

User's Manual



TPX 88 and TPX 88 A

Twisted Pair Matrix Switcher Twisted Pair Matrix Switcher with Local Audio Outputs

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。按照生产的建议处理废弃电池。

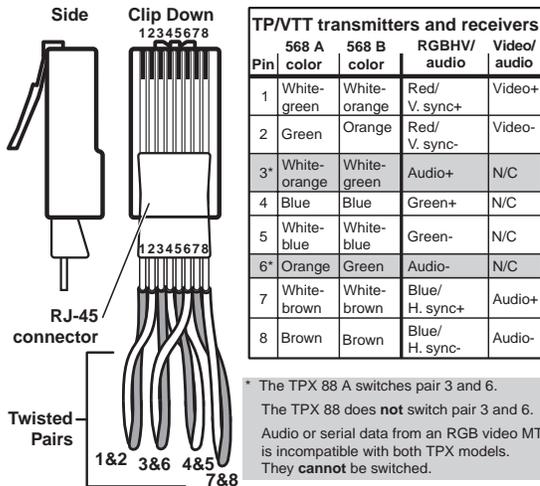
Quick Start — TPX Matrix Switchers

Installation

Step 1 — Turn off power

Step 2

Cable the switcher for twisted pair input and output. See *Termination of TP cable* in chapter 2, *Installation*, to properly terminate the RJ-45 connectors.



TP/VTT transmitters and receivers				
Pin	568 A color	568 B color	RGBHV/ audio	Video/ audio
1	White-green	White-orange	Red/ V. sync+	Video+
2	Green	Orange	Red/ V. sync-	Video-
3*	White-orange	White-green	Audio+	N/C
4	Blue	Blue	Green+	N/C
5	White-blue	White-blue	Green-	N/C
6*	Orange	Green	Audio-	N/C
7	White-brown	White-brown	Blue/ H. sync+	Audio+
8	Brown	Brown	Blue/ H. sync-	Audio-

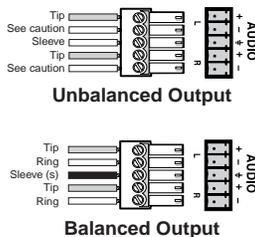
* The TPX 88 A switches pair 3 and 6.
 The TPX 88 does **not** switch pair 3 and 6.
 Audio or serial data from an RGB video MTP is incompatible with both TPX models. They **cannot** be switched.

NOTE If you are using Enhanced Skew-Free™ A/V cable, use the TIA/EIA T 568A standard only.

MTP transmitters and receivers					
Pin	568 A Color	568 B Color	Video MTP	S-video MTP	RGB video MTP
1	White-green	White-orange	Video +	Luma (Y) +	Red/ V. Sync +
2	Green	Orange	Video -	Luma (Y) -	Red/ V. Sync -
3*	White-orange	White-green	NONE	NONE	Mono audio + or RS-232 + (MTP 15HD only)
4	Blue	Blue	Audio left +	Chroma (C) & audio left +	Green +
5	White-blue	White-blue	Audio left -	Chroma (C) & audio left -	Green -
6*	Orange	Green	NONE	NONE	Mono audio - or RS-232 - (MTP 15HD only)
7	White-brown	White-brown	Audio right +	Audio right+	Blue/ H. Sync +
8	Brown	Brown	Audio right -	Audio right -	Blue H. Sync -

Step 3

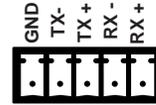
TPX 88 A: Cable the switcher for stereo audio output.



CAUTION Connect the sleeve to ground. Connecting the sleeve to a negative (-) terminal will damage the audio output circuits.

Step 4

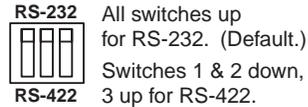
If desired, connect a control system or computer to the Remote (RS-232/RS-422) port.



Pin	RS-232	Function	RS-422	Function
Gnd	Gnd	Signal ground	Gnd	Signal ground
TX-	—	Not used	TX-	Transmit data (-)
TX+	TX+	Transmit data	TX+	Transmit data (+)
RX-	—	Not used	RX-	Receive data (-)
RX+	RX+	Receive data	RX+	Receive data (+)

Step 5

Set the rear panel Remote DIP switches.



RS-232 All switches up for RS-232. (Default.)
 RS-422 Switches 1 & 2 down, 3 up for RS-422.

Step 6

Plug the switcher and input and output devices into a grounded AC source, and turn on the input and output devices.

Definitions

Tie — An input-to-output connection.

Set of ties — An input **typed** to 2 or more outputs.

Configuration — One or more **ties** or **sets of ties**.

Current configuration — The currently active **configuration** (also called **configuration 0**).

Global preset — A **configuration** that has been stored. One **preset** can be assigned to each input button. When a **preset** is retrieved from memory, it becomes the **current configuration**.

Front Panel Controls

Input and output buttons and LEDs select and identify inputs and outputs. Input buttons also select presets. **On the TPX 88 A**, the input and output LEDs also display the audio levels.

Enter button saves changes when you change the configuration.

Preset button saves a configuration as a preset or recalls a previously-defined preset.

Quick Start — TPX 88 Matrix Switchers, cont'd

View button selects a view-only mode that prevents inadvertent configuration changes.

Esc button cancels selections in progress and resets the front panel LEDs. The Esc button does **not** reset the current configuration, the Video and Audio LEDs, any presets, or any audio gain/attenuation settings.

(TPX 88 A only) I/O button selects/deselects video and/or audio. The I/O button also selects the audio level adjust mode.

(TPX 88 A only) Video and audio LEDs indicate that video and/or audio is selected for configuration.

(TPX 88 A only) Mute All button mutes and unmutes all audio outputs.

(TPX 88 A only) Volume knob adjusts the input level or output volume in audio level adjust mode.

Create a tie

1. Press and release the I/O button to select audio and/or video.



2. Press and release the desired input button.

Amber indicates **video** and **audio** (audio follow).
Green indicates **video** only (audio breakaway).
Red indicates **audio** only (audio breakaway)



3. Press and release the desired output button(s).

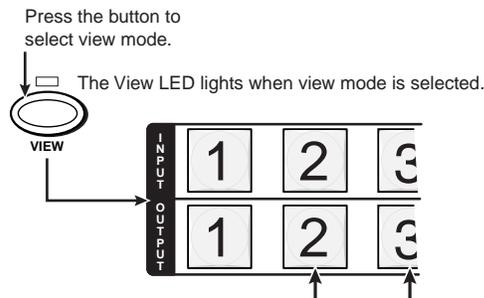
Amber indicates **video** and **audio** tie.
Green indicates **video** tie.
Red indicates **audio** tie.



4. Press and release the Enter button.

View ties

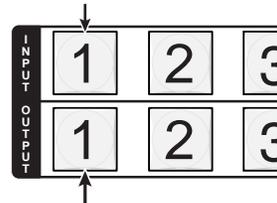
1. Press and release the View button.



The buttons for all untied outputs light until you select an input.

2. Press and release the desired input.

Press and release an input button.
The button lights.

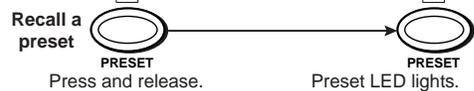
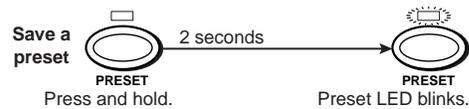


The buttons for all tied outputs light.
The buttons for all untied outputs are unlit.

3. Press and release the View button to exit view mode.

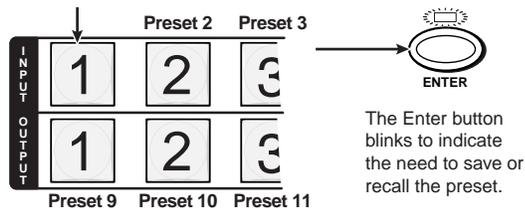
Save or recall a preset

1. **Save a preset** — Press and **hold** the Preset button for 2 seconds.



2. Press and release the desired input or output button.

Press and release the input 1 button to select **preset 1**.
The button blinks.



3. Press and release the Enter button.

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TPX 88 Twisted Pair Matrix Switchers

Chapter One

Introduction

About the TPX 88 Manual

About the TP A/V System

About Both TPX Switcher Models

About the TPX 88 A Switchers

Features

Introduction

About the TPX 88 Manual

This manual provides installation, operation, and maintenance information for the Extron TPX 88 and TPX 88 A matrix switchers. The TPX switchers are 8-input by 8-output matrix switchers for routing the signals that Extron twisted pair (TP) transmitters and receivers use to distribute video and audio signals in an A/V system.

In this manual, the term “TPX 88” is generally used to identify both twisted pair matrix switchers. If a specific discussion relates to the audio version only, the term “TPX 88 A” is used.

In this manual, the terms “twisted pair transmitter” and “twisted pair receiver” refer to any transmitter or receiver listed in the table on the following pages; the terms “TP transmitter” and “TP receiver” refer specifically to members of the TP family of Extron twisted pair transmitters and receivers, such as the TP T 15HD A and the TP R BNC A.

Besides the TPX 88’s video signal routing capabilities, the TPX 88 A can route the TP transmitter family’s digital audio outputs, switching the audio with the video (audio follow) or separate from the video (audio breakaway). The TPX 88 A can also process the audio, adjusting the gain and attenuation, and output the audio locally on the switcher’s rear panel.

About the TP A/V System

The Extron twisted pair transmitters, twisted pair receivers, and TP matrix switchers provide a system for long-distance distribution of video and stereo or mono audio over Extron’s Enhanced Skew-Free™ A/V unshielded twisted pair (UTP) cable or over Category (CAT) 5 UTP, shielded twisted pair (STP), or foil shielded twisted pair (FTP) cable. The table on the following page lists the Extron transmitters and receivers that are compatible with the TPX units and their video and audio capabilities. With adapters, many RGBHV twisted pair products can also distribute component, S-video and/or composite video.

TP cable advantages

Extron’s Enhanced Skew-Free A/V UTP cable and CAT 5 cable are a fraction of the size of coaxial cable, as well as being much lighter, more flexible, and far less expensive. These TP products make cable runs simpler and less cumbersome. Termination of the cable with RJ-45 connectors is simple, quick, and economical.

Extron twisted pair products' attributes

Family	Model	RGBHV	Component/ HDTV	S-video	Composite	Audio		
TP	Transmitters	TP T 15HD AV	Yes	Optional	Optional	1 Optional 1 Yes	Stereo (2)	
		TP T 15HD A	Yes	Optional	Optional	Optional	Stereo	
		TP T 15HD 45/ TP T A 45	Yes	Optional	Optional	Optional	Stereo	
		TP T BNC	Yes	Optional	Optional	Optional	No	
		TP T BNC DA4	Yes	Optional	Optional	Optional	No	
		TP T 460/468	Yes	Optional	Optional	Optional	Stereo	
		TP T AV	No	No	No	Yes	Stereo	
	Receivers	TP R BNC AV	Yes [☆]	Optional	Optional	1 Optional 1 Yes	Stereo (2)	
		TP R BNC A	Yes [☆]	Optional	Optional	Optional	Stereo	
		TP R 15HD A	Yes [☆]	Optional	Optional	Optional	Stereo	
		TP R AV	No	No	No	Yes	Stereo	
	MTP	Transmitters	MTP T 15HD A	Yes	Optional	Optional	Optional	Yes*
			SW2/4/6 MTP T 15HD A	Yes	Optional	Optional	Optional	Yes*
			MTP T 15HD RS	Yes	Optional	Optional	Optional	No
MTP T SV			No	No	Yes	No	No	
MTP T SV A			No	No	Yes	No	Yes [†]	
MTP T SV A RCA			No	No	Yes	No	Yes [†]	
MTP T SV A AAP			No	No	Yes	No	Yes [†]	
MTP T SV A 45			No	No	Yes	No	Yes [†]	
MTP T CV			No	No	No	Yes	No	
MTP T AV			No	No	No	Yes	Yes [†]	
MTP T AV RCA			No	No	No	Yes	Yes [†]	
MTP T AV AAP			No	No	No	Yes	Yes [†]	
MTP T AV 45		No	No	No	Yes	Yes [†]		
DA	MTP DA4/8	◆	◆	◆	◆	◆		

- * MTP transmits or receives audio, but the TPX 88 and TPX 88 A **cannot** switch this TP device's audio.
- † The TPX 88 and TPX 88 A switch the audio but cannot process it or output it locally.
- ◆ Video and audio capabilities are dependent on the MTP transmitter providing the input.
- ☆ The TPX 88 does not support the TP R receivers' automatic level and peaking feature or the input signal detect feature (the receiver's power LED lights amber only). Support of the automatic level and peaking and the signal detect features, requires the use of a TPX 88 A.

Introduction, cont'd

Extron twisted pair products' attributes (continued)

Family	Model	RGBHV	Component/ HDTV	S-video	Composite	Audio
MTP Receivers	MTP R 15HD A	Yes	Optional	Optional	Optional	Yes*
	MTP RL 15HD A	Yes	Optional	Optional	Optional	Yes*
	MTP RL 15HD A SEQ	Yes	Optional	Optional	Optional	Yes*
	MTP R 15HD RS	Yes	Optional	Optional	Optional	No
	MTP RL 15HD RS	Yes	Optional	Optional	Optional	No
	MTP RL 15HD RS SEQ	Yes	Optional	Optional	Optional	No
	MTP R SV	No	No	Yes	No	No
	MTP R SV A	No	No	Yes	No	Yes [†]
	MTP R SV A RCA	No	No	Yes	No	Yes [†]
	MTP R CV	No	No	No	Yes	No
	MTP R AV	No	No	No	Yes	Yes [†]
	MTP R AV RCA	No	No	No	Yes	Yes [†]
VTT/ VTR	Transmitter	VTT001CM	Yes	No	No	No
		VTT001 AAP	Yes	No	No	No
		IN1404XT	Yes	No	No	No
	Receiver	VTR001CM	Yes	No	No	No
		VTR001 AAP	Yes	No	No	No

* MTP transmits or receives audio, but the TPX 88 and TPX 88 A **cannot** switch this TP device's audio.

† The TPX 88 and TPX 88 A switch the audio but cannot process it or output it locally.

Transmission distances

The minimum reliable transmission distance between transmitters and receivers is 50 feet for most models. The maximum distance is determined by the output frequency, resolution, and the transmitter/receiver family. The table below lists the recommended maximum transmission distances for most transmitter/receiver families using Extron Enhanced Skew-Free A/V UTP cable, terminated with CAT 5 rated connectors.

NOTE Refer to each product's user manual to determine the ranges for that family of products.

Recommended transmission ranges at 60 Hz

Video format	Maximum ranges
Composite video, S-video, and component video and audio	800" (245 m) – 1000" (300 m)
640 x 480	500" (150 m) – 1000" (300 m)
800 x 600	400" (120 m) – 800" (245 m)
1024 x 768	300" (90 m) – 600" (185 m)
1280 x 1024	200" (60 m) – 450" (135 m)
1600 x 1280	150" (45 m) – 450" (135 m)

NOTE It is possible to exceed the recommended distances, however, image quality may be reduced.

NOTE Extron recommends using the highest quality cable available and affordable, with less than 8 nanoseconds/100 meters of skew (see Termination of TP cable in chapter 2). We also recommend the use of pre-terminated and tested cables. Cables terminated on site should be tested before use to ensure that they comply with Category 5 specifications.

NOTE Extron Skew-Free A/V UTP cable is recommended for most applications. CAT 5 cable can be satisfactorily used for some products (refer to each product's user manual). The system **can** be used with cable other than that recommended, but video performance **will be** compromised and maximum cable lengths and video resolutions **must be** decreased.

About Both TPX Switcher Models

The TPX switchers are single box solutions to simple twisted pair routing applications (figure 1-1). Each input and output is individually isolated and buffered, and any input(s) can be switched to any one or all outputs with virtually no crosstalk or signal noise between channels.

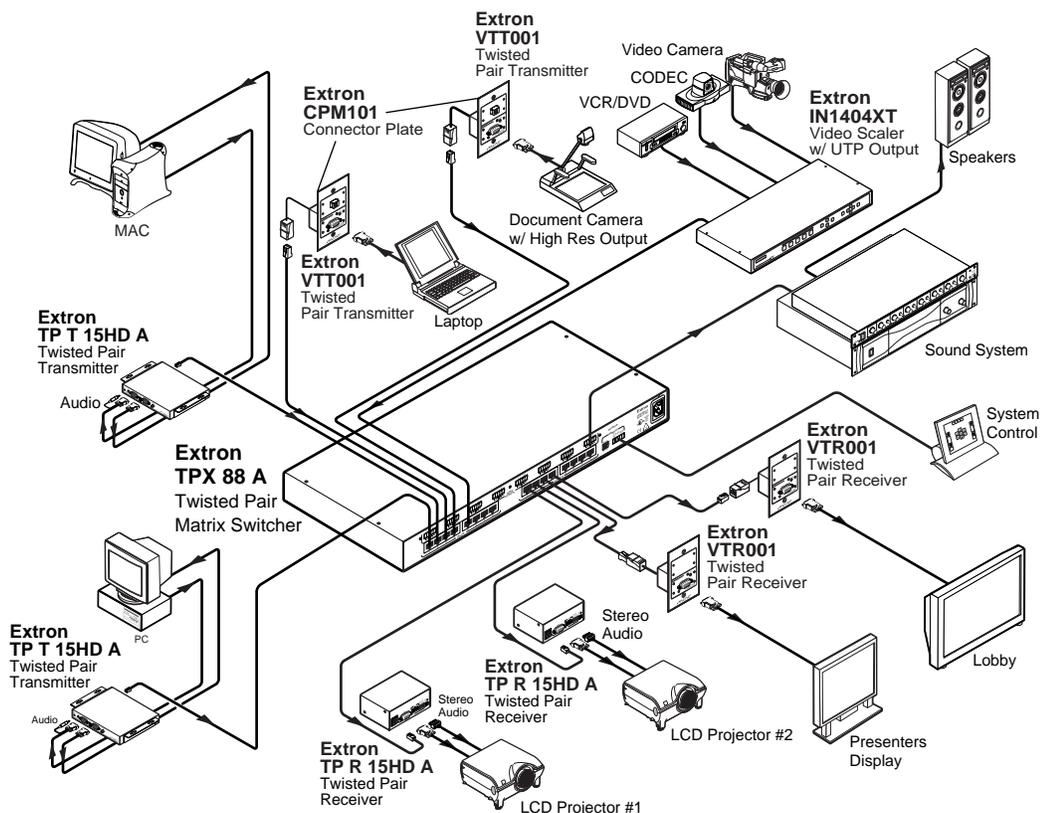


Figure 1-1 — Typical TPX 88 A matrix switcher application

The TPX 88 switchers support I/O grouping, a feature that lets you virtually divide the matrix into up to four smaller sub-switchers, making installation and control easier. I/O grouping allows you to separate different signal types to avoid connecting signal types from different, incompatible, transmitter/receiver families.

The TPX matrix switchers are housed in rack-mountable, 1U high, 17" wide metal enclosures. The appropriate rack mounting kit is included with each switcher, allowing you to mount the switcher in a standard 19" rack. Each model has an internal 100 VAC to 240 VAC, 50/60 Hz, 25 watts, auto-switchable, power supply that provides worldwide power compatibility.

NOTE Many twisted pair transmitters and receivers have the ability for one component of the pair to provide power for the other (such as a TP R BNC A providing the power for a TPT BNC).

The TPX 88 cannot power connected twisted pair transmitters and receivers. The TPX 88 cannot switch the power that a twisted pair transmitter or receiver supplies to a twisted pair receiver or transmitter.

In a twisted pair system that includes a TPX 88, both the twisted pair transmitter and the twisted pair receiver must be powered locally. The appropriate power supply is included with the transmitters and receivers.

The TPX switcher can be remotely controlled via its Remote (RS-232/RS-422) port. The switchers are programmed with Extron's Simple Instruction Set™ (SIS™), 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.

The Remote port can be connected to a control system, a PC, or an Extron MCP 1000 remote control panel and/or MKP 1000 remote keypad, MKP 2000 remote control panel, or MKP 3000 remote control panel.

About the TPX 88 A Switchers

Local audio outputs have volume and mute controls. The switcher's local audio outputs are on 5-pole, 3.5 mm captive screw connectors. These local outputs follow the RJ-45 outputs. For example, if audio input 6 is tied to audio output 1, then the TPX's local audio output 1 is the input 6 audio. This is true regardless of whether the audio follows the video or is broken away from the video in the routing of signals between twisted pair transmitters and receivers.

NOTE *The TP transmitters and receivers distribute audio in a proprietary digital channel of the TP link.*

The TPX 88 cannot switch this audio.

*The TPX 88 A can switch this audio **and** extract it for the local connectors.*

NOTE *The audio distributed by certain VersaTools® MTP transmitter/receiver pairs is **incompatible** with the audio extraction and processing capabilities of the TPX 88 A.*

*The TPX 88 and the TPX 88 A **cannot** switch the audio that is distributed by MTP **RGB** transmitters and receivers.*

*The TPX 88 **can** switch the audio that is distributed by MTP **S-video** and **composite video** transmitters and receivers.*

*The TPX 88 A **can** switch the audio that is distributed by MTP **S-video** and **composite video** transmitters and receivers **but cannot** extract it for the local connectors.*

On the TPX 88 A, the switching of the audio portion of the TP link can either be linked with the video portion (audio follow) or independent of the video portion (audio breakaway).

Features

Inputs — These switchers accept 8 sets of TP signals that are input from Extron twisted pair transmitters on TP cable terminated with RJ-45 connectors. Each transmitter creates the proprietary signal from its RGBHV, RGBS, RGsB, RsGsBs, HDTV, component video, S-video, or composite video input. Most transmitters also include either digital or differential analog audio on the proprietary signal.

