Extron® Electronics
INTERFACING, SWITCHING AND DISTRIBUTION

User's Manual

MLS 304MA, MLS 304SA, MLS 406, MLS 406MA, MLS 406SA

MediaLink™ Switchers

68-775-01 **Rev. C**
06 06

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.

安全须知 • 中文

这个符号提示用户该设备用户手册中有重要的操作和维护说明。

这个符号警告用户该设备机壳内有暴露的危险电压，有触电危险。

注意

阅读说明书 • 用户使用该设备前必须阅读并理解所有安全和使用说明。

保存说明书 • 用户应保存安全说明书以备将来使用。

遵守警告 • 用户应遵守产品和用户指南上的所有安全和操作说明。

避免追加 • 不要使用该产品厂商没有推荐的工具或追加设备，以避免危险。

警告

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

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

电源线保护 • 妥善布线， 避免被踩踏，或重物挤压。

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

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

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

Quick Start — MLS 304MA, MLS 406, MLS 406MA

Installation

Step 1

Remove power from the switcher and the input, output, and control devices.

Step 2

Install the rubber feet on the bottom corners or rack mount the switcher.

Step 3

Connect input devices to the switcher. See chapter 2 for details and wiring diagrams.

MLS 304MA

Inputs 1 and 2: composite video and audio
Inputs 3 and 4: RGB computer video or composite video and audio

MLS 406, MLS 406MA

Inputs 1, 2, 3: S-video or composite video and audio
Inputs 4, 5, 6: RGB computer video, S-video, or composite video and audio

Aux/Mix audio input

Connect a mono audio source to mix a line-level audio signal with the selected input's audio. This channel is always active.

See chapters 3 and 4 for details on setting up the audio and configuring video.

Step 4

Connect cables from the MLS's RGB, S-video, and video output connectors to the inputs on the display device.

Connect a cable between the Monitor Output port and the local monitor.

NOTE *There are three modes (selectable only via RS-232 control) for determining which input signal, if any, is sent to the Monitor Output port. For an explanation of modes and video routing, see* Video Signal Routing *on page 3-7. For selecting the mode, see chapter 4,* Serial Communication.

Step 5

Connect a host computer to the RS-232/MLC/IR control port (see *Control Connection* on page 2-6), load and start the control software, set up the video, select a Monitor Output mode, and select a Lineout/Preamp output level.

Step 6

Adjust the audio (sensitivity) level for each input. See *Making adjustments* on page 3-6.

Step 7

Connect audio devices to the **Lineout** and **Preamp audio outputs**

- **Lineout** outputs a fixed, line level audio signal not affected by Volume knob adjustments.
- **Preamp** outputs a variable, line level audio signal for use with powered speakers or an amplifier. The volume can be attenuated via the Volume knob or RS-232.

Lineout and Preamp outputs can be set up as

- **-10 dBV** (-8 dBu, 0.316 Vrms, default), unbalanced, for consumer level devices such as VCRs or stereo receiver-amplifiers

or

- **+4 dBu** (+6 dBV, 1.23 Vrms), balanced, for professional level devices such as mixers and power amplifiers

depending on how the connector is wired and how the MLS is set up via RS-232 control. Selecting mono or stereo (via RS-232) affects **both** of these ports. See *Audio outputs* on pages 2-9 through 2-10.

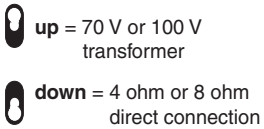
Step 8

Connect a host computer, control system, MediaLink Controller (MLC) and/or an Extron IR Link to the RS-232/MLC/IR control port. See *Control Connection* on pages 2-7 through 2-8.

Step 7 — MLS 304MA, MLS 406MA

Connect speakers to the **amplified output (MLS 304MA, MLS 406MA)** for mono audio output. See pages 2-11 through 2-13 for diagrams.

Set the rear panel toggle switch to the desired amplifier output type: transformer (Xfmr) (for a 70 V or 100 V system) or Direct (4 or 8 ohms).



NOTE *Both the toggle switch position and the wiring must match the*

This output provides a mono signal even if the input is a stereo signal. For stereo output, use the non-amplified Lineout and Preamp outputs instead. See chapter 2, *Installation*.

Step 8
Connect all the devices' power cords, and power on the system.

Video Configuration

Step 1
Via RS-232, configure the MLS: select the video type for 15-pin HD inputs; See chapters 2, *Installation* and 4, *Serial Communication*.

Step 2
Select a Monitor Output mode via the control software. See *Monitor Output Modes on* page 3-7 and chapter 4, *Serial Communication*.

Audio Configuration

Step 1
For the Lineout and Preamp outputs, select mono or stereo audio, and select -10 dBV (unbalanced) or +4 dBu (balanced) via RS-232 control. Default: -10 dBV.

Step 2
Via RS-232, set Aux/Mix to on or off. If the Aux/Mix input will be used, use a small screwdriver to adjust the Aux/Mix input level.

Step 3
Disconnect audio output devices.

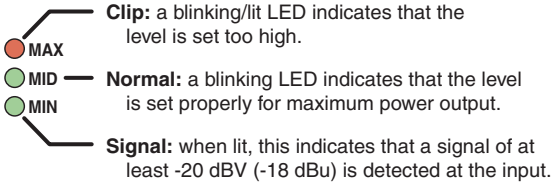
Step 4
Select an input and set audio input sensitivities.

NOTE *Audio input sensitivity levels must be adjusted with an active audio signal.*

4a. Enter setup mode: press and **hold** an input button for 3 seconds. The input's LED blinks.

4b. Adjust audio levels: while still holding the input button, rotate the Volume knob until the Mid/normal LED lights or blinks.

MLS 304MA, MLS 406MA, MLS 304SA, and MLS 406SA (amplified models)

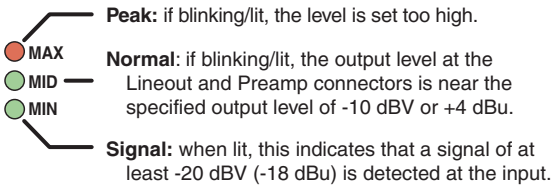


NOTE *Increasing the audio level beyond the point at which the Mid/normal LED blinks may result in a distorted output signal.*

NOTE *In setup mode a blinking or lit Mid/normal LED indicates that the power amplifier is capable of delivering maximum power output.*

NOTE *You may not need to adjust the per-input gain, because the default input gain adjustment is set for consumer audio sources such as VCRs, DVD players, and laptop computers.*

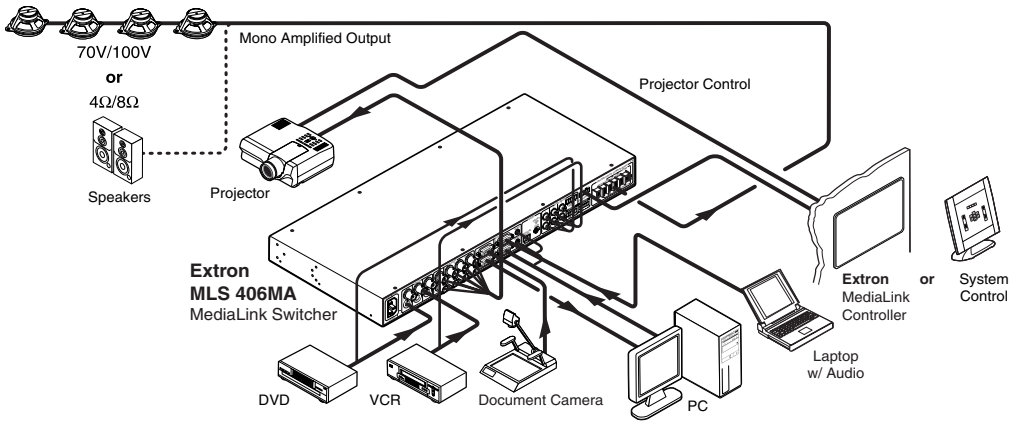
MLS 406 (nonamplified model)



4c. Release the input button to save the setting for that input.

4d. Repeat steps 4a through 4c for each input.

Step 5
Reconnect the output devices, and via RS-232 set the global treble and bass levels and turn on loudness control, if desired.



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Chapter One

Introduction

About this Manual

About the MLS 304 Series and MLS 406 Series

Features

Introduction

About this Manual

This manual covers the installation, setup, programming, and use of the Extron MLS 304MA, MLS 304SA, MLS 406, MLS 406MA, and MLS 406SA MediaLink™ switchers. The three models share many features, and instructions apply to all three unless otherwise stated. Throughout the manual these switchers are interchangeably referred to as MLS, MediaLink switcher, and switcher. Procedures or explanations that are model-specific mention the model name (e.g. MLS 406MA).

About the MLS 304 Series and the MLS 406 Series

The Extron MLS 304MA, MLS 304SA, MLS 406, MLS 406MA, and MLS 406SA are four- and six-input, active switchers. They accept RGB computer video (all models), S-video (MLS 406 Series), composite video inputs (all models), stereo audio inputs, and a line level mono audio auxilliary/mixer input.

Each switcher has a local monitor loop-through/output in addition to the RGB and video projector/plasma display output and balanced or unbalanced lineout and preamp audio outputs. If desired, the monitor output can be used as a second RGB display output instead of for a local monitor. Additionally, the MA models offer amplified mono audio output for 4 ohm, 8 ohm, or distributed 70 V or 100 V speaker systems. The SA models offer amplified stereo audio output for 4 ohm or 8 ohm speaker systems.

These switchers can all be set up and controlled via the front panel buttons or via an RS-232 connection from a computer, a control system, or an Extron MediaLink Controller. Some setup options are available only via the included Windows-based MediaLink Control Program. With the addition of an optional Extron IR Link infrared signal repeater, an Extron MediaLink IR remote control can be used for input selection and volume adjustment.

Features

All models

- High RGB video bandwidth (280 MHz at -3 dB)
- Triple-Action Switching™ (RGB delay switching)
- Video format versatility: the switchers accept RGB computer video, S-video (MLS 406, MLS 406MA, MLS 406SA), and composite video
- Monitor Output for local monitor loop-through or for an additional RGB output
- Aux/Mix audio input for mixing mono line level audio with the switchable audio input
- Adjustable audio bass, treble, and volume
- Individually adjustable audio input levels
- Balanced or unbalanced preamp audio output
- Loudness control
- Ability to lock the front panel to prevent unauthorized access (executive mode)
- Control and configuration via RS-232
- Ventilated 1U, rack mountable, metal enclosure

MA models

- Integrated 20 watt mono audio amplifier for 4 ohm or 8 ohm, or 16 watts for 70 V or 100 V distributed output

SA models

- Integrated 24 watt audio amplifier for stereo or dual mono 4 ohm output or 16 watts for stereo or dual mono 8 ohm output

Chapter Two

Installation

UL/Safety Requirements

Mounting the Switcher

Rear Panels and Cabling

Application Diagrams

Installation

UL/Safety Requirements

The Underwriters Laboratories (UL) requirements listed below pertain to the safe installation and operation of a MediaLink Switcher.

Important Safety Instructions

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

Mounting the Switcher

Tabletop use

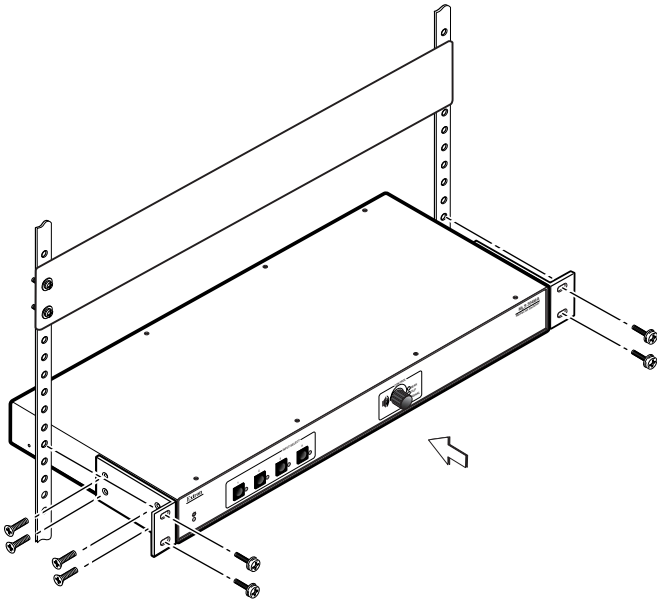
Each MLS switcher comes with rack mounting brackets and rubber feet. For tabletop use, attach a self-adhesive rubber foot to each corner of the bottom of the unit.

Rack mounting

For rack mounting, do not install the rubber feet. Attach the provided rack mounting brackets to the switcher with machine screws, then fasten the switcher to the rack using the supplied machine screws.

Although it is not required, for the models with audio amplification (MLS 304MA, MLS 304SA, MLS 406MA, MLS 406SA) Extron recommends allowing **one rack unit of space (1.75"/4.5 cm) above and below the switcher** for air circulation to prevent overheating.

CAUTION *The MA and SA models contain a class AB amplifier, which gets hot. There is no cooling fan in the MLS switcher.*

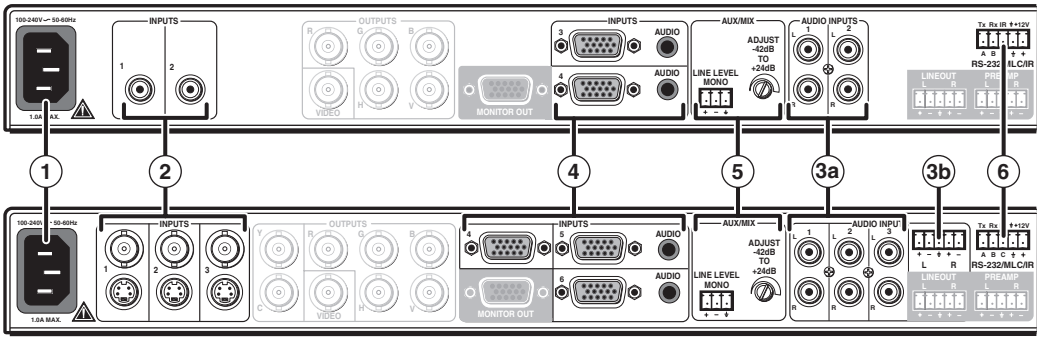


Rack mounting the MediaLink Switcher

Rear Panels and Cabling

Power, input, and control connections

MLS 304MA and MLS 304 SA Rear Panel



MLS 406, MLS 406MA, and MLS 406SA Rear Panel

NOTE *The MA and SA models differ only by amplifier output type and connection. All other A/V, power, and control connections are the same.*

Power connection

① **AC power connector** — Plug a standard IEC power cord into this connector to connect the switcher to a 100 to 240 VAC, 50 Hz or 60 Hz power source. The front panel power LED (☼) lights while the MLS is receiving power.

A/V input connections

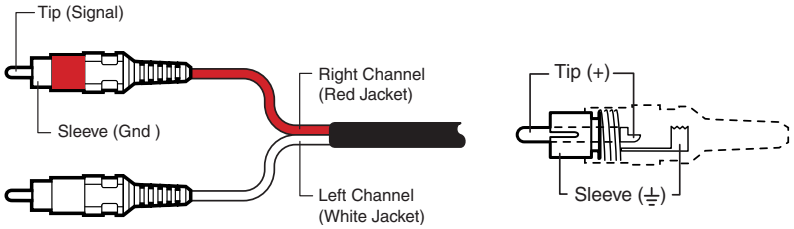
② **Video inputs** —

MLS 304MA MLS 304SA: connect a composite video source device to each of these female RCA (tip-ring) connectors for video inputs 1 and 2.

MLS 406, MLS 406MA, MLS 406SA: connect either an S-video source (using the 4-pin mini DIN connector) or a composite video source (using the BNC connector) for input 1, 2, or 3.

③a **RCA audio inputs** — These audio inputs correspond to the like-numbered video inputs. These inputs accept line level audio signals from consumer and professional audio sources. Consumer devices such as PCs, VCRs, and DVD players typically output an unbalanced -20 dBV to -10 dBVsignal. Professional products such as mixers and signal processing gear typically output a balanced 0 dBu to +4 dBu (+6 dBV) level signal.
To adjust input levels, see pages 3-5 and 4-10 through 4-11.

Connect an unbalanced stereo audio source to each pair of RCA jacks. Use the red sheathed cable/connector for the right channel, and use the white sheathed cable/connector for the left channel as shown below.

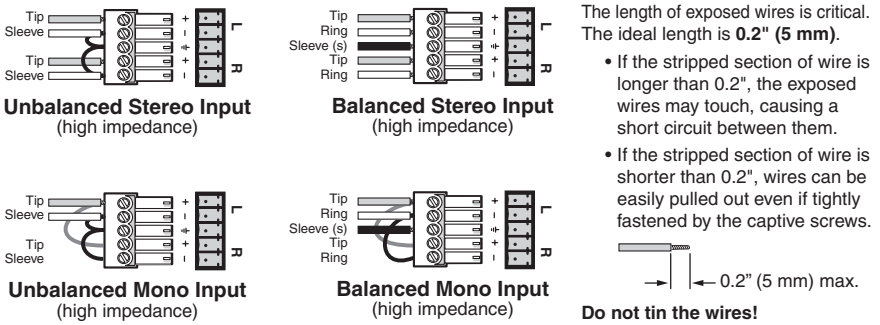


Wiring RCA connectors for unbalanced stereo audio input

NOTE *After the audio inputs and outputs are connected, see chapter 3 for instructions on how to adjust the per-input audio input levels and optimize audio input and output.*

(3b) MLS 406, MLS 406MA, MLS 406SA audio input 4 (captive screw) — This input accepts line level audio signals from consumer and professional audio sources. Consumer devices such as laptops, VCRs, and DVD players typically output an unbalanced -20 dBV to -10 dBV signal. Professional products such as mixers and signal processing gear typically output a balanced +4 dBu level signal. To adjust input levels, see pages 3-5 and 4-10 through 4-11.

Wire the 3.5 mm captive screw connector as shown in the following illustrations, depending on input signal type.



