Extron® Electronics

INTERFACING, SWITCHING AND DISTRIBUTION

User's Manual

MAV Series

Matrix Switchers

68-353-04 **Rev. C**
Printed in the USA
01 04

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.

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.

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.

Conserver 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.

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'll y a remplacment incorrect de la batterie. Remplacer uniquement avec une batterie du meme type ou d'un ype equivalent recommande par le constructeur. Mettre au reut les batteries usagees conformement aux instructions du fabricant.

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.

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 Erdanschluß, und stellt eine Sicherheitsfunktion dar. Diese 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 Stomversorgung (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.

Litium-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.

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 especificamente recomendados por el fabricante, ya que podrian implicar riesgos.

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 puentearia ni eliminaria.

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 sobrecalientamiento 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.

Quick Start — MAV Series Switchers

Installation

Step 1

Mount the switcher in a rack.

Step 2

Turn off power to the input and output devices, and remove the power cords from them.

Step 3

Cable the switcher for HDTV/component video , S-video, or composite video input and output (**3**).

Step 4

MAV 168/1616: Cable audio models for stereo audio input *(**4**)*. High impedance is generally over 800 ohms.

MAV 128 RCA: Cable the switcher for stereo audio input. Each input has two RCA connectors (left and right) for unbalanced stereo audio input.

Step 5

MAV 168/1616: Cable audio models for stereo audio output *(**5**)*.

MAV 128 RCA: Cable the switcher for stereo audio output.

Step 6

If desired, connect a control system or computer to the Remote RS-232/RS-422 port (**6**).

Step 7

If desired, attach an external sync timing device to the external sync connectors *(**7**)*.

Step 8

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.

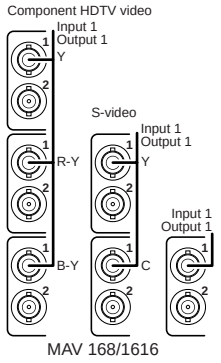
Set of ties — An input **tied** to 2 or more outputs.

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

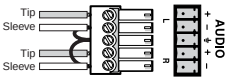
Current configuration — The currently active **configuration** (also called **configuration 0**).

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**.

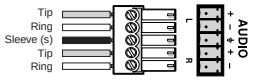
3



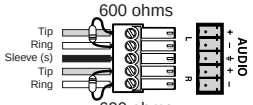
4 **MAV 168/1616**



Unbalanced Input
(high impedance)

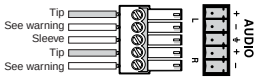


Balanced Input
(high impedance)

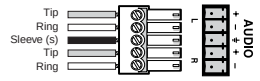


Balanced Input
(600 ohms)

5 **MAV 168/1616**



Unbalanced Output



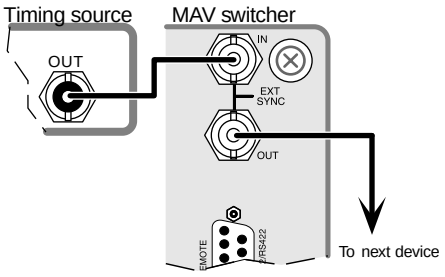
Balanced Output

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

6

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

7



Front Panel Controls

Input and output buttons and LEDs select and identify inputs and outputs. Input buttons also select presets. On audio models, the output LEDs also display the audio level of the selected input.

Enter button saves changes when you change the configuration.

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

View button selects a view-only mode that prevents inadvertent configuration changes. On audio models, the View button decrements the audio level of the selected input. The View LED indicates a negative (-) attenuation value.

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. On audio models, the Esc button increments the audio level of the selected input. The Esc LED indicates a positive (+) gain value.

Video and Audio buttons select/deselect video and/or audio. The Audio LED blinks to indicate audio breakaway. The Audio button also selects the audio level/adjust mode.

Input and output label windows hold labels that can be created easily with Extron's label software or with any Brother P-Touch labeler.

Create a tie

A. Press and release the Video and/or Audio button(s) to select audio and/or video.

B. Press and release the desired input button.

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

D. Press and release the Enter button.

View ties

A. Press and release the View button.

B. Press and release the Video and/or Audio button(s) to select audio and/or video.

C. Press and release the desired input button. The selected input and tied output LEDs light.

Save or recall a preset

A. To **save** a preset, press and **hold** the Preset button until the Preset LED begins to blink.

To **recall** a preset, press and release the Preset button. The Preset LED turns on steadily.

B. Press and release the input button associated with the desired preset number.

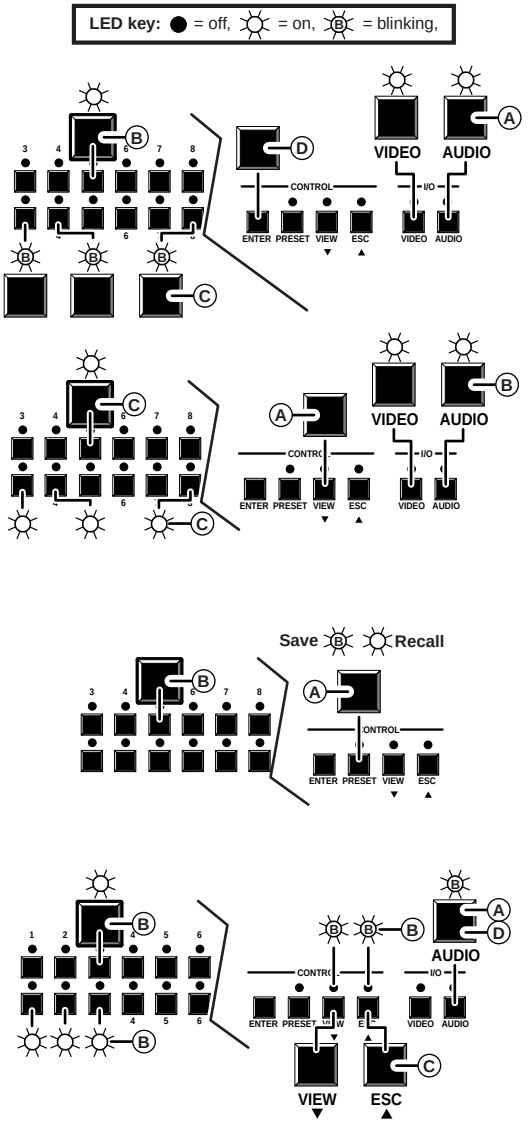
View and adjust audio level

A. Press and **hold** the Audio button until the Audio LED begins to blink.

B. Press and release the desired input button. The level is displayed by the output LEDs, (+) by the Esc LED, and (-) by the View LED.

C. Increment and decrement the level by pressing the Esc (▲) and View (▼) buttons.

D. Press and release the Audio button to exit.



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Chapter One

Introduction

Features

Introduction

The Extron MAV Series switchers are broadcast quality matrix switchers that distribute any video and/or audio input to any combination of outputs. The MAV switchers can route multiple input/output configurations simultaneously. There are four matrix sizes available, each with unique features or optional capabilities:

- MAV 84 RCA (eight inputs by four outputs)
- MAV 128 RCA (twelve inputs by eight outputs)
- MAV 168 (sixteen inputs by eight outputs)
- MAV 1616 (sixteen inputs by sixteen outputs)

The MAV 84 and MAV 128 input and output audio on RCA connectors.

Audio models in the MAV 168 and MAV 1616 series input and output audio on 3.5 mm, 5-pole captive screw terminals. The MAV 168 and MAV 1616 are available in models that can switch three video planes (component video), two video planes (S-video), or one video plane (composite) video, each with or without an audio plane. An audio-only matrix switcher is also available in the MAV 168 and MAV 1616 series.

MAV component video switchers can also route RGsB and RsGsBs video signals. Switchers configured for component video can also route multiple composite video planes or S-video and composite video. If used in this way, the various planes cannot be broken away; all inputs must be routed to the same outputs.

MAV S-video switchers can also be used to switch two planes of composite video. If used in this way, the two planes cannot be broken away; both inputs must be routed to the same outputs.

For the models with audio, audio switching can either be linked with the video (audio follow) or be independent of the video (audio breakaway). Adjustable audio gain and attenuation compensates for level differences between audio inputs.

The MAV Series switchers are single-box solutions to simple 150 MHz (-3dB) routing applications (figure 1-1, figure 1-2, figure 1-3, and figure 1-4). Each input and output is individually isolated and buffered, and any inputs can be switched to any one or all outputs with virtually no crosstalk or signal noise between channels.

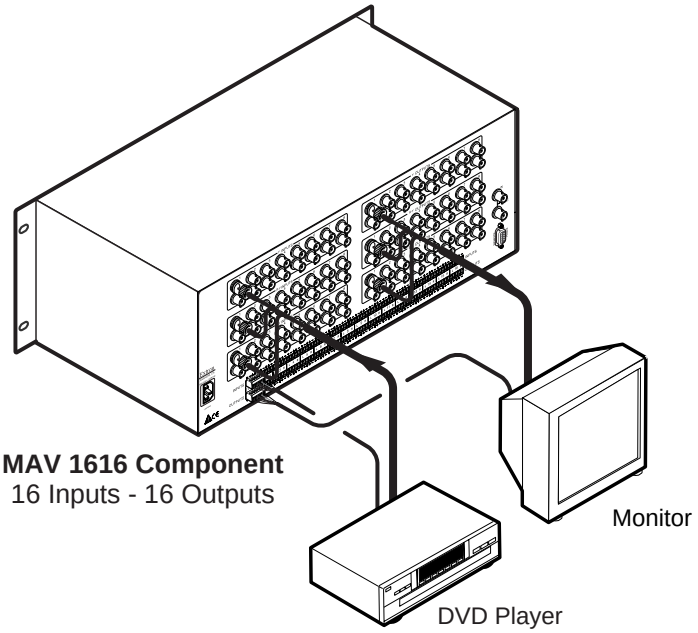


Figure 1-1 — Typical MAV 1616 component matrix switcher application

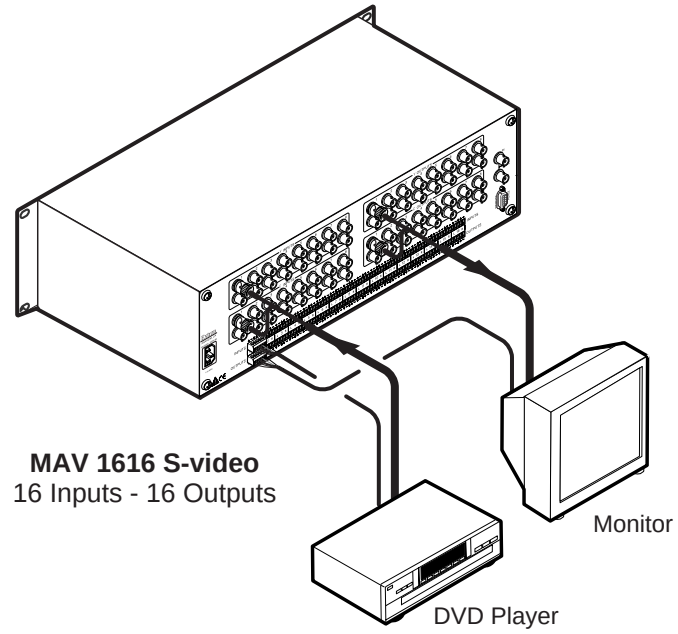


Figure 1-2 — Typical MAV 1616 S-video matrix switcher application

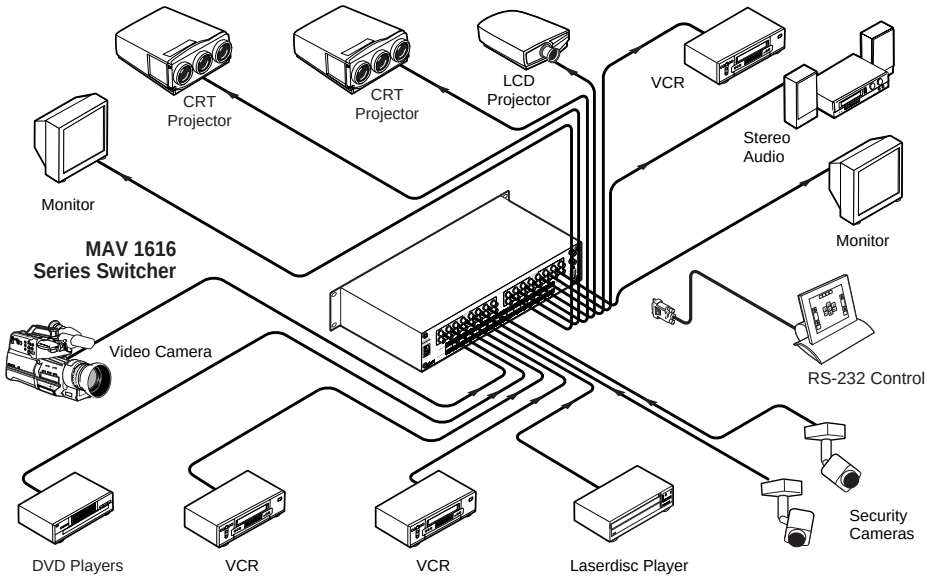


Figure 1-3 — Typical MAV 1616 composite matrix switcher application

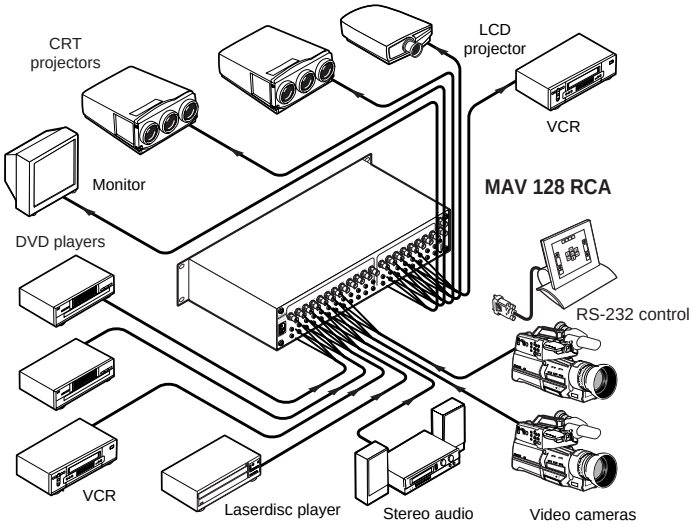


Figure 1-4 — Typical MAV 128 RCA application

The MAV component video switchers are housed in a 4U high enclosure. MAV S-video switchers are in a 3U enclosure. MAV composite and audio-only switchers are in a 2U enclosure. The appropriate rack mount kit is included with each switcher. Each model has an internal 100VAC to 240VAC, 50/60 Hz, 15 watts (MAV 128 RCA) or 20 watts (MAV 168/1616 series), auto-switchable power supply that provides worldwide power compatibility.

Features

MAV 128 RCA model

Inputs — These switchers offer 12 NTSC 3.58, NTSC 4.43, PAL, and SECAM composite video inputs on BNC connectors.

Unbalanced stereo audio is input on left and right RCA connectors.

Outputs — 4 or 8 composite video outputs are available on BNC connectors.

Unbalanced stereo audio is output on left and right RCA connectors.

Audio gain/attenuation — Users can set the input level of audio gain or attenuation (-15dB to +9dB) 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 1-5).

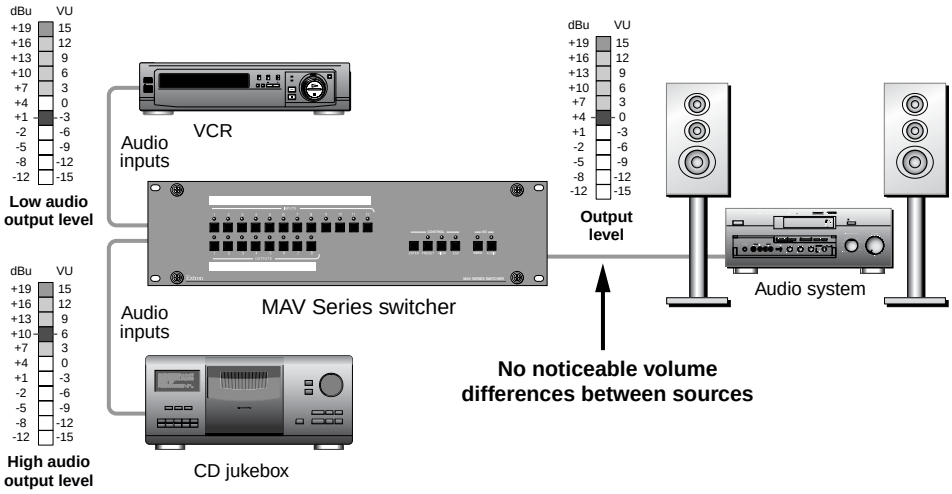


Figure 1-5 — Audio gain and attenuation

Audio follow — Audio can be switched with the corresponding video input, allowing 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.

