3 dB.
Decrement level	[X5]-G	In[X5]•Aud[X7]←	Decrease audio level by 1 dB.
Example:	7-G	In007•-09←	Decrement audio input 7 level from -08 dB to -9 dB.
Read input audio level	[X5]G	[X7]←	
<b>Audio mute</b>			
Audio mute	[X2]*1Z	Amt[X2]*1←	Mute audio output [X2] (audio off).
Audio unmute	[X2]*0Z	Amt[X2]*0←	Unmute audio output [X2] (audio on).
Read audio mute	[X2]Z	[X4]←	1 = mute on, 0 = mute off.
Global audio mute	1*Z	Amt1←	Mute all audio outputs.
Global audio unmute	0*Z	Amt0←	Unmute all audio outputs.

**NOTE** [X2] = Output number  
[X1] = Input number  
[X4] = Mute status  
[X5] = Input number  
[X6] = Audio gain  
[X7] = Numeric dB value  
[X8] = Audio attenuation

001 – maximum number of outputs  
000 – maximum number of inputs (000 = untied)  
0 = off (unmuted) 1 = on (muted)  
001 – maximum number of outputs  
00 – 09 (1 dB per step)  
-24 – +09  
-01 – -24 (1 dB per step)

# Programming Guide, cont'd

## Command and response table for SIS commands (continued)

Command	ASCII command (host to switcher)	Response (switcher to host)	Additional description
<b>Create and recall presets</b>			
<p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• If you try to recall a preset that is not saved, the matrix switcher responds with the error code E11.</li> <li>• If you try to save a preset for a room that has not been created, the matrix switcher responds with the error code E21.</li> <li>• Outputs must be assigned to a room before a room preset can be created.</li> <li>• The following characters are invalid or not recommended in preset names: + ~ , @ = ' [ ] { } &lt; &gt; ' " ; :   \ and ?.</li> </ul>			
Save current the current configuration as a global preset	[X9]	Spr[X9]↵	Command character is a comma.
Example:	9,	Spr09↵	Save current ties as preset 9.
<b>Direct write process —</b>			
<p><b>NOTE</b> The direct <b>write</b> of a global preset should always be preceded by a <b>clear</b> global preset ties command of that same preset number, as shown below. In a directly-written preset, the input tied to each output position (or no tied input) remains unchanged unless overwritten or cleared.</p> <p>If you do not <b>clear</b> the ties in a global preset number before you directly <b>write</b> a global preset to that number, ties that are part of the previous version of the specified preset with the same number can unexpectedly become part of the newly-created preset.</p>			
Clear a global preset ties	[Esc]+[X10]P0*!←	Spr[X10]↵	Clear all ties in preset [X10].
Directly write a global preset	[Esc]+[X9]P[X1]*[X2]!...[X1]*[X2]\$	Spr[X9]↵	You can enter as many ties as are valid for your virtualization. Tie all (!), tie RGBHV (&), tie video (%), and tie audio (\$) commands are all valid.
Example:	[Esc]+27P0*!← [Esc]+27P22*5!15*29\$13*26%3*8&←	Spr27↵ Spr27↵	Clear all ties in preset 27. <u>Brackets are shown to separate ties for clarity only.</u> Create global preset 27, which ties video and audio input 22 to output 5, RGBHV input 15 to output 29, video input 13 to output 26, and audio input 3 to output 8.
Recall a global preset	[X9].	Rpr[X9]↵	Command character is a period.
Example:	5.	Rpr05↵	Recall preset 5, which becomes the current configuration.
Write room outputs	[Esc][X10],[X2] <sup>1</sup> , [X2] <sup>2</sup> , ... [X2] <sup>n</sup> MR←	Mpr[X10],[X2] <sup>1</sup> , [X2] <sup>2</sup> , ... [X2] <sup>n</sup> ↵	See notes.
<p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>• Outputs must be assigned to a room before a room preset can be created.</li> <li>• A room can contain a maximum of 16 outputs.</li> <li>• An output can belong to only one room.</li> <li>• The maximum number of rooms ([X10]<sup>s</sup>) is 32.</li> <li>• If no room name is assigned, the default name is "Room #[X10]•[X2]<sup>1</sup>,•[X2]<sup>2</sup>,•[X2]<sup>3</sup>".</li> </ul>			
Example:	[Esc]8,3,04,5,6MR←	Mpr8,003,004,005,006↵	Outputs 3, 4, 5, and 6 are assigned to room 8.

**NOTE**

[X9] = Preset number	01 – 64
[X1] = Input number	000 – maximum number of inputs (000 = untied)
[X2] = Output number	001 – maximum number of outputs
[X10] = Room number	00 – 32

## Command and response table for SIS commands (continued)

Command	ASCII command (host to switcher)	Response (switcher to host)	Additional description
<b>View ties, gain, mutes, presets, file status, DSVP, and input status</b>			
Read room outputs <i>Example:</i>	<code>Esc</code> <code>X10</code> MR← <code>Esc</code> 3MR←	<code>X11</code> <code>X2</code> !, <code>X2</code> !, ... <code>X2</code> !← Class 1,001,002,008,009←	Outputs 1, 2, 8, and 9 are assigned to room 3, which is named "Class 1".
Save current ties as a room preset <i>Example:</i>	<code>X10</code> * <code>X12</code> , 3*9,	Rmm <code>X10</code> *Spr <code>X12</code> ← Rmm03*Spr09←	Command character is a comma. Save current ties as preset 9 for room 3.
Directly write a room preset	<code>Esc</code> + <code>X10</code> * <code>X12</code> P <code>X1</code> * <code>X2</code> !... <code>X1</code> * <code>X2</code> \$	Rmm <code>X10</code> *Spr <code>X12</code> ←	Direct entry of a global preset.
Recall a room preset <i>Example:</i>	<code>X10</code> * <code>X12</code> . 5*8.	Rmm <code>X10</code> *Spr <code>X12</code> ← Rmm05*Spr08←	Command character is a period. Recall room 5, preset 8 which becomes the current configuration.
View video and audio output tie	<code>X2</code> !	<code>X1</code> ←	Video and audio input <code>X1</code> tied to output <code>X2</code> .
View RGB output tie	<code>X2</code> &	<code>X1</code> ←	RGBHV input <code>X1</code> tied to output <code>X2</code> .
View video output tie	<code>X2</code> %	<code>X1</code> ←	Video input <code>X1</code> tied to output <code>X2</code> .
View audio output tie	<code>X2</code> \$	<code>X1</code> ←	Audio input <code>X1</code> tied to output <code>X2</code> .
View input audio level <i>Example:</i>	<code>X1</code> G 4G	<code>X7</code> ← -02←	Gain for input 4 is -2 dB.
View RGB or video mute	<code>X2</code> B	<code>X4</code> ←	1 = mute on, 0 = mute off.
View audio mute	<code>X2</code> Z	<code>X4</code> ←	1 = mute on, 0 = mute off.

<b>NOTE</b>	<code>X10</code> = Room number 00 – 32	
	<code>X11</code> = Name Up to 12 alphanumeric characters	
	<code>X2</code> = Output number 001 – maximum number of outputs	
	<code>X12</code> = Room preset number 10 maximum	
	<code>X1</code> = Input number 000 – maximum number of inputs (000 = untied)	
	<code>X4</code> = Mute status 0 = off (unmuted)      1 = on (muted)	



## Command and response table for SIS commands (continued)

Command	ASCII command (host to switcher)	Response (switcher to host)	Additional description
<b>View ties, gain, mutes, presets, file status, DSVP, and input status</b>			
View 16 audio ties for room <b>[X8]</b> , preset <b>[X12]</b> (All inputs and outputs shown are virtual.)	<b>[Esc][X10][X12]*[X2]*2VC</b> ←	<b>[X1]<sup>n</sup>•[X1]<sup>n+1</sup>•[X1]<sup>n+2</sup>• ... •[X1]<sup>n+15</sup>•Aud</b> ←	Show the virtual audio input tied to 16 sequential virtual outputs of room <b>[X8]</b> , preset <b>[X12]</b> , starting from output <b>[X2]</b> .
<i>Command description:</i>	Room# * preset# * starting output# (StO#) * 1 (= video) VC		
<i>Response description:</i>	I# tied to StO# <sup>n</sup> •I# tied to O# <sup>n+1</sup> •I# tied to O# <sup>n+2</sup> • ... •I# tied to O# <sup>n+15</sup> •Vid		
<b>NOTE</b> Where virtual outputs do not exist, the the BME responds with 000.			
Each position shown in the response is a virtual output. The number in each position is the virtual input tied to that virtual output.			
View 16 audio ties for room <b>[X8]</b> , global preset <b>[X12]</b> (All inputs and outputs shown are virtual.)	<b>[Esc][X10][X12]*[X2]*2VC</b> ←	<b>[X1]<sup>n</sup>•[X1]<sup>n+1</sup>•[X1]<sup>n+2</sup>• ... •[X1]<sup>n+15</sup>•Aud</b> ←	Show the virtual audio input tied to 16 sequential virtual outputs of room <b>[X8]</b> , preset <b>[X12]</b> , starting from output <b>[X2]</b> .
<i>Command description:</i>	Room# * preset# * starting output# (StO#) * 2 (= audio) VC		
<i>Response description:</i>	I# tied to StO# <sup>n</sup> •I# tied to O# <sup>n+1</sup> •I# tied to O# <sup>n+2</sup> • ... •I# tied to O# <sup>n+15</sup> •Aud		
<b>NOTE</b> Where virtual outputs do not exist, the the BME responds with 000.			
Each position shown in the response is a virtual output. The number in each position is the virtual input tied to that virtual output.			
<b>NOTE</b> The response to the View file directory command differs, depending on whether the command is sent via an RS-232/RS-422 port or Telnet connection or sent via a Web browser connection.			
View file directory RS-232/RS-422 and Telnet	<b>[Esc]DF</b> ←	filename1,date/time,length filename2,date/time,length : : : : filename <sub>n</sub> ,date/time,length space_remaining Bytes•Left	List user-supplied files.
View file directory Web browser	<b>[Esc]DF</b> ←	Var file = new array (); File [1] = 'filename1,date1,filesizel', File [2] = 'filename2,date3,filesizel', : : : : File [n] = 'filenamen,daten,filesizen', File [n+1] = space_remaining Bytes•Left	List user-supplied files.
Erase user-supplied Web pages or files	<b>[Esc]filenameEF</b> ←	Delfilename	
List individual sync frequency Example:	<b>[X2]LS</b> 2LS	<b>[X13],[X13]</b> ← 031.50,060.00	Listed as horizontal frequency, vertical frequency. Input 2 horizontal frequency is 31.5 kHz and its vertical frequency is 60 Hz.
<b>NOTE</b> The matrix switcher returns 000.00,000.00 if there is no connection or sync frequencies are not applicable.			
List keypads	<b>[X14]LK</b>	Part# <b>[X15],[X16],[X17]</b> ←	

<b>NOTE</b> <b>[X10]</b> = Room number	00 – 32
<b>[X12]</b> = Room preset #	32 maximum (0 = current configuration)
<b>[X2]</b> = Output number	001 – maximum number of outputs
<b>[X1]</b> = Input number	000 – maximum number of inputs (000 = untied)
<b>[X13]</b> = Sync frequency	xxx.xx (frequency in Hz [V] or kHz [H])
<b>[X14]</b> = Keypad number	1 – 128
<b>[X15]</b> = Firmware version number to second decimal place (x.xx)	
<b>[X16]</b> = Keyboard mode	001 = output mode    002 = room preset mode    003 = global preset mode
<b>[X17]</b> = Keyboard variable	Meaning depends on <b>[X16]</b> . See page 4-6.

# Programming Guide, cont'd

## Command and response table for SIS commands (continued)

Command	ASCII command (host to switcher)	Response (switcher to host)	Additional description
<b>RGB delay</b>			
Set RGB delay	<code>Esc X2 * X18 D ←</code>	Out X2 • Dly X18 ↵	Set the RGB interval for ties to output 4 to 3.5 seconds (7 x 0.5).
Example:	<code>Esc 4 * 7 D ←</code>	Out 004 • Dly 07 ↵	
Read RGB delay	<code>Esc X2 D ←</code>	X18 ↵	Output 5 switching interval is 2.5 seconds (5 x 0.5).
Example:	<code>Esc 5 D ←</code>	05 ↵	
<b>Names</b>			
<p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>Do not use leading spaces in preset names.</li> <li>If a preset is unassigned, the X11 displays [unassigned].</li> <li>If a global preset is saved, but not yet named, the default name is Preset X9.</li> <li>If a room preset is saved, but not yet named, the default name is Rm X10 Prst X12.</li> </ul>			
Write preset name	<code>Esc X9, X11 NG ←</code>	Nmg X9, X11 ↵	Name preset 1 "Security 1".
Example:	<code>Esc 1, Security 1 NG ←</code>	Nmg 01, Security 1 ↵	
Read preset name	<code>Esc X9 NG ←</code>	X11 ↵	Security 2 ↵
Example:	<code>Esc 2 NG ←</code>		
Write room name	<code>Esc X10, X11 NR ←</code>	Nmr X10, X11 ↵	Name room 1 "Classrm 1".
Example:	<code>Esc 1, Classrm 1 NR ←</code>	Nmr 01, Classrm 1 ↵	
Read room name	<code>Esc X10 NR ←</code>	X11 ↵	
Write room preset name	<code>Esc X10 * X12, X11 NP ←</code>	Nmp X10 * X12, X11 ↵	Name room 1, preset 3 "Podium_DVD".
Example:	<code>Esc 1 * 3, Podium_DVD NP ←</code>	Nmp 01 * 3, Podium_DVD ↵	
Read room preset name	<code>Esc X10 * X12 NP ←</code>	X11 ↵	
Write virtual input name	<code>Esc X5, X11 NI ←</code>	Nmi X5, X11 ↵	Name input 9 "Podium cam".
Example:	<code>Esc 9, Podium cam 1 NI ←</code>	Nmi 09, Podium cam 1 ↵	
Read virtual input name	<code>Esc X5 NI ←</code>	X11 ↵	
Write virtual output name	<code>Esc X2, X11 NO ←</code>	Nmo X2, X11 ↵	Name output 1 "Main PJ1".
Example:	<code>Esc 1, Main PJ1 NO ←</code>	Nmo 01, Main PJ1 ↵	
Read virtual output name	<code>Esc X2 NO ←</code>	X11 ↵	

**NOTE**

X2 = Output number	001 through maximum number of outputs
X18 = RGB Delay	Delay in ½ second increments (10 maximum)
X11 = Name (for presets, inputs, and outputs)	12 characters maximum
X9 = Global preset number	64 maximum (0 = current configuration)
X10 = Room number	32 max. (Each can have up to 10 presets (X12s) assigned.)
X12 = Room preset number	10 maximum
X1 = Input numbe	000 – maximum number of inputs (000 = untied)

## Command and response table for SIS commands (continued)

Command	ASCII command (host to switcher)	Response (switcher to host)	Additional description
<b>Resets</b>			
Initialize virtual map size	<b>Esc</b> X1 <sup>*</sup> X2ZM ←	ZpmX1 <sup>*</sup> X2 ←	Initialize the virtual map size.
Reset global presets and names	<b>Esc</b> ZG ←	Zpg ←	Clear all global presets and their names.
Reset an individual global preset	<b>Esc</b> X9ZG ←	ZpgX9 ←	Clear preset X9 and its name.
Reset all room map	<b>Esc</b> ZR ←	Zpr ←	Clear all rooms.
Reset individual room map	<b>Esc</b> X10ZR ←	ZprX10 ←	Clear room X10.
Reset all room presets	<b>Esc</b> ZP ←	Zpp ←	Clear all room presets and their names.
Reset individual room preset	<b>Esc</b> X10 <sup>*</sup> X12 ←	ZppX10 <sup>*</sup> X12 ←	Clear room X10, preset X12 and its name.
Reset RGB delays	<b>Esc</b> ZD ←	Zpd ←	Reset all RGB delays to 0.0 seconds.
Reset audio input levels	<b>Esc</b> ZA ←	Zpa ←	Reset all audio input levels (gain and attenuation) to 0 dB.
Reset all RGB and audio mutes	<b>Esc</b> ZZ ←	Zpz ←	Reset all video and audio mutes.
Reset flash	<b>Esc</b> ZFFF ←	Zpf ←	Reset flash memory (erase user-supplied files).
Reset whole switcher	<b>Esc</b> ZXXX ←	Zpx ←	Clear all ties and all presets, resets all audio gains to 0 dB, resets the RGB delay, and unmutes all video and audio outputs.
Absolute reset	<b>Esc</b> ZQQQ ←	Zpq ←	Similar to <b>Reset whole switcher</b> , plus sets the IP address to 192.168.254.254 and the subnet mask to 255.255.0.0.
<b>Virtual controls</b>			
Write virtual inputs	<b>Esc</b> X2,X19,X11,X20 <sup>!</sup> ,X20 <sup>!</sup> ... X20 <sup>!</sup> MI ←	MpiX2,X19,X11,X20 <sup>!</sup> ,X20 <sup>!</sup> ... X20 <sup>!</sup> ←	
Read virtual inputs	<b>Esc</b> X2MI ←	X19,X11,X20 <sup>!</sup> ,X20 <sup>!</sup> ... X20 <sup>!</sup> ←	
Write virtual outputs	<b>Esc</b> X3,X19,X11,X20 <sup>!</sup> ,X20 <sup>!</sup> ... X20 <sup>!</sup> MO ←	MpoX3,X19,X11,X20 <sup>!</sup> ,X20 <sup>!</sup> ... X20 <sup>!</sup> ←	
Read virtual outputs	<b>Esc</b> X3MO ←	X19,X11,X20 <sup>!</sup> ,X20 <sup>!</sup> ... X20 <sup>!</sup> ←	
Read plane types	<b>Esc</b> MC ←	letter and BME# pairs	
<b>NOTE</b> A letter and BME# pair consists of a letter that identifies the video or audio plane ( <b>R</b> ed, <b>B</b> lue, <b>M</b> ono, <b>A</b> udio, and so on) and a number that identifies the BME assignment. Example: R0G1B2S3A4.			

