User Guide

MediaLink® Controllers

MLC 104 IP Plus Series

MediaLink Controllers with Ethernet Control

Extron

68-1443-01 Rev. E
8 19

Safety Instructions

Safety Instructions • English

WARNING: This symbol, ⚠,when used on the product, 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.

ATTENTION: This symbol, ⚠, when used on the product, is intended to alert the user of important operating and maintenance (servicing) instructions in the literature provided with the equipment.

For information on safety guidelines, regulatory compliances, EMI/EMF compatibility, accessibility, and related topics, see the Extron Safety and Regulatory Compliance Guide, part number 68-290-01, on the Extron website, **www.extron.com**.

Sicherheitsanweisungen • Deutsch

WARNUNG: Dieses Symbol ⚠ auf dem Produkt soll den Benutzer darauf aufmerksam machen, dass im Inneren des Gehäuses dieses Produktes gefährliche Spannungen herrschen, die nicht isoliert sind und die einen elektrischen Schlag verursachen können.

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

Weitere Informationen über die Sicherheitsrichtlinien, Produkthandhabung, EMI/EMF-Kompatibilität, Zugänglichkeit und verwandte Themen finden Sie in den Extron-Richtlinien für Sicherheit und Handhabung (Artikelnummer 68-290-01) auf der Extron-Website, **www.extron.com**.

Instrucciones de seguridad • Español

ADVERTENCIA: Este símbolo, ⚠, cuando se utiliza en el producto, avisa al usuario de la presencia de voltaje peligroso sin aislar dentro del producto, lo que puede representar un riesgo de descarga eléctrica.

ATENCIÓN: Este símbolo, ⚠, cuando se utiliza en el producto, avisa al usuario de la presencia de importantes instrucciones de uso y mantenimiento recogidas en la documentación proporcionada con el equipo.

Para obtener información sobre directrices de seguridad, cumplimiento de normativas, compatibilidad electromagnética, accesibilidad y temas relacionados, consulte la Guía de cumplimiento de normativas y seguridad de Extron, referencia 68-290-01, en el sitio Web de Extron, **www.extron.com**.

Instructions de sécurité • Français

AVERTISSEMENT : Ce pictogramme, ⚠, lorsqu'il est utilisé sur le produit, signale à l'utilisateur la présence à l'intérieur du boîtier du produit d'une tension électrique dangereuse susceptible de provoquer un choc électrique.

ATTENTION : Ce pictogramme, ⚠, lorsqu'il est utilisé sur le produit, signale à l'utilisateur des instructions d'utilisation ou de maintenance importantes qui se trouvent dans la documentation fournie avec le matériel.

Pour en savoir plus sur les règles de sécurité, la conformité à la réglementation, la compatibilité EMI/EMF, l'accessibilité, et autres sujets connexes, lisez les informations de sécurité et de conformité Extron, réf. 68-290-01, sur le site Extron, **www.extron.com**.

Istruzioni di sicurezza • Italiano

AVVERTENZA: Il simbolo, ⚠, se usato sul prodotto, serve ad avvertire l'utente della presenza di tensione non isolata pericolosa all'interno del contenitore del prodotto che può costituire un rischio di scosse elettriche.

ATTENTZIONE: Il simbolo, ⚠, se usato sul prodotto, serve ad avvertire l'utente della presenza di importanti istruzioni di funzionamento e manutenzione nella documentazione fornita con l'apparecchio.

Per informazioni su parametri di sicurezza, conformità alle normative, compatibilità EMI/EMF, accessibilità e argomenti simili, fare riferimento alla Guida alla conformità normativa e di sicurezza di Extron, cod. articolo 68-290-01, sul sito web di Extron, **www.extron.com**.

Instrukcje bezpieczeństwa • Polska

OSTRZEŻENIE: Ten symbol, ⚠, gdy używany na produkt, ma na celu poinformować użytkownika o obecności izolowanego i niebezpiecznego napięcia wewnątrz obudowy produktu, który może stanowić zagrożenie porażenia prądem elektrycznym.

UWAGI: Ten symbol, ⚠, gdy używany na produkt, jest przeznaczony do ostrzegania użytkownika ważne operacyjne oraz instrukcje konserwacji (obsługi) w literaturze, wyposażone w sprzęt.

Informacji na temat wytycznych w sprawie bezpieczeństwa, regulacji wzajemnej zgodności, zgodność EMI/EMF, dostępności i Tematy pokrewne, zobacz Extron bezpieczeństwa i regulacyjnego zgodności przewodnik, część numer 68-290-01, na stronie internetowej Extron, **www.extron.com**.

Инструкция по технике безопасности • Русский

ПРЕДУПРЕЖДЕНИЕ: Данный символ, ⚠, если указан на продукте, предупреждает пользователя о наличии неизолированного опасного напряжения внутри корпуса продукта, которое может привести к поражению электрическим током.