TP outputs — These switchers output 8 sets of TP signals for use by Extron twisted pair receivers.

TPX 88 — The output proprietary signal includes the encoded video (RGBHV, RGBS, RGsB, RsGsBs, HDTV, component video, S-video, or composite video), but not the audio output by most TP transmitters. However, if the input TP link originated from an MTP transmitter with audio, the output proprietary signal also includes the audio portion of the link.

TPX 88 A — The output proprietary signal includes the encoded video (RGBHV, RGBS, RGsB, RsGsBs, HDTV, component video, S-video, or composite video) and audio.

Audio outputs (TPX 88 A only) — If the input TP link originated from a member of the TP family of transmitters (see the table on page 1-3 and page 1-4), the TPX 88 A outputs 8 stereo audio outputs, balanced or unbalanced, on 3.5 mm, 5-pole captive screw terminals.

Audio gain and attenuation (TPX 88 A only) — Users can set the input level of audio gain or attenuation (-18 dB to +24 dB) for the signal that is output locally. Gain and attenuation can be set via the RS-232/RS-422 link or from the front panel. Individual input audio levels can be adjusted so there are no noticeable volume differences between sources (figure 1-2).

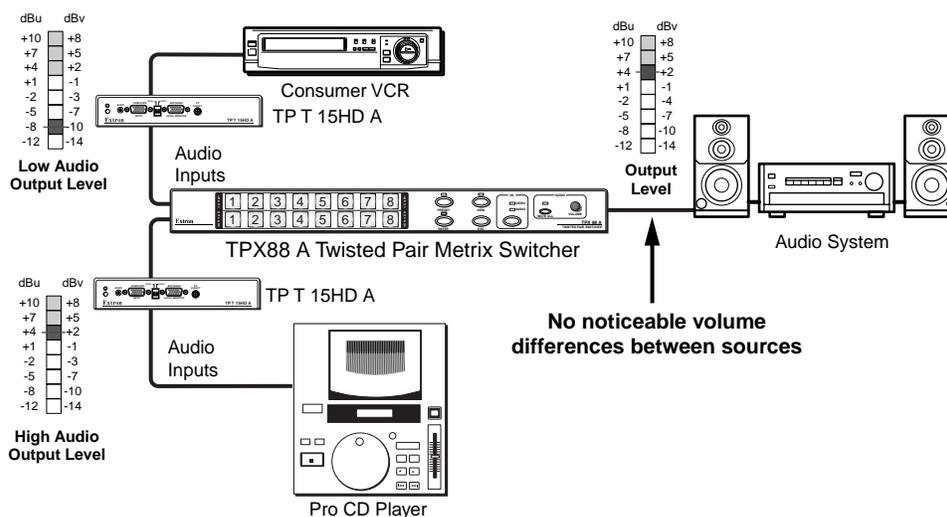


Figure 1-2 — Audio gain and attenuation

Audio output volume (TPX 88 A only) — The audio level of each local output can be adjusted through a range of 100% (no attenuation) to 0% (full attenuation). The audio level can be adjusted under front panel or RS-232/RS-422 control.

Switching flexibility — Provides individually buffered, independent matrix switched outputs with audio follow and audio breakaway for the TPX 88 A.

- **Any input to any or all outputs**
- **Quick multiple tie** — Multiple inputs can be switched to multiple outputs simultaneously. This allows all displays (outputs) to change from source to source at the same time.
- **Audio follow (TPX 88 A)** — The audio portion of the TP link input can be switched with the corresponding video portion of the input TP link. This feature allows any audio signal to be selected with any video signal simultaneously to one or all outputs in any combination. Audio follow switching can be done via front panel control or under RS-232/RS-422 remote control.
- **Audio breakaway (TPX 88 A)** — The audio portion of the TP link input can be broken away from its corresponding video portion of the input TP link. Audio breakaway switching can be done via front panel control or under RS-232/RS-422 remote control.

NOTE *Audio from a transmitter in the MTP family **cannot** be broken away.*

Operational flexibility — Operations such as input/output selection, setting of presets, and adjustment of audio output levels (TPX 88 A only) can be performed on the front panel or over the RS-232/RS-422 link. The RS-232/RS-422 link allows remote control via a PC or control system.

- **Front Panel Controller** — The TPX front panel controller feature supports touch-of-a-button input and output selection, preset creation and selection, and (TPX 88 A only) audio output volume control. The front panel features large, positive touch, illuminated input and output pushbuttons that can be labeled with text or graphics.
- **Windows-based control program** — For RS-232/RS-422 remote control from a PC, Extron includes its Windows-based control software with every matrix switcher. The control program provides a versatile range of operational options with its graphical interface and drag-and-drop/point-and-click operation. 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 by the switcher on site.
- **Simple Instruction Set (SIS™)** — The remote control protocol uses Extron's SIS for easy programming and operation.
- **Remote control** — The matrix switchers are remote controllable, using the MCP 1000 master control panel and any combination of MCP 1000 slave control panels and/or MKP 1000 slave control keypads. The remote control devices are easy to use and provide tactile buttons for quick selection. Each MCP 1000 can be used for one-touch switching for a particular output and selecting global presets. Each MKP 1000 dedicated to an output can be used to select a different input for that output or to select a preset.

Labeling — Extron's label software ships with every Extron matrix switcher. You can create labels to place in the front panel I/O buttons, with names, alphanumeric characters, or color bitmaps for easy and intuitive input and output selection. Alternatively, labels can be made with any Brother P-Touch or comparable labeler.

Introduction, cont'd

Global memory presets — 16 global memory presets are a time-saving feature that lets you set up and store input/output configurations in advance and then recall those configurations when needed with a few simple steps.

I/O grouping — Allows the matrix to be virtually divided into up to four smaller sub-switchers, making installation and control easier. I/O grouping allows specific outputs, such as those for a specific family of twisted pair receivers, with a specific signal format, to be grouped together. Switching between I/O groups is not possible from the front panel.

Rack mount — Rack mountable in any conventional 19" wide rack.

Front panel security lockout (executive mode) — If a TPX switcher is installed in an open area, where operation by unauthorized personnel may be a problem, a security lock-out feature can be implemented. When the front panel is locked, a special button combination is required to unlock the front panel controller before it can be operated.

Power supply — Includes an internal 100 VAC to 240 VAC, 50/60 Hz, 25 watts auto-switchable power supply, which provides worldwide power compatibility.



TPX 88 Twisted Pair Matrix Switchers

Chapter Two

Installation

Mounting the Switcher

Cabling and Rear Panel Views

Installation

Mounting the Switcher

The TPX switchers are housed in rack-mountable, 1U high, 17" wide metal enclosures. The appropriate rack mount kit is included with the switchers, allowing you to mount the switcher in a standard 19" rack. Rack mount the switcher as follows:

1. If rubber feet were installed on the bottom of the switcher, remove them.
2. Attach the rack mount brackets to the switcher with eight #8 machine screws, provided (figure 2-1).

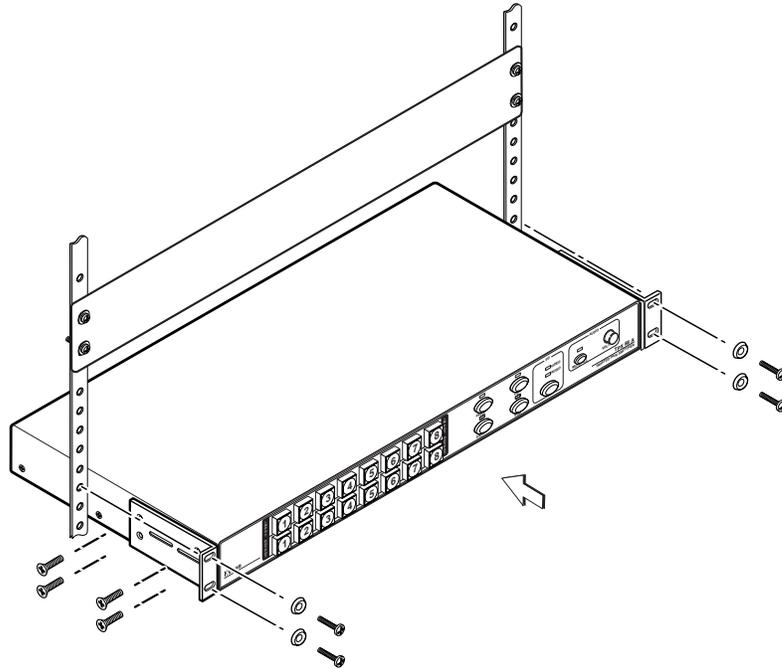


Figure 2-1 — Rack mounting a TPX switcher

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

Cabling and Rear Panel Views

All connectors are on the rear panel. The switcher can connect to as many as eight compatible twisted pair transmitters for input and twisted pair receivers for output. The TPX 88 A has output connections for eight local audio outputs. See the tables on page 1-3 and page 1-4 for audio compatibility. Figure 2-2 shows the rear panel of a TPX 88 A twisted pair matrix switcher.

NOTE *The rear panel of the TPX 88 has most of the same features as the TPX 88 A, but without the local audio connectors.*

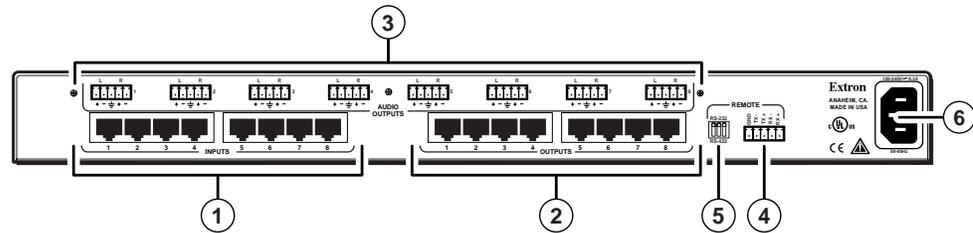


Figure 2-2 — TPX 88 A twisted pair matrix switcher with audio

CAUTION *Do not connect this device to a computer data or telecommunications network*

NOTE *RJ-45 termination must comply with the TIA/EIA T 568A or TIA/EIA T 568B wiring standards for all connections.*

- ① **Inputs connectors** — Connect one end of a TP cable to each of these RJ-45 female connectors. Connect the other end of each cable to a compatible twisted pair transmitter. See *Termination of TP cable* in this chapter.
- ② **Outputs connectors** — Connect one end of a TP cable to each of these RJ-45 female connectors. Connect the other end of each cable to a compatible twisted pair receiver. See *Termination of TP cable* in this chapter.

NOTE *Extron skew-free A/V cable is recommended for all applications.*

CAT 5 and CAT 6 cable can be used for TP and VTT transmitters and receivers.

*CAT 6 cable is **not recommended** for MTP transmitters and receivers.*

NOTE *The TP R receivers' automatic level and peaking and signal detect features require the use of a TPX 88 A.*

To support TP R receivers' level and peaking features, either the automatic or manual adjustment, use TP cables of approximately the same length on all TP inputs (①) and on all TP outputs (②).

- ③ **Audio Outputs connectors (TPX 88 A only)** — These 3.5 mm, 5-pole captive screw connectors output unamplified, unbalanced or balanced line level audio. The local audio outputs follow the RJ-45 outputs; that is, if input 6 is tied to output 1, then audio output 1 is the input 6 audio. See *Audio outputs connectors (TPX 88 A only)* in this chapter.

NOTE *These audio outputs are not available if the TP input is from an MTP family transmitter.*

- ④ **Remote connector** — Connect a host device to the TPX 88 via this 3.5 mm, 5-pole captive screw connector for serial RS-232/RS-422 control. See *Remote port configuration* in this chapter.

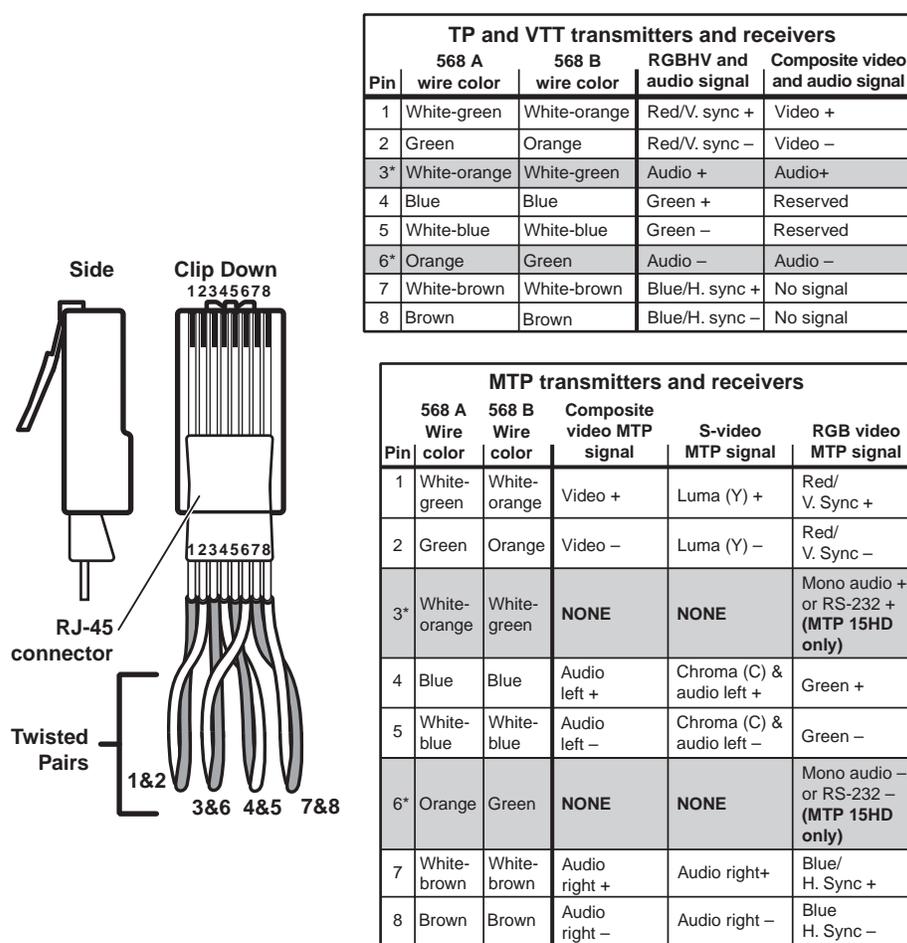
Installation, cont'd

- ⑤ **Remote configuration DIP switches** — Set these DIP switches to select either RS-232 or RS-422 serial control protocol. Set DIP switches 1 and 2 both down for RS-422 or set switches 1 and 2 both up for RS-232. DIP switch 3 should **always** be up. See *Remote port configuration* in this chapter.
- ⑥ **AC power connector** — Plug a standard IEC power cord into this connector to connect the switcher to a 100 VAC to 240 VAC, 50 or 60 Hz power source.



Termination of TP cable

Figure 2-3 details the recommended termination of TP cables for the compatible twisted pair transmitters and receivers in accordance with the TIA/EIA T 568A or TIA/EIA T 568B wiring standards.



TP and VTT transmitters and receivers				
Pin	568 A wire color	568 B wire color	RGBHV and audio signal	Composite video and audio signal
1	White-green	White-orange	Red/V. sync +	Video +
2	Green	Orange	Red/V. sync -	Video -
3*	White-orange	White-green	Audio +	Audio+
4	Blue	Blue	Green +	Reserved
5	White-blue	White-blue	Green -	Reserved
6*	Orange	Green	Audio -	Audio -
7	White-brown	White-brown	Blue/H. sync +	No signal
8	Brown	Brown	Blue/H. sync -	No signal

MTP transmitters and receivers					
Pin	568 A Wire color	568 B Wire color	Composite video MTP signal	S-video MTP signal	RGB video MTP signal
1	White-green	White-orange	Video +	Luma (Y) +	Red/ V. Sync +
2	Green	Orange	Video -	Luma (Y) -	Red/ V. Sync -
3*	White-orange	White-green	NONE	NONE	Mono audio + or RS-232 + (MTP 15HD only)
4	Blue	Blue	Audio left +	Chroma (C) & audio left +	Green +
5	White-blue	White-blue	Audio left -	Chroma (C) & audio left -	Green -
6*	Orange	Green	NONE	NONE	Mono audio - or RS-232 - (MTP 15HD only)
7	White-brown	White-brown	Audio right +	Audio right+	Blue/ H. Sync +
8	Brown	Brown	Audio right -	Audio right -	Blue H. Sync -

* The TPX 88 A switches wire pair 3 and 6.
The TPX 88 does **not** switch wire pair 3 and 6.
Audio or serial data from an RGB video MTP is incompatible with both TPX models. They **cannot** be switched.

NOTE If you are using Enhanced Skew-Free™ A/V cable, use the TIA/EIA T 568A standard only.

Figure 2-3 — TP cable termination

NOTE *Enhanced Skew-free A/V cable is **not recommended** for Ethernet/LAN applications.*

This cable is specially designed for compatibility with Extron's Twisted Pair products that are wired using the TIA/EIA 568 A standard.

The green, brown, and blue pairs of this cable have virtually identical lengths and should be used to transmit the RGB signals.

*The orange pair of this cable has a different length and **should not** be used to transmit the RGB signals.*

- You can use either wiring standard, but ensure that you use the same standard on both ends of **both** cables; the cable from the transmitter and the cable from the receiver.
- Ensure that you terminate the RJ-45 connectors for each cable properly for the family (TP, VTT, MTP) of transmitter or receiver connected.
- On RGB video MTPs, the audio or serial data that is carried on wire pairs 3 and 6 is **incompatible** with the TPX 88 A. The TPX 88 A **cannot** switch the audio or serial data, output the audio locally, or break the audio away.
- The **TPX 88 does not** switch or process wire pair 3 and 6.
 - Most TP transmitter/receiver audio (audio that is associated with the RGBHV link) is carried on wire pair 3 and 6, so the TPX 88 **cannot** switch this audio.
 - On S-video and composite video MTPs, audio is carried on wire pairs other than pair 3 and 6, so the TPX 88 **switches** this audio. The TPX 88 cannot output the audio locally or break it away.
- The **TPX 88 A switches and processes** wire pair 3 and 6.
 - The TPX 88 A **switches and processes** the proprietary digital audio link that is associated with the TP transmitter/receiver family, which is carried on wire pair 3 and 6.

Cable testing

NOTE *Systems that use Extron's skew-free UTP cable do not need to be tested for skew.*

To ensure proper cable termination, each transmission cable system that uses CAT 5 cable should be tested. Testing the cable between the RJ-45 connections at the transmitter and TPX 88 (transmitter cable system) and between the TPX 88 and the receiver (receiver cable system) gives the most accurate indications of cable problems.

There are two varieties of cable runs: simple runs, in which a single cable is terminated only at the transmitter, TPX 88, and receiver, and complex runs, which can include patch bays and multiple terminations and lengths of cable. In either case, the entire transmitter cabling system and receiver cabling system should be tested.

A complete test measures cable length and tests the wire map, attenuation, NEXT, PSNEXT, ELFEXT, PSELFEXT, return loss, ACR and PSACR. All of these tests are critical for digital data transfer, but not for analog video. While all of these tests are important indicators of the quality of the cable termination, the most critical testing parameters for video transfer are wire map (T-568-A or T-568-B termination) and pair length measurements. The largest concern is equalization of skew between cable pairs. Cable systems of 300 feet (91 meters) or less should exhibit no transmission problems if they pass at least CAT 5e or preferably CAT 6-D5 channel certification testing.

Installation, cont'd

The Microtest OMNI SCANNER 2 performs comprehensive certification testing to the proposed CAT 6 standards. Other manufacturers also make testing equipment. The tests include advanced diagnostics for troubleshooting the cause and location of many cable and termination problems. For simple installation testing, the Microtest MICRO SCANNER PRO tests wire map and cable length, including individual cable pair length.

The manufacturing process for network (CAT 5) UTP cable leads to a condition called pair skew. Skew exists between pairs when the physical length of one wire pair is different from another. As the transmission cable length increases, the amount of skew increases. Skew affects the displayed image when the differential length between wire pairs exceeds 2 feet, causing the timing of the red, green, and blue video signals to appear out of alignment (horizontal registration errors). A white vertical line on a black field can appear as individual red, green, and blue lines that are close together; the signal transmitted on the shortest wire pair leads the other colors and appears to the left on the display.

Pair skew can be measured with test equipment. UTP cable test equipment measures and reports wire pair length. In certain circumstances, the report on the various pair lengths can be used in equalizing pair skew.

If test equipment is not available, skew can be identified by viewing a crosshatch test pattern with a critical eye to determine if either the red, green, or blue video image leads (appears to the left of) the other two video images.

For best results when using CAT 5 cable in A/V applications, pair skew needs to be equalized. Extron suggests several ways to equalize the pair skew as follows.

NOTE *The design of Extron's Skew-Free A/V UTP cable minimizes pair skew to the point that equalization is not required.*

NOTE *If there are different cable types and/or big differences in input cable length, skew compensation will not work.*

Equalizing pair skew with Skew Equalizers

Try using the following methods to minimize or eliminate pair skew:

- If using MTP 15HD (RGB video) receivers, switch to SEQ versions of the receivers.
- Install separate SEQ 100 15HD or SEQ 100 BNC Skew Equalizers on the receivers' video outputs and adjust the skew for the leading video image.

Equalizing pair skew with skew compensation cables

The nominal velocity of propagation (NVP — the speed at which the signal travels on the transmission line, measured as a percentage of the speed of light) of TP cable is very close to that of conventional coaxial cable. The similarity in NVP means that, when all transmitter cables systems use the same cable type and are approximately equal in length, by adding an additional length of coax, equal to the length of pair skew, placed on the receiver's output, you can equalize the effects of pair skew (figure 2-4).