Audio breakaway — Audio can be broken away from its corresponding video signal. Audio breakaway switching can be done via front panel control or under RS-232/RS-422 control.

MAV 168/1616 video models

Inputs — These switchers offer 16 RGsB, RsGsBs, HDTV, component video, S-video, or NTSC 3.58, NTSC 4.43, PAL, and SECAM composite video inputs on BNC connectors (video models).

Stereo audio can be balanced or unbalanced, on 3.5 mm, 5-pole captive screw terminals (audio models).

Outputs — 8 or 16 RGsB, RsGsBs, HDTV, component video, S-video, or NTSC 3.58, NTSC 4.43, PAL, and SECAM composite video outputs are available on BNC connectors (video models).

Stereo audio can be balanced or unbalanced, on 3.5 mm, 5-pole captive screw terminals (audio models).

Bandwidth — Bandwidth is a maximum of 150 MHz (-3dB), fully loaded. This high bandwidth allows the MAV switchers to switch everything from NTSC video to HDTV.

MAV 168/1616 audio models

Inputs — 16 stereo audio inputs, balanced or unbalanced, on 3.5 mm, 5-pole captive screw terminals.

Outputs — 8 or 16 stereo audio outputs, balanced or unbalanced, on 3.5 mm, 5-pole captive screw terminals.

Audio gain/attenuation — Users can set the input level of audio gain or attenuation (-15dB to +9dB) 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 1-5).

Audio follow — Audio can be switched with the corresponding video input, allowing 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.

Audio breakaway — Audio can be broken away from its corresponding video signal. Audio breakaway switching can be done via front panel control or under RS-232/RS-422 control.

All models

Operational flexibility — Operations such as input/output selection, setting of presets, and adjustment of audio levels 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.

- **QuickSwitch Front Panel Controller (QS-FPC™)** — The MAV series QS-FPC feature supports touch-of-a-button input and output selection, preset creation and selection, and audio gain and attenuation control.
- **Windows-based control program** — Extron's Windows-based 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.

Labeling — Extron's label software ships with every Extron matrix switcher. You can create labels to place alongside 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.

Global memory presets — 12 (MAV 128) or 16 (MAV 168 and MAV 1616) 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.

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

Power supply — Includes an internal 100VAC to 240VAC, 50/60 Hz, 15 watts (MAV 128 RCA) or 20 watts (MAV 168/1616 Series), auto-switchable power supply, which provides worldwide power compatibility.

Switching — Provides individually buffered, independent matrix switched outputs.

External sync input and output connectors — Allow the switcher to use an external signal to synchronize switching during the vertical interval.

Chapter Two

Installation

Installation Overview

Mounting the Switcher

Cabling and Rear Panel Views

Installation

Installation Overview

To install a MAV Series switcher, do the following:

1. If desired, mount the switcher in a rack (see *Mounting the switcher* below).
2. Turn off power to the input and output devices, and unplug the power cables from them.
3. Attach the input and output devices to the switcher (see *Cabling and Rear Panel Views* below).
4. If desired, attach an external sync timing device to the external sync connectors (see *External sync connection* on page 2-6).
5. If desired, attach an MCP 1000 remote control panel primary unit to the switcher's RS-232/422 connector. You can also attach an MKP 1000 remote keypad or MCP 1000 secondary unit to the MCP 1000 primary unit. Refer to the *MCP 1000 Remote Control Panel User's Manual* and the *MKP 1000 User's Manual* for details.
6. Plug the switcher and, if appropriate, the input devices and output devices into a grounded AC source.
7. Turn on the input and output devices.
8. The image from each input device should appear on the output devices, and you should be able to switch from one input device to another. If this does not happen, double check steps 3 through 5 and make adjustments as needed.

Mounting the Switcher

The MAV component video models are housed in rack-mountable, 4U high, 17" wide metal enclosures. The MAV S-video models are housed in 3U enclosures. The MAV composite and audio-only models are housed in 2U high, enclosures. The appropriate rack mount kit is included with each switcher. To rack mount the switcher, do the following:

1. Insert the switcher into the rack, aligning the holes in the mounting bracket with those in the rack.
2. 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 up to as many as 16 component video, S-video, composite video and/or stereo audio devices, depending on the model. The switcher can output to as many as 16 video and/or audio outputs, depending on the model. Figure 2-1 shows a MAV 1616 component video and audio switcher. Figure 2-2 shows a MAV S-video and audio switcher. Figure 2-3 shows a MAV 1616 composite video switcher without audio. MAV 168 switchers are housed in the same 2U, 3U, or 4U enclosures as their MAV 1616 counterparts of the same video and/or audio type, but have fewer output connectors to accommodate the different matrix sizes they provide. Figure 2-4 shows a MAV 1616 audio switcher. Figure 2-5 shows a MAV 128 RCA switcher.

Some devices, such as VCRs, can be connected to both input and output connectors of the switcher. Others, such as tape players or CD players, can be connected only to the audio input connectors. An audio device and a separate video device can share an input; the switcher is capable of switching video and audio separately (audio breakaway).

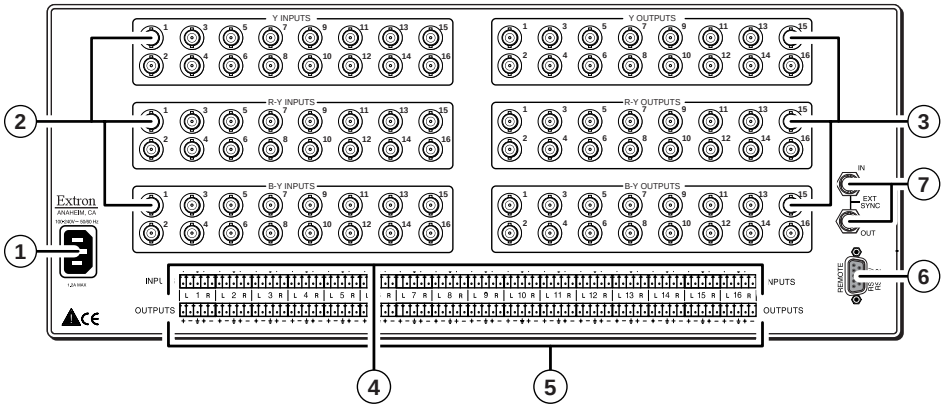


Figure 2-1 — MAV 1616 component video matrix switcher with audio

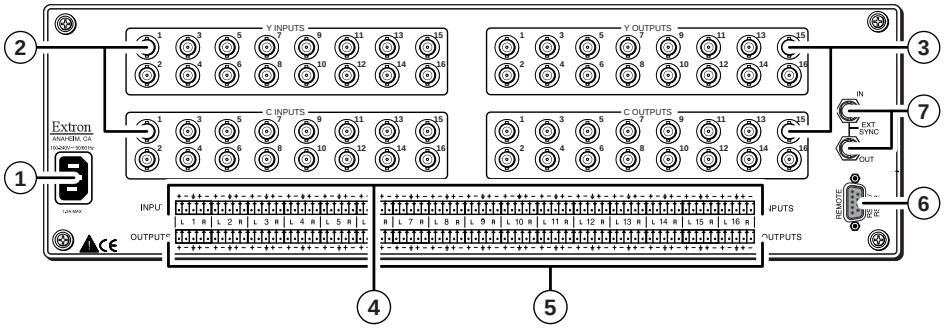


Figure 2-2 — MAV 1616 S-video matrix switcher with audio

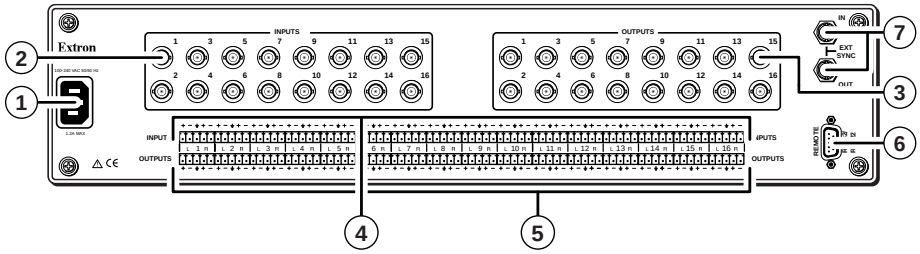


Figure 2-3 — MAV 1616 composite video matrix switcher without audio

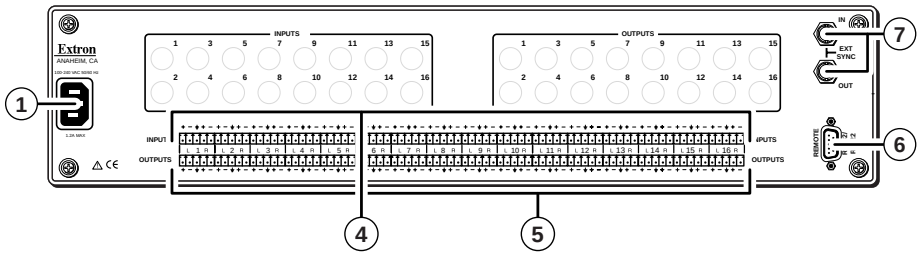


Figure 2-4 — MAV 1616 audio-only matrix switcher

NOTE *The rear panel of the MAV 168 models have the same features as the MAV 1616 series models, with the exception of eight video outputs, eight audio outputs, or both.*

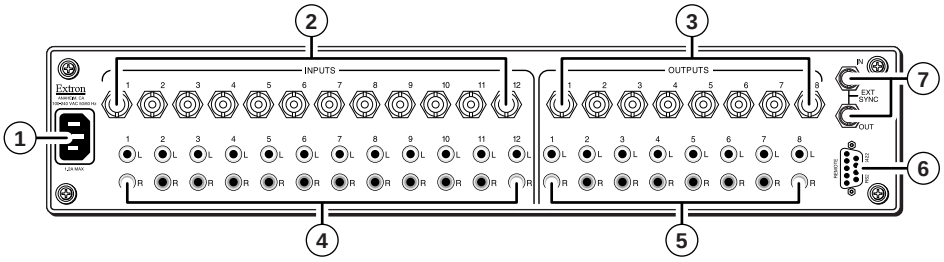


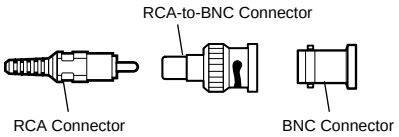
Figure 2-5 — MAV 128 RCA matrix switcher

Power connection

(1) **AC power connector —** Plug a standard IEC power cord into this connector to connect the switcher to a 100VAC to 240VAC, 50 or 60 Hz power source.

Video input and output connections (video models only)

NOTE *All video input and output connections to the MAV Series switchers are made with female BNC connectors. Some types of video output devices do not have BNC video output connectors. For these cases, a suitable cable or connector adapter is necessary between the device output connector and the BNC input connector of the switcher. The Extron part number for the RCA-to-BNC adapter is 10-264-01.*



(2) **HDTV/component video inputs** — Connect HDTV, component video, RGsB, or RsGsBs video inputs to these BNC connectors for each input.

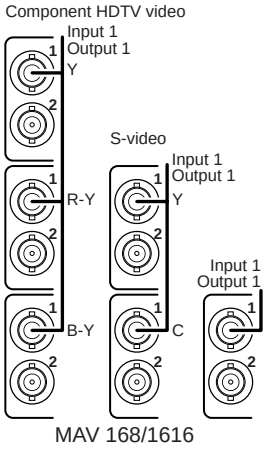
S-video inputs — Connect S-video inputs to these BNC connectors for each input.

Composite video inputs — Connect composite video inputs to these BNC connectors for each input.

(3) **HDTV/component video outputs** — Connect HDTV, component video, RGsB, or RsGsBs video outputs to these BNC connectors for each output.

S-video outputs — Connect S-video outputs to these BNC connectors for each output.

Composite video outputs — Connect composite video outputs to these BNC connectors for each output.



NOTE *The component video and S-video MAV Series switchers can also switch video lower on the video food chain by using only two or one BNC(s). If switching a different video format, ensure that the same video planes are used on the switcher output as on the input.*

NOTE *The MAV Series Switchers do not alter the video signal in any way. The signal output by the switcher is in the same format as the input.*

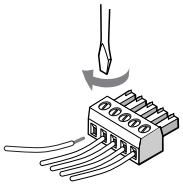
Audio input and output connections (audio models only)

WARNING *The captive screw connector can easily be inadvertently plugged partially into one receptacle and partially into an adjacent receptacle. This misconnection could damage the audio output circuits. Ensure that the captive screw connector is plugged into the desired input or output.*

④ **Audio input connections**

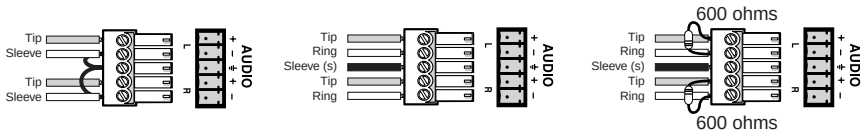
MAV 128 RCA — Each input has a pair (left and right) of RCA connectors.

MAV 168/1616 — Each input has a 3.5 mm, 5-pole captive screw connector for balanced or unbalanced stereo audio input. Connectors are included with each MAV Series switcher, but you must supply the audio cable. See figure 2-6 to wire a connector for the appropriate input type and impedance level. High impedance is generally over 800 ohms.



NOTE *When making connections for the MAV Series Switcher from existing audio cables, see figure 2-7. A mono audio connector consists of the tip and sleeve. A stereo audio connector consists of the tip, ring and sleeve. The ring, tip, and sleeve wires are also shown on the captive screw audio connector diagrams, figure 2-6 and figure 2-8.*

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

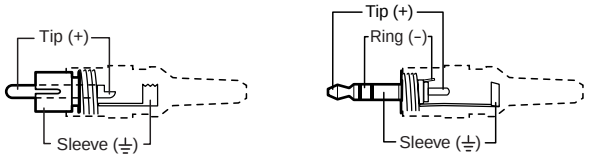


Unbalanced Input (high impedance)

Balanced Input (high impedance)

Balanced Input (600 ohms)

Figure 2-6 — Captive screw connector wiring for audio inputs



RCA Connector

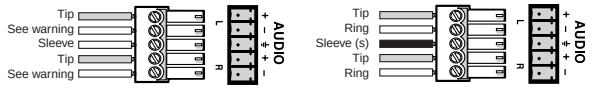
3.5 mm Stereo Plug Connector (balanced)

Figure 2-7 — Typical audio connectors

⑤ **Audio output connectors**

MAV 128 RCA — Each output has a pair (left and right) of RCA connectors.

MAV 168/1616 — These 3.5 mm, 5-pole captive screw connectors output the selected unamplified, line level audio. Connect audio devices, such as an audio amplifier or powered speakers. See figure 2-8 to properly wire an output connector.



Unbalanced Output **Balanced Output**

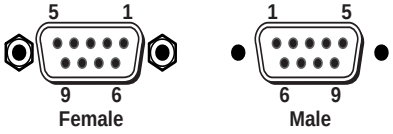
Figure 2-8 — Captive screw connector wiring for audio output

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

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

RS-232/422 connection

⑥ **RS-232/RS-422 connector —** Connect a host device, such as a computer or touch panel control, to the MAV via this 9-pin D connector for serial RS-232/RS-422 control.



If desired, attach an MCP 1000 remote control panel primary unit to the switcher's RS-232/RS-422 connector. You can also attach an MKP 1000 remote keypad or MCP 1000 secondary unit to the MCP 1000 primary unit. Refer to the *MCP 1000 Remote Control Panel User's Manual* and the *MKP 1000 User'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.

NOTE *The MAV switchers are factory configured for RS-232 control. To use the switcher under RS-422 control, an internal cable must be moved. See appendix B for the procedure for shifting the cable.*

External sync connection

When the switcher switches between inputs, the resulting change in image should be seamless, or clean. Video models of the MAV 1616/168 Series switcher can use an external signal to synchronize switching during the vertical interval. Without the external sync locking feature, switching between inputs can result in a brief rolling (sync loss) or a brief change in the picture size.