ВНИМАНИЕ: Данный символ, ⚠, если указан на продукте, предупреждает пользователя о наличии важных инструкций по эксплуатации и обслуживанию в руководстве, прилагаемом к данному оборудованию.

Для получения информации о правилах техники безопасности, соблюдении нормативных требований, электромагнитной совместимости (ЭМП/ЭДС), возможности доступа и других вопросах см. руководство по безопасности и соблюдению нормативных требований Extron на сайте Extron: , **www.extron.com**, номер по каталогу - 68-290-01.

安全说明 • 简体中文

警告: ⚠产品上的这个标志意在警告用户该产品机壳内有暴露的危险 电压，有触电危险。

注意: ⚠产品上的这个标志意在提示用户设备随附的用户手册中有重要的操作和维护(维修) 说明。

关于我们产品的安全指南、遵循的规范、EMI/EMF 的兼容性、无障碍使用的特性等相关内容，敬请访问 Extron 网站 , **www.extron.com**，参见 Extron 安全规范指南，产品编号 68-290-01。

安全記事 • 繁體中文

警告: ⚠若產品上使用此符號，是為了提醒使用者，產品機殼內存在著可能會導致觸電之風險的未絕緣危險電壓。

注意 ⚠ 若產品上使用此符號，是為了提醒使用者，設備隨附的用戶手冊中有重要的操作和維護（維修）說明。

有關安全性指導方針、法規遵守、EMI/EMF 相容性、存取範圍和相關主題的詳細資訊，請瀏覽 Extron 網站：**www.extron.com**，然後參閱《Extron 安全性與法規遵守手冊》，準則編號 68-290-01。

安全上のご注意 • 日本語

警告: この記号⚠が製品上に表示されている場合は、筐体内に絶縁されていない高電圧が流れ、感電の危険があることを示しています。

注意: この記号 ⚠ が製品上に表示されている場合は、本機の取扱説明書に記載されている重要な操作と保守(整備)の指示についてユーザーの注意を喚起するものです。

安全上のご注意、法規厳守、EMI/EMF適合性、その他の関連項目については、エクストロンのウェブサイト **www.extron.com** より『Extron Safety and Regulatory Compliance Guide』(P/N 68-290-01) をご覧ください。

안전 지침 • 한국어

경고: 이 기호 ⚠ 가 제품에 사용될 경우, 제품의 인클로저 내에 있는 접지되지 않은 위험한 전류로 인해 사용자가 감전될 위험이 있음을 경고합니다.

주의: 이 기호 ⚠ 가 제품에 사용될 경우, 장비와 함께 제공된 책자에 나와 있는 주요 운영 및 유지보수(정비) 지침을 경고합니다.

안전 가이드라인, 규제 준수, EMI/EMF 호환성, 접근성, 그리고 관련 항목에 대한 자세한 내용은 Extron 웹 사이트(**www.extron.com**)의 Extron 안전 및 규제 준수 안내서, 68-290-01 조항을 참조하십시오.

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. The Class A limits 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 interference. This interference must be corrected at the expense of the user.

NOTES:

- This unit was tested with shielded I/O cables on the peripheral devices. Shielded cables must be used to ensure compliance with FCC emissions limits.
- For more information on safety guidelines, regulatory compliances, EMI/EMF compatibility, accessibility, and related topics, see the **Extron Safety and Regulatory Compliance Guide** on the Extron website.

Battery Notice

This product contains a battery. **Do not open the unit to replace the battery.** If the battery needs replacing, return the entire unit to Extron (for the correct address, see the Extron Warranty section on the last page of this guide).

CAUTION: Risk of explosion. Do not replace the battery with an incorrect type. Dispose of used batteries according to the instructions.

ATTENTION : Risque d'explosion. Ne pas remplacer la pile par le mauvais type de pile. Débarrassez-vous des piles usagées selon le mode d'emploi.

Conventions Used in this Guide

Notifications

The following notifications are used in this guide:

WARNING: Potential risk of severe injury or death.

AVERTISSEMENT : Risque potentiel de blessure grave ou de mort.

CAUTION: Risk of minor personal injury.

ATTENTION : Risque de blessure mineure.

ATTENTION:

- Risk of property damage.
- Risque de dommages matériels.

NOTE: A note draws attention to important information.

TIP: A tip provides a suggestion to make working with the application easier.

Software Commands

Commands are written in the fonts shown here:

```
^AR Merge Scene,,Øp1 scene 1,1 ^B 51 ^W^C.Ø
[Ø1] R ØØØ4 ØØ3ØØ ØØ4ØØ ØØ8ØØ ØØ6ØØ [Ø2] 35 [17] [Ø3]
```

Esc X1 *X17* X20* X23* X21 CE ←

NOTE: For commands and examples of computer or device responses used in this guide, the character "**0**" is used for the number zero and "O" is the capital letter "o."