NOTE *After the audio inputs and outputs are connected, see chapter 3 for instructions on how to adjust the per-input audio sensitivity levels and optimize audio input and output.*

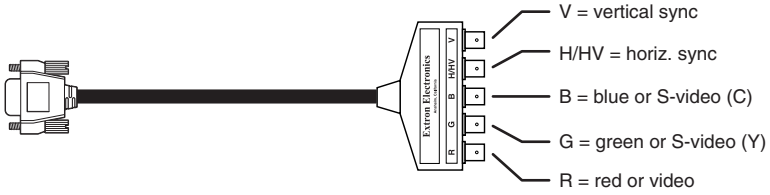
Computer video (and audio) inputs — MLS 304MA and MLS 304SA inputs 3 and 4; and MLS 406, MLS 406MA, and MLS 406SA inputs 4, 5, and 6, all on 15-pin HD connectors; are individually buffered and provide ID bit termination. They accept

- RGB computer video signals (default) *or*
- S-video (MLS 406 Series only) or composite video (all models)

For S-video or composite video, the switcher must be configured via RS-232 serial control (SIS commands or control software); see pages 4-4 and 4-10 through 4-11.

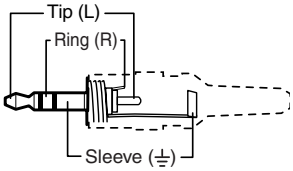
For RGB input, connect a standard VGA-style cable from the source computer to the desired MLS input. For S-video or composite video input, you may need to use an adapter cable such as an Extron SY 15HDM-RGBHV cable (shown below). Connect the video or S-video source to the MLS as follows:

Input Type	Signal (BNC Color)	15-pin HD Pin
S-video	Y (green), C (blue)	2, 3
Composite video	video (red)	1



NOTE *Selecting S-video or composite video for these inputs limits the Monitor Output mode options to Standard Mode.*

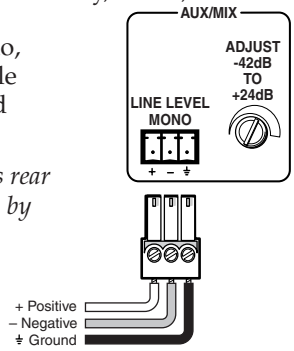
For these inputs (excluding input 4 on the MLS 406/MLS 406MA/MLS 406SA), connect the corresponding unbalanced stereo audio signal to the 3.5 mm mini stereo (tip-ring-sleeve) jack. Wire the stereo connectors as shown at right.



3.5 mm Stereo Plug (unbalanced)

NOTE *After the audio inputs and outputs are connected, adjust the per-input audio sensitivity levels and optimize audio input and output. See pages 3-5 and 3-6 for instructions.*

⑤ **Aux/Mix audio input and adjustment** — To mix an auxiliary, mono, line-level audio signal (from a wireless microphone receiver, for example) with the selected input's audio, connect the cable from the mono source to this 3-pole captive screw connector. The signal can be balanced or unbalanced. See the diagram at right.



NOTE *The Aux/Mix level can be changed ONLY via this rear panel control. It can not be controlled or adjusted by RS-232 control, or by a MediaLink Controller.*

The Aux/Mix input accepts line level audio signals from consumer and professional audio sources. Consumer devices such as PCs, VCRs, DVD players, and some wireless microphones typically output an unbalanced -20 dBV to -10 dBV signal. Professional products such as mixers and signal processing gear typically output a balanced 0 dBu to +4 dBu level signal.

CAUTION *The maximum auxiliary input signal level is +4 dBu. Do not exceed this input level.*

This input's audio channel is always active, and it is independent of the selectable audio inputs (1-4 or 1-6). The Aux/Mix audio can be heard throughout a presentation, whether or not another input is selected.

NOTE *If audio output is muted via the 1Z SIS command, all audio outputs are muted. You are not able to hear audio from any source.*

NOTE *If you mute audio input by selecting input zero (SIS commands 0! or 0$), only audio from the numbered inputs (1-4 or 1-6) is muted. The Aux/Mix audio input stays active and is not affected by selection of audio input 0.*

NOTE *Aux/Mix input can be turned off (muted) via a separate RS-232 command (0M). See chapter 4,* Serial Communication *for details.*

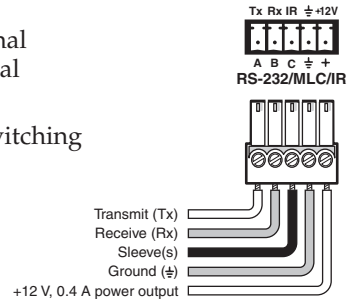
To adjust the Aux/Mix input level, use a small screwdriver to turn the control adjacent to the Aux/Mix connector. The adjustment range is -42 dB to +24 dB. Setting the potentiometer to the marked location sets the input level sensitivity for an approximately -10 dBV consumer signal.

NOTE *The Aux/Mix level can be changed ONLY via this rear panel control. It can not be controlled or adjusted by RS-232 control, or by a MediaLink Controller.*

NOTE *The optional MediaLink Audio Control Module (ACM-Level, part #70-182-01, -02, -03) is not compatible with these switchers. The mix level control is not supported.*

Control connection

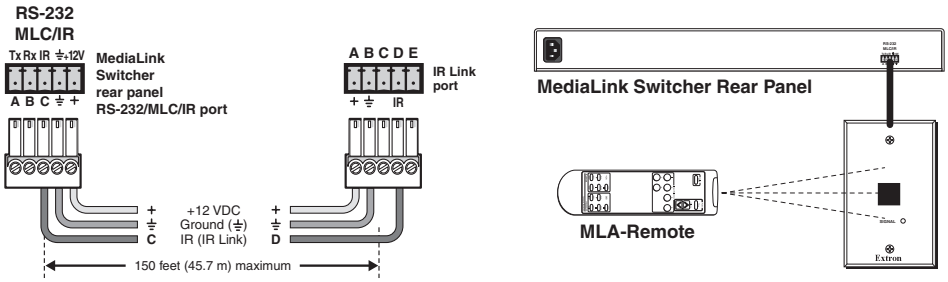
⑥ **RS-232/MLC/IR control port** —You can control the MLS switcher via an RS-232 connection directly from a host computer, a control system, or a MediaLink Controller (MLC). Alternatively, you can use IR remote control via an Extron IR Link connected to this port.



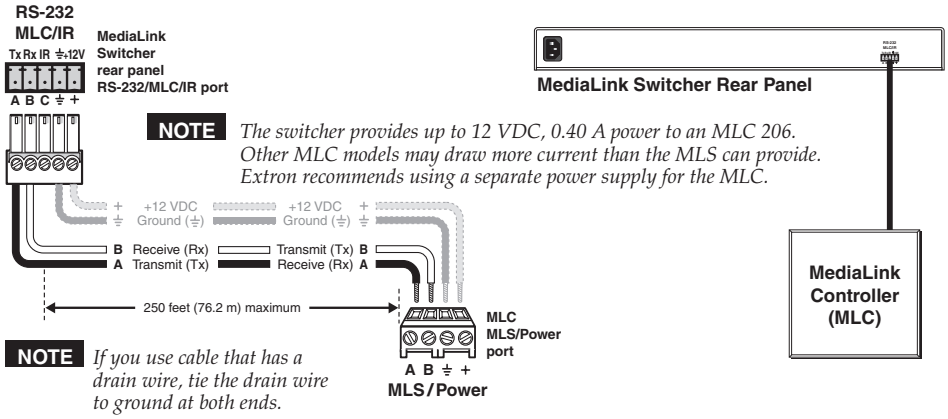
Connect a cable between this port and an optional Extron MLC MediaLink Controller or an optional IR Link IR signal repeater.

- The MLC provides remote control of input switching and volume.
- The IR Link accepts modulated IR signals from a remote control so the remote control can be used for selecting the switcher's inputs.

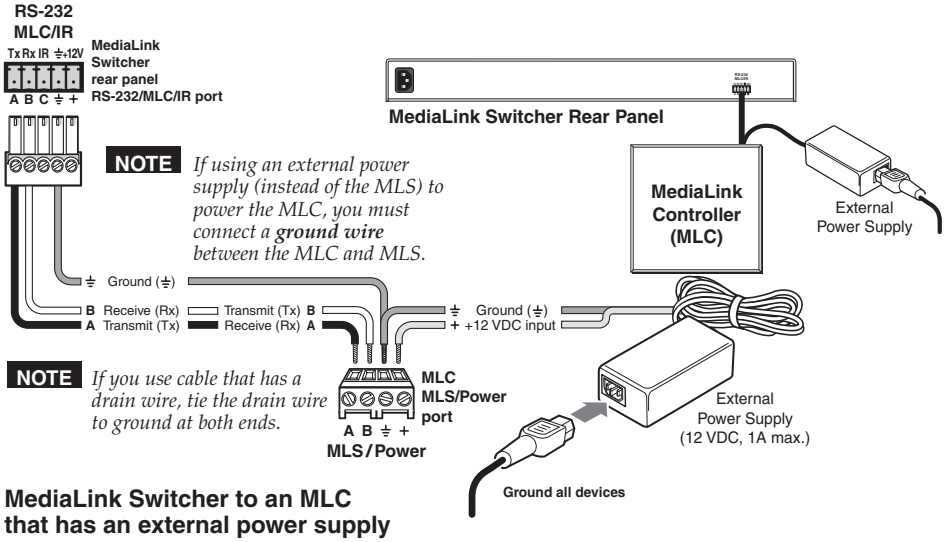
Extron Comm-Link cable is recommended for this connection. If you use Comm-Link cable, the switcher and controller (MLC) can be up to 250 feet (76.2 m) apart. Wire the captive screw connector for connection to an IR Link, an MLC, or a computer or control system as shown in the following four diagrams.



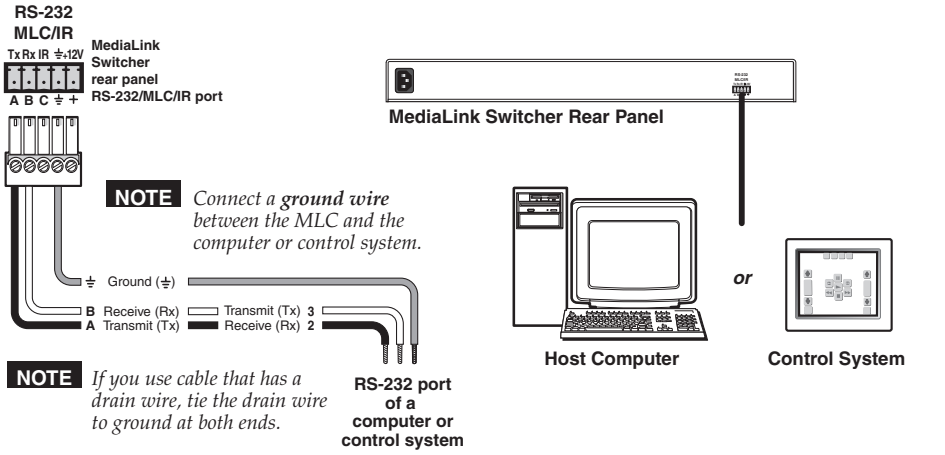
MediaLink Switcher to an IR Link



MediaLink Switcher to an MLC

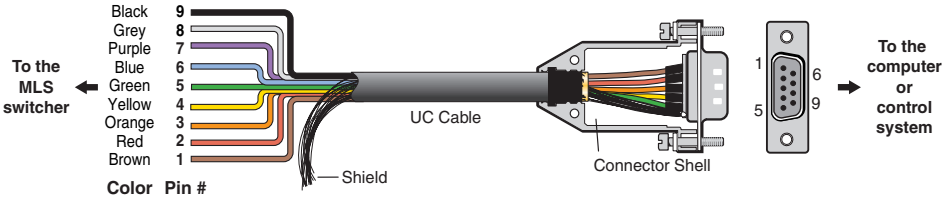


MediaLink Switcher to an MLC that has an external power supply



MediaLink Switcher to a computer or control system

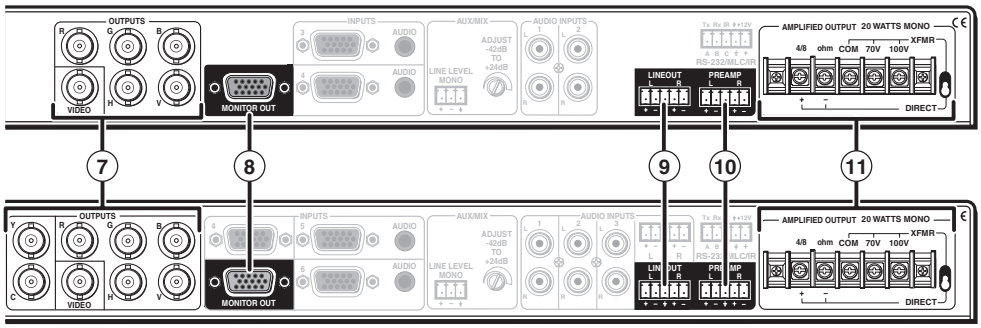
You may use a male 9-pin D-to-bare-wire RS-232 cable or a universal control cable (UC 50', UC 100', or UC 200') for the connection to a computer or control system. One end of the UC cable is terminated with a female 9-pin D connector, and the other end is unterminated. The UC cable's pin assignments are as shown in the following illustration. Refer to the computer/control system's pin assignment guide to determine which of the cable's wires to connect to which of the MLS's RS-232/MLC/IR port pins.



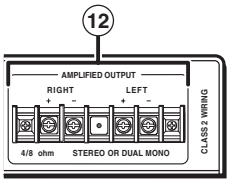
UC 50', 100', 200' Cable Color Codes

Video output, local monitor, and audio output connections

MLS 304MA Rear Panel



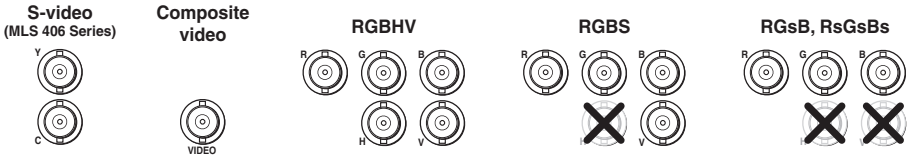
MLS 406MA Rear Panel



MLS 406SA Rear Panel (amplifier output)

Video outputs

⑦ **Display outputs** — Connect cables from the appropriate port(s) on the projector or display panel to these BNC connectors according to the output signal type, as shown below.



The output signal is in the same format (RGBHV, RGBS, RGsB, RsGsBs, S-video, or composite video) as the input signal. The signal is switched, but not processed. Cables can be connected between the projector and one, some, or all of the switcher's video outputs.

⑧ **Monitor Output** — This 15-pin HD connector serves as either a local monitor loop-through port or an additional RGB output. Connect a cable between this port and the local or additional display device.

There are three different options (modes) for determining which input signal, if any, is sent to the monitor output. These modes are selectable only via RS-232 control. For an explanation of modes and video routing, see pages 3-7 and 3-8. See chapter 4, Serial Communication *for details on selecting the mode.*

Audio outputs

Lineout audio output and **Preamp audio output** — These outputs are simultaneously active and can be wired and configured for balanced or unbalanced mono or stereo audio signal output. The switcher must also be configured for the corresponding signal type (mono or stereo).

Selecting either mono or stereo (via RS-232 by way of the control software or SIS commands) selects the output signal format for **both** the Lineout and Preamp outputs. The switcher configuration (mono or stereo) and the output wiring must match.

- The **Lineout** connector outputs a fixed, line level audio signal that is not affected by front panel Volume knob adjustments. A recording or assistive listening device would typically be connected here.

- The **Preamp** connector outputs a variable, line level audio signal for use with a powered amplifier or self-powered speakers. The volume can be controlled (attenuated) via the front panel knob or RS-232 communication. The volume range is 0 (mute) through 100.

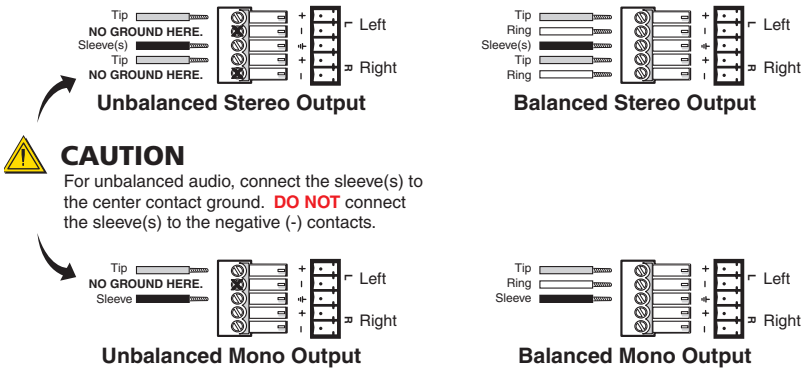
Lineout and Preamp outputs can be set up as

- **unbalanced, -10 dBV (-7.8 dBu, 0.316 Vrms, default)** for consumer level devices such as VCRs, DVD players, and stereo receivers

  or

- **balanced, +4 dBu (+1.8 dBV, 1.228 Vrms)** for professional devices such as mixers, signal processors, and power amps

depending on how the connector is wired and how the MLS is set up (via the control software). See the following wiring diagrams and chapter 4, *Serial Communication*.



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

NOTE *For mono output, wire either the left or the right side, not both.*

CAUTION *Do not bridge mono outputs. The left and right input signals are summed, and each mono output channel carries the same combination signal.*

NOTE *If the output is wired for balanced output, the level is +6 dB higher than the level for unbalanced output wiring. The balanced/unbalanced level difference occurs no matter which line level output setting is chosen via RS-232. See page 4-10.*

NOTE *After the audio inputs and outputs are connected, see chapter 3,* Operation and Setup *for instructions on how to adjust the per-input audio sensitivity levels and optimize Lineout and Preamp output.*

NOTE *If the Loudness feature is turned on, the gains for bass and treble frequencies are affected for all outputs whenever volume is adjusted.*

Amplified output (MLS 304MA, MLS 406MA only) — Cable speakers to this 5-position screw terminal for a mono amplified audio output. This provides a mono output signal even if the input is a stereo signal. For stereo output, use the non-amplified Lineout and Preamp outputs instead.