⑦ **External Sync In connector —** Connect an external sync signal to this BNC connection for genlocking the video signal in broadcast or other sync-critical applications.

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

Figure 2-9 shows a basic external sync configuration. The Ext Sync In connector receives a timing signal. The Out connector allows the signal to be passed on to another video device, if required.

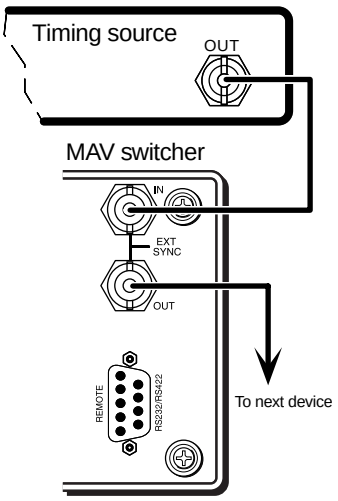


Figure 2-9 — Simple external sync connection example

Figure 2-10 shows another configuration, in which the timing source passes through three video cameras and a video scan converter before connecting to the switcher. This type of video camera is capable of synchronizing with the external timing source for video editing applications.

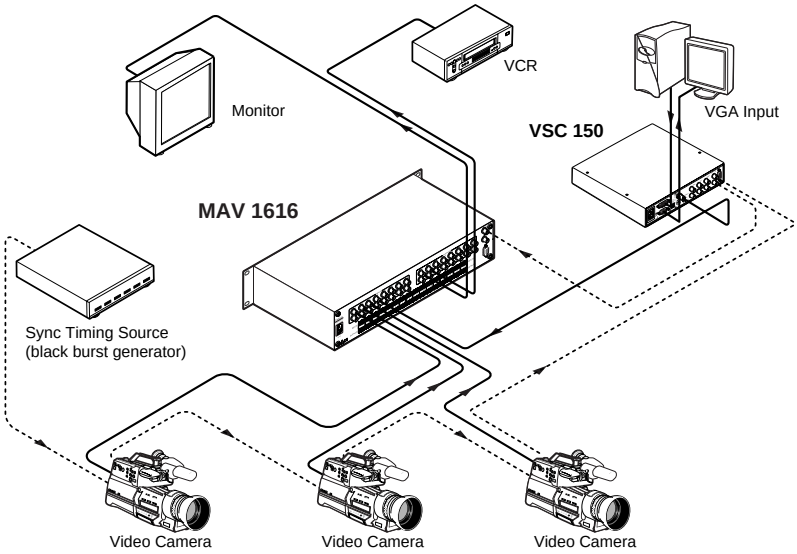


Figure 2-10 — Multiple device external sync connection example

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

Additional rear panel view

Figure 2-11 shows the rear panel of a MAV 168 composite switcher with audio.

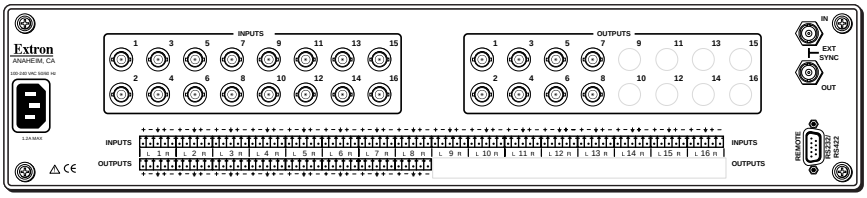


Figure 2-11 — MAV 168 composite video matrix switcher with audio

3

Chapter Three

Operation

Front Panel Controls and Indicators

Front Panel Operations

Troubleshooting

Worksheets

Operation

Front Panel Controls and Indicators

The front panel controls (figure 3-1 and figure 3-2) are grouped into two sets. The input and output buttons and LED indicators are grouped on the left side of the control panel. The control buttons and I/O selection buttons and indicators are grouped on the right side of the panel.

NOTE *While the number of inputs and outputs varies depending on the size of the matrix, there are only two front panel arrangements. The MAV 168 and MAV 1616 have 16 input buttons and 16 output buttons (figure 3-1). The MAV 128 has 12 input buttons and 8 output buttons (figure 3-2).*

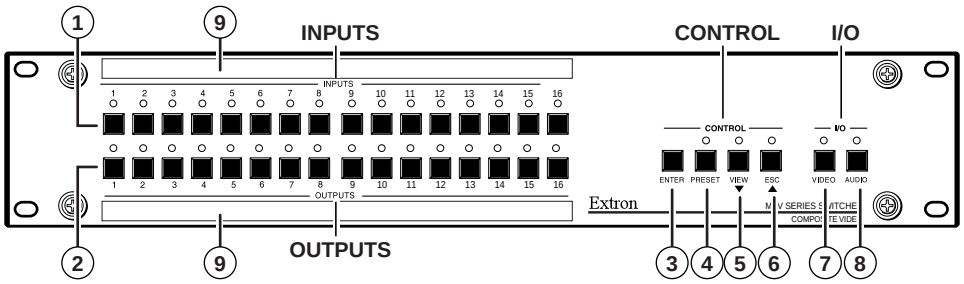


Figure 3-1 — MAV 1616/168 series front panel

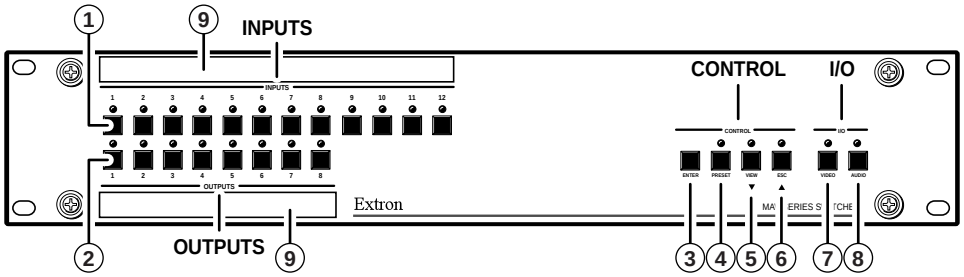


Figure 3-2 — MAV 128 RCA series front panel

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

Configuration — Consists of one or more **tie** or one or more **sets of ties**.

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

Global memory preset — A **configuration** that has been stored. 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 buttons, output buttons, and LEDs

NOTE *If the switcher has fewer outputs than output buttons and LEDs, only the applicable buttons and LEDs perform the function of selecting and identifying an output.*

1. **Input 1 through 16 buttons and LEDs —** The input buttons have two independent functions: to select and identify an input and to select or identify a preset. A more detailed explanation of the two functions is included in *Front panel operations*, beginning on pages 3-4.

2. **Output 1 through 16 buttons and LEDs —** The output buttons and LEDs select and identify outputs. As a secondary function on audio models, the output LEDs also display the user-adjustable audio level of the selected input. A more detailed explanation of the two functions is included in *Front panel operations*, beginning on pages 3-4.

Control buttons and LEDs

3. **Enter button —** The Enter button saves changes when you set up a new configuration. To create a simple configuration, specify video, audio, or both [see I/O selection buttons (7) and (8)], press the desired input button (1), press the desired output buttons (2), and press the Enter button.

4. **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.

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. 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 LEDs 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 LEDs for all of the unassigned outputs. No input LED is lit.

   As a secondary function on audio models, the View button decrements the audio level of the selected input. In audio adjustment mode, the View LED indicates a negative (-) attenuation value. A more detailed explanation of audio level adjustment is included in *Viewing and adjusting the audio level* on pages 3-11 through 3-14.

6. **Esc button and LED —** The Esc button cancels operations or 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. The Esc LED lights for two seconds after the Esc button is pressed and released to indicate the escape function.

   As a secondary function on audio models, the Esc button increments the audio level of the selected input. In audio adjustment mode, the Esc LED indicates a positive (+) gain value. A more detailed explanation of audio level adjustment is included in *Viewing and adjusting the audio level* on pages 3-11 through 3-14.

I/O controls

When creating or viewing a configuration, you must specify whether the configuration applies to video, audio, or both. This is done with the Video (7) and Audio (8) buttons.

NOTE *Although present, the Audio button has no function on video-only models.*

7. **Video button and LED —** The Video button selects and deselects video for a configuration that is being created or viewed. The Video LED lights to indicate that video is available for configuring or for viewing.

⑧ **Audio button and LED —** The Audio button selects and deselects audio for a configuration that is being created or viewed. The Audio LED lights to indicate that the audio configuration follows the video configuration. The Audio LED blinks to indicate that the audio configuration is broken away from the video configuration.

As a secondary function on audio models, the Audio button selects the audio level display/adjustment mode. Press and hold the Audio button until the Audio LED begins to blink. If the Video LED was lit, it turns off. Select an input. The current audio level setting for the selected input is displayed by the output LEDs. The audio level for the selected input can be increased and decreased by pressing the View (5) and Esc (6) buttons. A more detailed explanation of audio level adjustment is included in *Viewing and adjusting the audio level* on pages 3-11 through 3-14.

Front panel I/O label windows

⑨ **Input and output label windows —** These translucent panels can be removed and replaced to insert labels behind the panels. To remove a panel, insert the Phillips-head end of an Extron tweaker or small Phillips-head screwdriver into the hole in one end of the panel, and gently slide the tab on the edge of the panel out of the recess in the switcher housing.

Input and output labels can be created easily with Extron's Button Label Generator software, which ships with every Extron Matrix Switcher, or with any Brother P-Touch labeler. 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). See Chapter 5, *Matrix Software*, for details on using the label software.

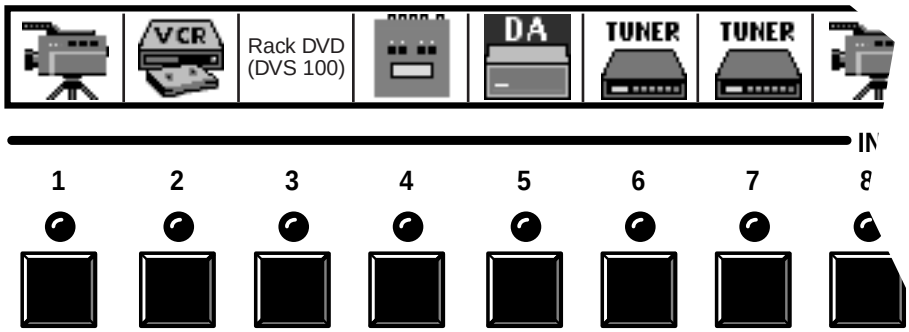


Figure 3-3 — Sample label

Front Panel 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; muting and unmuting the video and audio; saving a preset; recalling a preset; and viewing and adjusting the audio level.

Power

On all models, 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 blinks the front panel LEDs during the test. An error-free power up self-test sequence leaves the video and/or the Audio LED(s) on, depending on the model, and all other LEDs off.

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.

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 LEDs, output LEDs, or control LEDs that may be on.
2. Select to configure video, audio, or both by pressing the Video and/or Audio buttons.
3. Select the desired input and output(s) by pressing the input and 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

1. *Only one video input and one audio input can be tied to an output.*
2. *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.*
3. *To indicate current ties, output LEDs light when an input is selected. To clear unwanted outputs, press and release the associated output buttons.*
4. *If, when you configure video and audio ties, the Audio LED blinks and the Video LED is on after you select an input or output, the LEDs indicate audio breakaway: the audio ties are not the same as the video ties for that input.*
5. *If an input with no tie is selected, only that input's LED lights.*
6. *When the Video and Audio LEDs are on, if an input with an audio tie but no video tie is selected, the input's LED lights and the Audio LED blinks.*
7. *As each output is selected, the associated output LED blinks to indicate a tentative tie. LEDs for output(s) that were already tied to the input light steadily. Outputs that are already tied can be left on, along with new blinking selections, or toggled off by pressing the associated output button.*

Example 1: Creating a set of video and audio ties

See figure 3-4 and the following steps for an example in which input 5 is tied to outputs 3, 4, and 8.

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

Ⓐ Press and release the Esc button. The Esc LED flashes once.

Ⓑ To select video and audio for the tie, if necessary, press and release the Video and Audio buttons until the Video and Audio LEDs light.

Ⓒ Press and release the input 5 button. The input 5 LED lights.

(D) Press and release the output 3, output 4, and output 8 buttons. The output 3, output 4, and output 8 LEDs blink to indicate a tentative tie.

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

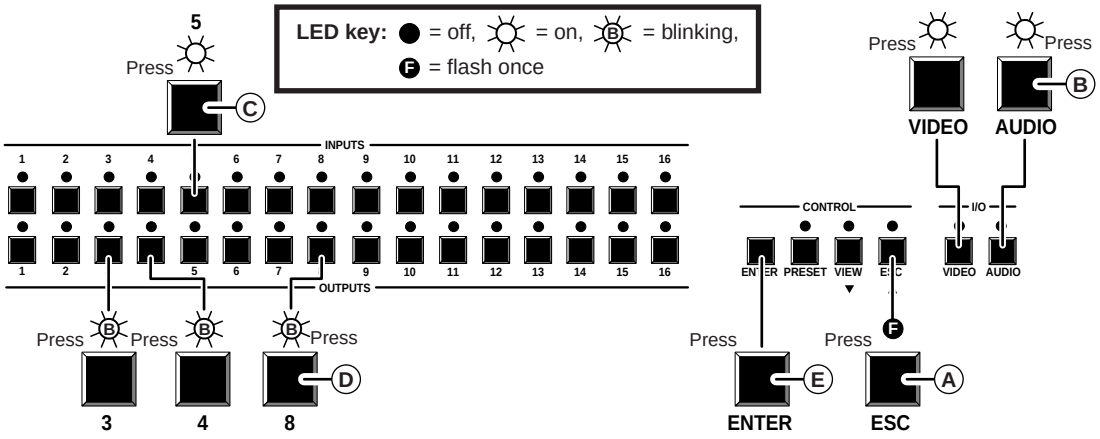


Figure 3-4 — Example 1: Creating a tie

(E) Press and release the Enter button. The input and output LEDs turn off. The current configuration is now defined as video and audio input 5 tied to video and audio output 3, output 4, and output 8.

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

See figure 3-5 and the following steps for an example in which a new video tie is added to the current configuration.

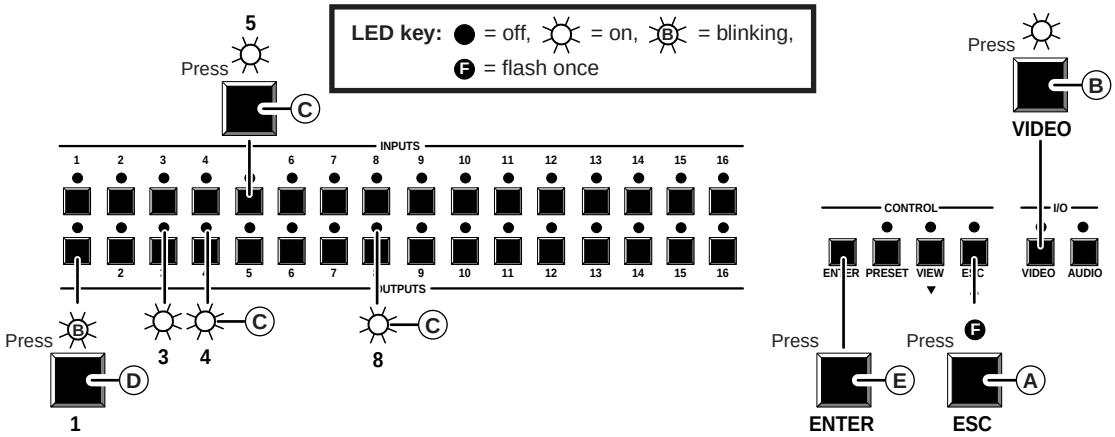


Figure 3-5 — Example 2: Adding a video tie

(A) Press and release the Esc button. The Esc LED flashes once.

(B) To select video only for the tie, if necessary, press and release the Video and Audio buttons until the Video LED lights and the Audio LED is off.

(C) Press and release the input 5 button. The input 5 LED lights. If the steps in Example 1 have been completed, the output 3, output 4, and output 8 LEDs light to indicate the ties created in Example 1.

(D) Press and release the output 1 button. The output 1 LED blinks to indicate a tentative tie.

Ⓔ Press and release the Enter button. The input and output LEDs turn off. 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, output 4, and output 8.

Example 3: Removing a tie from a set of video and audio ties

See figure 3-6 and figure 3-7 and the following steps for an example in which an existing audio tie is removed from the current configuration.