Computer responses and directory paths that do not have variables are written in the font shown here:

```
Reply from 208.132.180.48: bytes=32 times=2ms TTL=32
C:\Program Files\Extron
```

Variables are written in slanted form as shown here:

```
ping xxx.xxx.xxx.xxx –t
SOH R Data STX Command ETB ETX
```

Selectable items, such as menu names, menu options, buttons, tabs, and field names are written in the font shown here:

From the **File** menu, select **New**.

Click the **OK** button.

Specifications Availability

Product specifications are available on the Extron website, **www.extron.com**.

Extron Glossary of Terms

A glossary of terms is available at **http://www.extron.com/technology/glossary.aspx**.

Contents

Introduction

This section covers the following basic information you should know about this guide and the product before installation:

- **Before You Begin** — What this guide covers and does not cover, and what terms are used to refer to this product
- **About the MLC 104 IP Plus Series Controllers** — An overview of the product and its features
- **IR and RS-232 Device Control** — General information about IR and RS-232 control of other products
- **How the MLC 104 IP Plus Series Controllers Work: Components and Interactions** — A conceptual explanation of how it works
- **Optional Control Modules** — An overview of some of the control modules for the MLCs
- **System Requirements** — Computer and network system requirements for setting up an MLC

Before You Begin

This guide provides detailed information and best practices recommendations about cabling and configuring the Extron MLC 104 IP Plus Series MediaLink Controllers, and reference information about their dimensions, programming, and special applications.

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

Throughout this guide the various models in the MLC 104 IP Plus Series are also referred to as the "MLC 104 IP Plus," "MLC 104," "MLC," or "controller." Global Configurator software is also referred to as "GC," and the GlobalViewer application is sometimes referred to as "GV." In images of software or web pages, circled numbers correspond to the like-numbered procedural steps.

About the MLC 104 IP Plus Series Controllers

The MLC 104 IP Plus Series controllers are capable of controlling and monitoring a projector or other display device, source devices, switchers, and various other items such as lights, a projector lift, or a screen motor. They can be used in a distributed control system environment or as stand-alone controllers. They allow legacy products to be linked to and controlled via a network.

Features

General features

- **Flexible options for device control**
  - **Controlling the MLC** — All models offer front panel controls. The optional SCP 104 Series hard-wired control pads mirror the front panel controls on the MLC. The MLC can also be controlled via a computer using IP, RS-232, or digital I/O signals.
  - **Controlling other devices** — All models offer RS-232 and IR-based projector, display, and source control; digital I/O (digital input or output) controls; and RS-232 remote control of an Extron switcher. Additionally, the MLC 104 IP Plus_DV+ includes an IRCM-DV+ control module (for DVD and VCR control) installed in the faceplate.
- **A variety of mounting options** — The MLC can be mounted in furniture or a wall, in a lectern, or in a surface mount box, depending on the model and its faceplate. Optional faceplates are available for rack mounting the MLC.
- **Universal power system compatibility** — The MLC includes an external power supply that accepts 100-240 VAC, 50-60 Hz input.

Network and configuration features

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

The MLC integrates seamlessly with Extron GlobalViewer Enterprise (GVE) software and the free GlobalViewer web-based AV resource management and remote control application. Global Configurator and other useful software applications are available at **www.extron.com**.

Via Ethernet/IP communication you can access the MLC embedded web pages, which include online diagnostics and monitoring of basic control features. As an integrated part of the MLC, 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 GlobalViewer and user-supplied web pages, configuration settings, and device drivers. Data in flash memory is served at a transfer rate of 6 Mbits (megabits 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.
- **Built-in multilevel security** — The user controls access to the devices attached to the controller. Two levels of password protection (administrator and user) provide appropriate security.
- **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 devices connected to IP Link products such as the MLC.
- **E-mail notification** — The MLC 104 IP Plus can be set up to send e-mail notifications, such as a notice that a projector has been disconnected or the projector lamp has been used for a designated number of hours.

Controlling Other Devices

The MLC offers RS-232 and infrared (IR) control and monitoring, and control via digital input/output ports. It can learn IR signals from remote controls to communicate with sources such as VCRs and DVD players (see figure 1). Users can create their own device drivers (IR or RS-232) or go to the Extron website (**www.extron.com**) to obtain device drivers.