The 4 ohm/8 ohm direct connection circuit and the 70 V/100 V transformer connection are mutually exclusive: only one circuit (direct or transformer) can be active at a time.

CAUTION *Do not short the terminals to ground or the amplifier will be damaged.*

CAUTION *Do not bridge mono outputs. Bridging could damage the amplifier.*

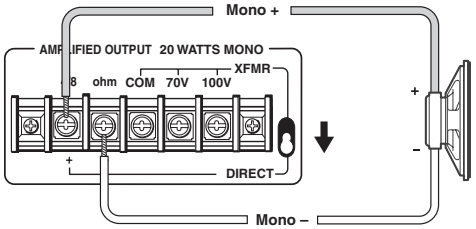
The MA models' amplifier power-up delays are approximately

- 10 seconds for 70 V or 100 V output, 8 seconds to hear the relay click
- 8 seconds for 4 ohm or 8 ohm output

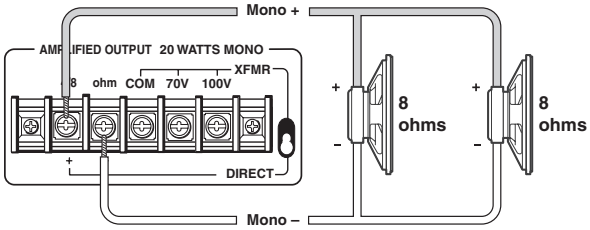
Wiring for 4 ohm or 8 ohm speakers (MA models)

The maximum power output when an MLS 304MA or MLS 406MA is wired for 4 ohm or 8 ohm speakers is 20 watts per channel.

1. Flip the toggle switch down (Direct) to select 4 ohm or 8 ohm connection.
2. Use the appropriate wiring for the load as shown in the following illustrations.

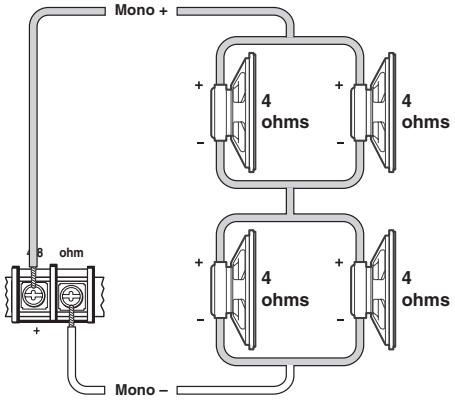


4 Ohm Load *or* 8 Ohm Load

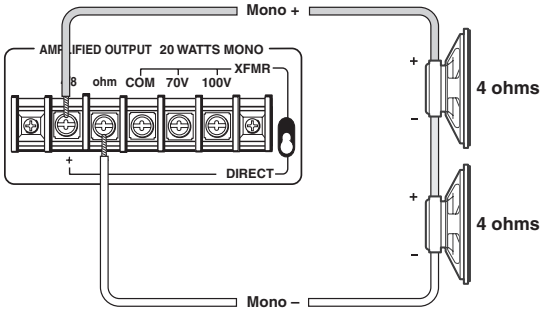


Two 8 ohm speakers wired in parallel equal a 4 ohm load.

4 Ohm Total Load

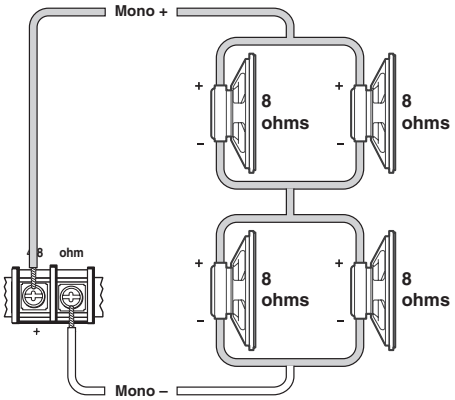


4 Ohm Total Load



Two 4 ohm speakers wired in series equal an 8 ohm load.

8 Ohm Total Load



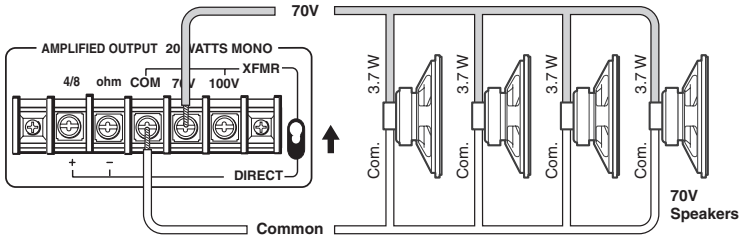
8 Ohm Total Load

Wiring for a 70 volt or 100 volt distributed speaker system (MA models)

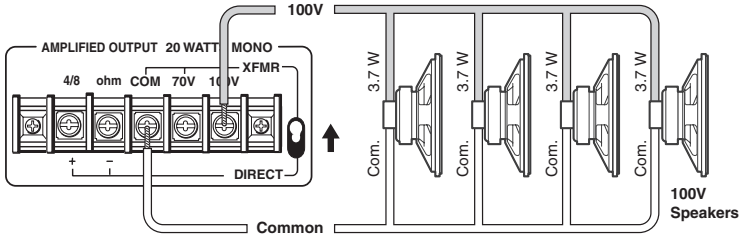
CAUTION *The speaker taps should not exceed the amplifier's maximum power output.*

NOTE *The maximum power output when the MLS is wired for 70 volt or 100 volt systems is 16 watts.*

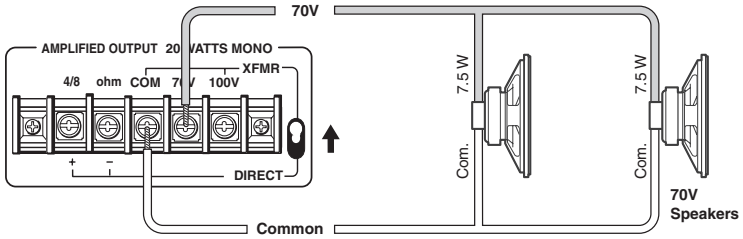
1. Flip the toggle switch up to select a distributed 70 V or 100 V system connection.
2. Use the appropriate wiring for the load as shown in the following illustrations.



4 Speakers Tapped at 3.7 Watts Each Equals 14.8 Watts Total



4 Speakers Tapped at 3.7 Watts Each Equals 14.8 Watts Total



2 Speakers Tapped at 7.5 Watts Each Equals 15 Watts Total

CAUTION *Do not short the terminals to ground or the amplifier will be damaged.*

CAUTION *Do not bridge mono outputs. Bridging could damage the amplifier.*

⑫ **Amplified output (MLS 304SA, MLS 406SA only)** — Cable speakers to this 5-position screw terminal for either stereo or dual mono amplified audio output. The switcher's default setting is stereo output. Dual mono (the same signal output on both channels) can be selected via software.

CAUTION *Do not short the terminals to ground or the amplifier will be damaged. Do not connect anything to the middle position of the 5-position screw terminal; it is not connected to ground.*

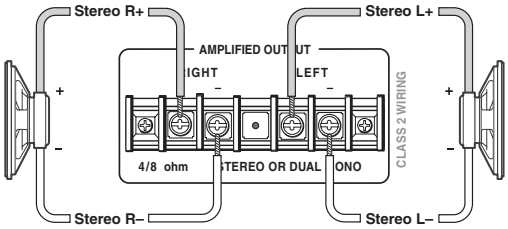
CAUTION *Do not bridge mono outputs. Bridging could damage the amplifier.*

The SA models' amplifier power-up delay is 8 seconds for either 4 ohm or 8 ohm output

Wiring for 4 ohm or 8 ohm speakers (SA models)

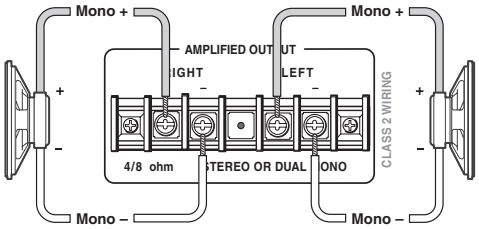
NOTE *The maximum power output when an MLS 304SA or MLS 406SA is wired for 4 ohm speakers is 24 watts (12 watts per channel). Maximum power output for 8 ohm speakers is 16 watts (8 watts per channel).*

Stereo Output



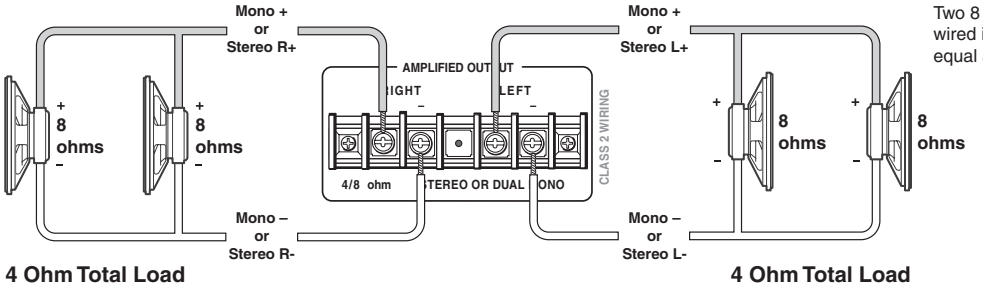
4 Ohm Load *or* 8 Ohm Load

Dual Mono Output



4 Ohm Load *or* 8 Ohm Load

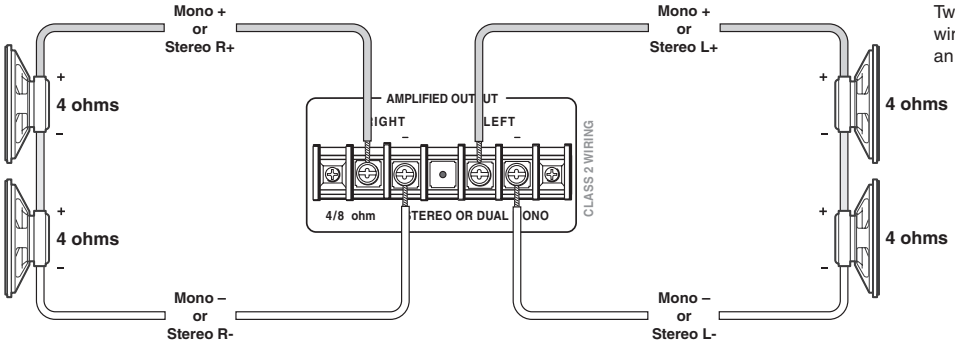
Stereo or Dual Mono Output



Two 8 ohm speakers wired in parallel equal a 4 ohm load.

4 Ohm Total Load **4 Ohm Total Load**

Stereo or Dual Mono Output



Two 4 ohm speakers wired in series equal an 8 ohm load.

8 Ohm Total Load **8 Ohm Total Load**

CAUTION *Do not short the terminals to ground or the amplifier will be damaged. Do not connect anything to the middle position of the 5-position screw terminal; it is not connected to ground.*

CAUTION *Do not bridge mono outputs. Bridging could damage the amplifier.*

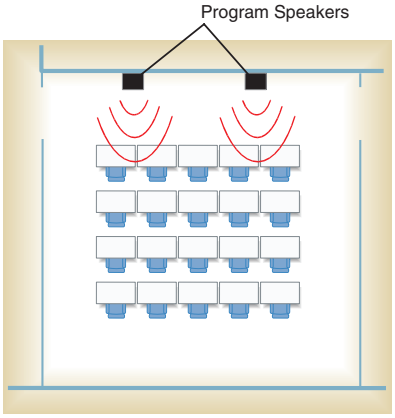
Speaker arrangement examples

Ceiling and program speakers can be arranged several different ways. The following factors affect the choice of speaker placement:

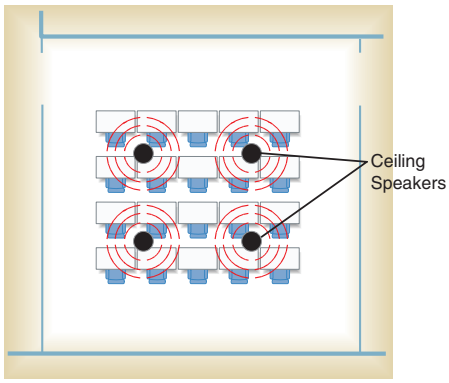
- Dimensions of the room
- Room acoustics
- Desired evenness of sound coverage
- Audience mobility (whether the audience will be seated or not)
- Ambient noise level
- Type of music or other audio source

Some general ideas for speaker placement are included below.

Examples of speaker layouts

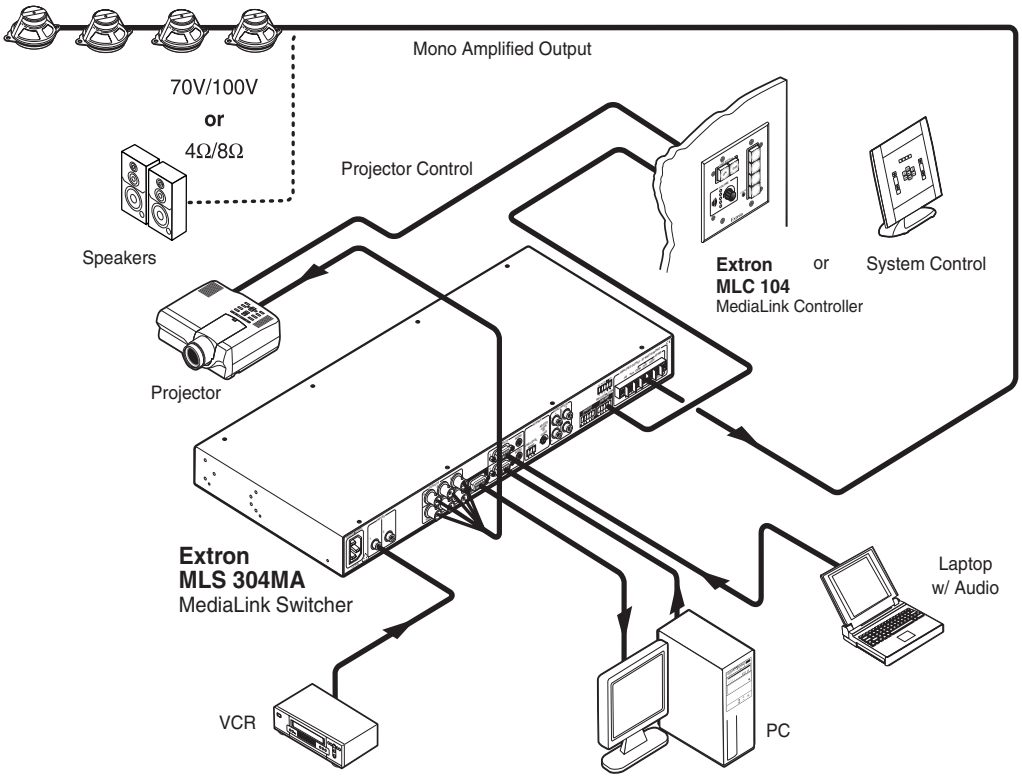


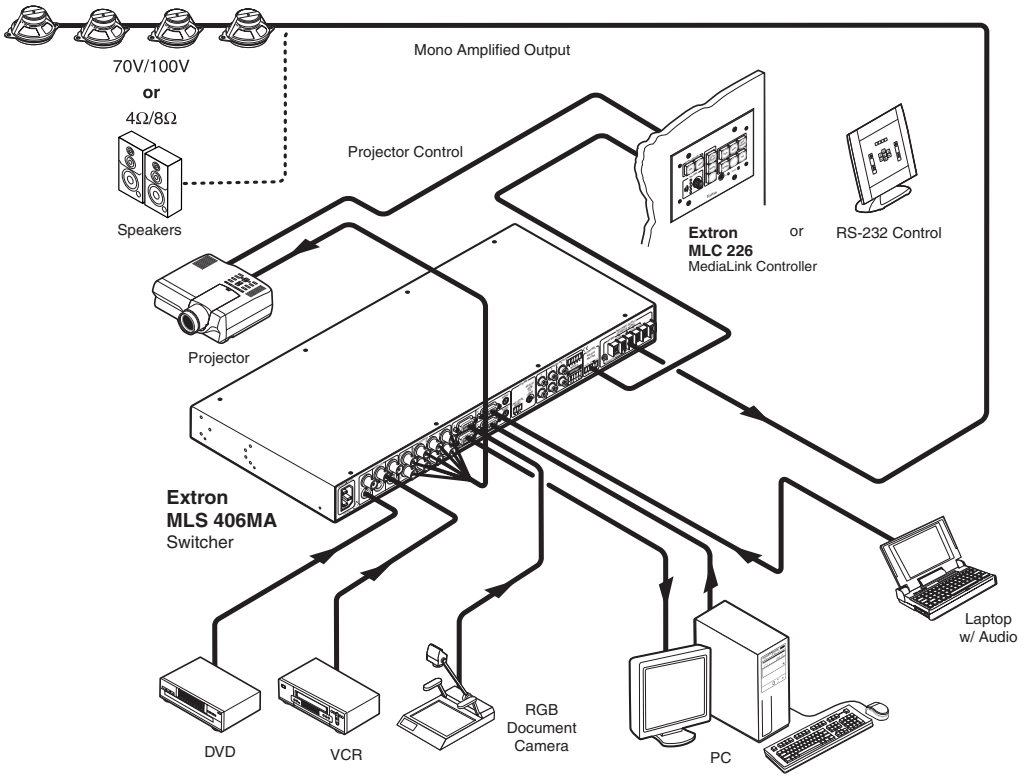
Classroom Top View
2 Front Program Speakers

