Extron® Electronics

INTERFACING, SWITCHING AND DISTRIBUTION

Reference Manual

Check the Extron Web site (www.extron.com) for updates.

MLC 104 Plus Series

MediaLink® Controllers

Precautions

Safety Instructions • English

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

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

Caution

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

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

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

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

Consignes de Sécurité • Français

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

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

Attention

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

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.

Sicherheitsanleitungen • Deutsch

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

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

Achtung

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

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

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

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

Instrucciones de seguridad • Español

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

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

Precaucion

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

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

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

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

安全须知 • 中文

⚠ 这个符号提示用户该设备用户手册中有重要的操作和维护说明。

⚡ 这个符号警告用户该设备机壳内有暴露的危险电压，有触电危险。

注意

阅读说明书 • 用户使用该设备前必须阅读并理解所有安全和使用说明。

保存说明书 • 用户应保存安全说明书以备将来使用。

遵守警告 • 用户应遵守产品和用户指南上的所有安全和操作说明。

避免追加 • 不要使用该产品厂商没有推荐的工具或追加设备，以避免危险。

Warning

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

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

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

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

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

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

Avertissement

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

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

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

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

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

Lithium Batterie • Il a danger d'explosion s'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.

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.

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 sobrecalentamiento de componentes internos sensibles. Estas aberturas nunca se deben obstruir con otros objetos.

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

警告

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

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

电源线保护 • 妥善布线，避免被踩踏，或重物挤压。

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

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

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

FCC Class A Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. The Class A limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

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

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MLC Components and Interactions

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System Requirements

Introduction

About This Manual

This manual provides detailed information and best practices recommendations about cabling and configuring the Extron MLC 104 Plus Series MediaLink® Controllers, and reference information about the controllers' specifications, dimensions, programming, and special applications.

It does not contain instructions on the most basic setup steps: those are covered in the *MLC 104 Plus Series Setup Guide*, which describes how to set up the hardware, how to use the Global Configurator (GC) program to download drivers, add A/V devices to a GC configuration, configure the front panel buttons, set a shutdown schedule, and set up e-mail alerts to flag a projector disconnection or warn that lamp hours are exceeded.

NOTE *MLC 104 Plus requires GC version 2.50 or higher.*
The IP models work with GC version 2.2 or higher

About the MLC 104 Plus Series MediaLink® Controllers

The MLC 104 Plus Series MediaLink Controllers are capable of controlling a projector and various other items such as lights, a projector lift, or a screen motor. Throughout this manual they are also referred to as the MLC 104, MLC, or "controller." All models offer RS-232 and IR-based projector (display) control; digital inputs and outputs for controlling items such as a projector lift, motorized projection screen, and lights; and RS-232 remote control of an Extron switcher.

MLC 104 Plus Series features

All models can be configured and controlled via a host computer using RS-232 communication, and the MLC 104 IP Plus models can also be configured and controlled via IP Link™ Ethernet control. Setup and control can be accomplished by simple ASCII commands (Simple Instruction Set, SIS™) or via the included Global Configurator program. The software offers many more setup options than does SIS programming.

All models offer front panel controls. The optional IR 402 remote control (which requires an optional IR signal repeater) and optional SCP 104 Series hardwired control pads can be used with the MLC, and they mirror the MLC's front panel controls. Additionally, the MLC 104 IP Plus DV+ includes an IRCM-DV+ control module (for DVD and VCR control) installed in the faceplate.

Additional features for IP models

Via Ethernet/IP communication the MLC 104 IP Plus models can make use of the controller's embedded Web pages, which include online diagnostics and monitoring of basic control features. As an integrated part of the MLC 104 IP Plus, IP Link provides the following advantages:

Global compatibility — The MLC uses standard Ethernet communication protocols, including ARP, DHCP, ICMP (ping), TCP/IP, Telnet, HTTP, and SMTP.

Embedded Web page serving — The MLC 104 IP Plus offers up to 7.25 MB of flash memory for storing Extron and user-supplied Web pages, configuration settings, and device drivers. Data in flash memory is served at a transfer rate of 6 Mbits per second.

Multi-user support — Up to two hundred (200) simultaneous connections enable each IP Link device to support many concurrent users and improve system throughput by sending information in parallel.

Management ability via Global Configurator 2.2 and higher — The included software and the GlobalViewer Web pages associated with it allow you to control, monitor, and schedule various functions of products connected to IP Link products such as the MLC.

E-mail notification — The MLC 104 IP Plus can be set up to send an e-mail when the projector has been disconnected or the projector's lamp has been used for a designated number of hours.

Controlling other devices

The MLC 104 Plus Series offers two methods of projector or display control: RS-232 or infrared (IR). The MLC can learn IR signals from remote controls to communicate with sources such as VCRs and DVD players. Users can create their own device drivers (IR or RS-232) or go to the Extron Web site (www.extron.com) to obtain device drivers.

TCP/IP Network

Help Desk PC

RS-232 or IR Projector control

Extron MLC 104 IP Plus
MediaLink Controller
- Projector on/off control
- Projector input switching
- Projector volume control

Audio   S-Video

Video

RGBHV   Audio

Extron MPA 122
Mini Power Amplifier

Extron SI 3CT LP
Full-range Ceiling Speakers

DVD/VCR Combo   Laptop
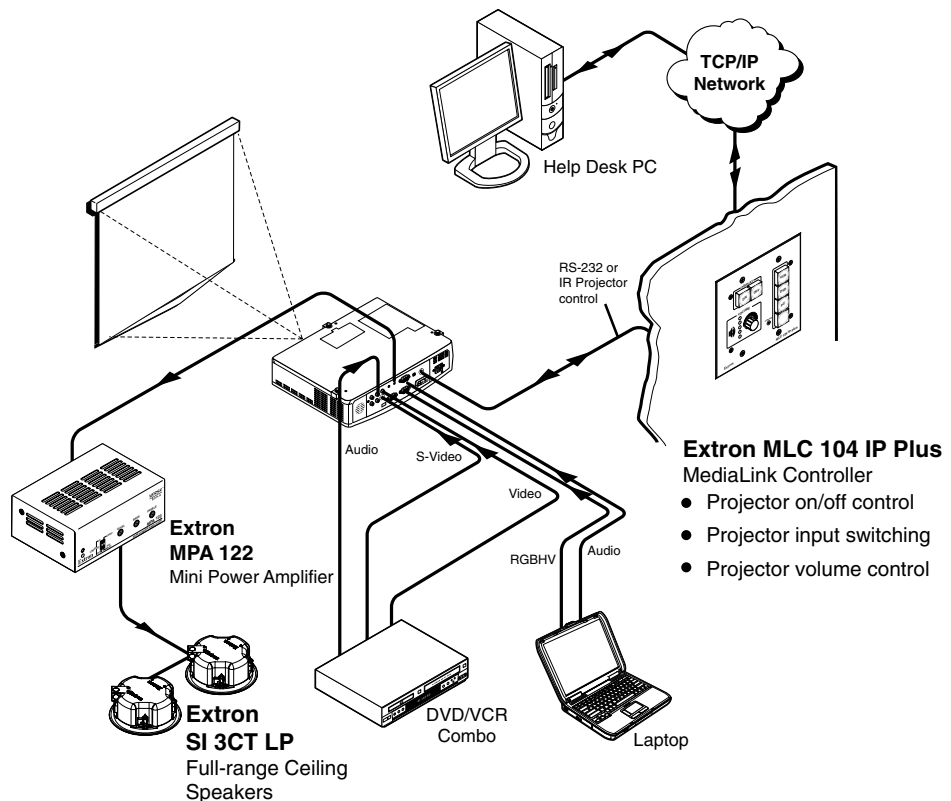
A typical application for an MLC 104 IP Plus MediaLink Controller

Projector Control

The MLC can control a projector or other display device by using IR or RS-232 control. The MLC must be configured for projector control in one of the following ways before it will send commands to the projector:

- An IR or an RS-232 driver file can be installed from a disk, downloaded from the Extron Web site (www.extron.com), or downloaded from Extron using the driver subscription feature within Global Configurator. The driver is saved to a folder within C:\Program Files\Extron\Driver2, and it is uploaded to the MLC via Global Configurator.

- RS-232 command strings can be entered directly from a host computer using Extron Global Configurator software.

- IR commands can be entered directly from an IR remote control through IR learning and the Extron IR Learner software to create a driver that the MLC can use. IR learning is convenient for installing new or updated commands into the MLC in the field.

Refer to the Global Configurator help file or the IR Learner help file (which come with the software) for details on setting up the MLC and for downloading, programming, or learning projector control commands.

How the MLC 104 Plus Series Controllers Work: MLC Components and Interactions

Unlike the Extron MLC 206 Series MediaLink Controllers, the MLC 104 Plus Series requires and uses event files to perform all functions except basic input switching and volume control. The event files define, monitor, and govern how an MLC 104 Plus Series controller works. Below are example diagrams of how the MLCs interact with accessories, event scripts, drivers, ports, and input and output devices.
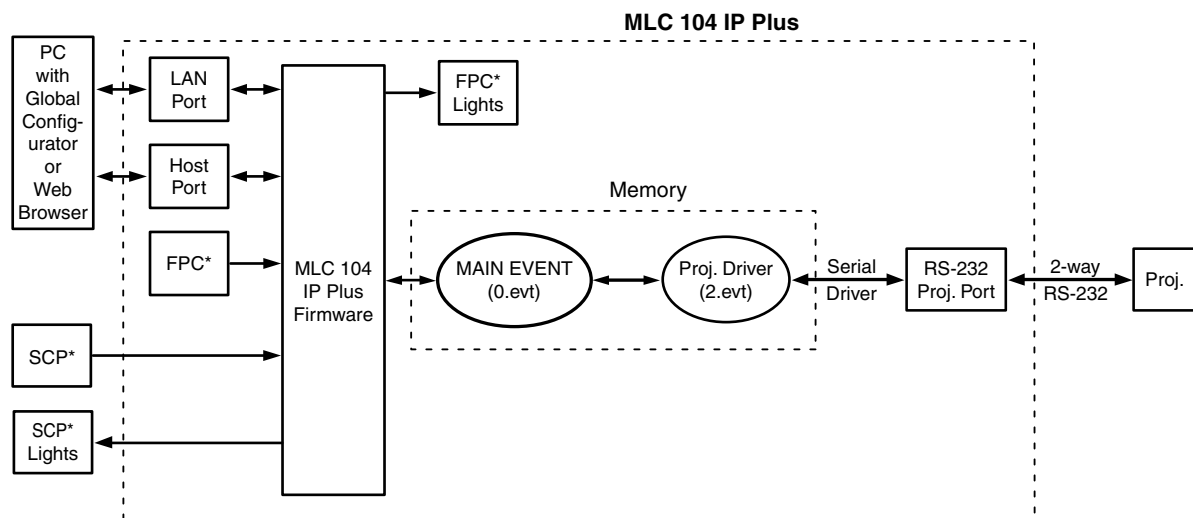
MLC 104 IP Plus

```
PC with Global Config-urator or Web Browser

LAN Port ←→                    → FPC* Lights
Host Port ←→
FPC* →           MLC 104 IP Plus Firmware

                 Memory
                 MAIN EVENT (0.evt) ←→ Proj. Driver (2.evt)   Serial Driver   RS-232 Proj. Port   2-way RS-232   Proj.

SCP* →
SCP* Lights ←
```

* FPC = front panel control
SCP = secondary control panel

MLC 104 Plus

```
PC with Global Config-urator

Host Port ←→                    → FPC* Lights
FPC* →           MLC 104 Plus Firmware

                 Memory
                 MAIN EVENT (0.evt) ←→ Proj. Driver (2.evt)   Serial Driver   RS-232 Proj. Port   2-way RS-232   Proj.

SCP* →
SCP* Lights ←
```
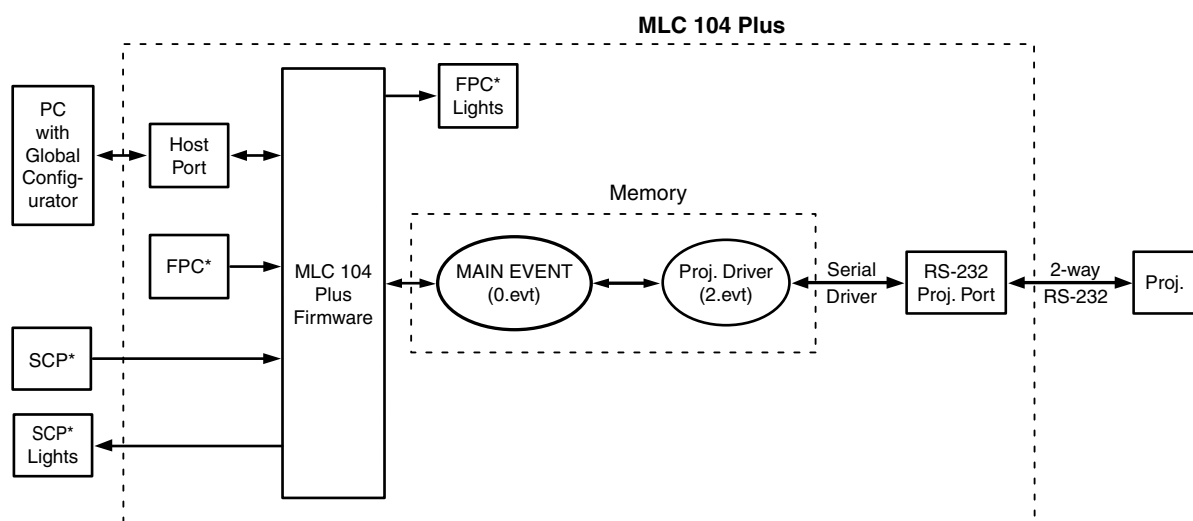
* FPC = front panel control
SCP = secondary control panel

The MLC can be configured completely via the Extron Global Configurator software. Once you have set up how you want it to work (assigned drivers to

ports, configured buttons and digital inputs or outputs, and set up IP addresses and functions), that information is saved to a project file that is uploaded into the MLC.

The configuration information is used to create the "main event" (0.evt) script file that defines the MLC's operation. The main event file also controls and monitors ports, optional SCP control panel(s), and changes made at the MLC's front panel (FPC, front panel control).

Each button on the MLC and on any connected SCPs has two switch numbers assigned to it: one for the button press, one for release. Scripts are compiled to generate the main event file to monitor any button press or release and to generate the actions (issuing commands, triggering relays, switching inputs) associated with the buttons.

Optional Control Modules and IR 402 Remote Control

The MLC can "learn" IR commands from a VCR's, DVD's, tape deck's or other device's remote control, allowing you to create an IR driver file that can be incorporated into the MLC's event scripts. A command can be associated with each of the buttons on an optional infrared control module (such as the Extron IRCM-VCR, CM-5BB, CM-9BLB, or IRCM-DV+) in order to allow limited control of source devices.

A total of four control modules (a maximum of four control module addresses) can be installed with this MLC. Refer to the *Control Modules User's Manual* and the *IRCM-DV+ Control Module User's Manual* for installation details and read the *Global Configurator Help* file to learn about configuration. See chapter 4 of this manual for special SIS commands for the IRCM-DV+.
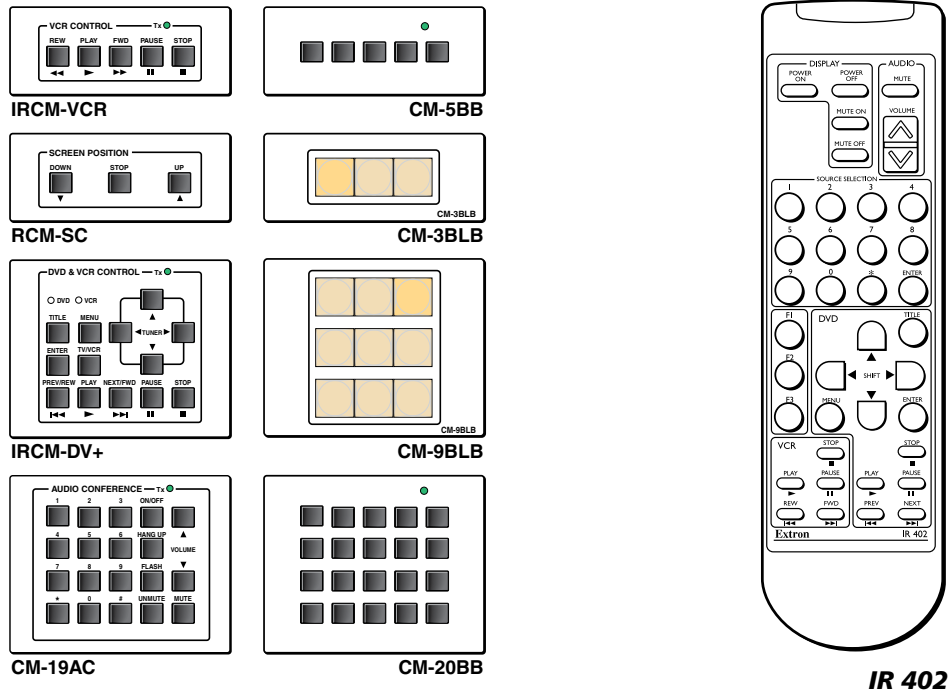
A few optional IRCM, RCM, and CM control modules   *IR 402 IR remote control*

The buttons on the optional IR 402 remote duplicate the MLC's front panel controls and also those of a VCR and a DVD player for normal operation (but not for setup). The IR 402 can also be used to control a MediaLink Switcher. The controller or switcher responds to commands from the IR 402 remote as if the corresponding button or knob were pressed or turned on the controller or switcher.

From a distance of no more than 30 feet and within 40° of the perpendicular axis, the IR 402 sends infrared (IR) signals to a MediaLink Controller or MediaLink Switcher via an optional, connected IR signal repeater.

MLC 104 IP Plus

IR Link

IR 402

The IR 402 remote's Display Power buttons, Display Mute buttons, and the VCR and DVD control buttons will not function until they have been programmed using GC version 2.2 or higher (2.5 or higher for the MLC 104 Plus) and the configuration has been uploaded into the MLC.
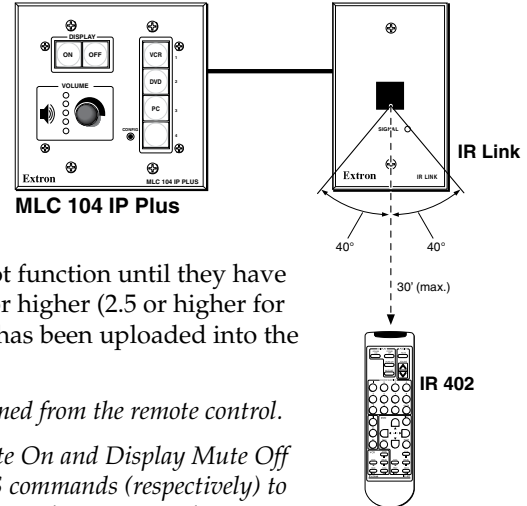
NOTE *Setup operations cannot be performed from the remote control.*

NOTE *Pressing the remote's Display Mute On and Display Mute Off buttons sends the* **1M** *and* **0M** *SIS commands (respectively) to the MLC.* *to learn about these commands.*

NOTE *To increase audio volume, press the Volume up (∧) button, rotate the MLC's Volume knob clockwise, or select a larger number in the Control tab of the MLC's embedded Web page.*

IR commands are transmitted from the MLC's Display RS-232/IR port (via IR Emitter) when the corresponding button is pressed on the remote or on the controller's, SCP's, or control module's front panel. Refer to the *Control Modules User's Manual*.

System Requirements

The MLC 104 Plus Series Controllers and Global Configurator have the following hardware and software requirements:

Hardware requirements

- Intel® Pentium® III, 1 GHz processor
- 512 MB of RAM
- 50 MB of available hard disk space
- A network connection with a minimum data transfer rate of 10 Mbps (100 Mbps is recommended) — for IP models

Software requirements

- Microsoft® Windows® operating system
  - Windows NT service pack 4, or
  - Windows 2000 service pack 2, or
  - Windows XP service pack 2, or
  - a higher version of Windows
- Microsoft Internet Explorer® 6.0 with ActiveX® enabled — for IP models
- Microsoft Windows Script 5.6

CAUTION *Do not run Global Configurator software on a PC that uses an earlier version of Windows.*

Chapter Two

Operation, Features, and Cabling

Operation, Features, and Cabling

Setup Checklist: How to Proceed With Installation

Get Ready

☐ Familiarize yourself with the MLC's features.

☐ Download and install the latest version of the Extron Global Configurator software and the latest driver package. (See the *MLC 104 Plus Series Setup Guide*, chapter 1.)

☐ Obtain IP setting information from the network administrator for the MLC. (Read the *MLC 104 Plus Series Setup Guide*, chapter 3.)

Configure the MLC

☐ Connect the MLC to the included external power supply. (See *MLC 104 Plus Series Setup Guide*, chapter 2.)

☐ Connect the PC to the MLC via Ethernet patch or crossover cable. (See *MLC 104 Plus Series Setup Guide*, chapter 2.)

☐ Configure MLC using Global Configurator. (Refer to *MLC 104 Plus Series Setup Guide*, chapter 3, and the Global Configurator help file.)

    ☐ Create a new Global Configurator project.

    ☐ Set the MLC's IP address, subnet mask, and other IP settings (for IP models).

    ☐ Define the MLC's GlobalViewer Tree location.

    ☐ Add the MLC to the project.

    ☐ Define e-mail settings and contacts.

    ☐ Add serial and IR drivers.

    ☐ Configure ports (Display, MLS, and Digital I/O) and assign device drivers as needed.

    ☐ Configure front panel buttons.

    ☐ Configure control module buttons.

    ☐ Create a display shutdown schedule.

    ☐ Create a display lamp hours warning e-mail (for IP models).

    ☐ Create a display disconnection warning e-mail (for IP models).

    ☐ Perform configurations for special applications, if needed. (See chapter 5.)

    ☐ Save the Global Configurator project/configuration.

    ☐ Build and upload the configuration.

Perform Physical Installation

☐ Install or replace button labels.

☐ Cable peripheral devices to ports on the MLC. (See chapters 2 and 6 of this manual or chapter 2 of the setup guide.)

☐ Test the system.

☐ Mount the MLC to an electrical box, wall, furniture, or rack and ground the unit. (See chapter 6 in this manual.)

Front Panel Features and Operation

NOTE *Many features must be set up in order for the MLC to function. See chapter 3, "Software-based Configuration and Control", and the* MLC 104 Plus Series Setup Guide *for information about Global Configurator, which you must use to set up most features of the MLC.*

MLC 104 IP Plus Front Panel
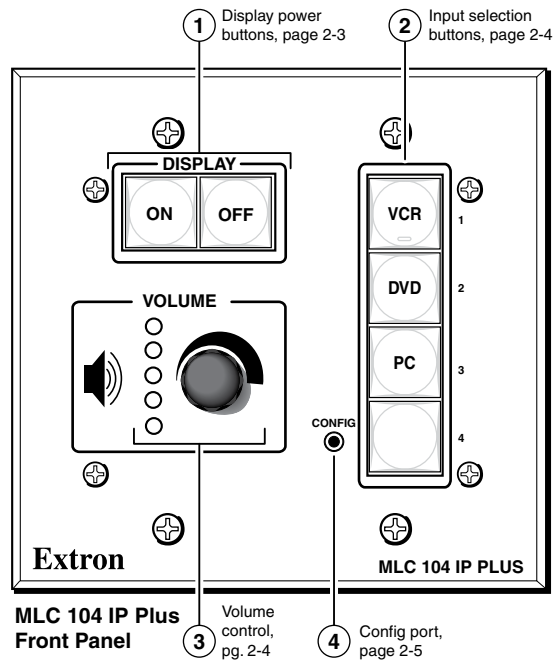
NOTE *The front panels of the IP and non-IP models are identical except for the product name.*

Buttons

The MLC 104 Plus Series controllers have backlit buttons. The functions, events, and scripts associated with these buttons are available with all models. Pressing the corresponding button on the Extron IR 402 remote control or an Extron SCP 104 keypad will cause that button's functions to be executed exactly as if you had pressed a front panel button.

By default all buttons illuminate brightly when selected (active), and light dimly when deselected. The button caps are removable so the button labels can be changed.

Each Display On/Off, Function/Room, and Input button can be set up to perform a sequence of several functions, which can be combinations of the following options:

- **a driver operation**—execute an RS-232 or IR control command that is part of a device driver (for a projector, VCR, DVD, audio source, etc.)

- **a time delay operation**—insert delays between executed commands

- **a button light operation—**change a front panel button's brightness, color, or flashing

- **a digital input/output operation**—turn the digital output on or off, toggle it, or pulse it

- **a user-defined RS-232 operation**—issue a non-driver-associated RS-232 command (one that you programmed separately) via a specific port (IR/Serial Out A, B, C; or the projector control port) or an internal command for the MLC, itself

① **Display On/Off buttons** — After they have been configured, press the On button to turn the projector or display device on, and press the Off button to

power it off. By default, only one of these two buttons can be selected (active) at once. Via Global Configurator (GC) software, other functions and relays can be associated with each of these buttons.

NOTE *To avoid conflicts with the front panel lockout PIN feature, Extron recommends configuring the Display Power buttons so that the MLC sends projector/display commands upon the button release instead of on the button press.*

② **Input selection buttons** — These buttons, labeled 1 through 4, can be configured to perform a variety of functions. Each button can be configured for input selection and to execute the IR or RS-232 commands of your choice, or trigger event scripts and/or port monitoring. By default they are a mutually exclusive group: only one of these buttons can be selected at a time. Also, by default each button is associated with an Extron input switching Simple Instruction Set (SIS™) command (1!, 2!, 3!, and so forth) and bidirectional communication via the MLC's MLS RS-232 port. See the picture at right.
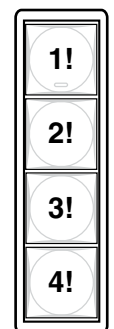
Alternatively, the buttons can be reconfigured (via software) to select different inputs and to trigger different commands. See chapters 3 and 4 for details.

Press an input selection button to select the desired audio and video input on the projector or an optional Extron switcher. The button for that selection lights brighter and remains lit brighter until a different input is selected.

NOTE *When these input selection buttons are configured for input switching, there is a default 0.5 second delay between when one input is selected and when a different input can be selected. This allows time for the projector to adjust to the change of sync signals. The delay period is adjustable.*

If the MLC is used without an optional switcher and the MLC has been set up for use with a projector, the selectable inputs on the MLC correspond to the number of inputs available on the projector. If an optional Extron switcher is connected to the MLC, all four input buttons are selectable. Which buttons are or aren't configured for input switching can be set via Global Configurator.

NOTE *When an input selection button is designated for input switching, pushing that button causes the MLC to send out an SIS input change command via the MLS RS-232 connector. In addition it can make the MLC send projector control commands through the Display RS-232/IR port, send a digital output signal, or send a serial command via the MLS RS-232 port.*

The default Extron SIS commands sent for each input via the MLS connector are shown at right. If desired, you can reassign (remap) any input from 1 to 99 to these input buttons. Button remapping can be convenient if a switcher is slaved to (controlled by) the MLC.

Button	Command
Input 1	1!
Input 2	2!
Input 3	3!
Input 4	4!

Volume control

③ **Volume knob and LEDs** — Rotate this knob clockwise to increase the audio volume, counterclockwise to decrease volume. Volume can be adjusted via this front panel knob, the corresponding knob on an SCP control panel, the Volume up/down buttons on an IR 402 remote control, or via RS-232/Telnet/ Web browser control.

The Global Configurator software lets you select whether this knob controls the projector's audio levels or the optional switcher's audio levels. If the knob controls the projector's audio levels, you can specify incremental adjustments or range-based adjustments (via device driver only). See chapter 3 and the software's help file for details.

NOTE *Not all devices that use RS-232 for audio level control can be properly controlled using the MLC's Volume knob. Some devices cannot respond quickly enough to the commands issued to them by the MLC.*

- *If the projector uses range adjustments, that can result in choppy audio level ramping (volume changing in jumps).*

- *If the projector uses incremental adjustments (volume up/down commands), that can result in slow audio ramping (requiring many turns of the knob to change the volume).*

If you experience problems using range-based audio control with a projector or other device, try slowing down the MLC's volume knob command rate by using the 49# SIS command (see chapter 4 on SIS programming for details) or encoder scaling in Global Configurator (see the Global Configurator Help file). If you need further assistance, contact Extron and ask to speak with an applications engineer.

If the MLC is configured for use with a MediaLink Switcher or for some projectors, the MLC's LEDs indicate volume ranges (with steadily lit LEDs) and minimum/maximum volume limits (with flashing LEDs), as shown in the following diagram.

Range-based Volume Adjustment

| Minimum, 0% of Max. Volume | 1% to 19% of Max. Volume | 20% to 39% of Max. Volume | 40% to 59% of Max. Volume | 60% to 79% of Max. Volume | 80% to 99% of Max. Volume | 100% of Max. Volume |
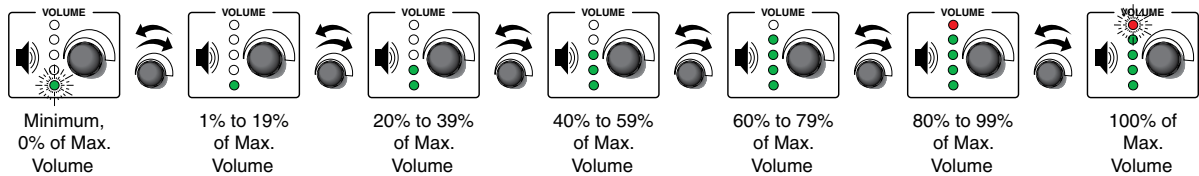
If the MLC is configured for increment/decrement volume adjustment, the LEDs scroll up/down briefly. See the example below.

Increment/Decrement-based Volume Adjustment

Configuration port

④ **Config (host control) port** — This port makes it possible to upload and configure device drivers and also to initiate IR learning via a front panel connection after the MLC has been installed.

Connect a Windows-based PC or an RS-232 control system to this 2.5 mm mini stereo-style (tip-ring-sleeve) connector. You can use the Extron 9-pin D to 2.5 mm stereo mini TRS RS-232 cable (part #70-335-01) or make your own cable. for a wiring diagram and port protocol.

NOTE *This port requires 38400 baud communication, a higher speed than many other Extron products use. The configuration software automatically sets the connection for the appropriate speed. If using HyperTerminal or a similar application, make sure the PC connected to these ports is set for 38400 baud.*

NOTE *Extron recommends configuring and controlling the MLC via the LAN connector. Ethernet connections are faster and more reliable.*

Front Panel Security Lockout (Executive Mode)

To prevent accidental changes to settings, the MLC features front panel security lockout (executive) modes for disabling access to controls. When front panel lockout is enabled, if a button is pressed, the button flashes red, but no change occurs. Nothing—not input switching, projector control, room control, volume adjustment, or any other knob- or button-executable function—results from front panel actions when lockout is active. Button and knob functions on the IR 402 remote control, SCPs, or control modules are also locked. Changes can still be made via RS-232 or, for IP models, via Ethernet (Telnet or Web browser) control.

The SIS command *3X* corresponds to and also enables this mode (see page 4-10). For details, see chapters 3 and 4. The only way to override a front panel lockout via the front panel is to enter a personal identification number (PIN) to unlock the panel, using the MLC's input buttons as a numeric keypad for PIN entry, as shown on page 2-7.

Enabling and disabling front panel lockout via the embedded Web pages and the front panel

Front panel lockout can be enabled/disabled using the embedded Web pages whether or not a PIN has been set. However, a PIN must be set up before you can enable or disable lockout using the front panel buttons.

Using the Web pages (IP models)

1. Using a Web browser, enter the MLC's IP address to open the MLC's embedded Web page. If an administrator password has been set and if you are prompted to do so, type in the administrator password.

2. Click on the **Configuration** tab, which opens to the System Settings page.

3. Select either **Off** or **Disable Front Panel, SCP, Control Modules and IR** in the Executive Mode settings area. See the following picture.
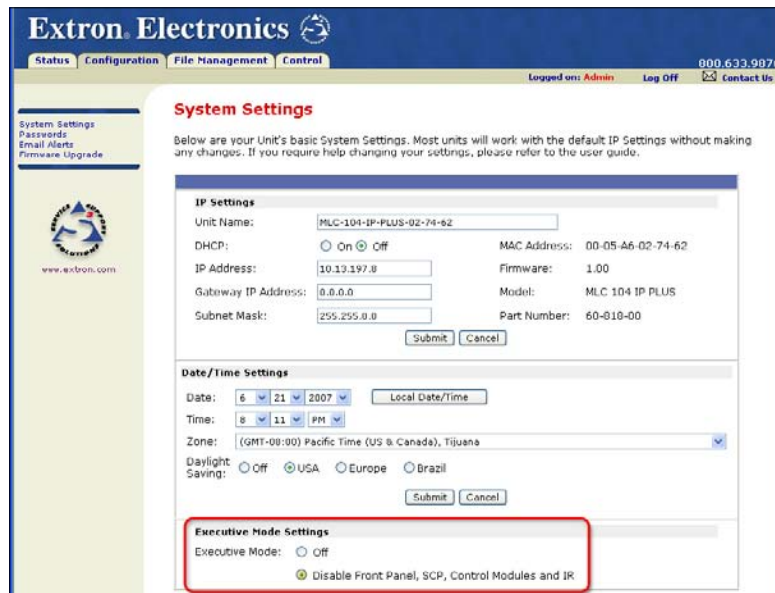
NOTE   *If **Disable Front Panel, SCP, Control Modules and IR** is selected via the System Settings factory default Web page, front panel lockout can't be enabled/disabled via the front panel unless PIN Mode is enabled. See page 4-40 to find the SIS commands for PIN enabling/disabling.*

Using the front panel (all models)

One or more PINs must be configured before this procedure can be used. See "Preparing the MLC for front panel lockout" on page 2-8. To lock/unlock the front panel, you use the Display On/Off buttons to change modes and use the input buttons as a numeric keypad.

NOTE *Make sure the projector or display is off before using a PIN to lock the front panel.*

NOTE *Failure to configure the On or Off buttons to send display/projector commands upon button release (instead of button press) may cause problems with the PIN Mode feature. (If one On/Off button is pressed before the other, and the buttons are configured to send commands at the button press, the first button's actions can be executed, preventing you from locking the front panel until the display's warm-up or cooldown period finishes.)*

NOTE *The PIN can be entered via either the MLC or the SCP.*

Locking the Front Panel of an MLC 104 Plus Series Controller

1 **Press and hold** both Display On/Off buttons simultaneously. The Display On/Off buttons light green, the other buttons dim, and the bottom Volume LED blinks.

2 While still pressing the Display buttons, **enter the PIN**. Use the input selection buttons as a 4-key numeric keypad; press one button at a time. One green Volume LED lights at a time as the buttons are pressed.

This example shows the default administrator PIN: **1** (2a), **4** (2b), **2** (2c), **3** (2d).

Release all buttons.

If the *correct* PIN is entered, the green Volume LEDs flash and all buttons flash red 3 times, indicating that front panel is locked.

If an *incorrect* PIN is entered, no buttons flash, the green Volume LEDs turn off, and the red (top) LED blinks.

Release all buttons.

Then the buttons light as they were lit before front panel lockout was set.

Unocking the Front Panel of an MLC 104 Plus Series Controller

1 **Press and hold** both Display On/Off buttons simultaneously. The Display On/Off buttons light red, the other buttons dim, and the bottom Volume LED blinks.

2 While still pressing the Display buttons, **enter the PIN**. Use the input selection buttons as a 4-key numeric keypad; press one button at a time. One green Volume LED lights at a time as the buttons are pressed.

This example shows the default administrator PIN: **1** (2a), **4** (2b), **2** (2c), **3** (2d).

Release all buttons.

If the *correct* PIN is entered, the green Volume LEDs flash and all buttons flash green 3 times, indicating that front panel is locked.

If an *incorrect* PIN is entered, no buttons flash, the green Volume LEDs turn off, and the red (top) LED blinks.

Release all buttons.

Then the buttons light as they were lit before front panel lockout was set.

Preparing the MLC for front panel lockout

To allow access to front panel changes to specific personnel while the front panel is locked, you can set a user and/or administrator PIN and set which type of PIN, if any, is allowed to unlock the panel.

Setting up and enabling or disabling PINs

Using the **Advanced Configuration** tab within Extron Global Configurator (GC) software, you can configure which PIN to enable (which PIN will be allowed to unlock the front panel), or disable both PINs so that no one can access the front panel during front panel lockout. And you can set the four-digit PINs for the administrator and for users.

NOTE   *Each digit of the PIN must be a number from 1 to 4 because they represent the MLC's four input buttons, which will be used as a numeric keypad. By default, both PINs are set to 1423. Refer to the* Global Configurator Help *file for the PIN setup procedure.*
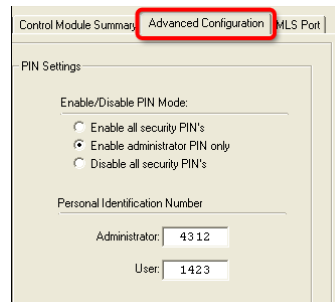
Scheduling front panel lockouts

You can set the MLC's front panel to be automatically locked at certain times and days by setting up a schedule using the **Schedule** tab within the Global Configurator software and uploading it to the MLC. The *Global Configurator Help* file includes instructions on how to set up a scheduled action.

IR Control

IR learning

The IR learning receiver sensor on the MLC 104 Plus Series' top panel can receive and "learn" commands from other devices' infrared remotes so you can create an IR driver file to control the projector or input devices such as a VCR or DVD player. IR learning of projector control codes is only necessary if there are no RS-232 codes available for that projector or if you need to customize the driver. Refer to the IR Learner help file for IR learning procedures.

This receiver accepts infrared signals of from 30 kHz to 62 kHz. The IR remote control must be pointed directly at the receiver for best results. The diagram at right indicates the best distances and angles at which to hold the remote control.

NOTE   *The MLC 104 Plus requires IR Learner version 1.23 or higher.*
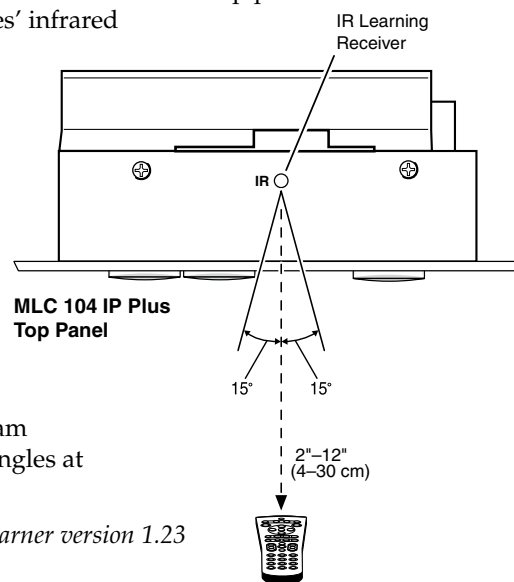
IR remote control

The MLC 104 Plus Series controllers do not have a built-in IR receiver that accepts signals for controlling the MLC, itself. However, you can connect an Extron IR Link or an IR Sensor remote IR receiver to the MLC's CommLink port as shown in "Additional control connections," starting on . Those devices can receive signals from an Extron IR 402 infrared remote control, which mirrors the MLC's front panel controls, and sends them to the MLC.

Panels and Cabling

Host/Config port cabling
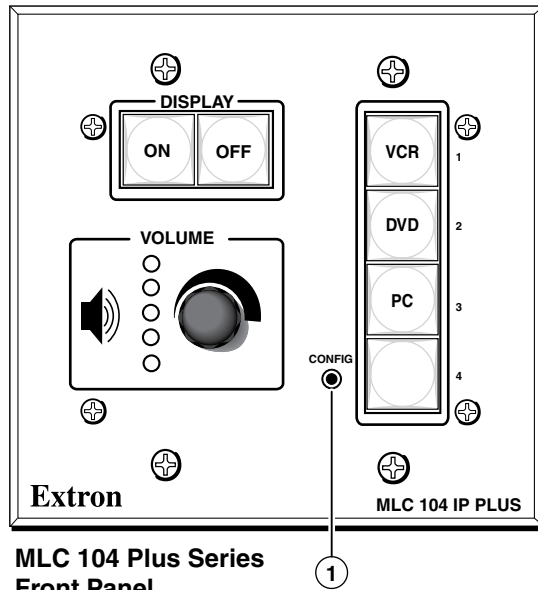
MLC 104 Plus Series
Front Panel

① **Front panel Config (host control) port** — For MLC configuration and control, connect a Windows®-based PC or an RS-232 control system to the MLC via this 2.5 mm mini stereo jack. This port is accessible even after the MLC has been installed and cabled. The optional 9-pin D to 2.5 mm stereo mini TRS RS-232 cable (part #70-335-01, shown below) can be used for this connection.

RS-232 protocol:
- **38400 baud**
- 1 stop bit
- no parity
- 8 data bits
- no flow control
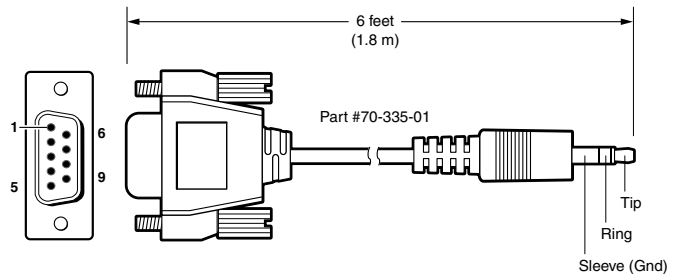
9-pin D	Connection	TRS Plug
Pin 2	Computer's RX line	Tip
Pin 3	Computer's TX line	Ring
Pin 5	Computer's signal ground	Sleeve

NOTE *This configuration port requires 38400 baud communication. This is a higher speed than many other Extron products use. Global Configurator software may automatically set the connection for the appropriate speed. If using HyperTerminal or a similar application, make sure the PC or control system connected to these ports is set for 38400 baud.*

NOTE *For the IP models, Extron recommends configuring and controlling the MLC via the LAN connector on the right side panel. Ethernet connections are faster and more reliable.*

Operation, Features, and Cabling, cont'd

Right/rear panel and cabling

MLC 104 IP Plus
Right Side Panel

Rear Panel
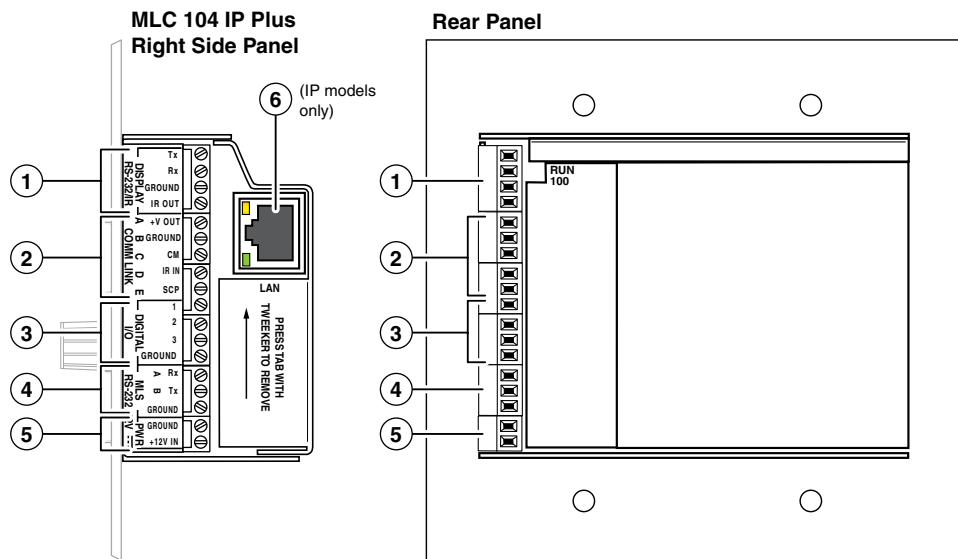
① **Display control (Display RS-232/IR) port** (page 2-10)

② **CM/IR/SCP (CommLink) port** (page 2-12)

③ **Digital I/O ports** (24 V, 1 A) (page 2-14 and "Using Digital Inputs" and "Using Digital Outputs" in chapter 5)

④ **MLS connector** (page 2-17)

⑤ **PWR (power) connector** (page 2-20)

⑥ **LAN (IP) connector and LEDs** (page 2-19) — IP models only

Projector/display connections

① **Display control (Display RS-232/IR) port** (-5 VDC to +5 VDC) —
From this port, commands from a projector driver or user-defined command strings entered via Global Configurator can be sent to the display device. Connect a cable between the projector or display and the <u>**left three poles**</u> (TX, RX, Ground) of this 3.5 mm direct insertion captive screw connector for bidirectional RS-232 control. The IR Out and Ground pins (the <u>**right two poles**</u>) can be used for one-way infrared signal output to control the display/projector or some other device, such as a VCR or DVD player. Use the following illustrations as a wiring guide.

NOTE *The connector accepts one wire per pole. You may need to splice projector and IR Emitter ground wires to a single wire that is inserted into this port.*
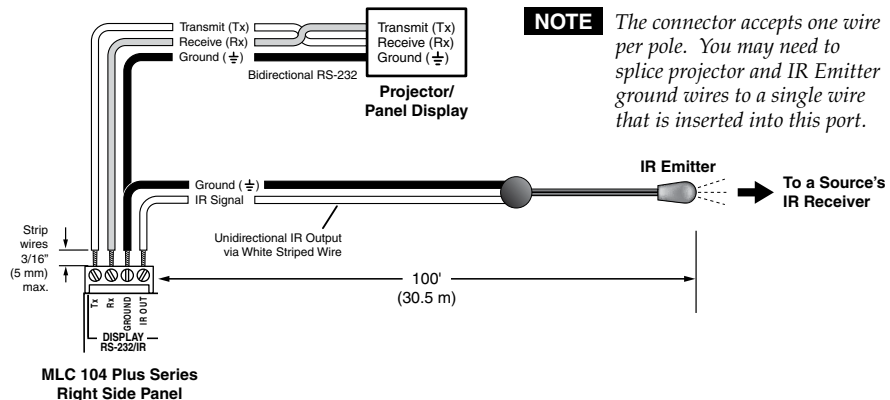
Wiring for RS-232 display control and IR source device control

Ground (⏚)
IR Output
Unidirectional IR
Strip wires
3/16" (5 mm) max.

Tx Rx GROUND IR OUT

— DISPLAY —
RS-232/IR

**MLC 104 Plus Series
Right Side Panel**

Ground (⏚)
IR Control
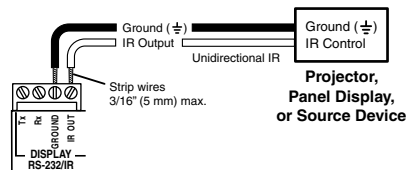
**Projector,
Panel Display,
or Source Device**

Wiring for IR display control

Wiring varies depending on the projector/display model. In most cases the drivers are bidirectional, but sometimes only the transmit (Tx) and ground connections will be needed for projector/display control. For bidirectional RS-232 communication, the transmit, ground, *and* receive pins must be wired at both the MLC and the projector or display.

NOTE *Each projector or display may require different wiring. For details, refer to the manual that came with the projector/display or the Extron device driver communication sheet.*

NOTE *Maximum distances between the MLC and the device being controlled may vary up to 200 feet (61 m). Factors such as cable gauge, baud rates, environment, and output levels (from the MLC and the device being controlled) all affect transmission distance. Distances of about 50 feet (15 m) are typically not a problem. In some cases the MLC may be capable of transmitting and controlling a given device via RS-232 up to 250 feet (76 m) away, but the RS-232 response levels of that device may be too low for the MLC to detect.*

Alternatively, an MLC can use infrared signals and IR Emitters to control several source devices. However, the MLC's direct insertion captive screw connectors have small openings that accept just one wire per pole. To connect up to two IR Emitters to the MLC, insert one ground and one signal wire in the MLC's Display RS-232/IR port, then connect the IR Emitters to those wires. If using all single emitters *or* all double emitters, wire the emitters in parallel. If using a mix of both single and dual emitters, see the *IR Emitter Installation Guide*, part number 68-808-01.

VCR

DVD Player

Single and Dual IR Emitter

Two Single IR Emitters

Dual IR Emitters

Two Single & 0ne Dual IR Emitter

Legend
(–) ━━━━ **Black wire**
(+) ════ **Black wire
w/white stripe**
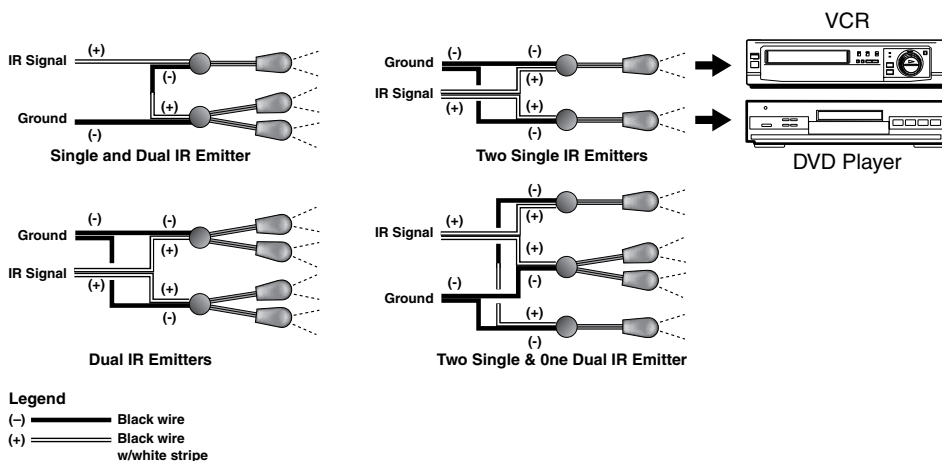
Wiring for IR control of up to two sources

Operation, Features, and Cabling, cont'd

Additional control connections

② **CM/IR/SCP (CommLink) port** — For remote control of the MLC 104 Plus Series controller or other items, you can connect up to four Extron control modules (IRCMs, ACMs, RCMs, CMs), one Extron infrared signal repeater (IRL 20 or IR Link), and/or up to two Extron SCP 104 control panels to this port. A maximum of seven devices can be connected to this port. See the figures on pages 2-13 and 2-14.

NOTE *The SCP 104 must have firmware 1.01 or greater and DIP switch 4 in the On (up) position to operate with an MLC 104 Plus Series controller. Refer to the* SCP 104 User's Manual *for more details.*

The SCP 104 replicates the MLC's front panel controls. The SCP 104 and the IR signal repeater can receive IR signals from an optional IR 402 remote control and send them to the controller. Control modules can be used (once the MLC is set up) to control VCRs, DVD players, tape decks, a projector lift, or screen control. Refer to the appropriate device's user's manual.

NOTE *If outside factors such as fluorescent light interfere with and affect the function of the MLC, you can disable IR control of the MLC. Using a special function SIS command (65#), you can turn off the MLC's ability to receive IR signals from IR signal repeaters and SCPs.*

The control modules, IR signal repeater, and SCPs can be daisy chained. Wire the connections as shown in the diagrams on the following pages.

Extron Comm-Link (CTL and CTLP) cable is recommended for these connections. Before inserting wires in the connectors, strip the cable and apply heat shrink as shown at right.

3/16" (5 mm) Max.