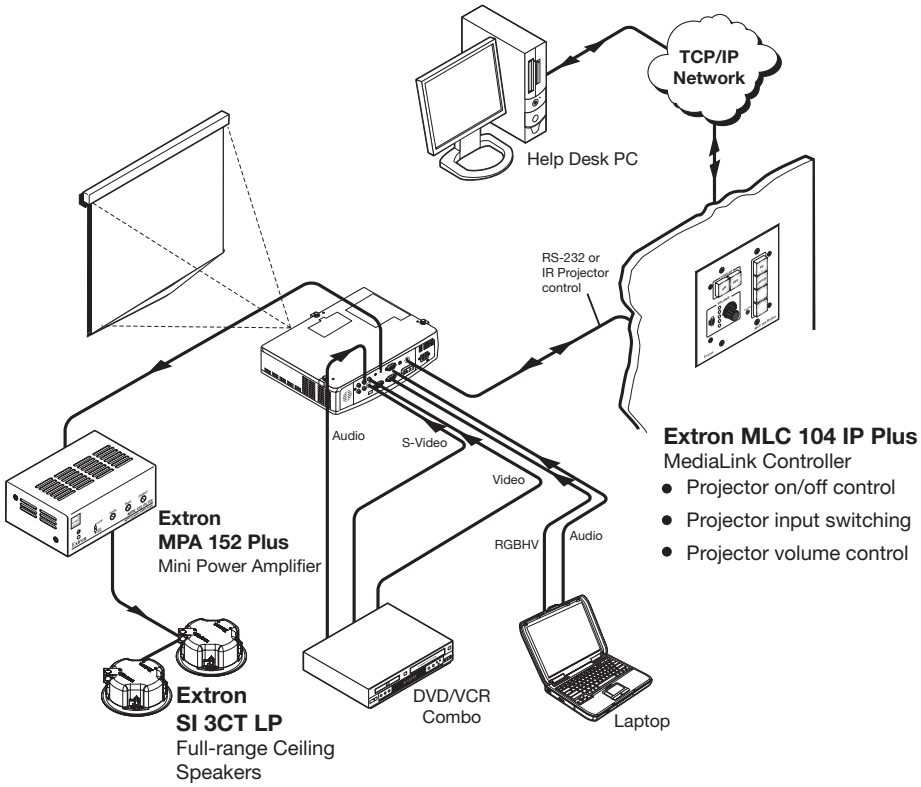


Figure 1. Typical MLC 104 IP Plus Series Application

IR and RS-232 Device Control

The MLC must be configured in one of the following ways before it sends commands to a projector, display, or source device:

- An IR or an RS-232 driver file can be installed from a disk, downloaded from the Extron website (**www.extron.com**), or downloaded from the extensive Extron driver library using the driver subscription feature within Global Configurator. The driver is saved to a folder and uploaded to the MLC via Global Configurator.
- RS-232 command strings can be entered directly from a host computer using Global Configurator.
- 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 in the rare cases when a driver is not already available from Extron.

See 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 device control commands.

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

Unlike the Extron MediaLink Controller (MLC 206 Series), the MLC 104 IP 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 a MLC 104 IP Plus Series controller works. The following diagram is an example of how the MLC interacts with accessories, event scripts, drivers, ports, input devices, and output devices.

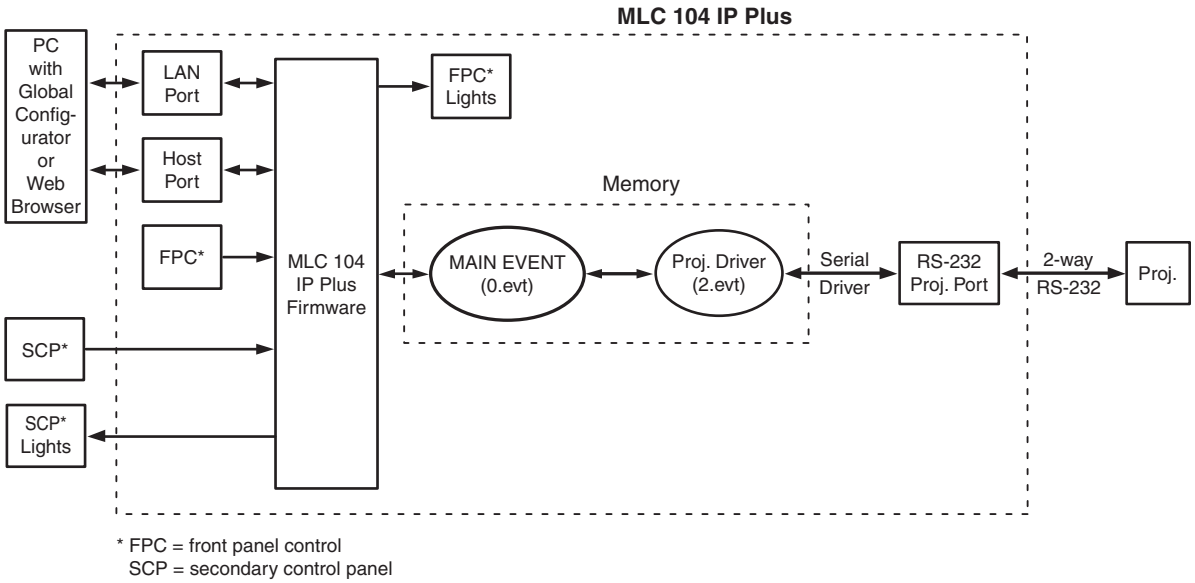


Figure 2. How the MLC Works

The MLC can be configured completely via Global Configurator software. Once you have set up how you want it to work (assigned drivers to ports, configured buttons and digital I/O ports, 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 operation of the MLC. The main event file also controls and monitors ports and optional control accessories, and also changes made at the front panel (known as FPC, front panel control).