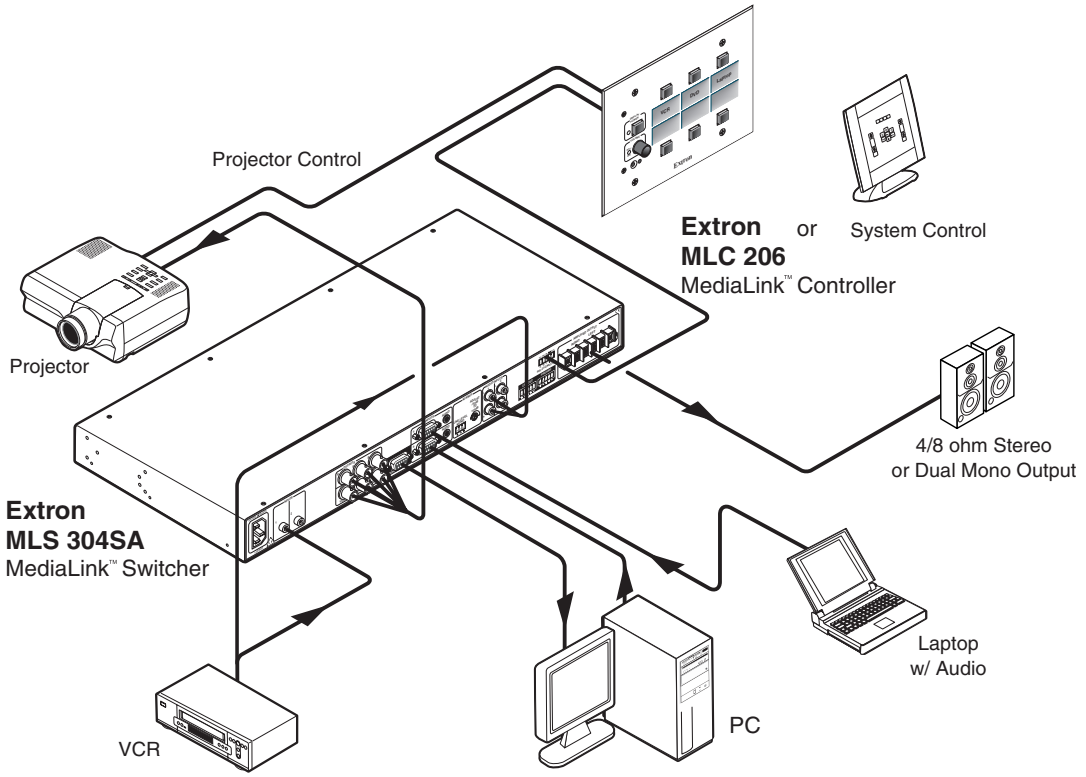


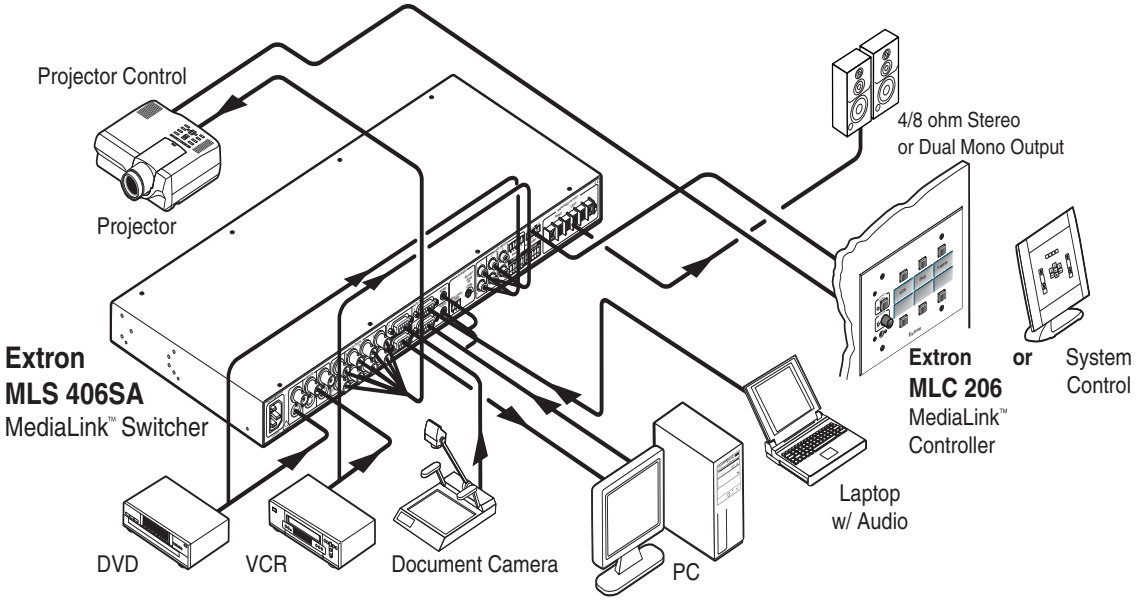
Classroom Top View
4 Ceiling Speakers

Application Diagrams






Projector Control
Extron
MLS 304SA
MediaLink™ Switcher
Projector
Extron
MLC 206
MediaLink™ Controller
or
System Control
4/8 ohm Stereo
or Dual Mono Output
Laptop
w/ Audio
PC
VCR


Projector Control
Projector
Extron
MLS 406SA
MediaLink™ Switcher
4/8 ohm Stereo
or Dual Mono Output
Extron
MLC 206
MediaLink™
Controller
or
System
Control
Laptop
w/ Audio
DVD
VCR
Document Camera
PC

3

Chapter Three

Operation and Setup

Front Panel Features and Operation

Setting Up and Optimizing the Audio

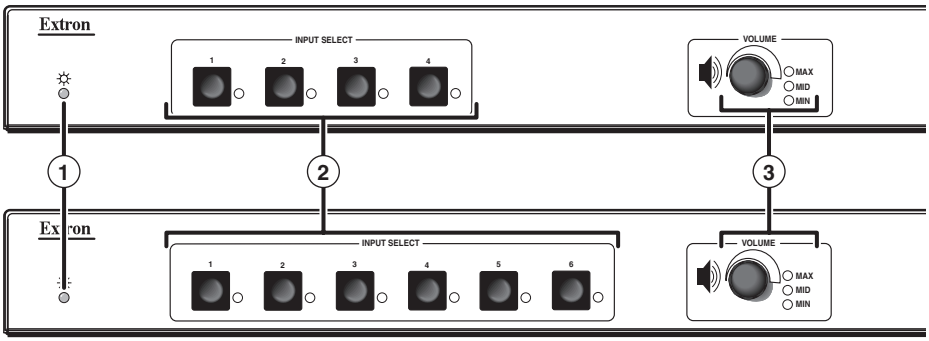
Video Signal Routing

Remote Control

Troubleshooting

Front Panel Features and Operation

MLS 304 Series Front Panel



MLS 406 Series Front Panel

NOTE *The MLS 304MA and MLS 304SA have identical front panel features. The MLS 406, MLS 406MA, and the MLS 406SA have identical front panel features.*

① **Power indicator LED** — When lit this LED indicates that the switcher is powered on.

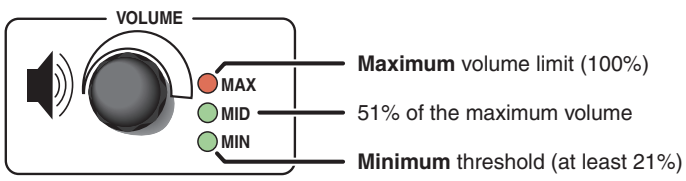
② **Input selection buttons and indicator LEDs** — Press one of these buttons to select the desired audio and video input. The corresponding LED lights and remains lit while an audio-video input is selected. During audio breakaway (selectable only via RS-232 control, and described in *Special Features* on page 4-9), audio is switched separately from video. The selected video input's LED lights steadily, and the audio input's LED blinks.

Which input's signal, if any, is routed to the Monitor Output depends on which mode (standard, DA, or RGB follow) is active. See V*ideo Signal Routing* on page 3-7 for details on modes and video routing.

③ **Volume adjustment knob and Min/Mid/Max LEDs** — Use this knob to make input level and volume adjustments. The LEDs indicate different things, depending on the mode (user or setup) the MLS is in. See *Making adjustments*, on page 3-6 for instructions on setup mode and per-input adjustments. See appendix A, *Reference Material*, for audio block diagrams.

- In the **user (regular) mode,** the LEDs function as volume level indicators. Rotate the Volume knob to adjust the output level of the Preamp and Amplified outputs.

User (regular) mode

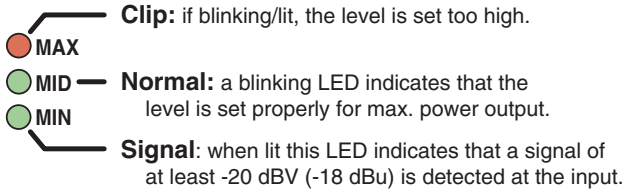


NOTE *The volume of the Lineout output is not affected by this volume adjustment.*

NOTE *If the Loudness feature is turned on, the gains for bass and treble frequencies are affected for all outputs whenever volume is adjusted.*

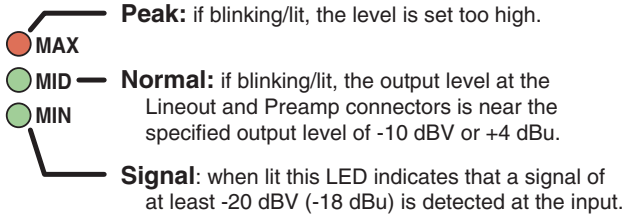
- In **setup mode** these LEDs function as input level indicators. Rotate the Volume knob and observe the LEDs to set up the proper audio input levels.

MLS 304MA, MLS 304SA, MLS 406MA, MLS 406SA



NOTE *If the Max/Clip LED lights, the audio may be clipped.*

MLS 406



NOTE *During setup audio/video breakaway is disabled.*

NOTE *Per-input audio level (sensitivity) settings can be adjusted via this front panel knob or via RS-232 control.*

Front panel security lockout (executive modes)

To prevent accidental changes to settings, the MLS switchers feature two types of front panel security lockout (executive) modes for limiting users' access to front panel controls. When either executive mode is active, functions and adjustments can still be made through RS-232 control or via hardwired IR control. For details on RS-232 control, see chapter four.

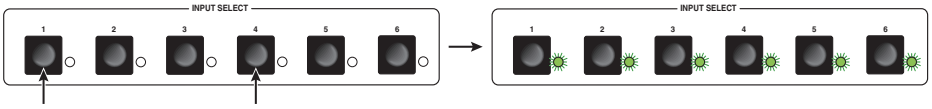
- **Executive mode 1** prevents user access to all front panel selections and setup; only volume adjustments are possible. Executive mode 1 can be enabled and disabled via the front panel buttons or via RS-232 control.
- **Executive mode 2** prevents user access to all selections and adjustments from the front panel. This mode can be enabled via RS-232 control only. When executive mode 2 is enabled, input selections and volume adjustments can be performed only via RS-232 control, IR remote control, or an optional Extron MediaLink Controller (MLC). Executive mode 2 can be disabled via the front panel buttons or via RS-232 control. See chapter four for details on RS-232 control and executive mode 2.

The executive mode setting (enabled/disabled) is retained even when the switcher is powered off.

NOTE *Resetting the switcher to factory defaults also disables executive mode.*

Enabling/disabling executive mode 1; disabling executive mode 2

Press and hold input selection buttons 1 and 4 simultaneously for 3 seconds as shown below. When all of the input selection LEDs light, the switcher has enabled or disabled executive mode, and you can release the buttons.



Press and hold buttons 1 and 4 simultaneously for 3 seconds.

All input selection buttons light for 1 second to indicate that executive mode 1 has been enabled or disabled, or that executive mode 2 has been disabled. Release the buttons.

Resetting the switcher

The switcher can be reset to the factory defaults via the front panel or via RS-232 control.

To reset the switcher via the front panel, follow these steps.

1. Unplug the switcher from the AC power source.
2. Press and hold input selection buttons 1 and 4 while reapplying power to the switcher (reconnecting it to the AC power source). All the input selection LEDs blink for one second while the switcher is being reset.

These settings are reset (defaults are in parenthesis):

- Audio level (sensitivity = -10 dBV)
- Audio gain/attenuation (+6 dB for SA, MA, and non-amp models)
- Bass (0)
- Treble (0)
- Loudness (off)
- Line level audio output (stereo)
- Video type (configurable inputs = RGB)
- RGB delay (0 sec.)
- Monitor Output mode (RGB follow)
- Executive mode (off)
- Aux/Mix (on)
- Volume (41)

Setting Up and Optimizing the Audio

For optimal audio quality, the audio input levels and the bass, treble, and loudness control must all be set up properly. Input and output (Preamp and Lineout) audio levels may need to be adjusted depending on the variation of output levels from different source devices. By default these switcher input levels are set for the consumer product line level of -10 dBV.

Bass, treble, and loudness should be adjusted once the input and output levels have been adjusted. By default the bass and treble have been set to 0, and loudness has been set to off.

Input level sensitivity can be adjusted via the front panel. Other adjustments must be performed via the supplied MediaLink Control Software (also available at www.extron.com) through the RS-232 port.

CAUTION *To avoid damage to your hearing and disturbing occupants of adjacent rooms, do not connect speakers to the MLS's amplifier output until setup has been completed and volume has been set to the minimum level.*

Configuring Lineout and Preamp output levels

Before adjusting any input levels, you must select an output level from the following options. You do not need to change the output level if the Lineout and Preamp outputs will not be used.

- **-10 dBV, unbalanced (consumer) (default):** typically used when the switcher's output is connected to consumer products such as VCRs, stereo receiver-amplifiers, or self-powered speakers with unbalanced inputs
- **+4 dBu, balanced (professional):** typically used when the switcher's output is connected to professional products such as mixers, power amplifiers, and some assistive listening devices with balanced inputs.

NOTE *Check the manufacturers' specifications for details on input/output devices you will connect to the Preamp and Lineout outputs.*

Adjusting audio input levels

Adjusting the input level (sensitivity) for each input via the front panel or the supplied control software will ensure that the switcher can deliver maximum power out of the amplifier, output the proper signal on the Lineout and Preamp outputs, and prevent noticeable jumps in audio levels during input switching.

The input level (sensitivity) can be adjusted (-42 dB to +24 dB) for all of the inputs, including the Aux/Mix input. The default input level (sensitivity) for each input is set for -10 dBV, unbalanced, consumer-type signals.

NOTE *The Auxiliary/Mix input level can be adjusted via the rear panel only. It cannot be adjusted via the control software.*

Common output levels for audio source devices range from -20 dBV, unbalanced, to +4 dBu, balanced. If the input level sensitivity settings are not closely matched to the source devices' levels, the signal may be overdriven and distorted.

- **Consumer portable** devices such as personal CD players and laptops typically have fixed and/or variable unbalanced outputs. If connecting a variable level output to the switcher, you must make adjustments with the source's volume set to maximum.
- **Consumer non-portable** devices such as VCRs, DVD players, and computer sound cards typically output an unbalanced **-10 dBV** signal.
- **Professional** products such as preamps, mixers, and signal processors typically output a balanced **+4 dBu** signal.

NOTE *There can be large variations in sources' output levels. Check the manufacturers' specifications for details on devices connected to switcher's inputs.*

Input level adjustments can be made in 1 dB increments/decrements via the front panel or the control software. See chapter 4, *Serial Communication* for details on software settings.

NOTE *Because there are many different output levels for source devices, Extron recommends that you adjust the **input** level (sensitivity) for each input. When making these adjustments, use source material with a wide dynamic range. The material should have loud passages that are representative of what will be used in the system.*

Making adjustments

Leave the bass and treble set to 0 and the loudness control set to off (default) before adjusting the input level (sensitivity). Audio input levels *must* be adjusted with an *active* audio signal.

1. Connect an active audio source to an input on the switcher.
2. Select the MLS input with the active input signal.
3. Adjust the switcher's input level via the front panel or the control software until the desired output level is reached and/or the Mid/normal LED turns on or blinks.

NOTE *Increasing the audio level beyond the point at which the Mid/normal LED blinks may result in a distorted output signal.*

Front panel setup mode: press and ***hold*** the input button for 3 seconds; the input's LED blinks. While still pressing the input button, rotate the Volume knob to adjust the input level.

NOTE *For the MA and SA models, in setup mode a blinking or lit Mid/normal LED indicates that the power amplifier can deliver maximum power output.*

MLS 304MA, MLS 304SA, MLS 406MA, MLS 406SA

Clipping level

- ***Max LED blinks or lights:*** the audio input level is too high; audio will be distorted. Lower the input gain so that this LED does not turn on.

Normal range

- ***Mid LED blinks or lights:*** input level has been properly adjusted. Adjust the input gain/attenuation until this LED blinks.

Signal detection threshold

- ***Min LED lights:*** a signal of at least -20 dBV (-18 dBu) (a low level consumer product level) is detected at the input.

NOTE *If the Max/Clip LED lights, the audio may be clipped.*

MLS 406

Peak: a blinking LED indicates the level is set too high.

Normal: the specified output level (-10 dBV or +4 dBu) has been reached. A blinking LED indicates the level is set properly for max. power output.

Signal: when lit this indicates that a signal of at least -20 dBV (-18 dBu) is detected at the input.

4. Once the desired level is reached, release the input button, to save the audio settings.
5. Repeat steps 1 through 4 for each input.
6. Fine tune levels including bass, treble, and loudness once all output devices (speaker, amp, etc.) have been connected.

Loudness control automatically provides the correct amount of bass and treble required to compensate for the change in response of the human ear at low levels. As volume decreases, the MLS automatically boosts the signal at 100 Hz and 10 kHz. As volume is increased, the boost at those frequencies is decreased. By default loudness control is set to off. Use the control software to turn it on. See appendix A, *Reference Material* for a frequency response graph when loudness is turned on.

Video Signal Routing

The input's signal format (RGB, S-video, or composite video) determines where the signal is output.

Composite video signals are always output on the Video BNC connector.

S-video signals (MLS 406 Series only) are always output on the Y and C (luma and chroma) BNC output connectors.

RGB/computer-video input signals are sent to the RGB output BNC connectors, but only if the input is configured as an RGB input.