If UTP cable test measurement cannot be done, pair skew can still be equalized, assuming that all of the transmitter cable systems are equal, by viewing a crosshatch test pattern with a critical eye. Examine the test pattern for loss of horizontal registration and, through a process of trial and error, equalize any pair skew with coax extensions on the red, green, and/or blue outputs.

Extron skew compensation coax cables are available in lengths of 2 through 20 feet, see Appendix A for part numbers.

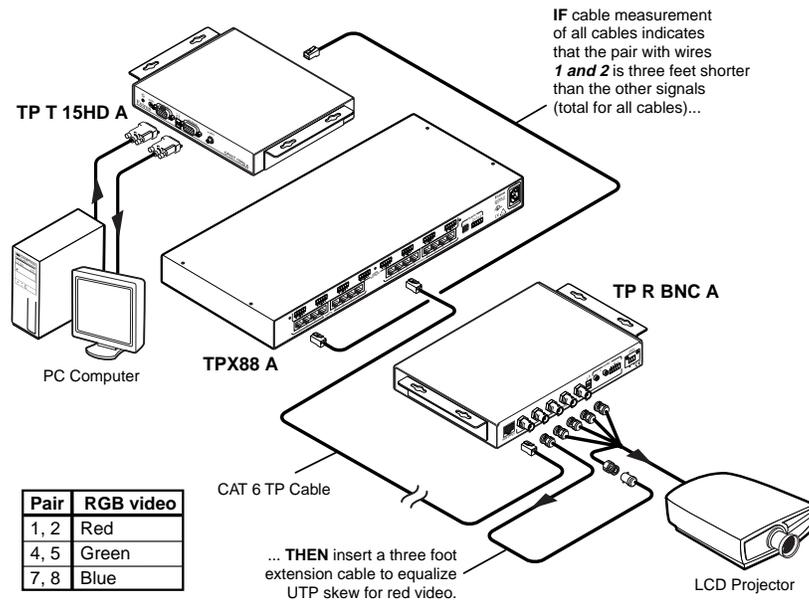
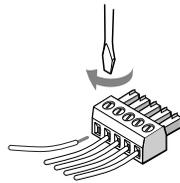


Figure 2-4 — Pair skew equalization

Audio outputs connectors (TPX 88 A only)

The Audio Outputs connectors are 3.5 mm, 5-pole captive screw connectors that output unamplified, line level audio. The local audio outputs follow the RJ-45 outputs; that is, if input 6 is tied to output 1, then audio output 1 is the input 6 audio.



Connect audio devices, such as an audio amplifier or powered speakers. See figure 2-5 to properly wire an output connector.

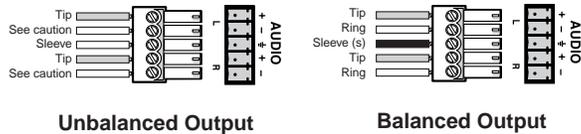


Figure 2-5 — Captive screw connector wiring for audio output

CAUTION Connect the sleeve to ground (Gnd). Connecting the sleeve to a negative (-) terminal will damage the audio output circuits.

The audio level for each input can be individually set, using the front panel or under RS-232/RS-422 control, to ensure that the output level does not vary from input to input. See chapter 3, *Operation*, chapter 4, *Programmer's Guide*, and chapter 5, *Switcher Software* for details.

By default, the audio output follows the video switch. Audio breakaway, which can be commanded via the front panel or under RS-232/RS-422 control, allows you to select from any one of the audio input sources. See chapter 3, *Operation*, chapter 4, *Programmer's Guide*, and chapter 5, *Switcher Software* for details.

Installation, cont'd

NOTE When making connections for the TPX 88 A from existing audio cables, see figure 2-6. 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 output connector diagram, figure 2-5.

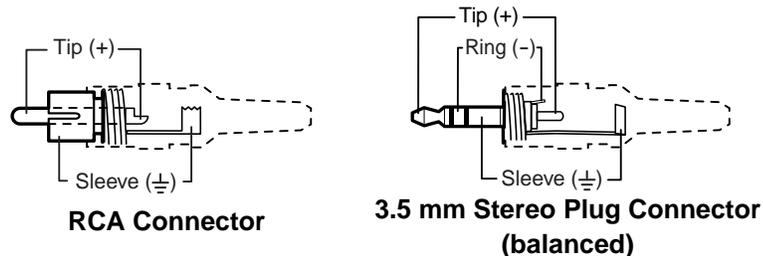


Figure 2-6 — Typical audio connectors

Remote port configuration

The Remote port is a 3.5 mm, 5-pole captive screw connector for serial RS-232/RS-422 control of the TPX 88. Wire the connector as shown in figure 2-7 and connect a host device, such as a computer, touch panel control, or RS-232 capable PDA.

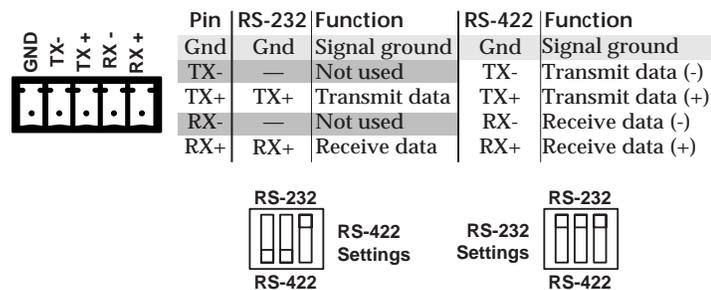


Figure 2-7 — Remote connector

NOTE RS-422 implementation may vary between computers or controls systems. Connect the control cable as shown in figure 2-7. If the serial communications link with the TPX switcher does not work, try reversing the polarity of the TX and RX signal lines.

Set Remote Configuration DIP switches 1 and 2 either both down to select RS-422 serial control protocol or both up to select RS-232. DIP switch 3 should **always** be up.

If desired, connect an MCP 1000 remote control panel master unit or MKP 2000 or MKP 3000 remote control panel to the switcher's Remote connector. You can also connect an MKP 1000 remote keypad or MCP 1000 slave unit to the MCP 1000 master unit. Refer to the connected device's manual for details.

See chapter 4, *Programmer's Guide*, for definitions of the SIS commands and chapter 5, *Matrix Software* for details on how to install and use the control software.



TPX 88 Twisted Pair Matrix Switchers

Chapter Three

Operation

Front Panel Controls and Indicators

Operations

Troubleshooting

Worksheets

Operation

Front Panel Controls and Indicators

The front panel controls (figure 3-1) are grouped into four sets. The input and output buttons are grouped on the left side of the control panel. The control buttons are grouped in the middle of the panel. On the TPX 88 A only, the input/output (I/O) selection button and audio controls are grouped on the right side of the panel.

NOTE The TPX 88 is identical to the TPX 88 A, with the exception that it does not have I/O selection or audio controls. These controls are marked with an asterisk (*) in figure 3-1.

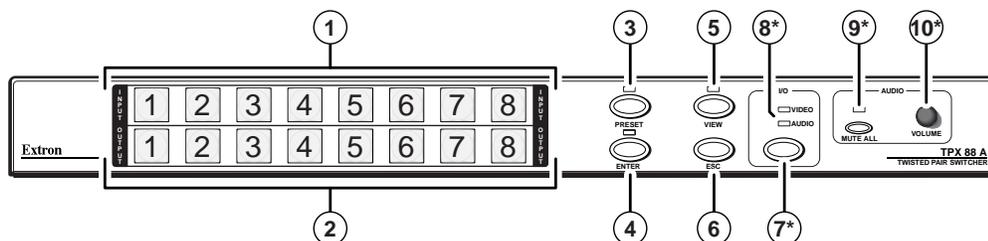


Figure 3-1 — TPX 88 A front panel

Definitions

The following terms, which apply to Extron matrix switchers, are used throughout this manual:

Tie — An input-to-output connection.

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

Configuration — Consists of one or more **ties** 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. Up to sixteen **global memory presets** can be stored in memory. The input buttons select the desired **preset** memory location to load or retrieve a **preset**. When a **preset** is retrieved from memory, it becomes the **current configuration**. One **preset** can be assigned to each input button.

Input and output buttons

The large, illuminated input and output pushbuttons can be labeled with text and/or graphics. The buttons can be set to provide amber background illumination all the time or the background illumination can be set off. The buttons blink or are fully illuminated (depending on the operation) when selected.

- ① **Input 1 through 8 buttons** — The input buttons have three independent functions: to select an input, to identify the selected inputs, and to select a preset. A more detailed explanation of these functions is included in *Operations*, beginning on page 3-5.
- ② **Output 1 through 8 buttons** — The output buttons have four independent functions: to select an output, to identify the selected outputs, to select a preset, and (on the TPX 88 A) to display the user-adjustable audio level of the selected input. A more detailed explanation of these functions is included in *Operations*, beginning on page 3-5.

Control buttons

- ③ **Preset button and LED** — The Preset button saves a configuration as a preset, or recalls and makes active a previously-defined preset. The Preset LED indicates save mode when it is blinking and recall mode when it lights steadily.
- ④ **Enter button** — The Enter button saves changes when you set up a new configuration. To create a simple configuration:
 - (TPX 88 A only) specify video, audio, or both [see the I/O button (⑦) and the Video and Audio LEDs (⑧)]
 - Press the desired input button (①)
 - Press the desired output buttons (②)
 - Press the Enter button.
- ⑤ **View button and LED** — The View button selects a view-only mode that allows the display of the current configurations. The view-only mode helps prevent changing configurations by accident. When lit, the View LED indicates that the switcher is in view-only mode.

In view-only mode, pressing any input button (①) or output (②) button lights the buttons for the input and all outputs that are a part of that set of ties. Pressing the button for any unassigned output lights only the buttons for all of the unassigned outputs. No input button is lit.
- ⑥ **Esc button** — The Esc button cancels operations or selections in progress and resets the front panel button indicators. The Esc button does **not** reset the current configuration or any presets. On the TPX 88 A, the Esc button does **not** reset the video and/or audio selection or any audio gain or attenuation settings.

I/O controls (TPX 88 A only)

When creating or viewing a configuration, you must specify whether the configuration applies to video, audio, or both. This is done with the I/O selection button (7) and indicated by the Video and Audio (8) LEDs.

- 7) **I/O button** — The I/O button selects video, audio, or video and audio for input selection.
- 8) **Video and Audio LEDs** — The Video and Audio LEDs indicate whether video, audio, or video and audio will be selected using the Input and output buttons (1 and 2).

Pressing the I/O button advances through a cycle of video and/or audio selection as follows: {default} video and audio, {press} video only, {press} audio only, {press} video and audio, and so on (figure 3-2).

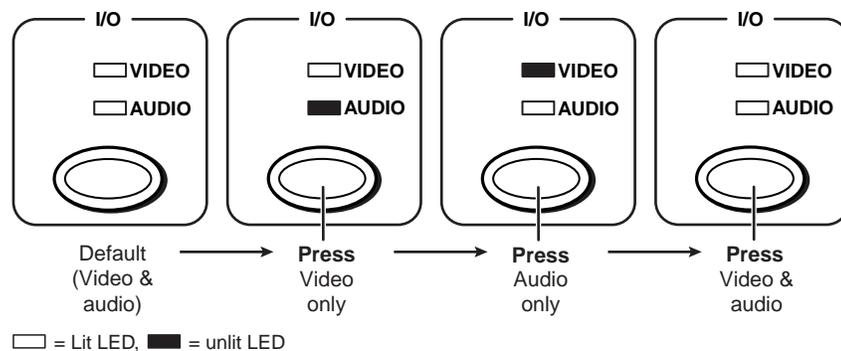


Figure 3-2 — Video and/or audio selection cycle

Audio controls (TPX 88 A only)

- 9) **Mute All button and LED** — The Mute All button toggles the mute function on and off for all of the local audio outputs (those on the rear panel 3.5 mm captive screw connectors).
- 10) **Volume knob** — The volume knob sets the audio gain or attenuation level for the selected input and the volume level for the selected output. The level and volume adjustments affect only the local audio outputs (those on the rear panel 3.5 mm captive screw connectors).

The current input audio level setting for the selected input is displayed by the output buttons. A more detailed explanation of audio gain adjustment is included in *Viewing and adjusting the input audio level (TPX 88 A only)* beginning on page 3-20.

The current output volume level setting for the selected output is displayed by the input buttons. A more detailed explanation of audio volume adjustment is included in *Viewing and adjusting the output volume (TPX 88 A only)* beginning on page 3-22.

Button icons

The numbered translucent covers on the pushbuttons can be removed and replaced to insert labels behind the covers.

Input and output inserts can be created easily with Extron's Button Label Generator software, which ships with every Extron matrix switcher. Each input and output can be labeled with names, alphanumeric characters, or even color bitmaps for easy and intuitive input and output selection.

Figure 3-3 shows a sample set of button inserts in a typical configuration. The icons in the input buttons show the video sources that drive the TP transmitters that are connected to the inputs. The TP receivers that are connected to the outputs drive the video displays that are shown by the icons in the output buttons.

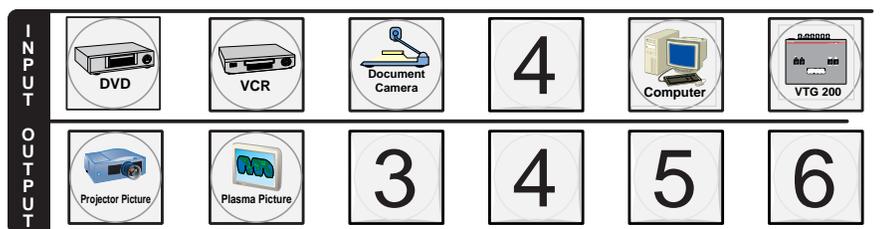


Figure 3-3 — Sample button icons

See chapter 5, *Matrix Software*, for details on using the labeling software. See Appendix A, *Reference Information*, for blank labels and procedures for removing and replacing the translucent covers.

Operations

The following paragraphs detail the power up process and provide sample procedures for creating ties, sets of ties, and configurations; changing a configuration; viewing ties, sets of ties, and configurations; saving a preset; recalling a preset; and viewing and adjusting the audio level.

Power

Power is automatically applied when the power cord is connected to an AC source. When AC power is applied, the switcher performs a self-test that cycles the front panel I/O button indicators on and off from left to right lit green, right to left lit red, and left to right lit amber. An error-free power up self-test sequence leaves the Video and/or the Audio LEDs on (TPX 88 A only), all other LEDs unlit, and all I/O buttons either unlit or showing background illumination.

The current configuration and all presets are saved in non-volatile memory. When power is applied, the last current configuration is retrieved. The previous presets remain intact.

If an error occurs during the self-test, the switcher locks up and will not operate. If your switcher locks up on power-up, call the Extron S³ Sales & Technical Support Hotline.

I/O grouping

I/O grouping is an RS-232/RS-422 controlled feature that allows you to subdivide the front panel control of the matrix into up to four smaller functional sub-switchers. Inputs and outputs can be assigned to one of four groups (figure 3-4) or not assigned to any group. Once assigned to a group, inputs and outputs can only be tied within that group from the front panel. For example, a front panel operator cannot tie an input that is assigned to group 1 to an output that is assigned to group 2. Ungrouped inputs and outputs can be switched to outputs and inputs in any group.

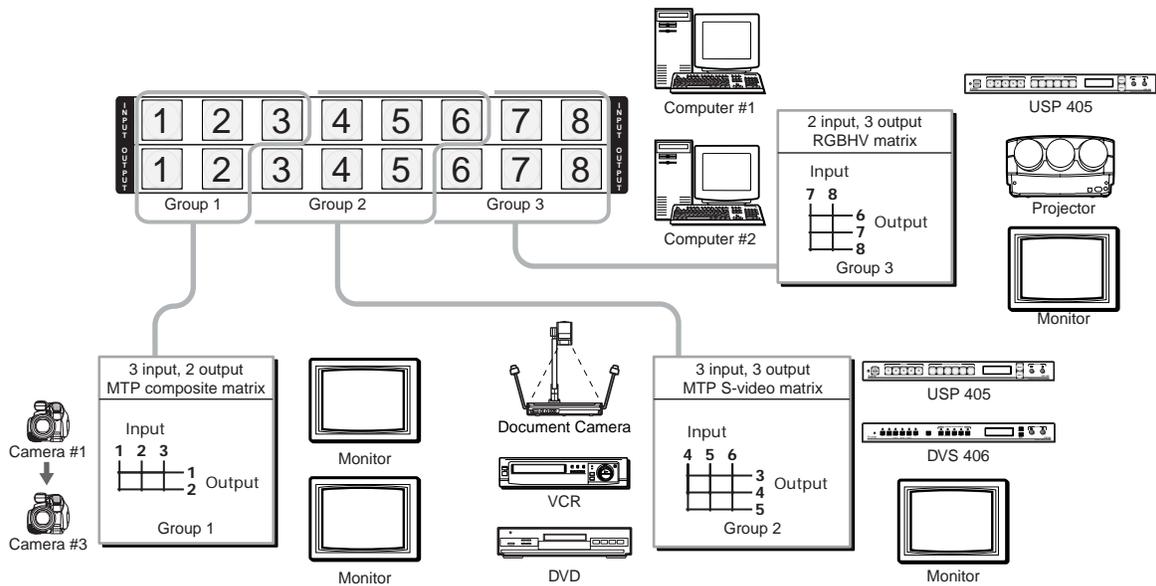


Figure 3-4 — I/O grouping of compatible twisted pair transmitter/receiver pairs

The I/O groups can be set up only by using the RS-232/RS-422 port and either the SIS or the Windows control program (see chapter 4, *Programmer's Guide*, and chapter 5, *Matrix Software*). Ties between groups (an input in group 1 tied to an output in group 2) can be created under RS-232/RS-422 control. Presets can also be created under RS-232/RS-422 control that tie inputs and outputs across group boundaries. These presets are selectable from the front panel.

Suggested applications for the I/O grouping feature include:

- Segregating specific twisted pair transmitter and receiver formats to prevent a transmission from one family of twisted pair transmitters from being inadvertently applied to a twisted pair receiver from an incompatible family. See the table on page 1-3 and page 1-4 for twisted pair transmitter and receiver compatibility.
- Segregating specific video formats to prevent an input in one video format from being inadvertently applied to an output device that supports another video format.
- Segregating input and output devices that are in separate rooms.
- Isolating video from being displayed on specific output devices for operational security reasons.

The I/O groups created under RS-232/RS-422 control can result in front panel indications that are different from indications when grouping is not used. In the following paragraphs, the effects of I/O grouping on the front panel indications are included where applicable.

Creating a configuration

The current configuration can be changed using the front panel buttons. To change the current configuration, do the following:

1. Press the Esc button to clear any input buttons, output buttons, or control buttons that may be lit.
2. **(TPX 88 A only)** Select to configure video, audio, or both by pressing the I/O button. The Video and/or Audio LEDs light to indicate that video and/or audio are selected.
3. Select the desired input and output(s) by pressing the input and output buttons.

Input and output buttons light **amber** to indicated video and audio ties. The buttons light **green** to indicated video only ties. The buttons light **red** to indicate audio only ties.

To indicate current ties, the buttons for tied outputs light the appropriate color (amber, green, or red) when an input is selected. To clear unwanted outputs press and release the associated lit output buttons.

4. Press and release the Enter button.
5. Repeat steps 1 through 4 to create additional ties until the desired configuration is complete.

- NOTE**
- *Only one video input and one audio input can be tied to an output but multiple outputs can be tied to a single input.*
 - *If a tie is made between an input and an output, and the selected output was previously tied to another input, the older tie is broken in favor of the newer tie.*
 - *If an input with no tie is selected, only that input's button lights. The button lights the appropriate color for the video and/or audio selection.*
 - *When the Video and Audio LEDs are lit, if an input with an audio tie but no video tie is selected, the input's button lights amber and the output button lights red.*
 - *If the input button for a grouped input is pressed, and then the output button for an output in a different group is pressed, the associated output button **does not light**. That output cannot be tied to an input from a different group using the front panel. The associated input button remains lit.*

Operation, cont'd

Example 1: Creating a set of video and audio ties

The following steps show an example in which input 5 is tied to outputs 3, 4, and 8. Where an explanation is helpful, the steps show the front panel indications that result from your action.

NOTE This example assumes that there are no ties in the current configuration.

1. Press and release the Esc button.
2. **TPX 88 A only** — To select video and audio for the tie, if necessary, press and release the I/O button until the LEDs light (figure 3-5).

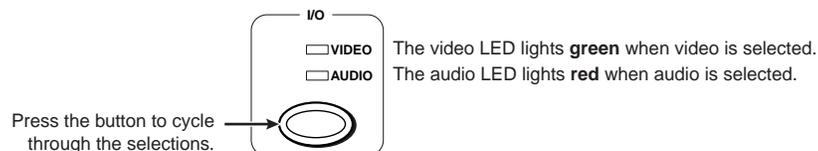


Figure 3-5 — Select video and audio

3. Press and release the input 5 button (figure 3-6).

Press and release the input 5 button.
The button lights **amber** to indicate that the **video** and **audio** inputs are selected (audio follow).