Each button on the MLC and on any connected SCPs or control modules (IRCMs, CMs) 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 events and to generate actions (such as issuing commands and switching inputs) associated with the buttons.

Optional Control Modules

The MLC can “learn” IR commands from the remote control of a VCR, DVD, or other device, allowing you to create an IR driver file that can be incorporated into the MLC event scripts. A command can be associated with each of the buttons on an optional infrared control module (such as the Extron 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 (see figure 3). See the *Control Modules User’s Manual* and the *IRCM-DV+ Control Module User’s Manual* for installation details and see the *Global Configurator Help* file to learn about configuration. See the **special SIS commands for the IRCM-DV+** on page 101.

IR commands are transmitted from the Display RS-232/IR port and IR ports on the MLC (via IR Emitters) when the corresponding button is pressed on the front panel of the controller, SCP, or control module. See the *Control Modules User’s Manual*.

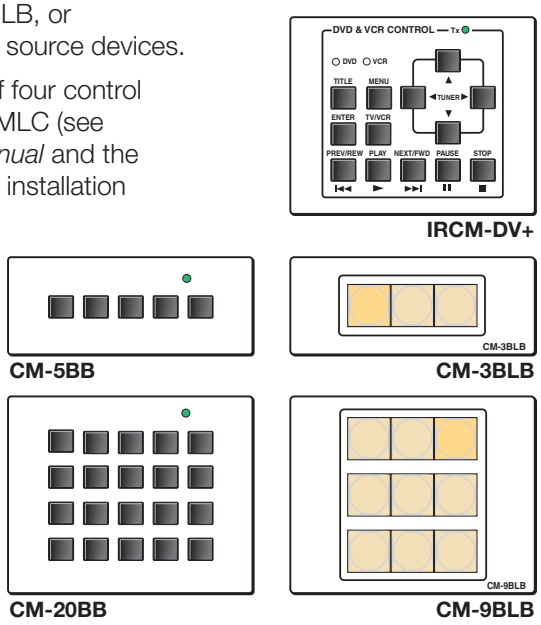


Figure 3. Optional IRCM and CM Control Modules

System Requirements

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

Hardware Requirements

	Global Configurator
Processor	Intel® Pentium® III, 1 GHz
RAM	512 MB
Available hard disk space	50 MB
A network connection with a minimum data transfer rate of 10 Mbps (100 Mbps is recommended)	

Software Requirements

NOTE: The MLC requires GC version 2.2 or higher.

	Global Configurator and GlobalViewer
Operating system	• Microsoft® Windows® XP, service pack 2 • Windows Vista® or • Windows 7 **ATTENTION:** • Do not run Global Configurator software on a PC that uses an earlier version of Windows. • Ne faites pas fonctionner le logiciel Global Configurator sur un ordinateur qui utilise une version plus récente de Windows.
Microsoft Windows Script	Version 5.6 or higher
Browser	Microsoft Internet Explorer® version 6.0 or higher with ActiveX® enabled

Operation, Features, and Cabling

This section includes the following elements:

- **Setup Checklist: How to Proceed With Installation** — A checklist of tasks to guide you through installation
- **UL and Safety Requirements** — General guidelines for safe product use
- **Installing or Replacing Button Labels** — Instructions for replacing the labels in front panel buttons
- **Front Panel Features and Operation** — Locations and descriptions of items on the front panel
- **IR Control** — A brief description of IR learning and IR remote control of the MLC
- **Panel Features and Cabling** — Locations, descriptions, and cabling notes for rear and side panel features and corresponding front panel indications
- **Resetting the Unit**— Information about the available reset modes and how to reset the MLC
- **Pinout Guides** — An example application diagram that can be used as a cabling and pin assignment reference

Setup Checklist: How to Proceed With Installation

Prepare

- ☐ Familiarize yourself with the features of the MLC.
- ☐ Download and install the latest version of the Extron Global Configurator (GC) software (version 2.2 or higher) and the latest driver package, and any additional software such as GlobalViewer Enterprise (GVE) or IR Learner (available from **www.extron.com** or the *Extron Software Products* disc).
- ☐ Obtain IP setting information from the network administrator for the MLC.
- ☐ Obtain model names and setup information for devices that the MLC controls.