7/8" (22 mm)

Heat Shrink on Outer Jacket to Inner Conductor Transition

Extron Comm-Link Cable

TIP *For best results and to avoid short circuits, Extron recommends using shielded wires or wires insulated using heat shrink (instead of bare wires) for the common/drain wires.*

NOTE *The maximum distance between the MLC and a connected device is 200' (61 m).*

NOTE *The CommLink port provides up to 12 VDC for powering the SCP control panel or other devices. The automatic current protection circuit for this port limits the draw to 0.5 amperes.*

NOTE *SCP control panel or control modules (CM, IRCM, RCM) used with the MLC* **are** *affected by front panel security lockout (executive mode) status changes.*

IR Link

Maximum = 1 IR Link

SIGNAL

Extron   IR LINK

IR 402

A +12 VDC
B Ground and Drain
D Modulated IR (from IR Link)

Heat Shrink over Drain Wire

SCP 104

A +12 VDC
B Ground (⏚)
C IRCM, ACM, RCM
E SCP communication (IR)

+V OUT GROUND CM IR IN SCP
A B C D E
COMM LINK

**MLC 104 Plus Series
Right Side Panel**

DISPLAY
ON   OFF

VCR   1
DVD   2
PC   3
       4

VOLUME

Extron   SCP 104

Maximum = 2 SCPs Per System

C IRCM/ACM/RCM
B Ground (⏚)
A +12 VDC

**200' (61 m) Max.
to Last Device**

Extron CTLP Cable Color Code:
E SCP Communication = White
D Modulated IR (for IR Link) = Gray
C Control Module Communication = Violet
B Ground (⏚) & Drain Wire = Black and Drain Wire
A +12 VDC = Red

DVD & VCR CONTROL — Tx
DVD   VCR
TITLE MENU   TUNER
ENTER TV/VCR
PREVIEW PLAY NEXT/FWD PAUSE STOP

Maximum = 4 Control Modules (4 module addresses)

IRCM-DV+

Basic connections to an SCP, control module, and IR signal repeater

NOTE   *If you connect a CM-3BLB or CM-9BLB to an SCP 226's 3-pole connector instead of to its 5-pole connector, the CM-xBLB control module's buttons will not light.*

SCP 104 Rear Panel

**MLC 104 Plus Series
Rear Panel**

J1

ABCDE ABCDE

ABCDE ABCDE

CM-3BLB

CM-3BLB

CM-3BLB Front   **CM-3BLB Rear**   **CM-3BLB Rear**   **CM-3BLB Front**
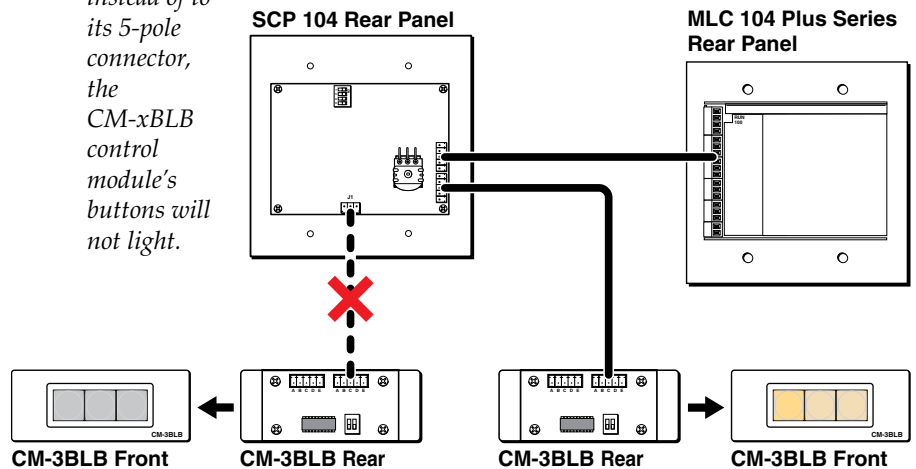
Operation, Features, and Cabling, cont'd

MLC 104 IP Plus DV+ connections:

The MLC 104 IP Plus DV+ consists of an MLC 104 IP Plus controller and an IRCM-DV+ installed in a high-impact plastic faceplate. The wiring is the same as in the previous diagram, except the IRCM-DV+ is cabled to the MLC at the factory, as shown in the following diagram.

MLC 104 IP Plus DV+ Rear Panel

SCP 104 Rear Panel

IRCM-DV+ Rear Panel

Factory-wired MLC - to - IRCM-DV+ Connection

IRCM-DV+ Rear Panel

SCP 104 Rear Panel

An MLC 104 IP Plus DV+ with SCPs and additional control modules

③ **Digital I/O ports** — The Digital I/O area (shown at right) provides three ports that can be configured as digital inputs or outputs, with or without +5 VDC pull-up. Connecting these ports to sensors, switches, LEDs, or relays allows for a way to trigger events or functions (such as triggering relays, issuing commands, or sending an e-mail) that have been configured using Global Configurator (GC) software.
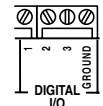
Right Side Panel

CAUTION *Configure these ports using Global Configurator software or SIS commands first, and then connect wires the MLC's ports. A mismatch between port configuration and wiring can cause malfunctions or unit failure.*

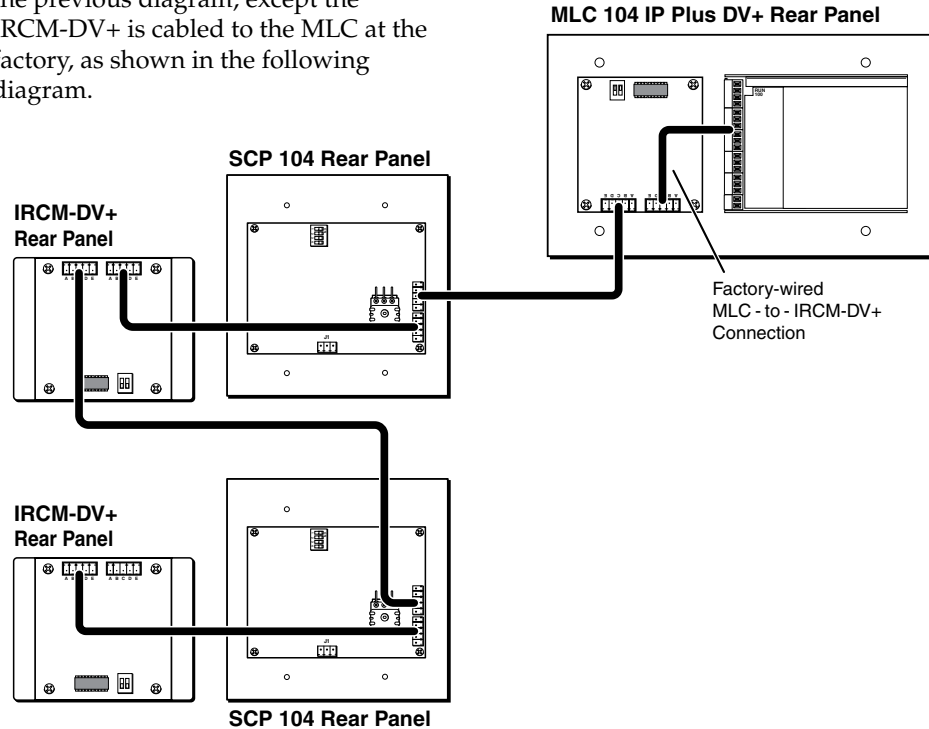**Digital input** — To allow the MLC to monitor devices such as push buttons, connect a switch, motion sensor, moisture sensor, tally feedback output, or a similar item to a digital input port. When one of these ports is configured as a digital input, it is set to measure two states: high and low. The port accepts 0 to 12 VDC input. The threshold voltages are as follows: a voltage below 2.0 VDC is measured as logic low, and a voltage above 2.8 VDC is measured as logic high. There is also an internal, +5 VDC, selectable, pull-up resistor for this circuit.

Using these pins and an external switch to trigger digital input

Digital input is triggered by an external switch wired between the I/O pin and ground. The pull-up resistor to +5.0 VDC is activated (switch 2 is enabled/closed).

MLC 104 IP Plus

+12 V +5.0 V

2k ohms

SW 2

Pin 1, 2, or 3 of the Digital I/O Port

Digital Input

CTL

Normally Open Switch

GND

Digital I/O Port GND
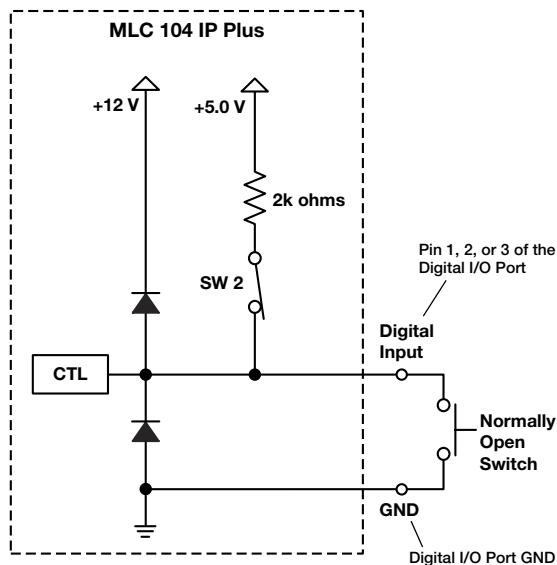
Using a motorized surface access enclosure to trigger digital input

Digital input at the MLC is triggered by a digital output from a motorized Extron HSA 822M.

A closure to ground (switch 1) occurs when a certain condition is met on the HSA. This closure to ground triggers the MLC.

The MLC must have the pull-up resistor to +5.0 VDC activated (switch 2 is enabled/closed).

MLC 104 IP Plus   HSA 822M/MS

+12 V   +5.0 V   +12 V

2k ohms

Pin 1, 2, or 3 of the Digital I/O Port

SW 2

Digital Input   Status Pin

CTL   CTL

SW 1

GND   GND

Digital I/O Port GND
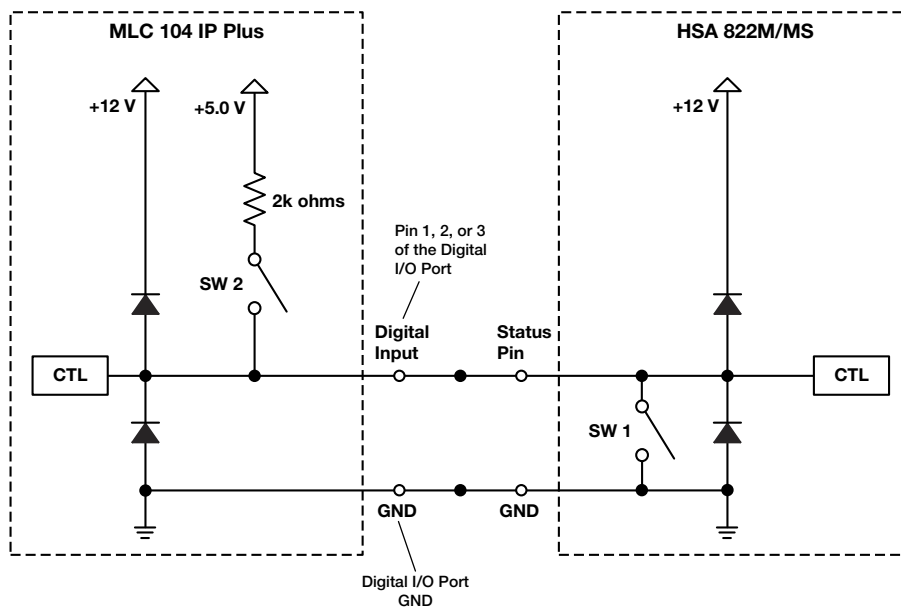
See "Using Digital Inputs" in chapter 5, "Special Applications", for a wiring diagram for this example.

Operation, Features, and Cabling, cont'd

Digital output — To power LEDs, incandescent lights, or other devices that accept a TTL signal, or to provide contact closure control for projector lifts, motorized screens, room or light switches via an Extron IPA T RLY4, you can use one or more of these ports as a digital output. Each I/O port is capable of accepting 250 mA, maximum. If the application calls for TTL compatibility, the digital output circuit can be set up to provide a 2k ohm pull-up resistor to +5 VDC.

When a digital I/O pin is configured as a digital output, it is set to offer two output states: "on" and "off".

When the port is set to an "on" state, switch 1 (SW 1) closes and the I/O pin connects to ground.

When the port is set to the "off" state, switch 1 opens and the I/O pin floats.

The MLC 104 Plus Series controller cannot provide TTL level outputs like some of the IP Link interfaces. Switch 2 cannot be enabled when I/O pin is used as an output.

When used as a digital output, a digital output pin on the MLC may not work with certain devices requiring contact closure control. Although the illustration shows a short to ground when switch 1 is enabled, the actual circuit does not provide a completely grounded output. For any devices requiring contact closure control, it is recommended that relays be used.
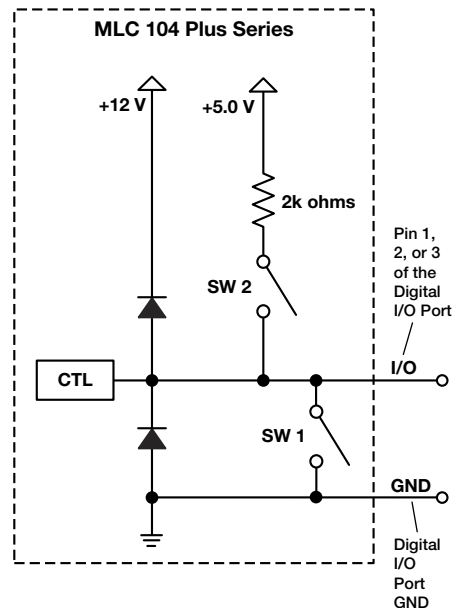
The digital output pin drives an LED using an external +5 VDC source.

The LED lights only when the I/O pin is set to "on" (switch 1 is closed).
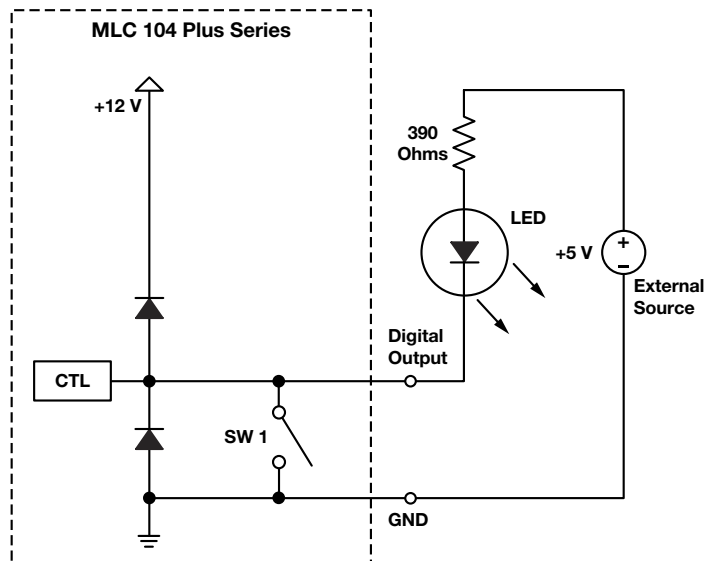
NOTE   *The I/O pin is capable of sinking a maximum of 250 mA from 12 VDC, max.*

The digital output pin drives an LED using the +12 VDC output of the controller as a voltage source.

The LED lights only when the I/O pin is set to "on" (switch 1 is closed).
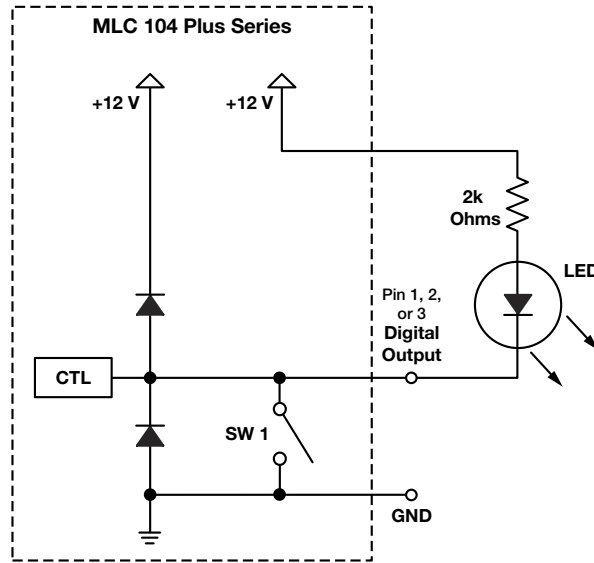
MLC 104 Plus Series

+12 V   **+12 V**

2k Ohms

LED

Pin 1, 2, or 3
Digital Output

CTL

SW 1

GND

NOTE *The I/O pin is capable of sinking a maximum of 250 mA from 12 VDC, max.*

The digital output pin drives an incandescent lamp using the +12 VDC output of the controller as the voltage source.

The lamp lights only when the I/O pin is set to "on" (switch 1 is closed).

MLC 104 Plus Series

+12 V   **+12 V**

+12 V Out

Lamp

Digital Output

CTL

SW 1

GND
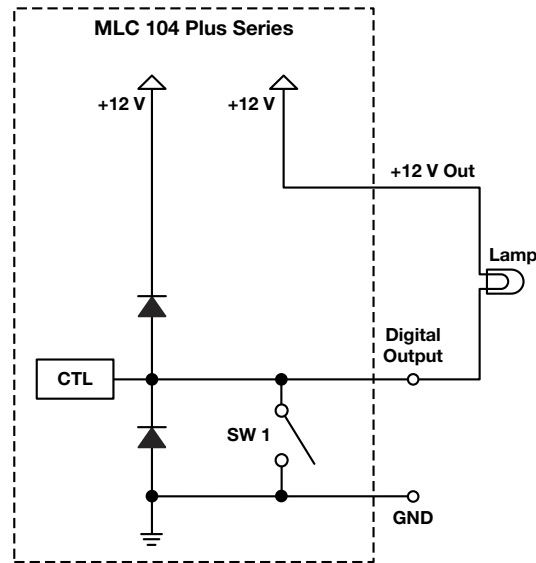
④ **MLS connector** — To control an optional Extron switcher or other RS-232 controllable device, connect a cable between this 3.5 mm direct insertion captive screw connector and the RS-232 port of the other device. By default this port supports any Extron switcher without additional drivers. If it is used to control other products, additional device drivers may be required.

NOTE *The commands issued from this port are standard Extron SIS commands, and they follow the typical Extron RS-232 protocol:*
• 9600 baud
• 8 data bits
• 1 stop bit
• no parity

If you connect an optional switcher (such as an Extron MLS Series or PVS Series switcher) to the MLC, you **must** connect a ground wire between the switcher and the MLC, as shown in the following diagrams.

Operation, Features, and Cabling, cont'd
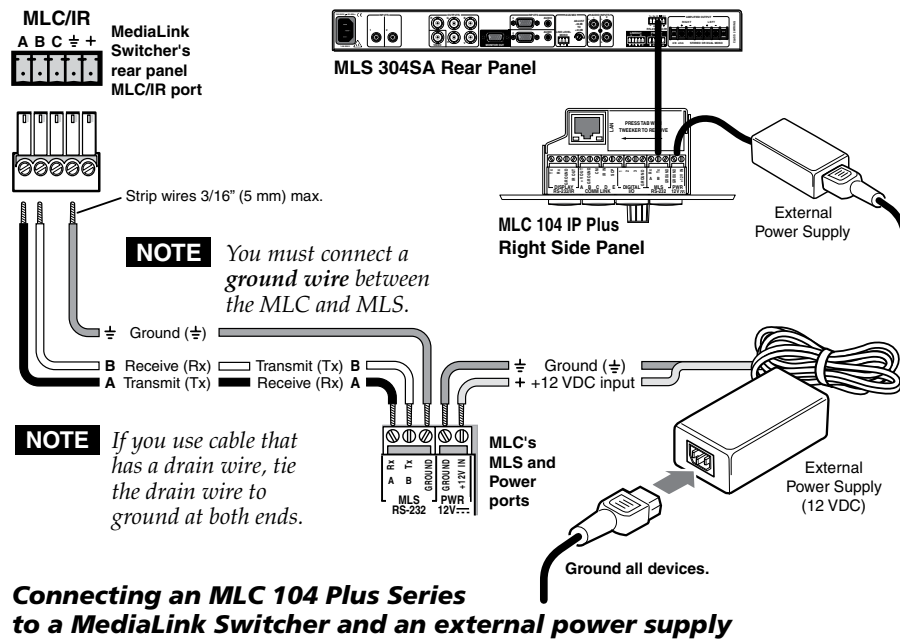
**Connecting an MLC 104 Plus Series
to a MediaLink Switcher and an external power supply**
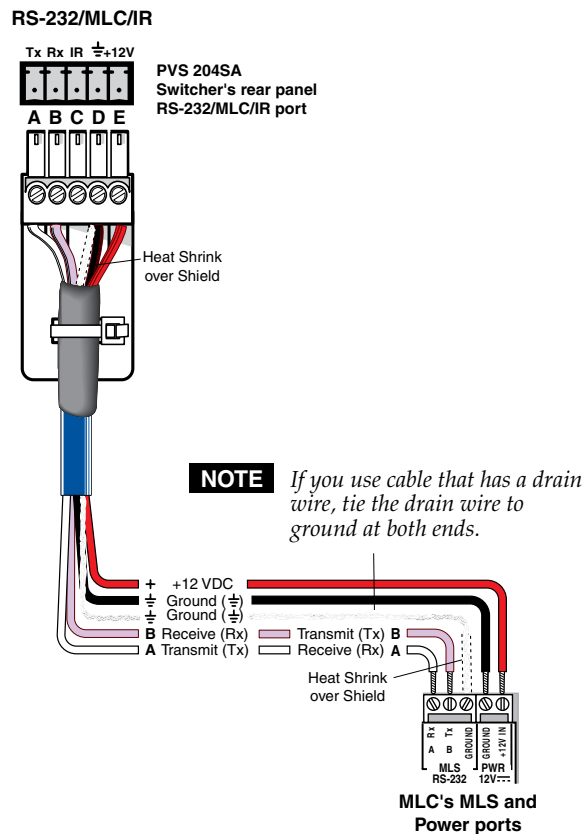
**Connecting an MLC 104 Plus Series
controller to a PVS Switcher**

⑥ **LAN (IP) connector and LEDs (IP models only)** — An Ethernet connection can be used to connect and to control the MLC (and the devices connected to it) in an Ethernet network. Plug a cable into this RJ-45 socket and connect the other end of the cable to a network switch, hub, router, or PC connected to an Ethernet LAN or the Internet.

- For 10Base-T (10 Mbps) networks, use a CAT 3 or better cable.

- For 100 Base-T (max. 155 Mbps) networks, use a CAT 5 cable.

You will also need to configure this port before using it.

Activity LED — This yellow LED blinks to indicate network activity.

Link LED — This green LED lights to indicate a good network connection.

LAN

RJ-45 Port

Link LED

Activity LED

- Use a **straight-through cable** for connection to a switch, hub, or router.

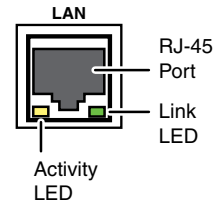- Use a **crossover cable** for connection directly to a PC. Wire the connector as shown in the following tables.

Pins:
1 2 3 4 5 6 7 8

Side View

Insert Twisted Pair Wires

RJ-45 Connector
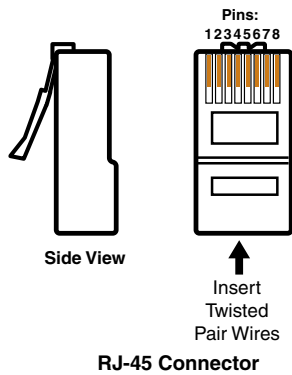
Straight-through Cable (for connection to a switch, hub, or router)			
End 1		**End 2**	
Pin	Wire Color	Pin	Wire Color
1	white-orange	1	white-orange
2	orange	2	orange
3	white-green	3	white-green
4	blue	4	blue
5	white-blue	5	white-blue
6	green	6	green
7	white-brown	7	white-brown
8	brown	8	brown

Crossover Cable (for direct connection to a PC)			
End 1		**End 2**	
Pin	Wire Color	Pin	Wire Color
1	white-orange	1	white-green
2	orange	2	green
3	white-green	3	white-orange
4	blue	4	blue
5	white-blue	5	white-blue
6	green	6	orange
7	white-brown	7	white-brown
8	brown	8	brown

Configure the settings for this port via either SIS commands or Global Configurator. See the programming sections of this manual (chapters 3 and 4) for details.

LAN port defaults:
- **MLC's IP address:** 192.168.254.254
- **gateway's IP address:** 0.0.0.0
- **subnet mask:** 255.255.0.0
- **DHCP:** off

Operation, Features, and Cabling, cont'd

Power connection

⑤ **PWR (power) connector** — To provide power to the MLC, connect a cable between this port and a 12 VDC, 2 amp (maximum) power supply. See the following diagram.

NOTE *Power the controller via an external power supply, not from an Extron switcher. The controller requires a separate 12 VDC power supply.*
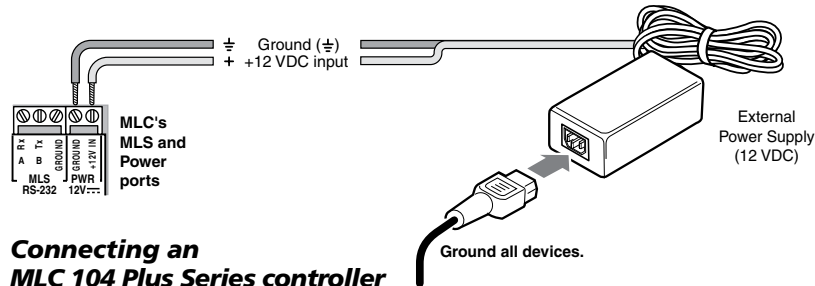
Connecting an MLC 104 Plus Series controller to an external power supply

NOTE *Check the power supply's polarity before connecting it to the MLC. See the illustration at right.*
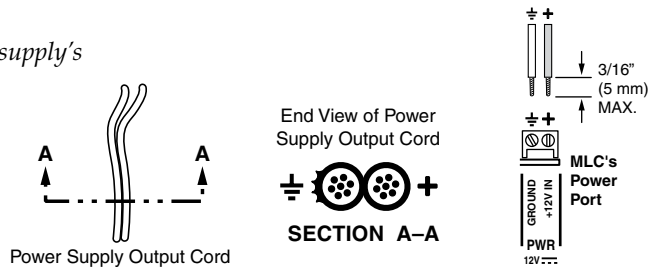
Top panel: IR learning sensor

In most cases, Extron has already produced an IR driver file for controlling the projector or display you plan to use. If a device driver file is not available, you can create your own using Extron IR Learner software, the projector or display's remote control, and the MLC's IR learning receiver sensor, shown below.

MLC 104 Plus Series Top Panel

IR Learning Receiver
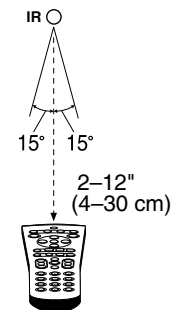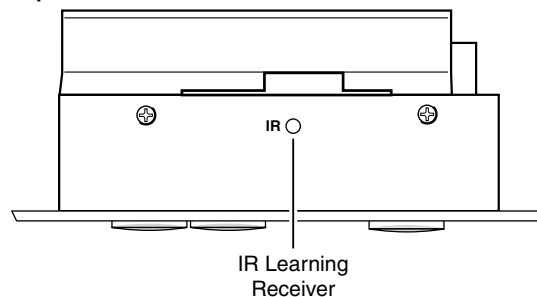
Refer to the IR Learner Help File for instructions on how to create the driver file. During the IR command capturing process, hold the projector's remote between 2" and 12" from and pointed directly at the MLC's IR learning sensor, as shown above.

NOTE *The MLC 104 Plus requires IR Learner version 1.23 or higher.*

Left side panel: reset features

Reset button and LED — Pressing this recessed button causes various IP functions and Ethernet connection settings to be reset to the factory defaults. The green LED flashes in a predetermined pattern depending on the selected reset mode. See "Resetting the Unit" on page 2-22 for details.

Reset
LED

R

Reset
button

MLC 104 Plus Series
Left Side
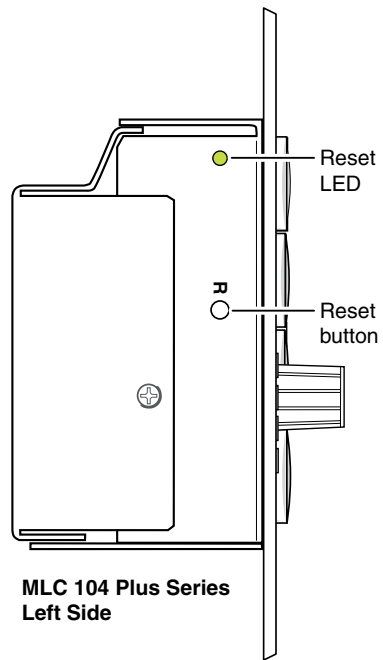
Operation, Features, and Cabling, cont'd

Resetting the Unit

There are four reset modes (numbered 1, 3, 4, and 5 for the sake of comparison with an Extron IPL product) that are available by pressing the Reset button on the side panel. The Reset button is recessed, so use a pointed stylus, ballpoint pen, or Extron Tweeker to access it. See the following table for a summary of the modes.

CAUTION *Review the reset modes carefully. Using the wrong reset mode may result in unintended loss of flash memory programming, port reassignment, or a controller reboot.*

NOTE *The reset modes listed below close all open IP and Telnet connections and close all sockets. The following modes are separate functions, not a continuation from Mode 1 to Mode 5. Also, IP settings do not apply to the MLC 104 Plus.*

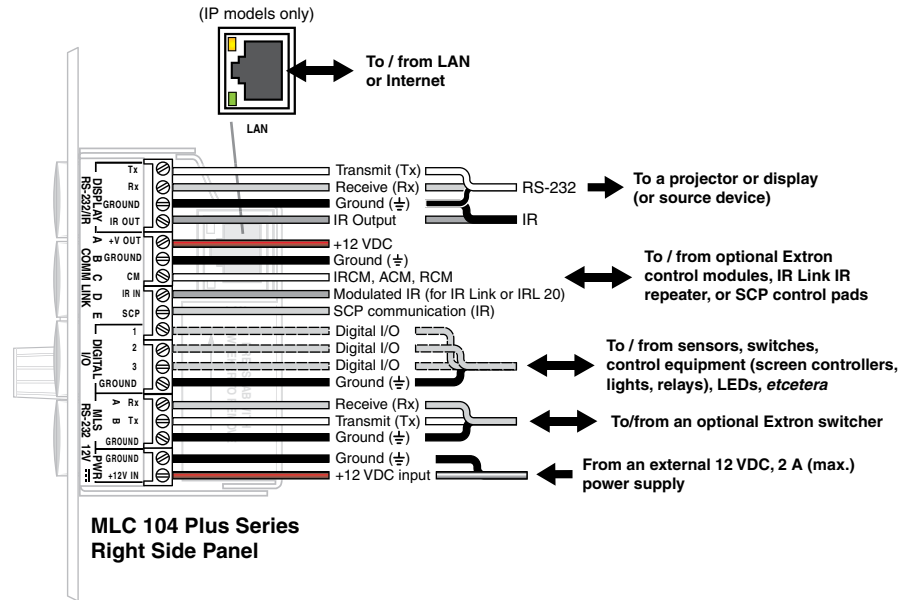|	Reset Mode Comparison/Summary		
Mode	**Activation**	**Result**	**Purpose/Notes**
1	Hold down the recessed Reset button while applying power to the MLC. **NOTE** *After a mode 1 reset is performed, update the MLC's firmware to the latest version.* **Do not** *operate the MLC firmware version that results from the mode 1 reset. If you want to use the factory default firmware, you must upload that version again. See appendix B, "Firmware Updates," for details on uploading firmware.*	**The MLC reverts to the factory default firmware.** Event scripting will not start if the MLC is powered on in this mode. All user files and settings (drivers, adjustments, IP settings, etc.) are maintained. **NOTE** *If you do not want to update firmware, or you performed a mode 1 reset by mistake, cycle power to the MLC to return to the firmware version that was running prior to the mode 1 reset. Use the 0Q SIS command to confirm that the factory default firmware is no longer running (look for asterisks following the version number.)*	Use mode 1 to revert to the factory default firmware version if incompatibility issues arise with user-loaded firmware.
3	Hold down the Reset button for about 3 sec. until the Reset LED blinks once, then release and press Reset momentarily (<1 sec.) within 1 second.	**Mode 3 turns events on or off.** During resetting, the Reset LED flashes 2 times if events are starting, 3 times if events are stopping.	Mode 3 is useful for troubleshooting.
4	Hold down the Reset button for about 6 sec. until the Reset LED has blinked twice (once at 3 sec., again at 6 sec.). Then release and press Reset momentarily (for <1 sec.) within 1 second.	**Mode 4** • Enables ARP capability. • Sets the IP address back to factory default. • Sets the subnet back to factory default. • Sets the default gateway address back to the factory default. • Sets port mapping back to factory default. • Turns DHCP off. • Turns events off. The Reset LED flashes 4 times in quick succession during reset.	Mode 4 enables you to set IP address information using ARP and the MAC address.
5	Hold down the Reset button for about 9 sec. until the Reset LED has blinked three times (once at 3 sec., again at 6 sec., again at 9 sec.). Then release and press Reset momentarily (for <1 sec.) within 1 second.	**Mode 5 performs a complete reset to factory defaults (except the firmware).** • Does everything mode 4 does. • Resets almost all the real time adjustments: all audio settings, limit initial power up volume, power up/down delay, auto power down, and misc. options. This does not affect an optional MLS switcher, however. • Clears driver-port associations and port configurations (IR/RS-232). • Removes button configurations. • Resets all IP options. • Removes scheduling settings. • Removes/clears all files from switcher. The Reset LED flashes 4 times in quick succession during the reset.	Mode 5 is useful if you want to start over with configuration and uploading, and also to replace events.

Pinout Guide

The illustration below summarizes the pin assignments of all of the MLC's side panel connectors that are covered in detail on the preceding pages.

(IP models only)

To / from LAN or Internet

LAN

Tx	Transmit (Tx)	RS-232 → To a projector or display (or source device)
Rx	Receive (Rx)	
GROUND	Ground (⏚)	
IR OUT	IR Output	IR
+V OUT	+12 VDC	To / from optional Extron control modules, IR Link IR repeater, or SCP control pads
GROUND	Ground (⏚)	
CM	IRCM, ACM, RCM	
IR IN	Modulated IR (for IR Link or IRL 20)	
SCP	SCP communication (IR)	
1	Digital I/O	To / from sensors, switches, control equipment (screen controllers, lights, relays), LEDs, etcetera
2	Digital I/O	
3	Digital I/O	
GROUND	Ground (⏚)	
Rx	Receive (Rx)	To/from an optional Extron switcher
Tx	Transmit (Tx)	
GROUND	Ground (⏚)	
GROUND	Ground (⏚)	From an external 12 VDC, 2 A (max.) power supply
+12V IN	+12 VDC input	

DISPLAY RS-232/IR — COMM LINK A B C D E — DIGITAL I/O — MLS RS-232 — PWR 12V

**MLC 104 Plus Series
Right Side Panel**

Operation, Features, and Cabling, cont'd

3

Chapter Three

Software-based Configuration and Control

Software-based Configuration and Control

Configuration and Control: an Overview

An MLC Plus Series controller <u>must</u> **be configured before use** or it will not be able to control other devices. The IP models can be configured and controlled via a host computer attached to the right/rear panel LAN (local area network) port or the front panel Config port. The MLC 104 Plus can be configured from the front panel Config port. See chapter 2 for pin assignments and other details on the configuration and control ports.

NOTE *For IP models, Extron recommends configuring and controlling the MLC via the LAN connector. Ethernet connections are faster and more reliable.*

- The primary means for configuring the controller is by using the Extron Global Configurator (GC) software. This method requires a properly configured PC with Windows® 2000, Windows XP, or a higher version of Windows installed. Global Configurator generates GlobalViewer® Web pages that are uploaded to the MLC and, for IP models, can be used to control the MLC and make adjustments to its settings.

NOTE *Microsoft® Internet Explorer® is currently the only Web browser that fully supports GlobalViewer pages.*

- Alternatively, for IP models, the default Web pages embedded within the MLC provide a means to perform some setup, adjustment, and control via a Web browser (Netscape® Navigator® version 6.0+, Internet Explorer version 5.5+, or Mozilla® Firefox® version 1.0+) from any type of network-enabled computer.

NOTE *Netscape and Firefox cannot be used for viewing the Serial Control pages of the factory-embedded Web page. Run Internet Explorer to use those pages.*

- The third way to control and configure the controller is by using Simple Instruction Set (SIS™) commands via Telnet (IP models), a Web browser (IP models), or RS-232. SIS commands are discussed in detail in chapter 4.

The Basic Setup Steps: a Guide to this Chapter and Other Resources

NOTE *Setup/configuration may be performed away from the job site.*

1 **Configure the MLC for network communication**. See "Configuring IP-enabled MLCs for Network Communication" on page 3-3.

2 **Download or install Global Configurator and other Extron software (IR Learner) and device drivers.** See chapter 1 of the *MLC 104 Plus Series Setup Guide*, the software disk(s) that were shipped with the unit, and the Extron Web site for instructions.

NOTE *The* MLC 104 Plus Series Setup Guide *is shipped with the MLC. It is also available as a PDF file on the Extron Web site (www.extron.com). The CD included with the unit contains software, device drivers, a PDF file of the full reference manual, and additional documentation available when the unit was shipped. The setup guide outlines most of the common tasks required to set up an MLC.*

3 **Create a Global Configurator project and configure basic settings and functions.** See chapter 3 of the *MLC 104 Plus Series Setup Guide*, or see the *Global Configurator Help* file for step-by-step procedures.

4 **Configure additional or advanced functions**, if desired. See the *Global Configurator Help* file. For information on IR learning, read the *IR Learner Help* file.

5 **Save and upload the configuration to the MLC.** See the *MLC 104 Plus Series Setup Guide*, chapter 3.

6 For IP models, **control the MLC and devices connected to it** by using the MLC's embedded Web pages or its GlobalViewer (GV) Web pages. See "Controlling an IP Link-enabled MLC" later in this chapter.

Communicating with the MLC

To communicate with the MLC, you must power on the MLC and the PC you'll use to configure it, and connect the two devices for IP (network, for IP models) or serial (RS-232) communication.

- **Power:** see chapter 2 for wiring instructions. It's best to power the unit using the 12 VDC external power supply that is shipped with the MLC.

- **Communication:** to connect the MLC to a network (IP models) or to connect it directly to the PC using a serial cable (all models), see page 2-9 or page 2-19 of this manual for wiring instructions. See "Configuring IP-enabled MLCs for Network Communication," below to set the unit up to talk with the PC.

Configuring IP-enabled MLCs for Network Communication

To function together, both the PC and the MLC must be configured correctly. Unless you use an RS-232 connection for all setup and communication with the controller, the PC must be network-capable with the proper protocols, and the MLC 104 IP Plus must be set up so it can be connected to a LAN or other network.

NOTE *Network and IP features apply only to the MLC 104 IP Plus products, which are the IP-enabled models. The MLC 104 Plus does not support IP Link® features.*

When you power on the MLC for the first time, you have a choice of several ways to set up the controller's IP address:

- Use the Global Configurator software via the LAN connector.
- Use the ARP (address resolution protocol) command via the LAN connector.
- Use a Web browser via the LAN connector.
- Use SIS commands via an RS-232 connection.
- Use SIS commands via Telnet and the LAN connector.

If you use a Web browser or Telnet the first time you connect a PC to an IP model controller via IP, you will probably need to temporarily change the PC's IP settings in order to communicate with the controller. See "Setting up the PC for IP communication with an IP-enabled MLC" later in this chapter. Then you must change the controller's default settings (IP address, subnet mask, and [optional] administrator name and password) in order to use the unit on an intranet (LAN) or on the Internet. After you have set up the MLC for network communication, you can reset the PC to its original network configuration via RS-232 or IP connection.

MLC 104 Plus Series's RS-232 protocol:

- **38400 baud**
- 8 data bits
- 1 stop bit
- No parity
- No flow control

NOTE *The configuration port requires 38400 baud communication. This is a higher speed than many other Extron products use. The Global Configurator program automatically sets the connection for the appropriate speed. If using HyperTerminal or a similar application, make sure the PC or control system connected to this port is set for 38400 baud.*

MLC 104 IP Plus's LAN port defaults (IP models):

- **MLC's IP address:** 192.168.254.254
- **Gateway's IP address:** 0.0.0.0
- **Subnet mask:** 255.255.0.0
- **DHCP:** off
- **Link speed and duplex level:** autodetected

Software-based Configuration and Control, cont'd

Once an IP-enabled controller has been configured, an Ethernet (intranet or Internet) connection can be used to contact, configure, or control it.

NOTE *Both your computer and the MLC must be connected to the same subnet on a LAN (using a straight-through cable). Alternatively, you can use a crossover Ethernet cable to connect the controller directly to your computer's Ethernet card.*

The following instructions assume that you have already connected the Windows-based PC to the MLC 104 IP Plus's LAN port or to the Config port, and powered on the controller and the PC.

Configuring the MLC 104 IP Plus for network communication via Global Configurator software

You can configure the controller's IP address via an IP/Ethernet connection using the Extron Global Configurator (GC) Windows-based software.

Read the Global Configurator help file for basic information on using Global Configurator software and setting up a project. Also read the *MLC 104 Plus Series Setup Guide*, revision B or higher, included with the controller, for step-by-step instructions of how to use GC to set up the MLC's IP address.

Configuring the MLC 104 IP Plus for network communication using the ARP command

You can use the ARP command to set up an IP address for the controller. The ARP command tells your computer to associate the controller's MAC (media access control) address with the assigned IP address. You must then use the ping utility to access the controller, at which point the controller's IP address is reconfigured.
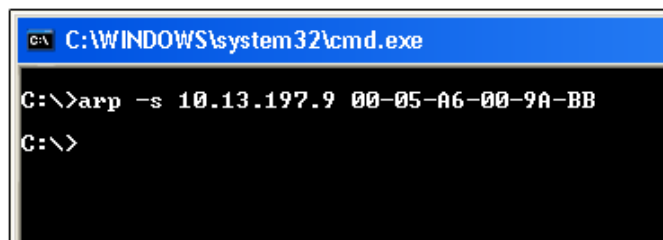
Use ARP to configure the MLC's IP address as follows:

1. Obtain a valid IP address for the controller from your network administrator.

2. Obtain the controller's MAC address (UID #) from the label on its rear, top, or side panel. The MAC address should have this format: 00-05-A6-xx-xx-xx.

3. If the MLC has never been configured and is still set for factory defaults, go to step **4**. If not, perform a Mode 4 system reset. For detailed information on reset modes, see "Resetting the Unit" in chapter 2, "Installation".

CAUTION *The MLC must be configured with the factory default IP address (192.168.254.254) before the ARP command is executed, as described below.*

4. At the PC, access the MS-DOS command prompt, then enter the arp –s command. Enter the desired new IP address for the MLC and the MLC's MAC address. For example:

arp –s 10.13.197.9 00-05-A6-00-9A-BB

```
C:\WINDOWS\system32\cmd.exe

C:\>arp -s 10.13.197.9 00-05-A6-00-9A-BB
C:\>
```
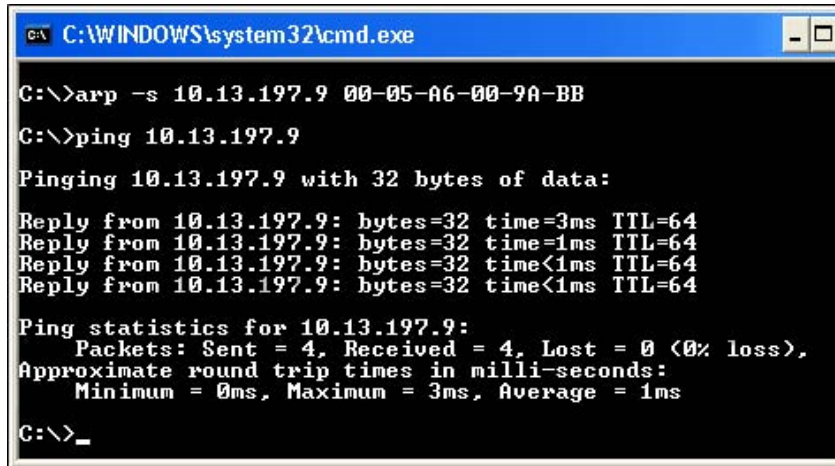
NOTE *The MAC address is listed on the controller's rear or bottom panel.*

After the arp -s command is issued, the controller changes to the new address and starts responding to the ping requests, as described in the next step.

5. Execute a ping command by entering "ping" followed by a space and the new IP address at the command prompt. For example:

ping 10.13.197.9

You <u>must</u> ping the MLC in order for the IP address change to take place. The response should show the controller's new IP address, as shown in the following picture.

You can reconnect using either Telnet or a Web browser to verify that the update was successful.

6. After verifying that the IP address change was successful, enter and issue the *arp –d* command at the DOS prompt. For example:

arp –d 10.13.197.9 removes 10.13.197.9 from the ARP table

or

arp –d* removes all static IP addresses from the ARP table.

Configuring the MLC 104 IP Plus for network communication via a Web browser

The default Web pages that are preloaded on the MLC 104 IP Plus are compatible with popular Web browsers such as Netscape Navigator (version 6.0 or higher), Microsoft Internet Explorer (version 5.5 or higher), or Mozilla Firefox (version 1.0 or higher). However, the MLC and the PC must both be part of the same subnet before they can communicate via the LAN port. You must change the PC's IP address to one that is on the same subnet as the default IP address of the MLC (192.168.254.254).

NOTE *This method requires a <u>crossover</u> cable. See page 2-9 for cabling details.*

NOTE *Make a note of the host PC's TCP/IP configuration before changing its IP address and make sure the PC and MLC are on the same subnet.*

1. Temporarily change the host PC's IP address. See "Setting up the PC for IP communication with an IP-enabled MLC" later in this chapter for step-by-step instructions.

2. Obtain a valid IP address for the controller from your network administrator.

3. Launch the Web browser on the connected PC (for which you set up the network configuration earlier), and enter "http://192.168.254.254/" in the address box. The MLC's default Web page is displayed.

Software-based Configuration and Control, cont'd

4. Select the **Configuration** tab, then select **System Settings** from the menu on the left of the screen. A Web page appears. The top part of a typical screen is shown in the following picture.
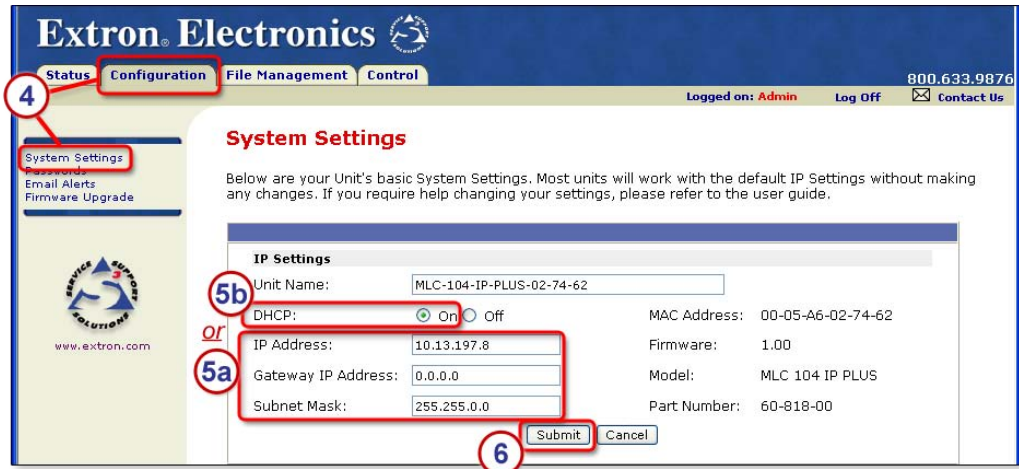
5. Set the MLC for the new IP address using either step **5a** *or* step **5b**.

   5a. Enter the new IP address for the MLC, the corresponding subnet mask, and the gateway address. IP addresses, subnet mask, and e-mail addresses follow standard naming and numbering conventions. The IP network administrator should provide the IP addresses and subnet mask to be used with this controller.

   5b. Select **DHCP On**.

6. Click **Submit**. It takes a minute or so for the controller to store the new settings. Once the controller's IP address is changed, you lose communication with the controller.

7. Close the browser.

8. After changing the controller's IP settings, change your PC's TCP/IP settings back to their original configuration.

Configuring the MLC 104 IP Plus for network communication using SIS™ commands

RS-232

The MLC can also be configured using serial (RS-232) communication and a terminal emulation program such as HyperTerminal, which is installed with Windows. For information on RS-232 port requirements (including 38400 baud) and on Simple Instruction Set (SIS) commands, variables, and syntax, see chapter 4.

Telnet

The MLC and the PC must both be part of the same subnet before they can communicate via the LAN port. You must change the PC's IP address to one that is on the same subnet as the default IP address of the MLC (192.168.254.254).

NOTE *This method requires connecting the MLC to the PC's LAN port using a crossover network cable. See page 2-9 for cabling details.*

NOTE *Make a note of the host PC's TCP/IP configuration before changing its IP address and make sure the PC and MLC are on the same subnet.*

1. Temporarily change the host PC's IP address. See "Setting up the PC for IP communication with an IP-enabled MLC" on the next page for step-by-step instructions.

2. Start Telnet on the PC

   a. Click the **Start** menu and select **Run**. The Run dialog box appears.

   b. Type *telnet*, a space, and the default IP address (192.168.254.254) into the Open area, and click **OK**.
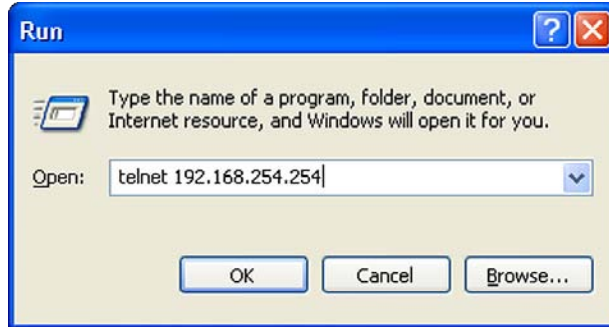
3. Set the MLC for the new IP address by doing one of the following.

   • Enter SIS command `Esc` `X14` CI ←, where `X14` is the new IP address (see chapter 4, "SIS™ Programming and Control") to set the IP address.

   or

   • Enter SIS command 1DH ← to enable DHCP.

4. After changing the controller's IP address, change your PC's TCP/IP settings back to their original configuration.

Setting up the PC for IP communication with an IP-enabled MLC

You need a Windows-based (Windows 2000, XP, or higher) PC equipped with an operating network adapter. To allow your PC to work with Extron's Ethernet-controlled products, the TCP/IP protocol must be installed and properly configured.

When setting up the MLC for network communication via a Web browser or Telnet connection, you must change the IP address of the PC to one that is on the same subnet as the MLC. This is not required if you are setting up the MLC for network communication via Global Configurator, the ARP command, or SIS commands via an RS-232 connection.