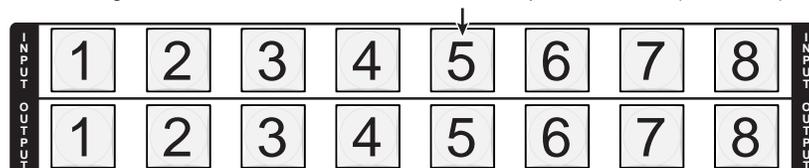
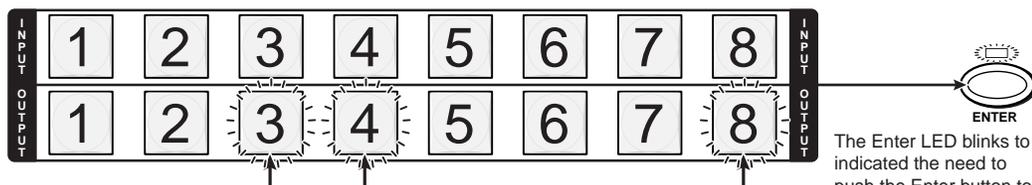


Figure 3-6 — Select an input

4. Press and release the output 3, output 4, and output 8 buttons (figure 3-7).

NOTE The entire set of ties can be canceled at this point by pressing and releasing the Esc button. The Esc button flashes once.



Press and release the output 3, 4, and 8 buttons.
The buttons blink **amber** to indicate that the selected **video** and **audio** input will be tied to these outputs.



Figure 3-7 — Select the outputs

5. Press and release the Enter button (figure 3-8).

The current configuration is now defined as video and audio (TPX 88 A only) input 5 tied to video and audio output 3, output 4, and output 8.

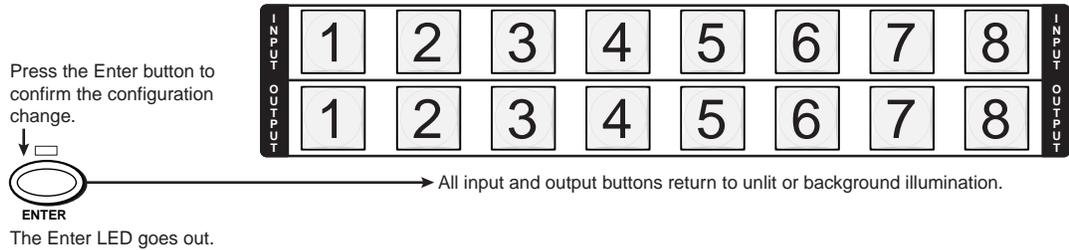


Figure 3-8 — Press the Enter button

Example 2: Adding a tie to a set of video and audio ties

The following steps show an example in which a new video tie is added to the current configuration. Where an explanation is helpful, the steps show the front panel indications that result from your action.

NOTE This example assumes that you have performed example 1.

1. Press and release the Esc button.
2. **TPX 88 A only** — To select video only for the tie, if necessary, press and release the I/O button until only the video LED lights (figure 3-9).

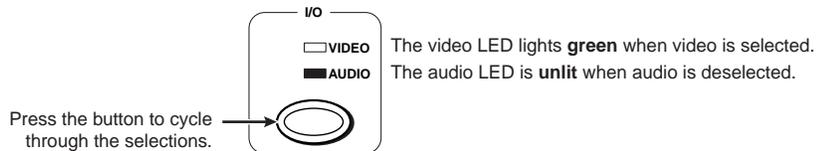


Figure 3-9 — Select video only

3. Press and release the input 5 button (figure 3-10).

Press and release the input 5 button.
The button lights green to indicate that only the video inputs are selected (audio breakaway).

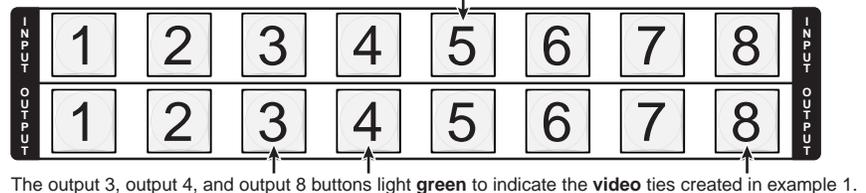


Figure 3-10 — Select an input

Operation, cont'd

4. Press and release the output 1 button (figure 3-11). The output 1 button blinks green to indicate a tentative video tie.

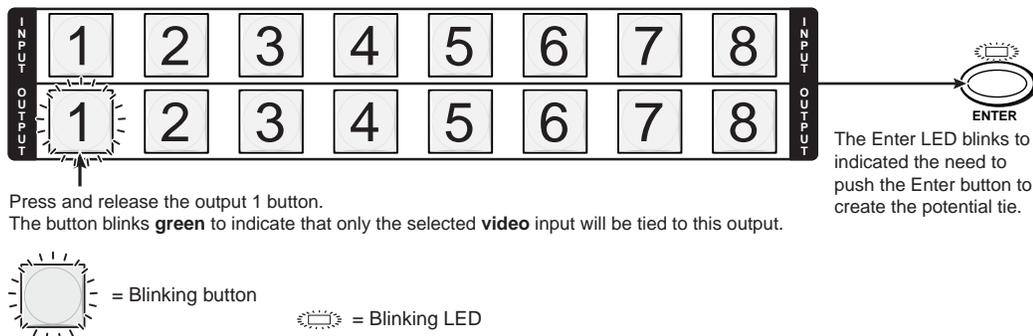


Figure 3-11 — Select the output

5. Press and release the Enter button (figure 3-12).

The current configuration is now video input 5 tied to video output 1, output 3, output 4, and output 8; and (TPX 88 A only) audio input 5 tied to audio output 3, output 4, and output 8.

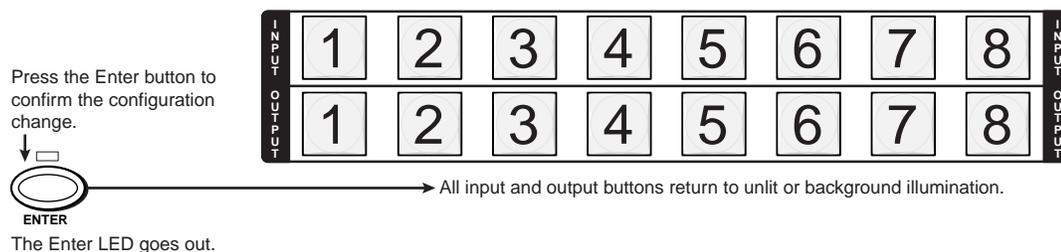


Figure 3-12 — Press the Enter button

Example 3a: Removing an audio tie from a set of ties (TPX 88 A only)

NOTE This example can be performed on a TPX 88 A only.

The following steps show an example in which an existing audio tie is removed from the current configuration. Where an explanation is helpful, the steps show the front panel indications that result from your action.

NOTE This example assumes that you have performed example 1 and example 2.

1. Press and release the Esc button.
2. To select audio only for the tie, if necessary, press and release the I/O button until only the audio LED lights (figure 3-13).

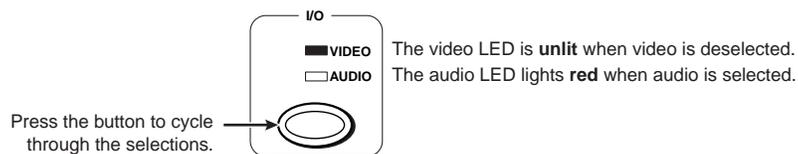
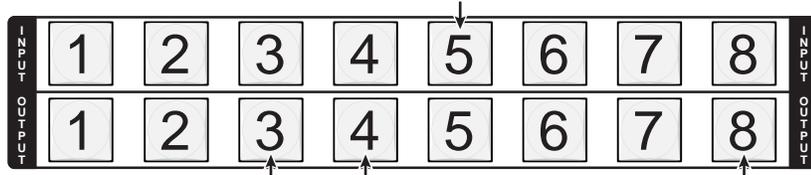


Figure 3-13 — Select audio only

3. Press and release the input 5 button (figure 3-14).

Press and release the input 5 button.
The button lights **red** to indicate that only the **audio** inputs are selected (audio breakaway).

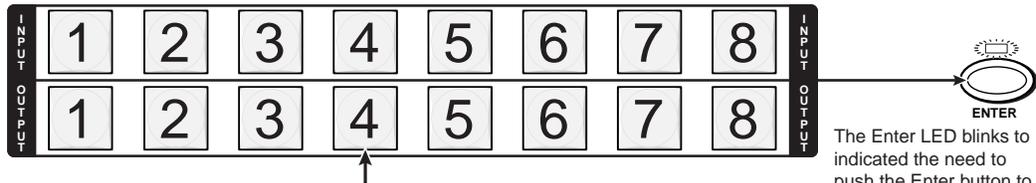


The output 3, output 4, and output 8 buttons light **red** to indicate the **audio** ties created in example 1. The output 1 button remains **unlit** because the output 1 tie is **video** only and **audio** is selected.

Figure 3-14 — Select an input

NOTE *The output 1 button does not light, even if the steps in example 2 have been completed, because example 2 added a video tie only.*

4. Press and release the output 4 button (figure 3-15).



Press and release the output 4 button.
The button returns to **unlit** to indicate that the **audio** input will be untied.

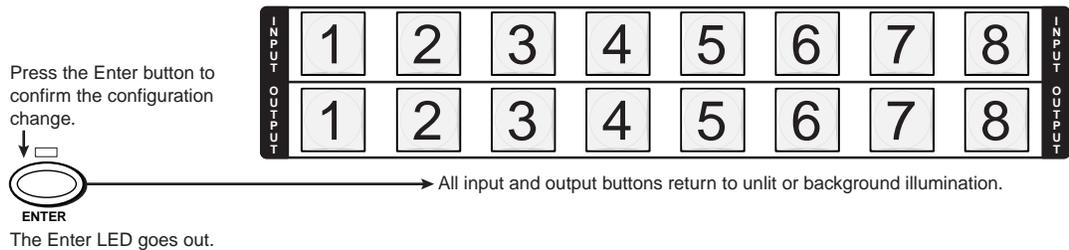
The Enter LED blinks to indicate the need to push the Enter button to create the potential tie.

 = Blinking LED

Figure 3-15 — Deselect the output

5. Press and release the Enter button (figure 3-16).

The current configuration is now video input 5 tied to video output 1, output 3, output 4, and output 8; and audio input 5 tied to audio output 3 and output 8.



Press the Enter button to confirm the configuration change.

The Enter LED goes out.
All input and output buttons return to unlit or background illumination.

Figure 3-16 — Press the Enter button

Operation, cont'd

Example 3b: Removing a tie from a set of ties (TPX 88 only)

NOTE This example can be performed on a TPX 88 only.

The following steps show an example in which an existing tie is removed from the current configuration. Where an explanation is helpful, the steps show the front panel indications that result from your action.

NOTE This example assumes that you have performed example 1 and example 2.

1. Press and release the Esc button.
2. Press and release the input 5 button (figure 3-17).

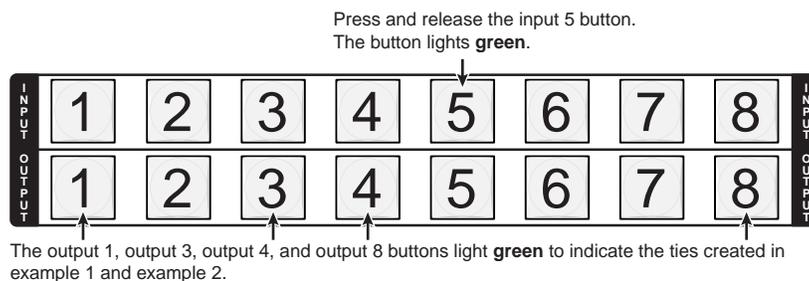


Figure 3-17 — Select an input

3. Press and release the output 4 button (figure 3-18).

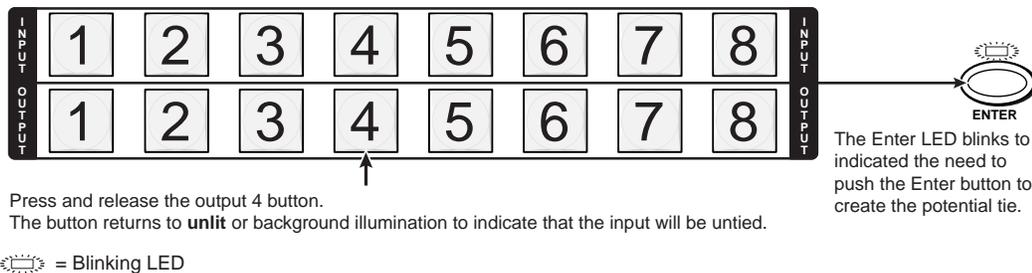


Figure 3-18 — Deselect an output

4. Press and release the Enter button (figure 3-19).

The current configuration is now defined as input 5 tied to output 1, output 3, and output 8.

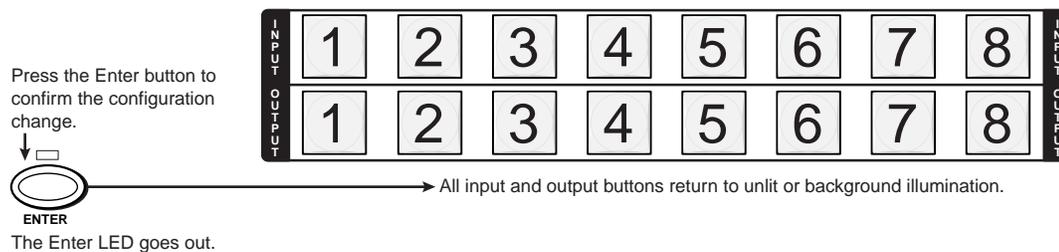


Figure 3-19 — Press Enter

Viewing a configuration

The current configuration can be viewed using the front panel buttons. The view-only mode prevents inadvertent changes to the current configuration.

To view the current configuration, do the following:

1. Press the Esc button to clear any input button indications, output button indications, or control button indications that may be on.
2. Press and release the View button.
3. **(TPX 88 A only)** Select video, audio, or both to view by pressing the I/O button. The Video and/or Audio LEDs light to indicate that video and/or audio are selected.
4. Select the desired input or output whose ties you wish to view by pressing the input or output buttons.

- NOTE**
- To see all ties of the current configuration, press and release each input and output button, one at a time, **(TPX 88 A only)** with the Video and Audio LEDs lit.
 - **(TPX 88 A only)** In view-only mode, you can view video and audio, video-only, or audio-only ties. Pressing and releasing the Video and Audio buttons toggles each on and off.
 - When you enter view-only mode, the output buttons light for all outputs without ties. Likewise, when an output button for which there are no ties is pushed, the output buttons turn on for all outputs without ties. **(TPX 88 A only)** The output buttons' colors indicate audio breakaway for one or more of those outputs.

Example 4a: Viewing ties (TPX 88 A only)

The following steps show an example of viewing the video and audio, audio-only, and video-only ties in the current configuration. Where an explanation is helpful, the steps show the front panel indications that result from your action.

- NOTE** This example assumes that you have performed example 1, example 2, and example 3a.

1. Press and release the Esc button.
2. Press and release the View button to enter view-only mode. The View LED lights (figure 3-20).

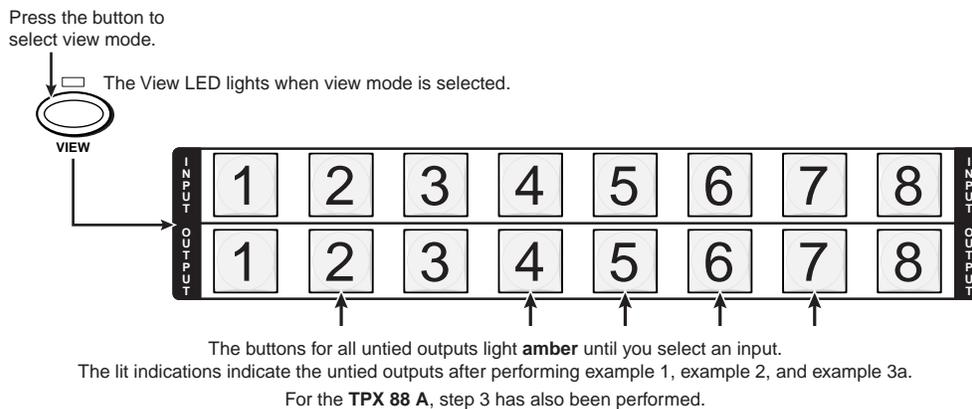


Figure 3-20 — Select view mode

Operation, cont'd

NOTE A tie can also be viewed by selecting a tied output. To demonstrate this, note the number of an output button that is lit the same color as the input button (amber for video and audio, green for video, or red for audio), and then press and release the output button for an untied (unlit or background illumination) output. Observe that all of the untied outputs light. Then press the output button noted previously and observe that the selected output button and the tied input button (input 5) light.

3. To select both video and audio for viewing, if necessary, press and release the I/O button until the LEDs light (figure 3-21). Observe the indications shown in figure 3-20.

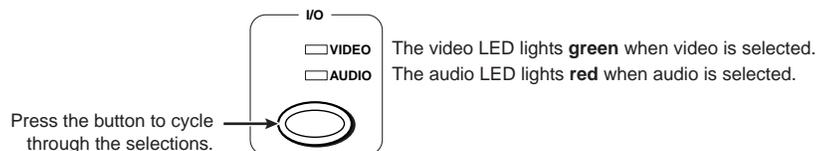
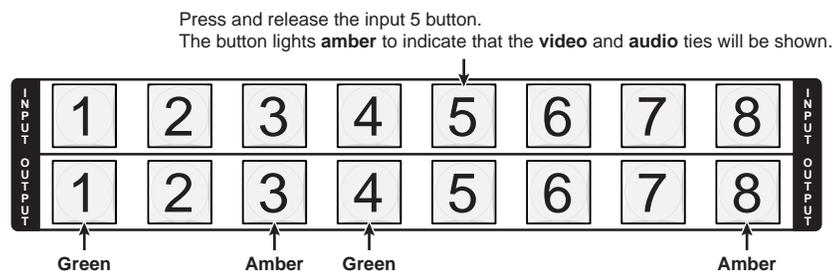


Figure 3-21 — Select video and audio

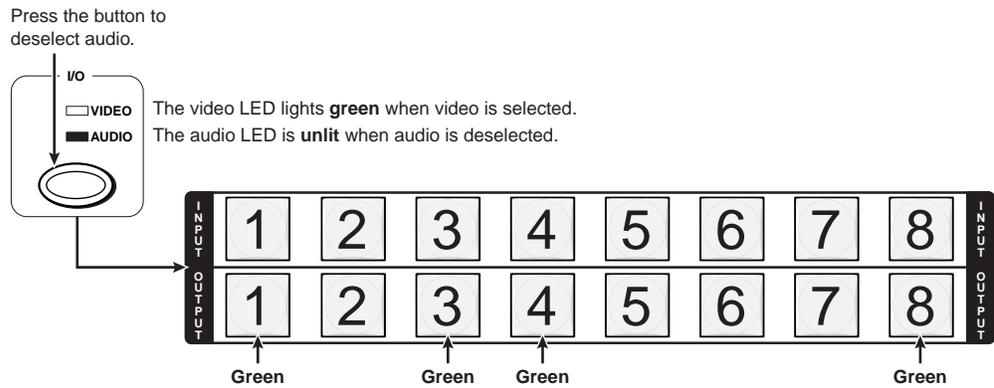
4. Press and release the input 5 button (figure 3-22). The input 5 button lights amber.



The output buttons for outputs that are **not** tied to input 5 are either unlit or background illuminated. The output buttons for outputs that **are** tied to input 5 light the appropriate color:
Amber for **audio** and **video** ties (audio follow)
Green for **video** ties (audio breakaway)
Red for **audio** ties (audio breakaway)

Figure 3-22 — Select an input

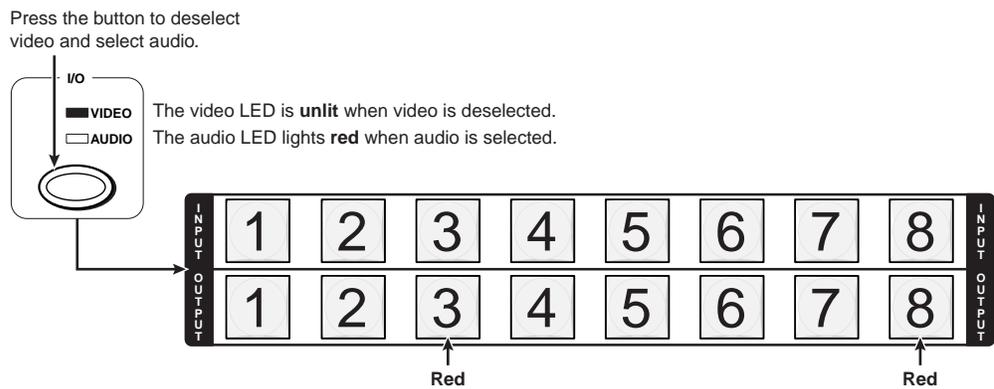
5. Press and release the I/O button to deselect audio (figure 3-23).



The output buttons for outputs that do **not** have video ties to input 5 are either unlit or background illuminated. The output buttons for outputs that **are** tied to input 5 light **green** to indicate **video** ties (audio breakaway).

Figure 3-23 — Deselect audio to view video only

6. Press and release the I/O button to deselect video and select audio (figure 3-24).



The output buttons for outputs that do **not** have video ties to input 5 are either unlit or background illuminated. The output buttons for outputs that **are** tied to input 5 light **red** to indicate **audio** ties (audio breakaway).