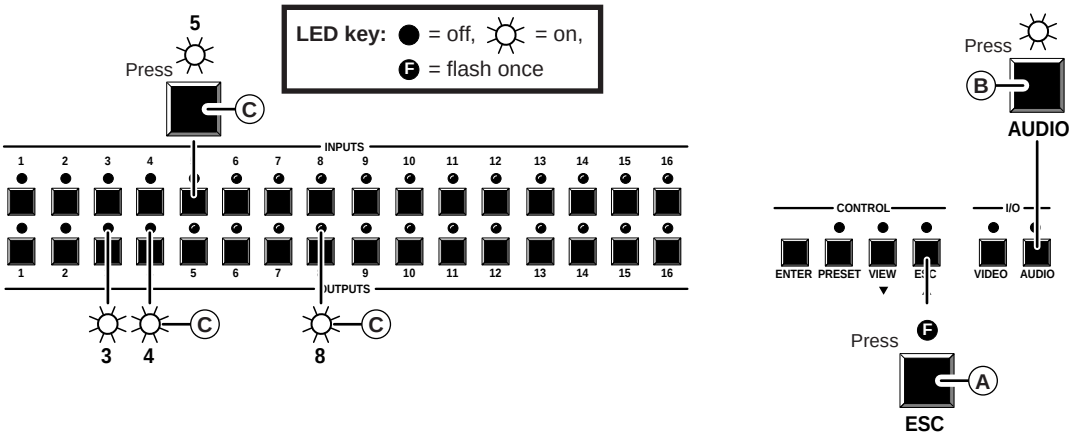


Figure 3-6 — Example 3: Selecting audio and selecting input 5

Ⓐ Press and release the Esc button. The Esc LED flashes once.

Ⓑ To select audio only for the tie, if necessary, press and release the Video and Audio buttons until the Video LED is off and the Audio LED lights.

Ⓒ Press and release the input 5 button. The input 5 LED lights. If the steps in Example 1 have been completed, the output 3, output 4, and output 8 LEDs light to indicate ties created in Example 1.

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

Ⓓ Press and release the output 4 button (figure 3-7). The output 4 LED turns off, while the output 3 and output 8 LEDs remain lit.

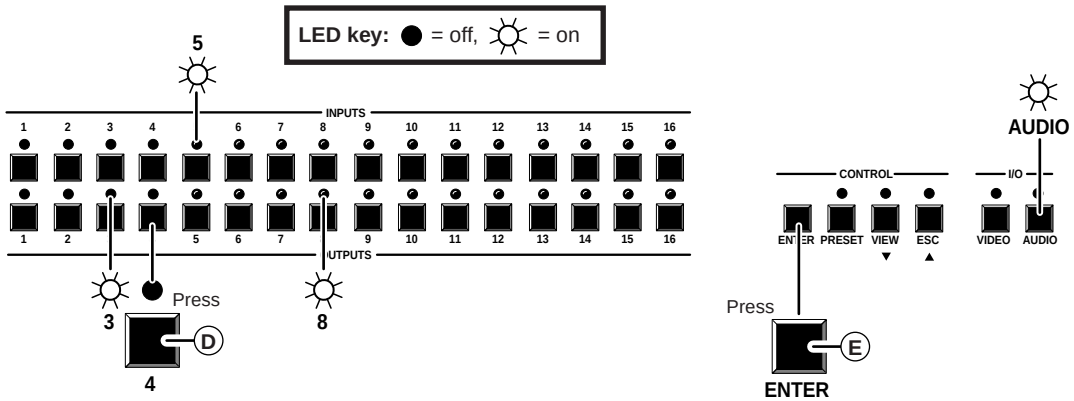


Figure 3-7 — Example 3, step d: Removing an audio tie

Ⓔ Press and release the Enter button. The input and output LEDs turn off. 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.

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. View-only mode also provides a way to mute video and audio outputs (see *Muting and unmuting video and/or audio* in this chapter.

To view the current configuration, do the following:

1. Press the Esc button to clear any input LEDs, output LEDs, or control LEDs that may be on.
2. Press and release the View button.
3. Select video, audio, or both to view by pressing the Video and/or Audio buttons.
4. Select the desired input or output(s) for which ties need to be viewed by pressing the input and output buttons.

NOTE

1. *To see all ties of the current configuration, press and release each input and output button, one at a time, with the Video and Audio LEDs on.*
2. *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.*
3. *If, when you view video and audio ties, the Audio LED blinks and the Video LED is on after you select an input or output, the LEDs indicate that the audio ties are not the same as the video ties for that input (audio breakaway is active). Toggle the Video LED off by pressing and releasing the Video button.*
4. *When you enter view-only mode, the output LEDs turn on for all outputs without ties. Likewise, when an output button for which there are no ties is pushed, the output LEDs turn on for all outputs without ties. The blinking Audio LED indicates audio breakaway for one or more of those outputs.*

Example 4: Viewing video and audio, audio only, and video only ties

See figure 3-8, figure 3-9, figure 3-10, and figure 3-11 and the following steps for an example of viewing the video and audio, audio-only, and video-only ties in the current configuration.

NOTE *Example 4 shows the process of viewing the current configuration after the steps in Examples 1, 2, and 3 have been completed.*

Ⓐ Press and release the Esc button. The Esc LED flashes once.

Ⓑ Press and release the View button to enter view-only mode. The View LED lights.

Ⓒ To select both video and audio for viewing, if necessary, press and release the Video and Audio buttons until the Video LED and Audio LED light. With no input LED selected, all output LEDs that have no established ties light.

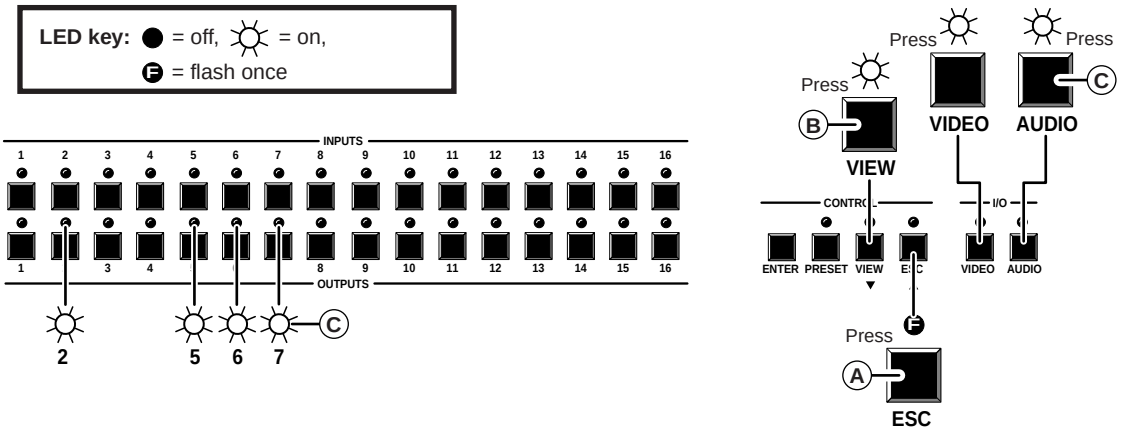


Figure 3-8 — Example 4: Viewing the current configuration

D Press and release the input 5 button (figure 3-9). The input 5 LED lights.

If ties are established for input 5, all output LEDs toggle; outputs with no ties turn off and the LEDs associated with all outputs tied to input 5 (audio, video, or audio and video ties) light. If no ties are established for input 5, all output LEDs turn off.

If audio is broken away, the Audio LED blinks.

NOTE *A set of ties can also be viewed by selecting a tied output. To demonstrate this, note the number of a lit output LED, and press and release the output button for an unlit (untied) output LED. Observe that all of the untied outputs light. Then press the output button for the output LED noted previously and observe that the selected output LED, the tied input LED (input 5), and the output LEDs light for all of the outputs that are tied to the input.*

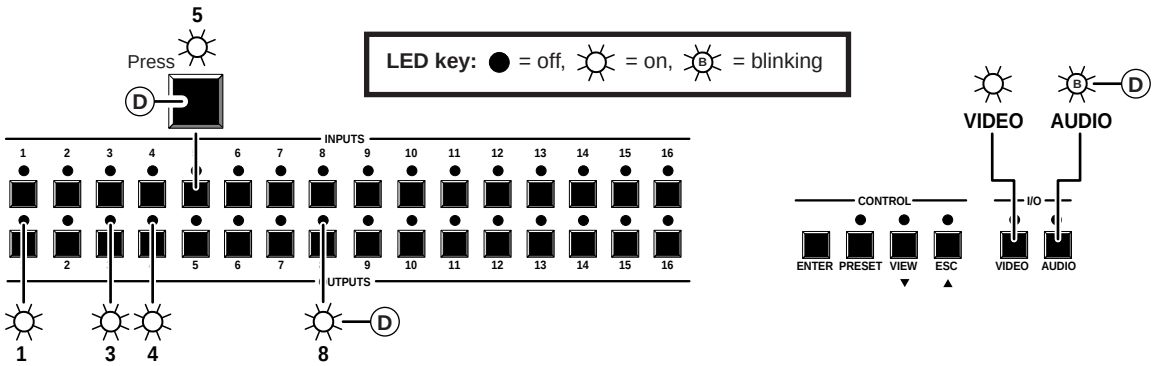


Figure 3-9 — Example 4, step D: Viewing the current configuration, video and audio

E Press and release the Video button to toggle the Video LED off (figure 3-10). If audio is broken away, the Audio LED stops blinking and lights.

If audio ties are established for input 5, the output LEDs for all audio outputs tied to input 5 light. If no ties are established for input 5, all output LEDs turn off.

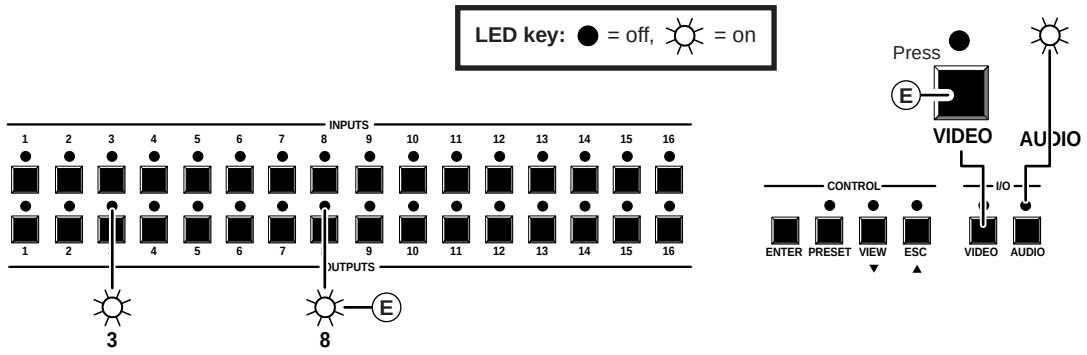


Figure 3-10 — Example 4, step E: Viewing the current configuration, audio only

Ⓕ Press and release the Video and Audio buttons to toggle the Video LED on and the Audio LED off (figure 3-11).

If video ties are established for input 5, the output LEDs for all video outputs tied to input 5 light. If no ties are established for input 5, all output LEDs turn off.

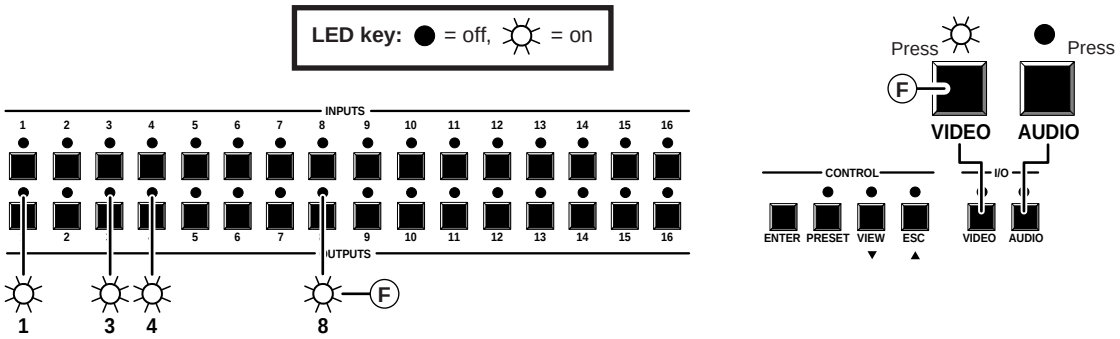


Figure 3-11 — Example 4, step F: Viewing the current configuration, video only

Muting and unmuting video and/or audio

Individual outputs can be muted or unmuted by doing the following:

1. Press the Esc button to clear any input LEDs, output LEDs, or control LEDs that may be on.
2. Press and release the View button.
3. Select video, audio, or both to mute or unmute by pressing the Video and/or Audio buttons.
4. One at a time, press and **hold** the output button(s) for the desired output(s) for approximately 2 seconds. The output LED(s) for the selected output(s) blink to indicate the mute or return to their previous state to indicate the unmute.
5. Press and release the View button to return to normal switcher operation.

NOTE *1. You can mute video and audio, video-only, or audio-only outputs. Pressing and releasing the Video and Audio buttons toggles each selection on and off.*

2. *When you enter view-only mode, the output LEDs turn **on** for all outputs **without** ties.*
3. *When you mute video, the mute command mutes all video planes.*
4. *Mutes are **not** saved to non-volatile memory. When power is removed and restored, the mute settings are lost.*

Example 5: Muting and unmuting an output

See figure 3-8, on page 3-9, and figure 3-12 and the following steps for an example of muting and unmuting several MAV switcher outputs.

NOTE *Figure 3-8 shows the process of viewing the current configuration after the steps in Examples 1, 2, and 3 have been completed.*

Ⓐ Press and release the Esc button. The Esc LED flashes once.

Ⓑ Press and release the View button to enter view-only mode. The View LED lights.

Ⓒ To select both video and audio for viewing, if necessary, press and release the Video and Audio buttons until the Video LED and Audio LED light. With no input LED selected, all output LEDs that have no established ties light.

Ⓓ **One at a time**, press an **hold** the Output 3 and Output 4 buttons (figure 3-12) for approximately 2 seconds until the associated output LED begins to blink. The output 3 and output 4 video and audio signals are muted.

NOTE *Figure 3-12 shows only the indications directly related to the mute operation. Indications from existing ties are not shown to avoid confusion.*

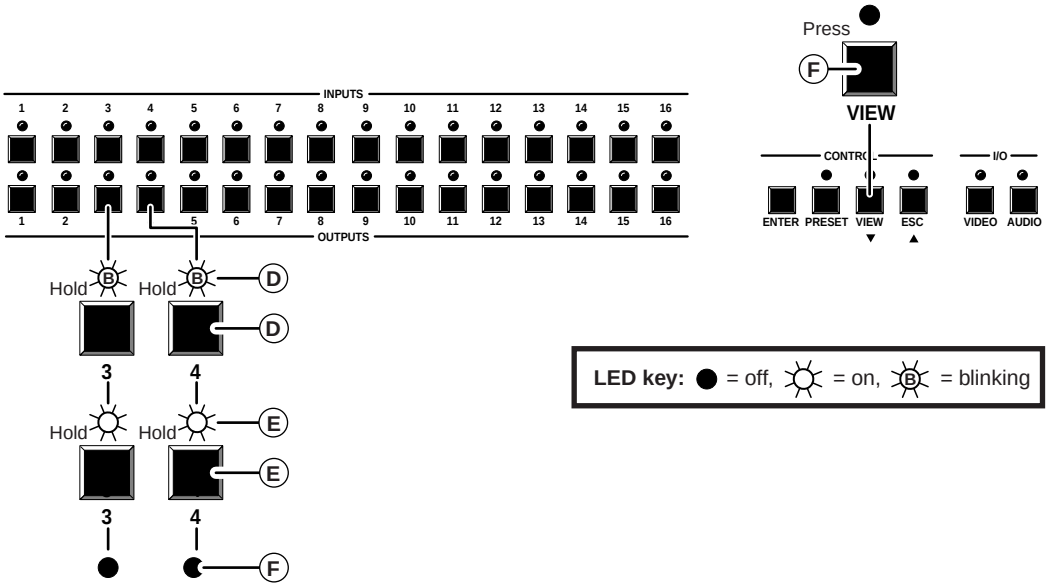


Figure 3-12 — Example 5, step D: Muting and unmuting outputs

Ⓔ **One at a time**, press and **hold** the Output 3 and Output 4 LEDs for approximately 2 seconds until the associated output LED lights steadily. The output 3 and output 4 video and audio signals are unmuted.