See pages 2-4 through 2-6 for information on cabling. See pages 4-4 through 4-11 for information on video configuration.

Monitor Output modes

Which signal, if any, is output via the Monitor Output connector depends on the selected input's signal type *and* on the Monitor Output mode. Monitor Output modes are selectable only via RS-232 control (see chapter 4, *Serial Communication*).

- Mode changes affect only how the **Monitor Output** is determined.
- Changing the mode does not affect the other outputs in any way.

Standard mode (mode 3)

- If the selected input is S-video or composite video, there is *no* Monitor Output.
- If the selected input is RGB, that input's signal routed to the Monitor Output.

DA (distribution amplifier) mode (mode 2)

- If any configurable input (3 or 4 on the MLS 304MA and MLS 304SA; 4, 5, or 6 on the MLS 406, MLS 406MA, and MLS 406SA) is S-video or composite video, there is *no* Monitor Output.
- If all the configurable inputs are set for RGB, the input 4 signal on the MLS 304MA/MLS 304SA or the input 6 signal on the MLS 406/MLS 406MA/MLS 406SA becomes the Monitor Output, no matter which input is selected.

RGB follow mode (mode 1)

- If *all* the configurable inputs (3 and 4 on the MLS 304MA and MLS 304SA; 4, 5, and 6 on the MLS 406, MLS 406MA, and MLS 406SA) are RGB, and
  - the selected input is MLS 304MA/MLS 304SA input 1 or 2; or MLS 406/MLS 406MA/MLS 406SA input 1, 2, or 3; the highest numbered (4 or 6, depending on the model) RGB input's signal is sent to the Monitor Output.
  - the selected input is RGB, that signal will be sent to the Monitor Output.
- If the selected input is configurable and any configurable input is set for S-video/composite video, there is *no* Monitor Output.

The table on the next page summarizes the modes.

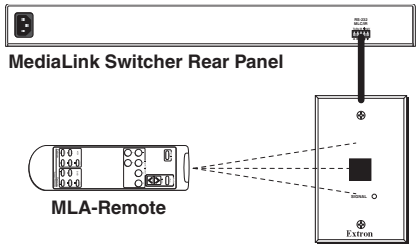
Monitor Output Modes

MLS 304MA, MLS 304SA			
Mode	**Selected input**	**Input special conditions**	**Monitor Output**
Standard	Any composite video input Any RGB input	n.a. n.a.	None Selected input
DA	Any input Any input	3 and 4 = RGB 3 or 4 = composite video	Input 4 None
RGB follow	1 or 2 3 or 4 = RGB 3 or 4 = composite video	3 and 4 = RGB 3 and 4 = RGB 3 or 4 = composite video	Input 4 Selected input None
MLS 406, MLS 406MA, MLS 406SA			
Mode	**Selected input**	**Input special conditions**	**Monitor Output**
Standard	Any S-video or composite video 4, 5, or 6 = RGB	n.a. 4, 5, and 6 = RGB	None Selected input
DA	Any Any	4, 5, and 6 = RGB 4, 5, or 6 = S-video or composite video	Input 6 None
RGB follow	1, 2, or 3 4, 5, or 6 = RGB 4, 5, or 6 = S-video or composite video	4, 5, and 6 = RGB 4, 5, and 6 = RGB 4, 5, or 6 = S-video or composite video	Input 6 Selected input None

n.a. = not applicable

Remote Control

The MediaLink Switcher can be controlled by using its front panel controls; an optional Extron infrared remote control (the MLA-Remote, for example) and an Extron IR Link signal repeater; a MediaLink Controller; or another RS-232 control device or computer. See *Control Connection* on page 2-7 for wiring diagrams and system examples.



NOTE *Any Extron IR remote control that offers input selection buttons 1 through 6 can be used with the MLS switcher for input switching. Unlike most other models, the MLA-Remote also allows volume control and audio mute.*

Troubleshooting

Power on the input and output devices and the switcher. The image should appear on the screen, and sound should be audible.

If the image does not appear or there is no sound

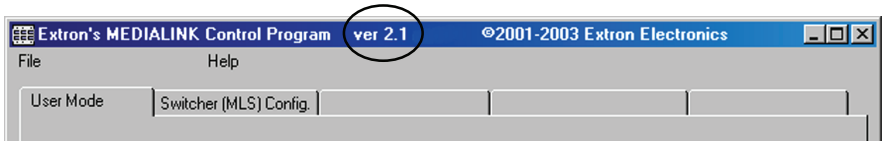
1. Ensure that all devices are plugged in and receiving power. The switcher's power LED ( ) lights if the it is receiving power and an active sync signal.
2. Check the cabling, connector wiring, and grounding, and make adjustments as needed.
3. To test the system setup and output, substitute a video or audio/video test generator for one of the input devices.
4. Use the control software or a control system to verify that the audio and/or video is not muted or set to input 0.
5. If no signal is being output from the Monitor Out port, check which Monitor Out mode has been selected. You may need to change the setting to another mode to obtain the desired output. See pages 3-7, 3-8, and 4-10.
6. Call the Extron S³ Sales and Technical Support Hotline if needed.

If the switcher does not respond to controls

1. Executive mode 1 or 2 may be active. To disable either executive mode, press and hold input buttons 1 and 4 for 3 seconds, then release them when the input LEDs blink. Executive modes can also be disabled via RS-232 control.
2. Via RS-232 verify that the configurable inputs (inputs 3 and 4 on the MLS 304MA or MLS 304SA; inputs 4, 5, and 6 for the MLS 406/MLS 406MA/MLS 406SA) have been set up for the correct input type (RGB or composite video).
3. If audio input 0 (audio mute) is selected (via RS-232), rotating the Volume knob does not affect the volume, since an active audio input is not selected. Select an active audio input.
4. If you have just updated the switcher's firmware (see chapter 4, *Serial Communication*), and the power LED lights but the switcher does not respond to front panel input selections or volume adjustments, you may need to reset the unit to factory defaults (see page 3-4, *Resetting the switcher*, or page 4-6, *Zap command*).
5. Call the Extron S³ Sales and Technical Support Hotline if the switcher still does not respond after you have performed steps 1 through 4.

If you are unable to configure the MLS via the Windows®-based software

1. Check the MediaLink Control Software to determine its version number. The software version number appears in the top bar of the program's window:



   These MLS 304 Series and MLS 406 Series switchers can be set up using software **version 2.1 or higher**. Earlier versions are not designed to work with these models.

2. Verify that the connector at the RS-232/MLC/IR port is correctly wired and that the PC's correct COM port is selected when you start the software.

4

Chapter Four

Serial Communication

RS-232 Programmer's Guide

Control Software for Windows

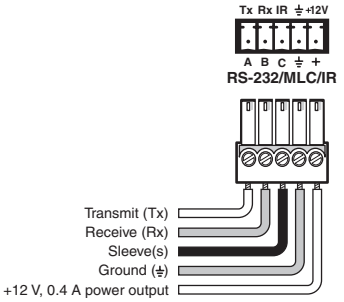
Serial Communication

The MediaLink switcher can be remotely set up and controlled via a host computer or other device (such as a control system) attached to the rear panel RS-232/MLC/IR port. Alternatively, the switcher can be controlled by an optional MediaLink Controller (MLC) (connected to the same port) or by an RS-232 device acting through the MLC. The control device (host) can use either Extron's Simple Instruction Set (SIS) commands or the graphical control program for Windows. For details on use and setup of a system that includes a MediaLink Controller, see the *MediaLink Controllers User's Manual*.

Switcher protocol:

- 9600 baud
- 1 stop bit
- no parity
- no flow control

RS-232/MLC/IR connector pin assignments:



RS-232 Programmer's Guide

Host-to-MLS communications

SIS commands consist of one or more characters per field. No special characters are required to begin or end a command sequence. When the MLS determines that a command is valid, it executes the command and sends a response to the host device. All responses from the switcher to the host end 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.

MLS-initiated messages

When a local event such as a front panel selection or adjustment takes place, the MLS responds by sending a message to the host. No response is required from the host. The MLS-initiated messages are listed here (underlined).

Boot V1.00, (c) 2003, ? to Enter

(c)Copyright 2004, Extron Electronics, MLS406MA, Vx.xx ↵
The MLS sends the boot and copyright messages when it first powers on. Vx.xx is the firmware version number. The MLS 406MA is used in this example.

Chn X1 ↵ (where X1 is the input number)
The MLS sends this response when an input is switched.

Error responses

When the MLS receives a valid SIS command, it executes the command and sends a response to the host device. If the MLS is unable to execute the command because the command is invalid or it contains invalid parameters, it returns an error response to the host.

The error response codes and their descriptions are as follows:

E01 – Invalid input channel number (the number is too large)
E10 – Invalid command
E13 – Invalid value (the number is out of range/too large)
E14 – Invalid for this configuration
E23 – Checksum error (for file uploads)

Using the command/response tables

The command/response tables on the next page list valid command ASCII codes, the MLS's responses to the host, and a description of the command's function or the results of executing the command. Upper- and lower-case characters may be used interchangeably in the command field unless otherwise specified (setting gain/attenuation, for example).

ASCII to HEX Conversion Table															
	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

Esc	1B	CR	ØD	LF	ØA

The ASCII to hexadecimal (HEX) conversion table at left is for use with the command/response tables.

ASCII to Hex conversion table

Symbol definitions

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

• = Space

Esc = Escape key

X1 = Specific input number (0 – 6 maximum)
- 0 = no connection
- 1 = input 1
- 2 = input 2
- 3 = input 3
- ...
- 6 = input 6

X2 = Maximum number of input channels
(1 – 4 [max.] for the MLS 304 Series or 1 – 6 [max.] for the MLS 406 Series)

X3 = Video type (can be set for inputs 3 – 4 of the MLS 304 Series or inputs 4 – 6 of the MLS 406 Series only)
- 1 = Vid (composite video [MLS 304 Series only] and/or S-video [MLS 406 Series only])
- 2 = RGB (default)

X4 = Audio gain
(0 dB through +24 dB in 1 dB steps)
(default = 0 dB for MLS 304MA, MLS 406, MLS 406MA; default = +6 dB for MLS 304SA, MLS 406SA)

X5 = Audio attenuation (1 to 42; 0 dB through -42 dB in 1 dB steps)

X6 = On/off status
- 0 = off/disable
- 1 = on/enable

X7 = Input to be adjusted (1 – 4 for MLS 304 Series, 1 – 6 for MLS 406 Series switchers)
- 1 = input 1
- 2 = input 2
- 3 = input 3
- ...
- 6 = input 6

X9 = Adjustment range (0 – 14) (-10.5 dB – +10.5 dB in 1.5 dB steps)
- 0 = -10.5 dB
- 1 = -9.0 dB
- 2 = -7.5 dB
- 3 = -6.0 dB
- 4 = -4.5 dB
- 5 = -3.0 dB
- 6 = -1.5 dB
- 7 = +0 dB (default)
- 8 = +1.5 dB
- 9 = +3.0 dB
- 10 = +4.5 dB
- 11 = +6.0 dB
- 12 = +7.5 dB
- 13 = +9.0 dB
- 14 = +10.5 dB

X10 = Volume adjustment range (0 – 100 steps)

X11 = Switcher firmware version (listed to two decimal places e.g.: x.xx)

X12 = Executive mode (front panel lockout) status
- 0 = unlocked (default)
- 1 = front panel except volume adjustment is locked

Command/response table for SIS commands

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional description
Input selection			
Select an input (audio and video).	X1 !	Chn X1 ↵	Select input X1 (audio and video).
Example:	6!	Chn6 ↵	*Example*: select input 6.
Select an audio input.	X1 $	Aud X1 ↵	Select input X1 audio only.
Select a video input.	X1 &	Vid X1 ↵	Select input X1 video only.
Video configuration (MLS 304MA inputs 3 and 4; or MLS 406/406MA inputs 4, 5, and 6)			
Set the video signal type.	X2*X3\	Typ X3 = ____↵	Set the input signal type for input X1. (Type = Vid or RGB)
Example:	4*1\	Typ1=Vid↵	*Example*: set input 4 to S-video or composite video.
View the video signal type.	X2\	Typ X3 = ____ ↵	Show the video signal type
Example:	4\	Typ1=Vid ↵	*Example*: show input 4 video type.
Audio gain/attenuation (per input)			
Set a specific input's audio gain.	X8*X4 G	InX8Aud=X4 ↵	Set a single input's gain (in dB).
Example:	5*9G	InX8Aud=+09 ↵	*Example*: set input 5's gain to +9 dB.
Set a specific input's audio attenuation.	X8* X5 g	In X8 Aud= X5 ↵	Set an input's attenuation (in dB).
Example:	4*12g	In4 Aud=-12 ↵	*Example*: set attenuation to -12 dB.
Increment a specific input's gain.	X8*+G	In X8 Aud= X4 ↵	Increase an input's gain by 1 dB.
Decrement a specific input's gain.	X8*-G	In X8 Aud= X4 ↵	Decrease an input's gain by 1 dB.
View a specific input's audio gain level.	X8*G	In X8 Aud= X4 ↵	Show an input's audio level.
Set current input's audio gain.	X4 G	In X8 Aud= X4 ↵	Set the current input's gain (in dB).
Set current input's audio attenuation.	X5 g	In X8 Aud= X5 ↵	Set attenuation (in dB).
Increment current input's gain.	+G	In X8 Aud= X4 ↵	Increase the gain by 1 dB.
Decrement current input's gain.	-G	In X8 Aud= X4 ↵	Decrease the gain by 1 dB.
View current input's audio gain level.	G	In X8 Aud= X4 ↵	Show the audio level.
NOTE *The commands in this section are case sensitive.*			
Audio treble adjustment (global: applies to all inputs)			
Set the treble level.	X9 >	Trb=X9 ↵	Set the global treble level.
Example:	2>	Trb=-7.5 ↵	*Example*: set treble to -7.5 dB.
Increment the treble level.	+ >	Trb=X9 ↵	Increase the treble by 1.5 dB.
Decrement the treble level.	– >	Trb=X9 ↵	Decrease the treble by 1.5 dB.
View the treble level.	>	Trb=X9 ↵	Show the current treble level.
Audio bass adjustment (global: applies to all inputs)			
Set the bass level.	X9 <	Bas=X9 ↵	Set the global bass level.
Example:	10<	Bas=+4.5 ↵	*Example*: set the bass to +4.5 dB.
Increment the bass level.	+ <	Bas=X9 ↵	Increase the bass by 1.5 dB.
Decrement the bass level.	– <	Bas=X9 ↵	Decrease the bass by 1.5 dB.
View the bass level.	<	Bas=X9 ↵	Show the current bass level.
Audio mute (overall: amp and preamps)			
Mute on	1Z	Amt1 ↵	Mute all (fixed, variable, and amplified) audio outputs.
Mute off	0Z	Amt0 ↵	Unmute all audio outputs.
View the audio mute status.	Z	Amt X7 ↵	Show the status of audio mute.
Volume adjustment (overall: amp and preamps)			
Set the overall output volume.	X10 V	Vol X10 ↵	Specify the volume for the audio output.
Example:	27V	Vol027 ↵	*Example*: set volume to 27.

Command/response table for SIS commands (continued)

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional description
Increment the volume.	+V	Vol X10 ↵	Increase audio output.
Decrement the volume.	-V	Vol X10 ↵	Decrease audio output.
View the volume level.	V	Vol X10 ↵	Show the output volume.
Audio status for the active input These commands allow you to view (or program a control system to monitor) the on/off status of the Clip, Normal, and Signal indicators (the equivalent of viewing the front panel Volume LEDs) between adjustments to the audio input levels. For details on making these adjustments via the front panel controls, see pages 3-2 and 3-3.			
View Signal, Normal, & Clip status	S *or* 0S	Sig X7 Norm X7 Clp X7 ↵	
View Signal (Min) status	1S	X7 ↵	**Signal detection threshold:** 0 = off (Signal level is too low to detect.) 1 = on (A signal of at least -20 dBV [-18 dBu] is present.)
View Normal (Mid) status	2S	X7 ↵	**Normal range:** 0 = off (Input level is too low.) 1 = on (Input is in the right range.)
View Clip (Max) status	3S	X7 ↵	**Clipping level:** 0 = off (Audio input has been set up properly.) 1 = on (The level or gain is too high, audio clips/distorts. Output equipment could be damaged. Adjust the MLS's input level so only the Normal LED is blinking. The Clip LED should not turn on.)
Aux/Mix input			
Turn Aux/Mix input on or off.	X7 M	Mix X7 ↵	Turn the Aux/Mix input on/off.
View the Aux/Mix status.	M	Mix X7 ↵	Show whether Aux/Mix input is turned on or off.
NOTE *The default Aux/Mix setting is On.*			
Front panel security lockout modes (executive modes)			
Disable executive mode.	0X	Exe0 ↵	Adjustments and selections can be made from the front panel.
Enable executive mode 1.	1X	Exe1 ↵	Lock front panel input selection buttons; select inputs via RS-232 or IR remote control only. Only volume adjustment is available via the front panel. This command is equivalent to pressing and holding front panel buttons 1 and 4.
Enable executive mode 2.	2X	Exe2 ↵	Lock <u>all</u> front panel selections and adjustments; select inputs, change volume, etc., via RS-232 only. The whole front panel is locked. Executive mode 2 can be enabled via RS-232 command, 2X only. RS-232 or the front panel can be used to disable this mode.