Figure 3-24 — Deselect video and select audio to view audio only

7. Press and release the View button to exit view mode (figure 3-25).

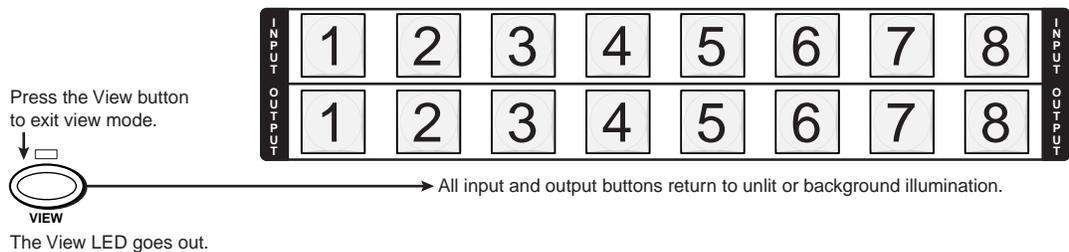


Figure 3-25 — Press the View button to exit view mode

Operation, cont'd

Example 4b: Viewing ties (TPX 88 only)

The following steps show an example of viewing the ties in the current configuration. Where an explanation is helpful, the steps show the front panel indications that result from your action.

NOTE This example assumes that you have performed example 1, example 2, and example 3b.

1. Press and release the Esc button.
2. Press and release the View button to enter view-only mode. The View LED lights (figure 3-26).

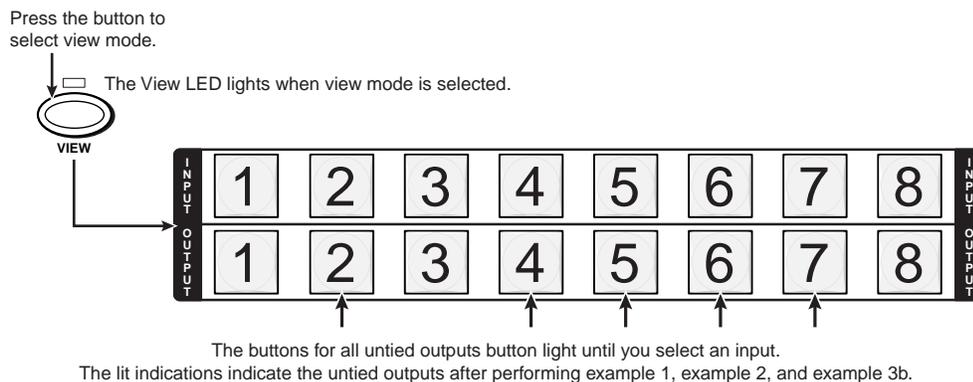


Figure 3-26 — Select view mode

NOTE A tie can also be viewed by selecting a tied output. To demonstrate this, note the number of an output button that is lit, and then press and release the output button for an untied (unlit or background illumination) output. Observe that all of the untied outputs light. Then press the output button noted previously and observe that the selected output button and the tied input button (input 5) light.

3. Press and release the input 5 button (figure 3-27).

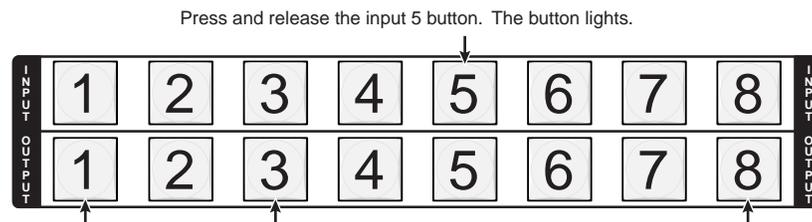


Figure 3-27 — Select an input

5. Press and release the View button to exit view mode (figure 3-28).

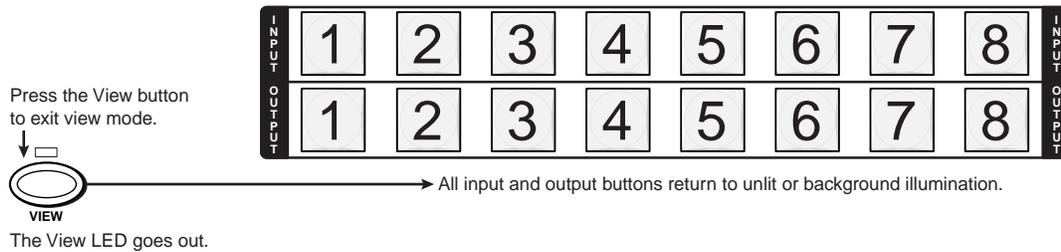


Figure 3-28 — Press the View button to exit view mode

Using presets

The current configuration (configuration 0) can be saved as a preset in any one of 16 preset memory addresses, or, as many presets as the switcher has input and output buttons.

- NOTE**
- Only the audio and video ties are stored and recalled; audio gain settings are not saved, and they do not change when a preset is recalled.
 - Presets cannot be viewed from the front panel unless recalled as the current configuration. Presets can be viewed using Extron's Windows-based control program. See Chapter 5, Matrix Software, for more details.
 - The current configuration and all presets are stored in non-volatile memory. When power is removed and restored, the current configuration is still active and all presets are retained.
 - When a preset is recalled, it replaces the current configuration, which is lost unless it is also stored as a preset. The recalled preset overwrites all of the current configuration ties in favor of the preset configuration ties.

Example 5: Saving a preset

The following steps show an example in which the current configuration is saved as a preset. Where an explanation is helpful, the steps show the front panel indications that result from your action.

1. Press and release the Esc button.
2. Press and **hold** the Preset button for approximately 2 seconds (figure 3-29).

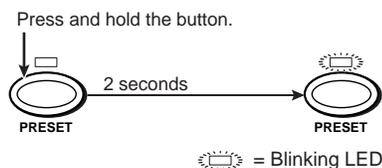


Figure 3-29 — Enter save preset mode

Operation, cont'd

3. Press and release the Input 1 button (figure 3-30).

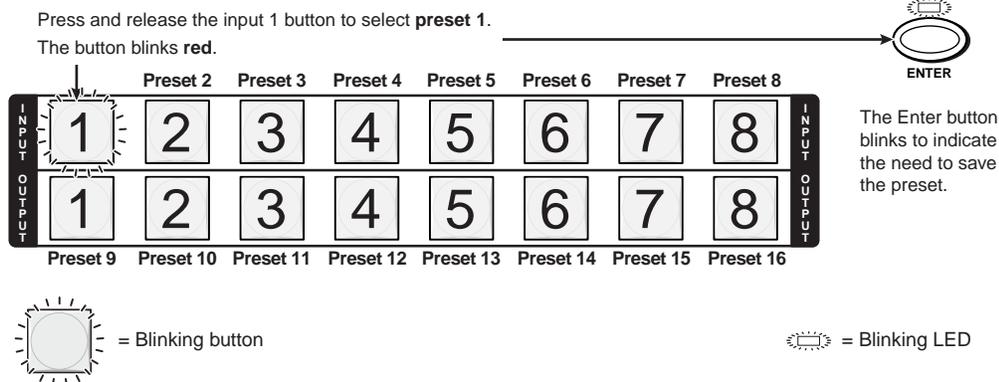


Figure 3-30 — Select the preset

4. Press and release the Enter button (figure 3-31). The current configuration is now stored in memory location 1.

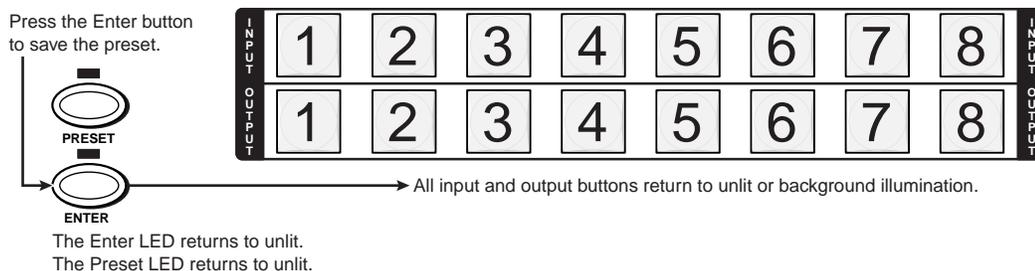


Figure 3-31 — Press the Enter button

Example 6: Recalling a preset

The following steps show an example in which a preset is recalled to become the current configuration. Where an explanation is helpful, the steps show the front panel indications that result from your action.

1. Press and release the Esc button.
2. Press and release the Preset button (figure 3-32).

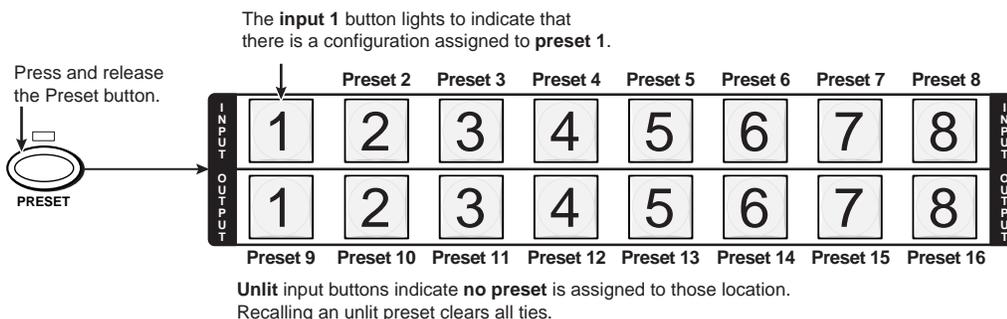


Figure 3-32 — Select recall preset mode

3. Press and release the Input 1 button (figure 3-33).

Press and release the input 1 button to select **preset 1**.

The button blinks red.

Any other buttons with stored presets return to unlit or background illumination.

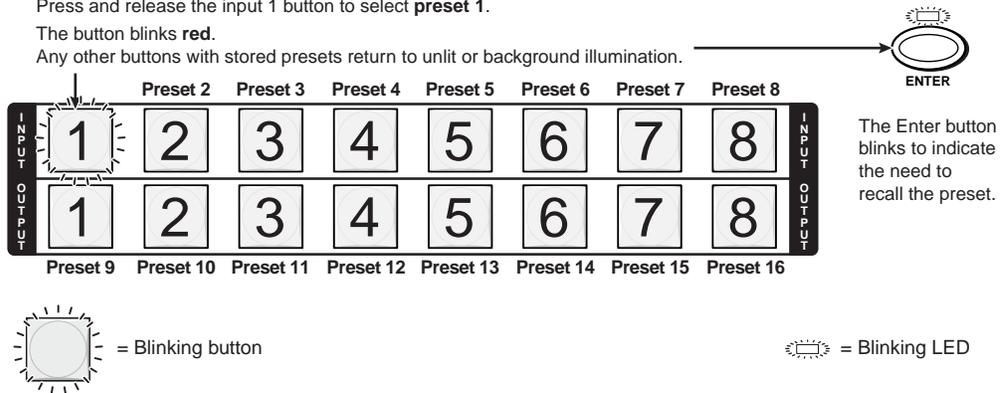


Figure 3-33 — Select the preset

4. Press and release the Enter button (figure 3-34). The configuration stored in memory location 1 is now the current configuration and can be viewed in the view-only mode (see example 4).

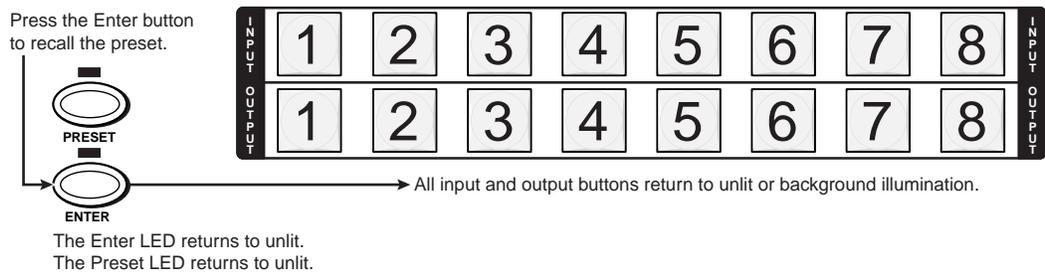
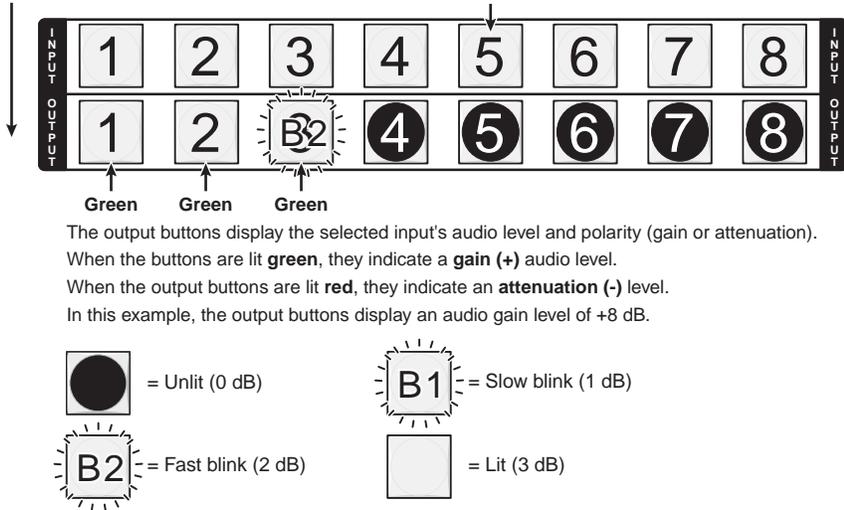


Figure 3-34 — Press the Enter button

3. Press and release the input 5 button (figure 3-36).

Press and release the input 5 button.
The button lights to indicate that the input 5 **audio** is selected.



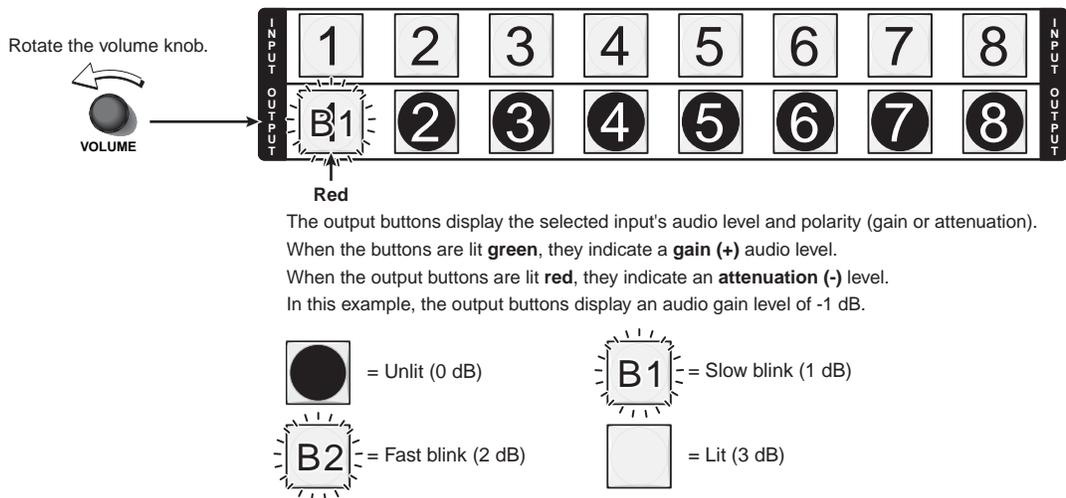
The output buttons display the selected input's audio level and polarity (gain or attenuation).
When the buttons are lit **green**, they indicate a **gain (+)** audio level.
When the output buttons are lit **red**, they indicate an **attenuation (-)** level.
In this example, the output buttons display an audio gain level of +8 dB.

Figure 3-36 — Select an input

4. Slowly rotate the volume knob counterclockwise (figure 3-37). Note the output button indication changes that occur as you rotate the knob.

NOTE Turn the volume knob **slowly**. The encoder will not reliably recognize the level change if you turn the knob too quickly.

Figure 3-37 shows the result of reducing the audio level a total of 9 dB. Note that the level is now displayed in red to indicate a negative level.



The output buttons display the selected input's audio level and polarity (gain or attenuation).
When the buttons are lit **green**, they indicate a **gain (+)** audio level.
When the output buttons are lit **red**, they indicate an **attenuation (-)** level.
In this example, the output buttons display an audio gain level of -1 dB.

Figure 3-37 — Adjust the input audio level

NOTE If another input button is pressed and released, the level value for the current input is saved and the level value for the newly selected input is displayed.

Operation, cont'd

5. Press and release the I/O button (figure 3-38).

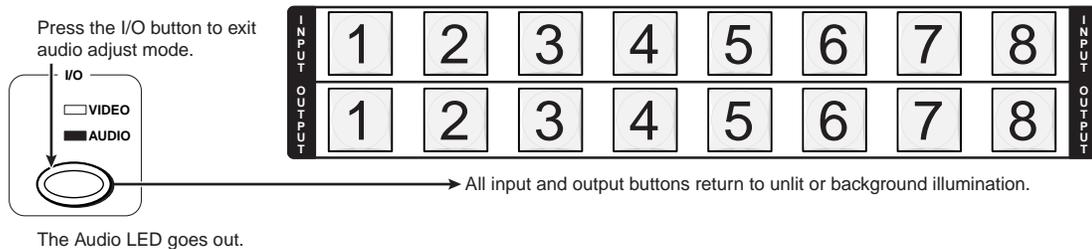


Figure 3-38 — Deselect audio mode

Viewing and adjusting the output volume (TPX 88 A only)

On the TPX 88 A, the audio level of each local output (the output on the captive screw connectors) can be displayed and adjusted through a range of 100% (no attenuation) to 0% (full attenuation). The audio level can be adjusted from the front panel or under RS-232/RS-422 control.

NOTE *The volume adjustment does not affect the audio portion of the twisted pair link output on RJ-45 connectors.*

NOTE *The output level adjustment will not work for a local output that is muted. If one or more local outputs are muted, press the Mute All button once or twice as necessary to turn off the Mute All LED.*

1. Press the Esc button to clear any input buttons, output buttons, or control buttons that may be lit.
2. Press and **hold** the I/O button until the Audio LED begins to blink, then release the I/O button.
3. Press and release an output button to select an output. The input buttons display the volume level for the selected output. Each **unlit** or background illuminated input button indicates approximately 7 dB of volume attenuation (whether there is an input associated with the button or not). There are eight steps displayed, from full attenuation applied (no input buttons lit, or 50 dB of attenuation) to the full volume output (all input buttons lit, or output volume equal to the input signal plus any gain or attenuation).

Another way to view the volume level is to realize that each lit input button indicates up to 14 percent of the input volume is applied to the output. When all 8 input buttons are lit, the switcher is outputting 100% of the audio input.

4. Rotate the Volume knob to increase and decrease the audio volume.
5. Press and release the I/O button to exit the audio display and adjustment mode. The Audio LED stops blinking.

NOTE

- *There is one audio volume level setting per output. The audio level setting is shared by the left and right audio inputs.*
- *The audio volume levels are stored in non-volatile memory. When power is removed and restored, the audio level settings are retained.*

Example 8: Viewing and adjusting an output volume level

The following steps show an example in which the audio output volume is viewed and adjusted. Where an explanation is helpful, the steps show the front panel indications that result from your action.

NOTE *The output level adjustment will not work for a local output that is muted. If one or more local outputs are muted, press the Mute All button once or twice as necessary to turn off the Mute All LED.*

1. Press and release the Esc button.
2. Press and **hold** the I/O button for approximately 2 seconds (figure 3-39).

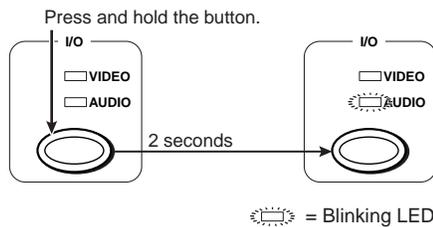
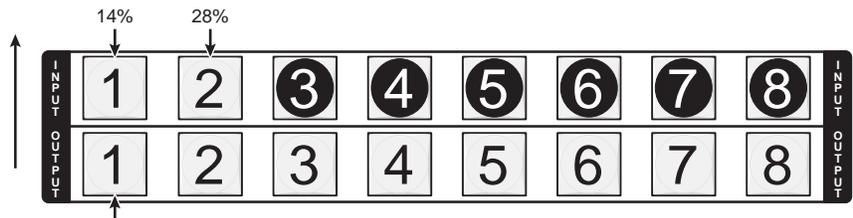


Figure 3-39 — Select audio view and adjust mode

3. Press and release the output 7 button (figure 3-40).

The input buttons display the selected output's audio volume level.

Each lit input button indicates up to 14 percent of the total input volume is applied to the output. Each unlit or background illuminated input button indicates 1 dB to 7 dB of attenuation is applied to the output. In this example, the **green** input buttons indicate that the switcher is outputting approximately 28 percent of the applied audio input. The **unlit** input buttons indicate an audio volume **attenuation** of approximately 42 dB.



Press and release the output 1 button.
The button lights to indicate that the output 1 **audio** is selected.

 = Unlit
(up to 7 dB of attenuation)

 = Lit
(up to 14% of input signal output)

Figure 3-40 — Select an output

Operation, cont'd

4. Slowly rotate the volume knob clockwise (figure 3-41). Note the output button indication changes that occur as you rotate the knob.

NOTE Turn the volume knob **slowly**. The encoder will not reliably recognize the level change if you turn the knob too quickly.

Figure 3-41 shows the result of increasing the audio volume level by a total of up to 56 percent.

The input buttons display the selected output's audio volume level.

Each lit input button indicates up to 14 percent of the total input volume is applied to the output. Each unlit or background illuminated input button indicates 1 dB to 7 dB of attenuation is applied to the output.

In this example, the **green** input buttons indicate that the switcher is outputting approximately 84 percent of the applied audio input. The **unlit** input buttons indicate an audio volume **attenuation** of approximately 14 dB.