**NOTE** X2 = Output number

X5 = Input number

X9 = Preset #

X10 = Room number

X12 = Room preset number

X19 = Signal type. See page 4-7.

X11 = Name

X20 = Virtual input or output

001 through maximum number of outputs

001 through maximum number of inputs

32 maximum (0 = current configuration)

32 max. (Each can have up to 10 presets (X12s) assigned.)

10 maximum

12 characters maximum

Example: 4i003 (BME 3, input connector 003)



# Programming Guide, cont'd

## Command and response table for SIS commands (continued)

Command	ASCII command (host to switcher)	Response (switcher to host)	Additional description
<b>Information requests</b>			
Information request, system	I	<u>X21</u> <u>X22</u> •T <u>X23</u> •U <u>X24</u> •M <u>X25</u> <u>X26</u> ←	Input size X output size, BME type connected, number of BMEs, input map and output map.
<i>Example:</i>	I	128X128 T1 U6 M128X128←	
Information request, specific BME	<u>X3</u> I	<u>X21</u> <u>X22</u> •T <u>X23</u> •U <u>X24</u> •M <u>X25</u> <u>X26</u> ←	
<b>NOTE</b> Where <u>X21</u> is 0, the command is equivalent to system "I" command, above.			
Request part number	N	60-xxx-iocr	Contact Extron for part numbers.
<b>NOTE</b> xxx = 410 = Wideband video 412 = Audio io Two-character (video) or four -character (audio) input/output matrix configuration code c Redundant controller installed r Redundant power supplies installed		411 = Sync 530 = low resolution video 0 = no, 1 = yes 0 = no, 1 = yes	
Request the part number of a specific BME	<u>X3</u> N	60-xxx-iocr	Contact Extron for part numbers.
Query controller firmware version	Q	<u>X27</u> ←	
<i>Example:</i>	Q	1.23←	The factory-installed BME controller firmware version is 1.23 (sample value only).
Query software version for a specific BME	<u>X3</u> Q	<u>X27</u> ←	
Request fan status	<u>X3</u> *01S	<u>X28</u> <u>X28</u> <u>X28</u> <u>X28</u> ←	
Request power supply status	<u>X3</u> *02S	<u>X28</u> <u>X28</u> <u>X28</u> <u>X28</u> ←	
Request controller status	<u>X3</u> *03S	<u>X29</u> <u>X29</u> ←	
Request input card status	<u>X3</u> *04S	<u>X29</u> <u>X29</u> <u>X29</u> ... <u>X29</u> ←	
Request output card status	<u>X3</u> *05S	<u>X29</u> <u>X29</u> <u>X29</u> ... <u>X29</u> ←	

- NOTE** X21 = Input size  
X22 = Output size  
X23 = BME type
- X24 = Number of BME  
X25 = Input map size  
X26 = Output map size  
X3 = BME number  
X27 = Video and audio mute:
- X28 = Fan or power supply status  
X29 = Card status
- The number of physical inputs  
The number of physical outputs  
0 = non existent  
1 = wideband video  
2 = low res video  
1 through 8
- The number of virtual inputs  
The number of virtual outputs  
0 – 8
- 3 = sync  
4 = stereo audio  
5 = mono audio
- 0 = no mutes  
1 = video mute  
0 = not installed  
1 = installed and working  
0 = not installed  
1 = installed and working  
2 = failed, positive rail
- 2 = audio mute  
3 = video and audio mute  
2 = failed  
3 = failed, both rails  
4 = failed, negative rail



# Programming Guide, cont'd

## Command and response table for IP SIS commands

Command	ASCII command (host to switcher)	Response (switcher to host)	Additional description
Set matrix name (location)	<b>Esc</b> X40CN ←	Ipn•X40 ←	
Read matrix name (location)	<b>Esc</b> CN ←	X40 ←	
Reset matrix name to factory default	<b>Esc</b> •CN ←	Ipn•X41 ←	
Set GMT time and date	<b>Esc</b> X42CT ←	IptX42 ←	
Read GMT time and date	<b>Esc</b> CT ←	X43 ←	
Set IP address	<b>Esc</b> X44CI ←	IpiX44 ←	
Read IP address	<b>Esc</b> CI ←	X44 ←	
Read hardware address	<b>Esc</b> CH ←	X45 ←	
Read # of open connections	<b>Esc</b> CC ←	X46 ←	
Set subnet mask	<b>Esc</b> X44CS ←	IpsX44 ←	
Read subnet mask	<b>Esc</b> CS ←	X44 ←	
Set gateway IP address	<b>Esc</b> X44CG ←	IpgX44 ←	
Read gateway IP address	<b>Esc</b> CG ←	X44 ←	
Set administrator password	<b>Esc</b> X47CA ←	Ipa•X47 ←	
Read administrator password	<b>Esc</b> CA ←	X47 ←	
Reset (clear) administrator password	<b>Esc</b> •CA ←	Ipa•X47 ←	
Set user password	<b>Esc</b> X47CU ←	Ipu•X47 ←	
Read user password	<b>Esc</b> CU ←	X47 ←	
Reset (clear) user password	<b>Esc</b> •CU ←	Ipu•X47 ←	
Set e-mail server values	<b>Esc</b> X44,X48,X47CM ←	IpmX44,X48,X47 ←	
Read e-mail server values	<b>Esc</b> CM ←	X44,X48,X47 ←	
Set e-mail notifications	<b>Esc</b> X49,X50,X51,X52 ... X52CR ←	IprX49,X50,X51,X52 ... X52 ←	
Read e-mail notification	<b>Esc</b> X49CR ←	X49,X50,X51,X52 ... X52 ←	

## Special Characters

The HTML language reserves certain characters for specific functions. The switcher does not accept these characters as part of preset names, the name of the switcher, passwords, or locally created file names.

The switcher rejects or Extron does not recommend the following characters:  
 {space (spaces are ok for names)} + } ~ , @ = ' [ ] { } < > ' " semicolon (;)  
 colon (:)| \ and ?.



# Matrix 12800 Switchers

# 5 Chapter Five

## Web Operations

[Download the Startup Page](#)

[Status Tab](#)

[Configuration Tab](#)

[File Management Tab](#)

[Control Tab](#)

# Web Operations

The Matrix 12800 can be controlled and operated through the Ethernet port on BME 0, across the LAN or WAN, using a Web browser, such as the Microsoft Internet Explorer. The browser downloads a series of displays that have the appearance of Web pages. This chapter describes the factory-installed HTML pages, which are always available and cannot be erased or overwritten.

**NOTE** *If your Ethernet connection to the matrix switcher is unstable, try turning off the proxy server in your Web browser. In Microsoft Internet Explorer, click **Tools > Internet Options > Connections > LAN Settings**, uncheck the “**Use a proxy server...**” box, and then click **Ok**.*

## Download the Startup Page

Access the switcher using the HTML pages as follows:

1. Start the Web browser program.
2. Click in the Address field of the browser.
3. Enter the IP address of the switcher in the Address field.

**NOTE** *If the local system administrators have not changed the value, the factory-specified default, 192.168.254.254, is the correct value for this field.*

4. If you want the browser to display a page other than the default page (such as a custom page that you have created and uploaded), enter a slash (/) and the file name to open.

**NOTE** *The Address field of the browser should display the address in the following format: xxx.xxx.xxx.xxx/{optional\_file\_name.html}*

**NOTE** *The following characters are invalid or not recommended in file names: {space} ~ @ = ' [ ] { } < > ' " ; : | \ and ?.*

5. Press the keyboard Enter key. The switcher checks to see if it is password protected.

If the switcher is not password protected, proceed to step 7.

If the switcher is password protected, the switcher downloads the Enter Network Password page (figure 5-1).



**Figure 5-1 — Enter Network Password page**

**NOTE** *A User Name entry is not required.*

6. Click in the Password field and type in the appropriate administrator or user password. Click the **OK** button.

7. The switcher checks several possibilities, in the following order, and then responds accordingly:
  - a. Does the address include a specific file name, such as 10.13.156.10/file\_name.html? If so, the switcher downloads that HTML page.
  - b. Is there a file in the memory of the switcher that is named “index.html”? If so, the switcher downloads “index.html” as the default startup page.
  - c. If neither of the above conditions is true, the switcher downloads the factory-installed default startup page, “nortxe\_index.html” (figure 5-2), also known as the System Status page.

## Status Tab

### System Status page

The Matrix 12800 System Status page (figure 5-2) provides an overall view of the status of the complete matrix switcher system, encompassing all BMEs and their active replaceable components. The status Web page automatically updates itself every few seconds to reflect the latest status of the switcher components.

Refresh system status  
Individual BME status  
MKP/MCP status  
Select DSVP

Function	BME_0	BME_1	BME_1	BME_2	BME_3	BME_4	BME_5
Primary Power Supplies	Pass	Pass	Pass	Failed	Pass	Pass	Pass
Redundant Power Supplies	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Primary Controller	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Redundant Controller	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Fans	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Air Flow	100%	100%	100%	100%	100%	100%	100%
Inputs Cards	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Output Cards	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Legend: ■ Pass ■ Failed ■ Not Installed

**Figure 5-2 — System status page**

For each BME, the System Status page shows the status of the primary and redundant power supplies, the primary and redundant controller, the fans, the input cards, and the output cards. Components that are operating properly are indicated in green, failures are indicated in red, and components that are not installed are indicated in gray. If a component fails or is removed, the display shows the change in status the next time it updates.

# Web Operations, cont'd

## BME Status page

To observe more status details for a specific BME, from the System Status page, click the BME number, either at the top of the status column or in the brackets to the left of the screen. The Matrix 12800 downloads the BME Status page (figure 5-3), which provides additional information for that BME, including the size of the matrix and the number of and status of individual input cards and output cards.

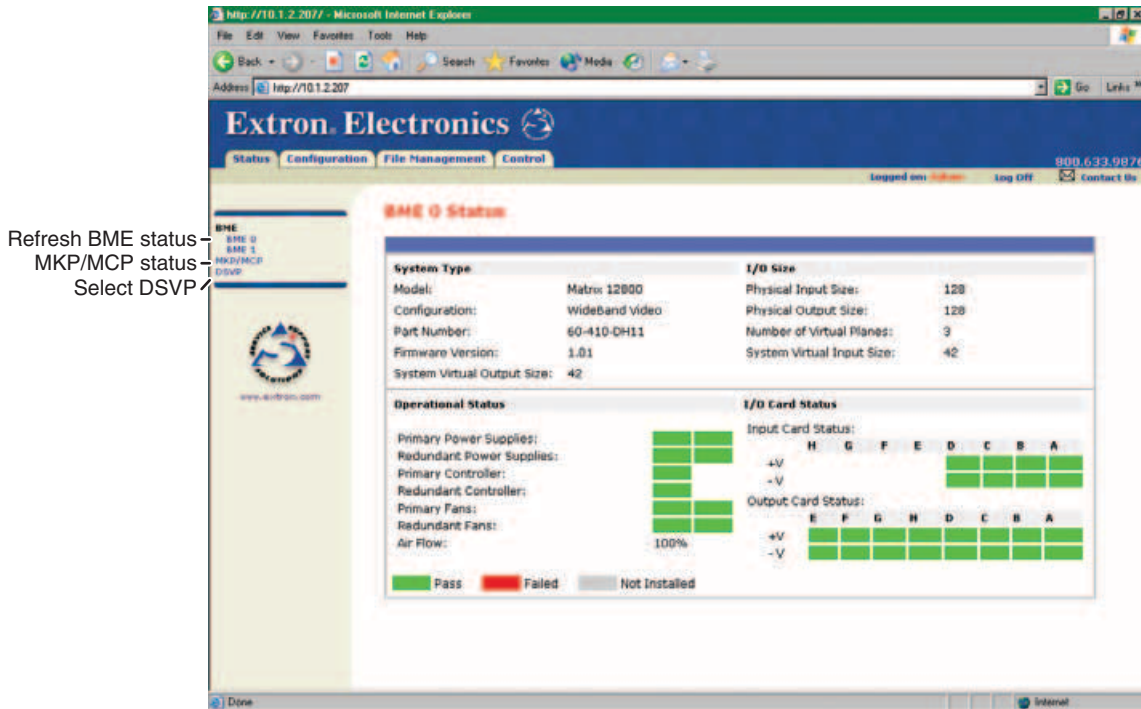


Figure 5-3 — BME Status page

## MKP/MCP Status page

To observe the connection status of remote keypads and remote control panels, from the System Status page, click the **MKP/MCP** link to the left of the screen (figure 5-4).

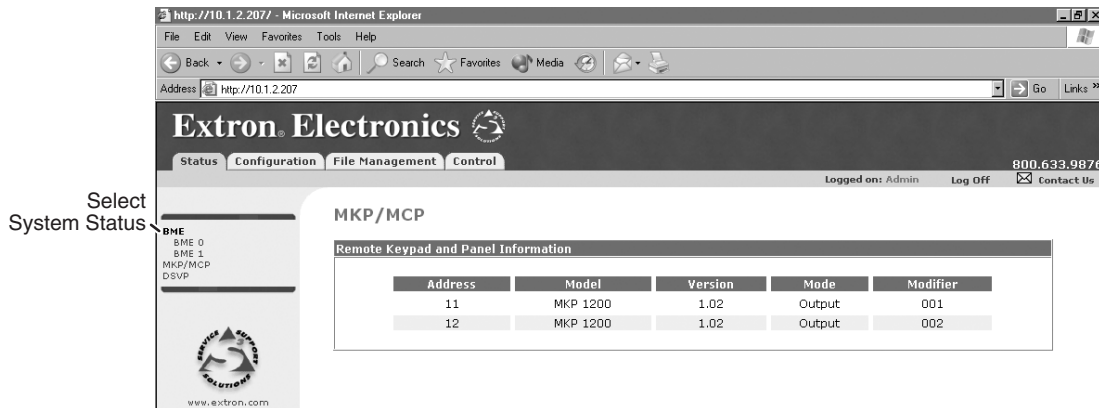


Figure 5-4 — MKP/MCP Status page

## DSVP page

To observe the Digital Sync Validation Processing (DSVP) for an input, from the System Status page, click the **DSVP** link to the left of the screen (figure 5-5).

**NOTE** DSVP is only available in systems that include a sync BME.

Input	Horizontal (kHz)	Vertical (Hz)	Name
001	037.87	060.30	
005	037.86	060.29	Input #05
009	037.86	060.29	Input #09
013	037.87	060.30	Input #13
017	037.86	060.30	Input #17

Figure 5-5 — DSVP page

## Configuration Tab

### System Configuration page

The Matrix 12800 downloads the System Configuration page (figure 5-6) when you click the Configuration tab. The screen consists of fields in which you can observe and edit IP administration and system settings. The e-mail settings page can be accessed by clicking on the e-mail settings link. See appendix A, “[Ethernet Connection](#)”, for basic information about IP addresses.