Configure the MLC

- ☐ Connect the PC and the MLC to the same Ethernet network, power them on, and use Telnet, Extron DataViewer, or a similar application to configure the MLC for network communication.
- ☐ Create a new GC project and configure the MLC (see the *Global Configurator Help* file).
  - ☐ Set the IP address and subnet mask for the MLC, and other IP settings.
  - ☐ Define the GlobalViewer Tree location for the MLC.
  - ☐ Add the MLC to the project.
  - ☐ Define e-mail settings and contacts.
  - ☐ Add serial and IR device drivers.
  - ☐ Configure the ports (Projector/Display, igital I/O, and MLS) on the MLC and assign device drivers as needed.
  - ☐ Configure the front panel buttons.
  - ☐ Configure control module buttons
  - ☐ Create a display shutdown schedule.
  - ☐ If a projector is part of the system and if desired, create a display lamp hours notification e-mail.
  - ☐ Create a display disconnection notification e-mail.
  - ☐ Perform configurations for special applications, if needed.
  - ☐ Save the Global Configurator project/configuration.
  - ☐ Build and upload the configuration.

Perform Physical Installation

- ☐ Install or replace button labels.
- ☐ Connect the MLC to a network (LAN) and other devices (see **Operation, Features, and Cabling** starting on page 7 or see the “Setup” section of the *MLC 104 IP Plus Series Setup Guide*).
- ☐ Connect power cords and turn on the output devices (projectors, monitors, speakers), control products (such as projector lifts and screen controls), the MLC, a PC (if needed for testing or control), and input devices (DSS, cable boxes, and the like).
- ☐ Test the system.
- ☐ Mount the unit to an electrical box, wall, furniture, or rack and ground the unit (see **Mounting Instructions** on page 148).

UL and 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: Risk of electric shock or fire. To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

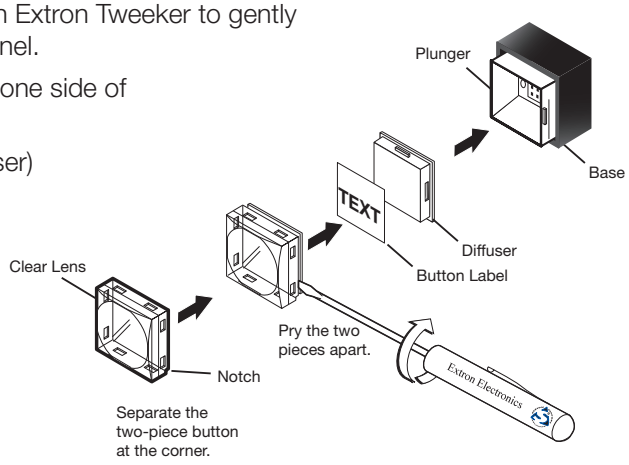
   AVERTISSEMENT : Risque de choc électrique ou d'incendie. Afin de réduire les risques d'incendie ou de choc électrique, protégez cet appareil de la pluie ou de l'humidité.

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 thunder storms or when it is 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 Listed junction box and faceplate. The end user or installer must furnish the junction box. It is not included with the MLC.
6. MLC 104 IP Plus series is only for use with UL Listed products.
7. Unused AAP openings are to be covered with a blank AAP panel(s).

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. Follow these steps to change the translucent button labels (see the image at right):

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.
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.



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. 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.
8. Align the tabs on the MLC button plunger with the notches on the diffuser plate. Gently but firmly press the reassembled button into place in the MLC or SCP front panel.
9. Repeat steps 1 through 8 as needed to relabel other buttons.

Front Panel Features and Operation

Front panel features are shown at right. Most of the features and LED indications are described and shown in the "Rear and Side Panel Features and Connections" section paired with the descriptions of the corresponding ports.

NOTE: The MLC must be set up in order to function. See **Software-based Configuration and Control** starting on page 34 and the *Global Configurator Help* file for information about Global Configurator, which you must use to set up the unit.