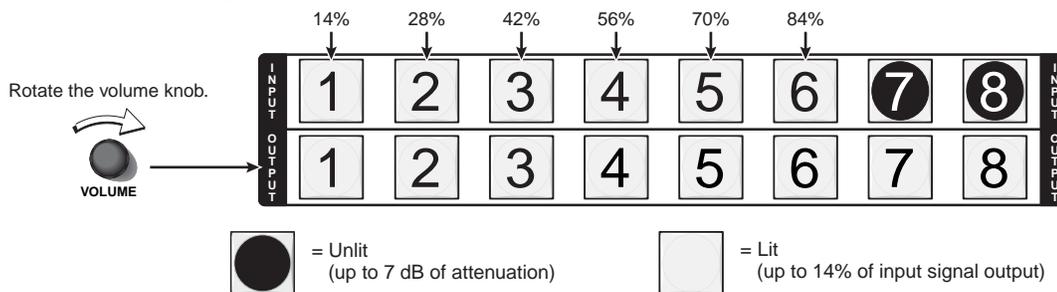


Figure 3-41 — Adjust the output audio volume

5. Press and release the Audio button (figure 3-42).

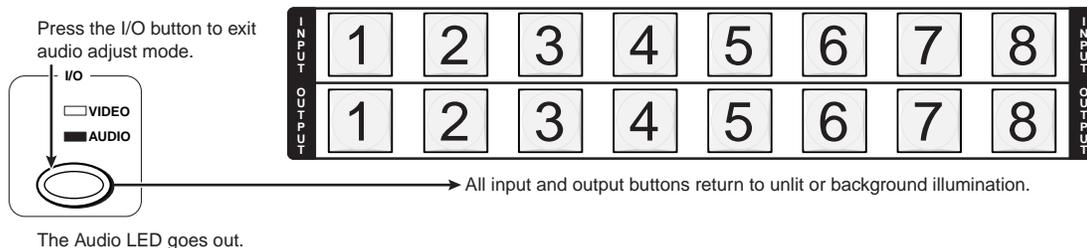


Figure 3-42 — Deselect audio mode

Muting and unmuting the local audio (TPX 88 A only)

You can mute all local audio (captive screw connector) outputs from the front panel. Mute or unmute the audio outputs by pressing and releasing the Mute All button (figure 3-43).

Press the button to toggle audio mute on or off for all outputs.

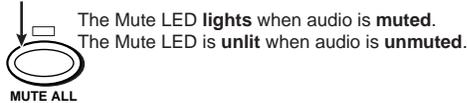


Figure 3-43 — Muting and unmuting outputs

NOTE The mute all function is saved to non-volatile memory. When you cycle power, muted outputs remain muted.

NOTE Individual audio outputs can be muted under RS-232/RS-422 control only. See chapter 4, Programmer's Guide, and chapter 5, Matrix Software, for details.

Front panel security lockout (executive mode)

The front panel security lockout limits the operation of the TPX matrix switcher from the front panel. When the switcher is locked, all of the front panel functions are disabled except for the view-only mode functions. See *Viewing a configuration* on page 3-13. Other than in view-only mode, if the user pushes a front panel button when the switcher is locked, the button blinks twice and the switcher does not otherwise respond to the user's front panel operations.

To toggle the front panel lock on or off, press and hold the Enter and Esc buttons for approximately three seconds (figure 3-44). The Enter LED blinks to indicate the lock's state change. Release the buttons. To toggle the front panel lock state again, press and hold the Enter and Esc buttons again.

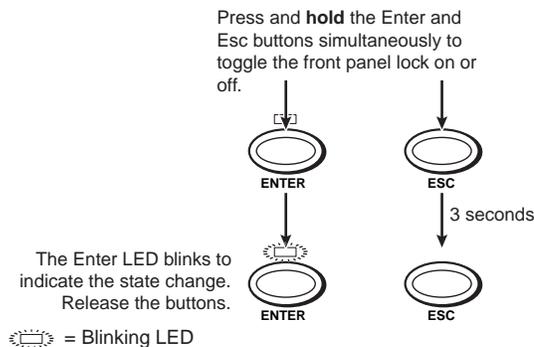


Figure 3-44 — Toggle the front panel lock on or off

System reset to factory defaults

To reset the switcher to the factory default settings, press and hold the Esc button on the front panel while AC power is being applied (figure 3-45). System reset clears all ties and presets and resets all I/O grouping. On the TPX 88 A, system reset also sets all input audio levels to unity gain (+0 dB).

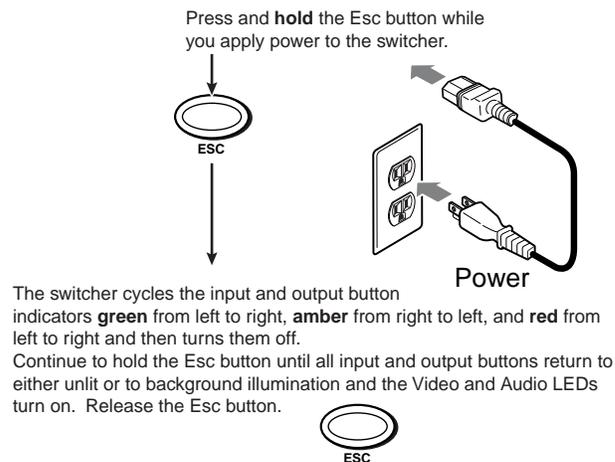


Figure 3-45 — System reset

Background illumination

The buttons on the front panel can be set to provide amber background illumination at all times or the background illumination can be turned off. To toggle the background illumination on or off, press and hold the Input 1 and Input 2 buttons for approximately half a second (figure 3-46).

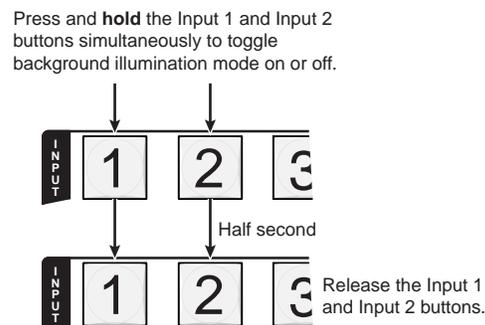


Figure 3-46 — Toggle background illumination on or off

NOTE When background illumination is on, the button indicators may momentarily go out intermittently when you are performing front panel operations. This happens when the switcher is accessing its flash memory and is normal.

Troubleshooting

This section gives recommendations on what to do if you have problems operating the TPX switcher.

1. Ensure that all devices are plugged in and powered on. The switcher is receiving power if one of the input LEDs is lit.
2. Ensure an active input is selected for output on the switcher.
3. Ensure that the proper signal format is supplied.
4. Check the cabling and make corrections as necessary.
5. Call the Extron S³ Sales & Technical Support Hotline if necessary.

Worksheets

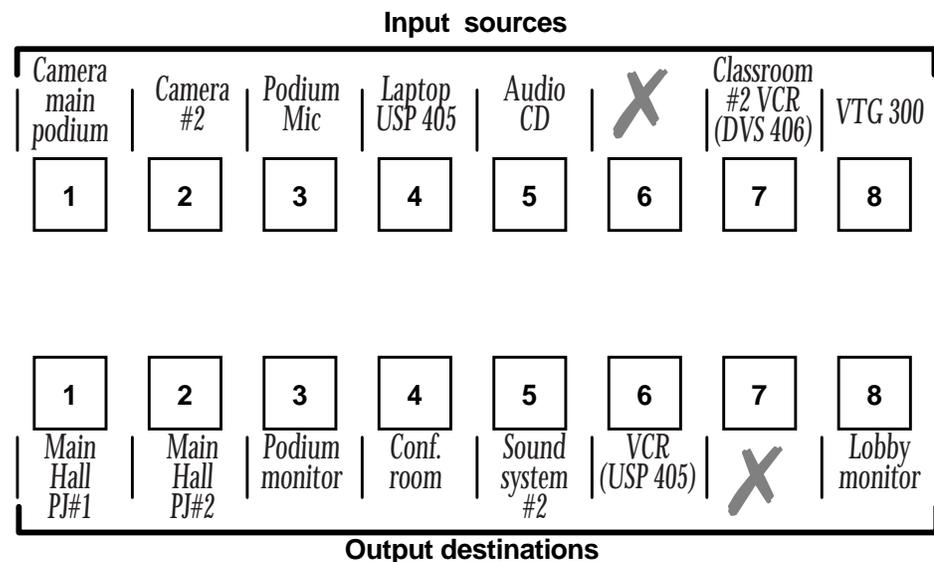
Rather than trying to remember the configuration for each preset, use worksheets to record this information. Make copies of the blank worksheet on page 3-31 and use one for each preset configuration. Cross out all unused or inactive inputs and outputs. If applicable, use different colors for video and audio.

Worksheet example 1: System equipment

Figure 3-47 shows a worksheet for a TPX 88 A in a fictional organization. System hardware is annotated. Input 6 has no connection, so it has been crossed out.

Inputs include PCs, a CD player, cameras, and a VTG 300, all connected through TP transmitters. Output devices include monitors, front and rear projectors, a stereo, and a VCR for recording presentations, all connected through TP receivers.

The Extron VTG 300 video test generator connected to input 8 enables a video test pattern to be sent to one, several, or all output devices for problem isolation or adjustment purposes. An audio test tape or CD could be used in a similar manner to check out the audio components.



Preset # 1 Title: Worksheet Example Video: — Audio: --

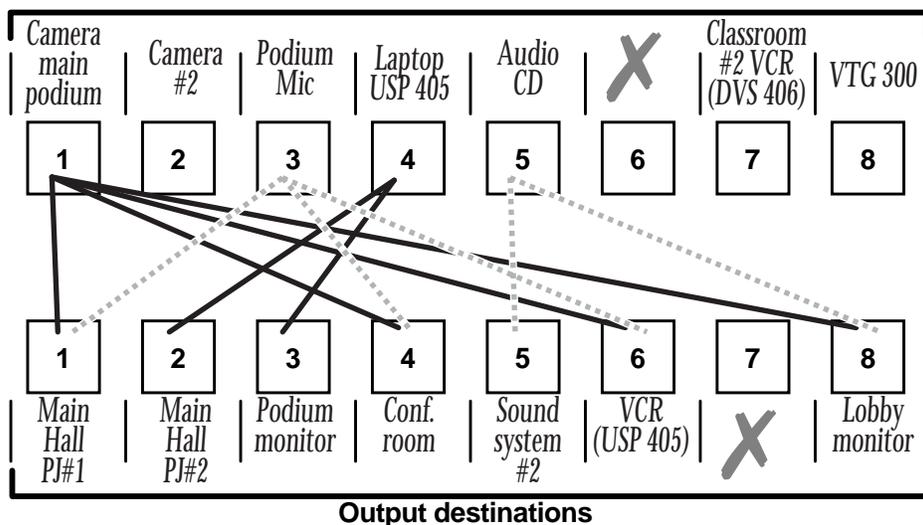
Fill in the preset number, use colors or dashes, etc. to make connecting lines. Indicate if the configuration is for Video, Audio, or both.

Figure 3-47 — Worksheet example 1: System equipment

Operation, cont'd

Worksheet example 2: Daily configuration

Figure 3-48 continues from worksheet example 1 by showing the video and audio ties that make up the configuration of preset 1; a solid ink line shows video ties and a dashed pencil line shows the audio ties. In this example, the image of the presenter, from the main podium camera (input 1), is displayed in the main hall (output 1), to the overflow crowd in the conference room (output 4), and in the lobby (output 8). The image is also tied to the VCR (output 6). The presenter has a presentation on her laptop computer (input 4) that is scan converted and displayed in the main hall (output 2) and locally on the podium (output 3). The audio from her microphone (input 3) is played in the hall (output 1), in the conference room (output 4), and sent to the VCR. Classical music from the CD player (input 5) is being played in the background in the main hall on sound system #2 (output 5), and in the lobby (output 8).



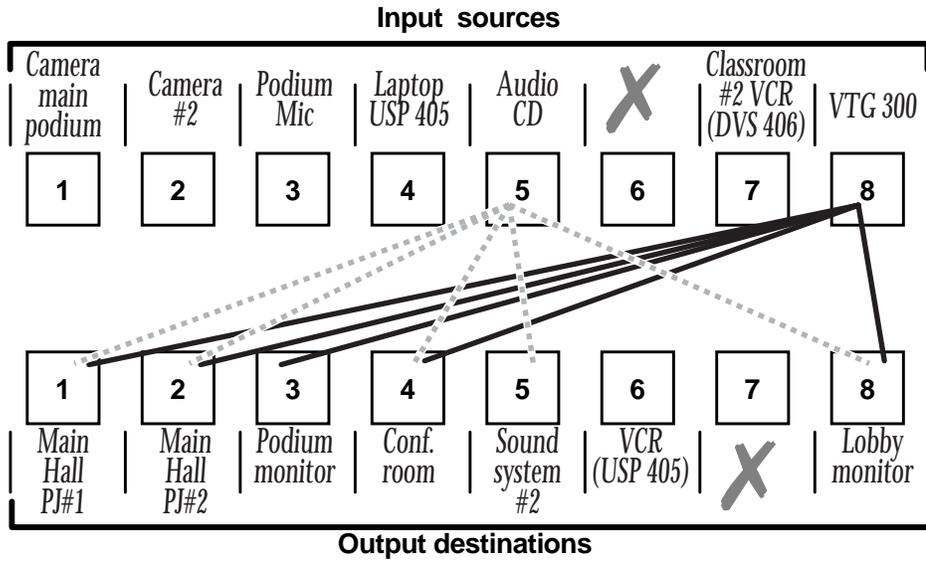
Preset # 1 Title: Worksheet Example Video: — Audio: - -

Fill in the preset number, use colors or dashes, etc. to make connecting lines. Indicate if the configuration is for Video, Audio, or both.

Figure 3-48 — Worksheet example 2: Daily configuration

Worksheet example 3: Test configuration

The A/V system in our fictional organization needs to be fine tuned on a regular basis. Figure 3-49 shows a typical test configuration, with an Extron video test generator (input 8) generating a test pattern to all monitors (outputs 1, 2, 3, 4, and 8). Sound checks are run from the CD player (input 5) to all audio systems (outputs 1, 2, 4, 5, and 8).



Preset # 1 Title: Worksheet Example Video: — Audio: --

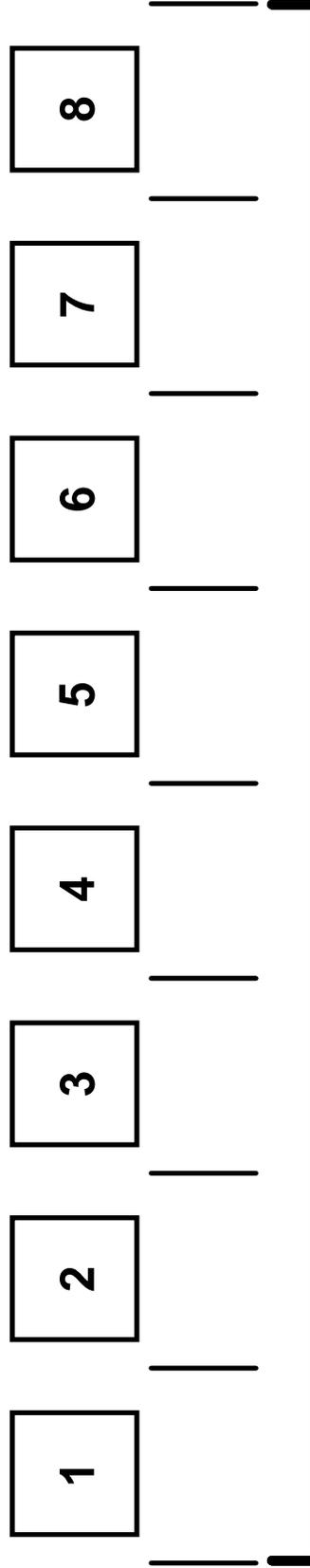
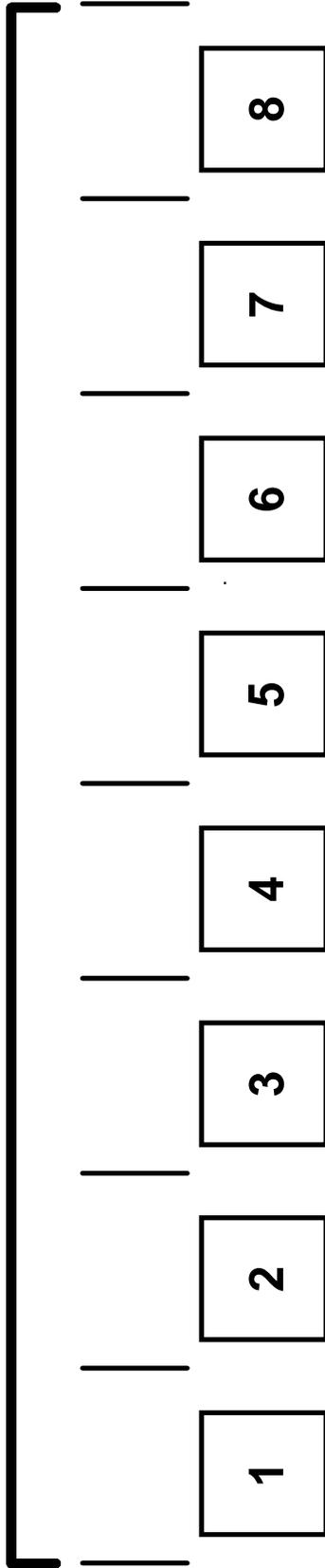
Fill in the preset number, use colors or dashes, etc. to make connecting lines. Indicate if the configuration is for Video, Audio, or both.

Figure 3-49 — Worksheet example 3: Test configuration

Operation, cont'd

Configuration worksheet

Input sources



Output destinations

Preset # _____ Title: _____ Video: _____ Audio: _____
Fill in the preset number and use colors, or dashes, etc. to make connecting lines.
Indicate if the configuration is for Video, Audio, or both.

Operation, cont'd



TPX 88 Twisted Pair Matrix Switchers

4 Chapter Four

Programmer's Guide

Host-to-Switcher Instructions

Switcher-Initiated Messages

Switcher Error Responses

Using the Command/Response Table

Command/Response Table for SIS Commands

Programmer's Guide

The switcher's rear panel 3.5 mm, 5-pole captive screw connector (figure 4-1) can be connected to the RS-232 or RS-422 serial port output of a host device such as a computer running the HyperTerminal utility, an RS-232 capable PDA, or a control system. This connection makes software control of the switcher possible.

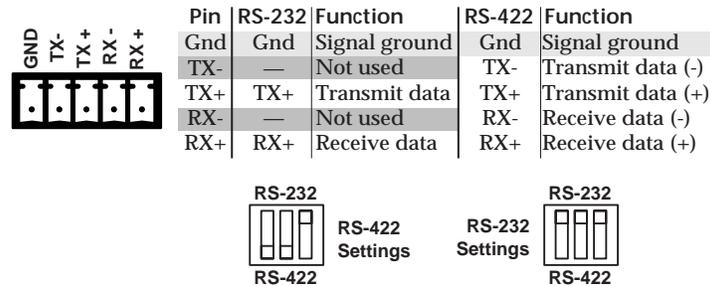


Figure 4-1 — Remote connector pin arrangement

NOTE The TPX switcher can communicate using either the RS-232 or RS-422 serial communication protocol. The protocol is DIP-switch selectable. See chapter 2, Installation, to configure the DIP switches.

The protocol is 9600 baud, 8-bit, 1 stop bit, no parity, and no flow control.

Host-to-Switcher Instructions

The switcher accepts SIS (Simple Instruction Set) commands through the RS-232/RS-422 port. 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 = \leftarrow), 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 front panel operation occurs, the switcher responds by sending a message to the host. The switcher-initiated messages are listed below (underlined).

(c)Copyright 2003, Extron Electronics, TPX 88, Vx.xx \leftarrow

The switcher initiates the copyright message when it is first powered on. Vx.xx is the firmware version number.

Qik \leftarrow

The switcher initiates the Qik message when a front panel switching operation has occurred.

Rprnn \leftarrow

The switcher initiates the Rpr message when a memory preset has been recalled from the front panel. "nn" is the preset number.

Sprnn \leftarrow

The switcher initiates the Spr message when a memory preset has been saved from the front panel. "nn" is the preset number.

Innn Audxx \leftarrow

The switcher initiates the Aud message when a front panel audio level operation has occurred. "nn" is the input number and "xx" is the dB level.

Outnn Volxx↵

The switcher initiates the Aud message when a front panel audio volume level operation has occurred. “nn” is the output number and “xx” is the volume level.

Exen↵

The switcher initiates the Exe message when executive mode is toggled on or off from the front panel. “n” is the executive mode status: 1 = on, 0 = off.

Amtn↵

The switcher initiates the Amt message when audio mute is toggled on or off for all local audio outputs from the front panel. “n” is the mute status: 1 = on (muted), 0 = off (unmuted).

Switcher Error Responses

When the switcher 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 (too large)
- E12 — Invalid output number (too large)
- E13 — Invalid value (out of range)
- E14 — Illegal command for this configuration
- E17 — Timeout (only caused by direct write of global presets)

Using the Command/Response Table

The command/response table begins on page 4-5. 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 command.

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/response fields. Command and response examples are shown throughout the table.