If you use an existing Ethernet LAN intranet, your network administrator can provide you with a unique IP address for the controller or confirm whether you need to set up the MLC 104 IP Plus for DHCP (Dynamic Host Configuration Protocol) to have an address assigned automatically when you sign on.

1. Open the Network Connections page as follows:

   • Locate and right-click on **My Network Places** on the Windows (2000, XP, or higher) desktop, then click on **Properties**.
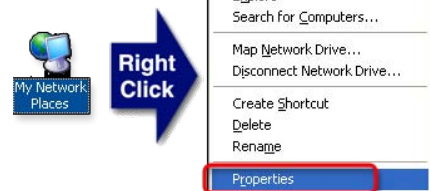
Software-based Configuration and Control, cont'd

_or_

- Click on the **Start** menu,
  click on **Settings** (if needed), click on **Control Panel** to open the Control Panel window, then double-click on **Network and Dial-up Connections** (Windows 2000) or **Network Connections** (Windows XP, shown below).
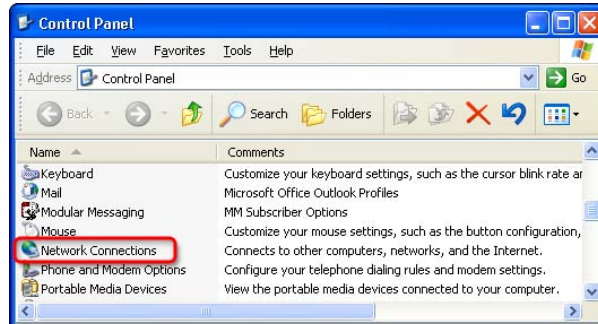
2. Right-click on **Local Area Connection**, then select **Properties**.
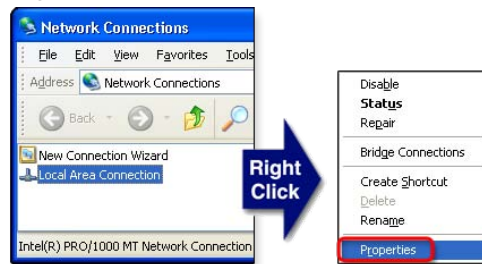
3. Select **Internet Protocol (TCP/IP)** and click on the **Properties** button (shown at right). If **Internet Protocol (TCP/IP)** is not on the list, it must be added (installed). Refer to the Microsoft Windows user's manual or the Windows online help system for information on how to install the TCP/IP protocol.
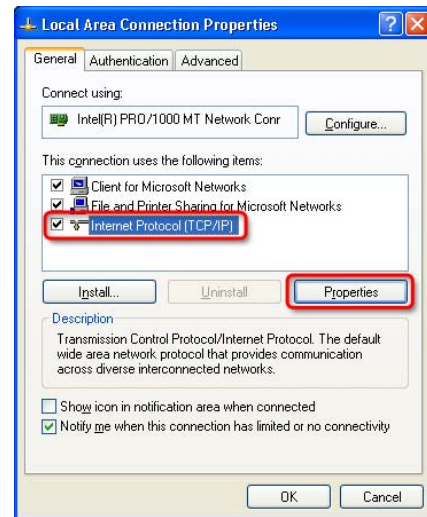
4. Write down the PC's current IP address and subnet mask below. If your PC is set to "Obtain an IP address automatically," make a note of that, instead. You will need to restore these settings to the PC later.

   IP address:

   .   .   .

   Subnet mask:

   .   .   .

5. Change the PC's IP address so it can communicate with the MLC 104 IP Plus and change the controller's IP settings.

   a. Select the "Use the following IP address:" radio button.

   b. Enter the following values, as shown in the following picture:

   IP address: 192.168.254.253
   Subnet mask: 255.255.0.0
   Default gateway: blank or 0.0.0.0

   c. Click the **OK** button to save the changes and exit the network setup. Reboot the PC, if required, for the changes to become effective.

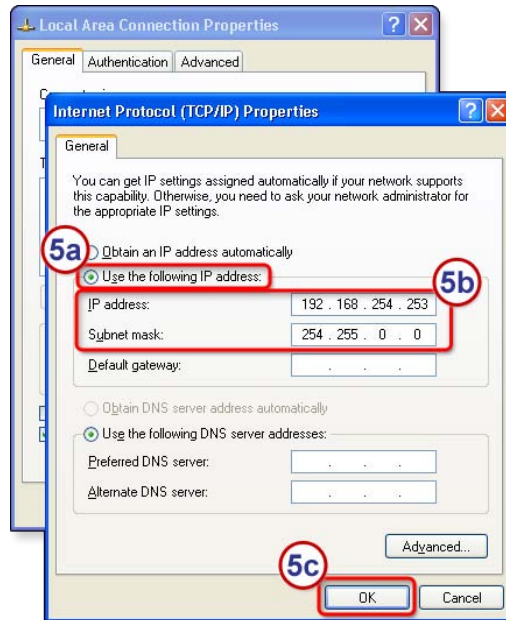6. Plug one end of a Category 5 network/Ethernet crossover cable into the MLC's Ethernet (LAN) connector. See chapter 2 for RJ-45 LAN connector wiring. Plug the other end of the Ethernet cable into the Ethernet port on the PC.

   NOTE *If a network hub or switch is used between the PC and the MLC, use a straight-through CAT 5 cable instead of a crossover cable. See page 2-19.*

7. Set up the MLC's IP address using a Web browser, or SIS commands as described earlier in this chapter.

8. Restore the PC's previous IP configuration by following steps **1**, **2**, **3**, and **5** but using the PC's original IP address settings you wrote down in step **4**.

Global Configurator Software for Windows®

The included Extron Global Configurator (GC) program for Windows offers the most complete way to configure and customize the controller via either RS-232 (all models) or IP connection (IP models). GC provides the ability to generate a Web browser-based GlobalViewer® (GV) application and Web pages for each IP Link-based device (IP Link interface, System 5 IP, MLC 226 IP, MLC 104 IP, MLC 104 IP Plus, or other Extron device) on a network. Once an MLC 104 IP Plus is configured, its GlobalViewer Web pages allow the user to manage, monitor, and control the MLC and the devices connected to it.

Software-based Configuration and Control, cont'd

Global Configurator offers the best and easiest way to configure the controller. Other setup options include using SIS commands and the MLC's factory-embedded Web pages, but many setup features are available only via Global Configurator. GC includes some functions found on the controller's front panel and many additional features that are available only through the software.

Downloading the software and getting started

Global Configurator software is included with the controller. Global Configurator software updates and a large variety of device drivers can be downloaded at no charge from the Extron Web site (http://www.extron.com).

NOTE *Device drivers (for controlling projectors, VCRs, DVD players, etc.) can be used by other Extron IP Link products, so they may be listed on the Extron Web site as an IP Link driver package. You may also want to download the optional IR Learner™, a free software utility for capturing infrared codes from a handheld IR remote control to create custom drivers for operating IR-controlled devices like the MLC that use IP Link and GlobalViewer.*

NOTE *Do not change the directory or the name of the directory where the software files are installed by default.*

Refer to the *MLC 104 Plus Series Setup Guide* for specific information on how to download the software. Refer to that guide and to the *Global Configurator Help* file for details and step-by-step procedures on how to start a GC project and perform basic setup tasks for an MLC 104 IP Plus. Both the setup guide and the help file contain instructions on how to set the **MLC's IP address, gateway IP address, subnet mask, mail server IP address, domain name, Telnet port, Web port, SMTP username**, and **SMTP password** so that the MLC is able to communicate with the network. Obtain these parameters from your network administrator and set them before continuing.

PC system requirements

The MLC 104 IP Plus and Global Configurator have the following hardware and software requirements:

- Intel® Pentium® III 1 GHz processor
- Microsoft Windows operating system
  - Windows NT service pack 4, or
  - Windows 2000 service pack 2, or
  - Windows XP service pack 2, or a later version
- Microsoft Internet Explorer 6.0 with ActiveX® enabled
- Microsoft Windows Script 5.6
- 512 MB of RAM
- 50 MB of available hard disk space
- A network connection with a minimum data transfer rate of 10 Mbps (100 Mbps is recommended)

CAUTION *Do not run this software on a PC that uses an earlier version of Windows.*

NOTE *The MLC 104 Plus requires GC version 2.50 or higher. IP models can use GC version 2.20 or higher.*

Using Global Configurator: helpful tips

Resources and notes

- The *Global Configurator Help* file provides information on settings and how to use the Global Configurator program, itself.

- The *MLC 104 Plus Series Setup Guide*, which is shipped with the MLC, covers basic setup steps. It includes instructions and examples on how to use the basic tabs in GC.

- Some items in Global Configurator correspond directly to the front panel controls. See chapter 2 of this manual for features and settings.

- If you will configure the MLC at the installation site, Extron recommends using the driver subscription function within Global Configurator to download drivers for all manufacturer and device types before you go out into the field.

- The Global Configurator project file (*.gc2* or *.gcz*) contains configuration settings and it can be saved to a directory or folder for backup or for installation on another MLC 104 IP Plus Series controller. Saving a configuration is recommended before you perform a firmware upgrade.

- The MLC can be set up to allow configuration access to administrators only, and to prevent other users from making changes to the controller's settings, events, and drivers. If an administrator password is set for the controller, non-administrator users can select inputs and adjust output volume but are prevented from making any other changes using GlobalViewer Web pages.

- IP addresses, subnet mask, and e-mail addresses follow standard naming and numbering protocol. The network administrator provides the IP addresses and subnet mask to be used with this controller.

- The unit name is any name (e.g., Room107MLC104IPplus, Lab1234mlc104IP, ConfRoomSystem, LectureHall8-cntrlr, etc.) that you want to use to label a specific MLC controller unit. The default is a combination of the product name and part of the hardware address. This can be changed to your choice of alphanumeric characters and hyphens (-).
  - Spaces are not permitted within a unit's name.
  - Underscores (_) are not permitted.
  - Valid characters are A-Z, a-z, 0-9, and - (hyphen).
  - The name cannot start with a number or a hyphen, and it cannot end with a hyphen.
  - Maximum name length is 24 characters.

A brief guide to Global Configurator's tabs

In the upper right side of the GC software window are several tabs that divide the program into groups of functions you can view and configure. The left three, **IP Link Settings**, **Schedule**, and **Monitor**, are displayed for all IP Link-enabled products. Any tabs to the right of those three vary in quantity, type, and layout, depending on the product being configured. See the illustration below for an example of the tabs that may be available when you configure an MLC.

To learn about the functions available on each of these tabs, look in the *Global Configurator Help* file. In the contents pane on the left, click on "Reference Information", click "Global Configurator Window", then click on the name of the tab you want to know more about.

Advanced Configuration
IR learning to create customized IR driver files

If you do not find a driver on the Extron Web site for the device you plan to use, you can create your own IR driver file. Extron IR Learner™ software lets you create a customized driver file of IR commands that can be used with the Global Configurator software for port setup and button configuration. Visit http://www.extron.com to download IR Learner and install it on your PC.

Once IR Learner is installed on the PC, you can start the program directly by double-clicking the IR Learner icon, shown at right.

Or, you can select **Run IR Learner** from Global Configurator's **Tools** menu, as shown at right. The IR Learner utility opens in a new window.

Additional information on how to use the software is available in the *IR Learner Help* file.

NOTE *The MLC 104 Plus requires IR Learner version 1.23 or higher.*

Advanced configuration options in Global Configurator

In Global Configurator in the **Advanced Configuration** tab you can set

- what happens during power-up and power-down cycles and for how long
- personal identification numbers (PINs) and whether or not each PIN is enabled during front panel lockout (executive mode) (see page 2-6 for details)
- volume adjustment parameters
- configuration for each digital port
- miscellaneous settings including whether to reset button statistics or upload the enhanced Web pages when the configuration is uploaded to the MLC

The *Global Configurator Help* file explains these features in the reference section about the **Advanced Configuration** tab and in the MLC-specific instructions for configuring advanced settings. You may want to keep the following items in mind while configuring advanced settings. And not all features of this tab are listed below.

Power Settings (Display power up/power down settings)

When the display is on, delay I/O switching for: — This feature prevents a second input switch for the specified duration (0 to 5.0 seconds in 0.5 second increments). This allows a projector to synchronize with the new input signal before switching inputs again.

The I/O switching delay period can be set here or by using special SIS command 54# on page 4-40.

When powering up/down delay for: — Most projectors require a certain amount of time for lamp warm-up and cool-down during which they cannot display an image. These delays can also be set using special SIS commands (1# and 2#, see page 4-33 in the SIS programming chapter).

NOTE *Global Configurator automatically sets the warm-up and cool-down delay times based on default values in the display/projector's driver. SIS commands override the default settings. For best results, set delay times to 2 to 4 seconds longer than the times required by the display/projector. This ensures that the correct Display power button state is shown on the front panel and on the GV and standard embedded Web pages.*

Repeat IR power down — Some IR-controled projectors/displays must receive a second power down command. If selected, this feature automatically sends the

power off/power down command twice. The MLC must be configured to send the IR power off command upon display power off button <u>release</u> (not at the button press).

Send channel IR/232 as display powers up — This setting ensures that the inputs of the MLC and of the display device are coordinated when the display is powered on.

Lockout I/O switching while display powers On or Off — This feature prevents input switching during the display power up and power down periods. This I/O switching lockout is the same as SIS special command 53# (page 4-33). For this command to work you must also set the power up and power down delay periods (mentioned above).

Hold power-down button for two seconds — This prevents shutting down the display or projector by accidentally pressing the Display Off button. When this feature is enabled, you must press and hold the front panel Display Off button for two seconds before the power-off sequences can start. The corresponding SIS command is 22#.

Volume settings

When adjusting the volume use — For a projector, display, or audio output device, volume is controlled by one of two methods: selecting a setting within a specific range of values, or sending a simple command to increase or decrease the volume by a fixed increment. Refer to the user's manual for the display or audio device to choose the best method for volume adjustment.

NOTE *The power-up volume limit is limited by the maximum volume setting (SIS special command 47#). If the maximum volume (47# command) is set, the limit audio level feature (SIS special command 11#) is automatically set to 25% of the maximum volume (47#). See pages 4-33 and 4-39.*

Volume encoder scaling factor (0-255) — This feature allows you to slow down the volume knob (the encoder) on the MLC's front panel. This feature addresses a scenario that occurs with some projectors that use range type volume control. When the MLC's knob controls projector volume, sometimes the MLC sends the volume commands faster than the projector is able to detect and process. When the projector does not detect some of the volume change commands, a choppy volume ramp occurs.

Encoder scaling gives the programmer the ability to slow the knob down to a speed the projector can handle. The drawback is that users must turns the knob more times to change from minimum to maximum volume. It is up to the user to find a balance between smooth audio ramping and the number of knob turns needed to cover the volume range. This requires trial and error for each projector exhibiting this problem.

Although this feature is mainly for range type volume control, it applies to any range type command programmed to be executed by the volume knob. The SIS special command 49# sets the encoder scaling factor.

Miscellaneous settings

Reset button statistics on upload — For more information on button statistics (which track how many times each front panel button is pressed), see "Statistics" on page 3-17.

Upload enhanced web pages — See "Control" on page 3-21 to see examples of both basic and enhanced Web pages (which show photo-like versions of the MLC's and control modules' front panels).

Enable/Disable IR Receiver determine's the MLC's ability to receive IR signals through the CM/IR/SCP port on the side panel. This feature is the same as the 65# SIS command (page 4-40).

# Software-based Configuration and Control, cont'd

Configuring an auxiliary (MLS, PVS) switcher

An Extron MediaLink Switcher (MLS) or PoleVault Switcher (PVS) can be connected to the MLC to expand the number of inputs available to the projector/display. However, if the MLS or PVS switcher is disabled, the MLS RS-232 port can be used as an auxiliary, bidirectional RS-232 port, just like the Display port. To enable and configure an auxiliary switcher, follow the *Global Configurator Help* file's procedure to add and configure a MediaLink switcher.

Setting up passwords for IP models

To control access to the MLC through a LAN connection, you can set administrator and user passwords. Full instructions are available in the *MLC 104 Plus Series Setup Guide* or the *Global Configurator Help* file's section on advanced configuration.

1. Open an existing Extron Global Configurator (GC) project or start a new project.

2. Click **Tools** and select **Change Device Settings** from the drop-down menu.
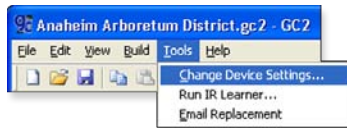
3. In the Device Settings window, select (click on) the name of the desired MLC.

4. Click **Settings** and choose **Set Administrator Password** or **Set User Password** from the drop-down menu, as shown at right. A Set for *<IP address>* window appears.

5. Type the desired password into both areas of the window and click **OK**. The Set for... window closes.

    NOTE   *Passwords must contain 4 to 12 alphanumeric characters. Symbols and spaces are not allowed, and the passwords are case sensitive.*

6. Click the **Close** button.

7. Complete the rest of the configuration, save the project, and upload (build) the configuration to the MLC. The Upload Manager window appears.

8. Click **Exit** after the files have been uploaded.

Printing a wiring block diagram

Once you have configured a system using Global Configurator, you can generate and print a simple block diagram of what products to wire to which of the MLC's ports. The diagram includes model names, DIP switch settings for control modules, and the type of communication (IR or RS-232) configured for each port. Read the *Global Configurator Help* file's "Reference Information" section about the **File** menu for details.

NOTE   *This procedure requires Microsoft Word software. The installer or user must provide that software. It is not an Extron product.*

Procedure overview:
In Global Configurator, click on the **File** drop-down menu and select **Print** and then **Wiring Diagram**. In the Print Wiring Diagrams window, select the devices to include in the diagram. Click the **Print** button at the bottom of the window.

GC processes the information about the selected device(s), generates a document containing the wiring diagram, and opens that document in Word. Print the diagram(s), save the file, if desired, and exit Word. Close the Global Configurator Print Wiring Diagrams window.

Updating firmware

If the need arises, you can replace the MLC's firmware without opening the unit or changing firmware chips. See appendix B, "Firmware Updates", for instructions on how to update the controller's firmware.

NOTE *Save the existing configuration project before replacing the firmware.*

Saving and uploading the configuration

This is not an advanced configuration function, but when you finish creating the configuration in Global Configurator, you must save the GC project and upload the configuration to one or more MLC units. See chapter 3 of the *MLC 104 Plus Series Setup Guide* (shipped with the MLC) for instructions.

Controlling an IP Link-enabled MLC

You can control the MLC 104 IP Plus and devices connected to it by using the MLC's factory-embedded Web pages or its GlobalViewer (GV) Web pages that were created when you uploaded the GC configuration or a customized graphical user interface (GUI).

Embedded Web pages

The MLC 104 IP Plus features an embedded Web server, which includes factory-set Web pages. These pages can be replaced with user-designed files, but the default Web pages provide many basic features for monitoring, configuring, and controlling the MLC via a Web browser. These Web pages provide some of the features of the configuration program. This section provides an overview of the embedded Web pages.

To access the embedded Web pages,

1. Launch a Web browser (Internet Explorer, Netscape Navigator, Mozilla Firefox) on the connected PC, and enter the MLC's IP address in the address field.

2. In the Connect to <IP address> dialog box, shown at right, enter the MLC's IP address or text of your choice in the User Name field, type in the administrator password in the Password field, and click **OK**. The MLC 104 IP Plus's default Web page appears.

    NOTE *If the MLC has not already been configured with a password, this password dialog box does not appear; the default Web page opens directly.*

    NOTE *Passwords must contain 4 to 12 alphanumeric characters. Symbols and spaces are not allowed, and the passwords are case sensitive.*

    NOTE *Administrators have access to all of the Web pages and are able to make changes to settings. Users can access the* **System Status** *and* **Control: User Mode** *pages only.*

Status

The Status Web pages provide only settings information. Changes must be made via the **Configuration** Web page or via the Global Configurator software or SIS programming. Personnel who have user access can view these pages but do not have access to configuration pages.

System Status

The System Status page provides information about the MLC's model, part number, firmware level, voltages and internal temperatures, port and IP settings, and the status of projector lamp hours and the display connection, as shown in the following example. This information is useful when troubleshooting problems.

> **NOTE** *Projector lamp hours are a reflection of time elapsed since the lamp was changed as determined by the driver/events associated with the MLC's Display RS-232/ IR port.*

Statistics

The Statistics page is mainly for administrators and maintenance personnel. It shows information about system usage: the number of hours the system has been turned on, how many hours the projector lamp has been used, how much time per day and per week the system is turned on, and how many times each button on the MLC has been pressed, either physically or virtually (via configuration software, SIS commands, or event scripts). All of the button press and system use statistics (with the exception of lamp hours) can be reset to 0 by clicking the **Reset Statistics** button at the bottom of this screen.

NOTE *This page is not available unless the MLC has been configured with Global Configurator ver. 2.x or higher.*

Configuration

There are four Configuration Web pages, which only administrators can access: System Settings, Passwords, Email Alerts, and Firmware Upgrade.

Software-based Configuration and Control, cont'd

System Settings

This is for IP, date/time, and executive mode (front panel lockout) setting changes.

NOTE   *Unit Name is any name (e.g., Room108MLC104IPplus, Lab1234mlc104 IP, ConfRoomSystem, LectureHall8-cntrlr) you use to label this specific MLC. The default is a combination of the product name and part of the hardware address. This can be changed to your choice of alphanumeric characters and hyphens (-).*

- *Spaces ( ) and underscores (_) are not permitted within a unit's name.*
- *Valid characters are A-Z, a-z, 0-9, and - (hyphen).*
- *The name cannot start with a number or hyphen. It cannot end with a hyphen.*
- *Maximum length is 24 characters.*

Passwords

In the Passwords page you can change the administrator and/or user passwords.

NOTE   *Passwords must contain 4 to 12 alphanumeric characters. Symbols and spaces are not allowed, and the passwords are case sensitive. A minimum of 4 characters are required when creating passwords via the Web pages.*

Email Alerts

In this page you can specify the Web server's IP address and domain name, set up SMTP verification credentials, and specify e-mail alert recipients' addresses and which e-mail file they will be sent.

NOTE *The MLC must first be configured with Global Configurator before e-mail addresses and e-mail file names appear on this page.*

Firmware Upgrade

Through this page you can locate and load new firmware to the unit.

NOTE *See appendix B, "Firmware Updates", for instructions on how to update the controller's firmware.*

NOTE *Save the existing configuration project before replacing the firmware.*

Software-based Configuration and Control, cont'd

File Management

This Web page allows you to sort by file type (see the **Filter by File Extension** drop-down box). Personnel with administrator access can view these pages and make changes. Those with user-level privileges are not able to see this page. for an explanation of file types.

CAUTION *Files with the .cdc extension (___.cdc files) should NOT be deleted.*

CAUTION *Event files (__.evt) should NOT be deleted. They are necessary for the controller's operation. Never delete the main event file (0.evt).*

You can also view files in subfolders, including those containing GlobalViewer files if they have been installed on the MLC.

Control

User Mode

The first of the Control Web pages is User Mode, which is a representation of the controller's front panel buttons, volume control, and any optional control modules (IRCMs, RCMs, ACMs) that are part of the system. Clicking on a button on screen emulates a button press on the corresponding device. This page is accessible to both administrators and users.

From the factory, the MLC 104 IP Plus comes with a preloaded Web page with a basic representation of the MLC's front panel controls and the buttons of any optional attached control modules. See the example below.
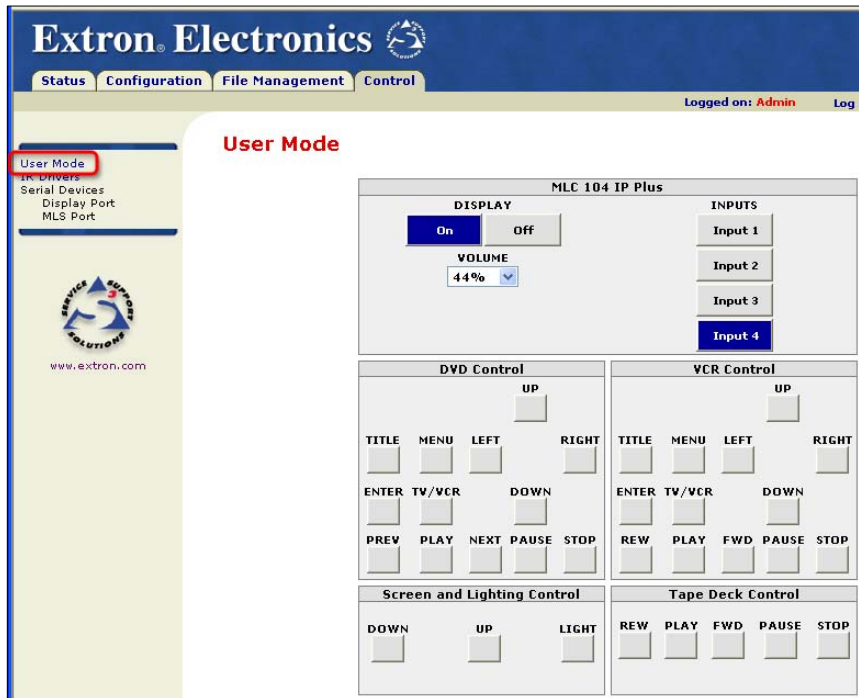
Typical User Mode page

Web pages that show a more realistic representation of the MLC's front panel and of control modules (as shown at right) are included with the configuration software. These pages (over 200 files) can be uploaded into the MLC if you select **Upload Enhanced Web Pages** from the **Advanced Configuration** page in Global Configurator before you build the configuration and load it into the MLC.

Enhanced User Mode page

Software-based Configuration and Control, cont'd

IR Drivers

This Web page lists IR driver files only and allows you to select a file to see and execute the commands stored in it. This page is available only to those logged in as an administrator.

> **NOTE** *The MLC must first be configured with Global Configurator before this page can be used.*
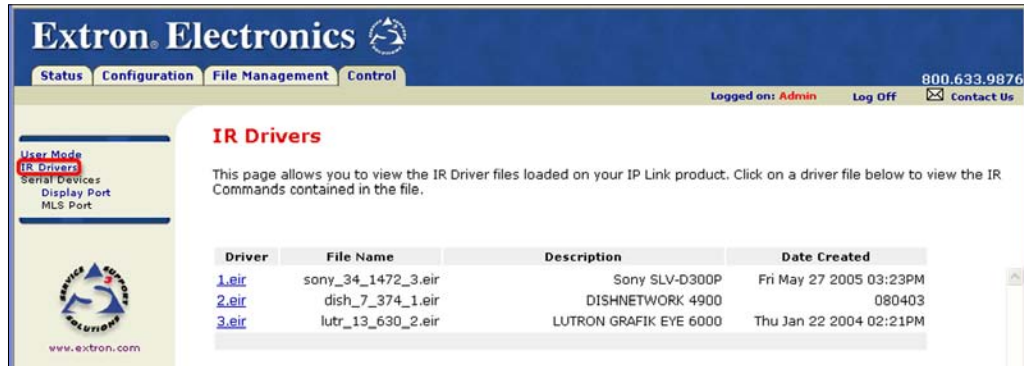
An example for a specific IR driver is shown below.

Serial Devices (serial drivers)

Once the ports have been set up in the configuration program, each configured serial port (projector/display control port and MLS port) is listed in this section of the Control page menu.

Click on a port name to bring up a page that shows the available commands for the device cabled to that port. See the sample screen shot on the next page.

If you want to execute a command that is available in the driver (whether associated with an MLC button or not) for a configured device, you can click on a button or select an option from a pull-down menu to execute that command.

> **NOTE** *You must use Microsoft Internet Explorer version 6.0 or higher with ActiveX enabled in order to use the serial devices' control pages.*
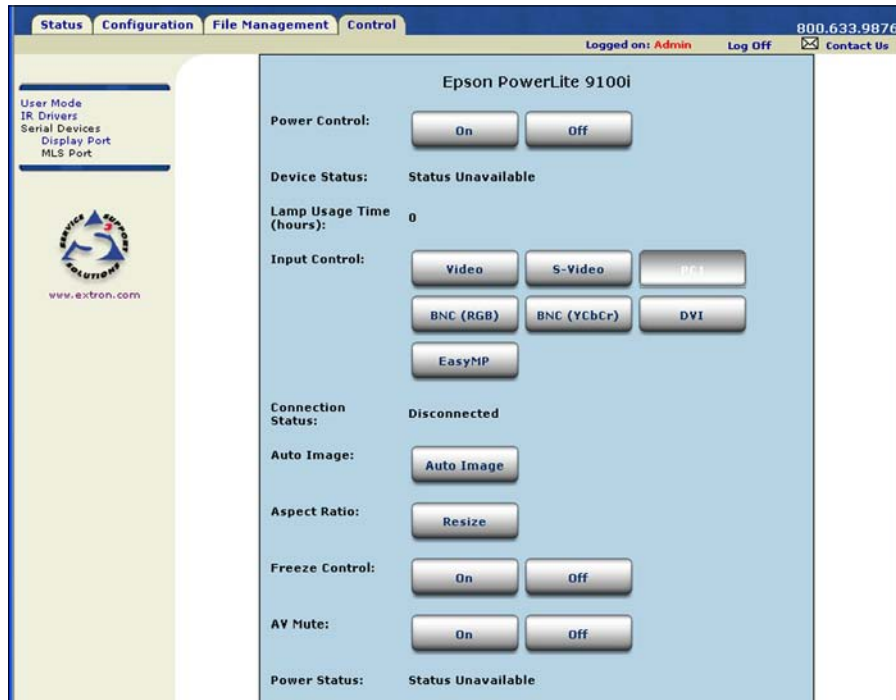
Example of a page for a projector driver

GlobalViewer® Web Pages

The MLC 104 IP Plus controller can be used as part of a network of devices based on Extron IP Link technology, such as IP Link interfaces. Global Configurator (GC) is a Windows-based program used for configuring and customizing the Web browser-based GlobalViewer (GV) application for each IP Link interface, System 5 IP, MLC 226 IP, MLC 104 IP Plus, or other IP Link-based device on a network. Once an MLC 104 IP Plus is configured, its GlobalViewer Web pages allow the user to manage, monitor, and control the MLC and the devices connected to it.

Refer to the Global Configurator help file and the *MLC 104 IP Plus Series Setup Guide* for specific information on how to use the software and perform basic setup tasks for a MLC 104 IP Plus.

NOTE *To work with Global Viewer Web pages, you must use Microsoft Internet Explorer version 6.0 or higher with ActiveX enabled.*

NOTE *If the MLC has been configured with passwords, the GlobalViewer Web pages are password protected. Although default embedded Web pages are accessible via the GlobalViewer Web pages, nonadministrators (people with only user access) are able to access the Control and Status default Web pages only.*

Four screens for the MLC are available via Global Viewer: Control, Monitor, Schedule, and Info (). Read the *Global Configurator Help* file for details on each screen and how to use the GlobalViewer pages.

Software-based Configuration and Control, cont'd

Customizing the MLC's Control Web Pages

Extron offers Web page templates that can be customized using standard HTML editing tools to provide a different interface to the user while still using GlobalViewer functions. An experienced Web developer can add images, modify text, and change background colors to create a look and feel that reflects your brand or your user's specific requirements. For example, a university with dozens of devices and rooms to control may wish to create customized Web pages with the university's school colors and logo. End users can control the system using these customized pages instead of the standard GV pages.

Alternatively, Extron can create a customized graphical user interface (GUI) for you to upload to each MLC in the system. End users can view the Web pages of this customized GUI while administrators and installers still have access to the factory-set Web pages and the standard GV Web pages in addition to the customized ones.

For a small, one-time fee, Extron will turn the following items into files ready to upload to the MLC IP models:

• your Global Viewer project file containing system configuration details

• your choice of available color schemes

• your choice of labels for panel buttons

• a company or institution logo

These customized Web pages, whether created by Extron or modified by an outside HTML developer from Extron-supplied templates, can also include button sets for any control modules (IRCMs, RCMs, CMs, etc.) used in the system.

Visit the Extron Web site (*http://www.extron.com/product/customgui.aspx*) or contact an Extron customer support representative for more information on this service and on available template options.

Chapter Four

SIS™ Programming and Control

Host-to-MLC Communications

Commands and Reponses

SIS™ Programming and Control

The MLC 104 Plus Series controller can be remotely set up and controlled via a host computer or other device (such as a control system) attached to the rear panel Config/RS-232 port or LAN port, or the front panel Config port.

The MLC 104 Plus Series units must be configured before use. As shipped the controller can trigger basic input switching on an optional MLS switcher, but it cannot control any other devices before being configured.

The MLC can be set up and controlled by using Extron's Simple Instruction Set (SIS) commands or the Extron Global Configurator software (version 2.2 or higher for IP models, version 2.5 or higher for MLC 104 Plus), and both of those methods can be accessed via RS-232 (all models) or Ethernet LAN connection (IP models). See chapter 2 for pin assignments and other details on the configuration and control ports. For information on the software and the MLC 104 IP Plus's embedded Web pages, see chapter three.

<u>MLC 104 Plus Series RS-232 protocol:</u>
- **38400 baud**
- 8 data bits
- 1 stop bit
- no parity
- no flow control

NOTE *The configuration port requires 38400 baud communication. This is a higher speed than many other Extron products use. The Global Configurator (version 2.2 or higher for IP models, version 2.5 or higher for MLC 104 Plus) software automatically sets the connection for the appropriate speed. If using HyperTerminal or a similar application, make sure the PC or control system connected to these ports is set for 38400 baud.*

<u>LAN port defaults (IP models):</u>
- **MLC's IP address:** 192.168.254.254
- **gateway's IP address:** 0.0.0.0
- **subnet mask:** 255.255.0.0
- **DHCP**: off

Host-to-MLC 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 MLC determines that a command is valid, it executes the command and sends a response to the host device. All responses from the MLC 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.

MLC-initiated messages

If you are communicating with the MLC via RS-232 or via a verbose (see page 4-21) Telnet connection, when a local event such as a front panel selection or adjustment takes place, the MLC responds by sending a message to the host. No response is required from the host. The MLC-initiated messages are listed here (underlined).

<u>Chn</u>X1←┘ (where X1 is the input number)
The unit sends this response when an input is switched.

(c) Copyright 2007, Extron Electronics, MLC 104 IP PLUS, Vx.xx, 60-818-00 ←┘
Day, DD Mon YYYY HH:MM:SS
Vx.xx is the firmware version number.
The MLC sends the boot and copyright messages under the following circumstances:

- If the MLC is off and an RS-232 connection is already set up (the PC is cabled to the MLC and a serial terminal emulation program such as HyperTerminal is open), the connected unit sends these messages via RS-232 when it is first powered on.

- If an MLC IP model is on, it sends the boot and copyright messages when you first open a Telnet connection to the MLC. You can see the day of the week, date, and time if the MLC is connected via Telnet, but not via RS-232. If you are using a Telnet connection, the copyright message, date, and time are followed by a password prompt.

Additional messages may be sent by the MLC in response to front panel selections and volume adjustments and when scripts are executed during scheduled events.

Password information (IP models)

The "↵Password:" prompt requires a password (administrator level or user level) followed by a carriage return. The prompt is repeated if the correct password is not entered.

If the correct password is entered, the unit responds with "↵Login Administrator ↵" or "↵Login User↵", depending on the password entered. If passwords are the same for both administrator and user, the unit will default to administrator privileges.

Error responses

When the MLC receives a valid SIS command, it executes the command and sends a response to the host device. If the MLC 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)
E12 – Invalid port number
E13 – Invalid value (the number is out of range/too large)
E14 – Not valid for this configuration
E17 – System timed out
E22 – Busy
E24 – Privilege violation
E25 – Device is not present
E26 – Maximum number of connections has been exceeded
E27 – Invalid event number
E28 – Bad filename or file not found
E30 – Hardware failure (followed by colon and descriptor number) (This is an unsolicited response.)

Error response references

The following superscripted numbers are used within the command descriptions on the following pages to identify commands that may respond as shown:

[14] = Commands that give an E14 (not valid for this configuration) response if the unit's current configuration doesn't support that command.

[22] = Commands that yield an E22 (busy) response.

[24] = Commands that give an E24 (privilege violation) response if you are not logged in at the administrator level.

[27] = Commands that may yield an E27 (invalid event number) response.

[28] = Commands that may give an E28 (file not found) response.

Commands and Reponses

Using the command/response tables

The MLC can be controlled via either a Telnet (port 23, IP models only) or RS-232 connection using ASCII commands. IP models can also be controlled via a Web browser (port 80) connection using URL-encoded commands. The ASCII and URL commands listed in the tables starting on perform the same functions, but they are encoded differently to accommodate the requirements of each port (Telnet or browser).

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

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

ASCII to Hex conversion table

NOTE *The non-IP model (MLC 104 Plus) does not support Telnet or Web access.*

The command/response tables list valid ASCII (for Telnet or RS-232) command codes, the corresponding URL (uniform resource locator) encoded (for Web browsers) command codes, the MLC'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.

- Commands may be sent back-to-back without spaces (for example, 2!65V1Z).

- Numbers can be entered as 1, 2, or 3 digits, e.g., 8V = 08V = 008V.

- There are a few differences in how to enter the commands depending on whether you are using Telnet or a Web browser.

  - When using these commands through a Web browser, the URL reference is used to shorten the examples. "URL" refers to the full URL of the control interface and Web page reference including all path information (e.g., *http://192.168.100.10/myform.htm*).

  - To send any of the commands using a Web browser you must prefix them with the full URL followed by *?cmd=*.

  - For control via a Web browser, all **non-alphanumeric characters** must be represented as the hexadecimal equivalent, %xx, where xx represents the two-character hex byte. A comma (**,**), for example, would be represented as *%2C*.
    Characters such as **%**, **+**, and the space character ( ) *must* be encoded as hex bytes, or they will be misinterpreted by the MLC. For example, the ASCII command **+V** must be encoded as **%2BV** for Web browser use.

  - Some characters differ depending on the method you use to send the commands:

Telnet	Web browser
Escape (hex 1B)	W [must **not** be hex encoded]
Carriage return (hex 0D)	Pipe character (**|**) [must **not** be hex encoded]

NOTE *With Telnet you can use either an "Escape" (Esc) command or a "W" command, and the carriage return or the pipe character. With the Web browser, you are required to use a "W" command and the pipe character.*

In either method, {Data} = data that will be directed to a specified port and **must** be hex encoded if non-alphanumeric.

> **NOTE** *If you make adjustments (changes to volume, etc.), whether via the front panel or via RS-232 or IP communication, it will take up to 1 minute 40 seconds (100 seconds) for the data in the MLC's RAM to be saved to flash memory. Do not remove power during that period.*

Symbol definitions

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

← = Carriage return (no line feed, hex 0D)
(for URL-encoded commands, use the pipe character, **|**, instead)

• = Space character

| = Pipe (vertical bar) character

* = Asterisk character (which is a command character, not a variable)

Esc = Escape key (hex 1B)
(use **W** instead of **Esc** for Web browsers)

X1 = Specific port number or relay number
1 = front panel host (Config) port
2 = Display RS-232/IR port
3 = MLS port

X2 = Command data section.

> **NOTE** *For __Web encoding only__: data will be directed to the specified port and **must** be encoded (URL encoding) if it is non-alphanumeric. Change any **non-alphanumeric** character (%, +, |, ←, etc.) within the data section into the corresponding hexadecimal equivalent, %xx, where xx represents the two-character hex byte. For example, a space (hex: 20) would be encoded as %20 (hex: 25 32 30) and a plus sign (hex: 2B) would be encoded as %2B or hex 25 32 42.*

X3 = Greenwich Mean Time (GMT) offset value (-12.00 to +14.00) represents the time difference in hours and minutes (+/-hh:mm) relative to Greenwich, England. The leading zero is optional. For example, 5:30 = 05:30. Do not use a plus (+) sign if the GMT offset is positive.

X5 = On/off status
0 = off/disable (default for audio mute and DHCP)
1 = on/enable

X8 = Volume level (0 – 100 steps). The maximum volume level is limited by the max. volume range command (**X?***47#). Default volume = 25.

X11 = Version (typically listed to two decimal places, e.g., x.xx)

X12 = MLC's name. The name is a text string of up to 24 characters drawn from the alphabet (A-Z), digits (0-9), and minus sign/ hyphen (-). No blank or space characters are permitted as part of a name. No distinction is made between upper and lower case. The first character **must** be a letter. The last character must **not** be a minus sign/hyphen.

X13 = **Local date and time format**
Set format (MM/DD/YY-HH:MM:SS). Example: *01/18/05-10:54:00*.
Read format (day of week, date month year HH:MM:SS). Example: *Tue, 3 Jul 2007 18:19:33*.

X14 = IP address (xxx.xxx.xxx.xxx). Leading zeros in each of four fields are optional in setting values, and they are suppressed in returned values.
MLC's default address: 192.168.254.254
Default broadcast address: 255.255.255.255.

X15 = E-mail domain name; for example, *extron.com*

X17 = Time in tens of milliseconds to wait until the *first* response character is received via a serial port before terminating the current receive operation. (Default = 10 = 100 ms, max. = 32767.) The response includes leading zeros.

> **NOTE** *For commands that use both **X17** and **X20**, both variables must be zero __or__ both must be non-zero. In the RS (send data) command, **X17** may be omitted as long as **X20** is also missing.*

X18 = Hardware (MAC) address (xx-xx-xx-xx-xx-xx) (00-05-A6-xx-xx-xx)

X19 = Subnet mask (xxx.xxx.xxx.xxx). Leading zeros are optional in setting values in each of four fields, and they are suppressed in returned values. Default = 255.255.0.0.

X20 = Time in tens of milliseconds to wait *between characters* being received via a serial port before terminating the current command or receive operation. The response includes leading zeros. (Default = 2 = 20 ms, max. = 32767)

> **NOTE** *For commands that use both **X17** and **X20**, both variables must be zero __or__ both must be non-zero. In the RS (send data) command, **X17** may be omitted as long as **X20** is also missing.*

SIS™ Programming and Control, cont'd

X21 = Parameter (#L or #D) to set either the **L**ength of message to receive or the **D**elimiter value. # = byte count (for L) or # = a single ASCII character expressed in decimal form (for D). The parameter is case sensitive; you must use capital D or capital L. Byte count # can be from 0 to 32767, default = 0. The ASCII decimal # can be from 0 to 00255, default = 00000L.

Examples:
A 3-byte length = 3L.
A delimiter of ASCII 0A = 10D.
The response from the MLC includes leading zeros.

X22 = Verbose/response mode status:
0 = clear/none, default for Telnet connections; responses are not echoed to the host
1 = verbose mode is on, default for RS-232 host control; responses are echoed to the host and displayed to the user
2 = send tagged responses for queries
3 = verbose mode is on and tagged responses are sent for queries

NOTE *If tagged responses are enabled, all read commands return the constant string + data, the same as for setting a value. For example, for* **Esc** **CN** ⬅ *, the response is* **Ipn•X12** ↵ *rather than just the data.*

X23 = Priority status for receiving timeouts:
0 = use *send data string* command parameters (0 = default)
1 = use *configure receive timeout* command parameters

X25 = Baud rate: 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600, 14400, 19200, 28800, 38400, 57600, or 115200

X26 = Parity (only the first letter is needed):
O = odd
E = even
N = none (default)
M = mark
S = space

X27 = Data bits: 7, 8 (default = 8)

X28 = Stop bits: 1, 2 (default = 1)

X33 = Password (minimum length = 4 characters, maximum length = 12 characters, no special characters are allowed). Passwords are case sensitive.

NOTE *A user password cannot be assigned if no administrator password exists; the E14 error code will be returned. If the administrator password is cleared, then the user password is also removed.*

X34 = Daylight saving time (DST) is a region-specific 1-hour offset that begins in spring and ends in fall.
0 = off/ignore
1 = USA on – Starting in 2007, DST begins on the second Sunday of March at 2 AM and ends at 2 AM on the first Sunday of November. For example, time in California is GMT -8:00 from March to November and GMT -7:00 from November

to March. However, DST should be turned off in Hawaii, American Samoa, Guam, Puerto Rico, the Virgin Islands, the eastern time zone portion of the state of Indiana, and the state of Arizona (excluding the Navajo Nation).
2 = Europe on – begins on the last Sunday in March, ends on the last Sunday in October. DST should be turned off for Iceland.

X35 = Event number, range = 0 - 99 (valid only while events are running)

X40 = I/O mode
0 = input (default)
1 = output
2 = input and pull-up resistor
3 = output and pull-up resistor

X41 = Password to display on screen (response to password query or set). When the MLC connects to a host device via RS-232, the password (**X33**), itself, is the response. When the connection is via IP, **X41** is 4 asterisks (****) if a password has been assigned, or it is an empty field (   ) if a password hasn't been assigned.

X43 = I/O state
0 = off
1 = on

X45 = E-mail event number or mailbox (1 - 64). The response is two digits with a leading zero.

X46 = E-mail recipient's address (e.g., *JDoe@extron.com*) for the person to whom messages will be sent. The e-mail address has a 31 character maximum.

X47 = Name (numeral) of e-mail file to be sent

X49 = Default name: a combination of the model name and the last 3 pairs of the MLC's MAC address (e.g., MLC-104-IP-PLUS-02-74-62)

X52 = Connection's security level
11 = user
12 = administrator

X57 = IR playback file number (0 to 99) (no extension). The response includes leading zeros.

X58 = IR playback function number (1 to 137). The response includes leading zeros. IR function numbers 0 and 127 or higher can return information only.
0 = return all data
129 = manufacturer
130 = model
131 = class
132 = remote
133 = creation date
134 = comments
137 = user file name (a descriptive name the user/installer gave the file)

X59 = IR playback mode
0 = play once
1 = play continuously
2 = stop continuous playback

X63 = Pulse time in 20 ms increments. If this parameter is missing or = 0, then pulse length = default = 25 = 500 ms. 1 = 20 ms (minimum pulse time) to 65535 = 1310700 ms (maximum pulse time).

X64 = Broadcast repetition interval in seconds (0 to 255, default = 0 = off)

X69 = IP connection timeout period specified in 10-second steps (1 - 65000, default = 30 = 300 seconds). If no data is received during the specified period, the Ethernet connection closes. Responses are returned with leading zeros.

X70 = The number to insert into an email message if a ____.*eml* file has an embedded server-side include "<!--#echo var = "WCR▌" -->" (the **Esc** CR← command with no parameters.) The numeral is a 16-bit number to be employed as the user defines.
This is an optional parameter. Use 0 as a placeholder if the optional **X47** variable is used but **X70** is not needed. Maximum = 65535.

X73 = An e-mail account username of up to 31 characters. Do not use commas. This parameter is optional during setup and is used for SMTP authentication.

X74 = An e-mail account password (for SMTP authentication) of up to 31 characters. Do not use commas. This parameter is optional during setup.

X75 = An optional string for a destination email address using the form *test@extron.com*

X200 = Specific input number (1 – 4)
1 = input 1 (the default after a reset)
2 = input 2
3 = input 3
4 = input 4

X205 = Lamp hours elapsed (0 to 99999 hours) The five-digit response includes leading zeros. The default is 99999 hours, which yields an "N/A" response.

X206 = Voltage (in volts)

X207 = Temperature in degrees Celsius (the response is 3 digits including leading zeros)

X208 = Display (projector) power status
0 = display power is off (default)
1 = display power is on
2 = display is powering down/off (cooling down)
3 = display is powering up/on (warming up)

X209 = Front panel lockout (executive mode) status
0 = off/unlocked (default)
3 = on, disable/lock entire front panel (buttons, volume control) and optional connected SCP, control module(s), and IR remote control input

X211 = Status (in hexadecimal characters) of script or firmware button control. This variable is an 8-digit hexadecimal character calculated from a binary bit map. It is case-sensitive. Use capital letters. This bit mapped number indicates whether

a button is controlled by firmware or by scripts. See page 4-29 for details.

X212 = Status (in hexadecimal characters) of control of all button lights). This variable is an 8-digit hexadecimal character calculated from a binary bit map, and it is case-sensitive. Use capital letters. This bit mapped number indicates whether a button is controlled by firmware or by scripts. See page 4-31 for details.

X215 = IR output port number
1 = projector/display port

X216 = Display mute or connection status
0 = off/disconnected (default for mute)
1 = on/connected
2 = unknown/unavailable (default for connection status)

X217 = Firmware's event status polling period from 0 to 255 in 20 ms increments. **X217** is optional: if it is not set, it defaults to 100 (2 seconds) and is not shown in the command's response. If **X217** is set to 0, the firmware does not poll for event status.

NOTE *The event number that is polled is set by* **X35** *in the EN command.*

X223 = Digital I/O port (specifying which port)
1 = digital I/O port 1
2 = digital I/O port 2
3 = digital I/O port 3

SIS™ Programming and Control, cont'd

Command/response table for SIS commands

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Input selection				
Select an input[14,22]	X200!	X200%21	Chn X200↵	Select input X200 (X200 = 1, 2, 3, 4) (audio and video). [14] = The MLC responds with an E14 error code (invalid for this configuration) if the desired input is not set up to switch inputs (is not in input button mode). Events are still triggered, though. [22] = The MLC sends a "busy" response (E22) if switching functions are locked.
Display (projector) power				
Turn display power on	1P	1P	Pwr X208↵	On (discrete).
Turn display power off	0P	0P	Pwr X208↵	Off (discrete).
View display power status	P	P	X208↵	Show the display power status.
Example:	P	P	2↵	Example: the display is powering off.
Set power status	X208*0P	X208%2A0P	Pwr X208↵	This command is used only by scripts. It provides a way to set the power status to match the actual state of the projector. For X208: 0 = display power is off 1 = display power is on (default) 2 = display is powering down/off 3 = display is powering on (warming up).

NOTE   *This command does not trigger the warm up/cool down (power on/power off) sequences or the button's events.*

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Display mute				

NOTE   *The 1M and 0M commands emulate the IR 402's Display Mute On and Display Mute Off buttons. You must program these buttons on the remote for the 1M and 0M commands to function.*

Command	ASCII (Telnet)	URL Encoded (Web)	Response (MLC to host)	Additional description
Turn display mute on	1M	1M	Mut X216↵	Mute. X216 = 0 (off), 1 (on), or 2 (unknown).
Turn display mute off	0M	0M	Mut X216↵	Unmute.
View display mute status	M	M	X216↵	Show display mute status.
Set mute status	X216*0M	X216%2A0M	Mut X216↵	This command is used only by scripts. It provides a way to set the status to match the actual state of the projector.

NOTE   *This command does not trigger button events.*

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Volume adjustment (discrete, for volume mode = 0)				
Set the overall output volume level[14]	[X8]V	[X8]V	Vol[X8]↵	This command sets a specific volume level for the audio output at either the display device or via an optional auxiliary Extron switcher. [X8] = volume level (0 to 100). Default volume = 25. When no switcher is detected at the MLS port, the maximum volume level is limited by the max. volume range command ([X2]*47#).
NOTE	*The MLC responds with an E14 (not valid for this configuration) error if you attempt to set a discrete volume level while the MLC is in increment/decrement volume mode (volume mode 1). This command works only when the MLC is in volume mode 0. See the 46# volume knob mode SIS command.*			
Example:	27V	27V	Vol027↵	*Example:* set volume to 27.
Increment the volume	+V	%2BV	Vol [X8]↵	Increase audio output.
Decrement the volume	-V	%2DV	Vol [X8]↵	Decrease audio output.
View the volume level	V	V	[X8]↵	Show the output volume.
Volume adjustment (for volume mode = 1)				
Increment the volume	+V	%2BV	Vol [X8]↵	Increase audio output.
Decrement the volume	-V	%2DV	Vol [X8]↵	Decrease audio output.
View the volume level	V	V	[X8]↵	Show the output volume.
Audio mute				
Mute on	1Z	1Z	Amt1↵	Mute all audio outputs.
Mute off	0Z	0Z	Amt0↵	Unmute all audio outputs.
View the audio mute status	Z	Z	[X5]↵	Show the status of audio mute. [X5] = 0 (off) or 1 (on).
Front panel security lockout modes (executive modes)				
Disable lockout modes[24]	0X	0X	Exe 0↵	Default setting. Adjustments and selections can be made from the front panel in addition to via RS-232, Telnet, or Web browser.
Enable lockout mode 3[24]	3X	3X	Exe 3↵	Lock all front panel selections and adjustments via MLC, control modules, SCP, and IR remote. Make selections, changes, and configure features via RS-232 or Web/Ethernet only. All front panels in the control system are locked.