**Administration**

Administrator Password:  Re-enter Admin Password:

User Password:  Re-enter User Password:

Date/Time: Thu, 08 Apr 2004 16:33:52 GMT

**IP Settings**

Name: Matrix 12800

IP Address:

Gateway IP Address:

Subnet Mask:

Hardware Address: 00-05-46-00-02-03

Figure 5-6 — System configuration page



## Web Operations, cont'd

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### Administration fields

- Ethernet connection to the Matrix switcher, either entering SIS commands (see chapter 4, "[Programming Guide](#)"), using the Matrix 12800/6400/3200 Control Program (see chapter 3, "[Virtualization/Control Software](#)"), or using HTML pages, is password protected.
- Connection via the RS-232/RS-422 port is not password protected.

On password-protected connections, there are two levels of protection: administrator and user. Administrators have access to all Matrix 12800 switching capabilities and editing functions. Users can create ties, create and recall presets, set RGB and audio mutes, and view all settings with the exception of passwords.

The administration fields on the system configuration page are for entering and verifying administrator and user passwords. Passwords are case sensitive and are limited to 12 upper case and lower case alphanumeric characters. Each password must be entered twice; once in the password field and then repeated in the re-enter password field. Characters in these fields are masked by asterisks (\*\*\*\*). If you do not want to password protect an access level, leave the password field and the re-enter password field blank. After entering the desired password in both fields, click the **Submit** button.

To delete a password, type a single space in the enter and re-enter field and click the **Submit** button.

### Matrix IP settings fields

The system IP settings fields provide a location for observing and editing settings unique to the Ethernet interface. After editing any of the settings on this page, click the **Submit** button.

#### Name field

The Matrix Name field contains the name used as the "from" information when the Matrix 12800 e-mails notification of its failed or repaired status. This name field can be changed to any valid name, up to 12 alphanumeric characters.

#### IP Address field

The IP Address field contains the IP address of the connected BME. This value is encoded in the flash memory on the primary and redundant controller circuit cards.

Valid IP addresses consist of four 1-, 2-, or 3-digit numeric subfields separated by dots (periods). Each field can be numbered from 000 through 255. Leading zeroes, up to 3 digits total per field, are optional. Values of 256 and above are invalid.

The default address is 192.168.254.254, but if this conflicts with other equipment at your installation, you can change the IP address to any valid value.

#### Gateway IP Address field

The Gateway IP Address field identifies the address of the gateway to the mail server to be used if the Matrix 12800 and the mail server are not on the same subnet.

The gateway IP address has the same validity rules as the IP address.

#### Subnet Mask field

The Subnet Mask field is used to determine whether the Matrix 12800 is on the same subnet as the mail server when you are subnetting.

#### Hardware Address field

The Hardware Address field is hardcoded on the primary controller card in BME 0 and cannot be changed.

## Email Settings page

The Email Settings page (figure 5-7) can be reached by clicking on the Email Settings link on the system configuration page. The Email Settings page has fields for entering all of the information needed to set up the e-mail notification capabilities of the switcher. After editing any of the settings on this page, click the **Submit** button.

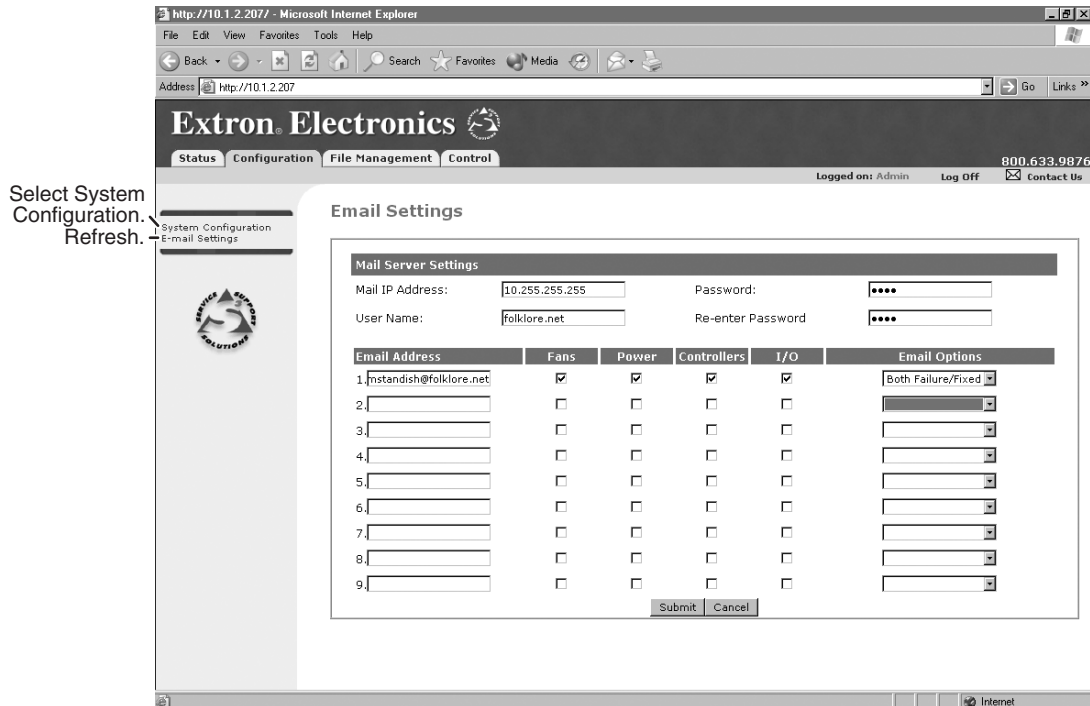


Figure 5-7 — Email Settings page

### Mail IP Address field

The Mail IP Address field displays the IP address of the mail server that handles the e-mail for the facility in which the Matrix 12800 is installed.

Valid IP addresses consist of four 1-, 2-, or 3-digit numeric subfields separated by dots (periods). Each field can be numbered from 000 through 255. Leading zeroes, up to 3 digits total per field, are optional. Values of 256 and above are invalid.

### User Name field

The mail server User Name field displays the domain name of the Matrix 12800 e-mail server (such as folklore.net in the examples throughout this chapter). Standard domain conventions (xxx.com) apply.

**NOTE** *The following characters are invalid or not recommended in a domain name: {space} ~ = ' [ ] { } < > ' " ; : | \ and ?. The @ character is only acceptable as the lead-in to the domain name (such as @folklore.net).*

### Password field

The mail server Password field and re-enter password field display and confirm the password that the Matrix 12800 uses to log on to the e-mail server. Passwords are case sensitive and are limited to 12 upper case and lower case alphanumeric characters. Characters in these fields are masked by asterisks (\*\*\*\*\*).

# Web Operations, cont'd

## Email Address fields

The nine Email Address fields identify the e-mail addresses of the personnel to whom the Matrix 12800 e-mails notification of its failure and repair status. Standard e-mail address conventions (nnnnn@xxx.com) apply.

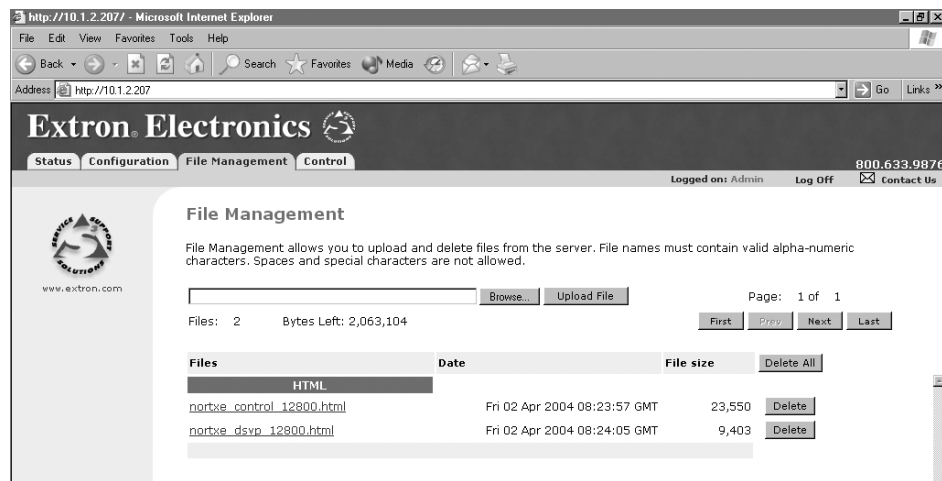
The check boxes and drop box associated with each address field permit the operator to specify specific e-mail requirements for each recipient.

In the associated check boxes, select the Matrix 12800 components for which the recipient is to receive e-mail notification. In the associated drop box, select whether the recipient is to be e-mailed of failures, fixes, both, not notified, or to be removed from the e-mail list. The no response option is handy for temporarily removing personnel from the e-mail list when they are unavailable, such as on travel or vacation. Selecting the remove e-mail options and clicking the **Submit** button removes the recipient from e-mail notification.

## File Management Tab

### File Management page

To delete files such as HTML pages from the Matrix 12800 or to upload your own files to the Matrix 12800, click the file management tab. The Matrix 12800 downloads the File Management page (figure 5-8).



**Figure 5-8 — File Management page**

**NOTE** The files shown in figure 5-8 are for example only.

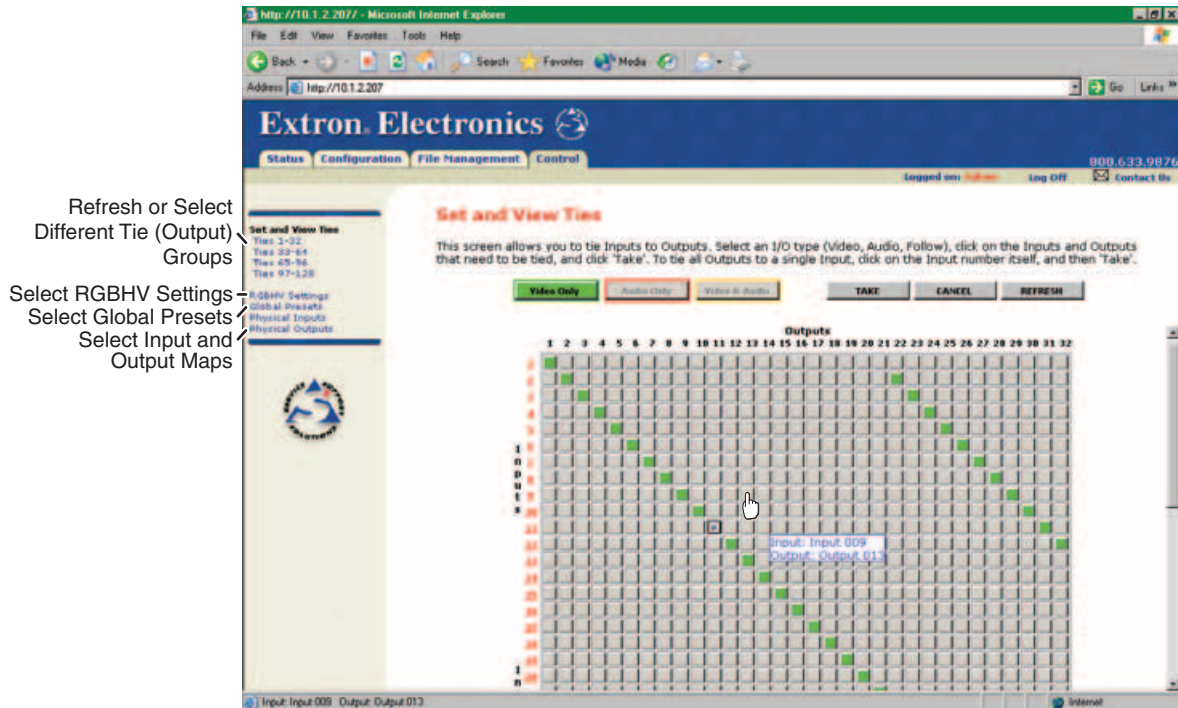
Upload your own files as follows:

1. Click the **Browse** button.
2. Browse through your system and select the desired file.
3. Click the **Upload File** button.

## Control Tab

### Set and View Ties page

You can create ties on the Set and View Ties page (figure 5-9). Access the Set and View Ties page by clicking the **Control** tab.



**Figure 5-9 — Set and View Ties page**

The page consists of a matrix of input (rows) and output (columns) (up to 32 outputs at a glance) selection buttons of four different colors:

- The **amber** buttons indicate **video and audio** ties.
- The **green** buttons indicate **video only** ties.
- The **red** buttons indicate **audio only** ties.
- The **gray** buttons indicate **no ties**.

**NOTE** *If you lose track of the input and output associated with a specific button, let the mouse pointer rest over a button for a moment. As shown on figure 5-9, a field pops up that identifies the input and output for that button.*

Select a different group of outputs by clicking the desired **Ties** link to the left of the screen.

# Web Operations, cont'd

Create a tie as follows:

1. Click the **Video Only**, **Audio Only**, or **Video & Audio** button to select video, audio, or both for switching (audio follow or audio breakaway). Each mouse click of a button toggles the other two buttons off.
2. Move the mouse pointer over the matrix of input and output selection buttons. Click a button to create a preliminary tie (if not tied) or preliminary untie (if tied) of the input and output associated with that button. A "P" (for preliminary) appears in the button.

**NOTE** If you lose track of the input and output associated with a specific button, let the mouse pointer rest over one of the tie buttons for a moment. A field pops up (as shown on figure 5-9) that identifies the input and output for that button.

**NOTE** To tie an input to all outputs, click the input number of that input.

3. Click the **Take** button to make the configuration changes or **Cancel** button to abandon the configuration changes.

## RGBHV Settings page

The RGBHV Settings page provides a way to set the input audio gain and attenuation, mute and unmute all video and audio outputs, and (for RGBHV video only) set the RGB delay (switching interval). Access the RGBHV Settings page (figure 5-10) by clicking on the **RGBHV Settings** link on the Set and View Ties page.

The screenshot shows the Extron Electronics website interface. The browser window title is "http://10.1.2.207 - Microsoft Internet Explorer". The address bar shows "http://10.1.2.207". The website header includes "Extron Electronics" and a navigation menu with "Status", "Configuration", "File Management", and "Control". The main content area is titled "RGBHV Settings" and contains a form with the following fields and controls:

- Input:** A dropdown menu set to "1".
- Signal Type:** Three buttons: "Video Only" (selected), "Audio Only", and "Video & Audio".
- Output:** A dropdown menu set to "6".
- Input Audio Level (dB):** A dropdown menu set to "-04".
- RGB Delay (Seconds):** A dropdown menu set to "2.5".
- Mute Status:** "UnMuted".

Annotations on the left side of the screenshot:

- "Select Set and View Ties" points to the "Set and View Ties" link in the sidebar.
- "Select Global Presets" points to the "Global Presets" link in the sidebar.
- "Select Input and Output Maps" points to the "Physical Outputs" link in the sidebar.

Figure 5-10 — RGBHV Settings page

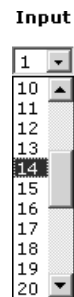
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### Changing the input gain and attenuation (systems with audio BMEs)

Users can set the level of audio gain or attenuation (-24 dB to +9 dB) for each input from the RGBHV Settings page. Audio levels can be adjusted so there are no noticeable volume differences between sources.

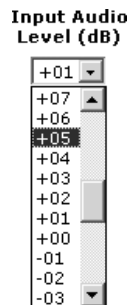
Change the audio level setting of an input as follows:

1. Click the Input drop box. A drop-down scroll box appears (figure 5-11).



**Figure 5-11 — Input selection drop box**

2. Click and drag the slider or click the scroll up (▲) button or scroll down (▼) button until the desired input is visible.
3. Click the desired input.
4. Click the Input Audio Level (dB) drop box. A drop-down scroll box appears (figure 5-12).



**Figure 5-12 — Gain drop box**

5. Click the desired gain or attenuation value.

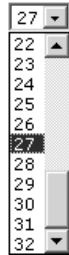
# Web Operations, cont'd

## Muting and unmuting one or all outputs

Mute one or all outputs as follows:

1. To select an individual output to mute or unmute, click the Output drop box. A drop-down scroll box appears (figure 5-13).

**Output**



**Figure 5-13 — Output selection drop box**

2. Click and drag the slider or click the scroll up (▲) button or scroll down (▼) button until the desired output is visible.
3. Click the desired output.
4. Click the **Video Only**, **Audio Only**, or **Video & Audio** button to select video, audio, or both for muting. Each mouse click a button toggles the other two buttons off.
5. Click the **Mute** or **UnMute** button to mute or unmute the selected output.