Symbol Definitions:

- ↵ = Carriage return/line feed
- ← = Carriage return (no line feed)
- = Space

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

- X1 = Input number 01 - 08
- X2 = Input number (for tie) 00 - 08 (0=disconnected)
- X3 = Output number 01 - 08
- X4 = Numeric dB value -18 to +24 (43 steps of gain or attenuation)
- X5 = Audio gain 0 - 24 (1 dB/step)
- X6 = Audio attenuation 1 - 18 (1 dB/step)
- X7 = Volume adjustment range 0% to 100%
- X8 = Mute, executive mode 0 = off, 1 = on
- X9 = Group # (for I/O grouping) 1 through 4 groups (0 = no group)
- X10 = Global preset # 16 maximum (0 = current configuration)
- X11 = Video/audio mute: 0 = no mutes
2 = audio mute
- X12 = Controller firmware version number to second decimal place

Command/Response Table for SIS Commands

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional description
Create ties			
<p>NOTE 1. Commands can be made back-to-back, with no spaces. For example: 1*1!02*02&003*003%4*6\$.</p> <p>2. The quick multiple tie and tie input to all output commands activate all I/O switches simultaneously.</p> <p>3. The TPX supports 1-, 2-, and 3-digit numeric entries (1*1!, 02*02!, or 001*001!).</p>			
Tie input $\boxed{x2}$ to output $\boxed{x3}$, video (V) and audio (A)	$\boxed{x2}^*\boxed{x3}!$	Out $\boxed{x3}$ •In $\boxed{x2}$ •All \downarrow	Tie input $\boxed{x2}$'s video and audio to output $\boxed{x3}$.
<i>Example:</i>	1*3!	Out03•In01•All \downarrow	Tie input 1 V & A to output 3.
Tie input $\boxed{x2}$ to output $\boxed{x3}$, video only	$\boxed{x2}^*\boxed{x3}\&$	Out $\boxed{x3}$ •In $\boxed{x2}$ Vid \downarrow	Audio breakaway.
<i>Example (see Note):</i>	8*4&	Out04•In08•Vid \downarrow	Tie input 8 video to output 4.
Tie input $\boxed{x2}$ to output $\boxed{x3}$, video only	$\boxed{x2}^*\boxed{x3}\%$	Out $\boxed{x3}$ •In $\boxed{x2}$ •Vid \downarrow	Audio breakaway.
<i>Example (see Note):</i>	7*5%	Out05•In07•Vid \downarrow	Tie input 7 video to output 5.
<p>NOTE The & tie command and the % tie command can be used interchangeably for video on the TPX switcher.</p>			
Tie input $\boxed{x2}$ to output $\boxed{x3}$, audio only	$\boxed{x2}^*\boxed{x3}\$$	Out $\boxed{x3}$ •In $\boxed{x2}$ •Aud \downarrow	Audio breakaway.
<i>Example:</i>	6*7\$	Out07•In06•Aud \downarrow	Tie input 6 audio to output 7.
Quick multiple tie	$\boxed{Esc}+Q\boxed{x2}^*\boxed{x3}!\dots\boxed{x2}^*\boxed{x3}!\leftarrow Qik$ \downarrow		
<i>Example:</i>	$\boxed{Esc}+Q3*4!3*5!3*6!\leftarrow$	Qik \downarrow	Tie input 3 to outputs 4, 5, and 6.
Tie input to all outputs, V & A	$\boxed{x2}^*!$	In $\boxed{x2}$ •All \downarrow	
<i>Example:</i>	5*!	In05•All \downarrow	Tie input 5 video and audio to all outputs.
Tie input to all outputs, video only	$\boxed{x2}^*\&$	In $\boxed{x2}$ •Vid \downarrow	
<i>Example (see Note):</i>	8*&	In08•Vid \downarrow	Tie input 8 video to all outputs.
Tie input to all outputs, video only	$\boxed{x2}^*\%$	In $\boxed{x2}$ •Vid \downarrow	
<i>Example (see Note):</i>	4*%	In04•Vid \downarrow	Tie input 4 video to all outputs.
<p>NOTE The & tie all command and the % tie all command can be used interchangeably for video on the TPX switcher.</p>			
Tie input to all outputs, audio only	$\boxed{x2}^*\$$	In $\boxed{x2}$ •Aud \downarrow	
<i>Example:</i>	1*\$	In 01•Aud \downarrow	Tie input 1 audio to all outputs.
Read ties			
Read video output tie	$\boxed{x3}\&$	$\boxed{x2}$ \downarrow	Video input $\boxed{x2}$ tied to output $\boxed{x3}$.
<i>Example:</i>	3&	1 \downarrow	Video input 1 tied to output 3.
Read video output tie	$\boxed{x3}\%$	$\boxed{x2}$ \downarrow	Video input $\boxed{x2}$ tied to output $\boxed{x3}$.
<i>Example:</i>	5%	4 \downarrow	Video input 4 tied to output 5.
<p>NOTE The & read tie command and the % read tie command can be used interchangeably for video on the TPX switcher.</p>			
Read audio output tie	$\boxed{x3}\$$	$\boxed{x2}$ \downarrow	Audio input $\boxed{x2}$ tied to output $\boxed{x3}$.
<i>Example:</i>	7\$	7 \downarrow	Video input 7 tied to output 7.

Programmer's Guide, cont'd

Command/response table for SIS commands (Cont'd)

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional description
Audio input gain and attenuation			
NOTE The set gain (G) and attenuation (g) commands are case sensitive.			
Set audio input gain to +dB value <i>Example:</i>	[X1]*[X5] G 1*2G	In[X1]•Aud[X4]↵ In01•Aud+02↵	Set input 1 audio level to +2 dB gain.
Set audio input attenuation to -dB value <i>Example:</i>	[X1]*[X6] g 3*5g	In[X1]•Aud[X4]↵ In03•Aud-05↵	Set input 3 audio level to -5 dB attenuation.
Increment gain <i>Example:</i>	[X1]+G 5+G	In[X1]•Aud[X4]↵ In05•Aud+03↵	Increase gain by 1 dB. Audio input 5 level incremented from +2 dB to +3 dB.
Decrement gain <i>Example:</i>	[X1]-G 7-G	In[X1]•Aud[X4]↵ In07•Aud-09↵	Decrease gain by 1 dB. Audio input 7 level decremented from -8 dB to -9 dB.
Read input gain <i>Example:</i>	[X1]G 2G	[X4]↵ +11↵	Input 2 audio level is +11 dB gain.
Audio output volume			
NOTE The adjustment range is between 0 and 100% audio output volume in 1 dB steps of attenuation. Each 1 dB equals approximately a 2% reduction in audio output volume.			
Set audio volume to % of max. value <i>Example:</i>	[X3]*[X7] V 1*50v	Out[X3]•Vol[X7]↵ Out01•Vol50↵	Set output 1 volume to 50%.
NOTE Odd-numbered [X7] values are rounded up to even-numbered values.			
Increase volume <i>Example:</i>	[X3]+V 1+V	Out[X3]•Vol[X7]↵ Out01•Vol52↵	Increase volume by 2%. Audio output 1 level incremented from 50% to 52%.
Decrease volume <i>Example:</i>	[X3]-V 1-V	Out[X3]•Vol[X7]↵ Out01•Vol50↵	Decrease volume by 2%. Audio output 1 level incremented from 52% to 50%.
Read output volume <i>Example:</i>	[X3]V V	[X7]↵ Vol50↵	Audio output 1 level is 50%.
Audio mute commands			
Audio mute <i>Example:</i>	[X3]*1Z 3*1Z	Amt[X3]*1↵ Amt03↵	Mute output [X3] audio (audio off). Mute output 3 audio.
Audio unmute	[X3]*0Z	Amt[X3]*0↵	Unmute output [X3] audio (audio on).
Read audio mute	[X3]Z	[X8]↵	1= mute on, 0 = mute off.
Global audio mute	1*Z	Amt1↵	Mute all audio outputs. The front panel Mute All LED lights.
Global audio unmute	0*Z	Amt0↵	Unmute all audio outputs. The front panel Mute All LED goes out.

Command/response table for SIS commands (Cont'd)

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional description
I/O Grouping			
NOTE The group that is assigned ($\overline{x9}$) must be 0 (not grouped), 1, 2, 3, or 4.			
Write input grouping	$\overline{\text{Esc}}\overline{I}\overline{x9}^1\overline{x9}^2\dots\overline{x9}^8\leftarrow$	GrI \downarrow	Each $\overline{x9}$ entry is the group number assigned to an input position, starting from input 1.
Example:	$\overline{\text{Esc}}\overline{I}40234133\leftarrow$	GrI \downarrow	Input 1 - Group 4, Input 2 - Group 0 (not grouped),...Input 7 - Group 3, Input 8 - Group 3.
Write output grouping	$\overline{\text{Esc}}\overline{O}\overline{x9}^1\overline{x9}^2\dots\overline{x9}^8\leftarrow$	GrO \downarrow	Each $\overline{x9}$ entry is the group number assigned to an output position, starting from output 1.
Read input grouping	$\overline{\text{Esc}}\overline{I}\leftarrow$	$\overline{x9}^1\overline{x9}^2\overline{x9}^3\dots\overline{x9}^8\downarrow$	One $\overline{x9}$ entry for each input, starting from input 1.
Example:	$\overline{\text{Esc}}\overline{I}\leftarrow$	See below	<p style="text-align: center;"> Input 5 in group 3 Input 1 in group 1 | Input 8 not grouped Response = group: $\overline{1}\overline{1}\overline{1}\overline{3}\overline{3}\overline{0}\overline{0}\overline{0}\downarrow$ Input: 01 02 03 04 05 06 07 08 </p>
Read output grouping	$\overline{\text{Esc}}\overline{O}\leftarrow$	$\overline{x9}^1\overline{x9}^2\overline{x9}^3\dots\overline{x9}^8\downarrow$	One $\overline{x9}$ entry for each output, starting from input 1.
Save, recall and direct write global presets			
NOTE If the user tries to recall a preset that is not saved, the matrix switcher responds with the error code E11.			
Save current ties as a global preset	$\overline{x10},$	Spr $\overline{x10}\downarrow$	Command character is a comma.
Example:	9,	Spr09 \downarrow	Save current ties as preset 9.
Recall a global preset	$\overline{x10}.$	Rpr $\overline{x10}\downarrow$	Command character is a period.
Example:	5.	Rpr05 \downarrow	Recall preset 5, which becomes the current configuration.
Direct write a global preset	$\overline{\text{Esc}}+\overline{x10}P\overline{x2}^*\overline{x3}!\overline{x2}^*\overline{x3}\%\overline{x2}^*\overline{x3}\$\dots\overline{x2}^*\overline{x3}\&\leftarrow$	Spr $\overline{x10}\downarrow$	Enter as many ties as are valid for this model. Tie all (!), tie RGBHV (&), tie video (%), and tie audio (\$) commands are all valid.
Example:	$\overline{\text{Esc}}+15P08*5!5*2\%3*3\$3*8\&\leftarrow$	Spr15 \downarrow	Brackets are shown to separate ties for clarity only. Create global preset 15, which ties video and audio input 8 to output 5, RGBHV input 5 to output 2, video input 3 to output 3, and audio input 3 to output 8.
Executive mode			
Lock front panel	1X	Exe1 \downarrow	Enable executive mode.
Unlock front panel	0X	Exe0 \downarrow	Disable executive mode.
View executive mode	X	$\overline{x8}\downarrow$	
Resets			
Reset global presets and names	$\overline{\text{Esc}}\overline{ZG}\leftarrow$	Zpg \downarrow	Clear all global presets.
Reset an individual global preset	$\overline{\text{Esc}}\overline{x10}\overline{ZG}\leftarrow$	Zpg $\overline{x10}\downarrow$	Clear global preset $\overline{x10}$.
Reset audio input levels	$\overline{\text{Esc}}\overline{ZA}\leftarrow$	Zpa \downarrow	Reset all audio input levels (gain and attenuation) to 0 dB.

Programmer's Guide, cont'd

Command/response table for SIS commands (Cont'd)

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional description
Resets (continued)			
Reset audio output levels	<code>EscZV ←</code>	<code>Zpv ↵</code>	Reset all audio output levels (volume) to 100% (no attenuation).
Reset all mutes	<code>EscZZ ←</code>	<code>Zpz ↵</code>	Reset all audio mutes.
Reset whole switcher	<code>EscZXXX ←</code>	<code>Zpx ↵</code>	Clears all ties and presets, resets all audio gains to 0 dB, and resets volume to 100%.
View ties, gain, volume, and presets			
View video output tie	<code>X3&</code>	<code>X2 ↵</code>	
Example:	<code>5&</code>	<code>07 ↵</code>	Input 7 video tied to output 5.
View video output tie	<code>X3%</code>	<code>X2 ↵</code>	
Example:	<code>7%</code>	<code>02 ↵</code>	Input 2 video tied to output 7.
NOTE The & read tie command and the % read tie command can be used interchangeably for video on the TPX switcher.			
View audio output tie	<code>X3\$</code>	<code>X2 ↵</code>	
Example:	<code>3\$</code>	<code>06 ↵</code>	Input 6 audio tied to output 3.
View input gain	<code>X2G</code>	<code>X4 ↵</code>	
Example:	<code>4G</code>	<code>-02 ↵</code>	Gain for input #4 is -2 dB.
View output volume	<code>X2V</code>	<code>X7 ↵</code>	
Example:	<code>7V</code>	<code>55 ↵</code>	Volume for output #7 is 55%.
View output mutes	<code>EscVM ←</code>	<code>X11¹X11²...X11⁸Mut ↵</code>	Each <code>X11</code> response is the mute status of an output, starting from output 1..
Example:	<code>EscVM ←</code>	<code>0•0•0•0•2•0•0•0•Mut ↵</code>	Output 5 audio is muted. All other outputs are unmuted.
View global preset configuration	<code>EscX10VC ←</code>	<code>X2¹•X2²•X2³•X2⁴•X2⁵•X2⁶•X2⁷•X2⁸•Vid•X2¹•X2²•X2³•...•X2⁸•Aud ↵</code>	Show preset <code>X10</code> 's configuration. Show the video input tied to each output and then the audio input tied to each output.
Response description:	input # (I#) tied to output # (O#1)•I# tied to O#2...I# tied to O#8•Vid•I# tied to O#1•...I# tied to O#8•Aud↵		
Example:	<code>Esc4VC ←</code> input 6 video tied to output 2 no tied video input audio input 8 tied to output 5 Response = tied input: <code>03•06•03•04•04•02•02•00•Vid•03•06•03•08•08•04•04•00•Aud ↵</code> Output: 1 2 3 4 5 6 7 8 1 2 3 4 5 6 7 8		
Each position shown in the response is an output: left = output 1, right= output 8. The number in each position is the input that is tied to that output.			
Video — Input 2 is tied to outputs 6 and 7, input 3 is tied to outputs 1 and 3, input 4 is tied to outputs 4 and 5, input 6 is tied to output 2. No input is tied to output 8.			
Audio — Input 3 is tied to outputs 1 and 3, input 4 is tied to outputs 6 and 7, input 3 is tied to output 2, and input 8 is tied to outputs 4 and 5. No input is tied to output 8.			
Information requests			
Information request	<code>I</code>	<code>VX2Xx3•AX2Xx3 ↵</code>	<code>VX2Xx3</code> = V size, <code>AX2Xx3</code> = A Size.
Example:	<code>I</code>	<code>V08X08•A08X08 ↵</code>	8 video and 8 audio inputs by 8 video and 8 audio outputs (TPX 88 A).
Request part number	<code>N</code>	<code>xx-xxx-xx ↵</code>	See appendix A for part #s.
Example:	<code>N</code>	<code>60-542-01 ↵</code>	TPX 88 A part # is 60-542-01.
Query firmware version	<code>Q</code>	<code>X12 ↵</code>	
Example:	<code>Q</code>	<code>1.23 ↵</code>	The installed firmware version is 1.23 (sample value only).



TPX 88 Twisted Pair Matrix Switchers

5 Chapter Five

Matrix Software

Matrix Switchers Control Program

Button-Label Generator

Matrix Software

Two software programs accompany the TPX 88 switchers:

- The Extron Matrix Switcher+ Control Program (Extron part #29-015-01), which communicates with the switcher via the RS-232/RS-422 port, provides an easy way for you to set up ties and sets of ties.

NOTE *The TPX switcher can communicate using either the RS-232 or RS-422 serial communication protocol. The protocol is DIP-switch selectable. See chapter 2, Installation, to configure the DIP switches.*

- The Extron Button-Label Generator, which allows you to design and print labels for the TPX switcher's front panel buttons.

Both programs are compatible with Windows 95/98, Windows NT, Windows ME, and Windows 2000. Updates to these programs can be downloaded from the Extron Web site (<http://www.extron.com>).

Matrix Switchers Control Program

Installing the software

The program is contained on a set of 3.5-inch diskettes, and you should load and run the program from the hard drive.

To install the program from the floppy disk to the hard drive, run Setup.exe from the floppy disk and follow the instructions that appear on the screen. The program occupies approximately 1 MB (megabyte) of hard-drive space.

By default, the Windows installation creates a C:\MTRX50 directory, and it places two icons (MATRIX Switcher+ Control Program and MATRIX Switcher+ Help) into a group or folder named "Extron Electronics".

NOTE *The program was designed to control most Extron matrix switchers, but its operation is limited to the features and configuration of your TPX switcher.*

Using the software

This section is an overview of the Extron Matrix Switcher+ Control Program. The help function contains additional information. See *Using the help system* on page 5-7 for details.

1. To run the Matrix Switcher+ Control Program, double-click on the Matrix Switcher+ Control Program icon (shown at left) in the Extron Electronics group or folder.



MATRIX Switcher+
Control Pgm

2. Click on the comm port that is connected to the RS-232/RS-422 port of the switcher. To set up the software without attaching the switcher to the computer, see *Using emulation mode* on page 5-7.

The Extron Matrix Switcher+ Control Program window (figure 5-1 and figure 5-2) displays the current configuration of the attached matrix.

3. To set up audio in follow mode (audio and video have the same tie configuration), select the Follow box at the bottom of the window. To set up audio in breakaway mode (audio and video have different tie configurations), deselect the Follow box.

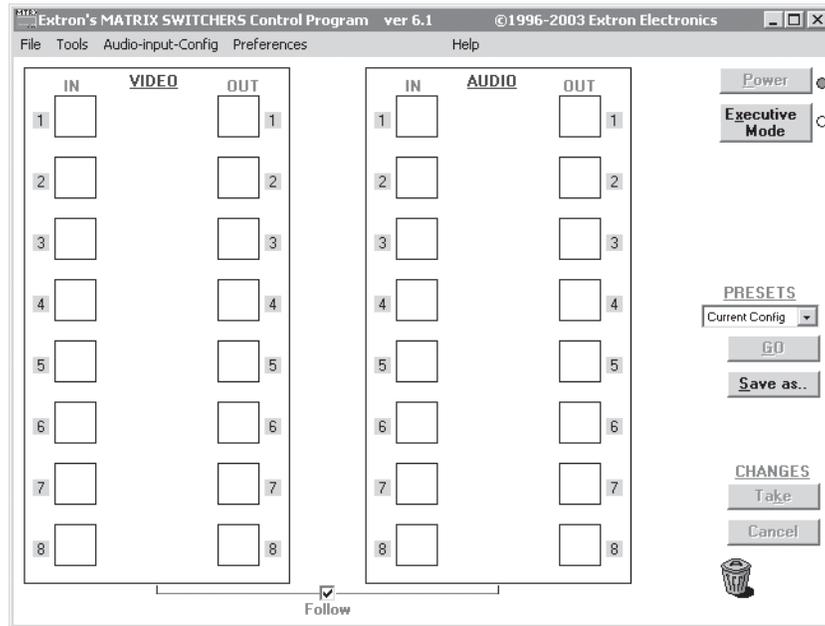


Figure 5-1 — Extron Matrix Switcher+ Control Program window (blank)

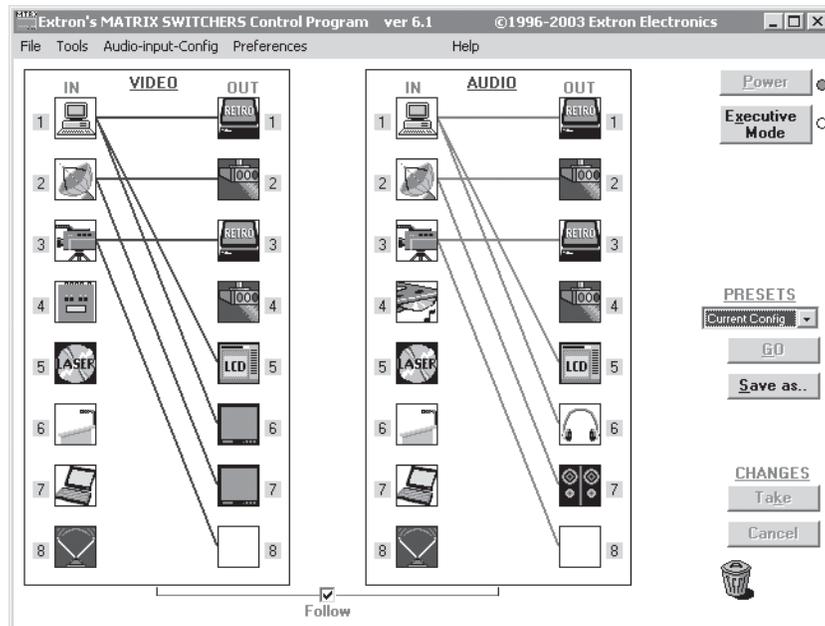


Figure 5-2 — Sample program window (complete)

4. To make the control program easier to use, assign a device icon to each input and output. Click on a box that represents an input or output, and drag the desired icon onto the box from the icon palette that appears.
5. To create a tie, drag an input box to one or more output boxes. To remove a tie, drag the output box to its tied input box.

Matrix Software, cont'd

Firmware upgrade

The Matrix Switcher+ control program provides a way to replace the firmware that is coded on the switcher's control board.

Perform a firmware upgrade as follows:

1. Visit the Extron web site, www.extron.com, select the TPX product category, and select the latest firmware file for download. Note the folder to which you save the firmware file.
2. Connect the PC to the TPX switcher via the switcher's RS-232/RS-422 port.
3. Start the Matrix Switcher+ Control Program. See *Using the software*, steps 1 and 2, starting on page 5-2.
4. Click the mouse on *Tools > Update Firmware*. An open file window (figure 5-3) appears.