Ⓕ Press and release the View button to exit view-only mode. The View LED and all input and output LEDs go out.

Using presets

The current configuration (configuration 0) can be saved as a preset in any one of 16 preset memory addresses.

NOTE

1. *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.*
2. *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 for more details.*
3. *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.*
4. *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 6: Saving a preset

See figure 3-13 and the following steps for an example of recalling a preset to become the current configuration.

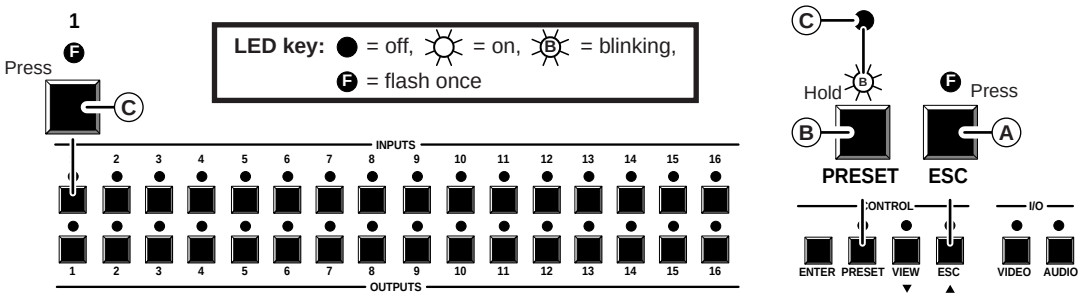


Figure 3-13 — Example 6: Saving the current configuration as preset 1

Ⓐ Press and release the Esc button. The Esc LED flashes once.

Ⓑ Press and **hold** the Preset button for approximately 2 seconds until the Preset LED begins to blink, then release the Preset button.

Ⓒ Press and release the input 1 button. The input 1 LED lights for approximately 2 seconds and turns off. The Preset LED turns off.

Example 7: Recalling a preset

See figure 3-14 and the following steps for an example of recalling a preset to become the current configuration.

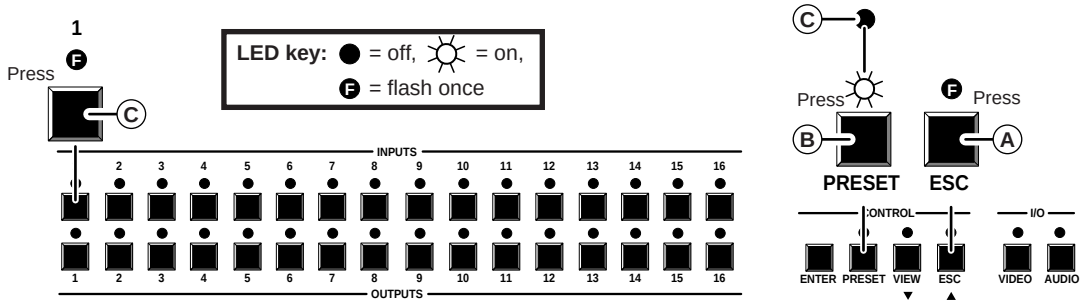


Figure 3-14 — Example 7: Recalling preset 1

Ⓐ Press and release the Esc button. The Esc LED flashes once.

Ⓑ Press and release the Preset button. The Preset LED lights.

Ⓒ Press and release the input 1 button. The input 1 LED lights for approximately 2 seconds and turns off. The Preset LED turns off. The configuration stored in memory location 1 is now the current configuration and can be viewed in the view-only mode (Example 4).

Viewing and adjusting the audio level (models with audio)

On models with audio, the audio level of each input can be displayed and adjusted through a range of -15dB to +9dB to ensure that there is no noticeable volume difference among sources. The audio level can be adjusted from the front panel or by using Extron's Windows-based control program.

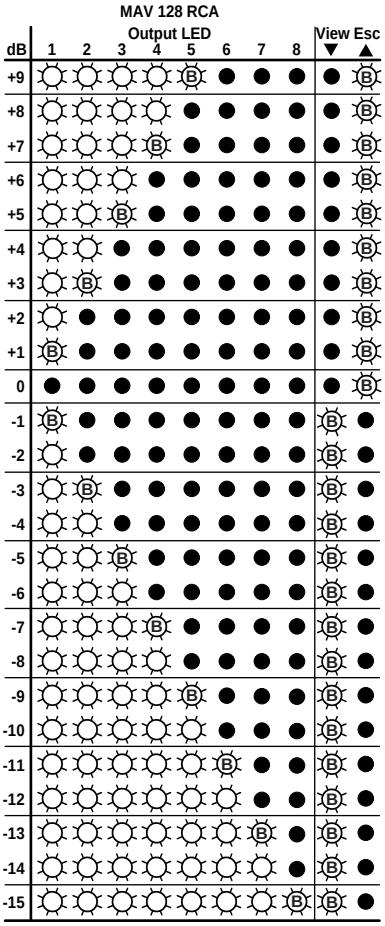
1. Press and **hold** the Audio button until the Audio LED begins to blink, then release the Audio button.
2. Press and release an input button to select an input. The audio level for the selected input is displayed by the output LEDs and the polarity (+ or -) is displayed by the view or Esc LEDs.
3. Press and release the Esc (▲) and View (▼) buttons to increase and decrease the audio level.
4. Press and release the Audio button to exit the audio display and adjustment mode. The Audio LED stops blinking and turns off.

NOTE

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

Example 8: Viewing and adjusting an audio level

See figure 3-15 and figure 3-17 and the following steps for an example of viewing and adjusting the audio level. Audio gain and attenuation is displayed differently on the MAV 128 RCA (see the table below right) from the display on the MAV 168 and 1616, but the steps for displaying the value are the same. For this reason, figure 3-16 and figure 3-18 show the indications displayed on the MAV 128 RCA without duplicating all of the actions shown in figure 3-15 and figure 3-17.



Ⓐ Press and release the Esc button. The Esc LED flashes once.

Ⓑ Press and **hold** the Audio button for approximately 2 seconds until the Audio LED begins to blink, then release the Audio button.

Ⓒ Press and release the input 5 button. The input 5 LED lights. The audio level for the selected input is displayed by the output LEDs. The polarity is indicated by either the Esc (▲) or View (▼) LED blinking.

On the MAV 168 and MAV 1616, each output LED indicates 1dB when lit.

On the MAV 128 RCA, each output LED indicates 1dB when blinking and 2dB when lit. See the table at right.

The blinking Esc (▲) LED indicates a positive (gain) level. The blinking View (▼) LED indicates a negative (attenuation) level. Figure 3-15 and figure 3-16 show an audio level of +8dB displayed in the output LEDs on the two different MAV panels.

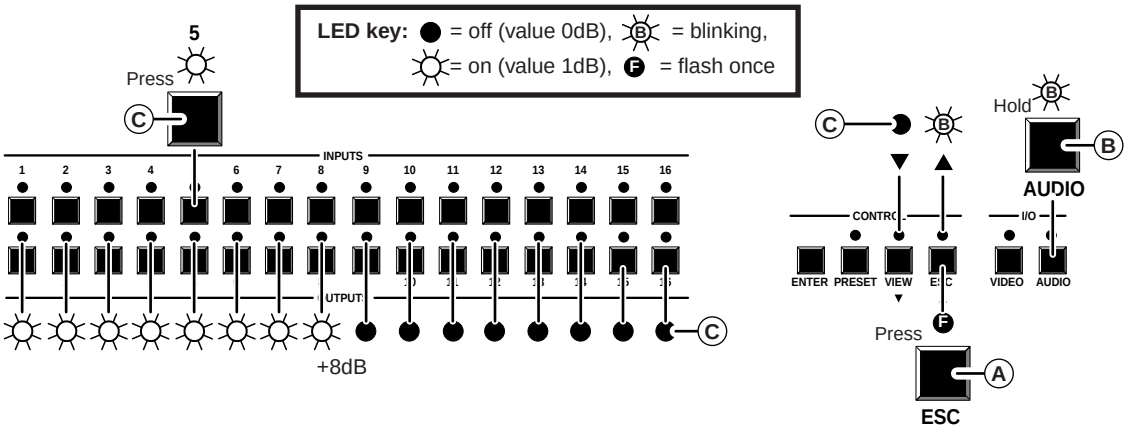


Figure 3-15 — Example 8: Viewing the audio level

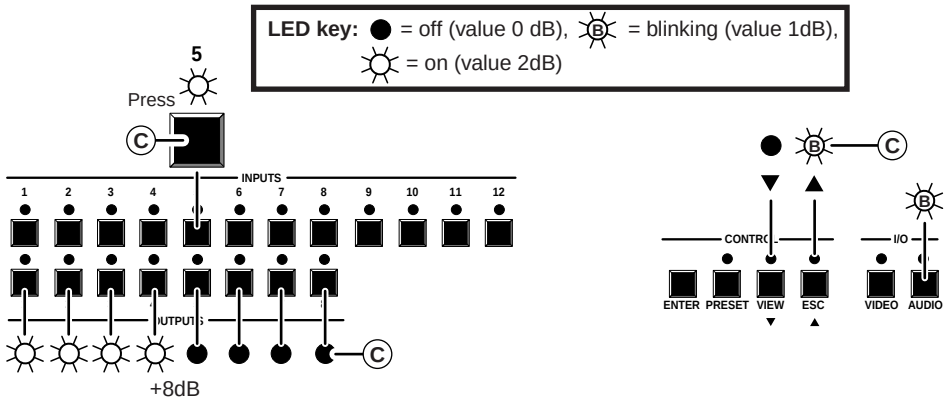


Figure 3-16 — +8dB displayed on MAV 128 RCA

(D) Press and release the View (▼) button once to decrease the audio level displayed by the output LEDs by 1dB. Press and release the View (▼) button several more times to decrease the audio level displayed by the output LEDs by an additional 1dB per button push. Note the output LED, View LED, and Esc LED changes that occur each time the View (▼) button is pressed and released. Figure 3-17 and figure 3-18 show the result of pressing the View (▼) button a total of 9 times. Note that the Esc (▲) LED has turned off and that the View (▼) LED is blinking to indicate a negative level.

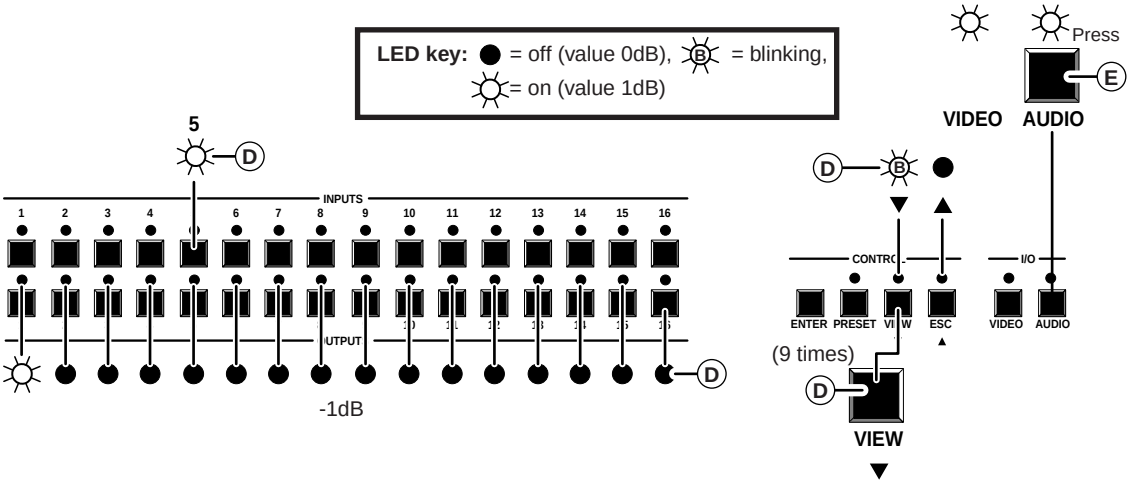


Figure 3-17 — Example 8, step D: Adjusting the audio level

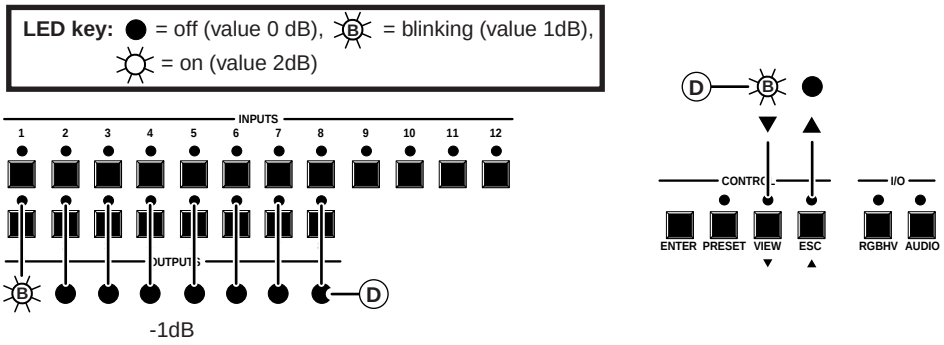


Figure 3-18 — -1dB displayed on MAV 128 RCA

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.*

Ⓔ Press and release the Audio button. The Audio LED stops blinking and the View (▼) LED (if lit), the Esc (▲) LED (if lit), the selected input LED, and all output LEDs turn off.

NOTE *Both the Video and Audio LEDs light.*

Executive mode (front panel security lockout)

The executive mode limits the operation of the MAV switcher from the front panel. When the switcher is in executive mode, all of the front panel functions are disabled except for the view-only mode functions. See *Viewing a configuration* on page 3-8. Other than in view-only mode, if the user pushes a front panel button when the switcher is in executive mode, that button's associated LED flashes twice and goes out.

To toggle executive mode on or off, press and hold the Video and Audio buttons for approximately two seconds. The Video and Audio LEDs blink twice to indicate the mode change. Release the Video and Audio buttons. To toggle the executive mode state again, press and hold the Video and Audio buttons again.

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. Continue to hold the Esc button until the power up sequence is completed (all LEDs turn off, the Video and Audio LEDs turn on, and the Esc LED blinks). System reset clears all ties and presets and sets all audio gain levels to unity gain (+0dB).

Troubleshooting

This paragraph gives recommendations on what to do if you have problems operating the MAV series switcher, and it provides examples and descriptions for some image problems you may encounter.

General checks

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 S^3 Sales & Technical Support Hotline if necessary.

Plasma display S-video problem

Extron has encountered a problem with the S-video output by some video conference codecs. Some codecs change the DC offset on the chrominance (C) so that it is very different from the level on the luminance (Y). This can cause a plasma display to come up in the wrong size mode.

With the matrix switcher taken out of the system, the plasma works fine. It looks like a Extron problem, but **it is not**. The matrix switcher boosts the bad codec output, which makes the plasma go to the wrong setting.

Solution: Try placing an Extron video DC block adapter, part **#26-495-01**, on the luminance (Y) input to the switcher from the codec.

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 3-17 and use one for each preset configuration. The forms accommodate all of the MAV models. Cross off all unused or inactive inputs and outputs. Use different colors for video and audio.

Worksheet example 1: System equipment

Figure 3-19 shows a worksheet for a MAV 1616 in a fictional organization with the system hardware annotated. Inputs 10 and 11 and output 7 have no connections in this organization, so they have been crossed out on the worksheet.

Inputs include video cameras, audio tape and CD players, laser disc players, VCRs, and a VTG 200. Output devices include monitors, front and rear projectors, a stereo, and several VCRs.

Note that VCRs 1, 2, 3, and 4 are connected to inputs 13 – 16 and also to outputs 13 – 16. This arrangement is convenient for video editing applications. Connecting the VCR inputs and outputs to the same inputs and outputs on the switcher is not a requirement. They can be separated and spread around in any configuration

The Extron VTG 200 video test generator connected to input 12 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.