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
View the lockout mode status	X	X	[X209]↵	Show lockout (executive mode) status. [X209] = 0 (off, unlocked) or 3 (front panels, control modules, and remote control locked/disabled).
Example:	X	X	0↵	Executive mode is off.
Status commands				
View lamp hours status	6S	6S	[X205]↵ *or* [X205]*[X205]↵	[X205] represents the number of elapsed hours of projector lamp use. The MLC responds with two sets of lamp hours only if two lamp hours have been set. If a lamp's status has not been set, it is shown as the default (99999 hours) or "N/A".
Set lamp hours status for 1 lamp[24]	[X205]*6S	[X205]%2A 6S	Lhr* [X205]↵	[X205] represents the five-digit numeric value for elapsed lamp use hours, and it is used by script to determine the number sent in response to the "view lamp hours" command (6S).
Set lamp hours status for 2 lamps[24]	[X205]* [X205]*6S	[X205]%2A[X205]%2A 6S	Lhr* [X205]* [X205]↵	
View connection status	7S	7S	[X216]↵	This command lets you know whether the MLC's scripts have determined if the display is still connected to the MLC. [X216] = 0 (disconnected), 1 (connected), or 2 (unknown).
Set display connection status[24]	[X216]*7S	[X216]%2A 7S	Pcs [X216]↵	This command is used to reset the projector/display connection status flag ([X216]) used by scripts. 0 = projector not connected. 1 = projector is connected. 2 = undetermined status.

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
View all voltages and temperature status	11S	11S	*responses from commands* 12S•13S•14S•15S•20S ⏎	View all voltages and the MLC's internal temperature at once.
View +12 V power supply voltage	12S	12S	+[X206]⏎	Display the operating voltage of the MLC's power input. [X206] = voltage in volts.
View +5 V IR receiver port voltage	13S	13S	+[X206]⏎	
View +3.3 V IP Link/FPGA voltage	14S	14S	+[X206]⏎	Show the field-programmable gate array (FPGA) voltage.
View +1.5 V FPGA voltage	15S	15S	+[X206]⏎	
View internal temperature status	20S	20S	[X207]⏎	Display the internal operating temperature. [X207] = temperature in degrees Celsius (the response is 3 digits including leading zeros).

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Serial data port configuration and use				

These commands apply to any port that uses RS-232 communication: both 1-way (output) and 2-way (bidirectional) RS-232 communication.

Send data string

ASCII: Esc [X1] * [X17] * [X20] * [X21] RS ← [X2]
→ response from command ←

URL: W [X1] %2A [X17] %2A [X20] %2A [X21] RS | [X2]

Additional description:

[X1] = specific port number
2 = Display RS-232/IR port
3 = MLS port
[X2] = command data section (< 200 bytes).
[X17] = time in tens of ms for the MLC to wait until receipt of the first response character before terminating the current receive operation (default = 10 = 100 ms, max. = 32767). The response includes leading zeros.
[X20] = time in tens of milliseconds (ms) for the MLC to wait between characters being received via a serial port before terminating the current receive operation (default = 2 = 20 ms, max. = 32767). The response includes leading zeros.
[X21] = #L or #D. The letter parameter is case sensitive (requires a capital "D" or capital "L"). The response includes leading zeros.
L = length of the message to be received.
D = delimiter value.
# = byte count (for L) or a single ASCII character expressed in decimal form (for D). Byte count # can be from 0 to 32767, default = 0. The ASCII decimal delimiter # value can be from 0 to 00255, default = the byte count.

Examples: A 3-byte length = 3L. A delimiter of ASCII 0A = 10D.

NOTE **[X17]*[X20]*[X21] is optional. [X17] may be omitted only if [X20] is also missing. If these three variables are not specified, the default values are used. For this command, [X17] and [X20] must both a) equal zero and b) be nonzero, or c) both be omitted.*

NOTE *For Web encoding for [X2], convert nonalphanumeric characters to hex numbers. A space (hex = 20) is encoded as %20. A plus sign (hex = 2B) is encoded as %2B.*
Example:
ASCII: Esc 05*4*7*3L RS ← <data>
URL: W05%2A4%2A7%2A3L RS | <data>
→ response from command ←

NOTE *The data string ([X2]) in this RS command is limited to 200 bytes.*

NOTE *Use the ASCII to decimal table below to convert the byte count number for [X21].*

ASCII to Decimal Conversion Table

To find the decimal equivalent of the ASCII character, add the row heading and column heading numbers together.

	0	1	2	3	4	5	6	7	8	9
10	LF			CR						
20								Esc		
30			space	!	"	#	$	%	&	'
40	(	)	*	+	,	-	.	/	0	1
50	2	3	4	5	6	7	8	9	:	;
60	<	=	>	?	@	A	B	C	D	E
70	F	G	H	I	J	K	L	M	N	O
80	P	Q	R	S	T	U	V	W	X	Y
90	Z	[	\	]	^	_	`	a	b	c
100	d	e	f	g	h	i	j	k	l	m
110	n	o	p	q	r	s	t	u	v	w
120	x	y	z	{	|	}	~	Del		

LF = line feed
CR = carriage return (←)
Esc = escape
Del = delete

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Configure serial port parameters[24]	Esc X1 * X25, X26, X27, X28 CP ↵	W X1 %2A X25 %2C X26 %2C X27 %2C X28 CP |	Cpn X1 • Ccp X25, X26, X27, X28 ↵	Set baud rate (X25), parity (X26), data bits (X27), and stop bits (X28) for port X1. X25 = 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600, 14400, 19200, 28800, 38400, 57600, or 115200 baud. X26 = parity (only the first letter is needed): O = odd, E = even, N = none (default), M = mark, S = space. X27 = data bits: 7, 8 (default = 8). X28 = stop bits: 1, 2 (default = 1).
Example:	Esc 2*9600,N,8,1CP ↵	W2%2A9600%2CN%2C8%2C1CP |	Cpn2•Ccp9600,N,8,1 ↵	Set the projector control port for 9600 baud, no parity, 8 data bits, and 1 stop bit.
View serial port parameters	Esc X1 CP ↵	W X1 CP |	X25, X26, X27, X29 ↵	
Configure receive timeout[24]	Esc X1 * X17 * X20 * X23 * X21 CE ↵	W X1 %2A X17 %2A X20 %2A X23 %2A X21 CE |	Cpn X1 • Cce X17, X20, X23, X21 ↵	Set the time to wait (X17 = waiting time in tens of ms until receipt of the first response character before terminating the receive operation, X20 = waiting time in tens of ms between characters before terminating) and priority status (X23: 0 = default, use *send data string* command parameters; 1 = use *configure receive timeout* command parameters) **for port X1**. X21 = #L or #D (see previous page). The response includes leading zeros.
View receive timeout	Esc X1 CE ↵	W X1 CE |	X17, X20, X23, X21 ↵	

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
IR/serial data port				
Send an IR command[28]	[Esc][X215],[X57],[X58],[X59]IR ←	W[X215]%2C[X57]%2C[X58]%2C[X59]IR ←	Irs[X215],[X57],[X58],[X59] ←	Send an IR command via IR/Serial Output port number [X215] (1 = display port). [X57] = the IR file number (0-99), [X58] = IR function number (1-137), [X59] = IR playback mode (0 = play once, 1 = play continuously, 2 = stop). The response includes leading zeros.
Get IR command info[13, 28]	[Esc][X57],[X58]IR ←	W[X57]%2C[X58]IR |	{descriptive text} ←	The response to this command is the name/description (e.g., Power On, Power Off, Enter, Play, Stop, RGB, Menu) of the specific command you ask about. [X57] = the IR file number (0-99), as in files *1.eir*, *2.eir*, *3.eir*, etc. stored in the controller. Each ___*.eir* file contains commands for a specific device. [X58] = IR playback function number (1-137), which corresponds to a specific function/command set contained within the file. IR function numbers 0 and 127 or higher can return information only. 0 = return all data; 129 = manufacturer; 130 = model; 131 = class; 132 = remote; 133 = creation date; 134 = comments; 137 = user file name (a descriptive name the user/installer gave the file)
Example:	[Esc]3,1IR ←	W3%2C1IR |	POWER ←	Command/function 1 in file *3.eir* is the Power command.
Example:	[Esc]3,2IR ←	W3%2C2IR |	E13 ←	Command/function 2 in file *3.eir* is not defined or does not exist, so the controller returns E13, the invalid value error number.

NOTE *An IR driver must be loaded into the MLC before IR command information can be read.*

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Ethernet data port configuration and use				
Set global IP port timeout period[24]	Esc 1*[X69]TC ←	W1%2A[X69]TC |	Pti 1*[X69] ←	The global port timeout is the default timeout period for all Telnet sessions. [X69] = IP connection timeout period specified in 10-second steps (1 - 65000, default = 30 = 300 seconds). If no data is received during the specified period, the Ethernet connection closes. Responses are returned with leading zeros. This timeout period is applicable only when the MLC is connected via Ethernet, and you must be logged in as an administrator to change this setting.
View global IP port timeout period	Esc 1TC ←	W1TC |	[X69] ←	
Set current port's timeout period[13,24]	Esc 0*[X69]TC ←	W0%2A[X69]TC |	Pti 0*[X69] ←	The current port timeout period applies to the currently open Telnet session only. When you start another Telnet session, it uses the default global port timeout period. [X69] = timeout period in seconds. See the description above. This variable is applicable only when the MLC is connected via Ethernet. If the MLC is connected via RS-232 protocol, only the global timeout commands apply, and any commands involving [X69] return the E13 error response.
View current port's timeout period[13]	Esc 0TC ←	W0TC |	[X69] ←	

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Digital I/O data port (dedicated Digital I/O ports) configuration and use				
NOTE *An input voltage below 2.0 VDC is considered to be logic low. An input voltage above 2.8 VDC is considered to be logic high. These thresholds are not adjustable.*				
Set the input/output (I/O) mode[24]	[X223]*[X40][	[X223]%2A[X40]%5B	Iom [X223]*[X40]↵	Set the input/output mode ([X40]) for a specific port ([X223]). [X223] = port number 1 = Digital I/O port 1 2 = Digital I/O port 2 3 = Digital I/O port 3 [X40] = mode 0 = input (default) 1 = output 2 = input and pull-up resistor 3 = output and pull-up resistor.
NOTE *When set for input with pull-up resistor ([X40] = 2), the digital input can be triggered by an external switch. When the switch closes, the voltage drops from 5 V to 0 V. When set for output with pull-up resistor, the MLC's digital I/O port can drive devices such as relays and LEDs. See the diagrams in chapter 2 and the special application examples in chapter 5 for more details.*				
View the digital I/O mode	[X223][	[X223]%5B	[X40]↵	
Pulse the digital I/O state[14]	[X223]*3*[X63]]	[X223]%2A3%2A[X63]%5D	Sio [X223]*[X43]↵	**Briefly** change the I/O state. [X63] = Pulse time in 20 ms per unit. If this parameter is missing or = 0, then pulse length = default (25 = 500 ms). 65535 (1310 s) = max. pulse time. [X43] = I/O state: 0 = off 1 = on
NOTE *This and the following three commands are valid only when the port is in output mode or in output with pull-up mode. Otherwise the E14 error (invalid for this configuration) is returned by the MLC.*				
Toggle the I/O state[14]	[X223]*2]	[X223]%2A2%5D	Sio [X223]*[X43]↵	Switch the input/output state from on to off or from off to on.
Set the I/O state to on[14]	[X223]*1]	[X223]%2A1%5D	Sio [X223]*1↵	
Set the I/O state to off[14]	[X223]*0]	[X223]%2A0%5D	Sio [X223]*0↵	
View the I/O state	[X223]]	[X223]%5D	[X43]↵	

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Firmware version, part number and information requests				
NOTE *In a query response, an asterisk (*) after the version number indicates the version that is currently used. A question mark (? or ??) indicates that the factory default firmware is the only firmware loaded in the MLC. A carat (^) indicates the version of firmware that should be running, but, since a mode 1 reset was performed, the factory default firmware version is loaded and running instead. An exclamation point (!) indicates that the firmware is corrupted.*				
NOTE *Responses to commands differ depending on which, if any, verbose response mode the MLC is in. See the CV command (Esc X22 CV ↵) under IP setup commands later in this table.*				
Query firmware version number	Q *or* 1Q	Q *or* 1Q	X11 ↵ *or* Ver01*X11 ↵	Show the MLC's firmware version (X11) to two decimal places. This query yields the number of the currently running version of the user-updatable firmware
Example:	1Q	1Q	1.01 *or* Ver01*1.01	
Query verbose firmware version information	0Q	0Q	[response from 2Q]–[response from 3Q]–[response from 4Q] ↵ *or* Ver00*[response from 2Q]–[response from 3Q]–[response from 2Q]–[response from 4Q] ↵	Show the bootstrap, factory-installed, and updated firmware versions. See 2Q, 3Q, and 4Q below.
Example:	0Q	0Q	2.16-1.00(1.57-MLC104IP -Wed, 16 Jan 2003 00:00:00 GMT)-1.01*(1.65-MLC104IP -Thu, 28 Jun 2007 00:35:39 GMT) ↵	
Query bootstrap firmware version	2Q	2Q	X11 ↵ *or* Ver02*X11 ↵	The bootstrap firmware is not user-replaceable, but you may need this information during troubleshooting.
Example:	2Q	2Q	1.03 ↵	
Query factory firmware version	3Q	3Q	X11 (kernel version–model description–date time of upload) ↵ *or* Ver03*X11 (kernel version–model description–date time of upload) ↵	Factory-installed firmware is different from the bootstrap firmware, but it is also not user-replaceable. This firmware was installed at the factory; it is the version the controller reverts to after a mode 1 reset (see chpt. 2).
Example:	3Q	3Q	1.00(1.57-MLC104IP -Wed, 16 Jan 2003 00:00:00 GMT) ↵	In this example the factory firmware version is 1.00 and the IP Link kernel version is 1.57 for the MLC 104 IP Plus, dated 16 January 2003.

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Query updated firmware version	4Q	4Q	X11 (kernel version–model description–date time of upload)↵ or Ver04*X11 (kernel version–model description–date time of upload)↵	Use this command to find out which version of the firmware, if any, was uploaded into the controller after it left the factory
Example:	4Q	4Q	1.01*(1.65–MLC104IP -Thu, 28 Jun 2007 00:35:39 GMT) ↵	In this example the current firmware version is 1.01, the IP Link kernel version is 1.65, for the MLC 104 IP Plus, dated 28 June, 2007.
NOTE *Responses to commands differ depending on which, if any, verbose response mode the MLC is in. See the CV command (Esc X22 CV →) under IP setup commands later in this table.*				
Query FPGA version	32Q	32Q	X11 ↵	Show the field-programmable gate array (FPGA) firmware version to two decimal places (x.xx).
Request the MLC's part number	N	N	60-818-00 ↵ or 60-1014-00 ↵ or Pno60-818-00 ↵ or Pno60-1014-00 ↵	Show the MLC's part #. IP models respond with 60-818-00, the MLC 104 Plus shows 60-1014-00.
Request A/V input number[14]	I	I	Chn X200 ↵	Show which input is active (selected). X200 is the input number.
NOTE *The MLC responds with an E14 error if no input buttons are set up for firmware control (input switching).*				
Request the model name	1I	1I	MLC 104 IP PLUS ↵ or Inf01*MLC 104 IP PLUS ↵	MLC 104 IP Plus.
Request the model description	2I	2I	MLC 104 IP PLUS ↵ or Inf02*MLC 104 IP PLUS ↵	MLC 104 IP Plus.
Request system memory usage	3I	3I	# bytes used out of # of kbytes ↵ or Inf03*# bytes used out of # of kbytes ↵	Show amount of memory used and total available memory for system operations.
Request user memory usage	4I	4I	# bytes used out of # of kbytes ↵ or Inf04*# bytes used out of # of kbytes ↵	Show amount of user memory used and total available user memory.
Example:	4I	4I	217856 Bytes Used out of 7232 KBytes	
Request status of attached hardware	32I	32I	P1##•P2##•K1##•K2##•K3##•K4##•S##↵	

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Prefixes for connected devices: P1 = SCP #1, address 0 P2 = SCP #2, address 1 K1 = control module #1, address 0 K2 = control module #2, address 1 K3 = control module #3, address 2 K4 = control module #4, address 3 S = MediaLink device, typically a slaved (auxiliary) MLS switcher.		**For ##:** 00 = not present 01 = present (SCP) or IRCM-VCR 02 = IRCM-DVD 03 = IRCM DVD+ 04 = ACM-Level 05 = ACM-Tone 06 = RCM-SC 07 = RCM-SCLT 08 = IRCM-Tape 09 = CM-5BB 10 = CM-20BB 11 = IRCM-DV+ 12 = CM-9BLB 13 = CM-3BLB 14 = CM-19AC 99 = unrecognized.		Show the absence of or types of connected devices. **For ✱✱:** 00 = not present 09 = MLS 102 VGA 01 = MLS 306 10 = MLA-VC10 02 = MLS 506 11 = MLS 304MA 03 = MLS 506MA70 V 12 = MLS 406 04 = MLS 506SA 13 = MLS 406MA 05 = MLS 506MA 100 V 14 = MLS 406SA 06 = MLS 100 A 15 = MLS 304SA 07 = MLS 103 V 16 = PVS 204SA 08 = MLS 103 SV 99 = non-MLS, non-PVS switcher.
Examples:	32I	32I	P101 P200 K111 K211 K307 K408 S09↵	This example includes one SCP (P101), an IRCM-DVD+ (K111 and K211), an RCM-SCLT (K307), an IRCM-Tape (K408), and an MLS 102 VGA (S09).

IP setup commands (IP models only)

`NOTE`   *The non-IP model accepts these commands, but it does not have a LAN port, so it cannot make use of the settings.*

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Set the unit name[24]	Esc X12 CN ↵	W X12 CN |	Ipn• X12 ↵	Change the MLC's name to one of your choosing (X12), such as "AuditoriumMLC", "Rm316-AVcenter", or "exec-boardroom-ctrl". The name consists of up to 24 alphanumeric characters (and the minus sign). The first character must be a letter, the last character cannot be a minus sign (hyphen). Either case (upper, lower) is OK.
Set unit name to factory default[24]	Esc •CN ↵	W%20CN |	Ipn• X49 ↵	X49 = the name the MLC was shipped with: MLC-104-IP-PLUS-##-## , a combination of the model name and the last 3 pairs of hex numbers in the controller's MAC address (e.g., MLC-104-IP-PLUS-02-74-62).
Read the unit name	Esc CN ↵	WCN |	X12 ↵ *or* X49 ↵	X12 is the MLC's current, user-defined unit name. X49 is the MLC's factory default name.

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Set date/time[24]	Esc [X13]CT ↵	W[X13]CT |	Ipt•[X13] ↵	[X13] = Local date and time format. The **set** format is *MM/DD/YY-HH:MM:SS*. *Example: 09/07/06-10:54:00.*
Read date/time	Esc CT ↵	WCT |	[X13] ↵	[X13] = Local date and time format. The **Read** format is *day of week, DD month year HH:MM:SS*. *Example: Fri, 08 Sept 2006 18:19:33.*
Set GMT offset[24]	Esc [X3]CZ ↵	W[X3]CZ |	Ipz[X3] ↵	Set the Greenwich Mean Time (GMT) offset value ([X3]) for the MLC's location. GMT offset (-12.00 to +14.00) represents the time difference in hours and minutes (+/-hh:mm) relative to Greenwich, England. The leading zero is optional. For example, 5:30 = 05:30. Do not use a plus (+) sign if the GMT offset is positive.
Read GMT offset	Esc CZ ↵	WCZ |	[X3] ↵	
Set daylight saving time[24]	Esc [X34]CX ↵	W[X34]CX |	Ipx[X34] ↵	[X34] = Daylight saving time (DST) is a region-specific 1-hour offset that begins in spring and ends in fall. **0 = off/ignore** **1 = USA on** – Starting in 2007, DST begins on the second Sunday of March at 2 AM and ends at 2 AM on the first Sunday of November. For example, time in California is GMT -8:00 from March to November and GMT -7:00 from November to March. However, DST should be turned off in Hawaii, American Samoa, Guam, Puerto Rico, the Virgin Islands, the eastern time zone portion of the state of Indiana, and the state of Arizona (excluding the Navajo Nation). **2 = Europe on** – begins on the last Sunday in March, ends on the last Sunday in October. DST should be turned off for Iceland.
Read daylight saving time	Esc CX ↵	WCX |	[X34] ↵	
Set DHCP on[24]	Esc 1DH ↵	W1DH |	Idh 1 ↵	
Set DHCP off[24]	Esc 0DH ↵	W0DH |	Idh 0 ↵	
NOTE *Changing DHCP from on to off also resets the IP address to the factory default (192.168.254.254).*				
View DHCP mode	Esc DH ↵	WDH |	[X5] ↵	[X5] = 0 (off) or 1 (on).
Set IP address[24]	Esc [X14]CI ↵	W[X14]CI |	Ipi•[X14] ↵	[X14] = IP address (xxx.xxx.xxx.xxx). Leading zeros in each of the four fields are optional in setting values.
Read IP address	Esc CI ↵	WCI |	[X14] ↵	Leading zeros in each of the four fields are suppressed in returned values.
Read hardware address (MAC)	Esc CH ↵	WCH |	[X18] ↵ *or* Iph•[X18] ↵	[X18] = hardware (MAC) address (xx-xx-xx-xx-xx-xx).

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Set subnet mask[24]	Esc X19 CS ←	W X19 CS |	Ips• X19 ↵	X19 = subnet mask (xxx.xxx.xxx.xxx). Syntax is the same as for IP addresses. Leading zeros are optional in setting values.
Read subnet mask	Esc CS ←	WCS |	X19 ↵	Leading zeros are suppressed.
Set gateway IP address[24]	Esc X14 CG ←	W X14 CG |	Ipg• X14 ↵	X14 = IP address (xxx.xxx.xxx.xxx). Leading zeros are optional.
Read gateway IP address	Esc CG ←	WCG |	X14 ↵	
Set verbose response mode on/off[24]	Esc X22 CV ←	W X22 CV |	Vrb X22 ↵	Enable or disable the verbose mode via this command. For X22: 0 = clear/none, default for Telnet connections; responses are not echoed to the host 1 = verbose mode is on, default for RS-232 host control; responses are echoed to the host and displayed to the user 2 = send tagged responses for queries 3 = verbose mode is on and tagged responses are sent for queries.

NOTE *If tagged responses are enabled, all read commands return the constant string + data, the same as for setting a value. For example, for Esc CN ←, the response is Ipn•X12↵ rather than just the data.*

NOTE *Verbose mode is a communication mode in which the device responds with more information than it usually would—more than the device, itself, requires. For example, the controller can send out unsolicited information (such as notice of a volume or input change or a change in some other setting). That is an example of a verbose (wordy) relationship between the controller and a connected device. Verbose mode creates more network traffic than usual, which can slow down network performance.*
Verbose mode is usually enabled for troubleshooting and disabled for daily use.
• For a direct RS-232 connection, the controller is set for verbose mode by default.
• When the MLC is connected via Ethernet, verbose mode is disabled (by default) in order to reduce the amount of communication traffic on the network. If you want to use the verbose mode with a controller connected via Ethernet, this mode must be set to "on" each time you reconnect to the controller.

Command	ASCII (Telnet)	URL Encoded (Web)	Response (MLC to host)	Additional description
Read verbose mode status	Esc CV ←	WCV |	X22 ↵	
Get a connection listing	Esc CC ←	WCC |	[total number of client connections] ↵ *or* Icc [total number of client connections] ↵	
Example:	Esc CC ←	WCC |	002 ↵	*Example: This shows two client connections.*

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Set the broadcast mode[24]	Esc X64|X14 EB ←	W X64%2C X14 EB |	Bmd X64|X14 ←	This command details how often and to what subnet work the MLC broadcasts a message. X64 = Broadcast repetition interval in seconds (0 to 255 [4.25 minutes], default = 0 = off). X14 = IP address (xxx.xxx.xxx.xxx). Leading zeros in each of four fields are optional in setting values, and they are suppressed in returned values. Default broadcast address: 255.255.255.255.
Set the broadcast mode to the default address[24]	Esc X64 EB ←	W X64 EB |	Bmd X64|255.255.255.255 ←	
Clear the broadcast mode[24]	Esc 0EB ←	W 0EB |	Bmd 000,255.255.255.255 ←	This command sets the repeat interval to zero, turning off the broadcast mode.
View the broadcast mode	Esc EB ←	W EB |	X64|X14 ←	
Password and security settings				
Read connection's security level	Esc CK ←	WCK |	X52 ← or Pvl X52 ←	For X52: 11 = user 12 = administrator
Set administrator password[24]	Esc X33 CA ←	W X33 CA |	Ipa• X41 ←	Set the administrator access password (X33, 4 to 12 alphanumeric characters). The password is case sensitive. Special characters (spaces, symbols) are not allowed. X41 = Password to display on screen (response to password query). When the MLC connects to a host device via RS-232, the password (X33), itself, is the response. When the connection is via IP, X41 is 4 asterisks (****) if a password has been assigned, or it is an empty field ( ) if a password hasn't been assigned.
Clear administrator password[24]	Esc • CA ←	W%20CA ←	Ipa• ←	Clear/remove all passwords (administrator and user).
Read administrator password	Esc CA ←	WCA |	X41 ←	

NOTE *A user password cannot be assigned if an administrator password does not exist. Also, if the administrator password is cleared, the user password is also cleared.*

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Set user password[14,24]	Esc X33 CU ←	W X33 CU |	Ipu•X41 ↵	Set the user password (X33 is 4 to 12 alphanumeric characters). The password is case sensitive. Special characters (spaces, symbols) are not allowed. X41 = Password to display on screen.

NOTE — *A user password cannot be assigned if an administrator password does not exist. Also, if the administrator password is cleared, the user password is also cleared.*

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Clear user password[24]	Esc • CU ←	W%20CU |	Ipu• ↵	This clears the user password only.
Read user password	Esc CU ←	WCU |	X41 ↵	

Remapping port designations (IP models only)

For security reasons the network administrator may wish to assign new/different port numbers to the controller's Telnet, Web browser, and direct access ports or to disable one or more ports. Typically Telnet uses port 23, Web access is via port 80 (HTTP), and direct access is via port 2001.

CAUTION — *Do **not** set two or more ports to the same port number. Setting two ports to the same number could cause networking conflicts and will also result in an E13 (invalid parameter) error.*

NOTE — *If you remap a port, you must set the port number to 1024 or higher, unless you reset the port to the default number or disable the port by setting it to 0.*

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Set the Telnet port map[24]	Esc *port#*MT ←	W*por#*MT |	Pmt *port#* ↵	Select a number for the port that will not conflict with any other ports.
Reset the Telnet port map[24]	Esc 23MT ←	W23MT |	Pmt 00023 ↵	This resets the Telnet port to port 23.
Disable the Telnet port map[24]	Esc 0MT ←	W0MT |	Pmt 00000 ↵	Setting the port number to 0 disables the port.
Read the Telnet port map	Esc MT ←	WMT |	*port#* ↵	
Set the Web (HTTP) port map[24]	Esc *port#*MH ←	W*por#*MH |	Pmh *port#* ↵	
Reset the Web (HTTP) port map[24]	Esc 80MH ←	W80MH |	Pmh 00080 ↵	This resets the Web port to port 80.
Disable the Web (HTTP) port[24]	Esc 0MH ←	W0MH |	Pmh 00000 ↵	
Read the Web (HTTP) port map	Esc MH ←	WMH |	*port#* ↵	
Set the Direct Access port map[24]	Esc *port#*MD ←	W*por#*MD |	Pmd *port#* ↵	
Reset the Direct Access port map[24]	Esc 2001MD ←	W2001MD |	Pmd 02001 ↵	This resets the direct access port to port 2001.
Disable the Direct Access port[24]	Esc 0MD ←	W0MD |	Pmd 00000 ↵	
Read the Direct Access port map	Esc MD ←	WMD |	*port#* ↵	

Command/response table for SIS commands (continued)

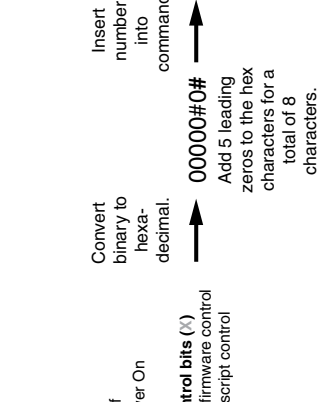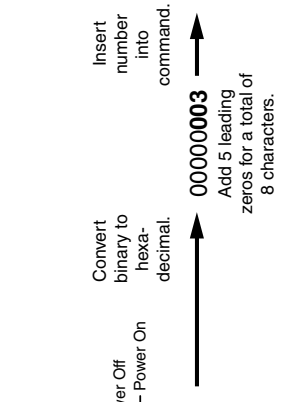| Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Directory commands				
Change or create a directory	Esc path/directory/ CJ ↵	W path%2Fdirectory%2F CJ |	Dir•path/directory/ ↵	The directory's name must be composed of alphanumeric characters and may include the minus sign (hyphen, -) and the colon (:). The first character must be a letter. Case does not matter. No blank or space characters are permitted in the name. Include the **full path**, not just the name of the directory. Nonalphanumeric characters in the path (e.g., /) must be encoded to hex. characters for use with a Web browser.
NOTE	A directory does not fully exist until a file has been copied into that path. Also, the MLC operates differently from PC operating systems: files stored in and directories created in the MLC may have the same names.			
Example:	Esc majordirectory/subdirectory/next-level/ CJ ↵	W majordirectory %2F subdirectory %2F next-level %2F CJ |	Dir•majordirectory/subdirectory/next-level/ ↵	In this case, the path is *majordirectory/ subdirectory/.* The directory that was just created or changed to is called *next-level.*
Example:	Esc custompages/HTMLfiles/ CJ ↵	W custompages %2F HTMLfiles/ CJ |	Dir•custompages/HTMLfiles/ |	This example just created a subdirectory for storing the user's custom-made HTML files. The directory that was just created is called *HTMLfiles.*
Example:	Esc oak/CJ ↵	W oak %2F CJ |	Dir•oak ↵	
Change back to the root directory	Esc /CJ ↵	W %2F CJ |	Dir• / ↵	
Go up one directory level	Esc ..CJ ↵	W %2E %2E CJ |	Dir•path/directory/ ↵	
View the current directory	Esc CJ	W CJ |	path/directory/ ↵	
NOTE	The current directory is determined on a per-connection/session. At the beginning of each IP connection/session, the current directory is selected as the root directory.			
File handling commands				
Erase the user-supplied Web page and files[24,28]	Esc filename EF ↵	W filename EF |	Del • filename ↵	
Erase the current directory and its files[24,28]	Esc /EF ↵	W %2F EF |	Ddl ↵	

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Erase the current directory and its subdirectories[24,28]	Esc //EF ↵	W%2F%2F EF |	Ddl ↵	
List files from the current directory	Esc DF ↵	W DF |	[filename 1] • [day, date time of upload] GMT • [file size 1 in bytes] ↵ [filename 2] • [day, date time of upload] GMT • [file size 2 in bytes] ↵ [filename 3] • [day, date time of upload] GMT • [file size 3 in bytes] ↵ ... [filename n] • [day, date time of upload] GMT • [file size n in bytes] ↵ [space remaining (to 7-digits] • Bytes Left ↵↵	Retrieve a list of files stored in the controller. Each line of the response lists a different filename and its corresponding file size. The last line of the response indicates how much available file space there is.

When working with the MLC's embedded Web pages, the response visible in a JavaScript™ server-side include (inserted between `<script> </script>` tags into HTML source code) follows this structure:

| | | | | var file=new Array();
file[1]="[filename 1],[day, date time1 of upload] GMT,[file size 1 in bytes]";
file[2]="[filename 2],[day, date time2 of upload] GMT,[file size 2 in bytes]";
file[3]="[filename 3],[day, date time3 of upload] GMT,[file size 3 in bytes]";
...
file[n]="[filename n],[day, date time$n$ of upload] GMT,[file size n in bytes]";
file[n+1]="[space remaining (to 7-digits)],Bytes Left"; ↵↵ |
| *Example (via Telnet or HyperTerminal):* | Esc DF ↵ | W DF \| | | 4.evt Tue, 01 Mar 2005 02:03:07 GMT 42233 ↵
1.eml Tue, 01 Mar 2005 02:03:34 GMT 200 ↵
2.eml Tue, 01 Mar 2005 02:03:34 GMT 300 ↵
2.eir Tue, 01 Mar 2005 02:03:34 GMT 1683 ↵
6.evt Tue, 01 Mar 2005 02:03:36 GMT 17956 ↵
4.eir Tue, 01 Mar 2005 02:03:47 GMT 6849 ↵
MLCmain.sc Tue, 01 Mar 2005 02:03:52 GMT 8515 ↵
0.evt Tue, 01 Mar 2005 02:03:56 GMT 34413 ↵
99.eml Tue, 01 Mar 2005 02:04:19 GMT 178 ↵
buttons.xml Tue, 01 Mar 2005 02:04:19 GMT 17214 ↵
MLC.cfg Wed, 16 Mar 2005 21:34:45 GMT 7188 ↵↵
6568448 Bytes Left ↵ |

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
List files from the current directory and its subdirectories	Esc LF ↵	WLF|	(See responses to Esc DF ↵, above.)	The response is the same except that the path/directory precedes filenames for files within the subdirectories.

File streaming commands (IP models only)

NOTE *File streaming commands should be used by advanced programmers only. Also, the non-IP model accepts these commands, but it cannot make use of the settings.*

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Load a file to user flash memory via Telnet or RS-232 [24, 28]	Esc + UF *filesize, filename* ↵ (raw, unprocessed data in a file of up to *filesize*)		Upl ↵	

NOTE *If the MLC has insufficient memory available to store the sent file, it responds with Fld ↵ (failed) instead of with Upl ↵.*

NOTE *Firmware can be updated by using this command to upload an _____.s19 file to the MLC. If the MLC determines that the file is not intended for its model, the Upl ↵ response is followed by a Fwm ↵ (firmware mismatch) response.*

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Retrieve a file from user flash memory via Telnet or RS-232 [28]	Esc *filename* SF ↵		{4 bytes of *filesize*, and then raw data from the file}	
Load a file to user flash memory via port 80 (HTTP, Web)	Send a Post command on port 80 followed by the delimited data to be written to the file in flash memory.			
Retrieve a file from user flash memory via port 80 (HTTP, Web)	Send a Page Get command on port 80 followed by WSF|		{The response is raw data from the file.}	
Example:	http://192.168.254.254/mypage.html?cmd=WSF|		{data from the file *mypage.html*.}	

Web browser-specific commands (IP models only)

NOTE *The non-IP model accepts these commands, but it cannot make use of the settings.*

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Read response from last URL command	Esc UB ↵	WUB|	{response from command} ↵	

E-mail (IP models only)

NOTE *The non-IP model accepts these commands, but it cannot make use of the settings.*

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Configure e-mail events (mailbox) [24]	Esc X45, X46, X47 CR ↵	W X45%2C X46%2C X47 CR|	Ipr X45 X46 X47 ↵	X45 = e-mail event number (1 - 64). X46 = e-mail recipient's address (e.g., JDoe@extron.com) for the person to whom messages will be sent. This address is limited to 31 characters. X47 = name of e-mail file to be sent (*1.eml, 2.eml, ... 64.eml*) (first line of the file = the subject, the rest = the body of the e-mail).
Example:	Esc 5, jdoe@extron.com, 7.eml CR ↵	W 5%2Cjdoe%40extron%2Ecom%2C 7%2Eeml CR|	Ipr 5, jdoe@extron.com, 7.eml ↵	For e-mail event 5, send file *7.eml* to jdoe@extron.com.

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Read/view e-mail events	Esc [X45] CR ←	W[X45]CR |	[X46], [X47] ←	[X45] = e-mail event number (1 - 64).
Send e-mail file specified in the e-mail event configuration[24]	Esc [X45] SM ←	W[X45]SM |	Eml [X45] ←	
Send a different e-mail file (one not configured in an e-mail event)[24]	Esc [X75],[X45],[X70],[X47]SM ←	W[X75]%2C[X45]%2C[X70]%2C[X47]SM |	Eml [X45] ←	[X75] is an optional string for a destination e-mail address in the form of *test@extron.com*. [X70] = The number to insert into an e-mail message if a _____*.eml* file has an embedded server-side include "<!--#echo var = "WCR|"-->" (the Esc ← command with no parameters.) The numeral is a 16-bit number to be employed as the user defines. This is an optional parameter. Use 0 as a placeholder if the optional [X47] variable is used but [X70] is not needed. [X47] = *xxx*, where *xxx* = a number 1 to 999 corresponding to the e-mail's filename (*xxx.eml*). If *xxx* = 0 or no parameter is given, the MLC sends the file that was set via the CR command.

NOTE *If file [X47].eml is not found when the SM command is executed, the MLC sends a default e-mail message.*

Command	ASCII (Telnet)	URL Encoded (Web)	Response	Additional description
Set e-mail server IP address and user domain name[24]	Esc [X14],[X15],[X73],[X74] CM ←	W[X14]%2C[X15]%2C[X73]%2C[X74]%2CCM |	Ipm•[X14],[X15],[X73],[X74]%2CCM |	[X14] = IP address (xxx.xxx.xxx.xxx). Leading zeros are optional in setting values. Leading zeros are suppressed in returned values. [X15] = E-mail domain name, e.g., *extron.com* [X73] = An e-mail account username (for SMTP authentication) of up to 31 characters. Do not use commas. This parameter is optional during setup. [X74] = An e-mail account password (for SMTP authentication) of up to 31 characters. Do not use commas. This parameter is optional during setup. In a response, instead of the actual password, [X74] is displayed as 4 asterisks (****) if a password has been set up or as nothing ( ) if it has not.
Read/view e-mail server IP address and user domain name	Esc CM ←	WCM |	[X14],[X15],[X73],[X74] ←	

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Event control				
Start events[27]	Esc 1AE ↵	W1AE ⏎	Ego ↵	Start all events.
Stop events[27]	Esc 0AE ↵	W0AE ⏎	Est ↵	Stop running all events.
Query quantity of events running	Esc AE ↵	WAE ⏎	#### ↵ *or* Enm #### ↵	The response is the quantity of currently running events, and it includes leading zeros. For example, if two events are running, the response is 00002 ↵.
Set the event number ([X35]) to hook to front panel button presses (hardware-script interactions)[24]	Esc [X35]*[X217]EN ↵	W[X35]%2A[X217]EN ⏎	Ehk [X35] ↵ *or* Ehk [X35]*[X217] ↵	If desired, use this command to designate an event script ([X35].evt) to be used to track and react to hardware happenings and MLC/IRCM/SCP button presses. [X35] = event number (0 - 99). The default value of [X35] after a system reset is 255. [X217] = firmware's event status polling period from 0 to 255 in 20 ms increments. [X217] is optional: if it is not set, it defaults to 100 (2 seconds) and is not shown in the command's response. If [X217] is set to 0, the firmware does not poll for event status.

NOTE *"Hooking" an event involves associating the event with a specific button so that event will be automatically executed when the designated button is pressed.*

NOTE *The MLC's firmware checks (polls) the status of event scripts on a regular basis. Variable [X217] represents the length of time between event status checks.*

NOTE *This command is optional. You do **not** have to use this command to set up the MLC. By default, during configuration, the configuration software associates the main event script file (0.EVT) with hardware events and button presses. Once that event file has been compiled, it is capable of receiving information from the MLC's register that tracks hardware actions and button presses. In response to a detected button press or other hardware happening, the event script can then tell the MLC to change relays, issue commands, or make some other change. You would use this command only to associate a different event script file with tracking and responding to hardware/button actions.*

Command	ASCII (Telnet)	URL Encoded (Web)	Response (MLC to host)	Additional description
Read the number of the event that is hooked to hardware/front panel changes	Esc EN ↵	WEN ⏎	[X35] ↵ *or* [X35]*[X217] ↵	Read the event number/event script ([X35]).

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Select firmware or script control of buttons[24]	Esc X211 LZ ←	W X211 LZ |	Bse X211 ←	This command determines whether the firmware or a script (software-generated instructions) controls the functions and lighting of a given button. X211 = Status of which buttons are controlled by script(s) and which are controlled by firmware. This variable is an 8-digit hexadecimal number. Refer to the diagram to see how this number is calculated. This variable is case-sensitive and requires capital letters.

Binary bit map for script control of button enabling

Input 1
Input 2
Input 3
Input 4

Power Off
Power On

Control bits (X)
0 = firmware control
1 = script control

X X X X 0 0 0 0 0 0 0 0 X X

Hex Nibble   Hex Nibble   Hex Nibble   Hex Nibble

Convert binary to hexa-decimal.

00000#0#

Add 5 leading zeros to the hex characters for a total of 8 characters.

Insert number into command.

Esc 00000#0# LZ ←

Example:

Change the Power On and Power Off buttons' functions from firmware control to script control.

Let the input buttons remain under control of the firmware.

Input 1
Input 2
Input 3
Input 4

Power Off
Power On

0 0 0 0 0 0 0 0 0 0 0 0 1 1

0   0   3

Convert binary to hexa-decimal.

00000003

Add 5 leading zeros for a total of 8 characters.

Insert number into command.

Esc 00000003 LZ →

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Example: Change the input 3 - 4 buttons from firmware control to script control.	Input 1, Input 2, Input 3, Input 4 — Power Off / Power On — `1 1 0 0 0 0 0 0` → **C 0 0**	`1 0 0 0 0 0 0 0` → **0 0** (Power Off / Power On)	Convert binary to hexadecimal. **00000C00** — Add 5 leading zeros for a total of 8 characters.	Insert number into command. Esc 00000C00 LZ ↓
Example: Change **all** front panel buttons from firmware control to script control.	Input 1, Input 2, Input 3, Input 4 — Power Off / Power On — `1 1 1 1 0 0 0 0` → **F 0**	`1 1 0 0 0 0 1 1` → **3** (Power Off / Power On)	Convert binary to hexadecimal. **00000F03**	Insert number into command. Esc 00000F03 LZ ↓

Read firmware / script button control status   Esc LZ ↓   WLZ | X211 ↵

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description

Button LED control[24]
(set button color/lighting)

ASCII (Telnet): Esc X212 LC ←

URL Encoded (Web): W X212 LC |

Response (MLC to host): Lse X212 ←

Additional description:
This command specifies which front panel buttons (Power On, Power Off, Function / Room, and/or input selection buttons) light and in what colors. You can change the lighting of one, several, or all buttons at once. X212 = an 8-digit hexadecimal number representing the status of button lamp LEDs. It is case-sensitive, so use capital letters.

Control bits (XX)
00 = **off** – no LED is lit, button is unlit
01 = **green** LED lights
10 = **red** LED lights
11 = both LEDs light, button is **amber**

Binary bit map for button LED status

Input 1, Input 2, Input 3, Input 4, Power Off, Power On

X X X X X X X X 0 0 0 0 0 0 0 0 0 0 0 0 0 0 X X X X

Hex Nibble: 9 — Hex Nibble: F — Hex Nibble 0 — Hex Nibble 0 — Hex Nibble 0 — Hex Nibble 0

Convert binary to hexadecimal.

00##000#

Add 2 leading zeros to the numbers from the 6 hex nibbles for a total of 8 characters.

Insert number into command.

Esc 00##000# LC →

Example

Light buttons:
• Power On = amber
• Power Off = red
• Inputs 1, 2 = amber
• Input 3 = green
• Input 4 = red

Input 1, Input 2, Input 3, Input 4, Power Off, Power On

1 0 0 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 1

Hex Nibble 9 — Hex Nibble F — Hex Nibble 0 — Hex Nibble 0 — Hex Nibble 0 — Hex Nibble B

Convert to hex.

009F000B

Add 2 leading zeros.

Insert number into command.

Esc 009F000B LC →

MLC 104 Plus Series Front Panel

DISPLAY — ON — OFF
VOLUME
CONFIG
VCR 1 — DVD 2 — PC 3 — IMAGE MUTE 4

Read button LED color status

ASCII (Telnet): Esc LC ←

URL Encoded (Web): WLC |

Response (MLC to host): X212 ←

Additional description:
See the previous command for how to decipher X212.

Command/response table for SIS commands (continued)

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Set button LEDs to blink slowly[24]	Esc 1*[X212]LX←	W1%2A[X212]LX|	Lbk*1*[X212]↵	
Read which button LEDs are set to blink (whether slowly or fast)	Esc 1LX←	W1LX|	[X212]↵	
Set button LEDs to blink fast[24]	Esc 2*[X212]LX←	W2%2A[X212]LX|	Lbk*2*[X212]↵	
Read which button LEDs are set to blink fast	Esc 2LX←	W2LX|	[X212]↵	

NOTE *The command to make a button LED blink fast takes precedence over the command to make it blink slowly. If a button's LEDs are set to blink both fast and slowly, the LED will blink fast.*

Reset (zap) commands and erase commands

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Erase the flash memory[24]	Esc ZFFF←	WZFFF|	Zpf↵	
Reset all device settings to factory defaults[24]	Esc ZXXX←	WZXXX|	Zpx↵	The "reset all settings" command does not affect IP settings or flash memory.

NOTE *The ZXXX command does not reset any IP-related settings such as the IP address, subnet mask, and gateway IP address. It also does not affect user files stored in flash memory.*

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Reset all device settings and delete files[24]	Esc ZY←	WZY|	Zpy↵	

NOTE *This command is intermediate between the ZXXXX and ZQQQ commands. It is an absolute system reset **excluding** IP settings (IP address, subnet mask, gateway IP address, unit name, DHCP settings, port mapping). This allows you to maintain communication with the MLC. This reset is recommended after you perform a firmware update.*

NOTE *This command is supported by MLCs with firmware of version 1.03 or higher.*

Command	ASCII (Telnet) (host to MLC)	URL Encoded (Web) (host to MLC)	Response (MLC to host)	Additional description
Absolute system reset[24] (mode 5 reset)	Esc ZQQQ←	WZQQQ|	Zpq↵	Reset all settings/memories. The ZQQQ command resets everything (all settings, adjustments, PINs, the IP address, and subnet mask) to the factory default values. Files in flash memory are also erased by this command. The firmware version doesn't change. The IP address is reset to 192.168.254.254, the subnet mask is reset to 255.255.0.0. This command is identical to reset mode 5, discussed in "Resetting the Unit" in chapter 2.

The syntax for setting a special function for an MLC is X?*__ # where X? is the value and __ is the function number. 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 rightmost column.

Command/response table for special function SIS commands (accessible via RS-232 only)

Command	ASCII Command (host to MLC)	Response (MLC to host)	X? values and additional descriptions
Delay times			
Most projectors require a certain amount of time during warm-up and cool-down during which they do not accept commands. Set the "lock input selection during power on/off" command (53#, page 4-39) first. Then send this command (1#) to specify the amount of time for the MLC to wait between sending the projector a power-on or power-off command and when the next input button press can occur.			
NOTE *Global Configurator automatically sets the warm-up and cool-down delay times based on default values in the display/projector's driver. This SIS command overrides the default settings. For best results, set delay times to 2 to 4 seconds longer than the times required by the display/projector. This ensures that the correct Display power button state is shown on the front panel and on the GV and standard embedded Web pages.*			
Power on delay[24]	X?*1#	WarmUp* X?↵	0 = 0 seconds, 1 = 2 seconds, 2 = 4 seconds, ... in 2 second steps up to 150 = 300 seconds (5 minutes).
Example:	8*1#	WarmUp*008	*Example:* set a 16 second power on delay.
Example:	1#	023	*Example:* view the power on delay setting (23 = 46 seconds).
Power off delay[24]	X?*2#	CoolDown*X?↵	0 = 0 seconds, 1 = 2 seconds, 2 = 4 seconds,... in 2 second steps up to 150 = 300 seconds.
Example:	23*2#	CoolDown*023↵	*Example:* set a 46 second power off delay.
Power off button delay[24]	X?*22#	PwrOffDly*X?↵	0 = the power off button requires no hold delay (default), 1 = the power off button requires a 2-second hold delay before starting the power-off sequence.
Audio settings			
Limit audio level on display power-on[24]	X?*11#	VolLimit*X?↵	If this feature is enabled, the maximum initial power-up volume level does not exceed the level specified by this command. 0 = audio off, ..., 20 = default value, ..., 100 = no limit on audio level at power-on.
NOTE *The maximum is limited by the maximum volume setting (47#). If the maximum volume (47# command) is set, the limit audio level feature (11# command) is automatically set to 25% of the maximum volume (47#). See page 4-39.*			

Command/response table for special function SIS commands, continued
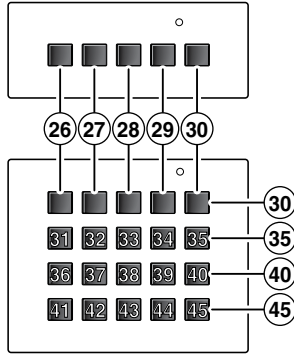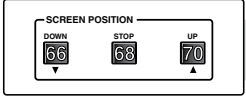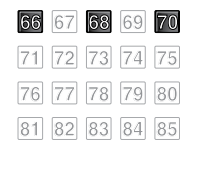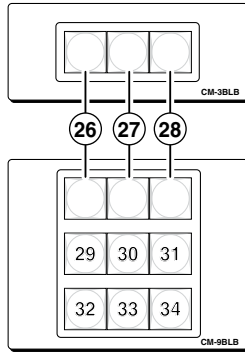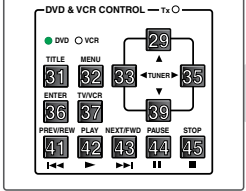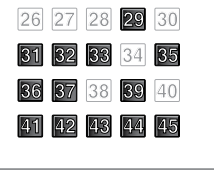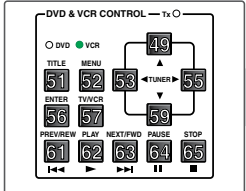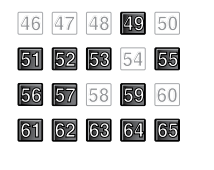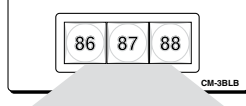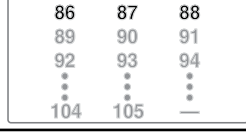
Command	ASCII Command (host to MLC)	Response (MLC to host)	X? values and additional descriptions
Example:	28*11#	VolLimit*028 ↵	*Example:* limit power-up volume to audio level 28.