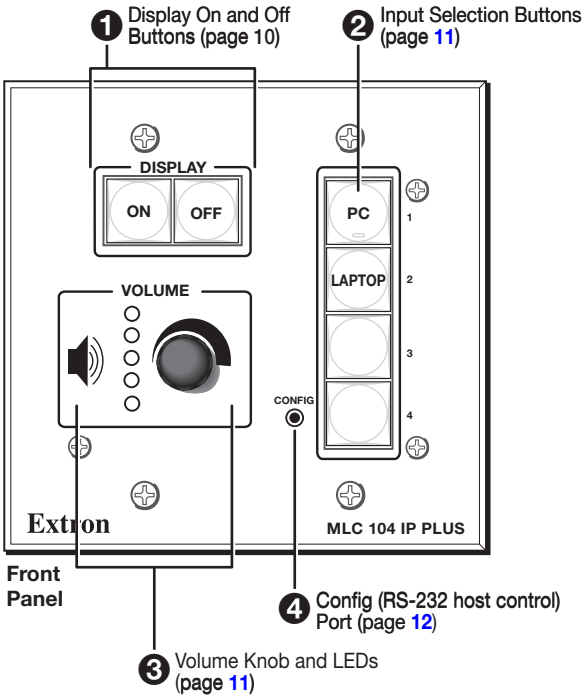


Figure 4. MLC 104 IP Plus Front Panel

Buttons

The **MLC 104 IP 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 an Extron SCP 104 keypad causes the functions of that button 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, or similar device)
- **A time delay operation**—insert delays between executed commands
- **A button light operation—**change the brightness, color, or flashing of a front panel button
- **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 (MLS RS-232 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. Through the Global Configurator (GC) software, other functions 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 or display commands upon the button **release** instead of on the button **press**.

❷ **Input selection buttons** — Each of these buttons, labeled 1 through 4, can be assigned several functions, depending on how the MLC is set up and what mode is active. Each button can be configured to control the digital inputs or outputs on the MLC, execute the IR or RS-232 commands of your choice, or trigger event scripts and/or port monitoring. See the *Global Configurator Help* file.

By default these buttons 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 SIS command (1!, 2!, 3!, 4!) and bidirectional communication via the MLS RS-232 port on the MLC. See the image at right.

Alternatively, the buttons can be reconfigured (via software) to select different inputs and to trigger different commands. See the **Software-based Configuration and Control** section starting on page 34 and the **SIS Programming and Control** section starting on page 69 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 and are not 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 an MLC is hosting a peripheral switcher.

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

Volume Control

❸ **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, or via RS-232/Telnet/web browser control.

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

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

- If the projector uses range adjustments, it can result in choppy audio level ramping (volume changing in jumps).
- If the projector uses incremental adjustments (volume up/down commands), it 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 volume knob command rate by using the **49# SIS command** (see the special function SIS table on page 106 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 LEDs on the MLC 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 following example.

Increment/Decrement-based Volume Adjustment

Configuration Port

❹ **Config (host control) port** — This port makes it possible to upload and configure device drivers via serial communication and also to initiate IR learning via a front panel connection after the MLC has been installed. Overall configuration requires the use of the rear panel LAN port.

CONFIG

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 or make your own cable. See page **16** for a wiring diagram and port protocol.

NOTES:

- 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, DataViewer, or a similar application, make sure the PC connected to these ports is set for 38400 baud.
- 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 panel lockout is enabled, no one can make changes using the buttons or volume knobs on the MLC front panel, SCPs, or control modules. When the front panel is locked, functions and adjustments can be made only via RS-232, Telnet, or web browser control. The **Simple Instruction Set (SIS™) command 3X** corresponds to and also enables this mode (see page 78). For details, see the **Operation, Features, and Cabling** section starting on page 7 and the **Software-based Configuration and Control** section starting on page 34. 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 MLC input buttons as a numeric keypad for PIN entry, as shown on page **14**.

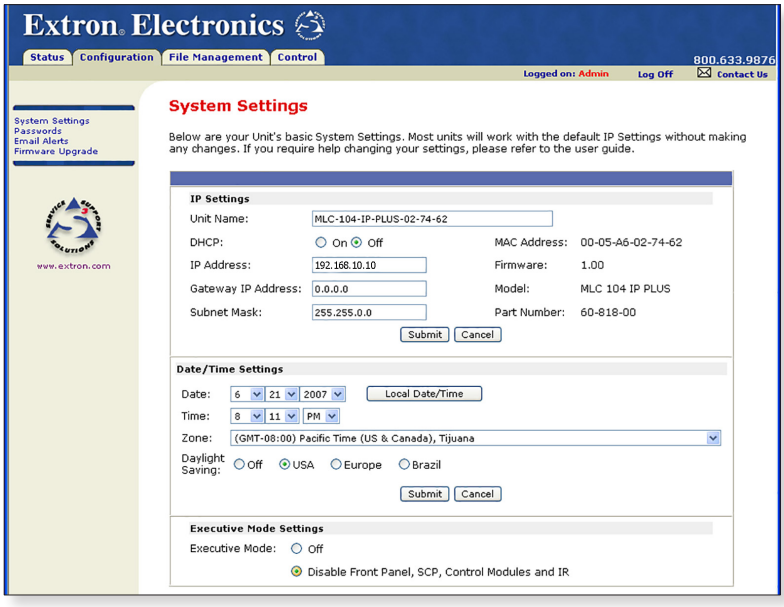
Enabling and disabling front panel lockout via the embedded web pages and the front panel

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. Changes can still be made via RS-232 or Ethernet (Telnet or web browser) control.