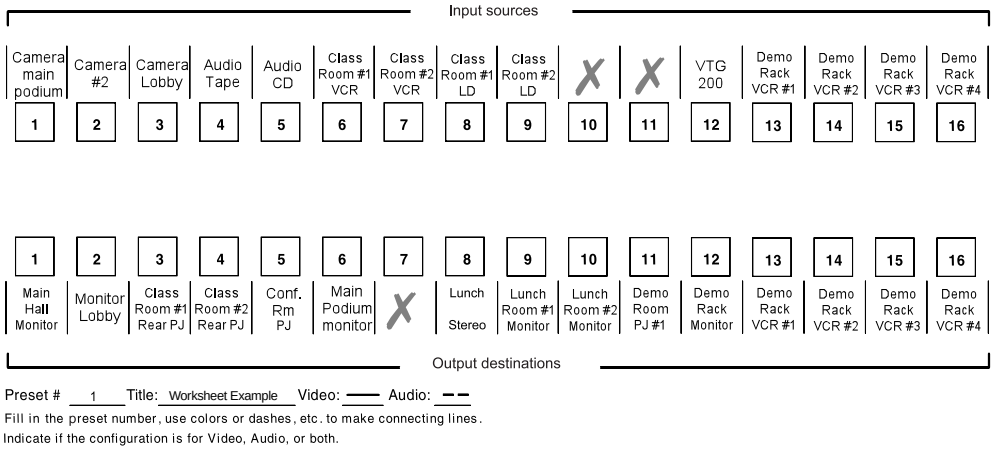
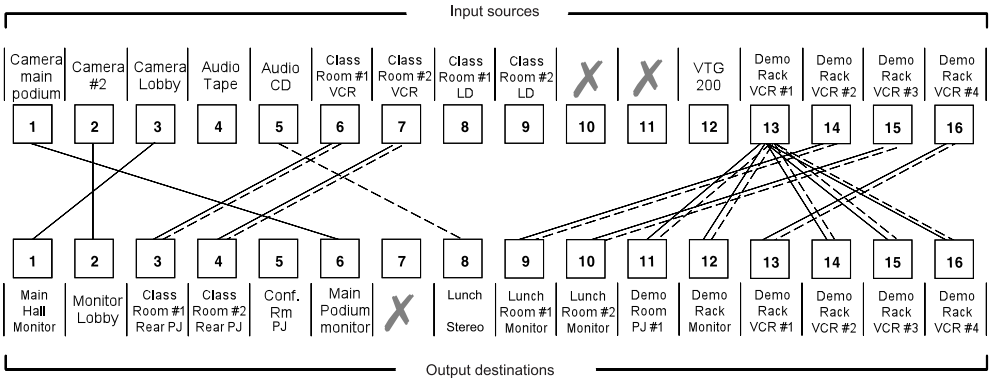


Figure 3-19 — Worksheet example 1: System equipment

Worksheet example 2: Daily configuration

Figure 3-20 shows a MAV 1616 switcher with 10 input devices tied to 14 output devices. Video and audio are shown as separate lines. This configuration has been assigned preset #3 with a title of "Daily Configuration" to indicate its use.



Preset # 3 Title: Daily Configuration Video: —— Audio: – –

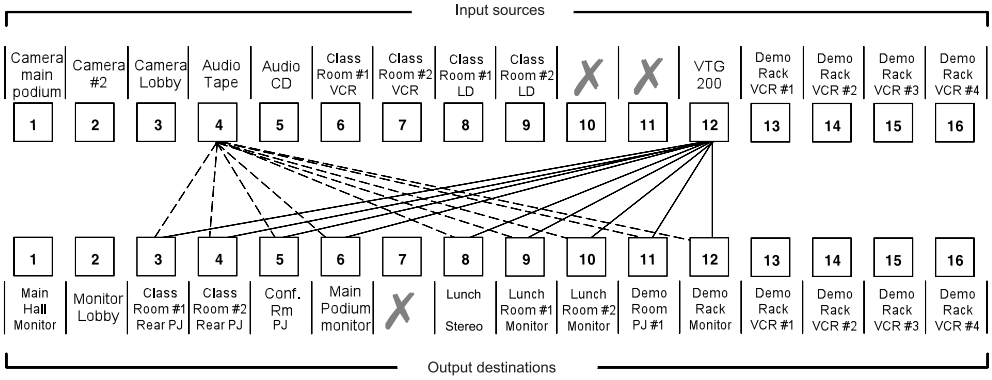
Fill in the preset number, use colors or dashes, etc. to make connecting lines.

Indicate if the configuration is for Video, Audio, or both.

Figure 3-20 — Worksheet example 2: Daily configuration

Worksheet example 3: Test configuration

Figure 3-21 shows a switcher with an Extron VTG 200 video test pattern going to nine of the fifteen output devices. Audio, shown as dashed lines, comes from a tape deck and goes to the same nine outputs. This configuration has been assigned preset #12 and a title of "Audio/Video Test" to indicate its use.



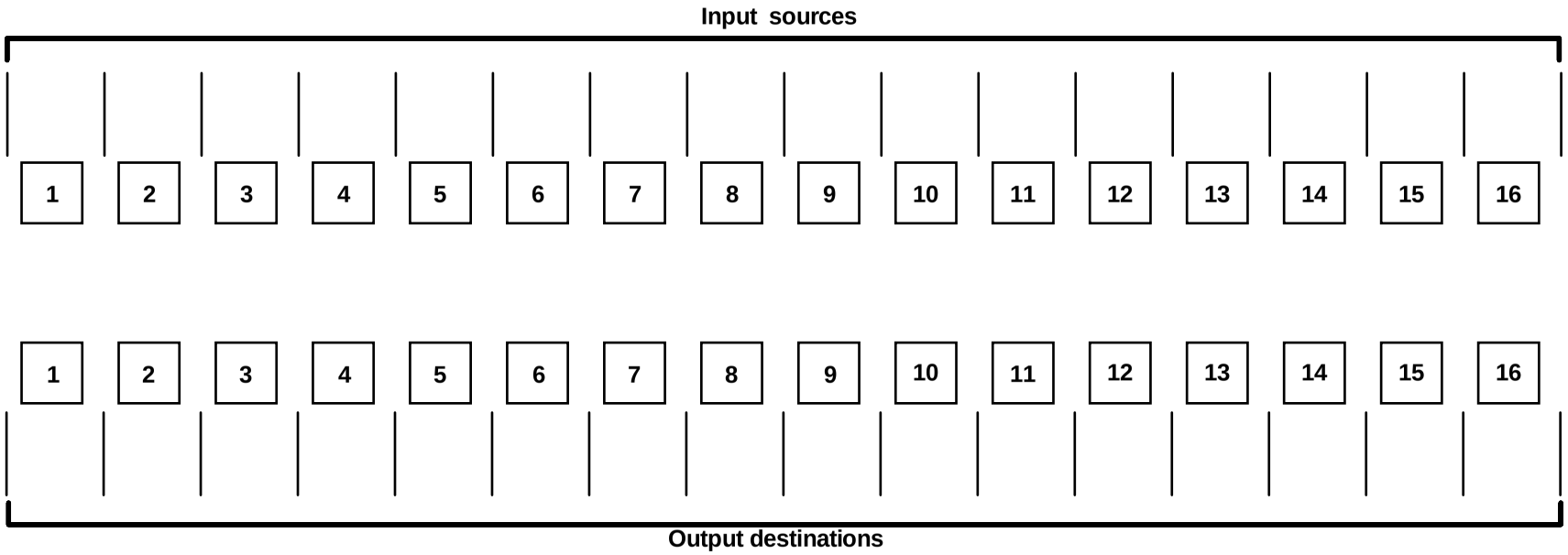
Preset # 12 Title: Audio/Video Test Video: —— Audio: – –

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 3-21 — Worksheet example 3: Test configuration

Configuration worksheet



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.

Chapter Four

Programmer's Guide

Host-to-Switcher Instructions

Switcher-Initiated Messages

Switcher Error Responses

Using the Command/Response Table

Command/Response Table

The switcher's rear panel RS-232/RS-422 connector (figure 4-1) can be connected to the serial port output of a host device such as a computer or control system. This connection makes software control of the switcher possible.

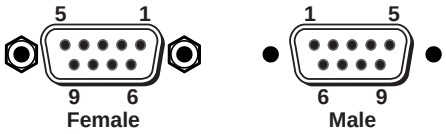


Figure 4-1 — MAV switcher RS-232 connector pin arrangement

NOTE *The MAV Series Switchers are factory configured for RS-232 control. To use the switcher under RS-422 control, an internal cable must be moved. See Appendix B for the procedure for shifting the cable.*

The RS-232/RS-422 connector on the MAV Series switcher is a 9-pin D female connector with the following pin assignments.

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

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 = ↵), 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 2002, Extron Electronics "CrossPoint/Mav/Matrix", Vx.xx↵

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

Reconfig↵

The reconfig message is initiated by the switcher when a front panel operation has occurred, an audio gain adjustment has been completed, or a memory preset has been recalled.

RAM Test Failed ↵
ROM Checksum Failed ↵
EEPROM Reset (Presets/Attenuators) ↵
Serial EEPROM Reset (Current Settings) ↵
Invalid Jumpers ↵

If an error occurs during powerup, the switcher initiates one or more of the messages listed above.

All Configuration Memory Cleared ↵

The memory cleared message is initiated by the switcher when a system reset has occurred. See *System reset to factory defaults* in chapter 3.

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

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 below. Lower case letters are acceptable in the command field only where indicated. Symbols are used throughout the table to represent variables in the command/response fields. Command and response examples are shown throughout the table.

ASCII to HEX Conversion Table														Esc	1B	CR	ØD	LF	ØA
Space	2Ø	!	21	"	22	#	23	$	24	%	25	&	26	'	27				
(	28	)	29	*	2A	+	2B	,	2C	-	2D	.	2E	/	2F				
Ø	3Ø	1	31	2	32	3	33	4	34	5	35	6	36	7	37				
8	38	9	39	:	3A	;	3B	<	3C	=	3D	>	3E	?	3F				
@	4Ø	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	5Ø	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				
`	6Ø	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	7Ø	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				

Command/Response Table

Symbol Definitions:

↵ = Carriage return/line feed

← = Carriage return (no line feed)

• = Space

[X1] = Input number — 01 – 12 (MAV 124 RCA); 01 – 16 (MAV 168/1616);

[X2] = Output number — 01 – 08 (MAV 128 RCA); 01 – 08 (MAV 168); 01 – 16 (MAV 1616)

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

[X3] = Input number (for tie) — 0 – maximum number of inputs (0=disconnected)

[X4] = Audio gain — 0 – 9 (1dB/step)

[X5] = Audio attenuation — 1 – 15 (1dB/step)

[X6] = Numeric dB value — -15 to +09

[X7] = Preset number — 00 – 16 (0 = current configuration)

[X8] = Preset number — 01 – 12 (MAV 128 RCA); 01 – 16 (MAV 168/1616 models)

[X9] = Mute status — 0 = no mute, 1 = video mute, 2 = audio mute, 3 = V and A mute

[X10] = Executive mode, mute — 1 = on, 0 = off

[X11] = Controller software 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			
Tie input [X3] to output [X2], A & V	[X3] * [X2] !	Out[X2]•In[X3]•All↵	
Example:	1*3!	Out3•In1•All↵	Tie input 1 A & V to output 3.
Tie input to output, RGBHV only	[X3] * [X2] &	Out[X2]•In[X3]•RGB↵	Audio breakaway.
Example[1]:	10*4&	Out04•In10•RGB↵	Tie input 10 RGB to output 4.
Tie input [X3] to output [X2], video only	[X3] * [X2] %	Out[X2]•In[X3]•Vid↵	Audio breakaway.
Example[1]:	7*5%	Out05•In07•Vid↵	Tie input 7 video to output 5.
Tie input [X3] to output [X2], audio only	[X3] * [X2] $	Out[X2]•In[X3]•Aud↵	Audio breakaway.
Example:	12*8$	Out8•In12•Aud↵	Tie input 12 audio to output 8.
Quick multiple tie	[Esc]Q[X3]*[X2]!…[X3]*[X2]!←	Out•Multi•In•Multi•All↵	
Example:	[Esc]Q3*4!3*5!3*6!←	Out•Multi•In•Multi•All↵	Tie input 3 to outputs 4, 5, and 6.
Tie input to all outputs	[X3]!	Out•Multi•In[X3]•All↵	
Example:	5!	Out•Multi•In05•All↵	Tie input 5 to all outputs.
Audio input gain and attenuation			
Set audio input gain to +dB value	[X1] * [X4] G	In[X1]•Aud=[X6] ↵	
Example:	1*2G	In1•Aud=+02↵	Set input 1 audio gain to +2dB.
Set audio input attenuation to -dB value	[X1] * [X5] g	In[X1]•Aud=[X6] ↵	
Increment gain up	[X1]{G	In[X1]•Aud=[X6]↵	
Example:	5 {G	In5•Aud=+03↵	Audio input 5 level incremented from +2dB to +3dB.

[1] The & tie command for RGB and the % tie command for video can be used interchangeably on the MAV models.

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 (continued)			
Decrement gain down	X1}G	In X1 •Aud= X6 ↵	
Example:	7 }G	In7•Aud=-09 ↵	Audio input 7 level decremented from -8dB to -9dB.
Global presets			
Save current configuration as preset	X8 ,	Spr X8 ↵	Command character is a comma.
Example:	9,	Spr09 ↵	Save current ties as preset 9.
Recall a preset	X8 .	Rpr X8 ↵	Command character is a period.
Example:	5.	Rpr05 ↵	Recall preset 5, which becomes the current configuration.
Start direct write of global presets	Esc P X8 ←	Write Preset X8 Ready ↵	Allows direct entry of presets.
	{**Tie** commands}		{Define ties for preset}.
End direct write of global presets	Esc p ←	End Write Preset X8 ↵	Saves directly written presets.
Quick recall preset	Esc . ←	Rpr X8 ↵	Command character is a period.
NOTE 1. *This sequence of commands forces the switcher to perform a complete backplane switch within 60 msecs of receipt of the Quick recall command.*			
2. *The switcher ignores any invalid command or non-switching commands received between the Start and End commands.*			
3. *If there is no activity for 5 seconds, the switcher returns the timeout (E17) error.*			
4. *The switcher disables front panel switching during this sequence of commands.*			
5. *The switcher returns the invalid command (E10) error if it receives the End command without the start command or the Quick recall command without a prior direct preset write.*			
6. *The switcher must receive the Quick recall command within 100 msecs of the End command.*			
Example:			
	Esc P14 ←	Write Preset 14 Ready ↵	Creates new preset 14 with:
	1*3!		A & V Input 1 tied to output 3.
	7*8%		Video input 7 tied to output 8[1].
	10*4&		RGB input 10 tied to output 4[1].
	12*4$		Audio input 12 tied to output 4.
	Esc p ←	End Write Preset 14 ↵	Stops entry, saves preset 14.
	Esc . ←	Rpr X8 ↵	Recalls the preset.
Video mute commands			
Video mute	X2 *1B	Vmt X2 *1 ↵	Mute output X2 video (video off).
Video unmute	X2 *0B	Vmt X2 *0 ↵	Unmute X2 video (video on).
Read video mute	X2 B	X10 ↵	1= mute on, 0 = mute off.
Global RGB mute	1*B	Vmt1 ↵	
Global RGB unmute	0*B	Vmt0 ↵	
Audio mute commands			
Audio mute	X2 *1Z	Amt X2 *1 ↵	Mute output X2 video (audio off).
Audio unmute	X2 *0Z	Amt X2 *0 ↵	Unmute output X2 video (audio on).
Read audio mute	X2 Z	X10 ↵	1= mute on, 0 = mute off.
Global audio mute	1*Z	Amt1 ↵	
Global audio unmute	0*Z	Amt0 ↵	

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

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional description
Executive mode			
Lock front panel	X	Exe1↵	Enable executive mode.
Unlock front panel	x	Exe0↵	Disable executive mode.
Resets			
Reset global presets	Esc zG	ZapG••↵	Clear all global presets.
Reset audio levels	Esc zA	ZapA••↵	Reset all audio levels to 0dB.
Reset whole switcher	Esc zXXX	ZapXXX↵	Clears all ties and presets, and resets all audio gains to 0dB.
View ties, gain, and presets			
View video output tie	V/v X2 %	Out X2 •In X3 •Vid↵	
Example:	v7%	Out07•In02•Vid↵	Output 7 video tied to input 2 video.
View audio output tie	V/v X2 $	Out X2 •In X3 •Aud↵	
Example:	V3$	Out03•In06•Aud↵	Output 3 audio tied to input 6 audio.
View gain for input	V/v X1 G	In X1 •Aud= X6 ↵	
Example:	v4G	In04•Aud=-02↵	Gain for input #4 is -2dB.
View all output mutes	VM	X9 •(up to 16)•Mut↵	Each position listed in the response is an output, left = output 1, right = *n* (*n* = the maximum number of outputs for this model).
Example[2] ***(MAV 168)***:	VM	0•1•0•2•0•3•0•0•Mut	
View preset configuration	V/v X7 .	X3 •(up to16)•Vid• X3 •(up to 16)•Aud↵	

NOTE *Each position listed in the response is an output, left = output 1, right= output* n (n *is the maximum number of outputs). The number in each position is the input tied to the output represented by that position.*

Response description: Input# (I#) assigned to output# (O#)1•I# to O#2...I# to O#*n*•*Vid*•I# to O#1•I# to O#2...I# to O#*n*•*Aud*↵

Example[2] ***(MAV 128 RCA)***: V0. Preset #0 is current configuration.