Button associations (virtual mapping) for an IRCM-DV+

By design an IRCM-DV+ can be assigned paired **module addresses (by DIP switch)** of either 1&2 *or* 3&4 *only*. It cannot be assigned to addresses 2&3 or 1&4. The odd-numbered module address (1 or 3) is reserved for DVD control, the even-numbered module address (2 or 4) is for VCR control. The address DIP switches must be set in order for the MLC to recognize and reserve memory space for the module. Refer to the *Control Modules User's Manual*.

To use an optional IRCM-DV+ with an MLC, you need to **associate the DVD portion** of this module **with an MLC input selection button**, and also **associate the VCR portion with a different MLC input selection button**. The associated button must be selected (pressed) in order to activate and use the VCR portion or the DVD portion of the module. You cannot activate both parts (VCR and DVD) at the same time. If you do not associate (map) the IRCM-DV+'s addresses (1&2 or 3&4) with MLC buttons, you cannot activate and use either the DVD or the VCR part of the IRCM-DV+.

> **NOTE** For MLC 104 IP Plus Series MediaLink Controllers, you **can** assign both the DVD and VCR portions of an IRCM-DV+ to the same input selection button. A and B must both be inputs that are set up for input switching mode *(firmware control) via Global Configurator.*

$$(A \times 16) + (B) = \boxed{X?}$$

Here is how to determine the value of $\boxed{X?}$ for the following commands:

A	B
Button to associate the **VCR** half (even address, 2 or 4) with	Button to associate the **DVD** half (odd address, 1 or 3) with

$\boxed{X?}$ is a decimal number from 000 to 67.

IRCM-DV+ address 2, address 1 button association

Associate MLC's buttons w/IRCM-DV+[24]

	$\boxed{X?}$*25#	DVA_VMap*$\boxed{X?}$↵	Associate specific MLC input selection buttons with the VCR and DVD halves of the IRCM-DV+ that has DIP switch-based addresses of 1 and 2. $\boxed{X?}$ can be from 0 to 67.
Example:	52*25#	DVA_VMap*052	Associate the MLC's input 4 button with IRCM-DV+ address 1 (DVD functions) and the MLC's input 3 button with IRCM-DV+ address 2 (VCR functions). See the illustration at left.

$$\boxed{X?} = (3 \times 16) + (4) = 52$$

3	4
Button to associate the **VCR** half (even address, 2) with	Button to associate the **DVD** half (odd address, 1) with

IRCM-DV+ address 4, address 3 association

Associate MLC's buttons w/IRCM-DV+[24]

$\boxed{X?}$*26#	DVB_VMap*$\boxed{X?}$↵	Associate MLC buttons with the VCR & DVD parts of an IRCM-DV+ that has DIP switch-set addresses of 3 and 4.

IRCM-DV+ activation

Force an IRCM-DV+ to activate or to turn off one half (DVD or VCR)

$\boxed{X?}$*$\boxed{Y?}$*24#	DV_Force*$\boxed{X?}$*$\boxed{Y?}$	$\boxed{X?}$ = DIP switch address (1, 2, 3, or 4) of the IRCM-DV+. For $\boxed{Y?}$: 0 = turn off IRCM-DV+, 1 = force the DVD half on (make it active), 2 = force the VCR half on.

> **NOTE** This command overrides the 25# and 26# commands listed above.

> **NOTE** This command does not *require each half of the IRCM-DV+ to be associated with an input button.*

Read an IRCM-DV+'s status	$\boxed{X?}$*24#	$\boxed{Y?}$	See the $\boxed{X?}$ and $\boxed{Y?}$ values above.

Command/response table for special function SIS commands, continued

Command	ASCII Command (host to MLC)	Response (MLC to host)	X? values and additional descriptions

Button press/release emulation

Emulating a button press or release causes the commands and actions that are associated with the button via the main event script to be executed. Button emulation triggers only what has been set up via the Front Panel tab in Global Configurator. Emulation does not trigger the built-in SIS input switching commands (X200 !) or the projector power on/off commands (1P or 0P).

See the diagrams below and on the next page to determine the number of the memory block associated with each button. Button press/release emulation commands start on page 4-37.

NOTE *The input button register numbering shown in the following illustrations is for a stand-alone MLC. It does not include button numbering for an optional auxiliary switcher connected to the MLS port.*

**Button/Switch Memory Block Numbering for the
MLC 104 Plus Series, SCP 104 Series, and IR 402**

Command/response table for special function SIS commands, continued

Command	ASCII Command (host to MLC)	Response (MLC to host)	X? values and additional descriptions

Each control module (IRCM, ACM, RCM, CM) has 20 memory blocks reserved for it, no matter how many buttons are physically present on the module:

- module 1: blocks 26-45
- module 3: blocks 66-85
- module 2: blocks 46-65
- module 4: blocks 86-105

NOTE *MLC 104 Plus Series units can be connected to a maximum of four control modules. See page 2-12 for cabling instructions.*

Memory block numbers for each module are sequential from left to right, top row to bottom row, as shown below.

Button/Switch Memory Block Numbering for Control Modules (IRCMs, ACMs, RCMs, CMs)

Memory Block Numbering for Any Control Module with Black Buttons
(Example is for Control Module 1)

Buttons and memory blocks are numbered in a grid of 5 columns and 4 rows of buttons on each module, as on the CM-20BB, shown above.

Memory Block Numbering Examples for Modules with Black Buttons

RCM-SC with DIP switch set for address 2 (module 3)

Module 3 has memory blocks 66-85.

IRCM-DV+ with DIP switch set for addresses 0 and 1 (modules 1 and 2)

Module 1 has memory blocks 26-45.

DVD Half (module 1)

Module 2 has memory blocks 46-65.

VCR Half (module 2)

Memory Block Numbering for Control Modules with Clear, Backlit Buttons

CM-3BLB

CM-9BLB

Backlit button modules feature a grid of 3 columns and 1 or 3 rows of buttons, as shown at left.

NOTE *There are still 20 memory blocks for each module.*

- Module 1: memory blocks 26-45.
- Module 2: memory blocks 46-65.
- Module 3: memory blocks 66-85.
- Module 4: memory blocks 86-105.

CM-3BLB, DIP switch set for address 3 (module 4)

Module 4 has memory blocks 86-105.

Command/response table for special function SIS commands, continued

Command	ASCII Command (host to MLC)	Response (MLC to host)	X? values and additional descriptions
Emulate a button/switch press	X? *42#	SwPrs*X?↵	This command causes the MLC to issue the commands associated with a button press. X? = the number of the memory block for the button/switch for which you want to emulate a press (1 - 128). **See the diagrams on the preceding two pages.**
Emulate a button/switch release	X? *43#	SwRls*X?↵	This makes the MLC issue the commands associated with a button release. X? = the button's/switch's memory block number (1-128).
Emulate a button press-and-release	X? *44 #	SwCmd*X?↵	The MLC issues the commands associated with both the press and the release of the specified button. X? = the button's/switch's memory block number (1-128).
Example:	25*44#	SwCmd*25↵	
Example: emulate pressing and releasing the volume up button on the remote control or rotating the MLC's front panel Volume knob clockwise.			
Example:	9*44#	SwCmd*9↵	
Example: emulate pressing and releasing the first input button. Actions associated with the button press are executed first, followed directly by actions associated with the button release.			
Button control			
Set slave (auxiliary switcher) map[24]	X? *3Y?# X? values Default: X? = Y? 00 = input 0 01 = input 1 02 = input 2 ... 98 = input 98 99 = input 99	SlaveMapY?*X?↵ Y? values 1 = input button 1 2 = input button 2 3 = input button 3 4 = input button 4	This command associates an MLC input button with a specific input on a connected switcher. X? is the actual input channel (including inputs on an auxiliary switcher) to select when button Y? is pressed. The values for these variables are shown at left.
Example:	6*34#	SlaveMap4*6↵	Map input 6 (an input on an auxiliary switcher) to the MLC's input button 4. When button 4 is pressed, the A/V system switches to input 6, and any instructions (DVD or VCR control commands, for example) associated with input button 4 on the MLC are executed.
Query slave map setting	3Y?#	X?↵	

SIS™ Programming and Control, cont'd

Command/response table for special function SIS commands, continued

Command	ASCII Command (host to MLC)	Response (MLC to host)	X? values and additional descriptions
Set and trigger a button press repeat	X?*Y?*45 #	RptRate*X?*Y?⏎	This command tells the MLC to repeat a specific button's press commands at a fixed interval (a set frequency). X? = the number of the button/ switch (1 - 128). **See the diagrams on pages 4-35 and 4-36.** Y? is the repeat interval: 0 to 65535, in 20 ms steps. 1 = 20 ms, 2 = 40 ms, 3 = 60 ms,... 65535 = 1,310,700 ms = 21.845 minutes. If Y? = 0, the MLC stops repeating the selected button's commands.
Example:	9*850*45#	RptRate*9*850⏎	The commands associated with the input 1 button press are executed every 850x20 ms (= 17,000 ms = 17 seconds) until the repeat rate for that button is set to 0 ("cleared").

NOTE *The button repeat SIS command (X?*Y?*45 #) must be entered each time you want to have a button press trigger repeated command releases. Also, only one button at a time can be set to repeat: multiple buttons can not be in repeat mode simultaneously.*

NOTE *The **Repeat Rate...** feature found in Global Configurator is based on this command. However, through scripting the MLC sets the repeat mode to on in response to a specific button press, and it sets the repeat mode to 0 when the button is released or input is no longer selected. Do not configure the Display power buttons to use the repeat rate function.*

Command	ASCII Command	Response	X? values
Query button repeat rate status	45#	X?*Y?⏎	See the variables for the command shown above.
Clear (turn off) the button repeat[24]	0*0*45#	RptRate*000*00000⏎	This command clears the button repeat setting and turns off the button repeat function.

| Front panel button LED control[24] | X?*Y?*51# | LmpY?*X?⏎ | This command controls which LED(s) turn on or off or blink in a specific button. X? is the LED state, Y? is which projector power or input button to control. See the list of values at left. |

X? values
- 0 = all LEDs are off
- 1 = green LED is on
- 2 = red LED is on
- 3 = green & red LEDs are on (button glows amber)
- 4 = slowly blinking green
- 5 = slowly blinking red
- 6 = slowly blinking amber
- 7 = fast blinking green
- 8 = fast blinking red
- 9 = fast blinking amber

Y? values
- 1 = power on button
- 2 = power off button
- 9 = input button 1
- 10 = input button 2
- 11 = input button 3
- 12 = input button 4

If you want to control the LEDs for CM-3BLB or CM-9BLB buttons, see page 5-36 to determine the button numbers.

| Query button LED control status | Y?*51# | X?⏎ | See the variables for the command shown above. |

NOTE *If you used the LX command (see page 4-32) to set a button for an LED combination other than those listed above for X?, the MLC responds with a zero (0). For example, if a button is set for its green LED to blink slowly and its red LED to blink fast, the MLC sends 0 in response to the Y?*51# command.*

Command/response table for special function SIS commands, continued

Command	ASCII Command (host to MLC)	Response (MLC to host)	X̄? values and additional descriptions
Miscellaneous settings			
Enable auxiliary switcher use (switcher slaving)	X̄?*41#	Slave*X̄?↵	For X̄?, 0 = disable control of an optional Extron MLS/PVS switcher, 1 = enable (default) MLS/PVS auxiliary switcher control.
Volume knob mode[24]	X̄?*46#	VolMode*X̄?↵	For X̄?, 0 = discrete volume values (default), 1 = continuous increment/ decrement.
Max. volume range[24]	X̄?*47#	VolMax*X̄?↵	For maximum volume, X̄? is 1 to 100. 100 = default.
NOTE *Maximum volume range cannot be changed while an Extron switcher is detected at the MLC's MLS switcher port.*			
NOTE *When the maximum volume is changed, the volume level and the volume limit during display power-up (11#) are set to 25% of the new maximum volume setting.*			
Volume encoder scale[24]	X̄?*49#	EncScale*X̄?↵	For X̄?: 0 = no scaling (default) (the volume encoder works at full speed.), 1 = decrease encoder speed by 2, 2 = decrease encoder speed by 3, ..., 255 = decrease encoder speed by 256.
NOTE *Use this command to slow down how fast the volume changes while you turn the Volume knob or press a volume button on the remote control. The lower the encoder speed, the more turns or button presses it takes to change the volume by the same amount.*			
The value entered is the encoder speed scaling factor. A value of 1 scales the speed down by a factor of 2 (the MLC issues commands at 1/2 speed), a value of 2 scales by a factor of 3 (the MLC issues volume commands 1/3 speed), and so forth.			
This feature addresses a scenario that occurs with some projectors that use range type volume control. When the MLC's knob controls projector volume, sometimes the MLC sends the volume commands faster than the projector can detect and process them. The projector does not detect some of the volume change commands, resulting in a choppy volume ramp.			
Encoder scaling gives the programmer the ability to slow the knob down to a speed the projector can handle. The drawback is that users must turns the knob more times to change from minimum to maximum volume. It is up to the user to find a balance between smooth audio ramping and the number of knob turns needed to cover the volume range. This requires trial and error for each projector exhibiting this problem.			
Although this feature is mainly for range type volume control, it applies to any range type command programmed to be executed by the volume knob.			
Front panel lockout			
Lock out input selection during power-on/power off[24]	X̄?*53#	PwrLock*X̄?↵	For X̄?: 0 = off, 1 = on (default).
NOTE *This command applies only to input selection buttons that are controlled by firmware and designated for input switching (input buttons that are set for input button mode via Global Configurator).*			

Command/response table for special function SIS commands, continued

Command	ASCII Command (host to MLC)	Response (MLC to host)	X? values and additional descriptions
Set input switching lockout duration[24]	X?*54#	IODelay*X?↵	This command locks out (prevents changes to) input switching for the specified duration after an input has been switched. X? is the lockout duration of 0 to 65535, in 20 ms steps. 1 = 20 ms, 2 = 40 ms, 3 = 60 ms,... 65535 = 1,310,700 ms = 21.845 minutes. Default = 25 = 0.5 s.
NOTE *This command applies to input selection buttons that are under firmware control (set up for input switching via Global Configurator) only.*			
Example:	25*54#	IODelay*25↵	Inputs cannot be switched for 0.5 seconds after an input change.
Enable PIN[24]	X?*60#	PINEnable*X?↵	For X?, 0 = personal identification number (PIN) access is enabled for all levels (administrator and user), 1 = only the administrator PIN is enabled, 2 = PIN access is disabled (default).
NOTE *PIN access can be used only while display power is off.*			
Set PIN[24]	X?*Y?*61#	PINNum*X?*Y?↵	For X?, 0 = administrator level, 1 = user level. For Y?, the PIN is any 4-digit combination of the numbers 1 through 4.
NOTE *You can set a maximum of one administrator PIN and one user PIN. An administrator PIN must be set before you set a user PIN.*			Administrator default PIN = 1423. User default PIN = 0.
Query PIN[24]	X?*61#	Y?↵	For X?, 0 = administrator level, 1 = user level. Y? is the corresponding 4-digit PIN.
IR receiver commands			
Disable IR reception	X?*65#	IRDisable*X?↵	For X?: 0 = enable all IR ports (default), 2 = disable the rear panel IR ports (input from IR devices and SCPs through the CM/IR/SCP port).

Chapter Five

Special Applications

Special Applications

There are numerous ways to use a MediaLink Controller to control and monitor A/V systems. The *MLC 104 Plus Series Setup Guide* and chapters 3 and 4 of this manual cover typical uses and features. This chapter shows you how to set up the MLC for a few specialized applications.

Before configuring the MLC,

1. Connect cables between the MLC, the input/output devices, and the PC as described in chapter 2

2. Install and start the Global Configurator software and create or open a GC project, and add an MLC to the project, if that hasn't already been done. For instructions, refer to chapter 3 of the *MLC 104 Plus Series Setup Guide*, steps 1, 2, and 3.

3. In Global Configurator, add device drivers and assign them to the Display RS-232/IR port or MLS port. For instructions on these tasks, refer to chapter 3 of the *MLC 104 Plus Series Setup Guide*.

Using Monitoring to Make Functions Track Actual Conditions

Sometimes a discrepancy occurs between an input or output device's actual status and the status known to the MLC. For example, if users have access not only to the MLC but also to the control panels or remote controls of input and output devices, they can directly change various kinds of device status and settings without using the MLC.

Status discrepancies can also happen in installations where the MLC is the only control device in a room. Most projectors automatically unmute when receiving an input change command. So, if inputs are switched via the MLC's front panel while a projector's video is muted, the projector unmutes itself, and the MLC does not know about that change.

To avoid a status discrepancy when configuring the MLC's button functions and scheduling events, you can set up a monitoring routine.

For example, let's say that you set up an MLC front panel button (input 4 for this example) in toggle mode to send the projector a video mute command on one press and a video unmute command upon the next press. If you press the input 4 button once, the MLC sends the video mute command. The next time you press that button, the MLC sends the video unmute command. But what if someone uses the projector's remote control to unmute the video before the next MLC button press? The MLC issues a video unmute command when the input 4 button is pressed, and the projector continues displaying video — there is no change in mute status.

However, if you also configure the MLC to check the projector's A/V mute status each time the input 4 button is pressed, you can make the MLC act (or not) based on the actual device status so that the MLC executes the correct action regardless of what happened the last time the MLC's button was pressed. This keeps the toggle button synchronized with the status of the controlled device.

NOTE *For monitoring, the device must be connected to one of the MLC's bidirectional ports.*

Setting up a front panel button

This section describes a procedure for setting up monitoring of audio and video muting status on the MLC, the example introduced on page 5-2. You can tailor this procedure to other functions that you want to set up.

1. Click on the **Front Panel** tab.
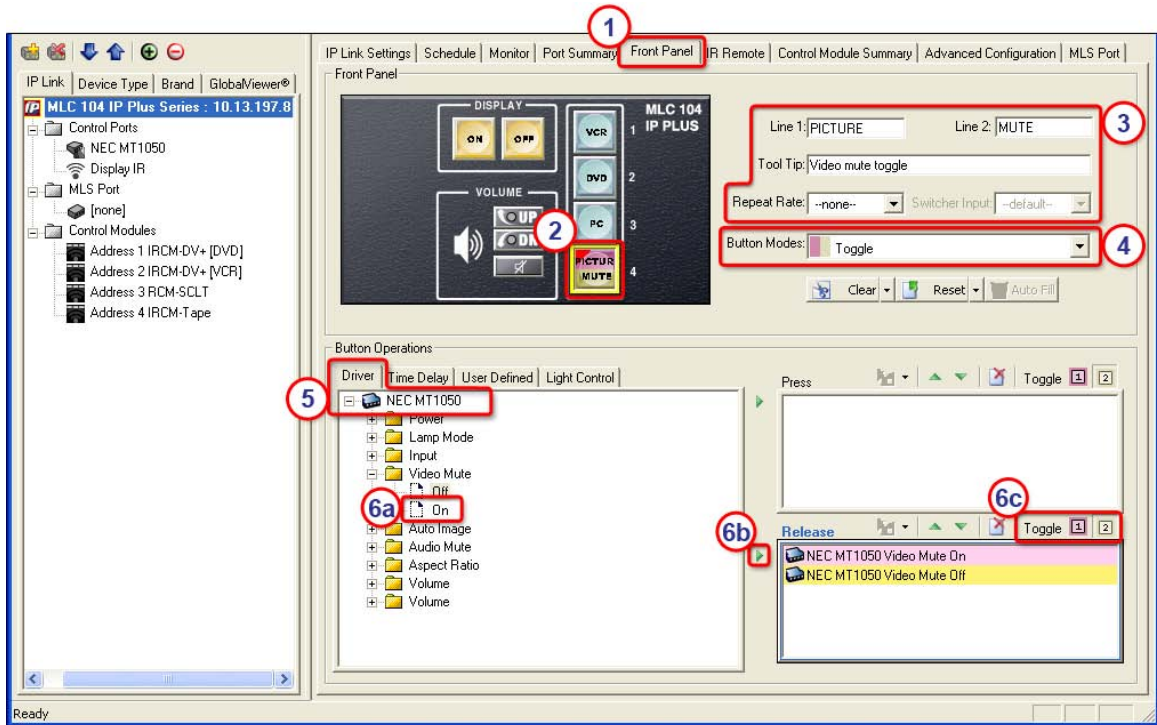
2. Click the input 4 button.

3. If desired, type in text for the onscreen button label and the tool tip (text that appears when the mouse pointer hovers over that button).

4. In the Button Mode list box, select **Toggle**. This changes the button from single switch mode to toggle mode, which allows you to configure the button for two sets of presses and releases instead of the default of one press and release.

5. In the Button Operations area's **Driver** tab, double-click the name of the projector. A list of available driver functions displays below the driver name.

6. Set the button press actions for projector A/V mute.

   a. Double-click **Video Mute** and click **On**.

   b. Click the green arrow adjacent to the Release area or drag the command to the Release area.

   NOTE *Extron recommends that you always assign monitored functions to the button release for best results.*

   c. For Toggle, click **1** to associate the Video Mute On command with the first button release.

   d. Click **Video Mute**, then click **Off**.

   e. Click the green arrow adjacent to the Release area or drag the command to the Release area.

      f.   For Toggle, click **2** to associate the Video Mute Off command with the second button release.

    7.   If desired, configure the button's lights.
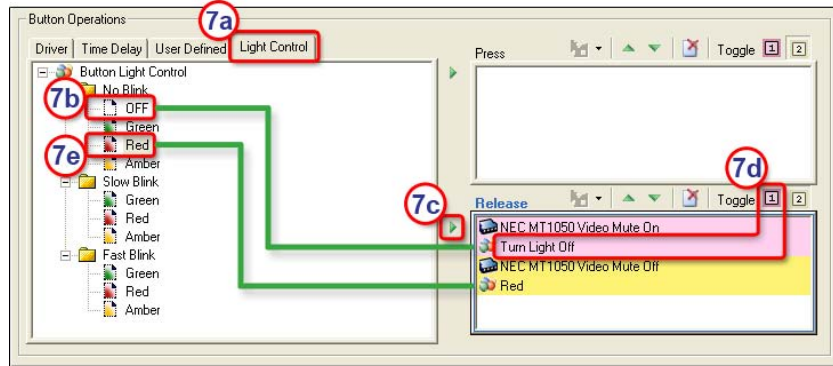
      a.   In the Button Operations area, click the **Light Control** tab.

      b.   Click on the desired button light setting, a combination of color and action (nonblinking, slowly blinking, fast blinking).

      c.   Click the green arrow adjacent to the Release area.

      d.   Click the name of the light setting in the Release area, then for **Toggle**, click **1** to associate that button lighting setting with the first button release.

      e.   Repeat steps 7b and 7c to select a button light setting for the second button release.

      f.   Click on the newly added button lighting command in the Release area.

      g.   Click **Toggle 2**.

NOTE *Basic button setup is covered in the front panel tab section of the Global Configurator help file, in case you need a refresher during configuration.*

Setting up monitoring conditions

    1.   Click the **Monitor** tab (IP Link Settings | Schedule | Monitor | Port Summary | Front Panel), then click **Add Monitor** (near the bottom of the GC window). The Monitor Conditions Wizard window appears.

    2.   Type in the name of the first monitored condition: *AV Mute On*, as shown in the following picture.
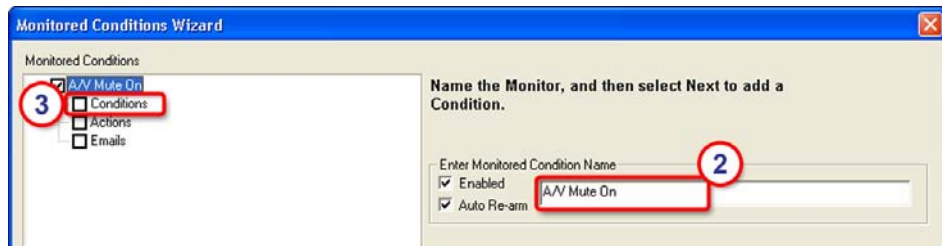
    3.   Select **Conditions** in the Monitored Conditions area.

    4.   Click on the name of the projector in the Subject Port area (NEC MT1050, in this example).
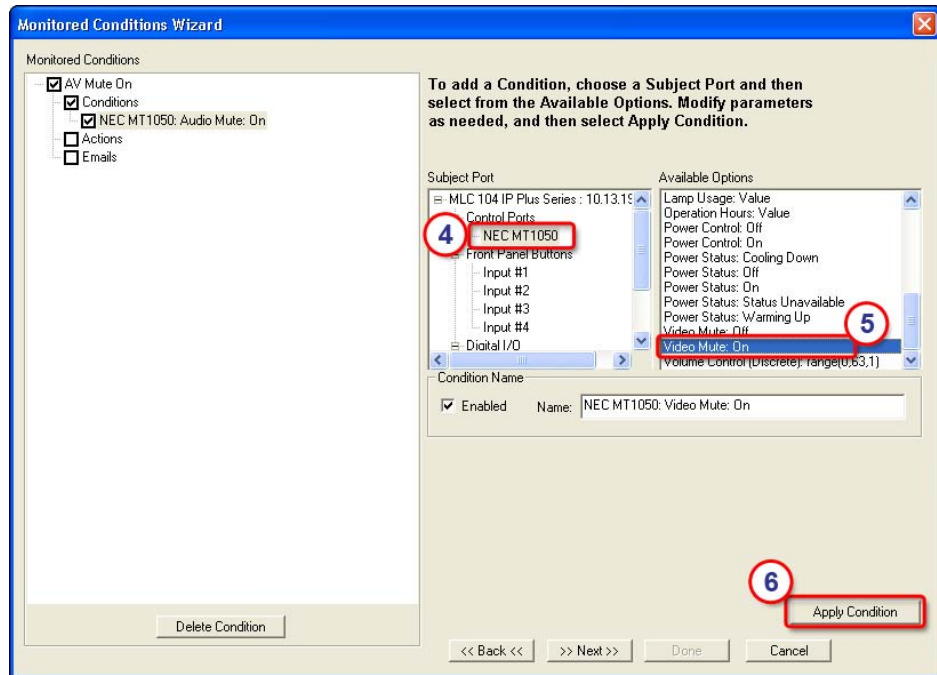
5. Click the **Video Mute: On** command in the Available Options area.

6. Click the **Apply Condition** button.

7. Click **Actions** in the Monitored Conditions area.
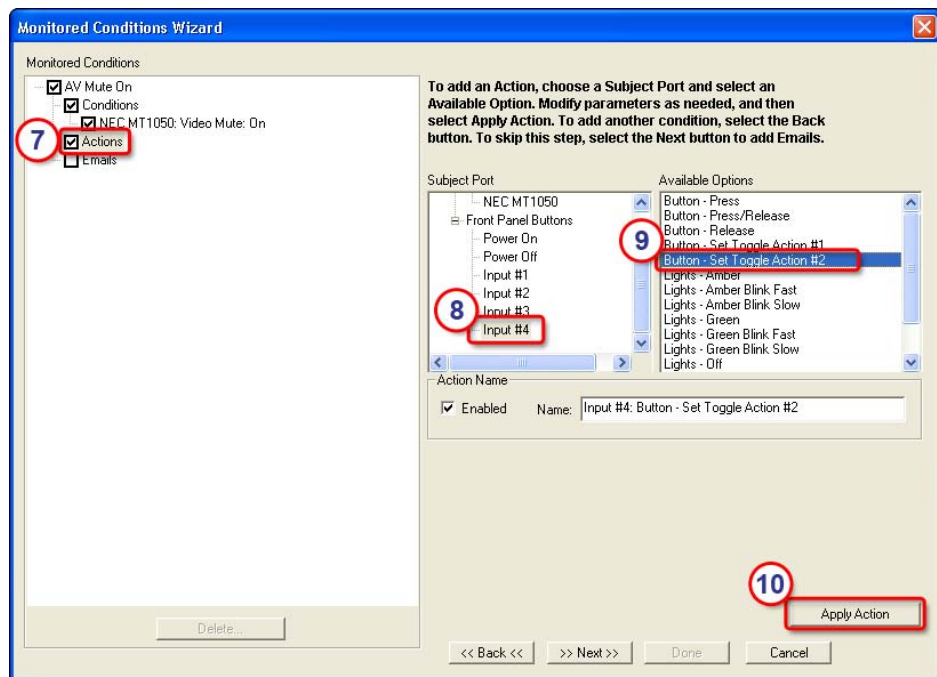
8. Scroll through the Subject Port area and click on **Input 4** in the Front Panel Buttons section.

9. Click **Button - Set Toggle Action #2** in the Available Options area. This sets the state of the input 4 button so that the next press of that button triggers the operations on toggle action #2.

Special Applications, cont'd

10. Click the **Apply Action** button.

11. Scroll through the Subject Port area and click on **Input 4** in the Front Panel Buttons section.

12. Click **Lights - Red** in the Available Options area.

13. Click the **Apply Action** button.

14. Click **Done**. The Monitor Conditions Wizard window closes.

15. Click **Add Monitor** (near the bottom of the GC window). The Monitor Conditions Wizard window opens.

16. Type in the name of the second monitored condition: *AV Mute Off*.

17. Select **Conditions** in the Monitored Conditions area.

18. Click on the name of the projector in the Subject Port area.

19. Click the **AV Mute: Off** command in the Available Options area.

20. Click the **Apply Condition** button.

21. Click **Actions** in the Monitored Conditions area.

22. Scroll through the Subject Port area and click on **Input 4** in the Front Panel Buttons section.

23. Click **Button - Set Toggle Action #1** (which triggers the A/V Mute On command) in the Available Options area.

24. Click the **Apply Action** button.

25. Scroll through the Subject Port area and click on **Input 4** in the Front Panel Buttons section.

26. Click **Lights - Off** in the Available Options area.

27. Click the **Apply Action** button.

28. Click **Done**. The Monitor Conditions Wizard window closes. The resulting monitored conditions are shown in the following image.

29. Complete the rest of the configuration as described in the *MLC 104 Plus Series Setup Guide* and in chapter 4 of this manual, then save the project and build and upload the configuration to the MLC.

Working With Combination Source Devices

Many combination DVD-VCR players can output the video signals from both the video tape and the DVD parts on a single port. If you connect this single output to one input on a switcher (or projector), the switcher has no way to automatically know whether it receives input from the DVD or from the VCR; the switcher treats it as one input device and does not switch between the two.

Available methods

There are several ways to work around the single-input limitation to make both the DVD and VCR media accessible to the switcher, including the following methods:

- Using separate source output ports on the DVD-VCR player
- Using a distribution amplifier with the switcher
- Using separate IRCM control modules for DVD-VCR control
- Using an IRCM-DV+ control module for DVD-VCR control

Using an IRCM-DV+ control module and one MLC input button for DVD-VCR control

If the combination DVD-VCR player has only one available output port and neither a distribution amplifier nor a pair of control modules [(IRCM-DVD or IRCM-DVD+) and IRCM-VCR] is available for use, you can create a special configuration to allow control via the MLC 104 Plus Series or SCP 104 front panel and an optional IRCM-DV+.

An IRCM-DV+ normally must be associated with two different MLC or projector inputs, one for the DVD half of the IRCM-DV+, one for the VCR half. However, in this installation example, both halves will be associated with the same input.

MLC 104 IP Plus

In this example (shown above and described in the following procedure), the DVD/VCR player's output is connected to switcher/projector input 2, which is associated with the MLC 104 Plus Series's input 2 button.

> **NOTE** *Detailed instructions on basic configuration via software are available in the* MLC 104 Plus Series Setup Guide, *the* Global Configurator Help *file, and in chapter 3 of this manual.*

> **NOTE** *The numbers in the following sample screen images correspond to the procedure's step numbers.*

Special Applications, cont'd

To configure a single MLC 104 Plus Series' input button to control the IRCM-DV+ and DVD-VCR player, follow this procedure:

1. Cable the MLC, input/output devices, and the PC as described in chapter 2, "Installation."

2. Create or open a Global Configurator (GC) project, and add an MLC to the project, if that has not already been done. For instructions, refer to chapter 3 of the *MLC 104 Plus Series Setup Guide* or the GC help file.

3. In Global Configurator, add device drivers and assign them to the Display control (RS-232 and IR) port. For instructions, refer to chapter 3 of the setup guide. See the diagram below to wire the MLC's Display port, and place the emitter head near the DVD-VCR player's IR receiver.
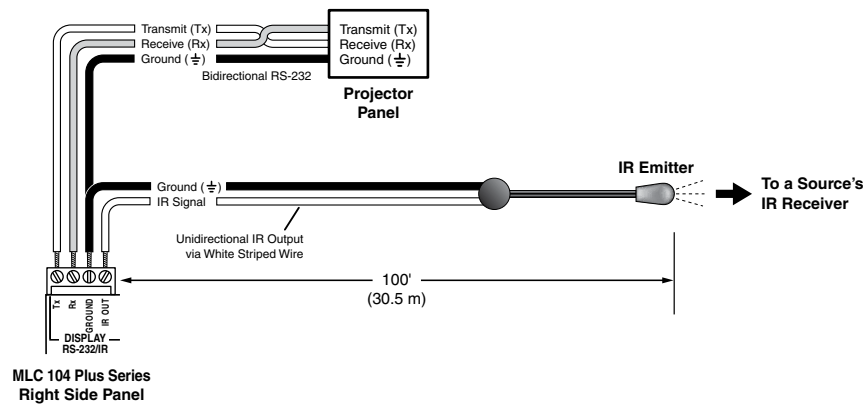
4. Click on the **Front Panel** tab.
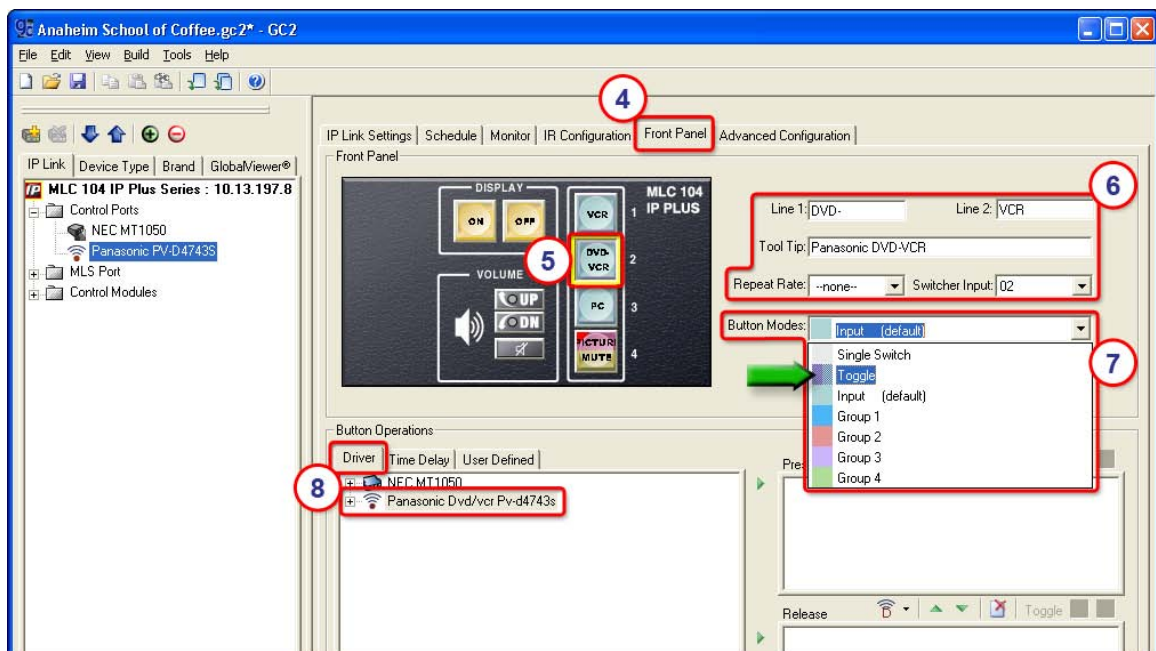
5. Click the input button (button 2 for this example) that will be used with the DVD-VCR player.

6. If desired, type in text for the onscreen button label, the tool tip (text that appears when the mouse pointer hovers over that button in GlobalViewer), and assign an input to the button.

7. In the **Button Mode** list box, select **Toggle**. This sets the button for toggle mode, which allows you to configure the button for two sets of presses and releases instead of the default of one press and release.

8. In the Button Operations area's **Driver** tab, double-click the name of the DVD-VCR player. A list of available driver functions is displayed below the driver name.

9. Set the actions for the DVD part of the player.
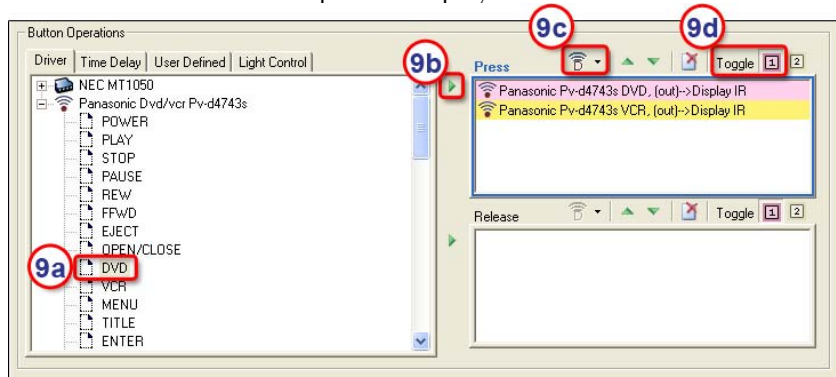
a. Click **DVD**.

b. Click the green arrow adjacent to the Press area or drag the DVD command to the Press area

c. Optional: click the **Port Select** button and choose the IR output port (Display IR) that will send commands to the DVD-VCR player.

d. For Toggle, click **1** to indicate which press (the first) to associate the DVD command with. In the example shown above, the DVD is associated with button press 1, the VCR is associated with button press 2.

10. Set the actions for the VCR part of the player using the procedure outlined in step **9** but selecting **VCR** and toggle **2**.

11. Click the name of any other IR command that should be sent to the DVD/VCR player and assign it to the desired press or release.

12. Set up IRCM-DV+ control
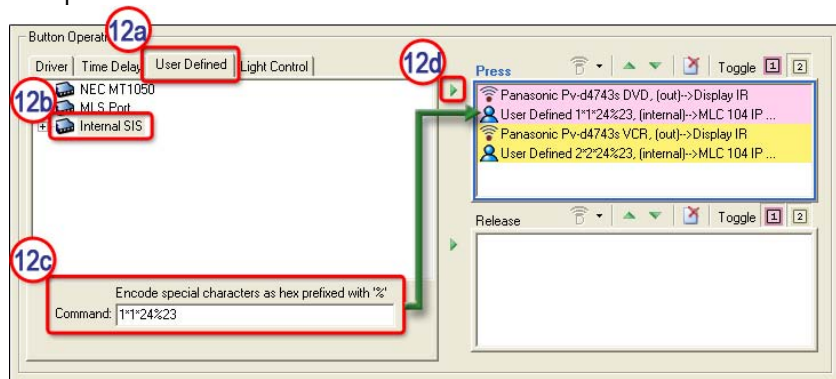
a. In the Button Operations area, click the **User Defined** tab.

b. Click **Internal SIS**.

c. Type in the SIS command to activate the IRCM-DV+'s DVD half: X?*1*24%23 or X?*1*24# where X? is the IRCM-DV+'s DIP switch setting

(1, 2, 3, or 4) and *%23* is the URL-encoding for the pound symbol character (#). (This command is described in more detail on .)

NOTE *If for any reason you are not able to enter asterisks (*) or other special characters as ASCII text here, try changing the special characters to their hex equivalent (%2A for an asterisk, %23 for the pound sign ((#))) to enter them in this field.*

   d. Click the green arrow adjacent to the Press area.

   e. For **To**ggle, click **1** to associate the IRCM-DV+'s DVD control with the first button press.

   f. Click **Internal SIS**.

   g. Type in the SIS command to activate the IRCM-DV+'s VCR half: X̄?̄*2*24%23 or X̄?̄*2*24# where X̄?̄ is the IRCM-DV+'s DIP switch setting (1, 2, 3, or 4).

   h. Click the green arrow adjacent to the Press area.

13. If desired, configure the button's lights.
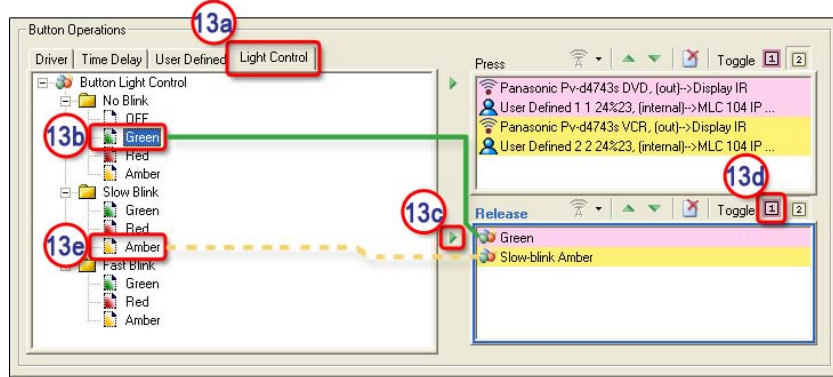
   a. In the Button Operations area, click the **Light Control** tab.

   b. Click on the desired button light setting, a combination of color and action (nonblinking, slowly blinking, fast blinking).

   c. Click the green arrow adjacent to the Release area.

   d. For Toggle, click **1** (or **2**) to associate that button lighting setting with the first (or second) button release. In this example, the button will light green (nonblinking) at the first button release.

   e. Repeat steps 13b through 13d to select a different button light setting for the other (second) button release.

14. To each toggle action, add a command to switch the input of the projector or switcher.

15. Complete the rest of the configuration as described in the *MLC 104 Plus Series Setup Guide* and in the Global Configurator help file: configure all control ports for IR or RS-232 communication and select device drivers, configure the rest of the buttons (including IRCM-DV+ buttons). Configure e-mail settings and set scheduling as appropriate, then save the project and build and upload the configuration to the MLC.

Scheduling Front Panel Lockout Periods

For additional security you can set up an automated schedule to either completely prevent front panel changes or to restrict who can make front panel selections and adjustments during certain hours and days. For full details, including instructions

on how to schedule front panel lockout periods, see "Front Panel Security Lockout (Executive Mode)" starting on page 2-6. Software setup instructions begin on page 3-9. See page 3-18 to set Executive Mode via software.

Sending E-mail by Pressing a Button (IP Models)

For some installations, you may want to set up an MLC 104 IP Plus button to send an e-mail requesting projector repairs or requesting assistance from the front office or the facility's security or maintenance departments. Follow these steps to set up a monitor to track a button press and send an e-mail as the action.

NOTE *This application requires Global Configurator version 2.2.1 or higher.*

1. Connect cables between the MLC, input/output devices, and the PC as described in chapter 2.

2. Install and start the Global Configurator software version 2.2.1 or higher, create or open a GC project, and add an MLC to the project. For instructions, refer to chapter 3 of the *MLC 104 Plus Series Setup Guide*, steps 1, 2, and 3.

3. In the IP Link tree view window, click on the MLC to be configured.
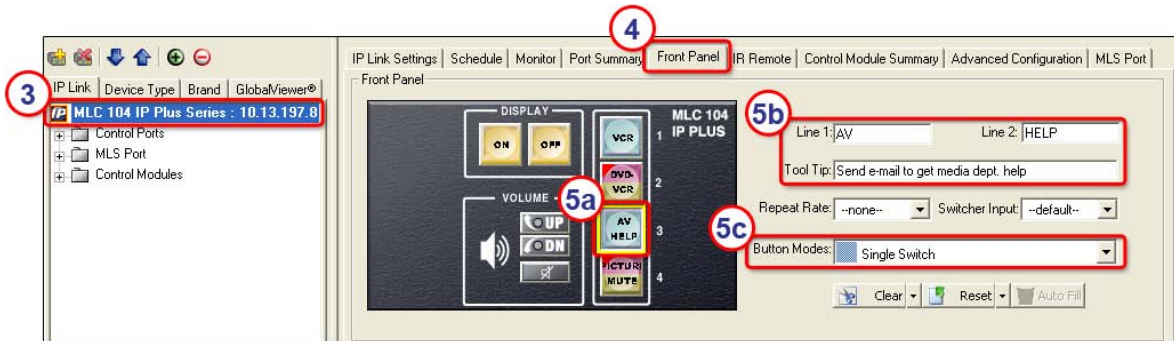
4. Click the **Front Panel** tab.

5. Configure the front panel button.

   a. In the Front Panel area, click the button that will trigger the e-mail. For this example, use input button 3.

   b. Type in text for the onscreen button label and the tool tip (text that appears when the mouse pointer hovers over that button).

   c. Select the Single Switch button mode.

   d. Click the **Light Control** tab in the Button Operations area

   e. Click on the desired combination of button light color and blink frequency.

   f. Click the green Add Operation arrow next to the Press area.

      g. Click on a different combination of button light color and blink frequency.

      h. Click the green Add Operation arrow next to the Release area.

6. Click the **Monitor** tab (`IP Link Settings | Schedule | Monitor | Port Summary | Front Panel |`) and click **Add Monitor** (near the bottom of the GC window). The Monitor Conditions Wizard window appears.

7. Type in the name of the monitored condition: *Help Desk Request*, as shown in the following picture.
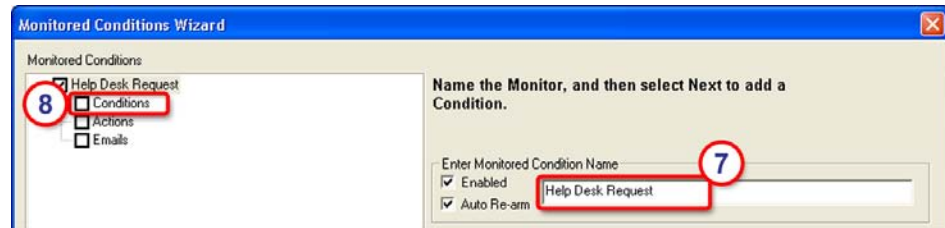
8. Select **Conditions** in the Monitored Conditions area.

9. In the Subject Port area, locate and select **Input #3**.

10. Select **Input 3: Release** from the Available Options area.

11. Click **Apply Condition**. *Input #3: Input 3: Release* appears in the Monitored Conditions area.

12. Click **Emails** in the Monitored Conditions area. The right side of the window changes to show selections for e-mail messages and contacts.

13. Create the e-mail file that the input 3 button will send.
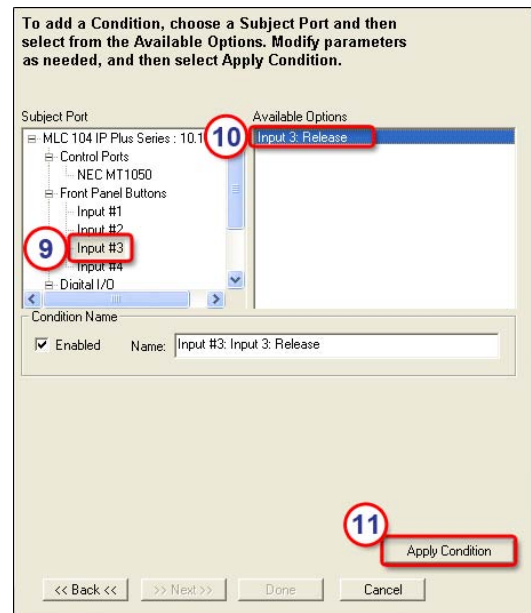
      a. Click `Email Manager...` near the bottom of the Monitor Conditions Wizard window. The Email Manager window opens.

b. Type in the e-mail name (this will appear in the list of available e-mails in GC), the subject (which appears as the set e-mail's subject line), and the body (the e-mail's contents).
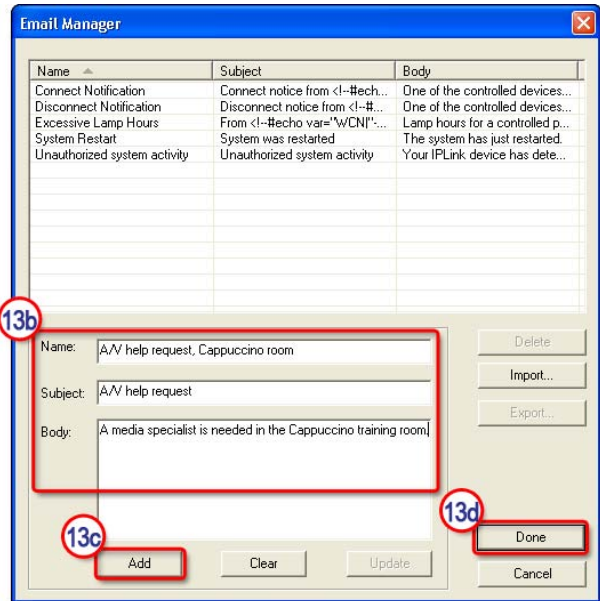
c. Click **Add**.

d. Click **Done**. You may be prompted to save the e-mail you just created. If so, click **Yes** to save the e-mail. The Email Manager window closes.

14. Click to select one e-mail (the one you just created) in the Email Messages list, as shown at right.
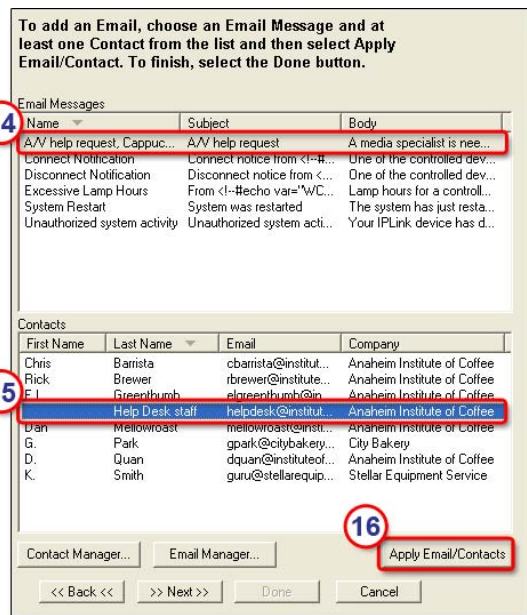
15. Click to select one or more e-mail recipients in the Contacts list. If you need to add a new contact, click **Contact Manager** and follow the onscreen directions.

16. Click **Apply Email/ Contacts**. The e-mail and the recipient name(s) appear in the Monitored Conditions area, as shown in the following screen excerpt.
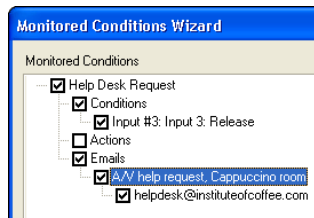
17. Click the **Done** button at the bottom of the Monitored Conditions Window, which then closes.

18. Complete the rest of the configuration as desired, then save the project and build and upload the configuration to the MLC.

Special Applications, cont'd

Working With a Non-MediaLink Extron Switcher

Although the MediaLink Controller's MLS port can be used as an auxiliary RS-232 port for controlling another type of device, it is usually used to connect an Extron MediaLink Switcher (MLS) or PoleVault Switcher (PVS). The MLC recognizes and communicates with MLS and PVS switchers without requiring additional drivers or configuration, unless you want to remap switcher inputs to the MLC's buttons.

The MLC can recognize Extron switchers other than MLS and PVS models, but as a single, generic type of switcher. For example, the MLC considers an MPS 112 switcher to be the same as an IN1508 or an SW 4AV. The MLC supports bidirectional communication for input switching and volume control, just as it does for the MLS and PVS switchers.