Command/response table for SIS commands (continued)

Command	ASCII Command (host to switcher)	Response (switcher to host)	Additional description
View the executive mode status.	X	Exe X12 ↵	Show executive mode status.
Example:	X	Exe0 ↵	Executive mode is off.
Firmware version, part number & information requests			
Query firmware version number.	Q	Ver X11 ↵	Show the switcher's firmware version.
Request the part number.	N	N60-5X0-0X ↵	Show the MLS's part # – MLS 304MA: 60-550-01 MLS 304SA: 60-550-02 MLS 406: 60-560-01 MLS 406MA: 60-560-02 MLS 406SA: 60-560-03.
Request general info.	I	(see below)	Show the MLS's status.
		Vid X1 • Aud X1 • Vol X10 ↵ Video input # X1 is selected/active. Audio input # X1 is selected/active. Audio volume status.	
Upload firmware			
NOTE *The MLS must already have **firmware version 2.1 or greater** in order for these commands to be used. For a switcher with firmware version 2.0 or earlier, use the firmware uploader utility software instead. See Updating firmware page 4-12.*			
Upload	Esc Upload ↵	Go ↵	The MLS will start uploading firmware code into its memory.
		Upl ↵	The firmware was successfully loaded into the MLS.
View the upload status	Q	Ver X11 ↵	Show the switcher's firmware version. This is the same as the "query firmware version" command.
		?.?? ↵	This is the response to the firmware version query if firmware uploading failed.
Reset to default settings (Zap)			
Reset all MLS settings/memories .	Esc zXXX	ZapXXX ↵	Reset all settings and adjustments to the factory default.

Command/response table for special function SIS commands

The syntax for setting a special function is __ * X? #, where __ is the function number and X? is the value. To view a function's setting, use __#, where __ is the function number. In the following table the values of the X? variable are different for each command/function. These values are given in the right column.

Command	ASCII Command (host to switcher)	Response (switcher to host)	X? values and additional descriptions
Delay times			
Set the RGB delay (Triple-Action Switching).	3 * X? #	RGBDly*X? ↵	0 = 0.0 seconds (default), 1 = 0.5 seconds, 2 = 1.0 seconds, ... in ½ second steps up to 10 = 5.0 seconds
Example:	3*7#	RGBDly*07↵	*Example*: 3.5 second RGB delay.
Audio settings			
Set the preamp output mode.	18 * X? #	PreAmpMod* X? ↵	Set the line level audio (Lineout's and Preamp's) outputs to be either mono or stereo signals. 1 = mono 2 = stereo (default)
NOTE *If mono is selected, the audio signal is the same on both the left and right channels. If stereo is selected, the switcher sends out different (stereo) signals on the left and right channels.*			
Set the loudness control.	29 * X? #	Loudness*X? ↵	When output volume is low, provide a +6 dB boost at 100Hz and at 10 kHz. When output volume is high, decrease the boost at those frequencies. This improves sound richness by restoring the high and low frequencies to which the ear is insensitive to at low volume levels. The effect diminishes as volume is increased. 0 = off (default for firmware ver. 2.1 and higher) (remove boost) 1 = on (default for firmware ver. 2.0 and lower) (turn boost on)
Set line level audio outputs' levels	40 * X? #	LineLevel*X? ↵	1 = -10 dBV (-8 dBu, 0.32 Vrms), unbalanced output (default) 2 = +4 dBu (+6 dBV, 1.23 Vrms), balanced output
NOTE *If the connector is wired for balanced output, the level is +6 dB higher than if it is wired for unbalanced output.*			
Mode selection			
Select the Monitor Out output mode	28 * X? #	MonitorOutOpt*X? ↵	See pages 3-7 and 3-8 for an explanation of these modes. 1 = mode 1 (RGB follow mode) 2 = mode 2 (DA mode) 3 = mode 3 (standard mode)

Control Software for Windows

The included Extron MediaLink Control Program for Windows offers another way to control the switcher via RS-232 connection in addition to the Simple Instruction Set commands. The control program's graphical interface includes the same functions as those on the switcher's front panel and some additional features that are available only through the Windows-based software.

The control software is compatible with Windows 95/98, Windows ME, Windows NT, Windows 2000, and Windows XP. The MediaLink Control Program is included with the MLS, and updates can be downloaded from the Extron Web site (http://www.extron.com).

Installing the software

The control program is contained on a CD-ROM, and it requires approximately 2 MB (megabytes) of hard disk space.

To install the software on the hard drive:

1. Run SETUP.EXE from the CD-ROM.
2. Follow the instructions that appear on the screen.

By default the installation creates a C:\Extron\MediaLnk directory, in which it places three icons (MediaLink Control Program, MediaLnk Help, and Firmware Loader).

Using the control program

Many items found in the MediaLink Control Program are also accessible via front panel controls. Refer to chapter three for details on features and settings. The MediaLink Help Program provides information on settings and on how to use the control program itself. Some features are only available via this control program. These features are described in the sections of this chapter that correspond to the parts of the control program where the features are found.

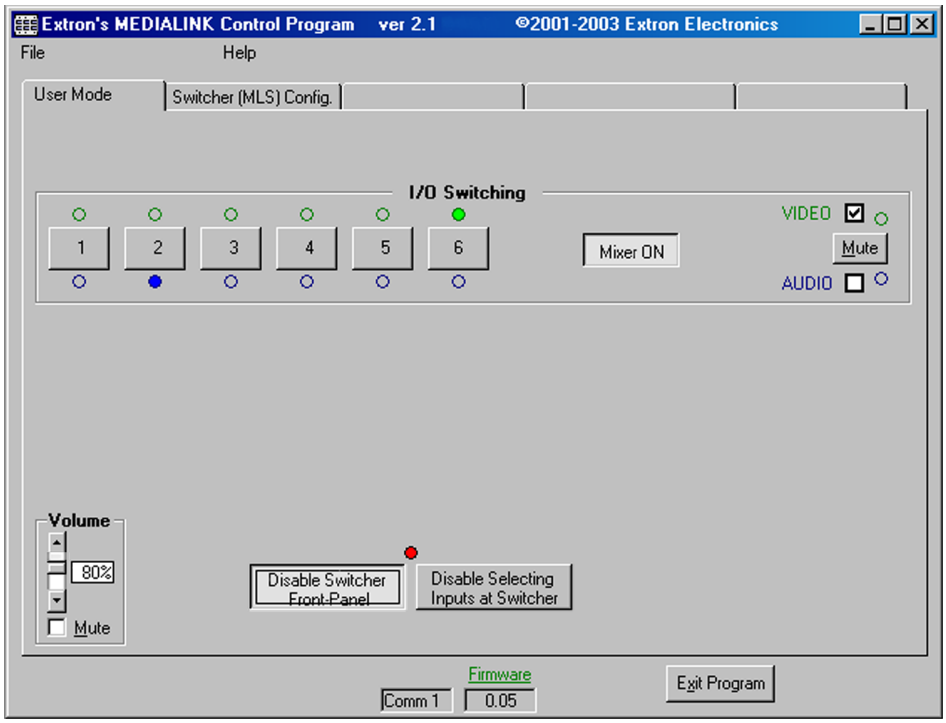
1. To run the control program, select the MediaLnk Control Program icon in the Extron Electronics group or folder on your start menu. The Comm menu appears on the screen.

MediaLnk.exe

2. Select the comm port that is connected to the MLS's RS-232/MLC/IR port. The Extron MediaLink Control Program windows appear. The port and firmware information are displayed at the bottom of the screen. There are two views available: the *User Mode* screen, and the *Switcher (MLS) Configuration* screen.

User Mode Screen

The *User Mode* screen, shown below, includes the most frequently used controls: it emulates the front panel for basic functions (input selection, volume control). See *Front Panel Features and Operations* on page 3-2 for details on basic functions.



Special features

Audio/video breakaway switching — To switch the audio signal separately from the video signal, select the Audio checkbox (at the right side of the I/O Switching area) and clear the Video checkbox, then select an input. The MLS switches to that input's audio source while leaving the previously selected video source active. The picture above shows audio breakaway: video is from input 6 and audio from input 2.

To switch the video signal without changing the audio source, select the Video check box and clear the Audio checkbox.
Selecting Mute selects input 0 (no input).

Mixer on/off toggling — Click this button to toggle the Aux/Mix input on or off.

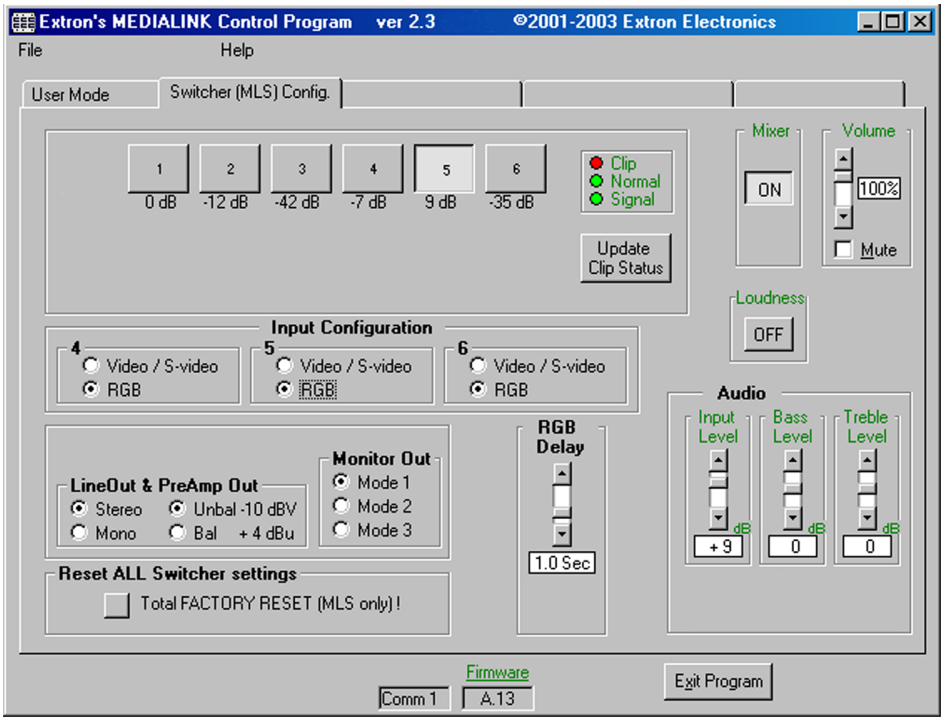
Volume Mute — Select this box (in the lower-left corner) to activate the audio mute (Amt) command.

Disable Switcher Front Panel — This feature (shown activated in the picture above) toggles executive mode 2 on or off to prevent or enable making any changes or selections via the MLS's front panel. This feature can be enabled/disabled via this software or SIS command 2X. You can also disable this feature by pressing and holding front panel buttons 1 and 4 simultaneously.

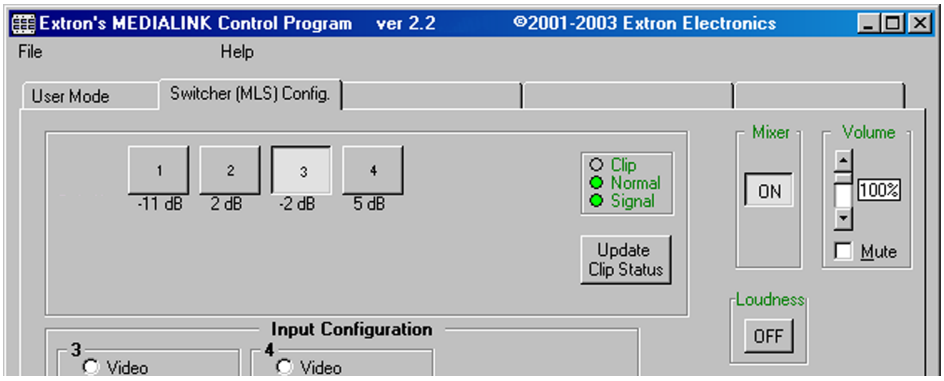
Disable Selecting Inputs at Switcher — Toggle this feature on to lock the front panel buttons; only volume control will be adjustable/selectable from the front panel. All other selections and adjustments can be made by IR remote control or via RS-232 (SIS command 1X or via this software). This button toggles executive mode 1 and is equivalent to pressing and holding front panel buttons 1 and 4.

Switcher (MLS) Config Screen

The *Switcher (MLS) Config* screen, shown below, allows you to make adjustments without having to use the front panel controls. The picture below shows how this screen looks for an MLS 406MA. The quantity of available inputs and the Input Configuration section choices vary depending on the MLS model.



Sample Switcher (MLS) Config screen for an MLS 406 Series switcher



Sample of the top half of the Switcher (MLS) Config screen for an MLS 304MA or MLS 304SA

On the switcher (MLS) Config Screen you can:

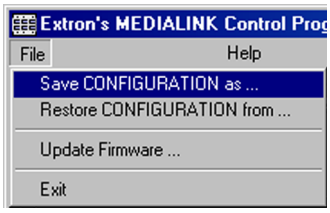
- Set the per-input audio level by adjusting the Audio Input Level slider bar until the output sounds right or measures correctly for maximum power output.
- View and update the view of the selected input's audio signal level status (Clip, Normal, Signal).
- Turn the Aux/Mix (mixer) input on or off.
- Set loudness boost on or off. If you turn the loudness boost on, when output volume is low the MLS provides a +6 dB boost at 100 Hz and at 10 kHz. When output volume is high, boost is decreased at those frequencies. This improves sound richness by restoring the high and low frequencies to which the ear is insensitive at low volume levels. The effect diminishes as volume is increased.
- Make overall bass and/or treble adjustments.
- Set overall volume.
- Choose between stereo and mono output for the Lineout and Preamp outputs.
- Select either -10 dBV unbalanced output or +4 dBu balanced output for the Lineout and Preamp outputs.
- Set the video format:
  - **Composite video or RGB for inputs 3 and 4 on an MLS 304MA or MLS 304SA**
  - **Composite video/S-video or RGB for inputs 4 through 6 on an MLS 406, MLS 406MA, or MLS 406SA**
- Select the Monitor Output mode. See *Video Signal Routing* on pages 3-7 and 3-8 for details.
- Set the RGB delay period (for Triple-Action™ Switching).
- Reset the switcher to factory default settings.

File menu options

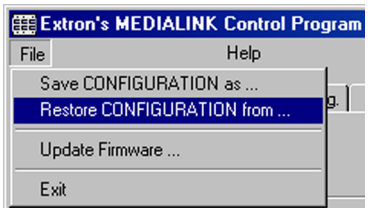
Saving and restoring configurations

The MLS can be configured by various means (front panel adjustments, downloading settings, or combinations of those methods); and the configuration settings can be saved to a file for later use.

1. In the MediaLink Control Program, select File, then select Save Configuration as... .



2. Save the file as *(filename)*.MLK. An unlimited number of configuration files can be saved as long as each file has a unique file name ending in .MLK.
3. To retrieve the configuration from within the MediaLink Control Program, select File, then select Restore Configuration from... .



Follow the on-screen directions. A set of all the switcher and audio adjustment settings is downloaded into the MLS.

Updating firmware

If the need arises, you can replace the MLS's firmware without opening the unit or changing firmware chips. Follow the directions below.

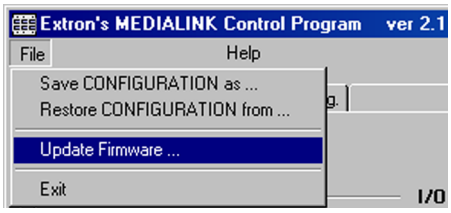
This procedure must be performed using a PC on which the MediaLink Control Software (version 2.1 or higher for MLS 304MA, MLS 406, or MLS 406MA; version 2.4 or higher for MLS 304SA and MLS 406SA) has been installed. The PC's RS-232 port must be directly cabled to the MLS's RS-232/MLC/IR port.

CAUTION *Do not attempt to upload firmware if a MediaLink Controller (MLC) or other control system is connected to the MLS switcher. The RS-232 cable from the PC must be connected directly to the MLS.*

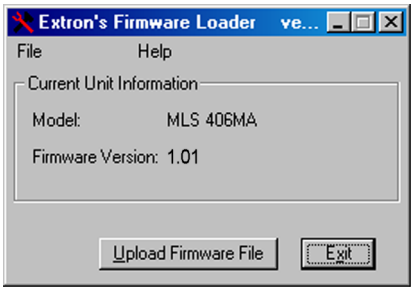
NOTE *Each time you replace existing firmware, the switcher will be reset to the factory default settings.*

1. Visit the Extron Web site (www.extron.com) to find the appropriate firmware file for the model of switcher (MLS 304MA, MLS 304SA, MLS 406, MLS 406MA, or MLS 406SA) you want to update. Save the new firmware file, and write down the filename and location for later use.
2. Connect a cable between the RS-232/MLC/IR port of the MLS and the serial (RS-232) port of the PC (see *Control connection* on pages 2-7 and 2-8), and power on the MLS.
3. Start the MediaLink Control program (see *Using the control program* on page 4-8).

4. From the File pulldown menu in the upper-left corner, select Update Firmware.



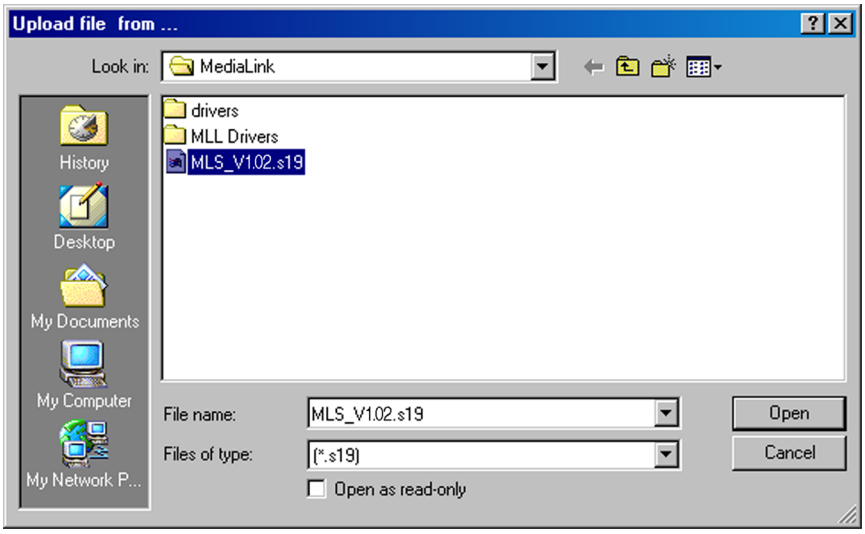
The MediaLink Control Software closes, and a separate utility program opens and displays a window indicating the current firmware version.