Video input 8 tied to output 2 — Audio input 5 tied to output 2 — No tied audio input

Response = tied input: 08•08•08•08•07•09•11•03•Vid•05•05•05•05•07•09•11•00•Aud↵

Output: 01 02 03 04 05 06 07 08 — 01 02 03 04 05 06 07 08

Video = Input (I) 8 is tied to outputs (O) 1–4; I7— O5; I9 — O6; I11 — O7; I3 — O8.

Audio = The same as video except that input 5 is tied to outputs 1–4 and no input is tied to output 8.

Information requests			
Information request	I/i	V X1 X X2 •A X1 X X2 •Exe X10 ↵	V X1 X X2 = V size, A X1 X X2 = A Size.
Example:	i	V16X16•A16X16•Exe0↵	16 Video & 16 Audio inputs and outputs, front panel unlocked.
Request part number	N/n	Nxx-xxx-xx↵	See appendix A for part #s.
Example:	N	N60-240-01↵	Composite MAV 1616 with audio part # is 60-240-01.
Query software version	Q/q	Ver X11 ↵	
Example:	Q	Ver2.00↵	Version shown is for example only.

[2] Video-only models do not display audio configuration or mutes, and the number of outputs shown varies with the number of video or audio outputs.

Chapter Five

Matrix Software

Matrix Switchers Control Program

Button-Label Generator

Matrix Software

Two software programs accompany the MAV Series switchers:

- The Extron Matrix Switcher+ Control Program (Extron part number 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 *If your MAV Series switcher was previously set up for RS-232, and your computer comm port uses RS-422, you must change the switcher cabling to match the computer interface. See Appendix B for details.*

- The Extron Button-Label Generator allows you to design and print labels for the MAV 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).

This chapter describes both programs.

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 disks to the hard drive, run SETUP.EXE from the floppy disk and follow the instructions that appear on the screen. The program occupies approximately 3 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 will be limited to the features and configuration of your MAV Series switcher.*

Using the software

Overview

This section is an overview of the Extron Matrix Control Program. The help function contains additional information. See *Using the help system* 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.

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* for details.

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.

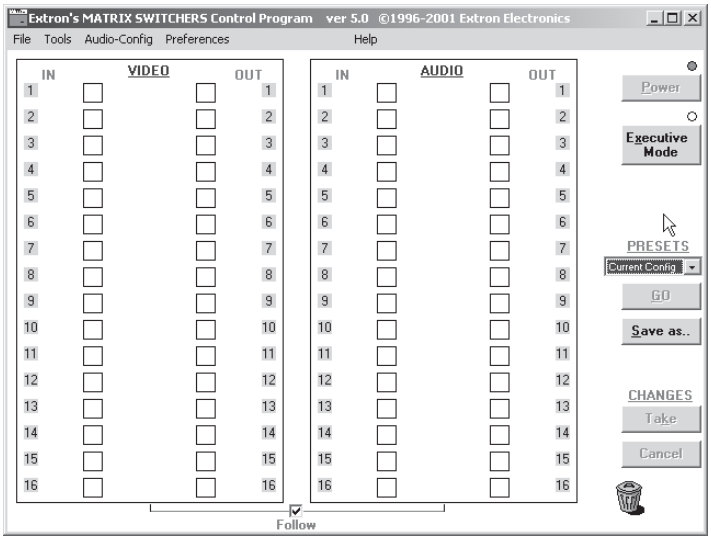


Figure 5-1 — Extron Matrix Switchers Control Program window (blank)

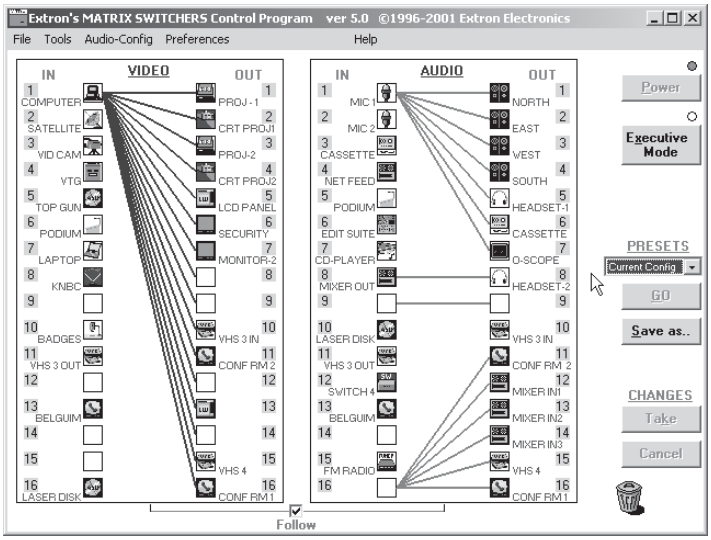


Figure 5-2 — Sample program window (complete)

4. To make the control program easier to use, you can 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.

Windows buttons

The buttons on the right side of the window perform the following functions:

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

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

Presets menu — Displays a list of up to 16 presets. You can select a preset from the list to display it in the window.

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.

Windows menus

File menu —

Save matrix settings as — Saves a complete set of up to 12 presets (MAV 128 RCA) or 16 presets (MAV 168/1616 models), 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 the 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 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 gain settings — Displays the audio gain level setting for a single input or for all inputs and allows you to change it.

Name presets — Allows you to assign a name to each of the 12 or 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.

Initialize — Initializes and clears any or all of the following: ties, presets, audio configuration, 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 changes to take effect immediately.

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

Ties as lines — Displays ties as lines.

Ties as crosspoints — Displays ties as a grid of inputs and outputs.

Using emulation mode

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

1. Start the program as described in step 1 on page 5-2.
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. The file NEW.INI 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 – 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+ Help icon (shown at left).

MATRIX Switcher+ Help

- 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 the C:\BUTTONS directory, and 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 left) in the Extron Electronics group or folder, and click OK when prompted.

Button-Label Generator

2. The Extron's Button-Label Generator window appears (figure 5-3). Under System selection, choose Mtrx50/MAV/XPoint.

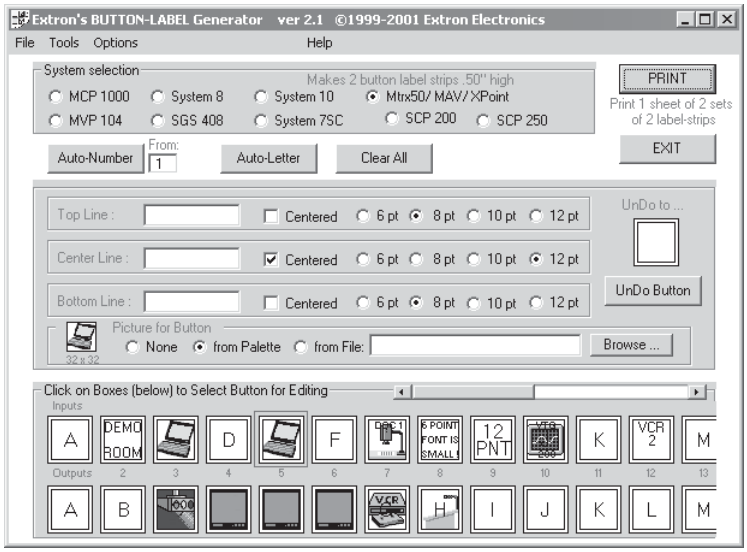


Figure 5-3 — Extron's Button-Label Generator window

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.

Appendix A

Specifications

Specifications

Part Numbers

Specifications

Video

Routing
- MAV 128 RCA ..... 12 x 8 matrix
- MAV 168 Series ..... 16 x 8 matrix
- MAV 1616 Series ..... 16 x 16 matrix

Gain ..... Unity

Bandwidth ..... 150 MHz (-3dB), fully loaded
- 0 - 10 MHz ..... no more than 0.1dB to -0.1dB
- 0 - 30 MHz ..... no more than 0.5dB to -0.5dB

Phase between I/Os ..... <1.28º at 3.58 MHz

Differential phase error ..... 0.1%, 3.58 to 4.43 MHz

Differential gain error ..... 0.1º, 3.58 to 4.43 MHz

Max. propagation of delay ..... 5 ns typical (±1 ns)

Crosstalk ..... -50dB @ 5 MHz

Switching speed ..... 200 ns (max.)

Video input

Number/signal type
- MAV 128 RCA ..... 12 composite video
- MAV 168/1616 Series ..... 16 RGsB, RsGsBs, component video (Y, R-Y, B-Y), HDTV, S-video, composite video

Connectors
- MAV 128 RCA ..... 12 RCA female
- MAV 168/1616 Series ..... 16 x 1, 2, or 3 BNC female

Nominal level ..... 1V p-p for Y of component video and S-video, and for composite video
0.7V p-p for RGB
0.3V p-p for R-Y and B-Y of component video, and for C of S-video

Minimum/maximum levels ..... Analog ..... 0.5V to 2.0V p-p with no offset

Impedance ..... 75 ohms

Return loss ..... <-30dB @ 5 MHz

Maximum DC offset 1.5V

External sync (genlock) ..... 0.3V to 0.4V p-p

Video output

Number/signal type
- MAV 128 RCA ..... 8 composite video
- MAV 168 Series ..... 8 RGsB, RsGsBs, component video (Y, R-Y, B-Y), HDTV, S-video, composite video
- MAV 1616 Series ..... 16 RGsB, RsGsBs, component video (Y, R-Y, B-Y), HDTV, S-video, composite video

Connectors
- MAV 128 RCA ..... 8 RCA female
- MAV 168/1616 Series ..... (8 or 16) x 1, 2, or 3 BNC female

Nominal level ..... 1V p-p for Y of component video and S-video, and for composite video
0.7V p-p for RGB
0.3V p-p for R-Y and B-Y of component video, and for C of S-video

Minimum/maximum levels ..... 0.5V to 2V p-p

Impedance ..... 75 ohms

Return loss ..... <-30dB @ 5 MHz

DC offset ..... ±5mV maximum with input at 0 offset

Switching type ..... Vertical interval

Sync

Input type	
(MAV 168/1616, 3 BNC)	RGsB, RsGsBs
Output type	
(MAV 168/1616, 3 BNC)	RGsB, RsGsBs
Genlock connectors	2 BNC female
Standards	NTSC 3.58, NTSC 4.43, PAL, SECAM
Input impedance	75 ohms
Output impedance	75 ohms
Max. propagation delay	5 ns

Audio

Routing	
MAV 128 RCA	12 x 8 stereo matrix
MAV 168 audio	16 x 8 stereo matrix
MAV 1616 audio	16 x 16 stereo matrix
Gain	Unbalanced output: 0dB; balanced output: +6dB
Frequency response	20 Hz to 20 kHz, ±0.05dB
THD + Noise	0.03% @ 1 kHz at rated nominal level
S/N	>90dB, output 21dBu, balanced, at rated maximum output drive
Crosstalk	<-80dB @ 1 kHz, fully loaded
Stereo channel separation	>80dB @ 1 kHz
CMRR	>75dB @ 20 Hz to 20 kHz

Audio input

Number/signal type	
MAV 128 RCA	12 stereo, unbalanced
MAV 168/1616 Series	16 stereo, balanced/unbalanced
Connectors	
MAV 128 RCA	(12 x 2) RCA female plugs
MAV 168/1616 Series	(16) 3.5 mm captive screw connectors, 5 pole
Impedance	>10 kohms unbalanced/balanced, DC coupled
Nominal level	-10dBV (316mV)
Maximum level	+19.5dBu, (balanced or unbalanced) at stated %THD+N
Input gain adjustment	-15dB to +9dB, adjustable per input via RS-232/422 or front panel

Audio output

Number/signal type	
MAV 128 RCA	8 stereo, unbalanced
MAV 168 Series	8 stereo, balanced/unbalanced
MAV 1616 Series	16 stereo, balanced/unbalanced
Connectors	
MAV 128 RCA	(8) x 2 RCA female jacks
MAV 168	(8) 3.5 mm captive screw connectors, 5 pole
MAV 1616	(16) 3.5 mm captive screw connectors, 5 pole
Impedance	
MAV 128 RCA	50 ohms unbalanced; capable of 600 ohms drive
All other audio models	50 ohms unbalanced, 100 ohms balanced
Gain error	±0.1dB channel to channel
Maximum level (Hi-Z)	>+21dBu, balanced or unbalanced at stated %THD+N

Maximum level (600 ohm) ..... >+15dBm, balanced or unbalanced at stated %THD+N

NOTE *0dBu = 0.775 volts (RMS).*

Control/remote — switcher

Serial control port ..... RS-232 or RS-422, 9-pin female D connector
Baud rate and protocol ..... 9600, 8-bit, 1 stop bit, no parity
Serial control pin configurations .... 2 = TX, 3 = RX, 5 = GND
Program control ..... Extron's control program for Windows®
Extron's Simple Instruction Set™ – SIS™

General

Power ..... 100VAC to 240VAC, 50/60 Hz, internal, autoswitchable
MAV 128 RCA ..... 15 watts
MAV 168/1616 S-video/Composite Video Series ..... 40 watts
MAV 168/1616 Series (other than S-video or composite) .. 65 watts
Temperature/humidity ..... Storage -40° to +158°F (-40° to +70°C) / 10% to 90%, non-condensing
Operating +32° to +104°F (0° to +40°C) / 10% to 90%, non-condensing
Rack mount ..... Yes
Enclosure type ..... Metal
Enclosure dimensions
MAV 128 RCA,
MAV 168/1616 audio only,
MAV 168/1616 composite .. 3.5" H x 17.0" W x 9.4" D (2U high, full rack width)
8.9 cm H x 43.2 cm W x 23.9 cm D
(Depth excludes connectors and controls. Width excludes rack ears.)
MAV 168/1616 S-video .. 5.25" H x 17.0" W x 9.4" D (3U high, full rack width)
13.3 cm H x 43.2 cm W x 23.9 cm D
(Depth excludes connectors and controls. Width excludes rack ears.)
MAV 168/1616 component 7.0" H x 17.0" W x 9.7" D (4U high, full rack width)
17.8 cm H x 43.2 cm W x 24.6 cm D
(Depth excludes connectors and controls. Width excludes rack ears.)
Shipping/product weight
MAV 128 RCA ..... 15 lbs (6.8 kg)/8.9 lbs (4.0 kg)
DIM weight 25
MAV 168/1616 2U models . 15 lbs (6.8 kg)/9.4 lbs (4.3 kg)
DIM weight 25
MAV 168/1616 3U models . 18 lbs (8.2 kg)/11.9 lbs (5.4 kg)
DIM weight 25
MAV 168/1616 4U models . 22 lbs (10.0 kg)/14.4 lbs (6.5 kg)
DIM weight 25
Vibration ..... ISTA/NSTA 1A in carton (International Safe Transit Association)
Listings ..... UL, CUL
Compliances
MAV 128 RCA ..... CE, FCC Class A & B, , VCCI, AS/NZS, ICES
All other models ..... CE
MTBF ..... 30,000 hours
Warranty ..... 3 years parts and labor

NOTE *Specifications are subject to change without notice.*

Part Numbers

MAV switcher part numbers

Extron Part	Part #
MAV 1616 HDTV/component video and audio switcher	60-367-01
MAV 1616 HDTV/component video switcher	60-367-02
MAV 168 HDTV/component video and audio switcher	60-366-01
MAV 168 HDTV/component video switcher	60-366-02

Extron Part	Part #
MAV 1616 S-video and audio switcher	60-365-01
MAV 1616 S-video switcher	60-365-02
MAV 168 S-video and audio switcher	60-364-01
MAV 168 S-video switcher	60-364-02
MAV 1616 composite video and audio switcher	60-240-04
MAV 1616 composite video switcher	60-240-05
MAV 168 composite video and audio switcher	60-329-01
MAV 168 composite video switcher	60-329-02
MAV 1616 audio switcher	60-240-06
MAV 168 audio switcher	60-329-03
MAV 128 RCA composite video and audio switcher	60-238-04
Matrix Switcher+ Control Program and Button-Label Generator	29-015-01
MAV Series Switchers User's Manual	68-353-03

Optional accessories

Extron Part	Part #
Rack/desk mounting kit	70-077-03
Captive screw audio connector	10-319-10
RCA-to-BNC adapter	10-264-01
SVHS - BNC adapter	26-353-01
MKP 1000	
Gray kit with audio	60-239-01
Black	60-239-02
White	60-239-03
MKP 1000P (primary)	60-298-01
MKP 1000S (secondary)	60-298-02

Cables

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

Bulk cable

Extron Part	Part #
RG6 super high resoultion cable	
Bulk RG6-1, 500'	22-098-02
Bulk RG6-1, 1000'	22-098-03
Bulk RG6-4, 500'	22-099-02
Bulk RG6-5, 500'	22-100-02
RG6 male crimp connectors, qty. 50	100-075-51

Extron Part	Part #
BNC-4 Mini HR Cable	
Bulk BNC 4-500′ HR	22-032-02
Bulk BNC 4-1000′ HR	22-032-03
BNC-5 Mini HR Cable	
Bulk BNC 5-500′ HR	22-020-02
Bulk BNC 5-1000′ HR	22-020-03
Plenum BNC-5 Mini HR Cable	
Bulk BNC 5-500′ HRP	22-103-02
Bulk BNC 5-1000′ HRP	22-103-03

Assorted connectors

BNC connectors	
BNC Mini HR crimp connectors, qty. 50	100-074-51
RG6 male crimp connectors, qty. 50	100-075-51
BNC bulkhead connectors, qty. 50 (for custom wall plates)	100-076-51

Pre-cut cables

BNC-4 Mini HR cable is used for RGBS cable runs, and BNC-5 Mini HR cable is used for RGBHV cable runs. Either type can also be used for composite video, S-video, or RGsB. All Extron BNC cables have male connectors on both ends. A plenum version of the BNC-5 Mini HR cable is also available.