You can control an Extron switcher such as an MPS 112, MPS 112 CS, or IN1508 via the MLS port if all of the following conditions are met.

- The MPS switcher uses firmware version 1.12 or higher.
- The MPS is in single switcher mode. It <u>must</u> be in single switcher mode (not separate switcher mode) to be controlled by the MLC.
- The MLC uses firmware version 1.05 or higher. This is required in order to remap inputs greater than 6.
- The IN1508 switcher has firmware version 2.08 or higher.

Also, if the MLC's input buttons are in input mode, the MLC and MPS buttons track bidirectionally: an input button press on one device is indicated on the other device.

To set up the MLC to control an Extron switcher, cable the MLC and connect a switcher to the MLC's MLS port, then follow these steps:

1. Create a new Global Configurator project that includes an MLC.

2. In the IP Link tree view window, click on the MLC to be configured.
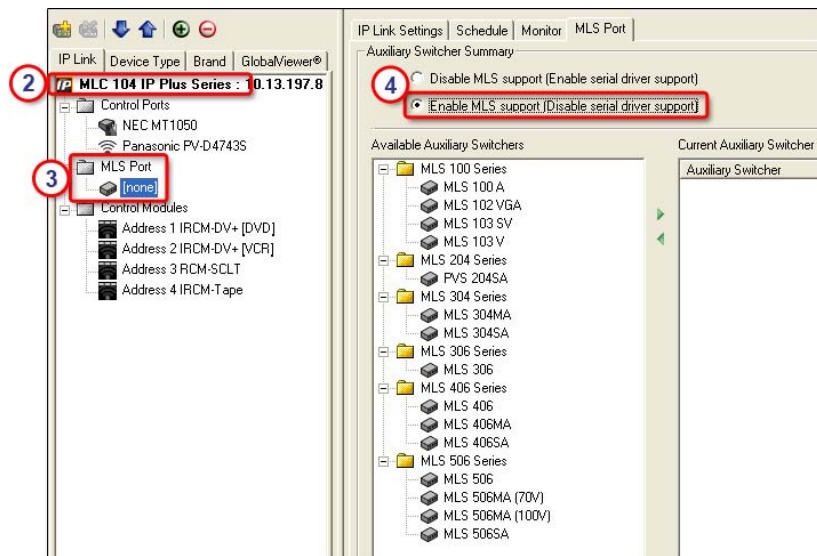
3. Click on **MLS Port**. The MLS Port tab displays in the right side of the window.

   NOTE   *If you create a new GC project, this port is labeled as "MLS Port" in the IP Link tree view. If you open an existing project that was created with an earlier version of software, the port is labeled "Slave Switcher" instead.*

4. The list of available switchers should be active and selectable. If not, click the **Enable MLS support (Disable serial driver support)** radio button.

5. If you want to use the MLC's buttons to control Extron switcher inputs other than the default inputs 1-4, remap the front panel buttons.

   a. Click the **Front Panel** tab.
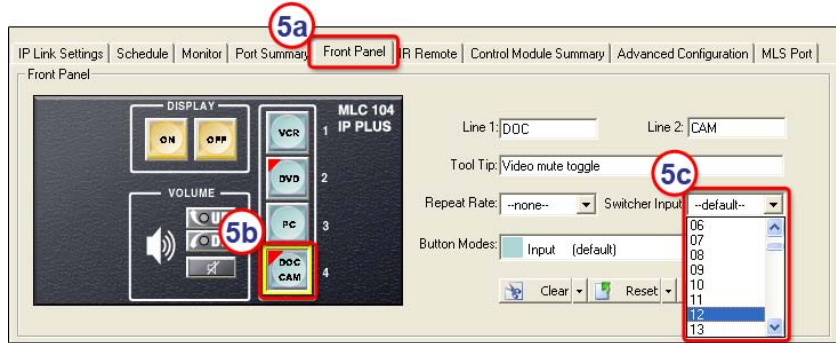
   b. Click an input button.

   c. Select the desired switcher input number from the Switcher Input list box. In the example shown above, a document camera is connected to input 12 of the switcher.

   d. Repeat steps 5b and 5c as desired to remap additional buttons to other switcher inputs.

6. Complete the rest of the configuration as desired, then save the project and build and upload the configuration to the MLC.

Using Digital Inputs

The MLC can monitor devices such as push buttons, switches, a motion sensor, moisture sensor, tally feedback output, or a similar item via a digital input port. When one of these ports is configured as a digital input, it is set to measure two states: high and low. The port accepts 0 to 12 VDC input. The threshold voltages are as follows: a voltage below 2.0 VDC is measured as logic low, and a voltage above 2.8 VDC is measured as logic high. There is also an internal, 2k ohm, +5 VDC, selectable, pull-up resistor for this circuit for contact closure detection.

The following examples tell how you can use these pins for digital input.

Using a motorized surface access enclosure to trigger digital input

One application for digital input on the MLC is monitoring the up/open and down/closed status of an Extron HSA 822M motorized surface access enclosure to signal when to power on or power off a projector or display.

1. In the **Advanced Configuration** tab in the Global Configurator software, configure the MLC's digital I/O ports (ports 2 and 3 in this example) for digital input with pull-up, as shown at right.
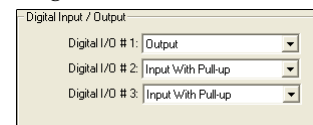
2. Set up a monitor for each port in the **Monitor** tab of Global Configurator.

   a. Click the **Monitor** tab ( ), then click **Add Monitor** (near the bottom of the GC window). The Monitor Conditions Wizard window appears.

   b. Type in the name of the first monitored condition: *HSA in up position*.

    c. Select **Conditions** in the Monitored Conditions area.

    d. Select **Digital Input 2** as the subject port and select **Digital I/O Port is Closed** as the option:
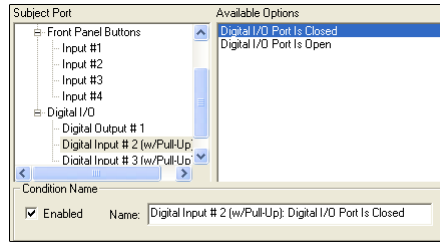
    e. Click **Apply Condition**.

    f. Select **Actions** in the Monitored Conditions area.

    g. Select the name of the projector or display in the Subject Port area (NEC MT1050, in this example).

    h. Select the projector or display's power-on command in the Available Options area.
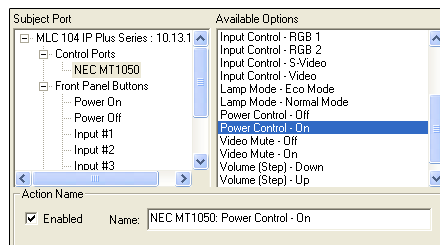
    i. Click **Apply Condition**.

    j. Click **Done**.

    k. Set up the second monitored condition by following steps **2a-2j** but typing in the second condition's name (*HSA in down position*), selecting **Digital Input 3** as the subject port, and selecting the projector or display's power-off command in the Available Options area.

    The two monitored conditions are summarized in the Monitored Conditions area, as shown at right.
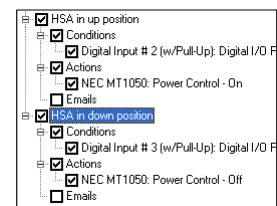
3. Save the configuration, then build and upload it to the MLC.

4. Cable the MLC's digital input ports to the appropriate pins of HSA 822M's bottom panel control port, as shown in the following diagram.
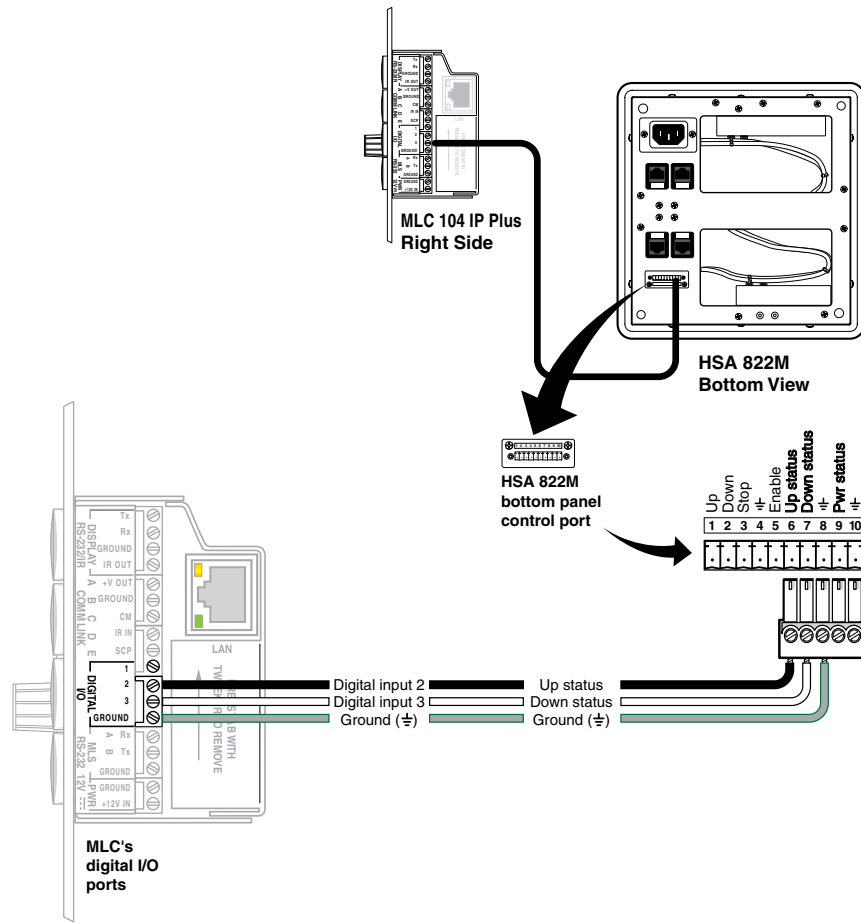
Connecting MLC 104 Plus Series digital input ports to an HSA 822M to monitor HSA movement

5. Cable, power on the equipment, and test the system. When the HSA's top is up, that status is detected at the MLC's digital input port 2, and the MLC sends a power-on command to the projector or display. When the HSA's top is down, the MLC detects a status signal at digital input 3, and it sends a power-off command to the projector or display.

6. Make any needed changes and complete the installation.

Using digital input of an IP model for an alert notification system

Another way to use digital inputs on the MLC is as part of an alert system. Digital inputs can be connected to a simple momentary contact closure switch with buttons. Then the MLC is configured so that a button press can trigger an alert e-mail to a help desk, security office, or administrative office.

NOTE *This feature can be used as an alert notification and should not be used as a life safety feature, as it operates over a local network and offers no redundant means of communication if the network goes down.*

In this example a 2-button switch is configured to have the MLC send e-mail alerts to alerts to a security desk or to an administrative office when a button is pressed.

1. In the **Advanced Configuration** tab in the Global Configurator software, configure the MLC's digital I/O ports (ports 2 and 3 in this example) for digital input, as shown at right.
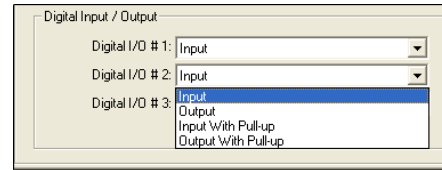
2. Set up a monitor for each port in the **Monitor** tab of Global Configurator.

    a. Click the **Monitor** tab (IP Link Settings | Schedule | Monitor | Port Summary | Front Panel), then click **Add Monitor** (near the bottom of the GC window). The Monitor Conditions Wizard window appears.

    b. Type in the name of the first monitored condition: *Safety office alert*.

    c. Select **Conditions** in the Monitored Conditions area.

    d. Select **Digital I/O 1** as the device or subject port and select **Digital I/O Port is Closed** as the option, as shown at right.
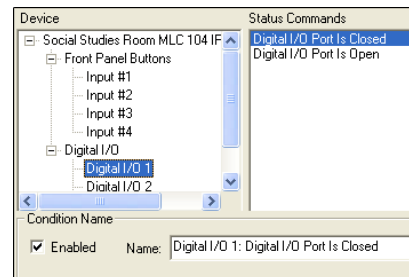
    e. Click **Apply Condition**.

    f. Select **Email** in the Monitored Conditions area.

    g. If you did not already create a notification e-mail, click **Email Manager** (the Email Manager window opens), type in the name, subject, and main text, click **Add**, then click **Done** to return to the Monitored Conditions Wizard window.
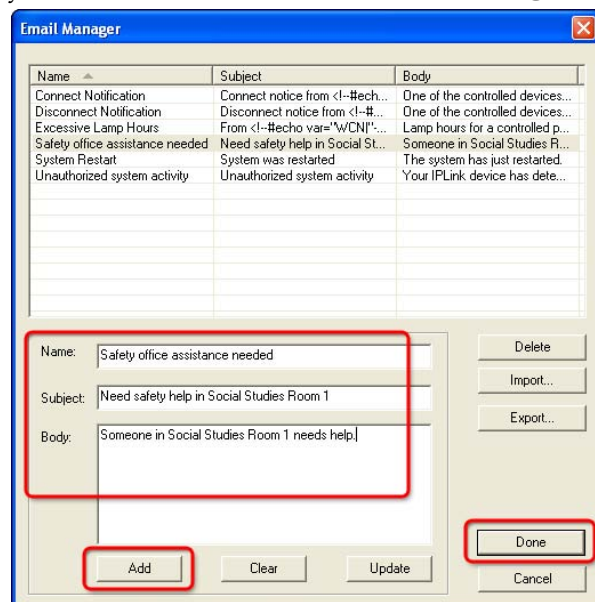
    h. If the contact person for this alert is not listed in the Contacts section, click **Contact Manager** (the Contacts Manager window opens), type in the names, e-mail address, and company information, click **Add**, then click **OK** to return to the Monitored Conditions Wizard window.

i Click on the desired alert e-mail and on the name of the contact to whom the e-mail will be sent, as shown at right, then click **Apply Email/Contacts**.

j. Click **Done**.

k. Set up the second monitored condition by following steps **2a-2j** but typing in the second condition's name (*Administration office alert*), selecting **Digital I/O 2** as the device or subject port, and selecting a different e-mail and contact in the Email Manager.
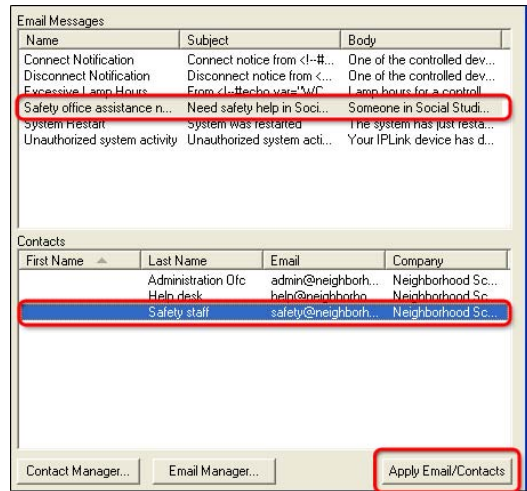
The monitored conditions are summarized in the Monitored Conditions area, as shown at right.

3. Save the configuration, then build and upload it to the MLC.

4. Cable the MLC's digital input ports to the appropriate pins of the button panel/switch, as shown in the following diagram.
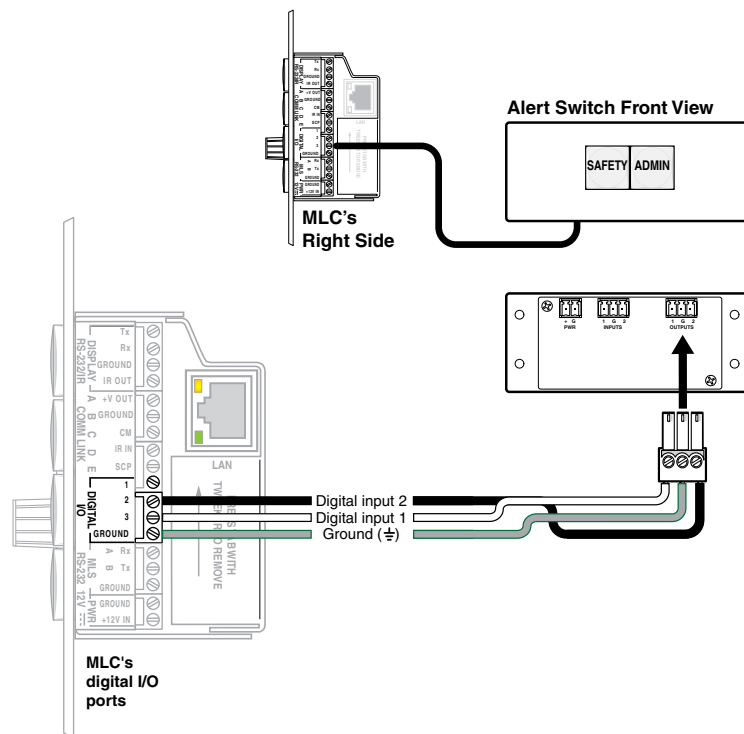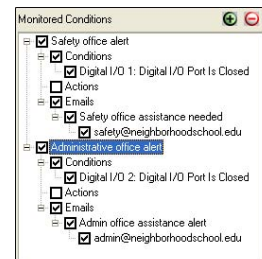
Connecting an MLC 104 Plus Series digital input ports to alert buttons

Special Applications, cont'd

5. Power on the equipment, and test the system. When one button is pressed, it makes momentary contact, completing the circuit with MLC digital input 1. The MLC's monitor detects the change and sends out the safety alert e-mail to the safety office. When the other button is pressed, it briefly completes the circuit with digital input 2, triggering the MLC to issue the administration office e-mail alert.

6. Make any needed changes and complete the installation.

Using Digital Outputs

To power devices that accept a TTL signal or to provide contact closure control for projector lifts, motorized screens, room or light switches via an Extron IPA T RLY4, you can use one or more of the MLC's digital I/O ports configured for digital output. When the port is set to an "on" state, (the circuit is closed), the I/O pin is connected to ground. Each I/O port is capable of accepting 250 mA, maximum. When the port is set to the "off" state (the circuit is open), the output pin is floating. If the application calls for TTL compatibility, the digital output circuit can be set up to provide a 2k ohm pull-up resistor to +5 VDC.

Controlling a Low Voltage Screen Motor Controller

The MLC 104 Plus Series does not have built-in relays that can be connected directly to a low voltage screen controller. However, with the addition of an Extron IPA T RLY4 relay controller and a few configuration steps, you can still raise or lower a projection screen using the MLC, a screen controller, and a screen control motor.

Follow the procedures in this section to cable the devices and then configure the MLC for this application.

Cabling the equipment

1. Connect the MLC to an IPA T RLY4 's front panel inputs as shown below.

- The MLC provides 12 VDC to the IPA's common voltage pin (C).

- Each MLC digital I/O port (1, 2, 3) connects to the corresponding relay input pin (1, 2, 3) on the IPA.

MLC 104 Plus Series Right Side

IPA T RLY4 Front Panel
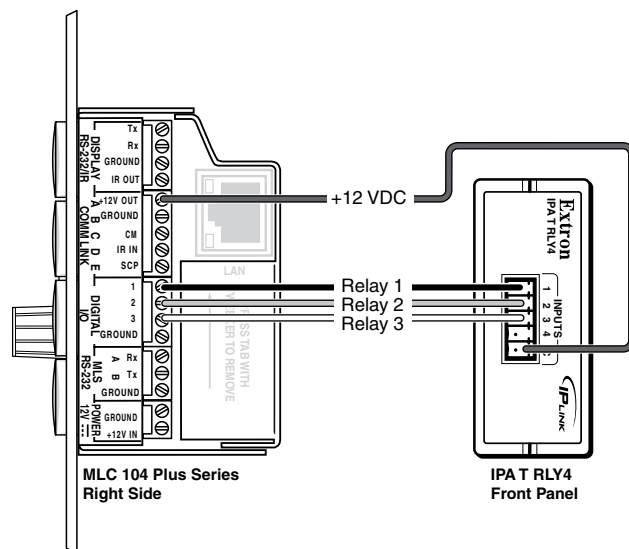
NOTE *Extron Comm-Link cable (CTL, part #22-148-02/-03; or CTLP, part #22-119-02/-03) can be used for these connections.*

2. Connect the IPA T RLY4's rear panel relay ports to the low voltage screen controller. The following illustrations provide examples of how to wire the IPA T RLY4 to typical low voltage screen controllers. However, your

equipment may require different wiring. **Refer to the manufacturer's specific wiring instructions for the screen controller you are using.**
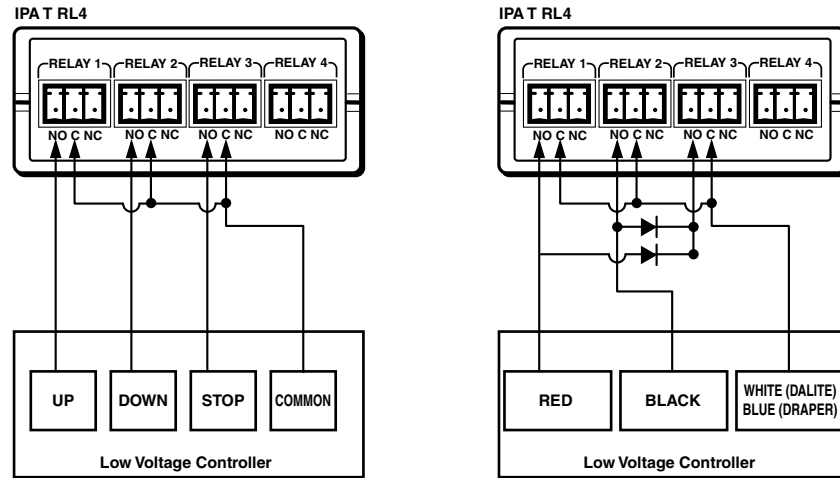
3. Cable the screen controller to the screen's drive motor according to that equipment's installation instructions.

Configuring the MLC for screen control

You must first configure the digital I/O ports and then associate the MLC's front panel buttons with the digital output ports and, therefore, with relays that trigger screen controller actions.

The Display Power On button will be used to turn the display/projector power on and also make the screen go down. You will set up this button to pulse digital output 1 for 2 seconds to make the screen controller lower the screen. Likewise, you will configure the Display Power Off button to pulse digital output 2 to make the screen controller raise the screen when the projector is turned off.

To configure the MLC, perform these steps:

Configure the MLC's digital I/O ports to control the IPA T RLY4's relays

1. Connect the MLC to a PC using an RJ-45 crossover cable or a serial cable, as described in chapter 2, and power on the equipment.

2. Start the Global Configurator software and create or open a project that includes an MLC 104 Plus Series controller and a projector or display panel.

NOTE *Refer to the Global Configurator help file for instructions on basic setup steps for projector control. This example assumes that you already configured the MLC for projector control.*

3.   In the IP Link tree view window, click on the MLC to be configured.
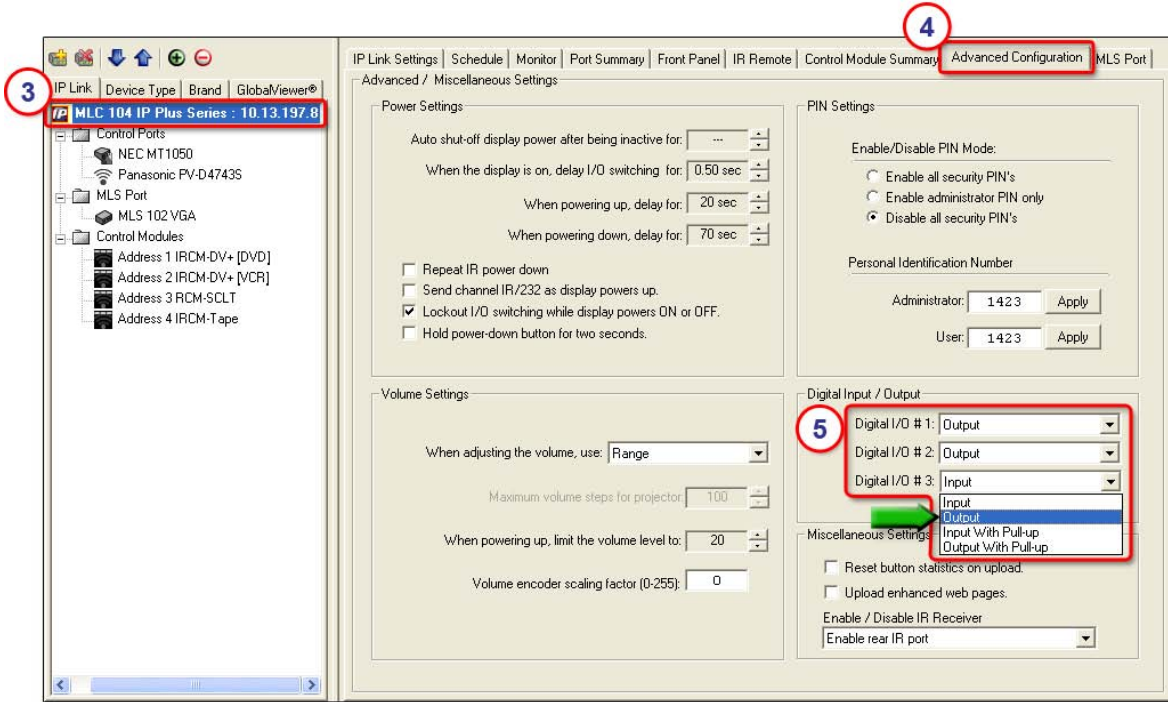
4.   Click on the **Advanced Configuration** tab.

5.   In the Digital Input/Output area, use the drop-down menus to set each of the three ports to Output.

**Configure the MLC's Display Power buttons to operate the digital outputs**

1.   Click the **Front Panel** tab.

2.   Click on the MLC's Display On button.

NOTE   *In the example below, the red triangle in the upper left corner of this button indicates that the button has already been configured to send the power-on command to the projector.*
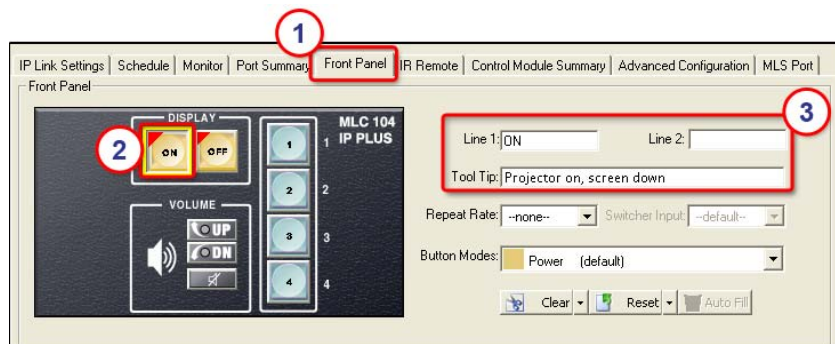
3.   Type in text for the onscreen button label and the tool tip (text that appears when the mouse pointer hovers over that button in GlobalViewer), if desired.

4. In the Button Operations area, click the **Digital Output** tab.
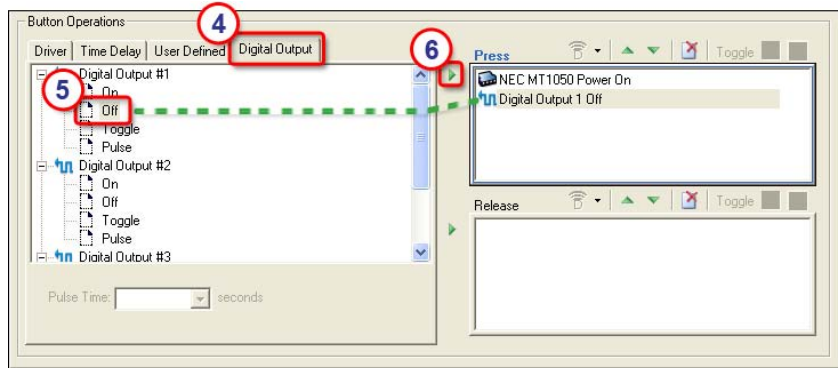
5. Under Digital Output #1, click **Off**.
   This command ensures that the relay is open (off) before it is pulsed.

6. Click the green arrow (▶) adjacent to the Press area or drag the command to the Press area.
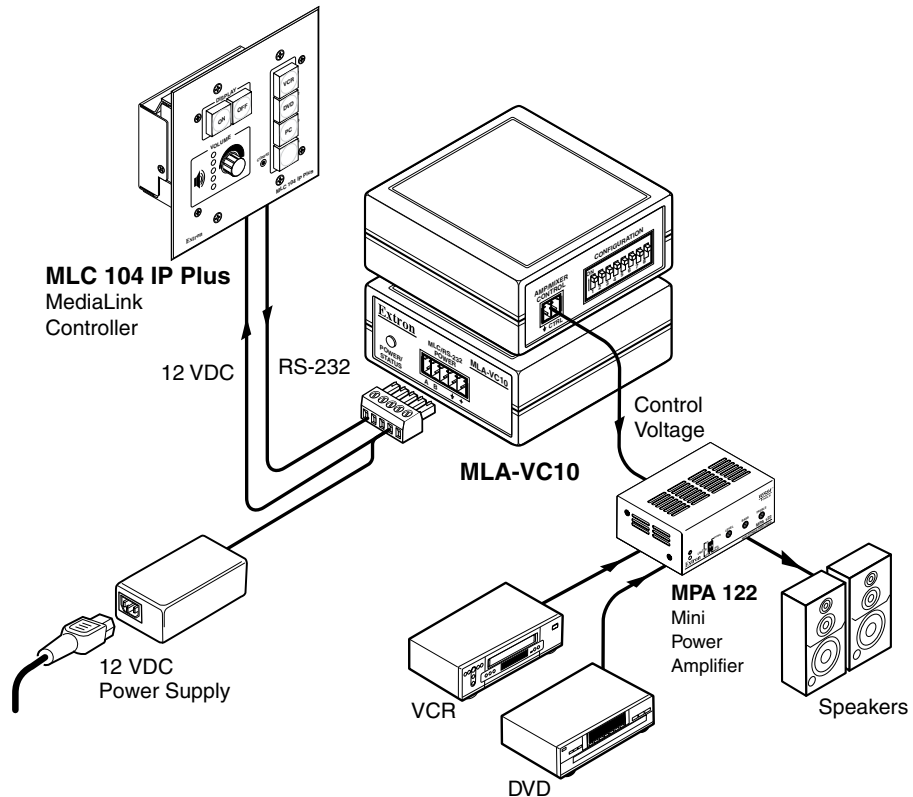
7. Under Digital Output #1, click **Pulse**.
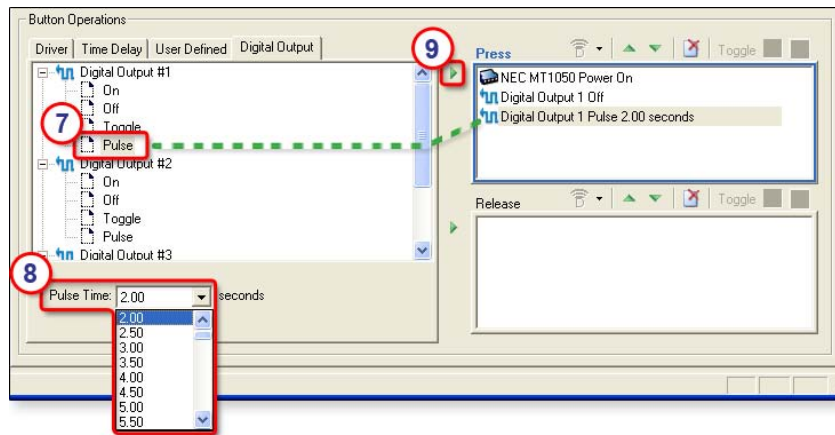
8. Select a pulse time (duration) of 2.0 seconds.

9. Click the green arrow (▶) adjacent to the Press area or drag the Pulse command to the Press area.

10. Click on the MLC's Display Off button.

11. Type in text for the onscreen button label and, if desired, the tool tip.
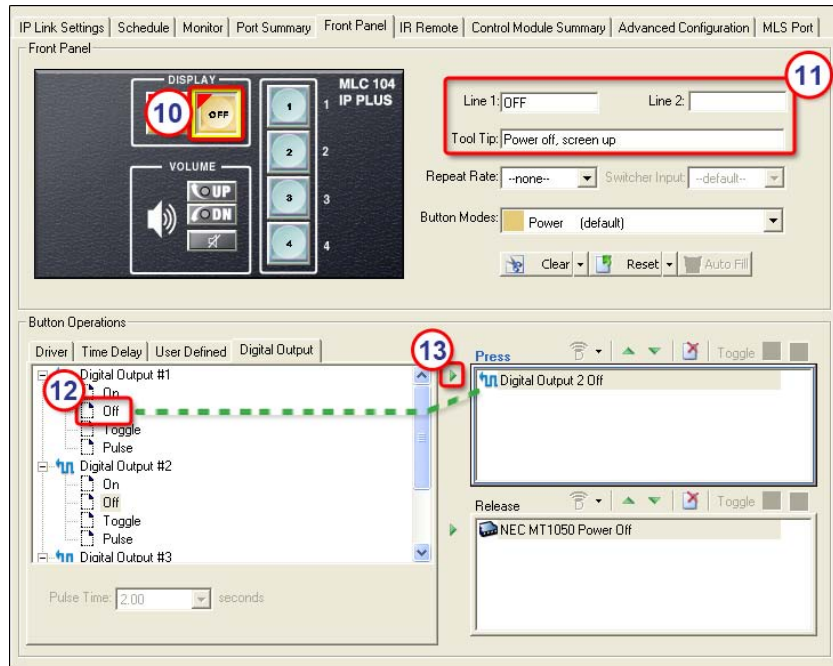
12. In the Button Operations area, under the **Digital Output** tab, locate Digital Output #2 and click **Off**. This command ensures that the relay is open (off) before it is pulsed.

13. Click the green arrow (▶) adjacent to the Press area or drag the command to the Press area.

14. Under Digital Output #2, click **Pulse**.
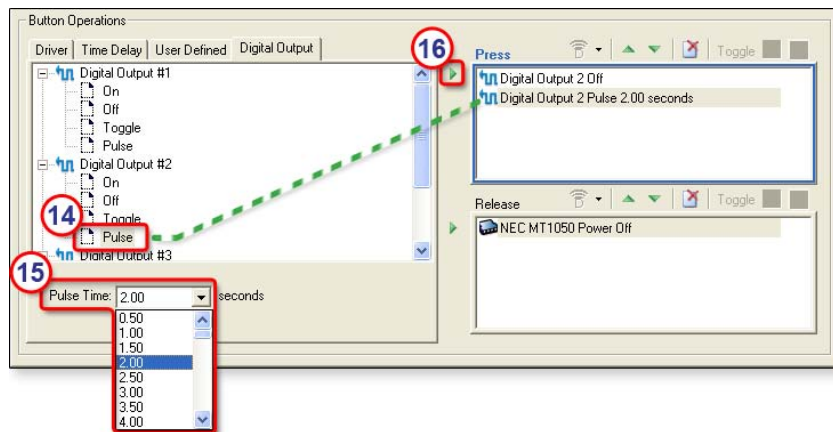
15. Select a pulse time (duration) of 2.0 seconds.

16. Click the green arrow (▶) adjacent to the Press area or drag the Pulse command to the Press area.

17. Configure other features, if desired, then save the GC project and build and upload the configuration to the MLC.

Using an Amplifier and Volume Controller with the MLC

The MLC can attenuate but not amplify audio volume, so you can add an amplifier (such as an Extron mini power amp [MPA]) to the system and an Extron MLA-VC10 volume controller. The MLA-VC10 provides a variable control voltage (supply voltage) of between 0 VDC and 10 VDC to remotely control the amplifier's volume output.
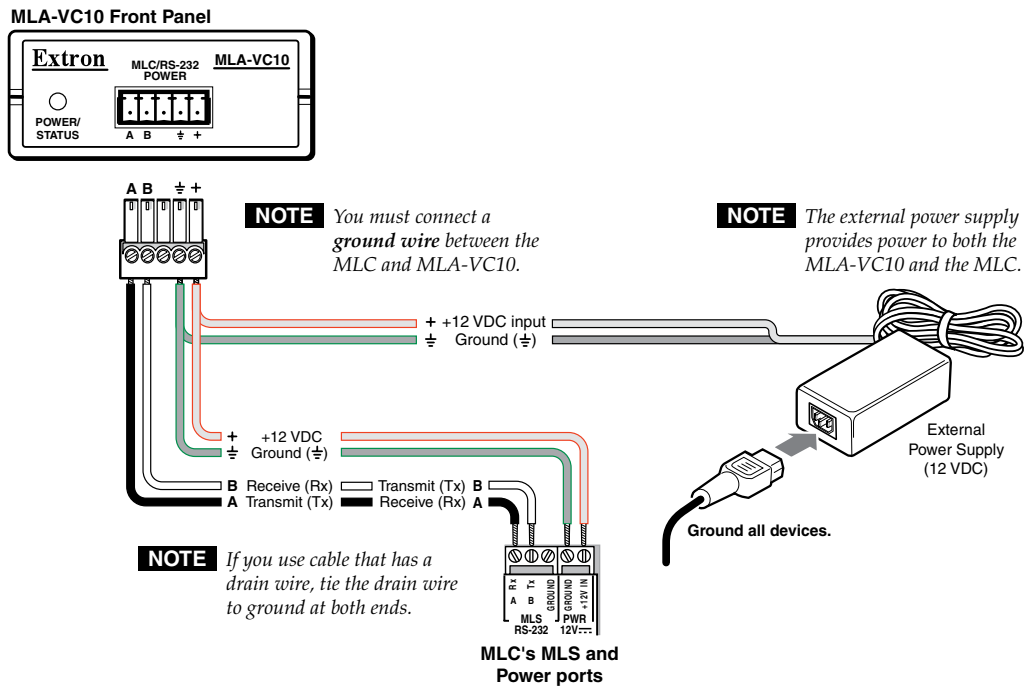
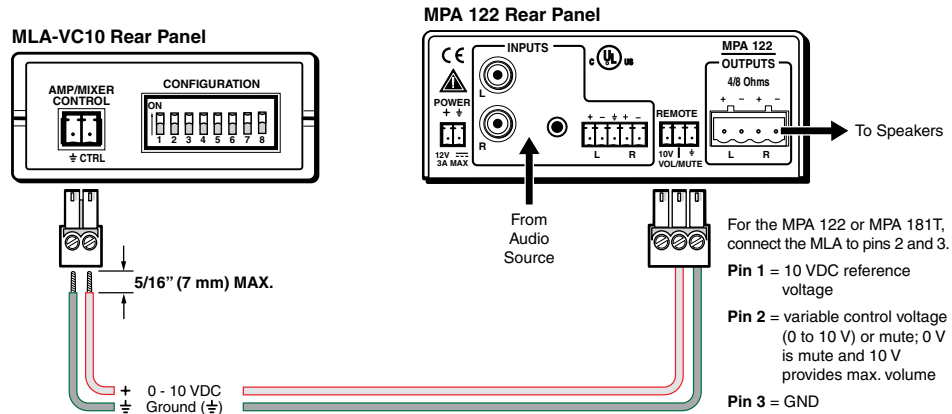The following picture shows a typical MLC 104 Plus Series system featuring an amplifier and volume controller.

MLC 104 IP Plus
MediaLink
Controller

12 VDC   RS-232

12 VDC
Power Supply

MLA-VC10

Control
Voltage

MPA 122
Mini
Power
Amplifier

VCR

DVD

Speakers

Volume control hardware setup

1. Cable these products as shown in the following diagrams, and refer to each product's user's manual as needed.

Special Applications, cont'd

MLA-VC10 Front Panel

NOTE *You must connect a **ground wire** between the MLC and MLA-VC10.*

NOTE *The external power supply provides power to both the MLA-VC10 and the MLC.*

+ +12 VDC input
≐ Ground (≐)

External Power Supply (12 VDC)

Ground all devices.

+ +12 VDC
≐ Ground (≐)

B Receive (Rx) — Transmit (Tx) B
A Transmit (Tx) — Receive (Rx) A

NOTE *If you use cable that has a drain wire, tie the drain wire to ground at both ends.*

MLC's MLS and Power ports

Connecting an MLC 104 Plus Series controller to an MLA-VC10 and an external power supply

MLA-VC10 Rear Panel

MPA 122 Rear Panel

To Speakers

From Audio Source

5/16" (7 mm) MAX.

+ 0 - 10 VDC
≐ Ground (≐)

For the MPA 122 or MPA 181T, connect the MLA to pins 2 and 3.

Pin 1 = 10 VDC reference voltage

Pin 2 = variable control voltage (0 to 10 V) or mute; 0 V is mute and 10 V provides max. volume

Pin 3 = GND

Connecting an MLA-VC10 to an MPA122

NOTE *For three-terminal amps, always connect the MLA-VC10 to the control voltage terminal and ground terminal of the amp's control port. Leave the other terminal (+10V for Extron MPA models) open (not connected).*

2. Set the MLA-VC10's eight DIP switches to configure the it for the control voltage required by the amplifier. The Extron MPA 122 and MPA 181T accept up to 10 VDC, so set all of the DIP switches up (On), as shown at right.
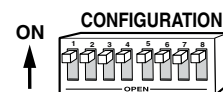
   If you use a different amplifier, read the amplifier's manual and the MLA-VC10's manual to determine the voltage the amplifier requires and how to set the MLA's DIP switches.

Volume control software setup

To configure the MLC to work with the MLA-VC10 volume controller, perform these steps:

1. Start the Global Configurator software and open a project that includes an MLC 104 Plus Series unit.

2. In the IP Link tree view window, click on the MLC to be configured.
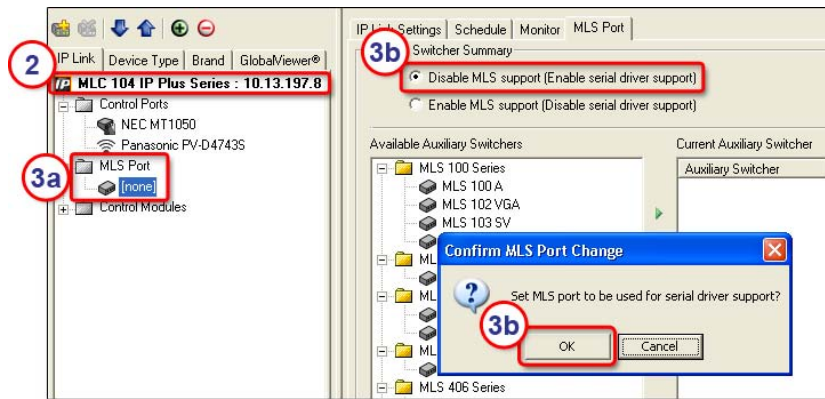
3. Configure the MLS port with the correct driver.

   a. Click on **MLS Port**. The MLS Port tab displays in the right side of the window.

   b. Click the **Disable MLS support (Enable serial driver support)** radio button. If the Confirm MLS Port Change window appears, click **OK**.

   c. Click on the **Serial Configuration** tab.

   d. Select the manufacturer (Extron, in this example).
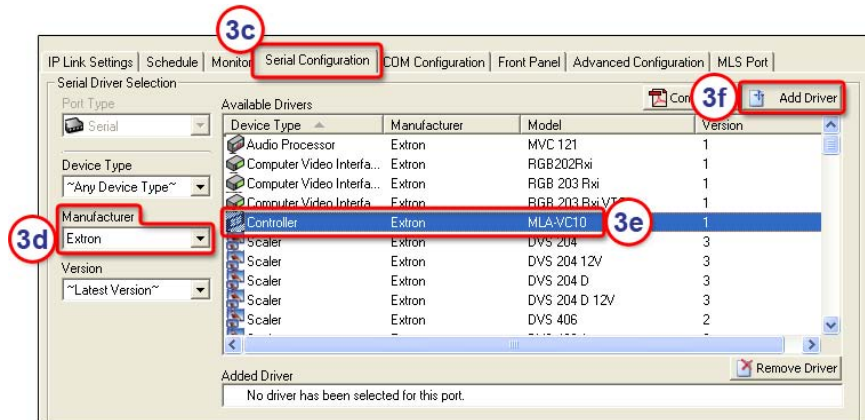
   e. Locate and select (click on) the model name (MLA-VC10) in the Available Drivers area.

   f. Click **Add Driver**. The MLA-VC10's name appears in the Added Drivers field, and the commands available in its driver appear in the GlobalViewer area at the bottom of the window.

   g. If desired, in the Driver Command and State Configuration area (near the bottom of the screen) you can make the following changes, which will

be reflected in the MLC's GlobalViewer Web pages after you build and upload the configuration to the MLC.

- De-activate or re-activate the buttons and functions by clicking on their respective check boxes.

- Change the function name by selecting the function, then clicking on the pencil icon at the top, right corner, or by right-clicking over a function name and selecting Rename.

- Change the vertical positions of the functions by highlighting a function and using the green up/down arrows to move the selected function up or down in the tree.

4. Configure the front panel volume control knob to control the MLA-VC10.

    a. Click on the **Front Panel** tab.

    b. Click on the **Volume Up** button.
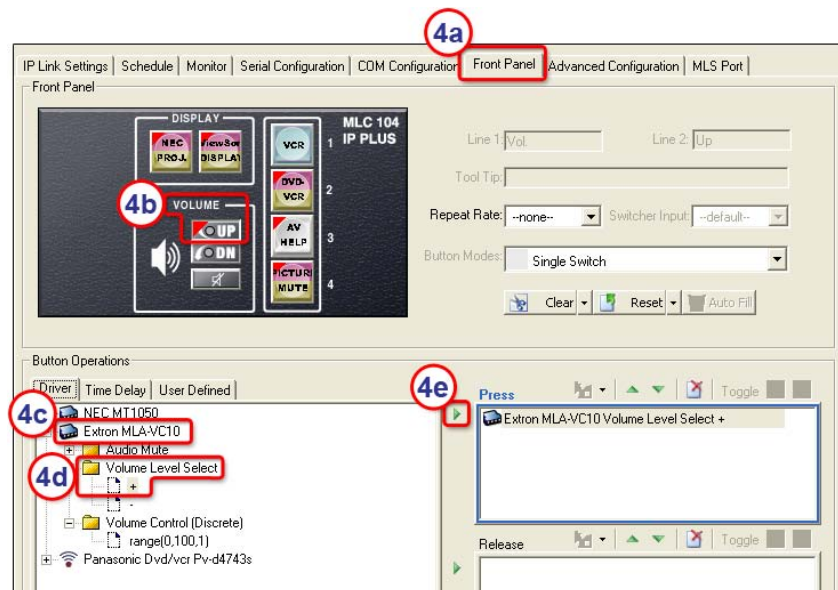
    c. In the Button Operations area's **Driver** tab, double-click on "MLA-VC10." A list of available driver functions displays below the driver name.

    d. Double-click **Volume Level Select** and click **+**.

    e. Click the green arrow adjacent to the Press area or drag the command to the Press area.

    f. Click on the **Volume Dn** (down) button.

    g. In the Button Operations area's **Driver** tab, double-click on "MLA-VC10."

    h. Double-click **Volume Level Select** and click **–**.

    i. Click the green arrow adjacent to the Press area or drag the command to the Press area.

5. Complete the rest of the configuration as desired, then save the project and build and upload the configuration to the MLC.

Controlling a Second Projector/Display

If an installation doesn't require additional inputs or an audio amplifier, you can use the MLS port and RS-232 serial communication to control an additional projector or display.

Connecting the second projector/display

Wiring varies depending on the projector/display model. In most cases the drivers are bidirectional, but sometimes only the transmit (Tx) and ground connections are needed for projector/display control. For bidirectional RS-232 communication, the transmit, ground, *and* receive pins must be wired at both the MLC and the projector or display. Use the diagram below as a guide.
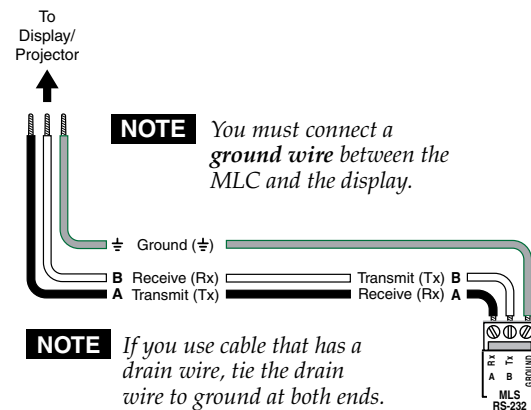
MLS port's RS-232 protocol:
- 9600 baud
- 8 data bits
- 1 stop bit
- no parity

NOTE *You must connect a* **ground wire** *between the MLC and the display.*

NOTE *If you use cable that has a drain wire, tie the drain wire to ground at both ends.*

Connecting an MLC 104 Plus Series controller to a second display/projector

NOTE *Each projector or display may require different wiring. For details, refer to the manual that came with the projector/display or the Extron device driver communication sheet.*

NOTE *Maximum distances between the MLC and the device being controlled may vary up to 200 feet (61 m). Factors such as cable gauge, baud rates, environment, and output levels (from the MLC and the device being controlled) all affect transmission distance. Distances of about 50 feet (15 m) are typically not a problem. In some cases the MLC may be capable of transmitting and controlling a given device via RS-232 up to 250 feet (76 m) away, but the RS-232 response levels of that device may be too low for the MLC to detect.*

Configuring the MLC for a second projector/display

Configuration involves setting up a driver for the MLS port and then setting up the Display On button to control the main projector/display and setting up the Display Off button to control the display/projector connected to the MLS port.

To configure the MLC to control a second display or projector, perform these steps:

1. Start the Global Configurator software and open a project that includes an MLC 104 Plus Series controller.

Special Applications, cont'd

**2.** In the IP Link tree view window, click on the MLC to be configured.
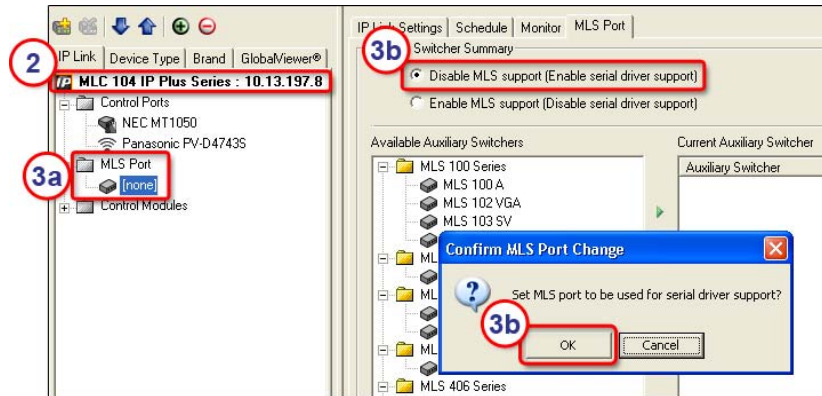
3. Configure the MLS port with the correct driver.

  a. Click on **MLS Port**. The MLS Port tab displays in the right side of the window.

  b. Click the **Disable MLS support (Enable serial driver support)** radio button. If the Confirm MLS Port Change window appears, click **OK**.

  c. Click on the **Serial Configuration** tab.

  d. Select the device type (display or video projector) and manufacturer.
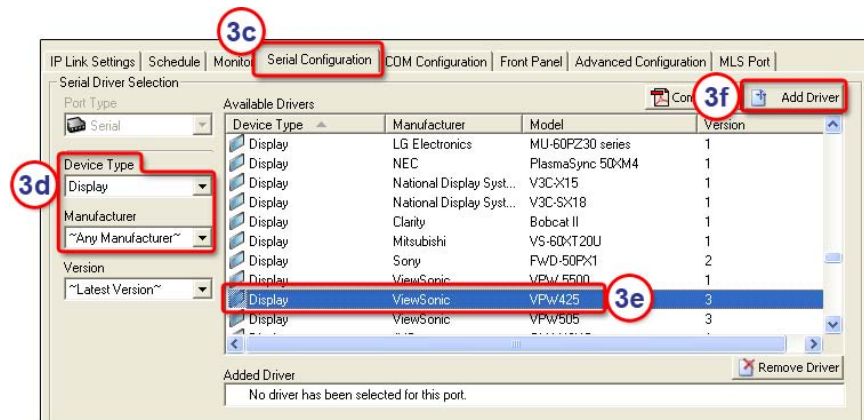
  e. Locate and select (click on) the display or projector's model name in the Available Drivers area.

  f. Click **Add Driver**. The display's name appears in the Added Drivers field, and the commands available in its driver appear in the GlobalViewer area at the bottom of the window.