Click the **Mute All** or **UnMute All** to mute or unmute all of the outputs.

The Mute status indications are displayed in the lower right corner of the page.

**Mute Status**  
**RGB**      **Audio**  
UnMuted    Muted

## Changing the RGB delay

The RGB delay interval defines how long the screen is blanked when switching to a new input for the selected output.

Change the RGB delay as follows:

1. Click the Output drop box. A drop-down scroll box appears (figure 5-14).

**Output**

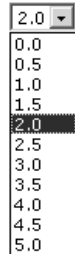


**Figure 5-14 — Output selection drop box**

2. Click and drag on the slider or click the scroll up (▲) button or scroll down (▼) button until the desired output is visible.
3. Click the desired output.

- Click the RGB delay drop box. A drop-down scroll box appears (figure 5-15).

**RGB Delay  
(Seconds)**

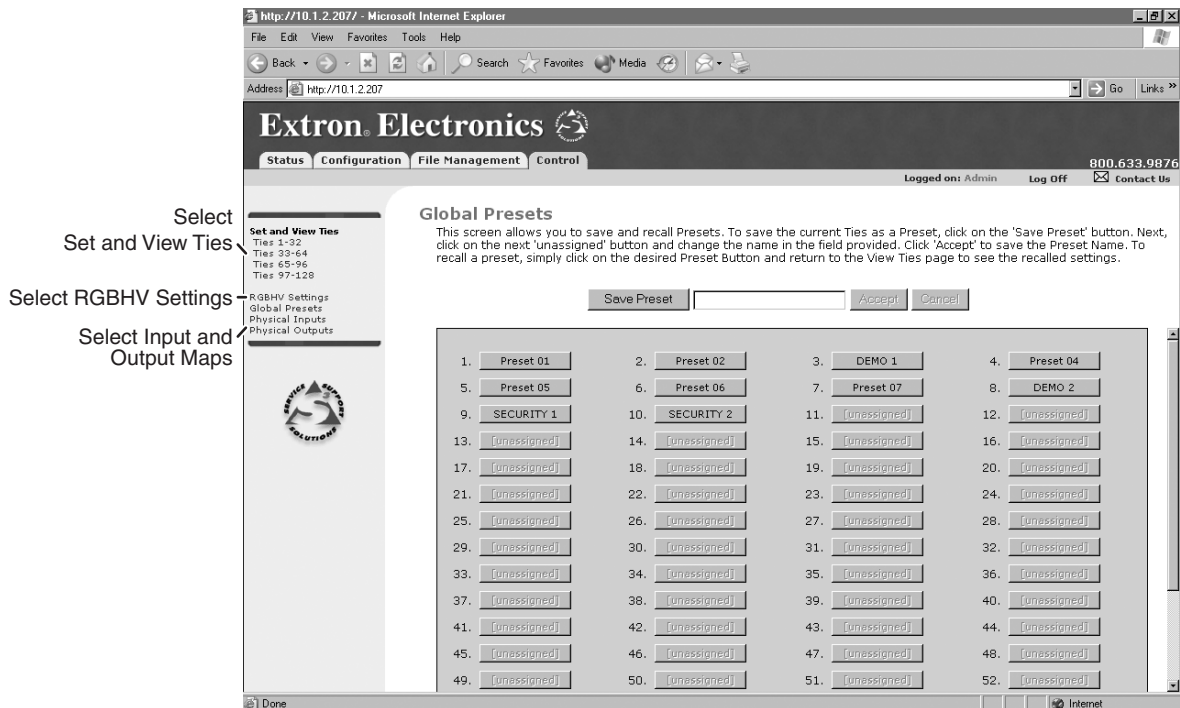


**Figure 5-15 — RGB delay drop box**

- Click the desired RGB delay.

## Global Presets page

You can save and recall global presets from the Global Presets page (figure 5-16). Access the Global Presets page by clicking the **Global Presets** link on the left of the Set and View Ties page.



**Figure 5-16 — Global presets page**







## Matrix 12800 Switchers

# 6 Chapter 6

## **Upgrades and Maintenance**

Opening and Closing the Matrix Switcher

Removing and Installing the Fan Assembly

Removing and Installing the Power Supply Module

Replacing the Fuse

Removing and Cleaning the Filter

Setting the DIP Switches

Removing and Installing the Controller Card and Replacing the Firmware

Removing and Installing the I/O Card and Setting the Audio Gain

Troubleshooting

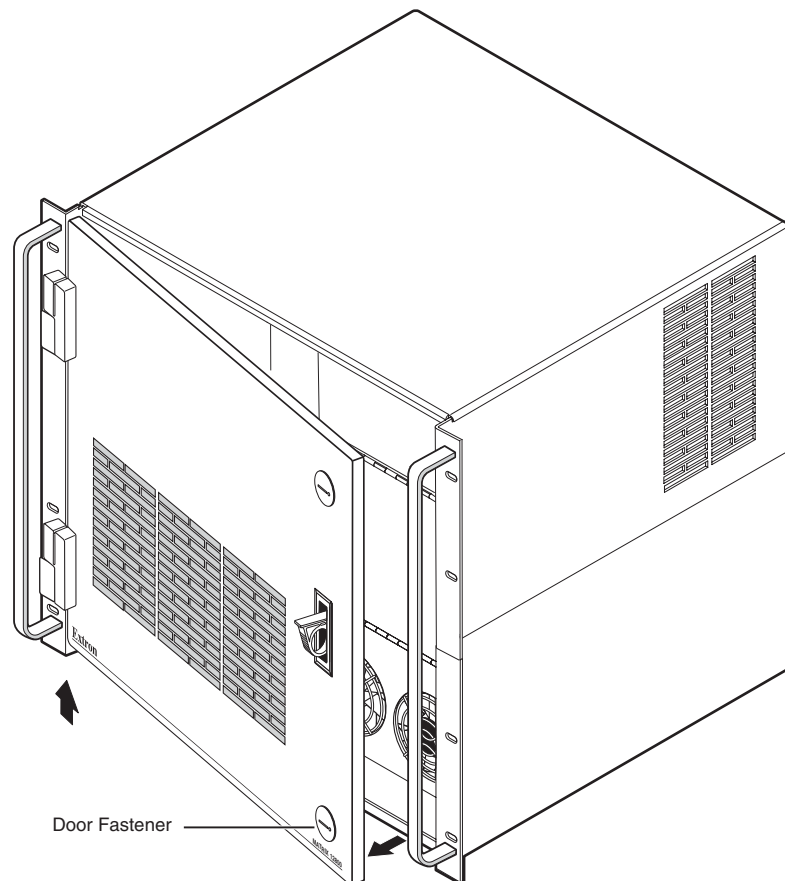
# Upgrades and Maintenance

**NOTE** For proper cooling and air flow, all access doors should be closed during normal switcher operations.

## Opening and Closing the Matrix Switcher

### Opening the switcher

All maintenance and upgrade procedures require access to the interior of the switcher by opening the front door (figure 6-1). Gain access to the interior as follows:



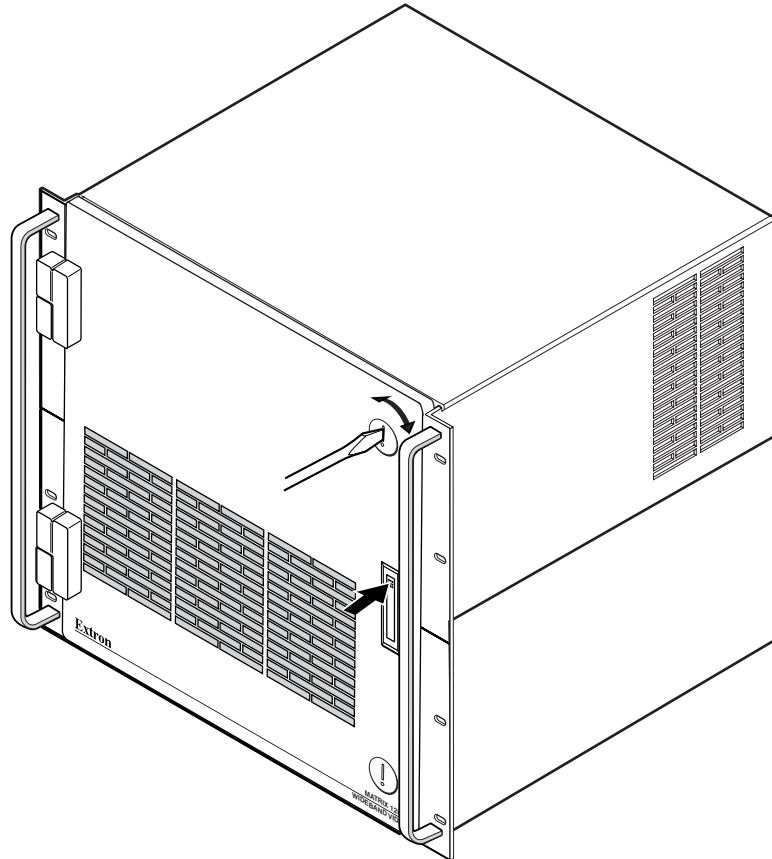
**Figure 6-1 — Opening the Matrix 12800 switcher.**

1. Turn the top door fastener clockwise from ⊕ to ⊖.
2. Turn the bottom door fastener counterclockwise from ⊕ to ⊖.
3. Open the door.
4. If you need to open the fan assembly door, remove the front door by lifting it straight up off the hinge pins.

---

## Closing the switcher

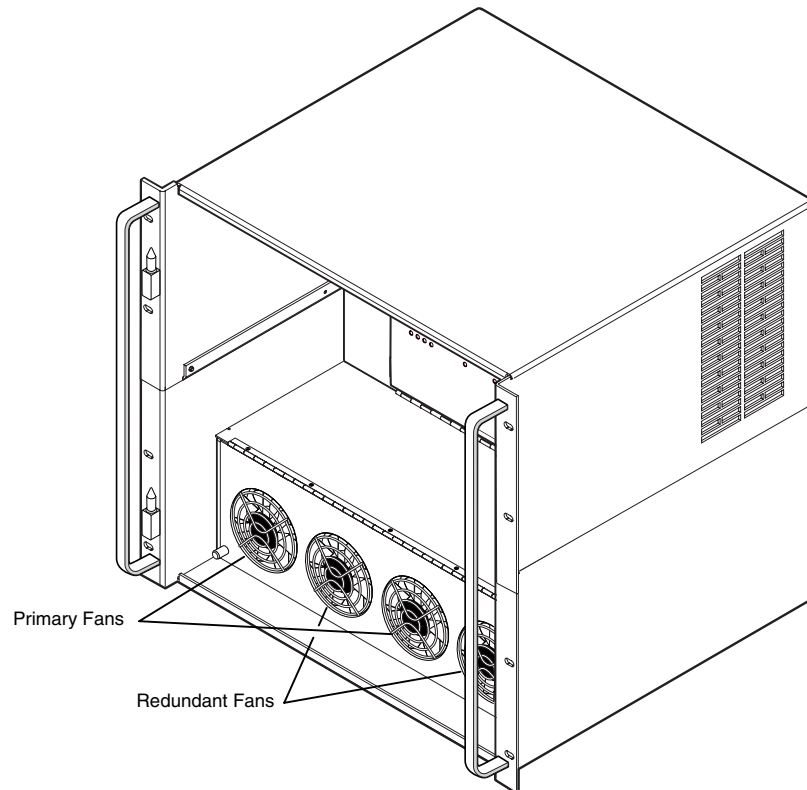
1. If the door was removed, replace the door by lifting it above the hinge pins and lowering it onto the pins.
2. Shut the door.
3. Turn the bottom door fastener clockwise from ⊖ to ⊕.
4. Turn the top door fastener counterclockwise from ⊖ to ⊕ (figure 6-2).



**Figure 6-2 — Closing the Matrix 12800 switcher**

### Removing and Installing the Fan Assembly

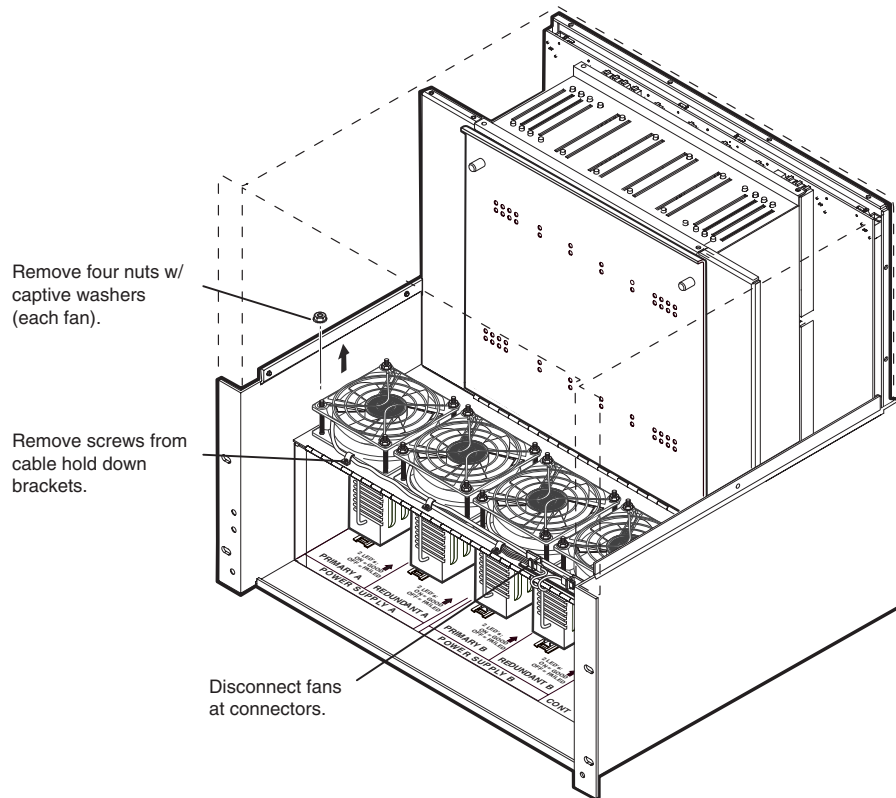
The four fans on the fan assembly door are paired; two primary fans in one assembly and two redundant fans in another assembly (figure 6-3). The two fans in the primary fan assembly share a common power connector and the two fans in the redundant fan assembly share a separate connector. The power cord for the primary fan assembly is sheathed in red, the power cord for the redundant fan assembly is sheathed in black. Fans are replaced two at a time (primary or redundant fan assembly pair).



**Figure 6-3 — Primary and redundant fan locations**

Remove and replace the primary or redundant fan assembly as follows:

1. Open the front door.
2. On the fan assembly door, turn the left and right knurled knobs  $\frac{1}{4}$ -turn counterclockwise. Raise the door and rest it on the roof of the power distribution enclosure.
3. Disconnect the power distribution plane fan power cable connector (the power cable that leads from the inside of the fan connector bracket to the power distribution plane) (figure 6-4) by pushing down on the center tab and pulling back on the connector.
4. Remove the fan assembly power connector (the connector that has two power cables on the back side) from the fan connector bracket by pinching the top and bottom tabs together and pulling the connector back and out of the bracket.
5. Remove and retain the three cable restraints that secure the power cables out of the way, and gently separate the power cables.



**Figure 6-4 — Fan pair replacement**

6. Using a 5/16-inch nut driver, remove and retain the four nuts securing each fan to the fan assembly door.
7. Lift the two finger grates out of the way.
8. Lift the two fans off of the fan assembly door retaining posts.
9. Place the replacement fan assembly on the fan assembly door retaining posts.
10. Place the finger grates over the two fans on the retaining posts.
11. Secure each fan and finger grate to the restraining posts with the four 5/16" nuts removed in step 6.
12. Secure the power cables out of the way, behind the fan connector bracket and through the three cable restraints retained in step 5. Tighten down the three cable restraints.
13. Align the fan assembly power connector with the slot on the outside of the fan connector bracket and snap the connector into the bracket.
14. Connect the power distribution plane fan power cable to the fan assembly power connector in the fan connector bracket.