5. Click Upload Firmware file. You are prompted to select the firmware file that you downloaded in step 1. Click OK.

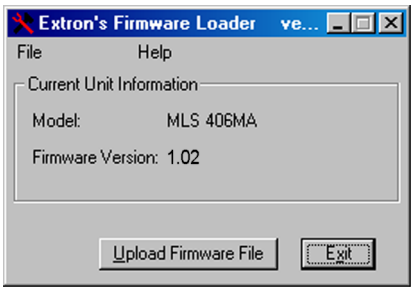
6. When the browser window opens, locate and select the firmware file, then click Open to upload the firmware into the MLS.

NOTE *The firmware update file must have a filename extension of* ***.s19****. If the file does not have that extension, it will not work properly.*



7. Follow the on-screen instructions.

8. When the firmware uploading is complete, a dialog box appears and asks you
   - **to exit the firmware update utility program** if the new firmware loaded correctly (if the correct firmware version is displayed in the program window, as shown in the example below)



   or

   - **to run the utility again** (perform step **5 of this procedure**) if the firmware did not load correctly.

   Follow the on-screen directions to complete the process.

NOTE *When you recycle power, power off the switcher for at least 4 seconds, then restore power.*

Using the help program

For information on program features, press the F1 computer key, click on the Help menu from within the MediaLink control program, or select the MediaLnk Help icon in the Extron Electronics group or folder on your start menu.

For explanations of buttons or functions, click on the tabs in the help screen to reach the desired screen. Use a mouse or the Tab and Enter keys to select a button or function. A description and tips on using the program appears on screen.

Key to file names

File name	Description
_____.MLK	User-saved MLC/MLC-MLS/MLS configuration file. This includes adjustments/settings. If the MLS is connected to an MLC (MediaLink Controller), the file also contains whatever driver (if any) was installed in the MLC 206 at the time the file was saved. See the *MediaLink Controllers User's Manual* for details.
_____.s19	Extron-supplied firmware update file. When the firmware is replaced, the switcher is also automatically reset to factory default settings.

Appendix A

Reference Material

Specifications

Part Numbers and Accessories

Frequency Response Graph for the Loudness Feature

Audio Reference Levels

Audio Block Diagrams

Reference Material

Specifications

Video

Gain	Unity
Bandwidth	280 MHz (-3 dB)
Differential phase error	1.0º at 3.58 MHz and 4.43 MHz
Differential gain error	1.0% at 3.58 MHz and 4.43 MHz
Crosstalk	-68 dB @ 10 MHz, -39 dB @ 100MHz
Switching speed	5 ms (max.)

Video input and loop-through

Number/signal type

MLS 304 Series	2 RGBHV, RGBS, RGsB, RsGsBs 1 RGBHV, RGBS, RGsB, RsGsBs local monitor loop-through 2 composite video
MLS 406 Series	3 RGBHV, RGBS, RGsB, RsGsBs 1 RGBHV, RGBS, RGsB, RsGsBs local monitor loop-through 3 S-video 3 composite video

Connectors

MLS 304 Series	2 female 15-pin HD (RGB), 1 female 15-pin HD (RGB loop-through) 2 female RCA (composite video)
MLS 406 Series	3 female 15-pin HD (RGB), 1 female 15-pin HD (RGB loop-through) 3 female 4-pin mini DIN (S-video) 3 female BNC (composite video)

Nominal level	1 V p-p for Y of S-video, and for composite video 0.7 V p-p for RGB 0.3 V p-p for C of S-video (MLS 406 Series)

Minimum/maximum levels

RGB	Analog: 0.3 V to 1.5 Vp-p with no offset
S-video, composite video	Analog: 0.4 V to 2.0 Vp-p with no offset
Impedance	75 ohms
Horizontal frequency	15 kHz to 145 kHz
Vertical frequency	30 Hz to 170 Hz

Return loss

RGB	<-40 dB @ 5 MHz
S-video	<-25 dB, 0 to 10 MHz
Composite video	<-40 dB, 0 to 10 MHz
DC offset (max. allowable)	1.5 V

Video output

Number/signal type

MLS 304 Series	1 RGBHV, RGBS, RGsB, RsGsBs (follows input) 1 composite video
MLS 406 Series	1 RGBHV, RGBS, RGsB, RsGsBs (follows input) 1 S-video 1 composite video

Connectors

MLS 304 Series	5 female BNC (RGB) 1 female BNC (composite)
MLS 406 Series	5 female BNC (RGB) 2 female BNCs (S-video) 1 female BNC (composite)

Nominal level ..... 1 Vp-p for Y of S-video, and for composite video
0.7 Vp-p for RGB
0.3 Vp-p for C of S-video (MLS 406 Series)

Minimum/maximum levels

RGB ..... Analog: 0.3 V to 1.5 Vp-p (follows input)

Composite video ..... Analog: 0.4 V to 2.0 Vp-p (follows input)

Impedance ..... 75 ohms

Return loss ..... <-40 dB @ 5 MHz

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

Switching type ..... Triple-Action (RGB delay)

Sync

Input type ..... RGBHV, RGBS, RGsB, RsGsBs

Output type..... RGBHV, RGBS, RGsB, RsGsBs (follows input)

Standards..... NTSC 3.58, NTSC 4.43, PAL, SECAM

Input level ..... 2.0 V to 5.0 Vp-p

Output level ..... TTL: 5.0 Vp-p, unterminated

Input impedance ..... 10k ohms

Output impedance ..... 75 ohms

Max input voltage ..... 5.0 Vp-p

Max. propagation delay ..... 30 ns

Max. rise/fall time ..... 4.0 ns

Polarity..... Positive or negative (follows input)

Audio

Gain ..... Unbalanced output: 0dB; balanced output: +6dB

Frequency response at 1 watt output

Preamp/Lineout..... 20 Hz to 20 kHz, ±0.5 dB

Direct (4/8 ohm)..... 20 Hz to 20 kHz, ±1.0 dB

Transformer (70V mono amplifier)
50 Hz to 20 kHz, +0 dB/-3 dB

Transformer (100V mono amplifier)
50 Hz to 20 kHz, +0 dB/-3 dB

THD + Noise

Power amp (mono or stereo)
0.037% @ 1 kHz at nominal level (1 watt, 8 ohm load)

Preamp..... 0.11% @ 1 kHz at nominal level

Lineout..... 0.018% @ 1 kHz at nominal level

S/N at maximum power output (unweighted)

Power amp ..... >75 dB @ 10 Hz to 22 kHz

Preamp..... >80 dB @ 10 Hz to 22 kHz

Lineout..... >80 dB @ 10 Hz to 22 kHz

Crosstalk

Power amp ..... <-75 dB @ 1 kHz, fully loaded

Preamp..... <-75 dB @ 1 kHz, fully loaded

Lineout ..... <-80 dB @ 1 kHz, fully loaded

Stereo channel separation ..... >80 dB @ 1 kHz

CMRR ..... >85 dB @ 20 Hz to 200 Hz, >75 dB @ 20 Hz to 20 kHz

Bass..... ±10 dB @ 100 Hz

Treble..... ±10 dB @ 10 kHz

Loudness (contour)..... +6 dB @ 100 Hz to 10 kHz

Audio input

Number/signal type

MLS 304 Series	4 stereo, unbalanced 1 Aux/Mix balanced/unbalanced mono (nonswitchable)
MLS 406, Series	5 stereo, unbalanced (inputs 1-3, 5, 6) 1 stereo, balanced/unbalanced (input 4) 1 Aux/Mix balanced/unbalanced mono (nonswitchable)

Connectors

MLS 304 Series	2 pairs of female RCA connectors (inputs 1-2) 2 female 3.5 mm mini stereo jacks (unbalanced only) (inputs 3-4); tip (L), ring (R), sleeve (GND) (1) 3.5 mm captive screw connector, 3 pole (Aux/Mix input)
MLS 406 Series	3 pairs of female RCA connectors (inputs 1-3) 1 female 3.5 mm captive screw connector, 5 pole (input 4) 2 female 3.5 mm mini stereo jacks (unbalanced only) (inputs 5, 6); tip (L), ring (R), sleeve (GND) (1) 3.5 mm captive screw connector, 3-pole (Aux/Mix input)
Impedance	>10k ohms unbalanced, DC coupled
Nominal level	-10 dBV (316 mVrms)
Maximum level	+8 dBV (10.2 dBu, 2.51 Vrms), unbalanced at <0.1%THD+N +10 dBu (7.28 dBV, 2.45 Vrms), balanced at <0.1% THD+N
Input gain adjustment	-42 dB to +24 dB, adjustable per input

NOTE *0 dBu = 0.775 Vrms, 0 dBV = 1 Vrms, 0 dBV ≈ 2 dBu*

Audio output — Lineout and Preamp

Number/signal type	2 (1 Lineout/fixed and 1 Preamp/variable) stereo/mono, balanced/unbalanced
Connectors	(2) 3.5 mm captive screw connectors, 5 pole
Impedance	50 ohms unbalanced, 100 ohms balanced
Gain error	±0.8 dB channel to channel
Nominal level	Configurable: -10 dBV (316 mVrms, default), +4 dBu (1.23 Vrms)

Maximum level (600 ohm)

Power amp (mono or stereo)	>+17 dBu, balanced < 0.5% THD+N
Preamp	>+19 dBu, balanced < 0.1% THD+N
Lineout	>+16 dBu, balanced < 0.1% THD+N

NOTE *Unbalanced wired outputs produce 6 dB of attenuation. Balanced outputs have unity gain/attenuation.*

Audio output — mono power amp (MLS 304MA, MLS 406MA only)

Number/signal type	(1) mono
Connector	(1) 5-position screw terminal
Sensitivity	-20 dBV (-17.8 dBu; 100 mVrms) (adjustable) for maximum power output

Power bandwidth

Direct (4 ohm)	20 Hz to 20 kHz, ≤ 0.5% THD
Direct (8 ohm)	20 Hz to 20 kHz, ≤ 0.15% THD
Transformer (70 V)	50 Hz to 20 kHz, ≤ 1% THD
Transformer (100 V)	50 Hz to 20 kHz, ≤ 0.5% THD

Included parts

Maximum power output	
Direct (4/8 ohm)	20 watts max. (continuous)
Transformer (70/100 V)	16 watts max. (continuous), transformer coupled
Protection	Input limiting, thermal, short circuit

Audio output — stereo power amp (MLS 304SA, MLS 406SA only)

Number/signal type	(1) stereo (default) or dual mono (configured via software)
Connector	(1) 5-position screw terminal
Sensitivity	-20 dBV (-17.8 dBu; 100 mVrms) (adjustable) for maximum power output
Power bandwidth	
Direct (4 ohm)	10 Hz to 20 kHz, ≤ 0.5% THD
Direct (8 ohm)	20 Hz to 20 kHz, ≤ 0.8% THD
Maximum power output	
Direct (4 ohm)	24 watts max. (continuous), 12 watts (rms) per channel
Direct (8 ohm)	16 watts max. (continuous), 8 watts (rms) per channel
Protection	Input limiting, thermal, short circuit

Control/remote — switcher

Serial control port	RS-232, 3.5 mm captive screw connector, 5 pole (uses 3 poles)
Baud rate and protocol	9600, 8-bit, 1 stop bit, no parity
Serial control pin configurations	1 = TX, 2 = RX, 4 = GND
Program control	Extron's configuration program for Windows® Extron's Simple Instruction Set (SIS™)

General

Power	100 VAC to 240 VAC, 50/60 Hz, 60 watts, internal, autoswitchable
Temperature/humidity	Storage -40° to +158°F (-40° to +70°C) / 10% to 90%, noncondensing Operating +32° to +113°F (0° to +45°C) / 10% to 90%, noncondensing
Rack mount	Yes, with included brackets (#70-077-03)
Enclosure type	Metal
Enclosure dimensions	1.75" H x 17.5" W x 8.5" D (1U high, full rack wide) 4.4 cm H x 44.4 cm W x 21.6 cm D (Depth excludes connectors and knob)
Product weight	
MLS 406	5.0 lbs (2.3 kg)
Amplified models	6.0 lbs (2.7 kg)
Shipping weight	
MLS 406	10 lbs (5 kg)
Amplified models	11 lbs (5 kg)
Vibration	ISTA 1A in carton (International Safe Transit Association)
Listings	UL, CUL
Compliances	CE, FCC Class A, VCCI, AS/NZS, ICES
MTBF	30,000 hours
Warranty	3 years parts and labor

NOTE *All nominal levels are at ±10%.*

NOTE *Specifications are subject to change without notice.*

Part Numbers and Accessories

These items are included in each order for an MLS switcher:

Included parts	Replacement part number
MLS 304MA switcher	60-550-01
MLS 304SA switcher	60-550-02
MLS 406 switcher *or*	60-560-01
MLS 406MA switcher *or*	60-560-02
MLS 406SA switcher	60-560-03
Rubber feet (4) and IEC power cord	
3-pole, 3.5 mm captive screw connector	10-319-13
5-pole, 3.5 mm captive screw connectors	10-319-10
Rack mounting bracket kit	70-077-03
MLS 304/406 Series User's Manual	
Windows-based MediaLink™ control software	

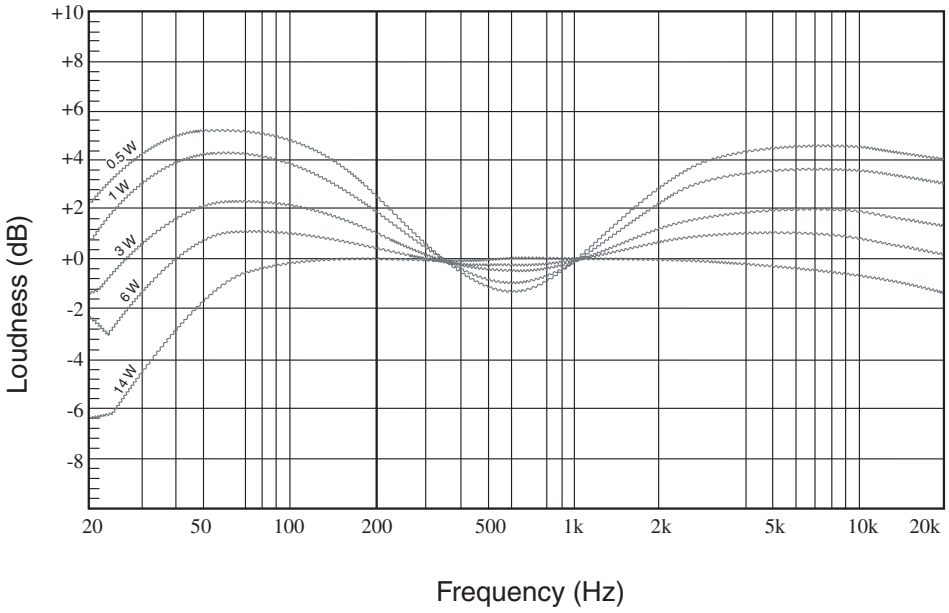
Optional accessories

These items can be ordered separately:

Accessory	Part number
Under-desk mounting brackets	70-222-01
MediaLink Controller (MLC)	See catalog or contact Extron
MLA-Remote IR remote control	70-154-01
IR Link IR signal repeater (gray, black, white)	60-404-01, -02, -03
BNCM-RCAF adapters (package of 10)	100-229-01
S-video cable (6 feet) (for MLS 406, MLS 406MA)	26-522-01
VGA with audio cable (6 feet)	26-490-02
SY 15 HDM RGBHVM adapter	26-533-02
SY 15 HDM RGBHVF adapter	26-531-02, -03, -04, -05, -06
CSR 6 captive screw to 2 RCA female adapter	26-575-01

Frequency Response Graph for the Loudness Feature

The following graph represents the frequency response of these MLS models when the loudness feature has been turned on.