4. Configure Display power button 1.

   a. Click on the **Front Panel** tab.

   b. Click on the first (left) Display power button. This will be used to control the projector connected to the Display RS-232 port
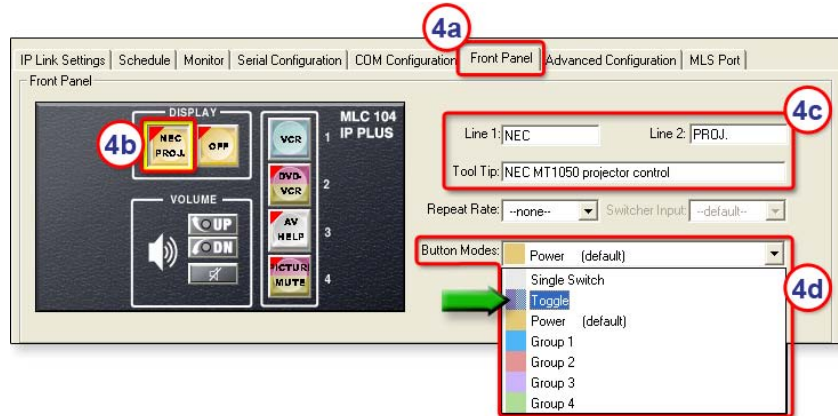
   c. Type in text for the onscreen button label and the tool tip (text that appears when the mouse pointer hovers over that button in GlobalViewer), if desired.

   d. In the Button Mode list box, select Toggle. This changes the Display button from its default power mode to toggle mode.

   e. In the Button Operations area's **Driver** tab, double-click the name of the projector connected to the Display port. A list of available driver functions displays below the driver name.
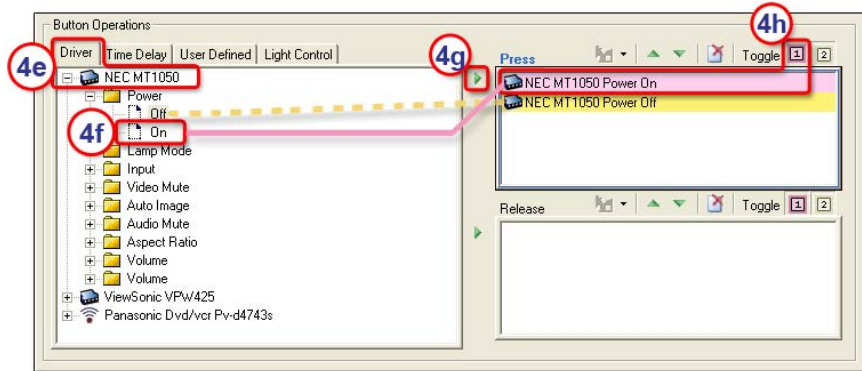
   f. Double-click **Power** and click **On**.

   g. Click the green arrow adjacent to the Press area or drag the command to the Press area

   h. For Toggle, click **1** to associate the Power On command with the first button press.

   i. Click **Power**, then click **Off**.

   j. Click the green arrow by the Press area or drag the command to the Press area. See the dashed line in the preceding screen picture.

   k. For Toggle, click **2** to associate the Power Off command with the second button press.

l.   In the Button Operations area, click the **Light Control** tab.
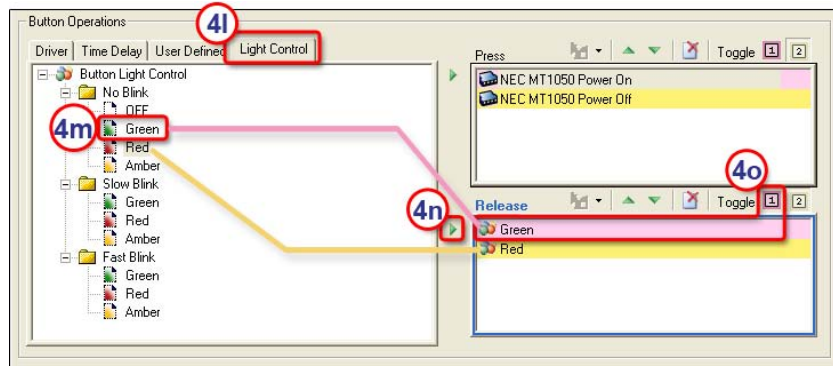
m.   Click on the desired button light setting, a combination of color and action (nonblinking, slowly blinking, fast blinking).

n.   Click the green arrow adjacent to the Release area.

o.   Click the name of the light setting in the Release area, then for Toggle, click **1** to associate that button lighting setting with the first button release.

p.   Repeat steps **4m** and **4n** to select a button light setting for the second button release.

q.   Click on the newly added button lighting command in the Release area.

r.   Click Toggle **2**.

5.   Configure Display power button 2 following steps **4a-4r** but using Display button 2 and the display driver assigned to the MLS port.
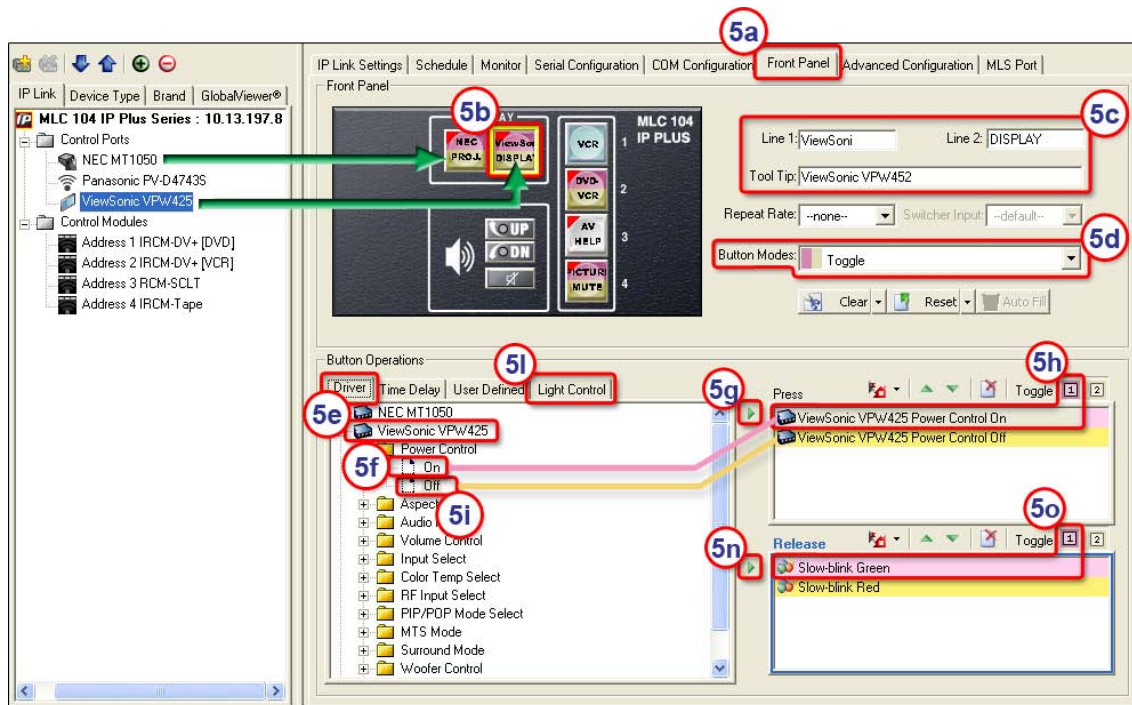
6.   Complete the rest of the configuration as desired, then save the project and build and upload the configuration to the MLC.

Customizing HTML Files to Control Devices, Modify Embedded Web Pages, and Send E-mail Alerts (IP models only)

This section discusses methods that someone familiar with HTML can use to make the MLC perform customized functions or to alter the MLC's embedded Web pages. One option is to create server-side includes (SSIs) to send commands to the MLC, itself, or to devices connected to its control ports. Another is to write query strings and insert them into Web pages stored on the MLC. Or you can put a server-side include command into an e-mail file to customize alert e-mails sent out by the MLC.

First we will detail SSIs and query strings, then show you how to integrate them into HTML files to upload into the MLC.

NOTE *Before attempting to develop new Web pages, the user should have a working knowledge of JavaScript, HTML, and Server Side Includes.*

Creating and using server side includes (SSIs)

About server side includes and the MLC

The MLC's embedded Web pages, GlobalViewer Web pages, and e-mails include device- or situation-specific content such as unit temperature, button status, projector connection status, or lists of available driver commands. How does the MLC know which information to use and when to use it?

The MLC processes SSIs, which are a type of HTML instructions that dynamically tell the MLC what material or files to include in the contents of a Web page or e-mail or to send out one of the MLC's ports. SSIs can include embedded instructions (scripts) and style sheets (to set up the page layout), and also specify what information to insert into the Web pages. These instructions run on the MLC's internal Web server.

To give the MLC customized instructions for creating e-mails and adding content to Web pages, you can create your own server side includes and place them within an HTML page or an e-mail file. These SSIs use Extron Simple Instruction Set (SIS) commands to ask for and display information from the MLC, itself. When a Web page is requested, the Web server (the MLC) replaces the SSI command with the response to the SIS command.

Should you create a customized SSI? Weigh the benefits (ability to customize messages from the MLC or information displayed on its GV Web pages) against the drawbacks (the more SSIs being used, the slower the server processor) when planning your installation.

NOTE *For the MLC and most other Web servers, an SSI-enabled HTML file must have a file extension of .shtml.*

Special Applications, cont'd

SSI command types and syntax

Host vs. remote commands

SIS commands for MLCs and other IP Link-enabled devices fall into two categories: host or remote.

- **Host** commands instruct the MLC, itself, to act or respond.
- **Remote** commands send data to an external control port on the MLC.
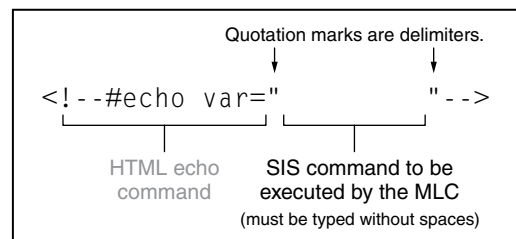
Command syntax

Basic syntax for server side includes is as follows:

`<!--#directive parameter=x parameter=x -->` where

- "directive" is an instruction to the server such as `include file` (to include/ insert the content of one document into another file) or `echo var` (to display a particular HTTP variable)
- the variable (x) is one or more SIS commands enclosed in quotation marks ("x")

For IP Link-enabled devices including the MLC, see the following examples of the basic SSI command format.

Server Side Include (SSI) Syntax for a Host SIS Command

Quotation marks are delimiters.

`<!--#echo var="          "-->`

HTML echo command

SIS command to be executed by the MLC
(must be typed without spaces)

The results of the echo command are displayed in the MLC's Web page(s) or in the monitor-triggered e-mail.

Examples:

`<!--#echo var="N"-->`
Request unit's part number.

`<!--#echo var="6S"-->`
View lamp hour status.

`<!--#echo var="1Z0P"-->`
Turn audio mute on (1Z), turn display power off (0P).

`<!--#echo var="WCTI"-->`
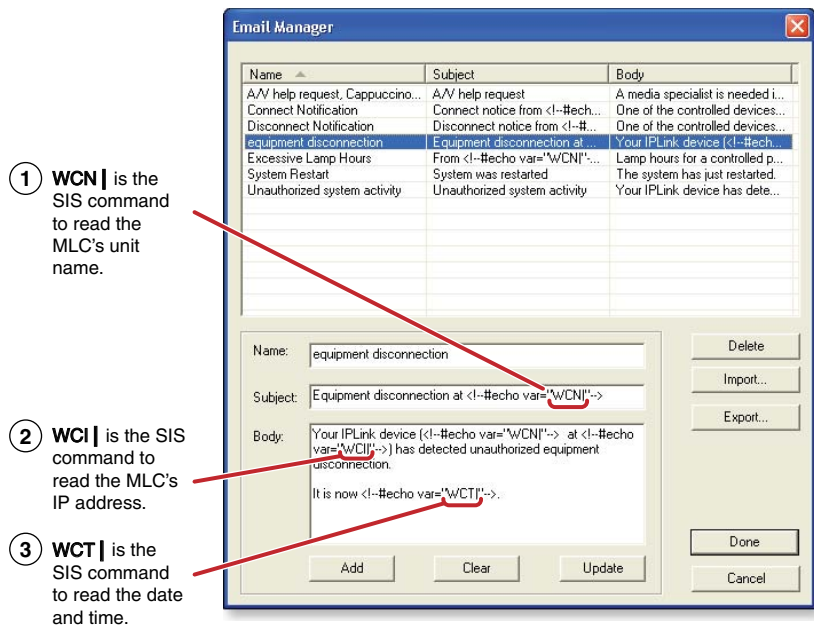W is the Web-encoded substitute for the [Esc] key.   View date and time.

NOTE *Do not use spaces between SIS commands. Do use Web encoding. See chapter 4 for details about how to encode SIS commands for Web use.*
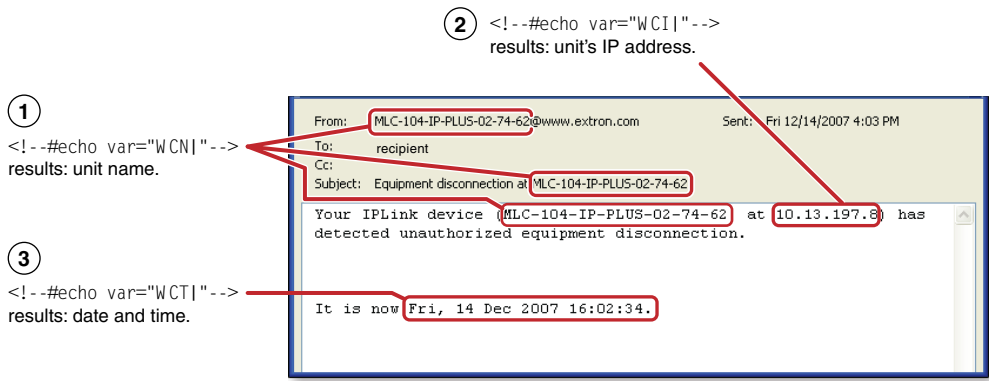
Example: SSI use in notification e-mails

One simple way to use host SSI commands is to customize e-mail messages that the MLC sends in response to a monitored condition. In the example shown below, the disconnection e-mail uses SSIs to insert the unit name, IP address, and time into an e-mail that is sent when the MLC detects that a device attached to it has been disconnected. For more information on commands, see the Command/response table for Simple Instruction Set (SIS) commands in chapter 4.

How these commands are typed into the Global Configurator Email Manager:

① **WCN|** is the SIS command to read the MLC's unit name.

② **WCI|** is the SIS command to read the MLC's IP address.

③ **WCT|** is the SIS command to read the date and time.

Resulting e-mail that is sent out upon equipment disconnection:

② `<!--#echo var="WCI|"-->` results: unit's IP address.

① `<!--#echo var="WCN|"-->` results: unit name.

③ `<!--#echo var="WCT|"-->` results: date and time.

SSI use in an MLC's Web page

Reference notes:

An __.shtml file can be uploaded to the MLC by using one of the following:

- the **File Management** tab of MLC's factory embedded Web page (http://*<unit's IP address>*/nortxe_index.html)

- an SIS command (see "File streaming commands" in chapter 5) via Telnet or HyperTerminal

- a Web browser by sending a Post command on port 80 followed by the delimited data in the .shtml file

Special Applications, cont'd

Creating and using query strings

A query string is a command that contains parameters or instructions for the Web server (the MLC) to execute. The query string is contained after the question mark within a reference URL (Web address). (See the syntax section below.)

When a link is accessed on a Web page, the URL is sent to the Web server (MLC) to tell it which Web page to return to the browser. Upon receiving the URL, the MLC's internal Web server locates the query string within the URL and executes the command it contains.

Query string command types and syntax

Host vs. remote commands

As with SSI formatted commands, query strings can use any valid SIS command of either type (host or remote).

- **Host** commands instruct the MLC, itself, to act or respond.

- **Remote** commands send data to an external control port on the MLC.

Command syntax

The basic format for a query string within a link is as follows:
`<a href="index.html?cmd=`*x*`">`*linked text*`</a>`   where *x* is the SIS command to be executed.

Syntax for a URL Containing a Query String

Text between the quotation marks is typed with no spaces.

Delimiter

"**?**" indicates the start of the query string.

Delimiter

`<a href="index.html ? cmd=         ">`   `</a>`

HTML URL reference (link) command

Indicator that a command follows

SIS command to be executed by the MLC (Web server) (typed with no spaces)

Link text (text that appears on the Web page for the user to click on)

End of link tag
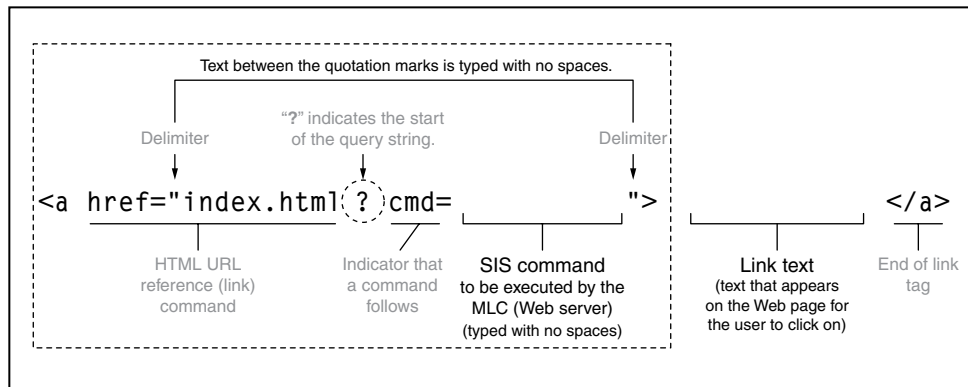
Chapter Six

Labeling, Installation, and Mounting

UL/Safety Requirements

Installing or Replacing Button Labels

Wiring Peripherals to the MLC

Mounting the MLC

Labeling, Installation, and Mounting

UL/Safety Requirements

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

1. Do not use the MLC near water or expose it to liquids.

    WARNING *To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.*

2. Clean the MLC only with a dry cloth.

3. Do not install the MLC near any heat source, such as a radiator, heat register, stove, or another apparatus (including amplifiers) that produces heat.

4. Unplug the MLC during lightning and thunderstorms or when it will be unused for long periods.

5. For the installation to meet UL requirements and to comply with National Electrical Code (NEC), the MLC must be installed in a UL approved junction box. The end user or installer must furnish the junction box; it is not included with the MLC.

Installing or Replacing Button Labels

For the MLC or the optional SCP control panel, you may wish to customize the button labels. The labels can be changed at any time. You can use printed labels included with the unit, write on blank labels, or purchase additional sheets of printed button labels from Extron. Button caps are also available, should you need to replace one.

Button labeling procedure

Follow these steps to change the translucent button labels:

1. Remove the button from the MLC or SCP; use a small, flat bladed screwdriver such as an Extron Tweeker to gently pry a button out from the front panel.

2. Locate the notch in the corner of one side of the clear button cap lens.

3. Separate the white backing (diffuser) from the clear button cap (lens); insert the blade of the small screwdriver into the corner notch and gently twist the blade.

4. Save the translucent, white diffuser, but remove the text/ label insert from the transparent button cap lens.

5. Select one of the button labels from the printed label sheets included with the device (MLC or SCP). Remove the label from its backing, if applicable.

6. Insert the button label into the button cap. Check for correct label orientation.

7. Align the white diffuser plate with the cap (lens). The bumps on the diffuser plate should be aligned (top and bottom) with the notches on the clear button cap. Firmly snap it into place.

Plunger

TEXT

Diffuser

Button Label

Clear Lens

Pry the two pieces apart.

Notch

Separate the two-piece button at the corner.

Extron Electronics

Extron Electronics
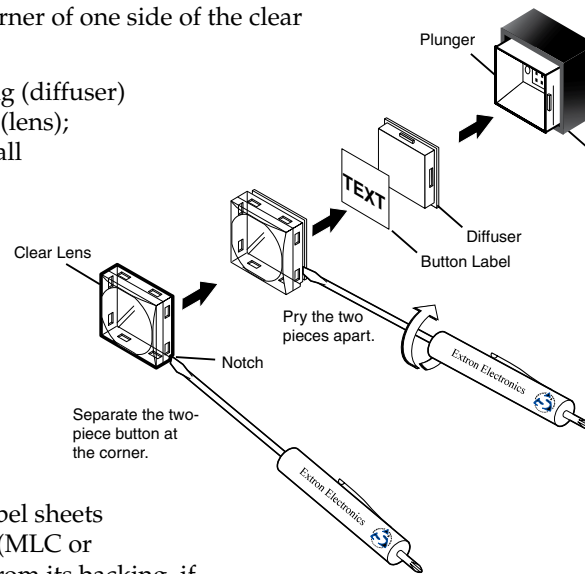
8. Align the tabs on the MLC's plunger with the notches on the diffuser plate. Gently, but firmly, press the reassembled button into place in the MLC's or SCP's front panel.

9. Repeat steps 1 to 8 as needed to relabel other buttons.

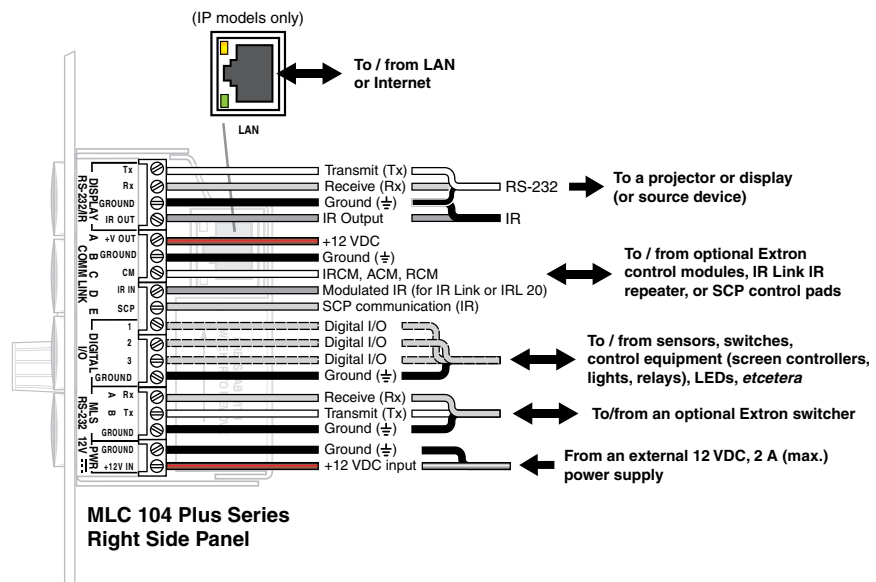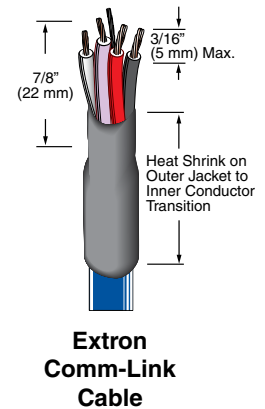### Moving a button cap to a different button

For ease of use in darkened rooms and by people with visual impairment, the MLC's buttons produce an audible click at each button press and each button release. Also, the cap of one button features a small tactile bump, much like the bumps on a computer keyboard's "F" and "J" keys. This cap is factory installed on the input 1 button, but you can move it to a different button.

Button Cap Lens

Tactile Bump
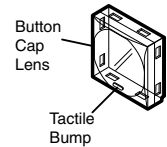
Wiring Peripherals to the MLC

Now that the MLC has been configured and the buttons have been labeled to match the installation, you can cable equipment to the MLC at the installation site.

1. Install the wall box, mud ring, or other mounting hardware.

2. Run cables through the wall, floor, or furniture and out through the opening where the MLC will be installed.

3. Remove cable jackets to about 7/8" from the end, then strip wires no more than 3/16" (5 mm) from the end.

4. Install heat shrink around bare drain wires, and install a larger heat shrink around the area where the outer cable jacket ends and the inner conductors are exposed. See the diagram at right for reference.

5. Connect wires to the MLC's connectors and to peripheral devices (display/projector, source devices, optional Extron switcher, control devices, IRCMs, SCPs). See chapter 2 for wiring details for each port.

6. For IP models, connect the network cable's RJ-45 connector to the LAN port, and wire the included 12 VDC power supply to the MLC's Power port, referring to chapter 2 of this manual and the diagram below as needed

3/16" (5 mm) Max.

7/8" (22 mm)

Heat Shrink on Outer Jacket to Inner Conductor Transition

Extron Comm-Link Cable

(IP models only)

LAN

To / from LAN or Internet

DISPLAY RS-232/IR	Tx	Transmit (Tx)	
	Rx	Receive (Rx)	RS-232 → To a projector or display
	GROUND	Ground (⏚)	(or source device)
	IR OUT	IR Output	IR
COMM LINK	+V OUT	+12 VDC	
	GROUND	Ground (⏚)	To / from optional Extron
	CM	IRCM, ACM, RCM	control modules, IR Link IR
	IR IN	Modulated IR (for IR Link or IRL 20)	repeater, or SCP control pads
	SCP	SCP communication (IR)	
DIGITAL I/O	1	Digital I/O	
	2	Digital I/O	To / from sensors, switches,
	3	Digital I/O	control equipment (screen controllers,
	GROUND	Ground (⏚)	lights, relays), LEDs, *etcetera*
MLS RS-232	Rx	Receive (Rx)	
	Tx	Transmit (Tx)	To/from an optional Extron switcher
	GROUND	Ground (⏚)	
PWR 12V	GROUND	Ground (⏚)	From an external 12 VDC, 2 A (max.)
	+12V IN	+12 VDC input	power supply

MLC 104 Plus Series Right Side Panel

7.   Power on the peripheral devices and the MLC and test the system.

8.   If you discover any wiring errors, disconnect power to all devices, correct the wiring, then reconnect power and test the system again.

9.   Carefully feed wires back into the wall or furniture and mount the MLC as described in the next section of this chapter, "Mounting the MLC".

Mounting the MLC

Once the system has been cabled, configured (see chapter 3), and tested, the controller can be installed in the wall, furniture, equipment rack, or Euro Channel.

MLC 104 IP Plus Front Panel
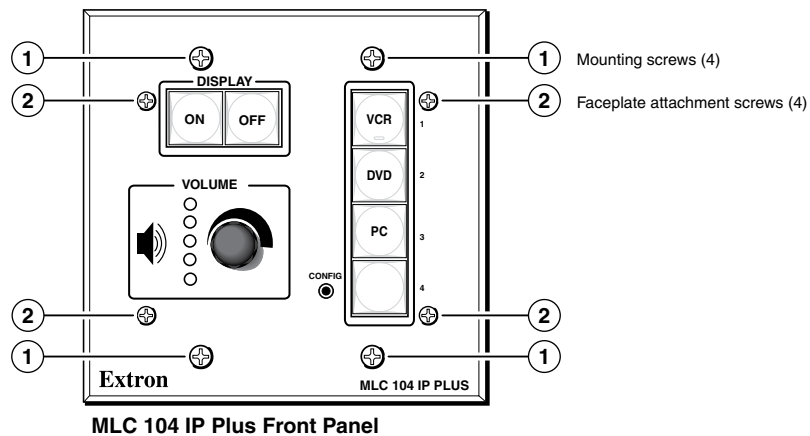
① **Mounting screws (4)** — Use these to attach the MLC to a wall, furniture, or other mounting surface.

② **Faceplate attachment screws (4)** — Do **not** remove these screws during or after mounting. They attach the faceplate to the MLC unit. Removing these screws during or after mounting will cause the MLC to detach, and it may then fall down into the wall or furniture.

Grounding to reduce electrostatic discharge

Extron products with faceplates designed for installation into a wall or furniture (such as the MLC, SCP, and control modules) can be adversely affected by electrostatic discharge (ESD) if they are not grounded correctly.

To avoid malfunctions, **if these products are not installed into a grounded metal electrical box**, ground the faceplates in one of two ways:

• Ground each faceplate directly to an earth ground, as shown below.

MLC 104 IP Plus Rear Panel

Ground each faceplate
to the earth
ground.

or
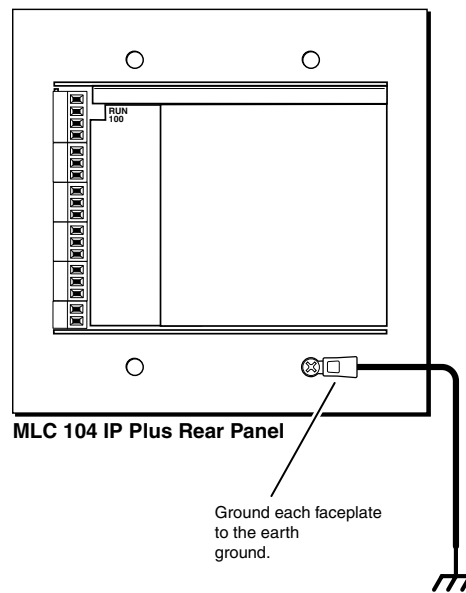
• Tie each faceplate to its circuit board ground via a ground pin on one of the connectors. Refer to the product's user's manual to determine the correct circuit ground pin.

Ground each
faceplate to
the circuit
ground.
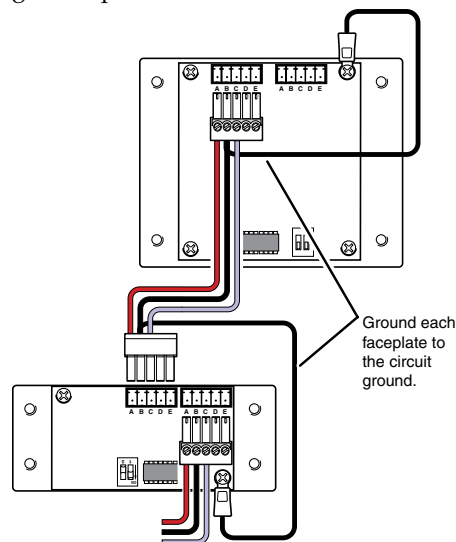
NOTE *Do <u>not</u> tie a product's faceplate to <u>both</u> a separate earth ground and the circuit ground (via a connector pin). If you tie a product to two different ground sources, you may introduce ground loops or other grounding-related problems into the system.*

NOTE *Do <u>not</u> tie a faceplate to a product's circuit ground if the product will be installed in a grounded metal electrical box.*

NOTE *Only metal faceplates can and should be grounded. Plastic faceplates do not require a grounding wire.*

Labeling, installation, and Mounting, cont'd

Mounting the MLC to an electrical box or mud ring

With power disconnected at the source, mount the MLC to the wall box or mud ring mounting bracket with the provided machine screws (mounting screws, as shown in the following illustrations).

NOTE *If the MLC (and any accessories such as control modules or an IR Link) is not mounted to a grounded metal wall box,*

- *Ground each faceplate directly to an earth ground. Or...*
- *Tie each faceplate to its circuit board and power supply via a ground pin on one of the connectors.*

Do not tie a product's faceplate to both a separate earth ground and the circuit ground (via a connector pin). If you tie a product to two different ground sources, you may introduce ground loops or other grounding-related problems into the system.

NOTE *For the installation to meet UL requirements and to comply with National Electrical Code (NEC), the MLC must be installed in a UL approved junction box. The end user or installer must furnish the junction box; it is not included with the MLC.*

Mounting the MLC to an electrical box or mud ring

Installing an Extron MR Series mud ring

Depending on the MLC model or MLM faceplate you use (other than lectern mount or EC/EU models), you can install the MLC 104 Plus Series controller using the following Extron mounting brackets (mud rings):

- 2-gang mud ring, black or white (part #70-519-22 or -23)

- 4-gang mud ring, black or white (part #70-519-42 or -43)

- 6-gang mud ring, black or white (part #70-519-62 or -63)

Determining the installation location

The UL-listed MR series mud rings do not need to be fastened to wall studs, so they can placed almost anywhere on a wall or other mounting surface. When you are deciding where to install the device and mud ring, consider the placement of the cable(s) and access. You may need to install the cables before you install the bracket.

WARNING *The MR series mud rings are UL-listed for low-voltage applications only.*

NOTE *The mud rings fit securely in hollow wall thicknesses ranging from 1/4" (0.63 cm) to 1" (2.5 cm).*

Preparing the site and installing the mud ring using the doglegs

1. See the to-scale dimension drawing included with the mud ring to determine the cut-out dimensions for your mud ring. If desired, make a photocopy of the template. Cut out the material that corresponds to your mud ring.

   NOTE *The solid lines on the template define the cut-out area, not the dashed line. For example, for a 2-gang mud ring, the cut-out width is 3.95", not 4.60".*

2. Use a soft pencil to mark the guidelines for the hole to be cut in the installation surface. If you are going to screw the mud ring to the surface, rather than using the doglegs, mark the four screw holes at the corners.

3. Carefully cut away the mounting surface material inside the guidelines.

4. Test the fit by inserting the mud ring into the hole in the wall. The doglegs on the mud rings should fit easily into the hole and the flat portion should rest flush against the wall. There should not be any noticeable play or movement of the mud ring in the opening. See the notes in the figure below.
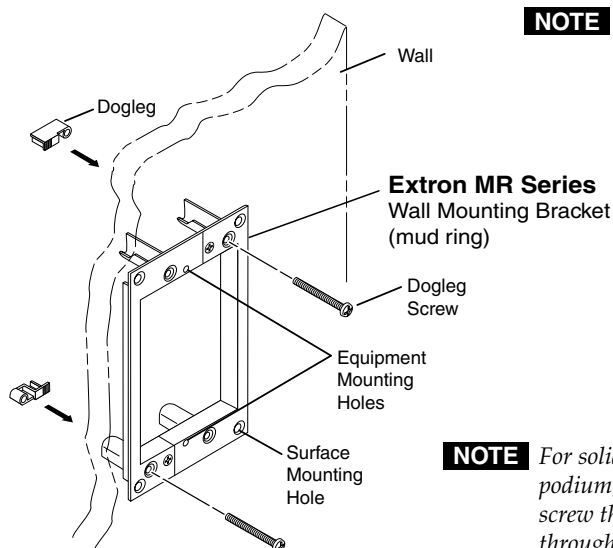
Wall

Dogleg

NOTE *You do not need to disassemble the dogleg from the dogleg screw. Rotate the dogleg out of the way to insert the mud ring into the wall.*

Extron MR Series
Wall Mounting Bracket (mud ring)

Dogleg Screw

Equipment Mounting Holes

Surface Mounting Hole

NOTE *For solid surfaces, such as a wooden podium, you can omit the doglegs and screw the mud ring directly to the surface through the four surface mounting holes.*

Labeling, installation, and Mounting, cont'd

5. If necessary, use a rasp or file to enlarge the hole. Smooth the edges of the hole to avoid injury to yourself or damage to the cables during installation.

6. Insert the mud ring into the hole in the wall.

7. Tighten all of the dogleg screws until the doglegs clamp the mud ring to the mounting surface. Do not overtighten.

NOTE *The MR 200 uses four doglegs to secure it to mounting surface. The MR 400 and MR 600 use six doglegs to secure them to mounting surface.*
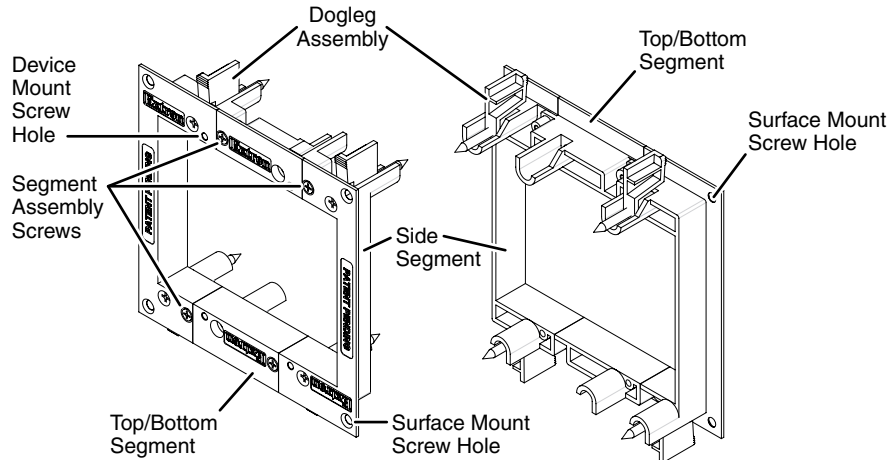
Mud Ring Model	Dogleg assemblies	Segment assembly screws (#4-3/8")	Surface mounting screws (#4-3/8")	Device mounting screws (#6-1/2")	Top/ bottom segments	Side segments
MR 200	4	4	4	4	2 small	2
MR 400	6	6	4	8	2 small 2 large	2
MR 600	6	8	4	12	2 small 4 large	2

NOTE *Each mud ring kit includes an expansion kit consisting of two small top/bottom segments that allow the mud ring to be enlarged or reduced to the next larger or smaller gang size. See "Modifying the mud ring," below.*

Modifying the mud ring

Each mud ring size, 1-gang through 7-gang, can be modified to make the mud ring one gang-size larger or smaller. You can resize the mud ring by adding a top and bottom segment, removing a top and bottom segment, or replacing one size top and bottom segment with another. See the following diagram.

Segment Assembly Screws

Small Top/Bottom Segment

2 Small Top/Bottom Segments
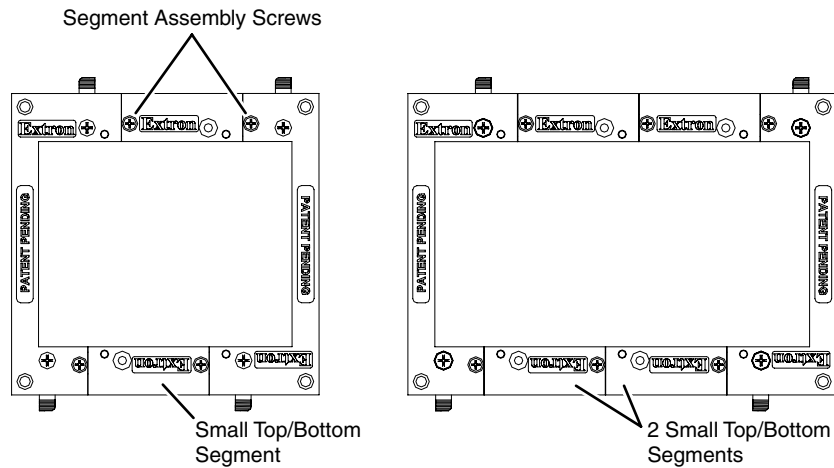
MR 200 2-gang Mud Ring   **MR 200** Modified to be a 3-gang Mud Ring

NOTE *The 1-gang mud ring cannot be made smaller.*

Modify an MR Series mud ring as follows:

1. If necessary, remove the mounted device(s) from the mud ring.

2. If necessary, remove the mud ring from the installation surface.

3. As necessary, remove the segment assembly screws that hold the segments together and add, remove, or replace a top segment and a bottom segment. The following table shows the modifications required to enlarge and shrink each mud ring model.

Mud Ring Model	Number of top/bottom segments when <u>reduced</u>	<u>Standard</u> number of top/bottom segments	Number of top/bottom segments when <u>expanded</u>
MR 100	N/A	0	1 small (top) 1 small (bottom)
MR 200	0	1 small (top) 1 small (bottom)	2 small (top) 2 small (bottom)
MR 300	1 small (top) 1 small (bottom)	1 large (top) 1 large (bottom)	1 small, 1 large (top) 1 small, 1 large (bottom)
MR 400	1 large (top) 1 large (bottom)	1 small, 1 large (top) 1 small, 1 large (bottom)	1 large, 2 small (top) 1 large, 2 small (bottom)
MR 500	1 small, 1 large (top) 1 small, 1 large (bottom)	2 large (top) 2 large (bottom)	1 small, 2 large (top) 1 small, 2 large (bottom)
MR 600	2 large (top) 2 large (bottom)	1 small, 2 large (top) 1 small, 2 large (bottom)	2 small, 2 large (top) 2 small, 2 large (bottom)
MR 700	1 small, 2 large (top) 1 small, 2 large (bottom)	3 large (top) 3 large (bottom)	1 small, 3 large (top) 1 small, 3 large (bottom)

As an example, to modify an MR 300 to be a 4-gang mud ring, you add one small segment on the top and on the bottom. To modify the same MR 300 to be a 2-gang mud ring, you replace the large segments on the top and bottom with small segments.

4   Replace and install new segment assembly screws as necessary.

5. If necessary, enlarge the opening in the mounting surface.

6. If necessary, reinstall the mud ring in the mounting suface.

7. If necessary, reinstall the mounted device(s) in the mud ring.

Labeling, installation, and Mounting, cont'd

Mounting the MLC to a wall or furniture

1. If you have an MLC 104 Plus Series model other than the MLC 104 IP Plus L (which has built-in faceplate screws), remove the four faceplate attachment screws and remove the original faceplate, if applicable.

2. If you have a model other than the MLC 104 IP Plus L, attach the optional lectern mounting faceplate to the MLC with the screws removed in step 1.

3. With power disconnected at the source, insert the MLC into the wall or furniture.

4. Fasten the MLC and faceplate directly to the furniture or wall using wood screws.

NOTE *If the MLC (and any accessories such as control modules or an IR Link) is not mounted to a grounded metal wall box,*

- *Ground each faceplate directly to an earth ground. Or...*

- *Tie each faceplate to its circuit board and power supply via a ground pin on one of the connectors.*

Do <u>not</u> tie a product's faceplate to <u>both</u> a separate earth ground and the circuit ground (via a connector pin). If you tie a product to two different ground sources, you may introduce ground loops or other grounding-related problems into the system.

NOTE *For the installation to meet UL requirements and to comply with National Electrical Code (NEC), the MLC must be installed in a UL approved junction box. The end user or installer must furnish the junction box; it is not included with the MLC. See "Mounting the MLC to an electrical box or mud ring" on the previous page.*

Rack mounting an MLC 104 IP Plus L

Procedure

1. Attach an MLC 104 IP Plus L to an optional rack mounting faceplate (UCM-RAAP) with the provided mounting machine screws and nuts.

2. With power disconnected at the source, fasten the MLC and faceplate to the rack using the supplied machine screws as shown in the illustration at right.

Extron
UCM-RAAP

Extron
MLC 104 IP Plus L
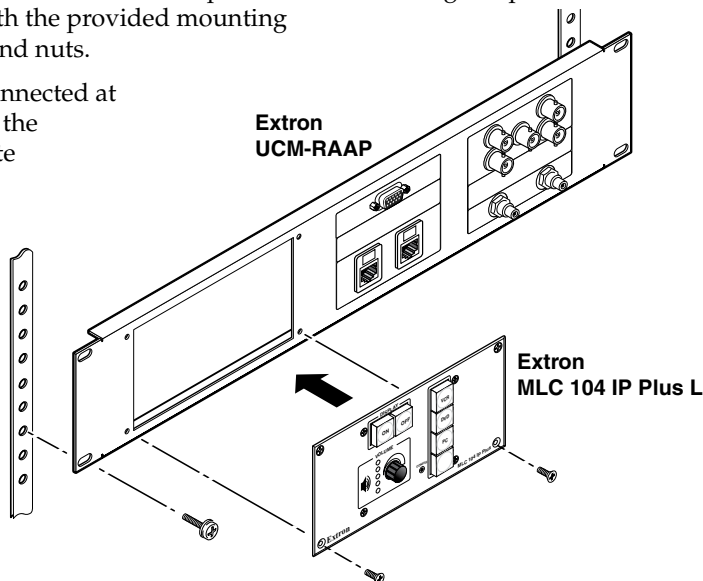
Rack mounting the MLC 104 IP Plus L

UL rack mounting guidelines

The following Underwriters Laboratories (UL) guidelines pertain to the safe installation of the MLC in a rack.

1. **Elevated operating ambient temperature** — If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient temperature. Therefore, install the MLC in an environment compatible with the maximum ambient temperature (Tma = +122 °F, +50 °C) specified by Extron.

2. **Reduced air flow** — Install the equipment in a rack so that the amount of air flow required for safe operation of the equipment is not compromised.

3. **Mechanical loading** — Mount the equipment in the rack so that a hazardous condition is not achieved due to uneven mechanical loading.

4. **Circuit overloading** — Connect the equipment to the supply circuit and consider the effect that circuit overloading might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

5. **Reliable earthing (grounding)** — Maintain reliable grounding of rack-mounted equipment. Pay particular attention to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

Mounting the MLC in a Euro Channel

1. Remove the four faceplate attachment screws and remove the original faceplate, if applicable.

2. Attach the optional MLM 104 EC or MLM 104 AAP EC faceplate to the MLC with the screws removed in step 1.

3. With power disconnected at the source, insert the MLC into the Euro Channel. For wider types of Euro Channels, you may need to insert a spacer plate first.

4. Mount the controller to the Euro Channel by attaching the faceplate to the two backing plates using four #4-40 mounting screws. See the illustration below.

NOTE *Make sure that the Euro Channel is grounded to an earth ground before completing the installation.*

**Extron
MLC 104 IP Plus
with MLM 104 EC**

Euro Channel

Backing Plate
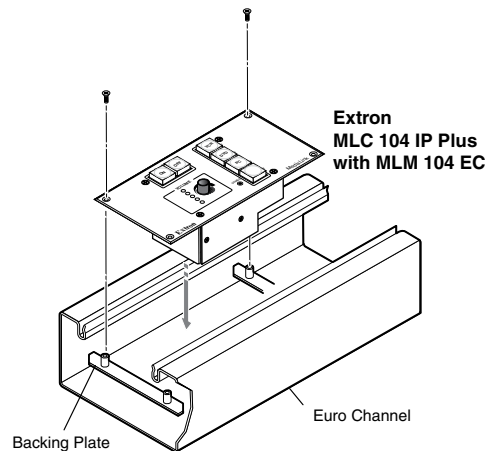
Mounting the MLC to a Euro Channel

Labeling, installation, and Mounting, cont'd

Appendix A

Reference Material

Specifications — MLC 104 IP Plus Series

Specifications — MLC 104 Plus

Part Numbers and Accessories

Glossary

File Types: a Key to Extron-specific File Names

Cut-out Templates

Reference Material

Specifications — MLC 104 IP Plus Series

Control — host ports

Serial host port............................... 1 bidirectional RS-232 front panel 2.5 mm mini stereo jack

Baud rate and protocol................. 38400, 8 data bits, 1 stop bit, no parity

Serial control pin configurations. Mini stereo jack: tip = TX, ring = RX, sleeve = GND

Ethernet host port .... 1 RJ-45 female

Ethernet data rate.......................... 10/100Base-T, half/full duplex with autodetect

Ethernet protocol........................... ARP, DHCP, ICMP (ping), TCP/IP, Telnet, HTTP, SMTP

Ethernet default settings .... Link speed and duplex level = autodetected
IP address = 192.168.254.254
Subnet mask = 255.255.0.0
Default gateway = 0.0.0.0
DHCP = off

Web server..................................... Up to 200 simultaneous sessions
7.25 MB nonvolatile user memory

Secondary control panel (SCP).... (1) 3.5 mm 5-pole direct insertion captive screw connector

Program control............................ Extron's Global Configurator for Windows®
Extron's Simple Instruction Set (SIS™)
Microsoft® Internet Explorer®, Telnet

IR learning frequencies................. 30 kHz to 62 kHz

IR learning distance .... 2" (5.1 cm) to 12" (30.5 cm) from the top panel

Control — serial ports

Display control port...................... (1) 3.5 mm direct insertion captive screw connector, 3 pole, for bidirectional
RS-232 control (± 5V)

Switcher control port .... (1) 3.5 mm direct insertion captive screw connector, 3 pole, for bidirectional
RS-232 control (±5 V)

Baud rate and protocol (RS-232) . 115200 to 300 baud (9600 baud = default); 8 (default) or 7 data bits; 1(default)
or 2 stop bits; no parity (default), or even or odd parity

Control — IR port

IR control port............................... (1) 3.5 mm direct insertion captive screw connector, 2 pole
TTL level (0 to 5 V) infrared control up to 1 MHz

Digital I/O control

Number/type .... 3 digital input/output (configurable)

Connector .... (1) 3.5 mm direct insertion captive screw connector, 4 pole

Pin configuration........................... 1, 2, 3 = digital inputs/outputs 1, 2, and 3; GND = GND

Digital inputs

      Input voltage range........... 0-12 VDC

      Input impedance .... 28k ohms

      Programmable pullup ...... 2k ohms to +5 VDC

      Threshold low to high ...... >2.8 VDC

      Threshold high to low ...... <2.0 VDC

Digital outputs............................... 250 mA sink from 24 VDC, maximum

General

External power supply .... 100 VAC to 240 VAC, 50/60 Hz, external; to 12 VDC, 1 A, regulated

Power input requirements

      MLC 104 IP Plus DV+....... 12 VDC, 0.305 A (includes MLC 104 IP Plus and IRCM-DV+)

   All other models............... 12 VDC, 0.285 A (0.305 A if used with an optional IRCM-DV+)

NOTE *An MLC 104 IP Plus Series controller must be powered by its own power supply. It cannot be powered by an MLS switcher.*

Temperature/humidity .... Storage: -40 to +158 °F (-40 to +70 °C) / 10% to 90%, noncondensing
Operating: +32 to +122 °F (0 to +50 °C) / 10% to 90%, noncondensing

Cooling .... Convection, unvented

Rack mount

    MLC 104 IP Plus DV+ .... No, but wall and furniture mountable

    All other models .... Yes, with optional rack mounting kits, and also wall- and furniture-
mountable with optional mounting kits

Enclosure type

    MLC 104 IP Plus controller only
                No faceplate, metal rear enclosure

    MLC 104 IP Plus, MLC 104 IP Plus DV+
                High-impact plastic faceplate, metal rear enclosure

    MLC 104 IP Plus in RAL9010, MLC 104 IP Plus AAP, MLC 104 IP Plus L
                Metal faceplate, metal rear enclosure

Enclosure dimensions

    MLC 104 IP Plus faceplate . 4.5" H x 4.6" W x 0.1" D (11.4 cm H x 11.7 cm W x 0.3 cm D) (2 gang)

    MLC 104 IP Plus AAP and MLC 104 IP Plus DV+ faceplates
                4.5" H x 8.2" W x 0.1" D (11.4 cm H x 20.9 cm W x 0.3 cm D) (4 gang)

    MLC 104 IP Plus L faceplate
                3.15" H x 6.5" W x 0.1" D (8.0 cm H x 16.5 cm W x 0.3 cm D)

    MLC 104 IP Plus DV+ device
                2.7" H x 3.4" W x 1.8" D (6.9 cm H x 8.6 cm W x 4.6 cm D) and
                2.7" H x 2.6" W x 0.9" D (6.9 cm H x 6.6 cm W x 2.3 cm D)
                (Depth excludes knobs and buttons. Fits some 4 gang wall boxes. Allow at
least 1.9" [4.8 cm] depth in the wall or furniture.)