**CAUTION** *Ensure that you close and secure the fan assembly door when you have finished this maintenance procedure. The Matrix 12800 may overheat otherwise.*

15. Close the fan assembly door and turn the left and right knurled knobs ¼-turn clockwise.
16. Close the front door.

## Removing and Installing the Power Supply Module

### Removing the power supply module

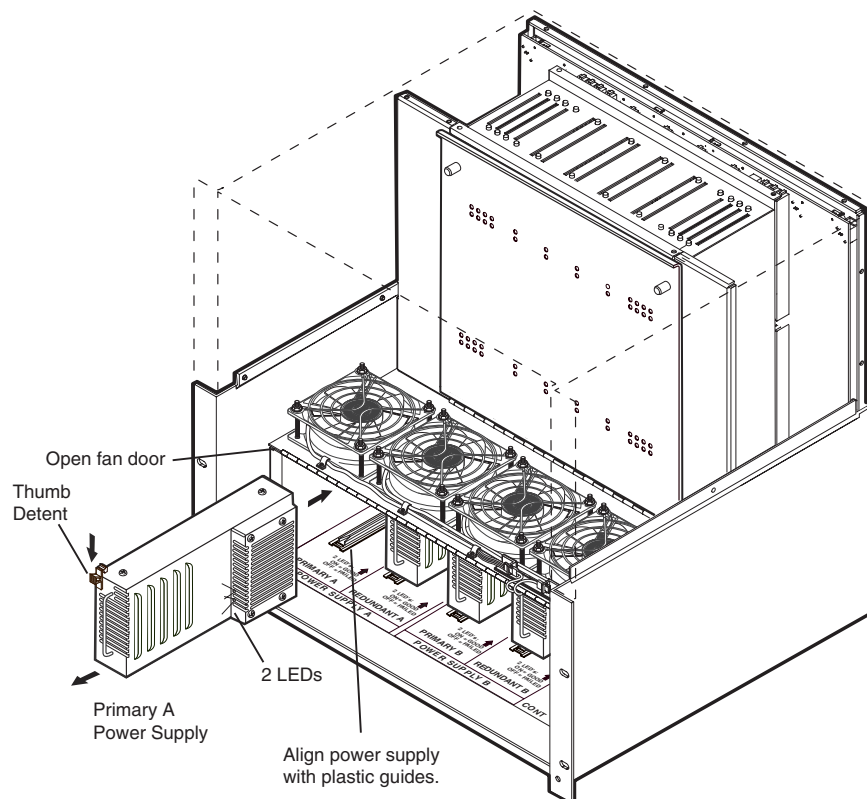
The two or four power supply modules (primary power supplies A and B and optional redundant power supplies A and B) are identical and hot-swappable. Each power supply module has two LEDs, visible when the fan assembly door is open, that indicate the status of the voltages that power supply outputs. If both LEDs are lit, the power supply is operating normally. If either LED is unlit, the power supply is out of tolerance and should be reseated, swapped, or replaced at the earliest opportunity.

**NOTE** *If this BME does not have redundant power supplies, the switcher may or may not shut down for an out of tolerance voltage.*

**NOTE** *The power supply modules are hot-swappable. If this BME has redundant power supplies A and B, each power supply can be removed without powering down the switcher. If the BME does not have power supply redundancy, removing either primary power supply shuts down the matrix.*

Remove a power supply module as follows:

1. Open the front door.
2. Turn the left and right knurled knobs on the fan assembly door ¼-turn counterclockwise. Raise the door and rest it on the roof of the power distribution enclosure.
3. Grasp the handle on the power supply module and push down on the thumb detent (figure 6-5). Pull the power supply module straight back until the module clears the alignment guides.



**Figure 6-5 — Power supply replacement**

- 
4. If a replacement power supply is not being installed immediately, close the fan assembly door and turn the left and right knurled knobs  $\frac{1}{4}$ -turn clockwise.

**CAUTION** *Ensure that you close and secure the fan assembly door when you have finished this maintenance procedure. The Matrix 12800 may overheat otherwise.*

5. If a replacement power supply is not being installed immediately, close the front door.

## Installing the power supply module

**NOTE** *The power supply modules are hot-swappable. You do not need to power down the switcher to install a power supply.*

Install a power supply module as follows:

1. If necessary, open the front door.
2. If necessary, turn the left and right knurled knobs on the fan assembly door  $\frac{1}{4}$ -turn counterclockwise. Raise the door and rest it on the roof of the power distribution enclosure.
3. Orient the power supply module to be installed with the LEDs to the right and near the bottom (figure 6-5).
4. Identify the correct position to install the power supply module. Align the flanges on the power supply module with the top and bottom power supply guides. Gently slide the power supply module into the power distribution enclosure until the module meets resistance.
5. Push down on the thumb detent, and firmly push the power supply module the rest of the way into the power distribution enclosure until the power supply module is properly seated on the power distribution plane. If the switcher is powered up, observe that the two LEDs light. Release the thumb detent.

**CAUTION** *Ensure that you close the fan assembly door when you have finished this maintenance procedure. The Matrix 12800 may overheat otherwise.*

6. Lower the fan assembly door to vertical and turn the left and right knurled knobs  $\frac{1}{4}$ -turn clockwise.
7. Close the front door.

**NOTE** *If you are upgrading the matrix switcher from a configuration with two power supplies to a configuration with four power supplies (adding redundancy), you also need to plug in the redundant IEC power cord on the rear panel.*

8. If power supplies were installed to add redundancy to the switcher, plug a standard IEC power cord between the rear panel Redundant AC Power Input connector and either an uninterruptible 100 to 240VAC, 50 Hz or 60 Hz power source or a power source that is completely independent from the primary power source.



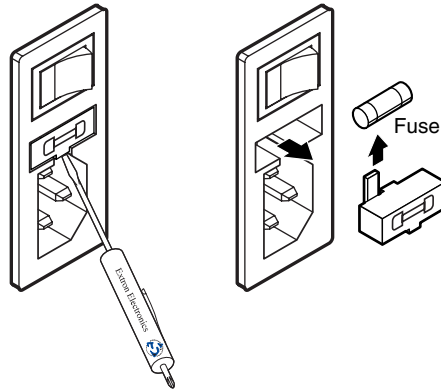
## Upgrades and Maintenance, cont'd

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### Replacing the Fuse

The primary and redundant AC power circuits are independently fused. The fuses are accessible on the rear panel of the switcher. If a fuse opens, the associated primary or redundant power loop shuts down. If this BME does not have redundant power supplies, the switcher shuts down. Replace the fuse as follows:

1. On the rear panel, insert the flat blade end of an Extron Tweaker or small screwdriver under the tab on the bottom of the fuse holder and gently pry on the fuse holder until it protrudes from the rear panel (figure 6-6).



**Figure 6-6 — Fuse replacement**

2. Pull the fuse holder clear of the rear panel.
3. Remove the fuse from the fuse holder.
4. If test equipment is available, you can check the fuse.
5. Place a new 5A/250V time delay fuse in the fuse holder.
6. Slide the fuse holder into the rear panel until it is flush with the panel.

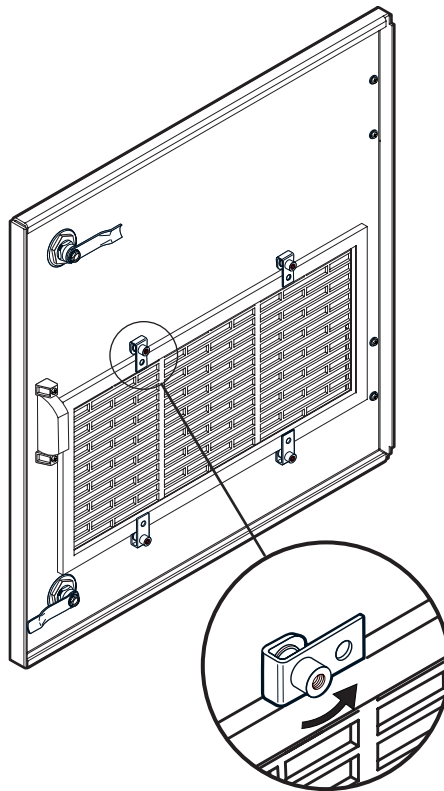
---

## Removing and Cleaning the Filter

**CAUTION** *The filter can be removed for cleaning without powering down the switcher, but do not operate the switcher without filtering longer than necessary to clean the filter.*

Remove and clean the air filter as follows:

1. Open the front door.
2. Loosen the four thumbscrews (figure 6-7) and rotate the four filter retaining clips out of the way.



**Figure 6-7 — Filter removal**

3. Lift the filter off the four retaining posts.
4. Vacuum dust and debris from the filter.
5. Place the filter back on the retaining posts, with the label on the filter facing you.
6. Rotate the filter retaining clips over the filter.
7. Tighten the thumbscrews.
8. Close the front door.

## Setting the DIP Switches

### Swapping the serial port protocol (RS-232/RS-422)

**NOTE** *If this BME is equipped with a redundant controller, the primary and redundant controllers must be configured for the same communications protocol.*

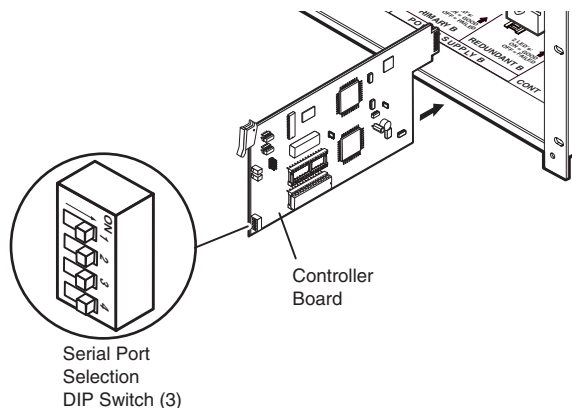
The Matrix 12800 controller cards are factory configured for RS-232 use. Change the RS-232/RS-422 configuration of the controller card as follows:

1. If changing the configuration of an installed card, open and remove the front door.
2. If changing the configuration of an installed card, turn the left and right knurled knobs on the fan assembly door ¼-turn counterclockwise. Raise the door and rest it on the roof of the power distribution enclosure.

**CAUTION** *Do not touch the electronic components or the connectors on the power distribution plane or on the circuit cards without being electrically grounded. Handle circuit cards by their edges only. Electrostatic discharge (ESD) can damage ICs, even if you cannot feel, see, or hear it.*

3. Set DIP switch 3, on the rear edge of the controller card (figure 6-8), to the Off position for RS-232 or to the On position for RS-422.

**NOTE** *The controller card is shown removed for clarity, but the card does not need to be removed.*



**Figure 6-8 — Serial port selection DIP switch**

4. If you changed the configuration of a card that is installed, close the fan assembly door and turn the left and right knurled knobs ¼-turn clockwise.

**CAUTION** *Ensure that you close and secure the fan assembly door when you have finished this maintenance procedure. The Matrix 12800 may overheat otherwise.*

5. If you changed the configuration of a card that is installed, close the front door.

## Changing the serial port baud rate

**NOTE** *If this BME is equipped with a redundant controller, the primary and redundant controllers must be configured for the same RS-232/RS-422 communications baud rate.*

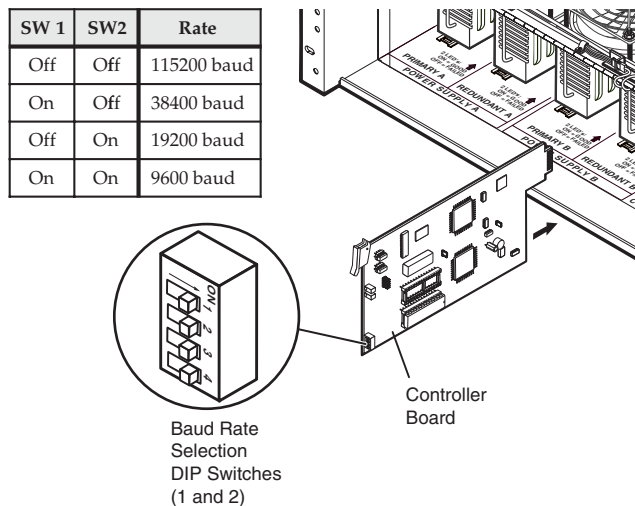
The Matrix 12800 controller cards are factory configured for 9600 baud rate on the RS-232/RS-422 port. Change the RS-232/RS-422 baud rate of the controller card as follows:

1. If changing the baud rate of an installed card, open and remove the front door.
2. If changing the configuration of an installed card, turn the left and right knurled knobs on the fan assembly door ¼-turn counterclockwise. Raise the door and rest it on the roof of the power distribution enclosure.

**CAUTION** *Do not touch the electronic components or the connectors on the power distribution plane or on the circuit cards without being electrically grounded. Handle circuit cards by their edges only. ESD can damage ICs, even if you cannot feel, see, or hear it.*

3. Set DIP switches 1 and 2, on the rear edge of the controller card (figure 6-9), to the positions for the desired baud rate. See the table in figure 6-9 for switch positions.

**NOTE** *The controller card is shown removed for clarity, but the card does not need to be removed.*



**Figure 6-9 — Serial port selection DIP switch**

4. If you changed the configuration of a card that is installed, close the fan assembly door and turn the left and right knurled knobs ¼-turn clockwise.

**CAUTION** *Ensure that you close and secure the fan assembly door when you have finished this maintenance procedure. The Matrix 12800 may overheat otherwise.*

5. If you changed the baud rate of a card that is installed, close the front door.

# Upgrades and Maintenance, cont'd

## Changing the sync termination

In a sync BME, the first eight physical inputs on each I/O card are equipped with sync termination DIP switches. Each switch provides the option of selecting either 510 ohms or 75 ohms.

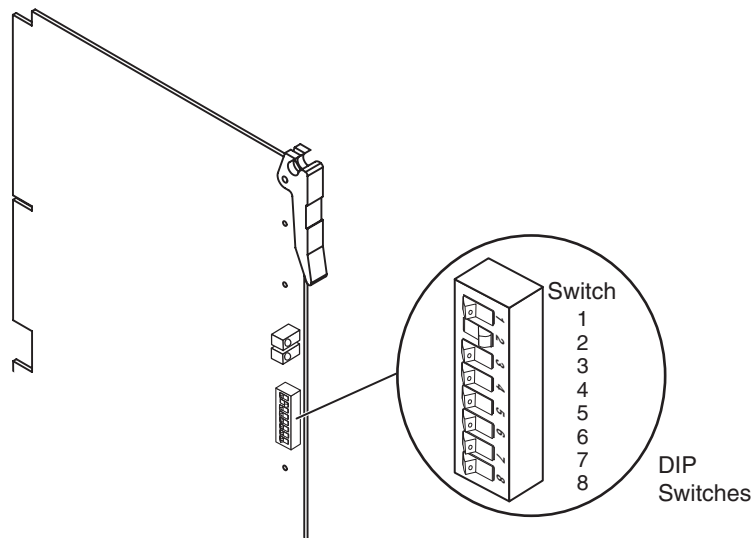
Change the sync termination of the sync I/O card as follows:

1. If changing the configuration of an installed card, open and remove the front door.
2. On the I/O cardcage door, turn the left and right knurled knobs ¼-turn counterclockwise. Lower the door.

**CAUTION** Do not touch the electronic components or the connectors on the backplane or on the circuit cards without being electrically grounded. Handle circuit cards by their edges only. ESD can damage ICs, even if you cannot feel, see, or hear it.

3. Select the correct input card and the sync termination DIP switch specific for the input to change (figure 6-10). Rock the DIP to the rear for 75-ohm termination (the default setting). Rock the switch to the front for 510-ohm termination.

**NOTE** All input numbers identified in figure 6-10 are physical inputs.



DIP switch	Input card 1	Input card 2	Input card 3	Input card 4
1	Input 1	Input 33	Input 65	Input 97
2	Input 2	Input 34	Input 66	Input 98
3	Input 3	Input 35	Input 67	Input 99
4	Input 4	Input 36	Input 68	Input 100
5	Input 5	Input 37	Input 69	Input 101
6	Input 6	Input 38	Input 70	Input 102
7	Input 7	Input 39	Input 71	Input 103
8	Input 8	Input 40	Input 72	Input 104

**Figure 6-10 — Sync termination DIP switch**

4. Raise the I/O cardcage door to vertical and turn the left and right knurled knobs ¼-turn clockwise.
5. Close the front door.