Audio Reference Levels

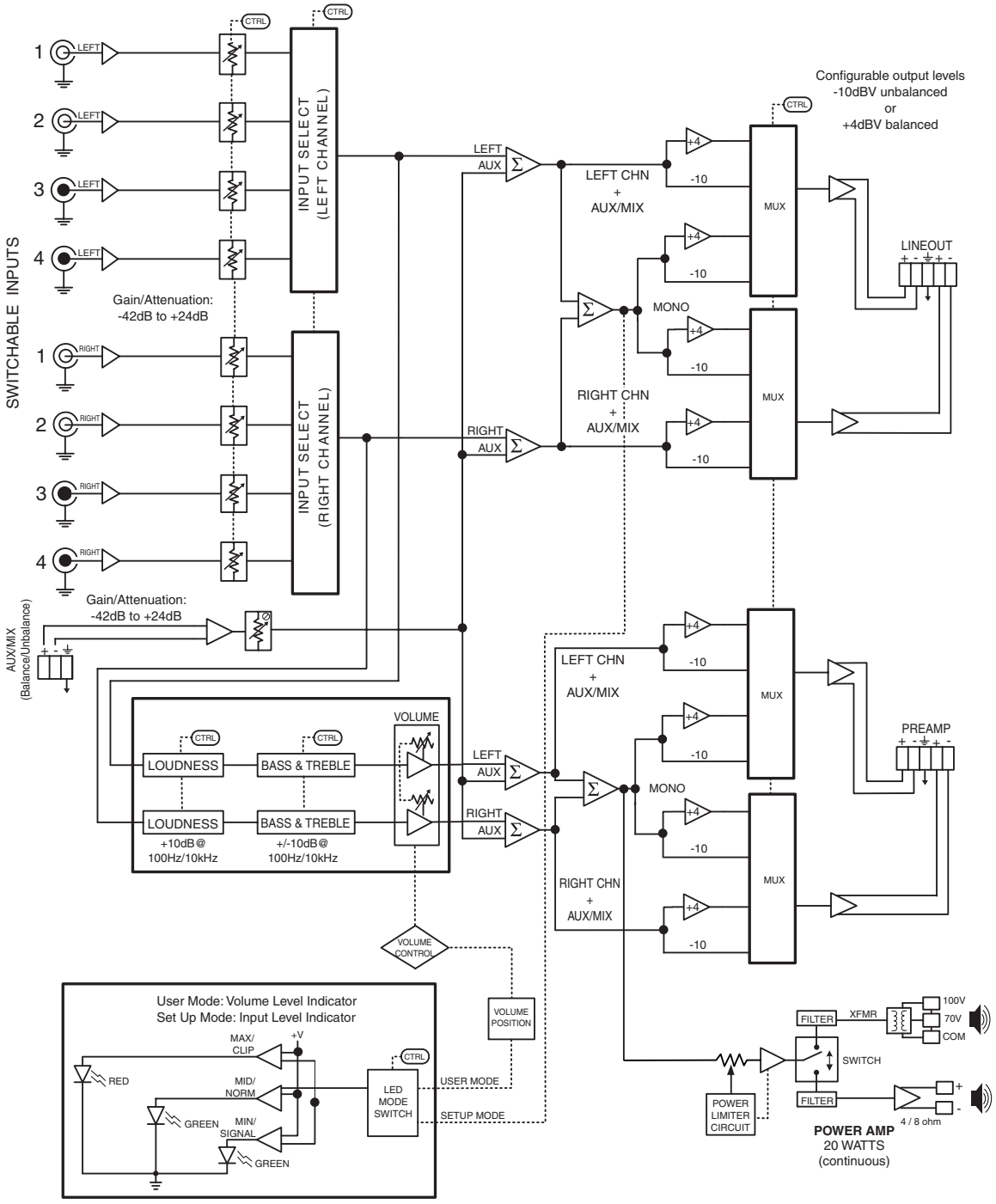
The specifications for the audio source devices may be listed in one of several units. Or you may wish to use a sine wave generator such as the Extron VTG 300 as a source for setting up audio inputs before the input devices are available. The tables below are a convenient reference for equivalences between dBV, voltage, and dBu.

dBV	Voltage	dBu
-20 dBV	0.100 V	-17.8 dBu
-19 dBV	0.112 V	-16.8 dBu
-18 dBV	0.126 V	-15.8 dBu
-17 dBV	0.141 V	-14.8 dBu
-16 dBV	0.158 V	-13.8 dBu
-15 dBV	0.178 V	-12.8 dBu
-14 dBV	0.200 V	-11.8 dBu
-13 dBV	0.224 V	-10.8 dBu
-12 dBV	0.251 V	-9.8 dBu
-11 dBV	0.282 V	-8.8 dBu
-10 dBV	**0.316 V**	**-7.8 dBu**
-9 dBV	0.355 V	-6.8 dBu
-8 dBV	0.397 V	-5.8 dBu
-7 dBV	0.447 V	-4.8 dBu
-6 dBV	0.501 V	-3.8 dBu
-5 dBV	0.562 V	-2.8 dBu
-4 dBV	0.631 V	-1.8 dBu
-3 dBV	0.708 V	-0.8 dBu
-2 dBV	0.794 V	0.2 dBu
-1 dBV	0.891 V	1.2 dBu
0 dBV	1.000 V	2.2 dBu
1 dBV	1.122 V	3.2 dBu
2 dBV	1.259 V	4.2 dBu
3 dBV	1.413 V	5.2 dBu
4 dBV	1.585 V	6.2 dBu
5 dBV	1.778 V	7.2 dBu
6 dBV	1.995 V	8.2 dBu
7 dBV	2.24 V	9.2 dBu
8 dBV	2.51 V	10.2 dBu
9 dBV	2.82 V	11.2 dBu
10 dBV	3.16 V	12.2 dBu

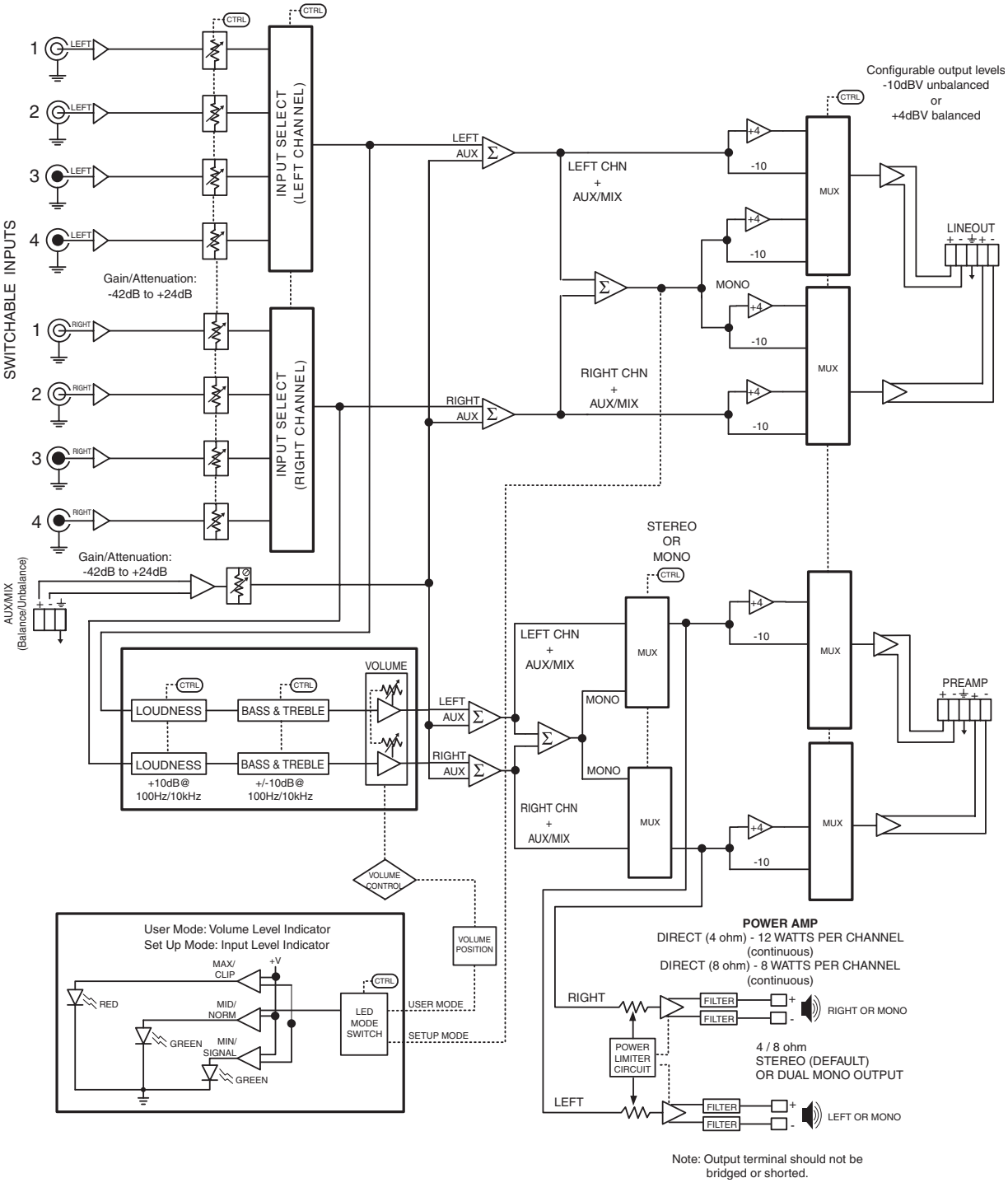
dBu	Voltage	dBV
-20 dBu	0.078 V	-22.2 dBV
-19 dBu	0.087 V	-21.2 dBV
-18 dBu	0.098 V	-20.2 dBV
-17 dBu	0.109 V	-19.2 dBV
-16 dBu	0.123 V	-18.2 dBV
-15 dBu	0.138 V	-17.2 dBV
-14 dBu	0.155 V	-16.2 dBV
-13 dBu	0.174 V	-15.2 dBV
-12 dBu	0.195 V	-14.2 dBV
-11 dBu	0.218 V	-13.2 dBV
-10 dBu	0.245 V	-12.2 dBV
-9 dBu	0.275 V	-11.2 dBV
-8 dBu	0.309 V	-10.2 dBV
-7 dBu	0.346 V	-9.2 dBV
-6 dBu	0.388 V	-8.2 dBV
-5 dBu	0.436 V	-7.2 dBV
-4 dBu	0.489 V	-6.2 dBV
-3 dBu	0.549 V	-5.2 dBV
-2 dBu	0.616 V	-4.2 dBV
-1 dBu	0.691 V	-3.2 dBV
0 dBu	**0.775 V**	**-2.2 dBV**
1 dBu	0.870 V	-1.2 dBV
2 dBu	0.976 V	-0.2 dBV
3 dBu	1.095 V	0.8 dBV
4 dBu	**1.228 V**	**1.8 dBV**
5 dBu	1.378 V	2.8 dBV
6 dBu	1.546 V	3.8 dBV
7 dBu	1.735 V	4.8 dBV
8 dBu	1.974 V	5.8 dBV
9 dBu	2.184 V	6.8 dBV
10 dBu	2.451 V	7.8 dBV

Audio Block Diagrams

MLS 304MA audio block diagram

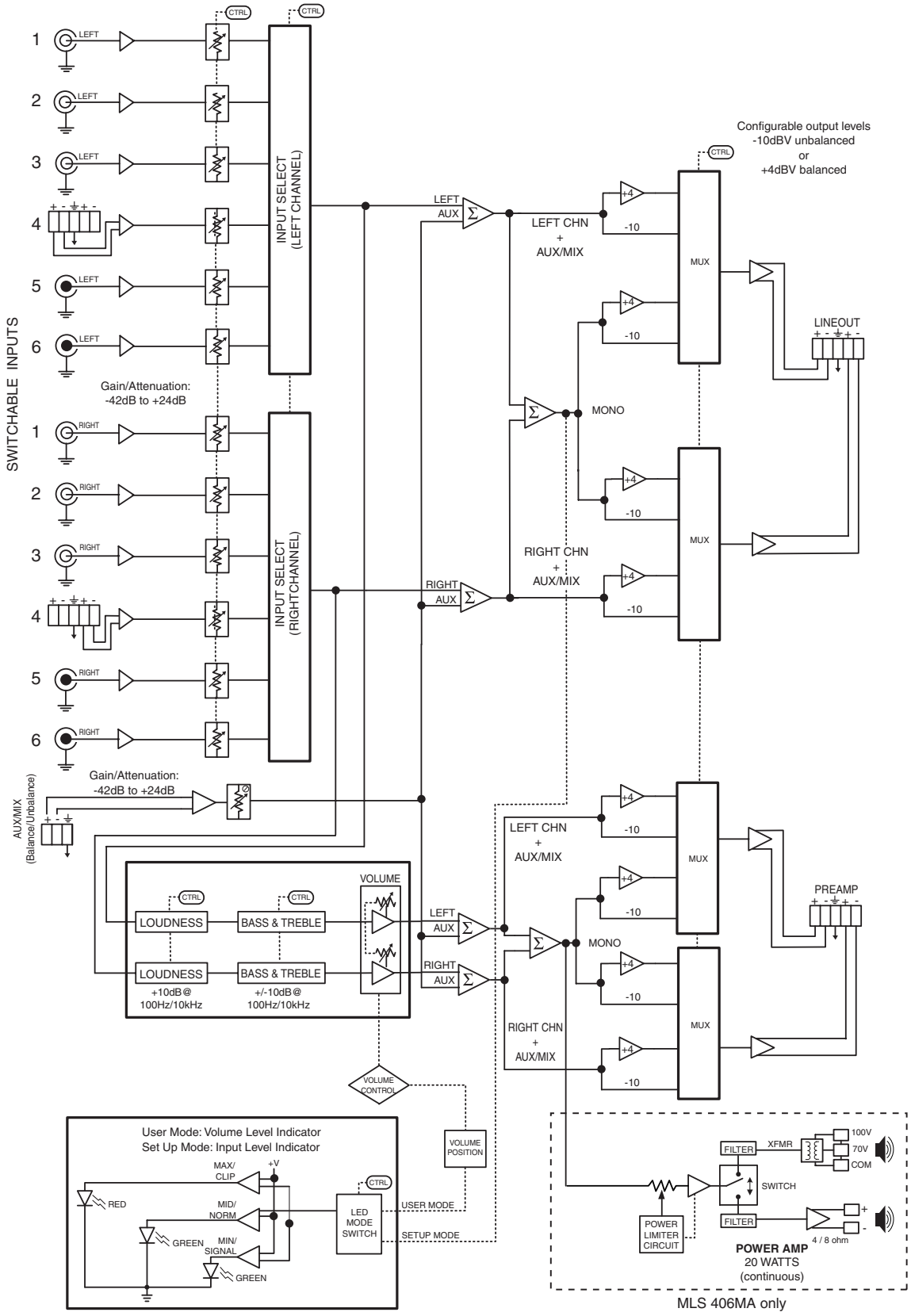


MLS 304SA audio block diagram

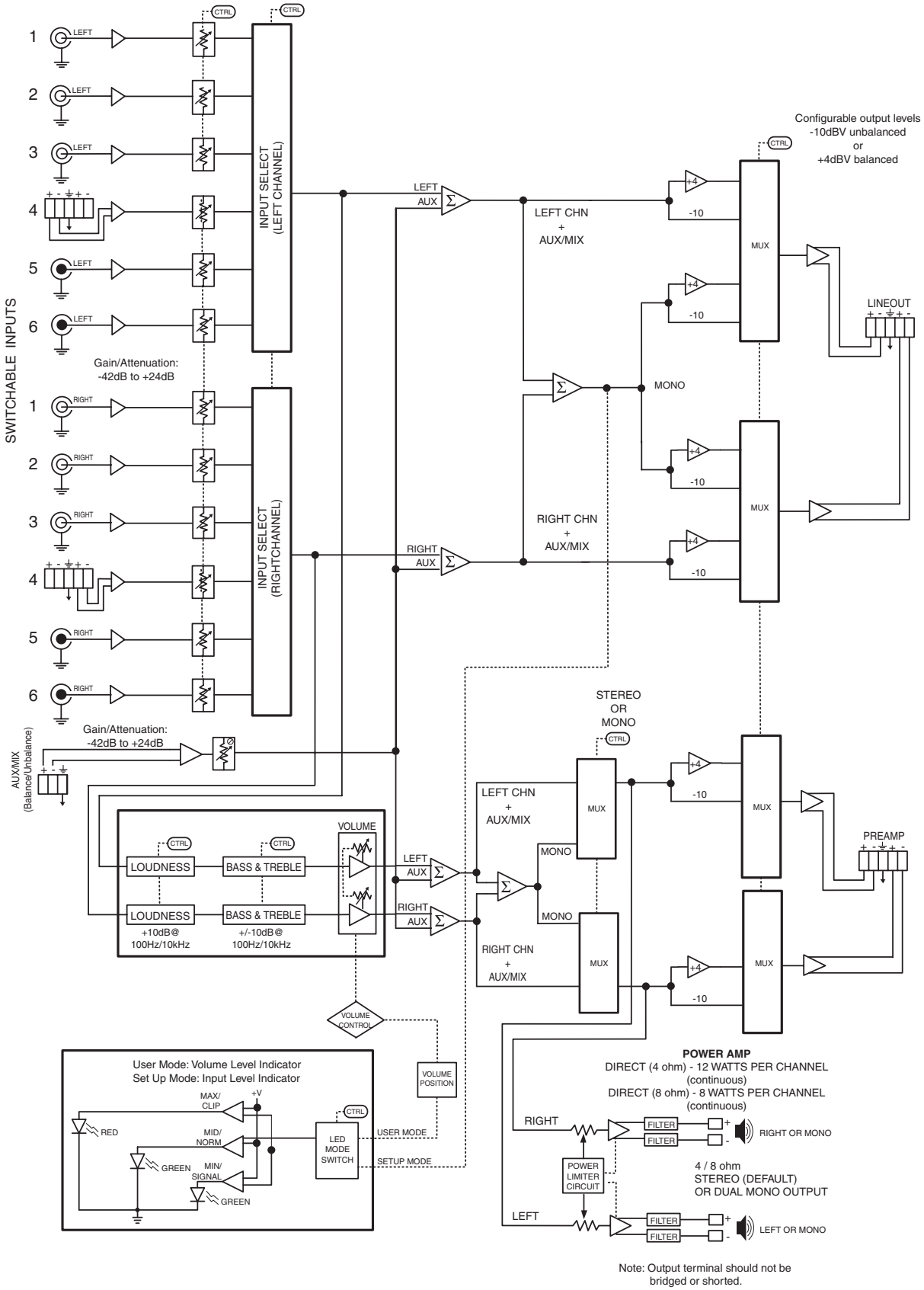


Note: Output terminal should not be bridged or shorted.

MLS 406, MLS 406MA audio block diagram



MLS 406SA audio block diagram



Note: Output terminal should not be bridged or shorted.

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FCC Class A Notice

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.

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
1001 East Ball Road
Anaheim, CA 92805, USA

Europe, Africa, and the Middle East:

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

Asia:

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

Japan:

Extron Electronics, Japan
Kyodo Building.,
16 Ichibancho
Chiyoda-ku, Tokyo 102-0082
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), 65.383.4400 (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.

Extron Electronics makes no further warranties either expressed or implied with respect to the product and its quality, performance, merchantability, or fitness for any particular use. In no event will Extron Electronics be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron Electronics has been advised of such damage.

Please note that laws vary from state to state and country to country, and that some provisions of this warranty may not apply to you.

www.extron.com

Extron Electronics, USA
1230 South Lewis Street
Anaheim, CA 92805
USA
714.491.1500
Fax 714.491.1517

Extron Electronics, Europe
Beeldschermweg 6C
3821 AH Amersfoort
The Netherlands
+31.33.453.4040
Fax +31.33.453.4050

Extron Electronics, Asia
135 Joo Seng Road, #04-01
PM Industrial Building
Singapore 368363
+65.6383.4400
Fax +65.6383.4664

Extron Electronics, Japan
Kyodo Building
16 Ichibancho
Chiyoda-ku, Tokyo 102-0082 Japan
+81.3.3511.7655
Fax +81.3.3511.7656

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