Extron Part	Part #
BNC-4 Mini HR Cable	
BNC-4-25′HR (25 feet/7.5 meters)	26-210-04
BNC-4-50′HR (50 feet/15.0 meters)	26-210-05
BNC-4-75′HR (75 feet/23.0 meters)	26-210-06
BNC-4-100′HR (100 feet/30.0 meters)	26-210-07
BNC-4-150′HR (150 feet/45.0 meters)	26-210-08
BNC-4-200′HR (200 feet/60.0 meters)	26-210-09
BNC-4-250′HR (250 feet/75.0 meters)	26-210-54
BNC-4-300′HR (300 feet/90.0 meters)	26-210-53
BNC-5 Mini HR Cable	
BNC-5-25′HR (25 feet/7.5 meters)	26-260-03
BNC-5-50′HR (50 feet/15.0 meters)	26-260-04
BNC-5-75′HR (75 feet/23.0 meters)	26-260-16
BNC-5-100′HR (100 feet/30.0 meters)	26-260-05
BNC-5-150′HR (150 feet/45.0 meters)	26-260-12
BNC-5-200′HR (200 feet/60.0 meters)	26-260-06
BNC-5-250′HR (250 feet/75.0 meters)	26-260-18
BNC-5-300′HR (300 feet/90.0 meters)	26-260-14

NOTE *Bulk cable in lengths up to 5000′ rolls is available with or without connectors.*

Appendix B

Reference Information

Hardware Procedures

Button Labels

Reference Information

Hardware Procedures

This appendix describes how to perform hardware upgrade procedures such as swapping the RS-232 and RS-422 ports, installing a new firmware update, and replacing the fuse.

Opening the switcher

Before you can perform any of the hardware upgrade procedures, you must open the switcher. To open the switcher, do the following:

1. Disconnect the power cord from the switcher.
2. If the switcher is rack mounted, remove the switcher from the rack and place it on a clean workspace.
3. Remove the eight screws that secure the switcher's top cover (figure B-1).

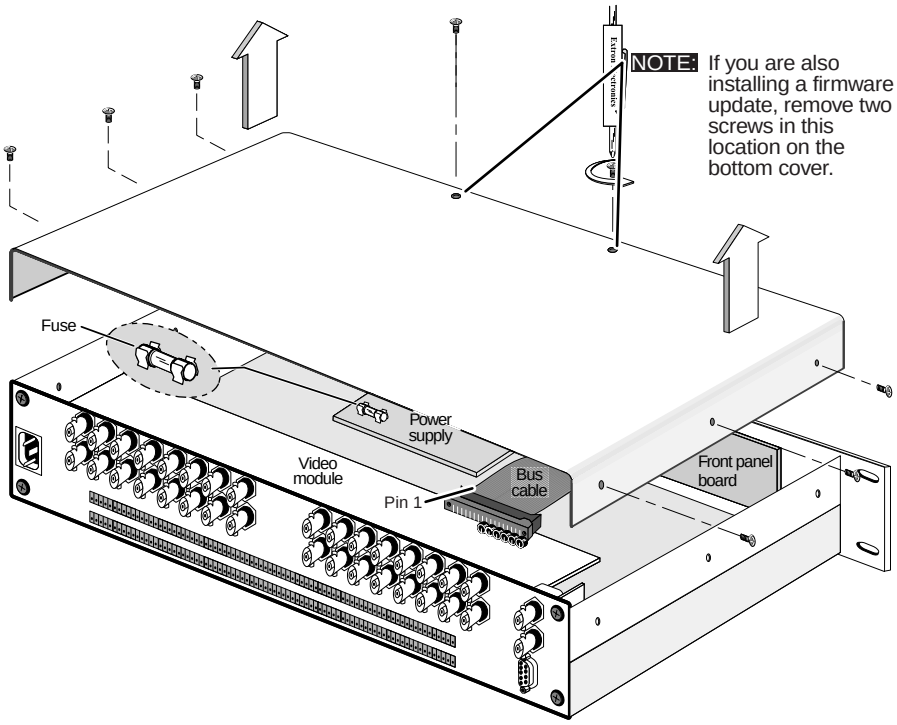
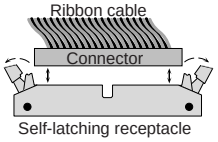


Figure B-1 — Removing the top cover screws

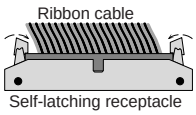
4. Lift the top cover straight up. Lift the cover evenly to clear the grooves at the edge of the rear panel.
5. If you are updating the firmware, remove the two screws at the front edge of the bottom cover, and the four screws and washers securing front panel to the bottom cover. Three internal cables connected to the front panel can be damaged if strained. Carefully tilt the front panel away from the main body of the switcher.
6. If you are updating the firmware, remove the top cable by pressing the two receptacle tabs on the top cable outward, as shown at the left, and pulling back gently on the cable connector to remove it from the receptacle. Lay the front panel down in front of the switcher.



Closing the switcher

To close the switcher when you have finished performing a procedure in this chapter, do the following:

1. Reinstall any cables you removed. To connect a self-latching cable to a receptacle, align the holes in the connector with the pins in the receptacle, and press evenly until the receptacle tabs lock into place.



2. Place the top cover (and the front cover if a firmware upgrade was performed) in place and replace all the screws that were removed in *Opening the switcher* on page B-2.

Swapping the serial ports

The MAV switchers are usually configured for RS-232 use. If you want to use RS-422 and the switcher is configured for RS-232, or if you want to use RS-232 and the switcher is configured for RS-422, do the following:

1. Follow the instructions in *Opening the switcher* on page B-2 for removing the top cover.
2. Locate the switcher's front panel board (figure B-2).

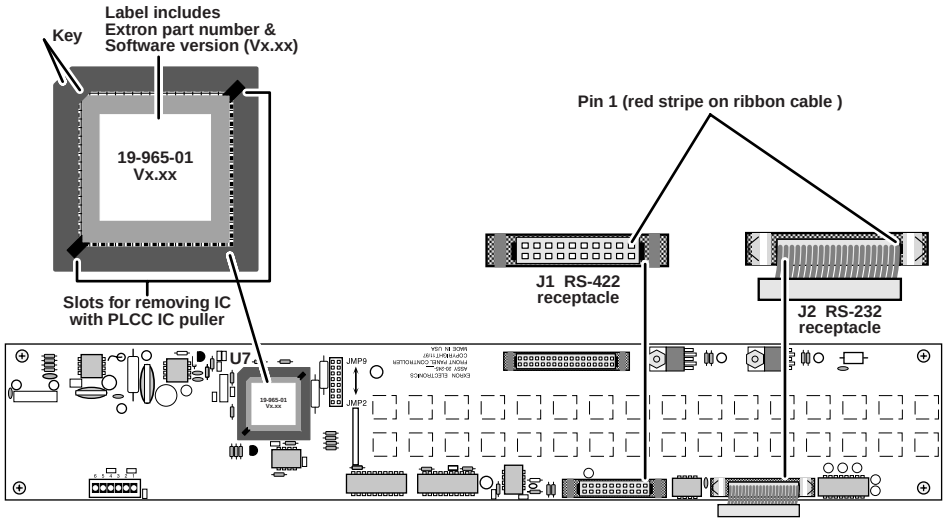
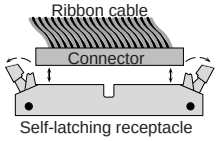
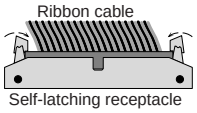


Figure B-2 — Front panel board

3. On the side of the front panel board that faces the rear of the switcher, locate the RS-232 ribbon cable. The RS-422 ribbon cable receptacle, which is normally empty, is located to the left of the RS-232 ribbon cable receptacle.
4. Remove the RS-232/RS-422 ribbon cable by pressing the two RS-232/RS-422 receptacle tabs outward, and pull up evenly on the cable connector to remove it from the current receptacle.



5. Plug the cable in to the desired receptacle by aligning the holes in the connector with the pins in the RS-232 or RS-422 receptacle, and pressing evenly until the receptacle tabs lock into place.



6. Reinstall the switcher's cover. See *Closing the switcher* on page B-3.

WARNING *If you choose to check for proper operation before putting the cover back on, ensure that tools and hands are outside the switcher, and then connect the power cord to the unit and to an AC source. The switcher should power up normally. Unplug the AC power cord, and reinstall the switcher.*

7. Attach the power cord to the switcher and to the AC power source. Ensure the switcher is working properly.
8. If the switcher was removed from a rack, remove its power cord, reattach the switcher to the rack, and reconnect the power cord.
9. Reconnect the input and output cables.

Installing a firmware update

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

To replace the firmware, do the following:

1. Follow the instructions in *Opening the switcher* on page B-2 for removing the top cover, including the instructions for removing the front panel.
2. Locate the RS-232/RS-422 ribbon cable that connects the front panel board to the rear panel RS-232/422 port (figure B-2). Note which receptacle on the front panel board that the cable plugs into, and remove the cable from its receptacle (see step 4 in *Swapping the serial ports*).

NOTE *Do not touch the components inside the switcher without being electrically grounded. Electrostatic discharge (ESD) can damage ICs, even if you cannot feel, see, or hear it.*

3. Unplug the power cable from the front panel board.
4. Place the front panel board, button side down, on a suitable workspace.
5. Locate IC U7 (see figure B-2).
6. Use the PLCC IC puller to remove the existing firmware IC. Squeeze the tool to align its hooks with the slots in opposite corners of socket U7. Insert the hooks, squeeze gently, and pull the IC straight out of the socket. Set the IC aside.
7. Note the key (angled corner) of the new firmware IC and the dot on the underside that indicates pin 1 (figure B-3). Orient the IC to match the key and pin 1 (indicated by the arrow), and carefully press the IC in place.

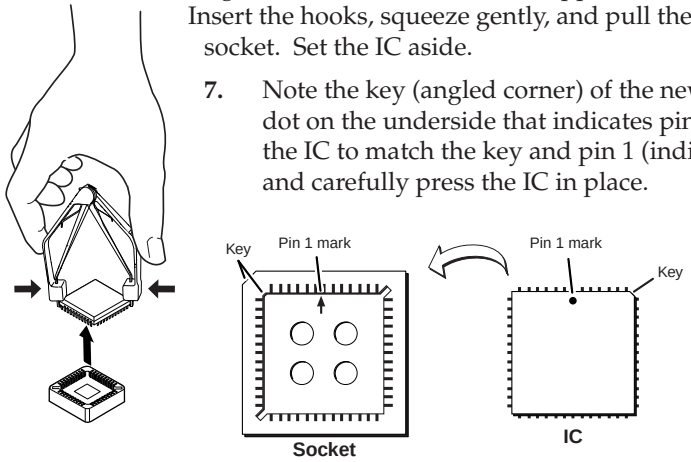


Figure B-3 — Key and pin 1 mark

8. Reinstall the power cable that was removed in step 3.

9. Reinstall the cables that were removed in step 2 and 3. Ensure that the RS-232/RS-422 ribbon cable is plugged into the proper receptacle for either RS-232 or RS-422, as appropriate.

10. Reinstall the switcher's front panel and cover. See *Closing the switcher* on page B-3.

WARNING *If you choose to check for proper operation before putting the cover back on, ensure that tools and hands are outside the switcher and then perform step 11. After recognizing the new IC, the switcher should power up normally. Unplug the AC power cord, and reinstall the switcher.*

11. Reinitialize the switcher to recognize the new IC as follows:

    a. Connect the power cord to the AC power source.

    b. Press and **hold** the Enter button while you connect the power cord to the switcher.

    c. Observe that the Input, Output, Preset, View, and Esc LEDs all flash.

    d. Release the Enter button.

12. Ensure that the switcher is working properly.

13. If the switcher was removed from a rack, remove its power cord, reattach the switcher to the rack, and reconnect the power cord.

14. Reconnect the input and output cables.

Replacing the AC fuse

To replace the AC fuse, do the following:

1. Follow the instructions in *Opening the switcher* on page B-2 for removing the top cover.

2. Locate the fuse on the power supply board (see figure B-2), and remove the fuse from its retaining clips.

3. If test equipment is available, you can check the fuse.

4. Place a new 2A/250V fast-blow fuse in the retaining clips.

5. Reinstall the switcher's cover as described in *Closing the switcher* on page B-3.

WARNING *If you choose to check the switcher for proper operation before putting the cover back on, ensure that tools and hands are outside the switcher, and then connect the power cord to the unit and to an AC source. The switcher should power up normally. Unplug the AC power cord, and reinstall the switcher.*

6. Attach the power cord to the switcher and to the AC power source. Make sure the switcher is working properly.

7. If the switcher was removed from a rack, remove its power cord, reattach the switcher to the rack, and reconnect the power cord.

8. Reconnect the input and output cables.

Button Labels

Eight sets of button labels are provided on the next page. Feel free to cut them out of the manual, write button information in each button area as desired, and put them in the switcher's label window.

FCC Class A Notice — MAV 128 RCA

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

Note: This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to ensure compliance.

FCC Class B Notice — MAV 128 RCA

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that the interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to ensure compliance.

Extron's Warranty

Extron Electronics warrants this product against defects in materials and workmanship for a period of three years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron Electronics will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

USA, Canada, South America, and Central America:

Extron Electronics
1230 South Lewis Street
Anaheim, CA 92805, USA

Asia:

Extron Electronics, Asia
135 Joo Seng Road, #04-01
PM Industrial Bldg.
Singapore 368363

Europe, Africa, and the Middle East:

Extron Electronics, Europe
Beeldschermweg 6C
3821 AH Amersfoort
The Netherlands

Japan:

Extron Electronics, Japan
Daisan DMJ Bldg. 6F,
3-9-1 Kudan Minami
Chiyoda-ku, Tokyo 102-0074
Japan

This Limited Warranty does not apply if the fault has been caused by misuse, improper handling care, electrical or mechanical abuse, abnormal operating conditions or non-Extron authorized modification to the product.

If it has been determined that the product is defective, please call Extron and ask for an Applications Engineer at (714) 491-1500 (USA), 31.33.453.4040 (Europe), 65.6383.4400 (Asia), or 81.3.3511.7655 (Japan) to receive an RA# (Return Authorization number). This will begin the repair process as quickly as possible.

Units must be returned insured, with shipping charges prepaid. If not insured, you assume the risk of loss or damage during shipment. Returned units must include the serial number and a description of the problem, as well as the name of the person to contact in case there are any questions.

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