# Removing and Installing the Controller Card and Replacing the Firmware

## Removing the primary or redundant controller card

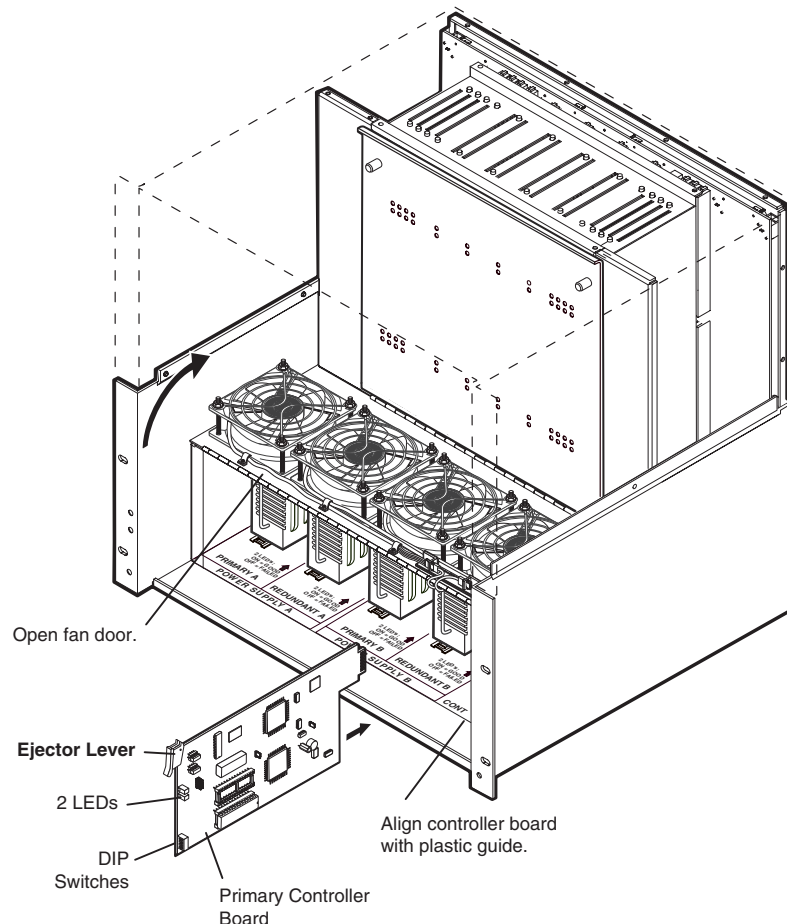
**NOTE** *The controller cards are hot-swappable. If this BME has redundant controller cards, either controller card can be removed without powering down the switcher. If the BME does not have controller card redundancy, removing the controller card shuts down the matrix.*

Remove the primary or optional redundant controller card as follows:

1. Open and remove the front door.
2. Turn the left and right knurled knobs on the fan assembly door ¼-turn counterclockwise. Raise the door and rest it on the roof of the power distribution enclosure.

**CAUTION** *Do not touch the electronic components or the connectors on the power distribution plane or on the circuit cards without being electrically grounded. Handle circuit cards by their edges only. ESD can damage ICs, even if you cannot feel, see, or hear it.*

3. Grasp the ejector lever on the top of the card to be removed (figure 6-11). Pivot the ejector lever out and away from the center of the card to lever the card out of the power distribution plane.



**Figure 6-11 — Controller card replacement**

## Upgrades and Maintenance, cont'd

4. Slide the card out of the cardcage.
5. Place the removed card on an anti-static surface or in an anti-static container.
6. If a replacement card is not being installed immediately, close the fan assembly door and turn the left and right knurled knobs  $\frac{1}{4}$ -turn clockwise.

**CAUTION** *Ensure that you close and secure the fan assembly door when you have finished this maintenance procedure. The Matrix 12800 may overheat otherwise.*

7. If a replacement card is not being installed immediately, close the front door.

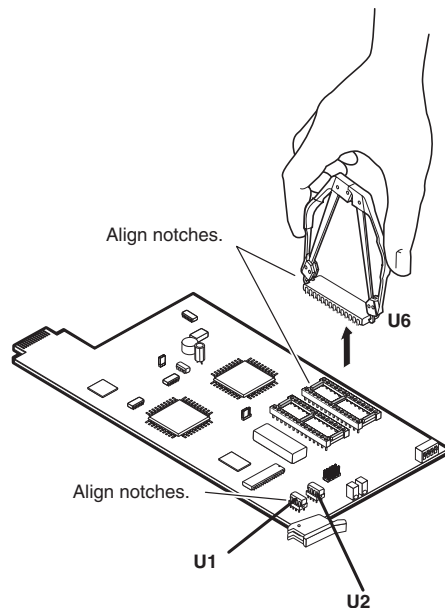
### Updating the firmware

**NOTE** *If your system has primary and redundant controller cards, both cards must have the same firmware revisions installed.*

**NOTE** *The ICs that contain the firmware for the matrix switcher also contain the memory in which presets and audio levels are saved. When you replace the IC, these settings are lost. You may want to record the presets and audio levels before you replace the IC.*

Replace the firmware as follows:

1. If the firmware is being replaced on an installed controller card, remove the card, see "Removing the primary or redundant controller card" in this chapter, placing the controller card on an anti-static mat.
2. Locate the PROM to be replaced, IC U1, U2, or U6 (figure 6-12).



**Figure 6-12 — PROM replacement**

- 
3. **For IC U6** — Use a PLCC IC puller to remove the existing firmware IC. Squeeze the tool to align its hooks with the slots in opposite corners of socket U6. Insert the hooks, squeeze gently, and pull the IC straight out of the socket. Set the IC aside.
  4. **For ICs U1 and U2** — Use your fingertips to grasp the edges of the existing firmware IC and pull the IC straight out of the socket. Set the IC aside.
  5. Note the key (notch) of the new firmware IC. Orient the IC to match the key on the socket, and carefully press the IC in place.
  6. If the controller card was removed from a switcher, reinstall the controller card, see “Installing the controller card” in this chapter.

## Installing the controller card

**NOTE** *The controller cards are hot-swappable. You do not need to power down the switcher to install a controller card.*

1. If necessary, open and remove the front door.
2. If necessary, turn the left and right knurled knobs on the fan assembly door ¼-turn counterclockwise. Raise the door and rest it on the roof of the power distribution enclosure.

**CAUTION** *Do not touch the electronic components or the connectors on the power distribution plane or on the circuit cards without being electrically grounded. Handle cards by their edges only. ESD can damage ICs, even if you cannot feel, see, or hear it.*

3. Orient the card to be installed so that the connector is on top (figure 6-11).
4. Pivot the ejector handle out and away from the center of the card.
5. Identify the correct location for the card. Align the top and bottom edges of the card with the guides. Gently slide the card into the cardcage ensuring that the bottom edge slides into the bottom guide. Continue sliding the card into the guides until the ejector handle contacts the guide frame.
6. Gently pivot the ejector lever in and down to seat the card in the power distribution plane.
7. If the card installed is a replacement, set the DIP switches on the rear edge of the card to the same setting as the card that was removed from this location.
8. Close the fan assembly door and turn the left and right knurled knobs ¼-turn clockwise.

**CAUTION** *Ensure that you close and secure the fan assembly door when you have finished this maintenance procedure. The Matrix 12800 may overheat otherwise.*

9. Close the front door.



## Upgrades and Maintenance, cont'd

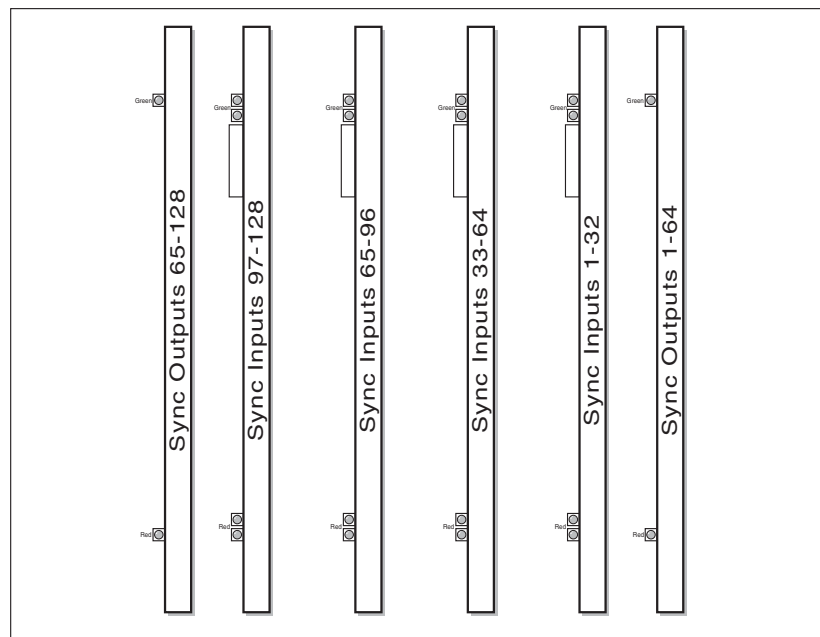
### Removing and Installing the I/O Card and Setting the Audio Gain

**NOTE** The I/O cards are hot-swappable. You do not need to power down the switcher to remove an I/O card.

Input and output circuit cards (figure 6-13 through figure 6-15) can be replaced for fault correction. Audio output cards must be removed if you want to change the output audio gain. Beyond those actions, you can increase or decrease the I/O configuration (size) of the Matrix 12800 by adding or removing I/O cards and then rerunning the Virtualization/Control Program (see chapter 3, “[Virtualization/Control software](#)”).

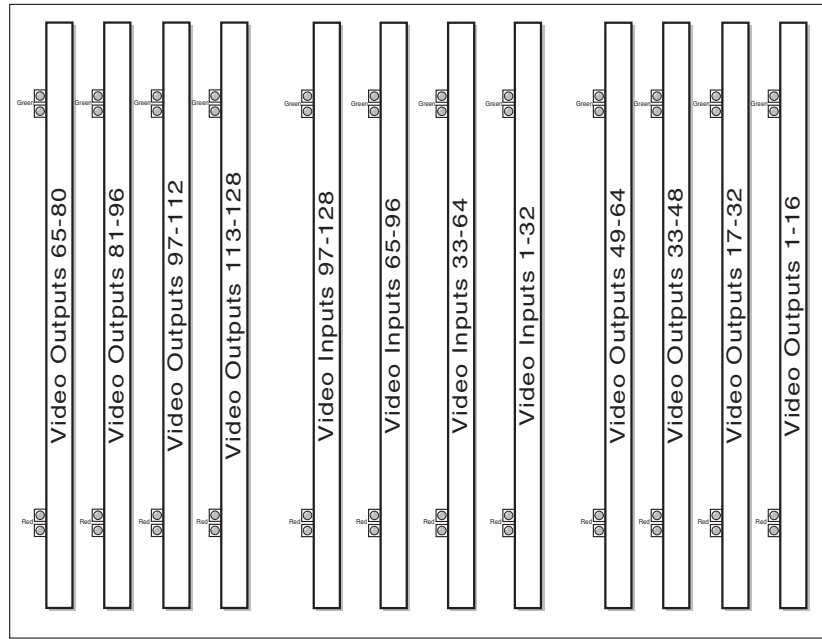
The following table identifies the number of inputs that each input card supports and the number of outputs that each output card supports. Use this table to determine how the size of the matrix changes with the removal or installation of a single card.

BME	Number of inputs per input card	Number of outputs per output card
Sync	32	64
Wideband/video	32	16
Audio	16	16



Front  
Sync cards

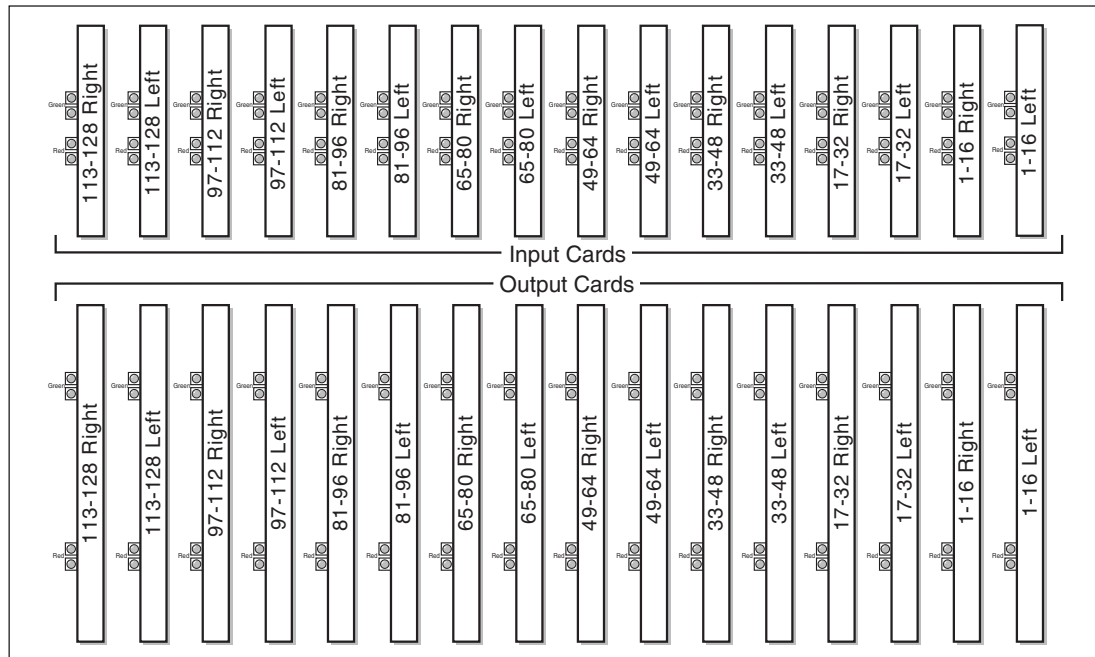
**Figure 6-13** — Arrangement of sync I/O cards in the cardcage



Front

Wideband and low resolution video cards

**Figure 6-14 — Arrangement of video I/O cards in the cardcage**



Input Cards

Output Cards

Front

Audio cards

**Figure 6-15 — Arrangement of audio input and output cards in the cardcage**

# Upgrades and Maintenance, cont'd

## Removing the I/O card

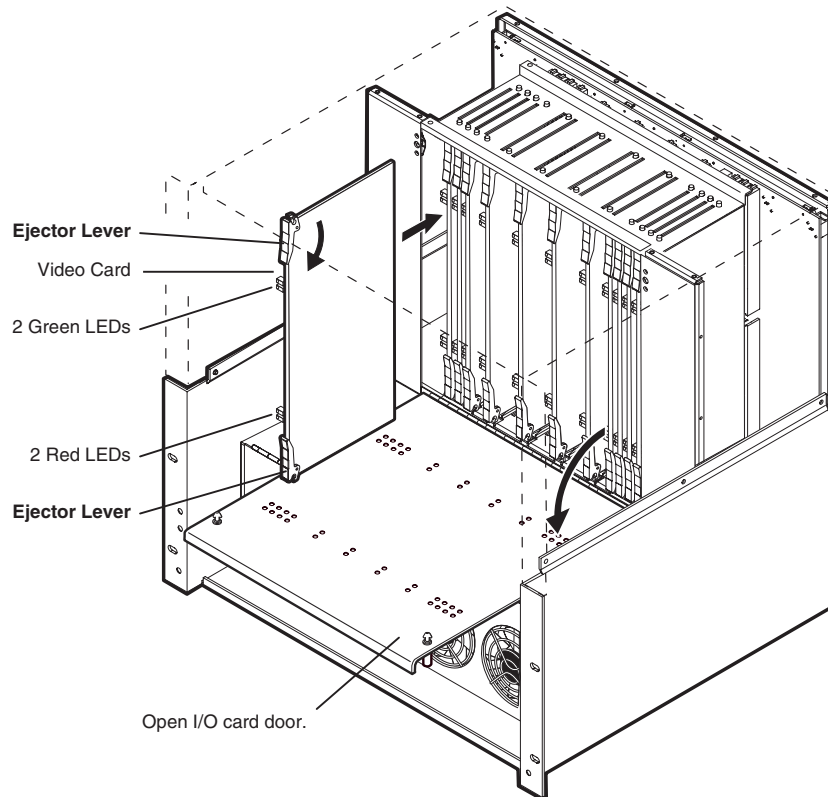
Remove I/O cards as follows:

1. Open the front door.
2. On the I/O cardcage door, turn the left and right knurled knobs ¼-turn counterclockwise. Lower the door.

**CAUTION** Do not touch the electronic components or the connectors on the backplane or on the circuit cards without being electrically grounded. Handle circuit cards by their edges only. ESD can damage ICs, even if you cannot feel, see, or hear it.

3. Grasp the ejector levers on the card to be removed (figure 6-16). Pivot the ejector levers out and away from the center of the card to lever the circuit card out of the backplane.
4. Slide the card out of the cardcage.
5. Place the removed card on an anti-static surface or in an anti-static container.
6. If a replacement card is not being installed immediately, raise the I/O cardcage door to vertical and turn the left and right knurled knobs ¼-turn clockwise.
7. If a replacement card is not being installed immediately, close the front door.