    All other models' device... 2.7" H x 3.4" W x 1.8" D (6.9 cm H x 8.6 cm W x 4.6 cm D)
                (Depth excludes knob and buttons. Fits some 2 gang boxes. Allow at least
1.9" [4.8cm] depth in the wall or furniture.)

**MLC 104 IP Plus L
Rear**

**MLC 104 IP Plus
Rear**

Reference Material, cont'd
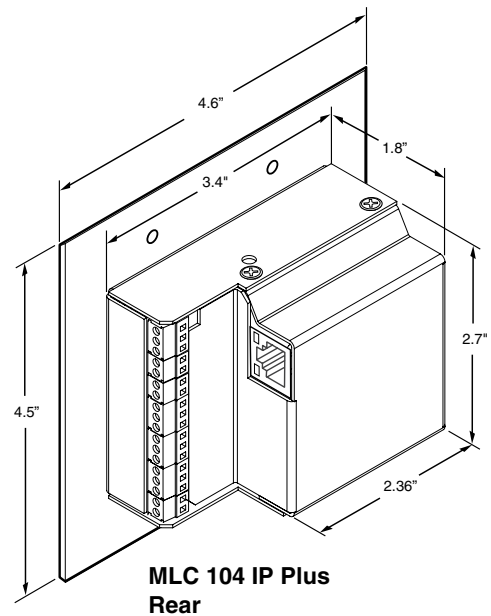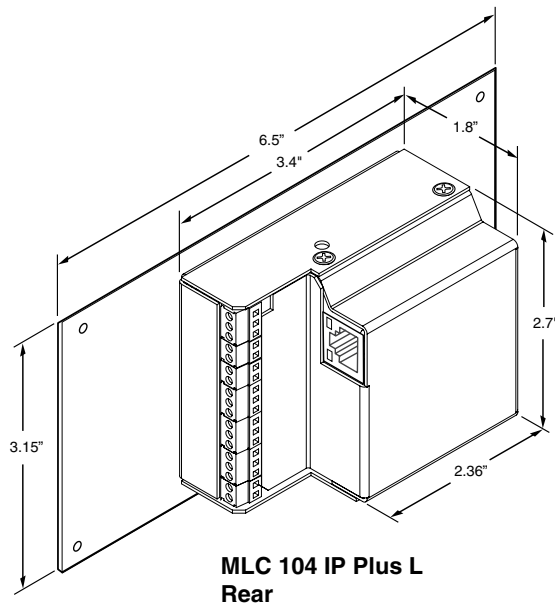
MLC 104 IP Plus DV+
Rear

MLC 104 IP Plus AAP
Rear
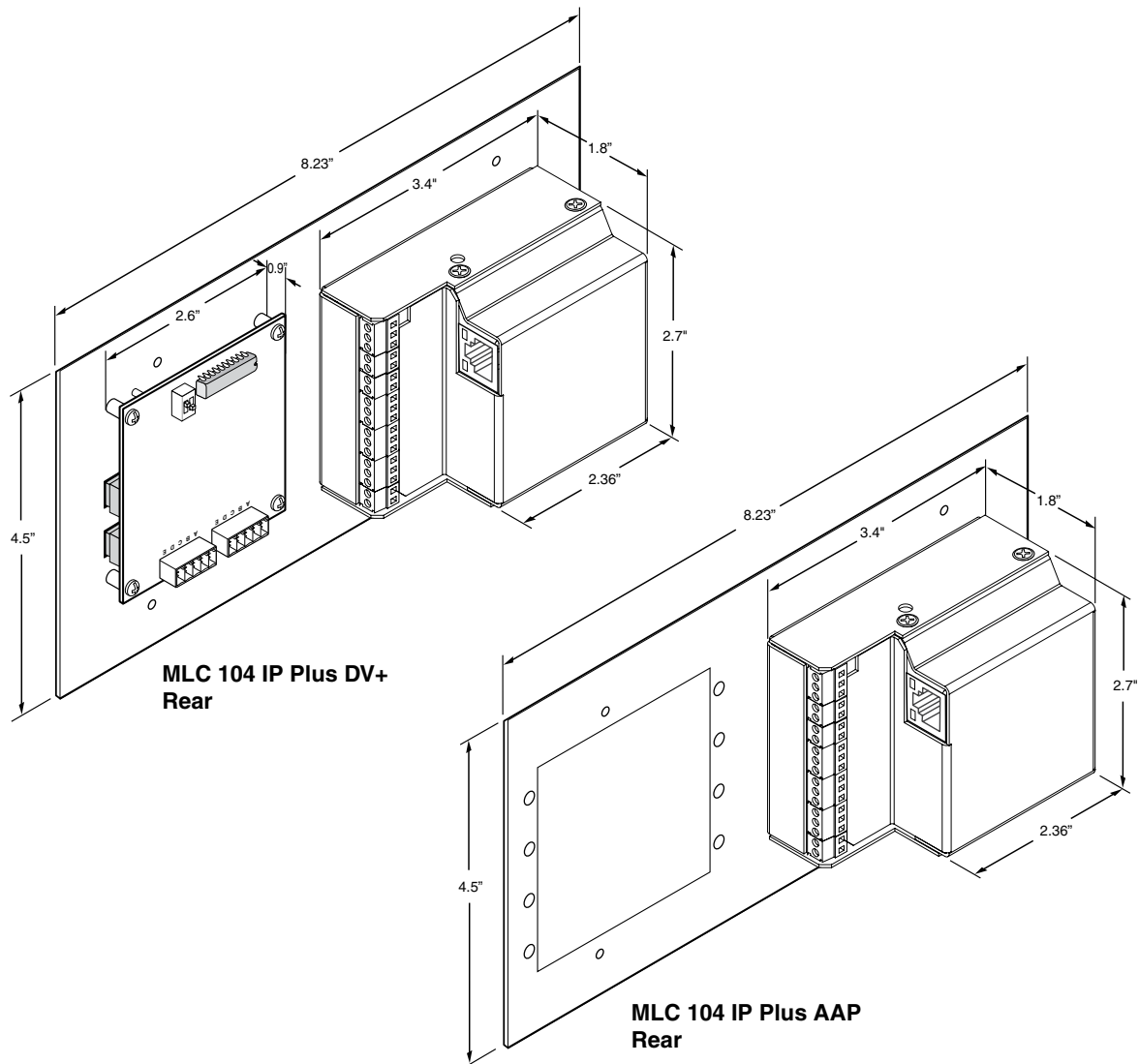
Product weight

       MLC 104 IP Plus DV+....... 2.1 lbs (1.0 kg)

       All other models................ 1.9 lbs (0.9 kg)

Shipping weight .... 6 lbs (3 kg)

Vibration.. ISTA 1A in carton (International Safe Transit Association)

Regulatory compliance

       Safety................................... CE, CUL, UL

       EMI/EMC .... CE, C-tick, FCC Class A, ICES, VCCI

       Accessibility .... Complies with the appropriate requirements of Section 508 of the
                                          Rehabilitation Act (29U.S.C.794d).

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.*

Specifications — MLC 104 Plus

Control — host ports

Serial host port.............................. 1 bidirectional RS-232 front panel 2.5 mm mini stereo jack

Baud rate and protocol................. 38400, 8 data bits, 1 stop bit, no parity

Serial control pin configurations. Mini stereo jack: tip = TX, ring = RX, sleeve = GND

Secondary control panel (SCP).... (1) 3.5 mm 5-pole direct insertion captive screw connector

Program control............................ Extron's Global Configurator for Windows®, version 2.5 or later
Extron's Simple Instruction Set (SIS™)

IR learning frequencies................. 30 kHz to 62 kHz

IR learning distance .... 2" (5.1 cm) to 12" (30.5 cm) from the top panel

Control — serial ports

Display control port...................... (1) 3.5 mm direct insertion captive screw connector, 3 pole, for bidirectional
RS-232 control (± 5V)

Switcher control port.................... (1) 3.5 mm direct insertion captive screw connector, 3 pole, for bidirectional
RS-232 control (±5 V)

Baud rate and protocol (RS-232) . 115200 to 300 baud (9600 baud = default); 8 (default) or 7 data bits; 1(default)
or 2 stop bits; no parity (default), or even or odd parity

Control — IR port

IR control port............................... (1) 3.5 mm direct insertion captive screw connector, 2 pole
TTL level (0 to 5 V) infrared control up to 1 MHz

Digital I/O control

Number/type .... 3 digital input/output (configurable)

Connector .... (1) 3.5 mm direct insertion captive screw connector, 4 pole

Pin configuration........................... 1, 2, 3 = digital inputs/outputs 1, 2, and 3; GND = GND

Digital inputs

    Input voltage range........... 0-12 VDC

    Input impedance .... 28k ohms

    Programmable pullup ...... 2k ohms to +5 VDC

    Threshold low to high ...... >2.8 VDC

    Threshold high to low ...... <2.0 VDC

Digital outputs.............................. 250 mA sink from 24 VDC, maximum

General

External power supply .... 100 VAC to 240 VAC, 50/60 Hz, external; to 12 VDC, 1 A, regulated

Power input requirements........... 12 VDC, 0.285 A (0.305 A if used with an optional IRCM-DV+)

NOTE *An MLC 104 Plus controller must be powered by its own power supply. It cannot be powered by an
MLS switcher.*

Temperature/humidity................ Storage: -40 to +158 °F (-40 to +70 °C) / 10% to 90%, noncondensing
Operating: +32 to +122 °F (0 to +50 °C) / 10% to 90%, noncondensing

Cooling .... Convection, unvented

Mounting

    Rack mount .... Yes, with optional rack mounting kits

    Wall mount........................ Yes, wall- and furniture-mountable with optional mounting kits

Enclosure type .... Metal faceplate, metal rear enclosure

Reference Material, cont'd

Enclosure dimensions

      MLC 104 Plus faceplate .... 4.5" H x 4.6" W x 0.1" D (11.4 cm H x 11.7 cm W x 0.3 cm D) (2 gang)

      Device .... 2.7" H x 3.4" W x 1.8" D (6.9 cm H x 8.6 cm W x 4.6 cm D)
                                    (Depth excludes knob and buttons. Fits some 2 gang boxes. Allow at least
                                    1.9" [4.8 cm] depth in the wall or furniture.)
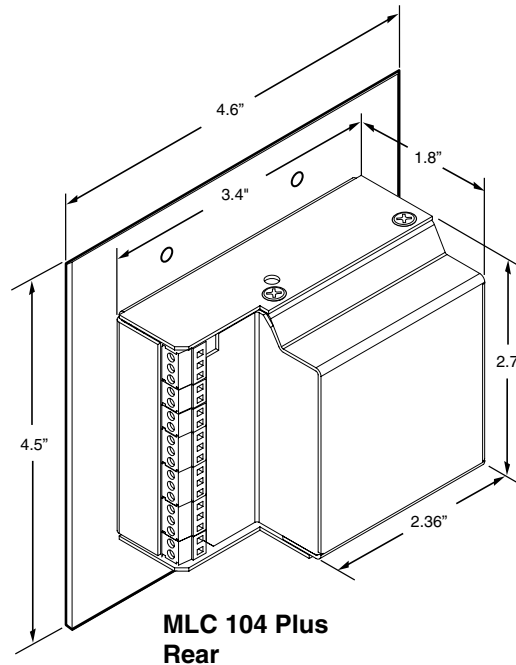
**MLC 104 Plus
Rear**

Product weight .... 1.9 lbs (0.9 kg)

Shipping weight .... 6 lbs (3 kg)

Vibration .... ISTA 1A in carton (International Safe Transit Association)

Regulatory compliance

      Safety .... CE, CUL, UL

      EMI/EMC .... CE, C-tick, FCC Class A, ICES, VCCI

      Accessibility .... Complies with the appropriate requirements of Section 508 of the
                                      Rehabilitation Act (29U.S.C.794d).

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

Controllers

Model	Part number
MLC 104 IP Plus (black and white, RAL9010 white)	60-818-03, -05
MLC 104 IP Plus AAP (black, white, RAL9010 white)	60-818-12, -13, -15
MLC 104 IP Plus L (black, white, RAL9010 white)	60-818-32, -33, -35
MLC 104 IP Plus DV+ (includes 1 black faceplate *and* 1 white faceplate)	60-818-82
MLC 104 Plus (brushed aluminum)	60-1014-04

Included parts

These items are included in each order for an MLC 104 Plus Series controller:

Included parts	Replacement part number
12 VDC, 1 A external power supply	70-775-01
Button labels (text)	33-954-01
Button labels (symbols/icons/pictures)	33-955-01
MLC 104 Plus Series Setup Guide	
2-gang MR Series mud ring/mounting brackets (black, white) — for MLC 104 IP Plus with faceplate or MLC 104 Plus	70-519-22, -23
4-gang MR Series mud ring/mounting brackets (black, white) — for MLC 104 IP Plus AAP, MLC 104 IP Plus DV+	70-519-42, -42
ESD grounding kit (included only for models with metal faceplates: MLC 104 Plus, MLC 104 IP Plus L, MLC 104 IP Plus AAP)	
Extron Software Products Disc A	

Accessories

These items can be ordered separately:

Adapters, power supplies, cables, labels	Part number
9-pin D to 2.5 mm stereo mini TRS RS-232 cable (3') (CFG Cable)	70-335-01
6' (1.8 m)CAT 5 crossover patch cable (NETXC M-M) with male RJ-45 connectors	26-591-01
UC50' (50', 15 m) universal projector control cable	26-518-01
MLC PW/RS-232/VC-35' power/switcher communications/MPA volume control cable	26-626-06, -15, -50
Button labels (International/multilingual text)	33-956-01
Button cap and diffuser kit (set of 3 button cap assemblies)	70-352-01

Reference Material, cont'd

Faceplates and frames	Part number
MLM 104 2GWP (black and white pair of faceplates)	70-378-02
MLM 104 4GWP (black, white)	70-379-02, -03
MLM 104 6GWP (black)	70-355-02
MLM 104 L (black, white)	70-357-02, -03
MLM 104 LAAP (black, white)	70-358-02, -03
MLM 104 MK (black, white)	70-357-22, -23
UCM RAAP (black, white)	70-344-02, -03

Electrical/mounting boxes	Part number
EWB 104 four gang external wall box (black, white, RAL 9010 white)	60-455-02, -03, -05
EWB 106 six gang external wall box (black, white, RAL 9010 white)	60-688-02, -03, -05
SMB 102 two gang surface mount box (black)	60-640-02
SMB 104 four gang surface mount box (black)	60-642-02

Control accessories	Part number
IR Emitter and shield kits (single, dual)	70-283-01, -02
IR Link IR signal repeater (black, white, RAL9010 white)	60-404-02, -03, -05
IRL 20 IR signal repeater	60-580-01
IR Sensor remote IR receiver	70-223-01
IR 402 remote control	70-207-01
IPA T RLY4 IP Link accessory with four relays	60-545-03
SCP 104 (black, white, RAL9010 white, or no faceplate)	60-672-02, -03, -05, -00
SCP 104 AAP (black, white, RAL9010 white)	60-672-12, -13, -15
SCP 104 L (black, white, RAL9010 white)	60-672-32, -33, -35
MLA-VC10 volume controller	60-502-01
MPA 122 two channel, 22 watt, mini power amplifier	60-668-01
IRCM-VCR (black, white, RAL9010 white)	70-148-02, -03, -05
RCM-SC (black, white, RAL9010 white)	70-183-02, -03, -05
IRCM-DV+ (black, white, RAL9010 white)	70-220-02, -03, -05
CM-3BLB (black, white, RAL9010 white)	70-493-02, -03, -05
CM-9BLB (black, white, RAL9010 white)	70-494-02, -03, -05
CM-19AC (black, white, RAL9010 white)	70-556-02, -03, -05
CM-5BB (black, white, RAL9010 white)	70-185-02, -03, -05
CM-20BB (black, white, RAL9010 white)	70-205-02, -03, -05

Switchers	Part number
MLS 100 Series switcher (MLS 100 A, MLS 102 VGA, MLS 103 SV, MLS 103 V)	60-497-01, -04, -03, -02
MLS 304MA, MLS 304SA switcher	60-550-01, -02
MLS 406, MLC 406MA, MLS 406SA switcher	60-560-01, -02, -03
MLS 506, MLS 506 MA 70 V, MLS 506 MA 100 V, MLS 506SA switcher	60-386-02, -03, -13, -04

Glossary

10/100Base-T is Ethernet which uses unshielded twisted pair (UTP - CAT 5, etc.) cable, where the amount of data transmitted between two points in a given amount of time is equal to either 10 Mbps or 100 Mbps.

ARP (Address Resolution Protocol) is a protocol which assigns an IP address to a device based on the device's MAC or physical machine address.

Custom Web page is any file that can be loaded into an MLC 104 IP Plus and served by the MLC's internal Web server. The MLC 104 IP Plus functions like a little computer with a Web server—you can use it for various Web-based tasks. The Web page provides a way to control the MLC and other devices attached to it without use of the software. This is true with or without an accompanying event script. Any number and size of graphics can be used. If they are too large to fit in the MLC 104 IP Plus' nonvolatile memory, you can create Web pages so that they can be served from another Web server. If you install Microsoft Internet Information Services (IIS) on your desktop, you can serve any page on its hard disk.

DHCP (Dynamic Host Configuration Protocol) is a standardized communications protocol that enables network administrators to locally and automatically manage the assignment of IP addresses in an organization's network.

Driver is a software package that controls the interface between the controller and peripheral devices.

Ethernet is a network protocol that uses MAC addresses instead of IP addresses to exchange data between computers. Using ARP (see above) with TCP/IP support, Ethernet devices can be connected to the Internet. An Ethernet LAN typically uses unshielded twisted pair (UTP) wires. Ethernet systems currently provide transmission speeds of 10 Mbps or 100 Mbps.

Event script is a program that controls an MLC 104 IP Plus. Event scripts are written in the "Extron C" language (.sc), and compiled into a machine-readable event script file (.evt). The Global Configurator program performs this compilation and uploads the compiled event file onto the MLC 104 IP Plus. The Extron C language is similar to ANSI C, with some differences. As long as event scripts are turned on, they run continuously on the unit.

HTTP (HyperText Transfer Protocol) is a Web protocol based on TCP/IP that is used to fetch HyperText objects from remote Web pages.

IP (Internet Protocol) is the protocol or standard used to send information from one computer to another on the Internet.

Reference Material, cont'd

IP address is a unique, 32-bit, binary number (12 digit decimal number, xxx.xxx.
xxx.xxx) that identifies each device or device port (an information sender
and/or receiver) that is connected to a LAN, WAN, or the Internet. IP
addresses can be static (see static IP) or dynamic (see DHCP).

IP net mask/subnet mask — See subnet mask.

IRCM (Infrared Control Module) is a type of Extron keypad used with MediaLink
Controllers (MLCs) and system switchers. IR commands for source devices
(VCRs, DVD players, receivers) can be stored in the MLC or switcher. After
setup, pressing a button on the IRCM causes the controller or switcher to
send a command to the source device.

MAC (Media Access Control) Address is a unique hardware number given
to devices that connect to a network such as the Internet. When your
computer or networking device (router, hub, interface, etc.) is connected to
a LAN or the Internet, a table (see ARP) relates the device's IP address to its
corresponding physical (MAC) address on the LAN.

Ping is a utility/diagnostic tool that tests network connections. It is used to
determine if the host has an operating connection and is able to exchange
information with another host. The term (ping) is a reference to submarine
sonar, which sends out a signal and waits to hear it echo ("ping") back from a
submerged object, much like how the ping utility functions in a network.

Port number is a preassigned address within a server that provides a direct route
from the application to the transport layer or from the transport layer to the
application of a TCP/IP system.

Section 508 is a portion of the United States Rehabilitation Act (29 U.S.C. 794d)
that requires Federal agencies to meet specific accessibility standards when
buying, developing, maintaining, or using information and multimedia
technology. This law was enacted to eliminate barriers in access for people
with disabilities and to encourage development of technologies that will help
achieve these goals. Visit www.extron.com to see how the MLCs comply
with Section 508.

SSI (server side include) is a type of HTML instruction set that tells the MLC
(or some other Web server) dynamically which material to include in the
contents of a Web page or e-mail. SSI files typically have a file extension of
.shtml.

Static IP refers to an IP address that has been specifically (instead of dynamically—
see DHCP above) assigned to a device or system in a network configuration.
This type of address requires manual configuration of the actual network
device or system and can only be changed manually or by enabling DHCP.

Subnet — See **subnetwork**.

Subnet address is the portion of an IP address that is specifically identified by the
subnet mask as the subnetwork.

Subnet mask is a 32-bit binary number (12 digit decimal number, xxx.xxx.xxx.
xxx) used on subnets (smaller, local networks) to help routers determine
which network traffic gets routed internally (within the subnetwork) to local
computers and which network traffic goes out to the rest of the network or
the Internet. It is an address mask used to identify the bits of an IP address
that are used for the subnet address. Using a mask, the router does not need
to examine all 32 bits, only those selected by the mask.

Subnetwork is a network that is part of a larger IP network and is identified by a
subnet address. Networks can be segmented into subnetworks to provide a
hierarchical, multilevel routing structure.

Switcher slaving is an old term sometimes used to indicate that a device such as the MLC or a main switcher unit is being used to control one or more A/V switchers.

Switching rotation is a term for the set of buttons that are controlled by the firmware. This is a mutually exclusive set of buttons controlled by firmware (not scripts) that causes an input switching SIS command (1!, 2!, 3!, and so forth) to be sent via the MLS port when each button is pressed. In Global Configurator, setting a button for input button mode is the same as designating that button as part of the switching rotation.

TCP (Transmission Control Protocol) is a connection-oriented protocol defined at the Transport layer of the OSI reference model. It provides reliable delivery of data.

TCP/IP (Transmission Control Protocol/Internet Protocol) is the communication protocol of the Internet. Computers and devices with direct access to the Internet are provided with a copy of the TCP/IP program to allow them to send and receive information in an understandable form.

Telnet is a standard terminal emulation utility/protocol that allows a computer to communicate with a remote user/client. A user who wishes to access a remote system initiates a Telnet session using the address of the remote client. The user may be prompted to provide a user name and password if the client is set up to require them. Telnet enables users to log in on remote networks and use those resources as if they were locally connected.

Tool tip is text that appears when the mouse pointer hovers over a button or other item on screen.

UDP (User Datagram Protocol) is an Internet protocol for sending short packets of information quickly between networked devices. It is faster than TCP and is often used for broadcast and multicast communication, but it does not include data verification to ensure that all packets arrived at their destination.

URL (Uniform Resource Locator) is the address (such as *www.extron.com*) that lets a resource on the internet be identified, located, and accessed.

Verbose refers to a wordy way of speaking. For the MLC and other IP-enabled products, verbose mode is a communication mode in which the device responds with more information than it usually would—more than the device, itself, needs to send. Verbose mode is usually enabled for

Reference Material, cont'd

troubleshooting and disabled for daily use. Verbose mode creates more network traffic than usual and can slow down performance.

File Types: a Key to Extron-specific File Names

You must have a basic understanding of the types of files used by this MLC controller in order to decide what (if anything) to do with them.

___.cdc — These are compressed device configuration files created and used by Global Configurator.

CAUTION   *___.cdc files should NOT be deleted.*

___.eir — These are driver files containing infrared commands. There is a separate ___.eir file for each device the MLC controls via infrared communication. This is the type of file created during IR learning. Via Global Configurator, these files can be imported and associated with one of the controller's IR/ Serial ports.

___.eml — E-mail template files have the .eml extension. These files are used to generate e-mail messages such as those regarding projector disconnection and excessive projector lamp hours. The first line of the file is the subject. The rest of the file contains the body of the e-mail. For the MLC 104 IP Plus, these files are numerically named (1 through 64). For example, *1.eml*, *2.eml*, *3.eml,... 64.eml*.

___.evt — These are event files, the most important files for the functioning of the MLC. Almost everything the MLC does is coordinated by the scripts in the main event file, *0.evt*. The other event files perform device driver functions. When the Windows-based configuration program creates event files, it names (numbers) the files according to port associations. For example, the main event file, 0.evt, contains instructions for the MLC's internal operations, while 2.evt is related to the Display port.

CAUTION   *Event files should NOT be deleted. They are necessary for the MLC's operation. Never delete the main event file (0.evt).*

_____.gc2 or _____.gcz — These are configuration files that are used by Global Configurator only, not by the MLC. They contain configuration settings that must be processed by Global Configurator to create device configuration and event files for the MLC.

_____.s19 — This is an Extron-supplied firmware update file. When the firmware is replaced, the MLC is also automatically reset to factory default settings. This file is not displayed on the File Manager page. See appendix B for details on firmware updates. Firmware can't be updated by loading an ___.s19 file through the file manager.

Cut-out Templates

This section includes templates for the MLC 104 IP Plus/MLC 104 Plus, MLC 104 IP Plus AAP, MLC 104 IP Plus DV+, MLC 104 IP Plus L; and for the MLM 104 LAAP and MLM 104 6GWP faceplates. Templates for MLM 104 IP Plus Series faceplates are available in the *MLM 104 Faceplates Installation Guide*, which you can download from http://www.extron.com.

NOTE *The solid lines on the templates define the cut-out area, not the dashed line.*

Cut-Out Template for Extron's
MLC 104 Plus & MLC 104 IP Plus

4.60" (11.68 cm)

Top Panel

3.50" (8.90 cm)

4.50"
(11.43 cm)

2.8"
(7.1 cm)

SURFACE CUT-OUT AREA FOR FURNITURE MOUNT

Location of
MLC 104 Plus and
MLC 104 IP Plus

To install the MLC 104 Plus and MLC 104 IP Plus directly into furniture, cut along this line.

TEMPLATE IS **NOT** FULL SIZE.

Cut-Out Template for Extron's

MLC 104 IP Plus AAP
MLC 104 IP Plus DV+

4.50" (11.43 cm)

2.8" (7.1 cm)

8.23"
(20.9 cm)

Location of MLC 104 IP Plus

To install the MLC 104 IP Plus AAP/DV+ directly into furniture, cut along this line.

7.1"
(18.0 cm)

Top Panel

SURFACE CUT-OUT AREA FOR FURNITURE MOUNT

NOTE *The solid lines on the templates define the cut-out area, not the dashed line.*

TEMPLATE IS **NOT** FULL SIZE.

Cut-Out Template for Extron's
MLC 104 IP Plus L

3.15" (8.0 cm)

Top Panel

2.8" (7.1 cm)

**SURFACE CUT-OUT AREA
FOR FURNITURE MOUNT**

6.50"
(16.5 cm)

Location of MLC 104 IP Plus

**3.50"
(8.9 cm)**

NOTE *The solid lines on the templates define the cut-out area, not the dashed line.*

**To install the MLC
104 IP Plus L
directly into furniture,
cut along this line.**

.250" (.64 cm)

.295" (.75 cm)

TEMPLATE IS **NOT** FULL SIZE.

Cut-Out Template for Extron's
MLM 104 LAAP

3.15" (8.0 cm)

2.8" (7.1 cm)

Top Panel

10"
(25.4 cm)

Location of MLC 104 IP Plus

7.9"
(20.0 cm)

**SURFACE CUT-OUT
AREA FOR
FURNITURE MOUNT**

**To install the MLC 104 IP Plus
and MLM 104 LAAP
directly into furniture,
cut along this line.**

NOTE *The solid lines
on the templates
define the cut-
out area, not the
dashed line.*

.250" (.64 cm)

.295" (.75 cm)

TEMPLATE IS **NOT** FULL SIZE.

Cut-Out Template for Extron's
MLM 104 6GWP

4.5" (11.43 cm)

2.8" (7.1 cm)

Top Panel

Location of
MLC 104 IP Plus

11.75"
(29.85 cm)

11.0"
(28 cm)

To install the
MLM 104 6GWP
directly into furniture,
cut along this line.

SURFACE CUT-OUT
AREA FOR
FURNITURE MOUNT

NOTE *The solid
lines on the
templates
define the
cut-out
area, not the
dashed line.*

TEMPLATE IS **NOT** FULL SIZE.

Reference Material, cont'd

Appendix B

Firmware Updates

Determining the Firmware Version

Updating the Main Firmware

Firmware Updates

If the need arises, you can replace the Extron MLC controller's main firmware without opening the unit or changing firmware chips.

Determining the Firmware Version

There are several ways to check which version of firmware the controller is using:

- the IP Link Settings tab within Extron Global Configurator software
- the System Status or the System Settings page of the controller's embedded Web pages (for IP models)
- the Info page of GlobalViewer® Web pages (if installed on an IP model controller)
- the Version column within Extron IP Link® Device Manager software
- the response from the MLC to an SIS command of 1Q or 0Q (See chapter 5.)

Using the Global Configurator software

1. Via RS-232 or Ethernet, connect a PC (on which the Global Configurator program has been installed) to the MLC.

2. Start the Global Configurator (GC) program and open a project. (See the *MLC 104 Plus Series Setup Guide* and chapter 4 of this manual for details.)

3. In the window on the left side of the GC screen, click on the name of the MLC for which you want to check the firmware level.

4. In the right side of the GC screen, click the **IP Link Settings** tab.

5. Click the **Refresh** button. The firmware version is listed in the System Description area.

Using a Web browser (IP models only)

The controller comes with a set of factory default embedded Web pages. Also, if the MLC controller is used as part of a network of devices based on Extron IP Link® technology, such as IP Link interfaces, the GlobalViewer application could be installed in the MLC as well as in other IP Link devices within the network. Refer to the Global Configurator help file for information on how to use that software and the resulting Web pages.

1. Connect the controller to a PC via an Ethernet connection, or connect the controller and the PC to a network/LAN. See chapters 2 and 4 of this manual and read the *MLC 104 Plus Series Setup Guide* for details.

2. Start a Web browser program (such as Microsoft® Internet Explorer® or Netscape® Navigator®).

3. Type the MLC's IP address into the browser's address area and log on to the MLC's internal Web page (see chapter 4) or to the optional GlobalViewer Web page stored in the MLC. (See the Global Configurator help file for details.)

NOTE   *If GlobalViewer is installed in the MLC, the GlobalViewer Web pages appear by default.*

- *GlobalViewer Web pages are supported by Internet Explorer, but not by other browsers. GlobalViewer features may not work properly when viewed via Navigator, Mozilla® Firefox®, or other browser programs.*

- *To reach the factory default Web pages on a controller that has been set up for GlobalViewer, type* **http://**<IP address>**/nortxe_index.html** *into the browser's address area, substituting the unit's actual IP address for "<IP address>". For example,* http://10.13.196.42/nortxe_index.html.

4. In the factory default Web pages, select the **Status** tab, **System Status** page. The firmware version is listed in the System Description area of the System Status area, as shown below.
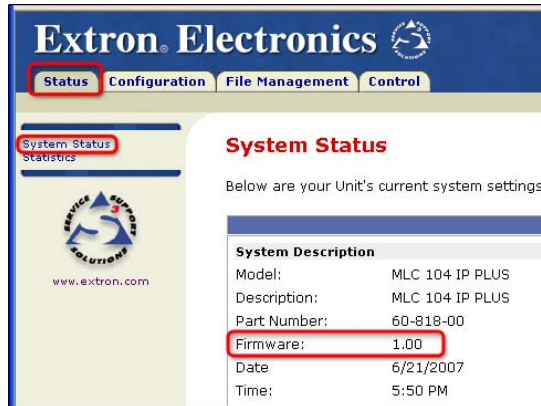
Or select the **System Settings** page within the **Configuration** tab. The firmware version is listed in the IP Settings area, as shown below.
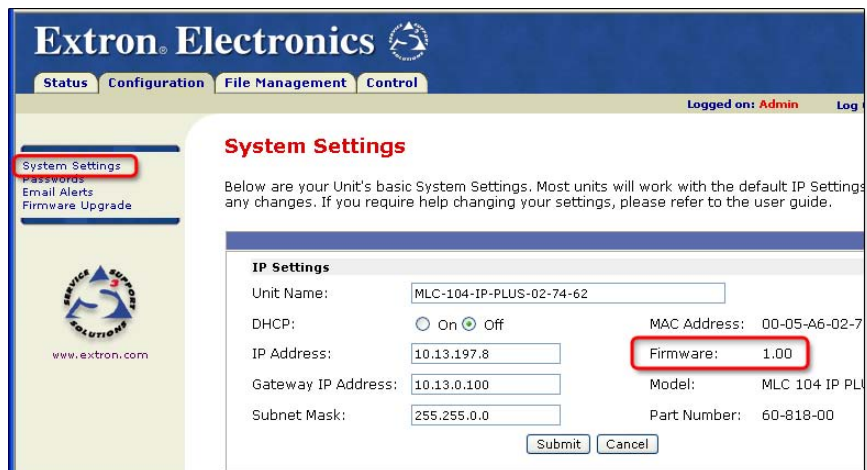
If using the GlobalViewer pages, click on the **Type** button and click on the **MediaLink Controller** folder. The firmware version is listed in the System Description area, as shown in the following picture.
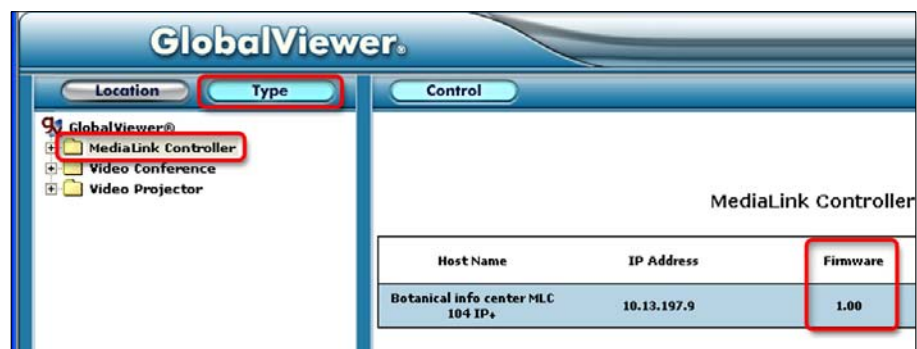
Updating the Main Firmware

Most firmware upgrade tools (except Extron Firmware Loader) require the PC and the controller to both be connected to an Ethernet network. Firmware Loader offers the option to use either an IP or an RS-232 connection for the firmware upgrade.

The instructions for each method of updating the MLC's firmware assume you have installed the appropriate software on your PC first.

NOTE *Because the MLC must be reset after a firmware update, the existing configuration will be erased. You should save the existing configuration to a file (see chapter 3) before replacing the firmware. If the file is saved, the configuration can be restored to the MLC later using Global Configurator.*

NOTE *Check the Extron Web site (www.extron.com) for firmware-related documents, instructions, patch files, and new firmware files before loading new firmware into the controller. We recommend that you read the firmware release notes (available from www.extron.com) before beginning the firmware update.*

Locating and downloading the firmware

1. Visit the Extron Web site (www.extron.com) to find the latest, appropriate firmware file (MLC 104 IP Plus, MLC 104 Plus) you want to update.

2. Download the executable installer file (*.exe) from the Web site and run the installer program. The program automatically stores the firmware file on the PC in **C:\Program Files\Extron\Firmware\MLC_104_IP_Plus\xx** (a folder specific to that version).

3. Write down the firmware filename and location for later use. The filename ends in *.s19* such as **MLC_104_IP_PLUS_19_1818_50_vxx_xxxx.s19** where xx_xxxx is the version number (xx.xxxx) or **MLC_104_IP_PLUS_19_1818_50_ Vx_xx.S19** where Vx_xx indicates the version number (x.xx).

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.*

Updating firmware via the MLC's embedded Web page (IP models)

Firmware uploads may be performed via a Web browser and the MLC's internal Web page. This method allows you to update one MLC at a time via an IP connection.

1. Download the firmware file.

2. Launch a Web browser (Microsoft Internet Explorer or Netscape Navigator) on the connected PC and type the controller's IP address in the address area.

3. If a password was previously set for the MLC, an Enter Network Password or Connect to... dialog box appears. Type the controller's IP address or text of your choice in the User Name area, type in the administrator password in the Password area, and click **OK**. The MLC's default Web page appears.

NOTE *Passwords must contain 4 to 12 alphanumeric characters. Symbols and spaces are not allowed, and the passwords are case-sensitive.*

3. Click on the **Configuration** tab, then select **Firmware Upgrade** from the list on the left of the screen. A screen like the one on the following page appears.

4. Click on the **Browse** button.
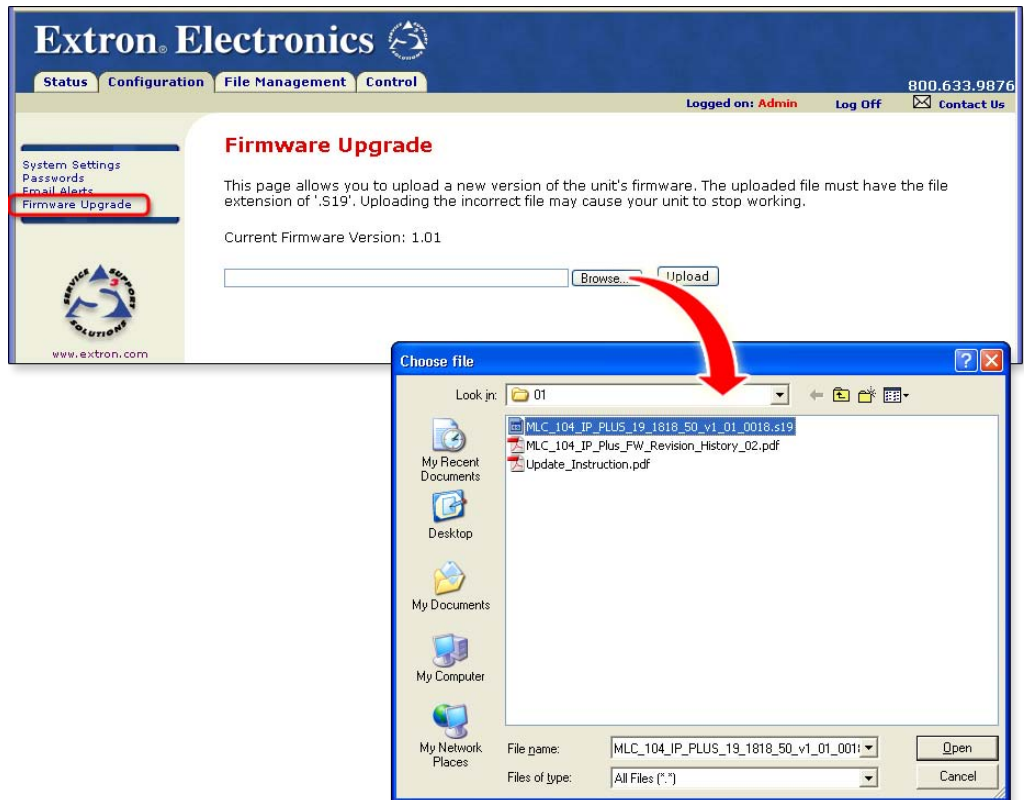
5. In the Choose file dialog box, locate and select the firmware file (*.s19) you downloaded to **C:\Program Files\Extron\Firmware\MLC_104_IP_Plus\xx**, and click the **Open** button.

6. Click on the Web page's **Upload** button to upload the firmware into the controller. It takes a while to load the file into the controller. You will not see any on-screen indication when the upload has finished. Once the firmware upload is completed, all the front panel buttons on the MLC and on any connected optional SCPs light/flash as the controller performs a reset.

7. Follow the instructions in "Resetting the MLC and restoring its configuration" later in this chapter.

Updating firmware via Extron Firmware Loader software

This method allows you to update one MLC at a time via either IP or RS-232 communication.

NOTE *The MLC 104 Plus requires Firmware Loader version 4.0 or higher.*

1. Download the firmware file.

2. Start the Firmware Loader (FWLoader, ⚒) software on the connected PC.

3. Choose the communication type and settings.

   a. For IP communication, select **TCP/IP** and set the communication settings. Enter the unit's IP address, verify or change the Telnet port number, and enter an administrator password if a password has been set for the unit.

NOTE *Passwords must contain 4 to 12 alphanumeric characters. Symbols and spaces are not allowed, and the passwords are case-sensitive.*

Firmware Updates, cont'd

      b. For serial communication, select **RS-232** and set the communications settings to 38400 baud, no parity, 8 data bits, 1 stop bit.

4. Click the **OK** button. A window like the one shown at right appears. It shows the firmware version currently used by the MLC.

5. Type in the filename and path of the new firmware file or click the **Browse** button to view folders to find the file. If you click **Browse**, the Choose Firmware File window (shown below) appears. Locate and select the firmware file, and click the **Open** button.
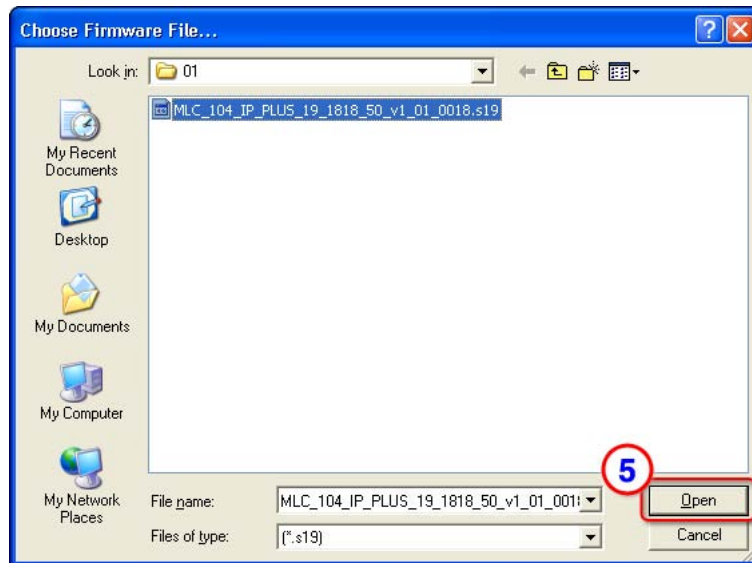
6. Click **Upload** in the Firmware Loader window. The PC uploads the new firmware into the MLC. Once the firmware is uploaded, the MLC resets itself and the front panel lights blink as they do during power-on. The Firmware Loader software displays the new firmware version, as shown at right.

7. Click **Exit** in that window, and click **Exit** in the Firmware Loader connections window.

8. Follow the instructions in "Resetting the MLC and restoring its configuration" later in this chapter.
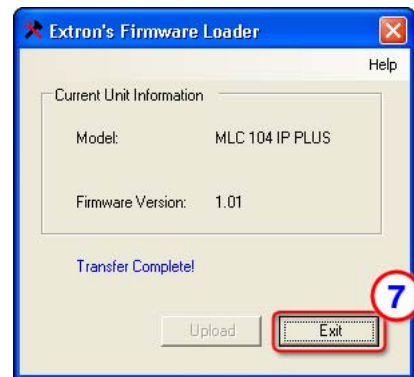
Updating firmware via Extron IP Link™ File Manager software (for IP models)

This is the **recommended method** for updating an MLC's firmware. It allows you to update one MLC or several MLCs at a time via an IP connection.

1. Download the firmware file.

2. Start the IP Link File Manager (IPLFileManager) software on the connected PC. The main IP Link File Manager window appears on screen, as does the smaller Select Startup Mode window, shown below at right.

3. Click one of the Select Startup Mode buttons to choose how to add MLCs to the firmware update list, and follow any on-screen instructions to add MLCs.

    •   Open Configuration File — Select this mode to open an existing configuration file.

    •   Import GC2.x Project **(recommended)** — Select this mode to import a GC2.x project file and the names and IP addresses of the devices in it.

    •   Manually Add IP Link Device(s) — Select this mode to add MLCs individually by IP address.

    •   Automatically Detect IP Link Device(s) — Select this mode to scan the network for IP Link devices, including MLCs. You may need to provide administrator passwords for some units.

    •   Use Previous Setup — Choose this to show IP Link devices from your previous session of IP Link File Manager.
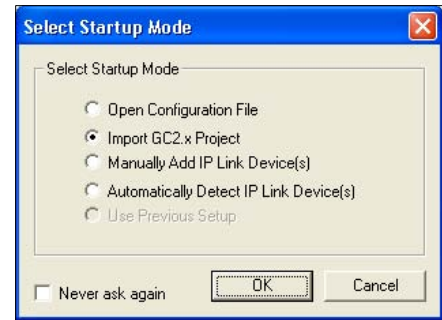
    Refer to the IP Link File Manager's help file if you need additional details on how to use any of those modes.

4. Click on the **Options** menu and select **Reset Device After Firmware Update**.
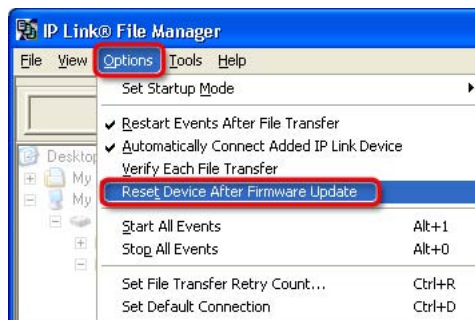
    This option causes the MLC to perform a ZY reset, which resets all device settings and deletes all files from the MLC after the firmware is updated. for ZY command details.

5. Click on the **Tools** menu and select **Firmware Update Manager**.

    The Firmware Update Manager window appears.

Firmware Updates, cont'd

6. Set the maximum number of firmware uploads that can take place at the same time. The firmware files are uploaded to batches of this many units at a time until all units listed in the Select Device list have received new files. The default is 5 uploads at a time, and the upper limit is the total number of units shown in the Select Device list.
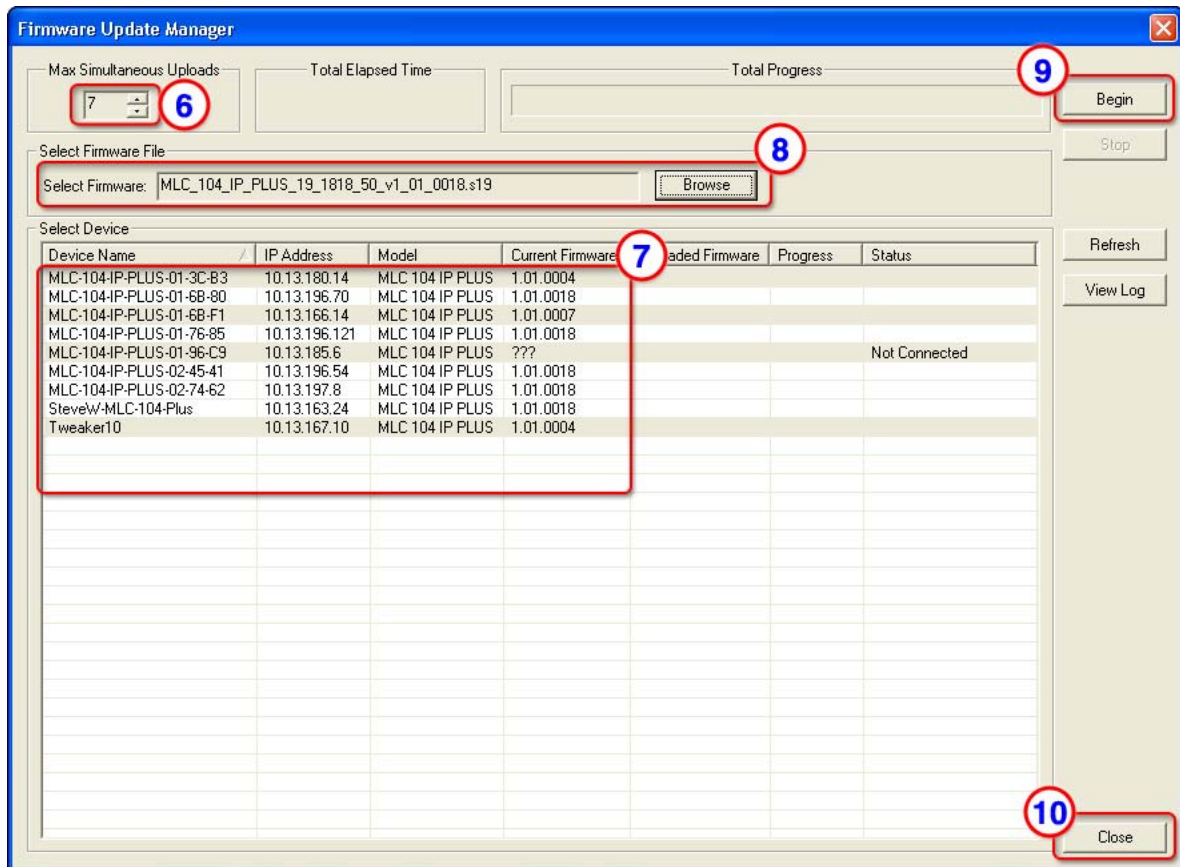
7. Select the MLCs for the firmware update.

    • Ctrl-click on the name(s) of the unit(s) to select (or deselect) more than one unit in the list.

    • Click on one unit's name and Shift-click on the name of another unit to select those two MLCs and the MLCs listed between them.

8. Click **Browse**, then locate and select the firmware file you downloaded.

9. Click **Begin**, then confirm that you want to start uploading the firmware. The software displays the progress and status of the firmware upload for each unit, then performs a firmware validation before finishing. If uploading fails, you can view the error log by clicking on **View Log**. If uploading is successful, the Status column indicates success for each unit.

10. Click **Close**.

11. Close the IP Link File Manager software.

12. Restore the MLC's configuration from a previously saved file.

Resetting the MLC and restoring its configuration

After a firmware update you must reset the unit. Resetting the MLC also removes configuration information, so replace the MLC's configuration after resetting.

1. Perform a ZY reset, which is an absolute system reset <u>excluding</u> IP settings (IP address, subnet mask, gateway IP address, unit name, DHCP settings, port mapping). This allows you to maintain communication with the MLC.

    • If using Telnet or HyperTerminal, enter [Esc] ZY ←.

    • If using a Web browser connection, enter W ZY |.

2. Using Global Configurator, restore (build) the previously saved project to the MLC.

Firmware Updates, cont'd

Appendix C

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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
U.S.A.

Japan: Extron Electronics, Japan
Kyodo Building, 16 Ichibancho
Chiyoda-ku, Tokyo 102-0082
Japan

Europe, Africa, and the Middle East:
Extron Europe
Hanzeboulevard 10
3825 PH Amersfoort
The Netherlands

China:
Extron China
686 Ronghua Road
Songjiang District
Shanghai 201611
China

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

Middle East:
Extron Middle East
Dubai Airport Free Zone
F12, PO Box 293666
United Arab Emirates, Dubai

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.

Extron **USA - West**
Headquarters

+800.633.9876
Inside USA / Canada Only

+1.714.491.1500
+1.714.491.1517 FAX

Extron **USA - East**

+800.633.9876
Inside USA / Canada Only

+1.919.863.1794
+1.919.863.1797 FAX

Extron **Europe**

+800.3987.6673
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