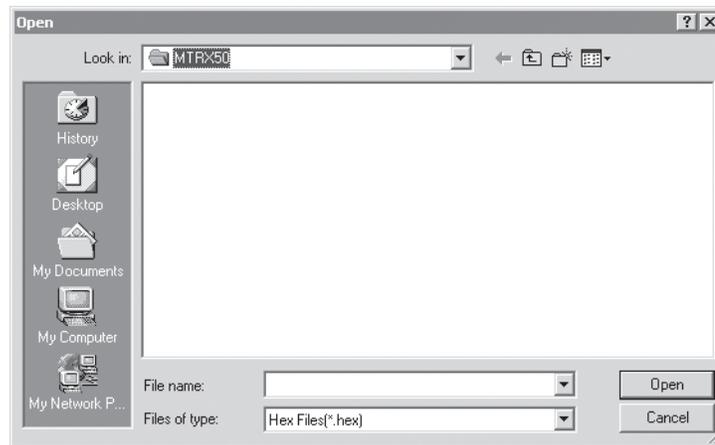


Figure 5-3 — Open window

5. Navigate to the folder where you saved the firmware upgrade file. Select the file.

NOTE *Valid firmware upgrade files must have the file extension '.hex'. Any other file extension is not a firmware upgrade.*

6. Click the mouse on the *Open* button. A status window, which shows the progress of the upload, appears. The file(s) upload to the TPX switcher may take a few minutes.

Windows buttons, drop boxes, and trash

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



Power — Unavailable for TPX switchers, because the switcher power cannot be controlled via software.

Executive mode — Allows you to lock out front panel operations, except for the view-only mode functions.

Presets menu — Displays a list of up to 16 global presets. 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.

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.

Trash can — Drag and drop from an input or output button to the trash can to unmake all ties associated with that input or output.

Windows menus

File menu

Save matrix settings as — Saves a complete set of up to 16 presets, plus the last active setting (preset #0), to a file. Saved settings include audio gain settings (if specified), assigned icons, and icon captions.

Restore matrix settings from — Loads and activates a previously saved setting file.

Save this-session's settings — Saves the current assigned icons and icon captions.

Restore last-session's settings — Loads the icons and icon captions that were saved during the last session. If you saved the previous session's changes to disk the last time you exited the program, the ties from that session are also loaded.

Select printer — Selects the target printer.

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

Exit — Closes the Extron MATRIX Switcher+ Control Program.

Tools menu

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.

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

Audio-Output volume settings — Displays the audio output level setting for a single input or for all inputs and allows you to change it. The level is expressed as a percentage of the input audio volume that is applied to the output; 0% is full attenuation (audio is silent), 100% is full volume.

Matrix Software, cont'd

Mute-Output settings — Displays the audio output level setting for a single input or for all inputs and allows you to change it. The level is expressed as a percentage of the input audio volume that is applied to the output; 0% is full attenuation (audio is silent), 100% is full volume.

Update firmware — Allows you to upload replacement firmware files to upgrade the switcher's operating system. See *Firmware upgrade*, in this chapter.

Name presets — Allows you to name each of the 16 memory presets.

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

I/O group settings — Allows you to establish I/O groups.

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

Audio-config — Displays the audio gain level settings for each input and allows you to change them.

Preferences menu

Immediate changes — Causes configuration changes to take effect immediately.

Hold/verify changes — Delays implementation of configuration changes until the Changes - Take button is pressed.

Ties as lines — Displays ties as lines (figure 5-2).

Ties as crosspoints — Displays ties as a grid of inputs and outputs (figure 5-4). Made ties are indicated as blue boxes. New ties that will take effect when you click the mouse on the *Take* button are indicated by +. Ties that will be broken when you click the mouse on the *Take* button are indicated by -.

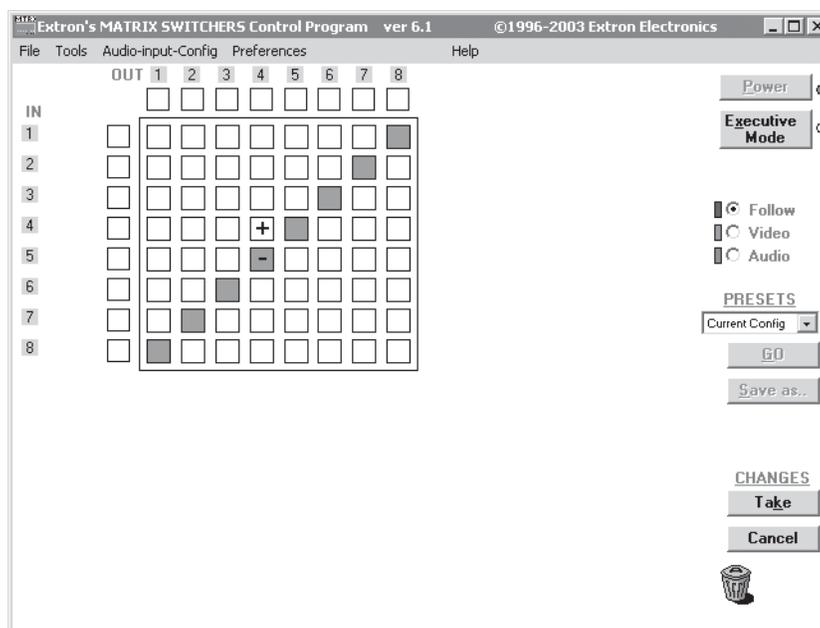


Figure 5-4 — Ties shown as crosspoints

Limit ties to same group — Allows you to limit the creation of ties using the program to within the same group (similar to front panel operation).

Icons in I/O boxes — Erases any numbers in the I/O boxes in the ties-as-lines window (figure 5-2). You can place icons in the boxes. 

Numbers in I/O boxes — Erases any icons in the I/O boxes in the ties-as-lines window and fills each box with the associated input or output number. 

Using emulation mode

Emulation mode allows you to set up the software without attaching the switcher to the computer. To use emulation mode, do the following:

1. Double-click on the MATRIX Switcher+ Control Program icon in the Extron Electronics group or folder.
2. Choose Emulate, and click OK.
3. Choose an emulation file to open, and click OK. The file DEMO.MTX provides a sample of a completed matrix setup. Selecting the file NEW.INI or clicking Cancel provides a blank setup to get you started.
4. Enter the file name under which you want to save any changes to the file, and click OK.
5. Select the number of video boards, audio boards, and matrix model for which you are preparing a configuration, and click OK.
6. Continue using the program as described in steps 3 through 5, beginning on page 5-2.

Using the help system

For information about program features, you can access the help program in any of the following ways:

- From the Extron Electronics program folder or group, double-click on the MATRIX Switcher+ Control Help icon (shown at right).
- From within the Matrix Switcher Control Program, click on the Help menu on the main screen.
- From within the Matrix Switcher Control Program, press the F1 key.



Button-Label Generator

The program is contained on the same set of 3.5-inch diskettes as the Matrix Switcher+ Control Program and is installed automatically when you install that program.

By default, the Windows installation goes in either the C:\MTRX50 directory if it is installed automatically with the Matrix Switcher+ Control Program or the C:\BUTTONS directory if it is installed as a stand-alone program. The Button-Label Generator icon is placed in the "Extron Electronics" group or folder.

Using the software

1. To run the Button-Label Generator program, double-click on the Button-Label Generator icon (shown at right) in the Extron Electronics group or folder, and click OK when prompted. The Extron's Button-Label Generator window appears (figure 5-5).

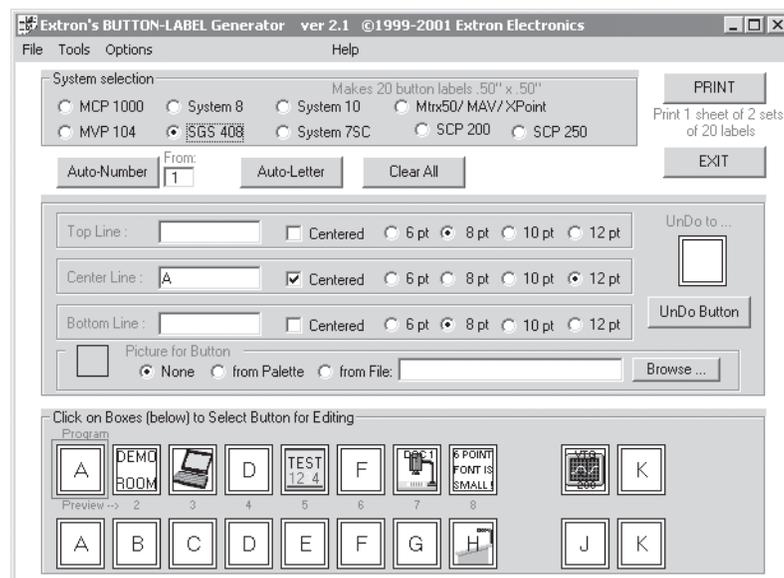


Figure 5-5 — Extron's Button-Label Generator window

2. Under System selection, choose *SGS 408* (this selection matches the button size of the TPX 88).
3. Using normal Windows controls, you can create and print labels that can be placed in the label windows on the front panel of the switcher.

For information about using the program, you can access the help program by clicking on the Help menu on the main screen and choosing Show Help.

You can also see an example of a completed Extron's Button-Label Generator window by clicking on the Help menu on the main screen, choosing Show Help, and clicking on the Load Demo button.



TPX 88 Twisted Pair Matrix Switchers

A

Appendix A

Reference Information

Specifications

Part Numbers

Button Labels

Reference Information

Specifications

Video

Routing.....	8 x 8 matrix
Gain	Unity
Crosstalk	-55 dB @ 10 MHz, -45 dB @ 30 MHz, -37 dB @ 100 MHz
Switching speed	200 ns (max.)

Video input from an Extron or Inline transmitter

Number/signal type	8 RGBHV, RGBS, RGsB, HDTV, component video, S-video, composite video
Connectors	(8) 8-pin RJ-45 female

Video output to an Extron or Inline receiver

Number/signal type	8 RGBHV, RGBS, RGsB, HDTV, component video, S-video, composite video
Connectors	(8) 8-pin RJ-45 female

Sync

Input type	RGBHV, RGBS, RGsB
Output type	RGBHV, RGBS, RGsB (follows input type)
Standards	NTSC 3.58, NTSC 4.43, PAL, SECAM
Input level.....	0.5 V to 5.0 Vp-p, 4.0 Vp-p normal
Output level.....	AGC to TTL: 4 to 5 Vp-p, unterminated

Audio — TPX 88 A only

Routing.....	8 x 8 stereo matrix
Gain	Unbalanced output: -6 dB; balanced output: 0 dB
Frequency response.....	20 Hz to 20 kHz, ± 0.05 dB
THD + Noise	0.03% @ 1 kHz at nominal level
S/N	>90 dB, output 21 dBu balanced (unweighted)
Crosstalk	<-80 dB @ 1 kHz, fully loaded
Stereo channel separation	>-90 dB @ 1 kHz
CMRR	>75 dB @ 20 Hz to 20 kHz

Audio input — TPX 88 A only

Number/signal type	8 stereo, balanced/unbalanced
Connectors	(8) 8-pin female RJ-45
Impedance	>10k ohms balanced/unbalanced, DC coupled
Nominal level	Proprietary signal level
Maximum level	Proprietary signal level
Input gain adjustment	-18 dB to +24 dB, adjustable per input by RS-232 or front panel

NOTE 0 dBu = 0.775 Vrms, 0 dBV = 1 Vrms, 0 dBV \approx 2 dBu

Audio output — TPX 88 A only

Number/signal type	8 stereo, balanced/unbalanced
Connectors	(8) 3.5 mm captive screw connectors, 5 pole (for local audio output) (1) 8-pin female RJ-45 connector
Impedance	50 ohms unbalanced, 100 ohms balanced 100 ohms for RJ-45 connectors
Gain	Selectable output level Unbalanced -6 dB, balanced 0 dB

Gain error	±0.1 dB channel to channel
Maximum level (Hi-Z)	>+21 dBu, balanced or unbalanced at 1%THD+N
Maximum level (600 ohm)	>+15 dBm, balanced or unbalanced at 1%THD+N

Control/Remote — switcher

Serial control port	RS-232 or RS-422, 5-pole captive screw connector
Baud rate and protocol	9600 baud, 8 data bits, 1 stop bit, no parity
Pin configurations	
RS-232	3 = TX, 5 = RX, 1= GND
RS-422	2 = TX-, 3 = TX+, 4 = RX-, 5 = RX+, 1= GND
Program control	Extron's control program for Windows® Extron's Simple Instruction Set (SIS™)

General

Power	100 VAC to 240 VAC, 50/60 Hz, 25 watts, internal, autoswitchable
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
Rack mount	Yes, with optional brackets
Enclosure type	Metal
Enclosure dimensions	1.75" H x 17.5" W x 9.5" D (1U high, full rack wide) 4.4 cm H x 44.5 cm W x 24.1 cm D (Depth excludes connectors and knobs.)
Product weight	3.5 lbs (1.6 kg)
Shipping weight	7 lbs (3.2 kg)
DIM weight	25
Vibration	ISTA 1A in carton (International Safe Transit Association)
Listings	UL, CUL
Compliances	CE, FCC Class B, VCCI, AS/NZS, ICES
MTBF	30,000 hours
Warranty	3 years parts and labor

NOTE All nominal levels are at ±10%.

NOTE Specifications are subject to change without notice.

Reference Information, cont'd

Part Numbers

Twisted Pair Matrix Switcher part numbers

Model	Part #
TPX 88 A	60-542-01
TPX 88	60-542-02
Rack/desk mounting kit	70-077-03
Five-pole 3.5 mm captive screw connectors (9) (TPX 88 A only)	10-319-10
Matrix Switchers+ Control Program and Button-Label Generator	
TPX 88 Matrix Switchers User's Manual	

Optional accessories

Model	Part #
MKP 1000	
Gray	60-239-01
Black	60-239-02
White	60-239-03
MCP 1000M (master)	60-298-01
MCP 1000S (slave)	60-298-02

Cables

NOTE *Skew-Free™ A/V UTP cables are not recommended for Ethernet/LAN applications.*

Skew-Free A/V cable	Part #
3' Skew-Free A/V UTP	26-569-01
6' Skew-Free A/V UTP	26-569-02
12' Skew-Free A/V UTP	26-569-03
25' Skew-Free A/V UTP	26-569-04
35' Skew-Free A/V UTP	26-569-05
50' Skew-Free A/V UTP	26-569-06
75' Skew-Free A/V UTP	26-569-07
100' Skew-Free A/V UTP	26-569-08
150' Skew-Free A/V UTP	26-569-09
200' Skew-Free A/V UTP	26-569-10
250' Skew-Free A/V UTP	26-569-11
300' Skew-Free A/V UTP	26-569-12
Skew-Free A/V plenum cable	Part #
25' Skew-Free Plenum	26-570-04
35' Skew-Free Plenum	26-570-05
50' Skew-Free Plenum	26-570-06
75' Skew-Free Plenum	26-570-07
100' Skew-Free Plenum	26-570-08
150' Skew-Free Plenum	26-570-09
200' Skew-Free Plenum	26-570-10
250' Skew-Free Plenum	26-570-11
300' Skew-Free Plenum	26-570-12
Bulk cable	Part #
Skew-Free A/V UTP 1000' (Bulk) (non-plenum)	22-141-03
Skew-Free A/V UTP 1000' (Bulk) (plenum)	22-142-03

RJ-45 connectors		Part #
CAT 6 jack (black)		10-463-10
CAT 6 jack (red)		10-463-11
CAT 6 jack (blue)		10-463-12
CAT 6 jack (orange)		10-463-13
CAT 6 jack (gray)		10-463-14
CAT 6 jack (white)		10-463-15
CAT 6 jack (ivory)		10-463-16
Skew compensation cable		Part #
2' skew cable		
Red		26-524-01
Green		26-525-01
Blue		26-526-01
4' skew cable		
Red		26-524-02
Green		26-525-02
Blue		26-526-02
6' skew cable		
Red		26-524-03
Green		26-525-03
Blue		26-526-03
8' skew cable		
Red		26-524-04
Green		26-525-04
Blue		26-526-04
10' skew cable		
Red		26-524-05
Green		26-525-05
Blue		26-526-05
12' skew cable		
Red		26-524-06
Green		26-525-06
Blue		26-526-06
14' skew cable		
Red		26-524-07
Green		26-525-07
Blue		26-526-07
16' skew cable		
Red		26-524-08
Green		26-525-08
Blue		26-526-08
18' skew cable		
Red		26-524-09
Green		26-525-09
Blue		26-526-09
20' skew cable		
Red		26-524-10
Green		26-525-10
Blue		26-526-10

Button Labels

Figure A-1 provides blank button labels. If desired, photocopy them or cut them out of the manual, write button information in each button area as desired, and put them in the switcher's input or output buttons' windows.

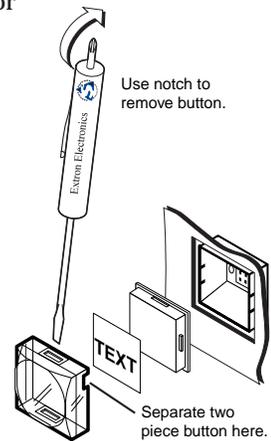
Installing labels in the matrix switcher's buttons

Use the following procedure to install new labels in the matrix switcher's front panel buttons.

1. Make new labels using either the blanks on page A-7 or the Button-Label Generator software (see chapter 5, *Matrix Software*). Cut them out.
2. Remove the button from the switcher by grasping the button firmly and pulling it away from the front panel.

NOTE *There are different button models available. Your buttons may appear different.*

3. Use an Extron Tweezer to gently lever the button cap off of the white backing plate.
4. Insert a button label into the cap and gently but firmly press the cap onto the white backing plate.
5. Press the button into place in the matrix switcher.



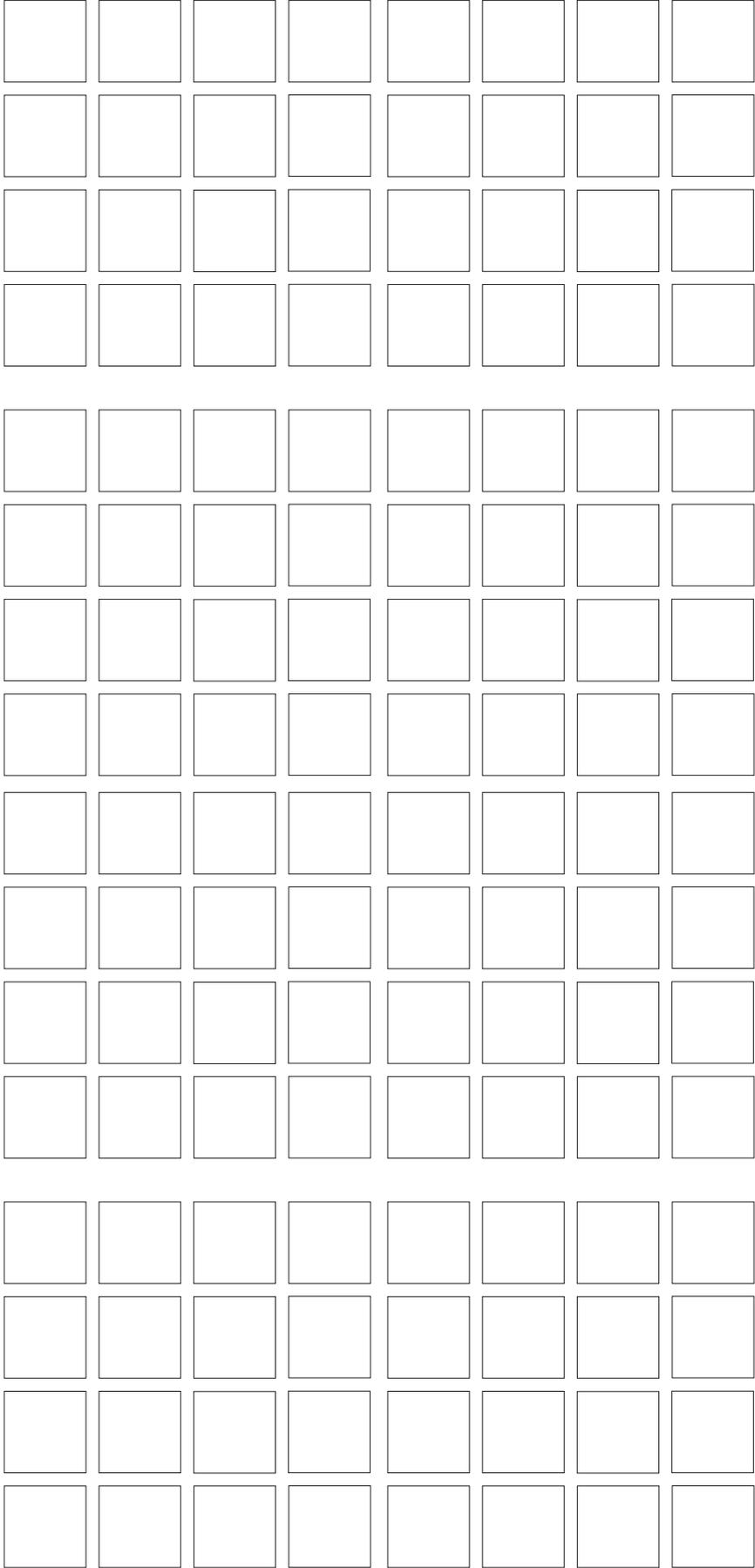


Figure A-1 — Button label blanks

Reference Information, cont'd