**NOTE** If this circuit card removal is a permanent change to the size of the matrix, the system must be virtualized again to recognize the change. Virtualize the system using the detailed instructions in chapter 3, “[Virtualization/Control Software](#)”.



**Figure 6-16 — I/O card replacement**

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## Setting the default audio gain

By default, the audio gain of each output is set to 0 dB (unbalanced) and 6 dB (balanced). You can reduce this setting by 6 dB (-6 dB [unbalanced], 0 dB [balanced]). Change the audio gain for one or more outputs as follows:

**CAUTION** Do not touch the electronic components or the connectors on the backplane or on the circuit cards without being electrically grounded. Handle circuit cards by their edges only. ESD can damage ICs, even if you cannot feel, see, or hear it.

**NOTE** Remove two cards for a stereo output and one card of a mono output.

1. Use the table below and figure 6-15 on page 6-17 to identify the cards for the output to be set.

Output	Output cards (stereo)	Output card (mono)
1 - 16	Left 1, Right 1	Left 1
16 - 32	Left 2, Right 2	Left 2
33 - 48	Left 3, Right 3	Left 3
49 - 64	Left 4, Right 4	Left 4
65 - 80	Left 5, Right 5	Left 5
81 - 96	Left 6, Right 6	Left 6
97 - 112	Left 7, Right 7	Left 7
113 - 128	Left 8, Right 8	Left 8

**CAUTION** Do not touch the electronic components or the connectors on the backplane or on the circuit cards without being electrically grounded. Handle circuit cards by their edges only. ESD can damage ICs, even if you cannot feel, see, or hear it.

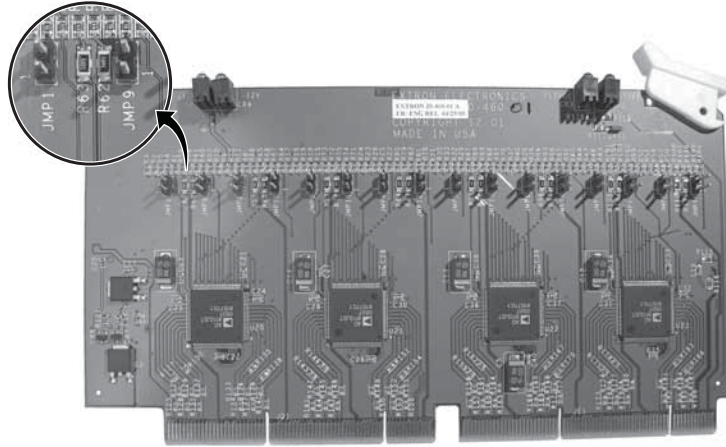
**NOTE** The audio output cards are the longer cards in the bottom row, inside the I/O cardcage door of an audio BME.

2. Remove the audio output cards from the card. See "[Removing the I/O card](#)", on the previous page. Place the removed card on an anti-static surface with the jumpers facing up.

**NOTE** The audio cards are shipped without jumpers. Jumpers are available using Extron part # **10-076-10**.

## Upgrades and Maintenance, cont'd

3. Locate the jumper block that corresponds to the output to be set (figure 6-17). JMP1 sets the gain for the first audio output associated with that card, JPM2 for the second audio output, and so on.



**Figure 6-17 — Audio output card jumpers**

4. Install a jumper across the block to set the -6 dB (unbalanced), 0 dB (balanced) gain level.  
Remove the jumper to set the 0 dB (unbalanced), 6 dB (balanced) level (default).
5. Reinstall the audio card. See “[Installing the I/O card](#)”, below.

### Installing the I/O card

**NOTE** *The I/O cards are hot-swappable. You do not need to power down the switcher to install an I/O card.*

Install I/O cards as follows:

1. If necessary, open the front door.
2. If necessary, turn the left and right knurled knobs on the I/O cardcage door ¼-turn counterclockwise. Lower the door.

**CAUTION** *Do not touch the electronic components or the connectors on the backplane or on the circuit cards without being electrically grounded. Handle circuit cards by their edges only. ESD can damage ICs, even if you cannot feel, see, or hear it.*

3. Orient the card to be installed so that the LEDs on the card are to your left (figure 6-13 through figure 6-15).
4. Identify the correct location for the card. Align the card with the top and bottom cardcage guides. Gently slide the card into the cardcage until the card meets resistance.
5. Hook the outer edge of the ejector levers behind the leading edge of the cardcage enclosure frame and gently pivot the ejector levers in and toward the center of the card to seat the card in the backplane.
6. If the card installed is a replacement for a sync input card, set the sync termination DIP switches on the rear edge of the card to the same setting as the card that was removed from this location.

7. Close the I/O cardcage door and turn the left and right knurled knobs ¼-turn clockwise.
8. Close the front door.

**NOTE** *If this circuit card installation is a permanent change to the size of the matrix, the system must be virtualized to recognize the change. Virtualize the system using the detailed instructions in chapter 3, "Virtualization/Control Software".*

## Troubleshooting

Matrix 12800 BME status information, available in the Virtualization/Control program, as a Web page, or viewable on the FPC 5000, show the operational status of each of the circuit cards, the power supplies, and the cooling fans in the Matrix 12800. To access the BME status via the Virtualization/Control program, click **Tools > Hardware Status**. Access the BME status via an HTML page by clicking a specific BME on the System Status page.

If a component fails, the indication turns red. On an HTML page, the airflow indication is expressed as a percentage of the maximum airflow.

### Power supplies

**NOTE** *If this BME does not have redundant power supplies, the switcher may or may not shut down for an out of tolerance voltage.*

**NOTE** *The power supply modules are hot-swappable. If this BME has redundant power supplies A and B, each power supply can be removed without powering down the switcher. If the BME does not have power supply redundancy, removing either primary power supply shuts down the matrix.*

#### LED Indicators

Top LED	Bottom LED	Status
On	On	Normal operation / In tolerance
Off	On	Failed / Out of tolerance
On	Off	Failed / Out of tolerance
Off	Off	Failed / Out of tolerance

#### Symptoms and Solutions

Symptom	Cause	Suggested solutions
One of the power supply LEDs is not lit. The status page indicates that one or more power supplies has failed.	One of the power supply voltages is out of tolerance.	<ol style="list-style-type: none"> <li>1. Remove and reseat the power supply.</li> <li>2. Swap this power supply with another power supply from the BME.</li> <li>3. Replace the power supply.</li> </ol>

# Upgrades and Maintenance, cont'd

## Controller cards

The controller cards have a green LED and a red LED that are visible through holes in the I/O cardcage door. In a BME with a redundant controller, the green LED on the active controller flashes to indicate that it is primary. In a BME with only one controller card, or if you pull one of the hot-swappable controller cards, both LEDs flash to indicate that the card is the primary controller.

**NOTE** *The controller cards are hot-swappable. If this BME has both primary and redundant controller cards, either controller card can be removed without powering down the switcher. If the BME does not have both primary and redundant controller cards, removing the controller card shuts down the matrix.*

### LED Indicators

Controller card	Green LED	Red LED	Status
Primary Redundant	Flashing On	Off Off	Normal operation / Card is active Normal operation / Primary card is active
Primary Redundant	On Flashing	Off Off	Normal operation / Secondary card is active Normal operation / Card is active
Primary Redundant	Flashing* Off	Flashing* Off	Primary card is active and operational Redundant card is failed or missing
Primary Redundant	Off Flashing*	Off Flashing*	Primary card is failed or missing Redundant card is active and operational

### Symptoms and Solutions

Symptom	Cause	Suggested solutions
The Matrix 12800 switcher has stopped. The status page indicates that one or more controller card(s) has failed.	The controller board has failed.	1. Remove and reseat the controller card. 2. Replace the controller card.*

\* Both LEDs on the active controller continue to blink for a few minutes after a controller card is replaced or resealed before returning to the normal operating status shown above.

## Input/output cards

The input and output cards have green LEDs and red LEDs that are visible through holes in the I/O cardcage door. The green LEDs indicate normal operation. A lit red LED indicates that the card has had a failure.

**NOTE** *The I/O cards are hot-swappable. You do not need to power down the switcher to remove an I/O card.*

### LED Indicators

Green LED (top)	Green LED	Red LED	Red LED (bottom)	Status
On	On	Off	Off	Normal operation
Off	Off	On	On	Card has failed
Off	Off	Off	On	Card seated incorrectly
Off	Off	On	Off	Card seated incorrectly

### Symptoms and Solutions

Symptom	Cause	Suggested solutions
One or more inputs or outputs does not function properly. A red LED is lit on the suspect card. The status page indicates that one or more input or output card(s) has failed.	The input or output board has failed.	<ol style="list-style-type: none"> <li>1. Remove and reseal the failed card.</li> <li>2. Replace the failed card.</li> </ol>

## Cooling

Symptom	Cause	Suggested solutions
The status page indicates reduced airflow.	There is an airflow restriction or one or more of the fans is not moving as much air as expected.	<ol style="list-style-type: none"> <li>1. Clean the front panel air filter.</li> <li>2. Replace the primary and redundant fan pair assemblies. Selectively reinstall the suspect assemblies to determine which has failed.</li> </ol>
The status page indicates that the primary or redundant fan pair has failed.	One of the fans in the fan pair has failed.	<ol style="list-style-type: none"> <li>1. Replace the failed fan pair assembly.</li> </ol>

## Communication with the FPC 5000

Symptom	Cause	Suggested solutions
The matrix switcher and the FPC 5000 cannot communicate.	There is a disagreement in the IP protocol settings between the matrix switcher and the FPC.	<ol style="list-style-type: none"> <li>1. Check that the FPC 5000 has the correct IP address for the Matrix 12800.</li> <li>2. Check that the FPC 5000 has the correct subnet mask value.</li> <li>3. Check all cable and network hardware.</li> </ol>



# Upgrades and Maintenance, cont'd

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# Matrix 12800 Switchers

# A

# Appendix A

## Ethernet Connection

[Ethernet Link](#)

[Subnetting — A Primer](#)

# Ethernet Connection

## Ethernet Link

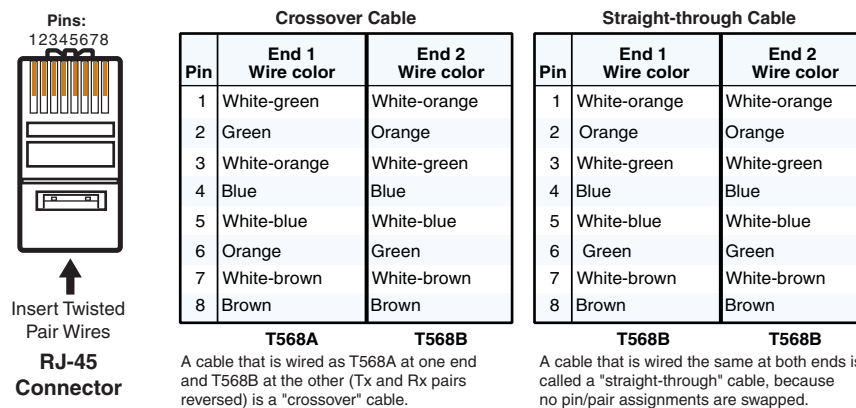
The rear panel Ethernet connector on the switcher can be connected to an Ethernet LAN or WAN. This connection makes SIS control of the switcher possible using a computer connected to the same LAN.



## Ethernet connection

The Ethernet cable can be terminated as a straight-through cable or a crossover cable and must be properly terminated for your application (figure A-1).

- **Crossover cable** — Direct connection between the computer and the switcher.
- **Patch (straight-through) cable** — Connection of the switcher to an Ethernet LAN.



**Figure A-1 — RJ-45 connector pinout tables**

## Default address

To access the switcher via the LAN port, you need the IP address of switcher. If the address has been changed to an address comprised of words and characters, you can determine the actual numeric IP address using the Ping utility. If the address has not been changed, the factory-specified default is 192.168.254.254.

Ping can also be used to test the Ethernet link to the switcher.

---

### Pinging to determine Matrix IP Address

The Microsoft® Ping utility is available at the DOS prompt. Ping tests the Ethernet interface between the computer and the switcher. Ping can also be used to determine the actual numeric IP address from an alias and to determine the web address.

Ping the switcher as follows:

1. On the Windows task bar, click on **Start > Run**.
2. At the Open prompt, type **command**.
3. Click the **OK** button.
4. At the DOS prompt, type **ping {IP address}** and then press [Enter]. The computer returns a display similar to figure A-2.

The line **Pinging ...** reports the actual numeric IP address, regardless of whether you entered the actual numeric IP address or an alias name.

```
C:\>ping 192.168.254.254

Pinging 192.168.254.254 with 32 bytes of data:

Reply from 192.168.254.254: bytes=32 time<10ms TTL=128
Reply from 192.168.254.254: bytes=32 time<10ms TTL=128
Reply from 192.168.254.254: bytes=32 time<10ms TTL=128
Reply from 192.168.254.254: bytes=32 time<10ms TTL=128

Ping statistics for 192.168.254.254:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

**Figure A-2 — Ping response**

### Pinging to determine Web IP address

The Ping utility has a modifier, *-a*, that directs the command to return the Web address rather than the numeric IP address.

At the DOS prompt, type **ping -a {IP address}** and then press [Enter]. The return display of the computer is similar to the Ping response shown in figure A-2, except that when you specify the *-a* modifier, the line **Pinging mail...** reports the web IP address rather than the numeric IP address, regardless of whether you entered the actual numeric IP address or an alias name.

## Ethernet Connection, cont'd

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### Connecting as a Telnet client

The Microsoft Telnet utility is available from the DOS prompt. Telnet allows you to input SIS commands to the switcher from the PC via the Ethernet link and the LAN.

Access the DOS prompt and start Telnet as follows:

1. On the Windows task bar, click on **Start > Run**.
2. At the Open prompt, type **command**.
3. Click the **OK** button.
4. At the DOS prompt, type **telnet** and then press [Enter]. The computer returns a display similar to figure A-3.

```
Microsoft (R) windows 2000 (TM) Version 5.0 (Build 2195)
Welcome to Microsoft Telnet Client
Telnet Client Build 5.00.99203.1

Escape Character is 'CTRL+]'

Microsoft Telnet>
```

**Figure A-3 — Telnet screen**

### Telnet tips

It is not the intention of this manual to detail all of the operations and functionality of Telnet; however, some basic level of understanding is necessary for operating the switcher via Telnet.

#### Open

Connect to the switcher using the Open command. Once you are connected to the switcher, you can enter the SIS commands the same as you would if you were using the RS-232 link.

Connect to the switcher as follows:

1. At the Telnet prompt, type **open {IP address}** and then press [Enter].  
**If the switcher is not password protected**, no further prompts are displayed until you break or disconnect the connection to the switcher.  
**If the switcher is password protected**, Telnet displays the password prompt.
2. If necessary, at the password prompt, type *{password}* and then press [Enter].

Connection to the switcher via the Ethernet can be password protected. There are two levels of password protection: administrator and user. A person logged on as an administrator has full access to all switching capabilities and editing functions. Users can select video, audio, or both for output, select test patterns, set audio or RS-232 mutes, select a blue screen, and view all settings with the exception of passwords. By default, the switcher ships with both passwords set to {carriage return}.

Once you are logged in, the switcher returns either **Login Administrator** or **Login User**. No further prompts are displayed until you break or disconnect the connection to the switcher.

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### Escape character and Esc key

When Telnet is first started, the utility advises that the **Escape character is 'Ctrl+['**. Many SIS commands include the keyboard **[Esc]** key. Consequently, some confusion may exist between the Escape character and the Escape key.

The Telnet Escape character is a key combination, the **[Ctrl]** key and the **[ ]** key pressed simultaneously, that returns you to the Telnet prompt while leaving the connection to the switcher intact.

The Escape key is the **[Esc]** key on the computer keyboard.

### Local echo

Once connected to the switcher, by default, Telnet does not display your keystrokes on the screen. SIS commands are typed in blindly and only the SIS responses are displayed on the screen. To command Telnet to show keystrokes, at the Telnet prompt, type **set local\_echo** and then press **[Enter]** before you open the connection to the switcher.

With local echo turned on, keystrokes and the responses of the switcher are displayed on the same line. For example: **1\*1!In1 Out1 All**, where **1\*1!** is the SIS command and **In1 Out1 All** is the response.

With local echo turned on, all keystrokes are displayed, even those that should be masked, such as the password entry. For example, when entering a password with local echo turned on, you see a display such as **a\*d\*m\*i\*n\***, where **admin** is the keyed in password and **\*\*\*\*\*** is the masked response.

You can turn off local echo by typing **unset local\_echo** and then pressing **[Enter]** at the Telnet prompt. If you are connected to the switcher and need to access the Telnet prompt to turn local echo off, type the Escape character (**[Ctrl+ ]**).

### Set carriage return-line feed

Unless commanded otherwise, Telnet transmits a line feed character only (no carriage return) to the connected switcher when you press the **[Enter]** key. This is the correct setting for SIS communication with the switcher. The Telnet **set crlf** command forces Telnet to transmit carriage return and line feed characters when **[Enter]** is pressed, but if **crlf** is set, the SIS link with the switcher does not function properly.

### Close

To close the link to the switcher, access the Telnet prompt by typing the Escape character (**[Ctrl+ ]**). At the Telnet prompt, type **close** and then press **[Enter]**.

### Help

For Telnet command definitions, at the Telnet prompt, type **?** and then press **[Enter]**.

### Quit

Exit the Telnet utility by typing **quit** and then pressing **[Enter]** at the Telnet prompt. If you are connected to the switcher, access the Telnet prompt by typing the Escape character (**[Ctrl+ ]**).

# Ethernet Connection, cont'd

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## Subnetting — A Primer

It is not the purpose of this manual to describe TCP/IP protocol in detail. However, some understanding of TCP/IP subnetting (a subnet is a **subset** of a **network** — a set of IP devices that have portions of their IP addresses in common) is necessary in order to understand the interaction of the switcher and the mail server gateway. To understand subnetting at the level required to install and operate the switcher, you must understand the concepts of a gateway, local and remote devices, IP addresses and octets, and subnet masks and octets.

## Gateways

The switcher can communicate with the e-mail server that the switcher uses for e-mail notification directly (if they are on the same subnet) or the communication can be routed via a gateway (a computer that provides a link between different subnets).

## Local and remote devices

The local and remote devices are defined from the point of view of the function being described. In this manual, subnetting is an issue when you are using the controlling PC to set TCP/IP values in the switcher (see “[Ethernet protocol settings](#)” in chapter 3, “Virtualization/Control Software”, and “[System Configuration page](#)” in chapter 5, “Web Operations”).

## IP addresses and octets

Valid IP addresses consist of four 1-, 2-, or 3-digit numeric subfields, properly called octets, separated by dots (periods) (figure A-4). Each octet can be numbered from 000 through 255. Leading zeroes, up to three digits total per octet, are optional. Values of 256 and above are invalid.

Typical IP Address: 192,168,254,254  
Octets

**Figure A-4 — IP address and octets**

## Subnet masks and octets

The subnet mask (figure A-5) is used to determine whether the local and remote devices are on the same subnet or different subnets. The subnet mask consists of four numeric octets separated by dots. Each octet can be numbered from 000 through 255. Leading zeroes, up to three digits total per octet, are optional. Each octet typically contains either 255 or 0. The octets determine whether or not the same octets of two IP addresses are compared when determining if two devices are on the same subnet.

255 indicates that this octet will be compared between two IP addresses.      0 indicates that this octet will **not** be compared between two IP addresses.

Typical Subnet Mask: 255,255,0,0  
Octets

**Figure A-5 — Subnet mask and octets**

## Determining whether devices are on the same subnet

To determine the subnet, the IP address of the local device is **compared** to the IP address of the remote device (figure A-6). Each octets of each address are **compared** or **not compared**, depending on the value in the related subnet mask octet.

- If a subnet mask octet contains the value 255, the related octets of the IP address of the local and remote devices addresses are unmasked.

**Unmasked octets are compared** (indicated by ? in figure A-6).

- If the subnet mask octet contains the value 0, the related octets of the IP addresses of the local and remote devices are masked.

**Masked octets are not compared** (indicated by X in figure A-6).

If the unmasked octets of the two IP addresses **match** (indicated by = in figure A-6) (example 1), the two addresses **are on the same subnet**.

If the two unmasked fields **do not match** (indicated by ≠ in figure A-6) (example 2 and example 3), the addresses **are not on the same subnet**.

	Example 1	Example 2	Example 3
Local IP Address:	192.168.254.254	192.168.254.254	192.168.254.254
Subnet Mask:	255.255.0.0 (??.X.X)	255.255.0.0 (??.X.X)	255.255.0.0 (??.X.X)
Remote IP Address:	192.168.2.25	190.190.2.25	192.190.2.25
Match?:	=.X.X — <b>Match</b> (Same subnet)	≠.X.X — <b>No match</b> (Different subnet)	≠.X.X — <b>No match</b> (Different subnet)

**Figure A-6 — Comparing the IP addresses**



# Ethernet Connection, cont'd

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# Matrix 12800 Switchers

# Appendix B

## Reference Information

Specifications

Part Numbers and Accessories

# Reference Information

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## Specifications

### Video— wideband/video BMEs

Routing .....	32 x 16 or larger matrix up to 128 x 128, depending on the configuration
Gain .....	Unity
Bandwidth	
Wideband models .....	375 MHz (-3 dB), fully loaded
0 - 10 MHz .....	No more than +0.1 dB to -0.1 dB
0 - 130 MHz .....	No more than +4 dB to -25 dB
Video models .....	150 MHz (-3 dB), fully loaded
0 - 10 MHz .....	No more than +0.1 dB to -0.1 dB
0 - 130 MHz .....	No more than +0.5 dB to -0.5 dB
Phase between I/Os .....	<1.28° at 3.58 MHz
Differential phase error .....	0.1%, 3.58 to 4.43 MHz
Differential gain error .....	0.1°, 3.58 to 4.43 MHz
Max. propagation of delay .....	5 ns typical (±1 ns)
Crosstalk .....	-80 dB @ 1 MHz, -62 dB @ 10 MHz, -52 dB @ 30 MHz
Switching speed .....	200 ns (max.)

### Video input— wideband/video BMEs

Number/signal type	
Wideband models .....	Up to 128 (varies with configuration) RGBHV, RGBS, RGsB, RsGsBs, component video, S-video, composite video
Video models .....	Up to 128 (usable quantity varies with configuration) component video, S-video, composite video
Connectors .....	128 female BNC (usable quantity varies with model)
Nominal levels .....	1 Vp-p for Y of component video and S-video, and for composite video 0.7 Vp-p for RGB and for R-Y and B-Y of component video 0.3 Vp-p for C of S-video
Minimum/maximum levels .....	Analog: 0.5 V to 1.5 Vp-p with no offset
Impedance .....	75 ohms
Return loss .....	<-30 dB @ 5 MHz

### Video output— wideband/video BMEs

Number/signal type .....	Up to 128 (varies with configuration) RGBHV, RGBS, RGsB, RsGsBs, component video, S-video, composite video
Connectors .....	128 female BNC (usable quantity varies with model)
Nominal levels .....	1 Vp-p for Y of component video and S-video, and for composite video 0.7 Vp-p for RGB and for R-Y and B-Y of component video 0.3 Vp-p for C of S-video
Maximum level .....	2 Vp-p
Impedance .....	75 ohms
Return loss .....	-25 dB to input section @ up to 50 MHz
DC offset .....	±10 mV typical with input at 0 offset
Switching type .....	Triple-Action™
Slew rate .....	>200 V/ms

### Sync— sync BME

Input and output types .....	Software configurable for RGBHV or RGBS
Sync connectors .....	Up to 128 female BNC (usable quantity varies with configuration)
Input level .....	0.5 V to 5 Vp-p (4 Vp-p nominal)
Output level .....	5 Vp-p
Gain .....	AGC to TTL: 4.0 V to 5.0 Vp-p

---

Input impedance .....	Inputs 1 - 32: 510 ohms or 75 ohms, switchable Inputs 33 - 128: 510 ohms
Output impedance .....	75 ohms
Horizontal frequency.....	15 kHz to 150 kHz
Vertical frequency.....	30 Hz to 150 Hz
Polarity.....	Positive or negative (follows input)

### Audio— audio BME

Routing .....	16 x 16 up to 128 x 128 mono or stereo matrix (in increments of 16), balanced/unbalanced
Gain (selectable per output) .....	Unbalanced output: 0dB (as shipped), or -6 dB (jumper-selectable) Balanced output: +6 dB (as shipped), or 0 dB (jumper-selectable)
Frequency response .....	20 Hz to 20 kHz, $\pm 0.05$ dB
THD + Noise.....	0.03% @ 20 Hz to 20 kHz, +15 dBu input, +21 dBu output
S/N.....	>85 dB, balanced, at rated maximum output
Crosstalk.....	<-70 dB @ 20 Hz to 20 kHz fully loaded
Stereo channel separation .....	>70 dB @ 20 Hz to 20 kHz
CMRR.....	>+75 dB, 20 Hz to 20 kHz

### Audio input— audio BME

Number/signal type.....	16 to 128 (in increments of 16) mono or stereo, balanced/unbalanced
Connectors .....	(16 to 128) 3.5 mm captive screw connectors, 5 pole
Impedance.....	>10k ohms unbalanced/balanced, DC coupled
Nominal level .....	+4 dBu (1.23V), 0 dBu (0.775 V), -10 dBV (316 mV), -20 dBV (100 mV)
Maximum level.....	+21.5 dBu, (balanced or unbalanced) at 1%THD+N
Input gain adjustment .....	-24 dB to +9 dB, adjustable per input via RS-232 control or front panel

**NOTE**     $0 \text{ dBu} = 0.775 \text{ Vrms}$ ,  $0 \text{ dBV} = 1 \text{ Vrms}$ ,  $0 \text{ dBV} \approx 2 \text{ dBu}$

### Audio output— audio BME

Number/signal type.....	16 up to 128 (in increments of 16) mono or stereo, balanced/unbalanced
Connectors .....	(16 to 128) 3.5 mm captive screw connectors, 5 pole (quantity varies with configuration)
Impedance.....	50 ohms unbalanced, 100 ohms balanced
Gain error .....	$\pm 0.1$ dB channel to channel
Maximum level (Hi-Z) .....	>+26.0 dBu, balanced at 1%THD+N
Maximum level (600 ohm).....	>+24.0 dBm, balanced at 1%THD+N

### Control/remote — switcher

Serial control port.....	RS-232 or RS-422, female 9-pin D connector
Baud rate and protocol.....	9600 baud, 8 data bits, 1 stop bit, no parity
Serial control pin configurations.	2 = TX, 3 = RX, 5 = GND
Ethernet control port.....	1 female RJ-45 connector
Ethernet data rate.....	10/100Base-T, half/full duplex with autodetect
Ethernet protocol.....	ARP, ICMP (ping), IP, TCP, HTTP, SMTP, Telnet
System intercommunications .....	2 RJ-45 connectors
Remote key pad control .....	(2) 5 mm, 5-pole captive screw connectors
Program control.....	Extron control/configuration program for Windows® Extron Simple Instruction Set (SIS™) Microsoft® Internet Explorer®, Netscape® Navigator®, Telnet

## Reference Information, cont'd

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### General

Power*	2 (positive-negative), 100 VAC to 240 VAC, 50-60 Hz; internal Matrix 12800 wideband: 150 watts at 115 VAC, 60 Hz Matrix 12800 sync: 100 watts at 115 VAC, 60 Hz Matrix 12800 audio: 300 watts at 115 VAC, 60 Hz *A redundant power supply is available.
Temperature/humidity	Storage: -40 to +158 °F (-40 to +70 °C) / 10% to 90%, noncondensing Operating: +32 to +122 °F (0 to +50 °C) / 10% to 90%, noncondensing
Cooling	Fan, air flows from front to sides
Mounting	
Rack mount	Yes
Enclosure type	Metal
Enclosure dimensions	17.5" H x 17.0" W x 16.0" D (10U high, full rack wide) 44.4 cm H x 43.2 cm W x 40.6 cm D (Depth excludes connectors. Width excludes rack ears.)
Product weight	
Matrix 12800 wideband	57.4 lbs (26.0 kg)
Matrix 12800 sync	54.0 lbs (24.5 kg)
Matrix 12800 audio	43.9 lbs (19.9 kg)
Shipping weight	
Matrix 12800 wideband	76.7 lbs (35 kg)
Matrix 12800 sync	73.3 lbs (34 kg)
Matrix 12800 audio	66 lbs (30 kg)
DIM weight, international	77 lbs (35 kg)
Vibration	ISTA 1A in carton (International Safe Transit Association)
Regulatory compliance	
Safety	CE, c-UL, UL
EMI/EMC	CE, C-tick, FCC Class A, ICES, VCCI
MTBF	30,000 hours
Warranty	3 years parts and labor

**NOTE** All nominal levels are at  $\pm 10\%$ .

**NOTE** Specifications are subject to change without notice.

## Part Numbers and Accessories

### Matrix 12800 BMEs

Call the Extron S3 Sales & Technical Support Hotline for part numbers. See the rear cover of this manual for the phone number in your region of the world.

### Optional accessories

These items can be ordered separately:

Controllers, connectors, and adapters	Part number
FPC 5000 Front Panel Controller	60-503-01
MKP 1200 Remote Keypad	60-528-01
MKP 1000 Remote Keypad	
Black	60-239-02
White	60-239-03
WT (water-tight) (black)	60-239-52
WT (white)	60-239-53
MCP 1000M Matrix Control Panel	60-298-01
MCP 1000S Secondary	60-298-02
MKP 2000 Matrix Switcher X-Y Remote Control Panel (black)	60-682-02
MKP 3000 X-Y Remote Control Panel with LCD Display (black)	60-708-02
3.5 mm captive screw connectors, qty. 10	100-457-01
RCAF-BNCM RCA-to-BNC adapter, qty. 10, 50, 100	100-229-01, -03, -04
SVHSM-BNCF 8" S-video-to-BNC adapter, qty. 10	26-353-01
Pin programming jumper, qty. 1	10-076-10

### Cables

When using signals with a scanning frequency of 15-125 kHz and running distances of 100 feet (30 m) or more, use high resolution BNC cables to achieve maximum performance.

#### Bulk cable and termination tools

RG6 super high resolution cable	Part number
RG6/500 non-plenum 1-conductor, 500' (150 m)	22-098-02
RG6/1000 non-plenum 1-conductor, 1000' (300 m)	22-098-03
RG6P/500 plenum 1-conductor, 500' (150 m)	22-164-02
RG6P/1000 plenum 1-conductor, 1000' (300 m)	22-164-03

MHR mini high resolution cable	Part number
MHRVGA/1000 non-plenum 5-conductor, 1000' (300 m)	22-024-03
MHR-2/500 non-plenum 2-conductor, 500' (150 m)	22-123-03
MHR-2P/500 plenum 2-conductor, 500' (150 m)	22-129-03

## Reference Information, cont'd

Termination tools and connectors	Part number
CTU 300 universal crimp tool	100-241-02
BNC Male RG6 Crimp Connectors (qty. 100)	100-339-01
BNC Male MHR Cable Crimp Connectors (qty. 100)	100-335-01
CTU 100 universal compression tool (BNC, F, RCA)	100-181-01
BNC Male RG6 Compression Connectors - Nickel/50 (qty. 50)	100-188-01
BNC Male MHR Compression Connectors - Nickel/50 (qty. 50)	100-186-01
BNC Male RG59P Compression Connectors - Nickel/50 (qty. 50)	100-212-01

### Terminated cable assemblies

S-video cables	Part number
MHR-2 SVM-M, 6' to 100' (1.8 m to 30.4 m)	26-316- <i>nn</i>
MHR-2P SVM-M, Plenum, 6' to 100' (0.9 m to 30.4 m))	26-522- <i>nn</i>

Composite video male-to-male cables	
RG6 BNC, 3' to 100' (0.9 m to 30.4 m)	26-383- <i>nn</i>

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Extron Electronics warrants this product against defects in materials and workmanship for a period of three years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron Electronics will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

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Anaheim, CA 92805  
U.S.A.

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Chiyoda-ku, Tokyo 102-0082  
Japan

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3825 PH Amersfoort  
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686 Ronghua Road  
Songjiang District  
Shanghai 201611  
China

**Asia:**

Extron Asia  
135 Joo Seng Road, #04-01  
PM Industrial Bldg.  
Singapore 368363  
Singapore

**Middle East:**

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F12, PO Box 293666  
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**NOTE:** If a product is defective, please call Extron and ask for an Application Engineer to receive an RA (Return Authorization) number. This will begin the repair process.

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