Front panel lockout can be enabled or 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

1. Using a web browser, enter the IP address of the MLC to open the MLC 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 image.



NOTE: If **`Disable Front Panel, SCP, Control Modules and IR`** is selected via the System Settings factory default web page, front panel lockout cannot be enabled or disabled via the front panel unless PIN Mode is enabled. See page **107** for the SIS command (X?*6Ø#) for PIN enabling and disabling.

Using the front panel

One or more PINs must be configured before this procedure can be used. See **Preparing the MLC for Front Panel Lockout** on page 15. To lock or unlock the front panel, you use the `Display On/Off` buttons to change modes and use the input buttons as a numeric keypad (see images below).

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 actions of the first button can be executed, preventing you from locking the front panel until the warm-up or cooldown period of the display finishes.)

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

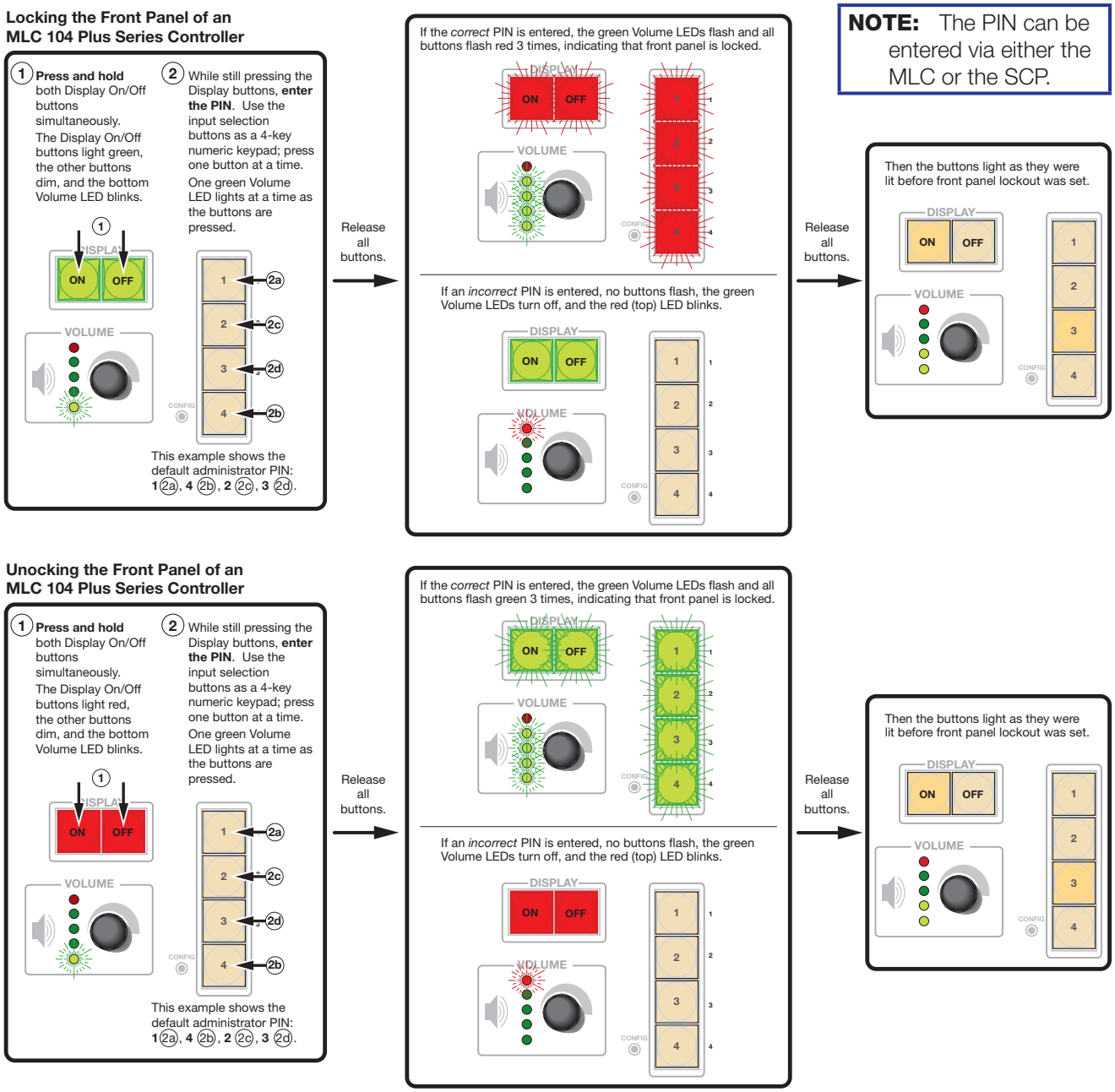


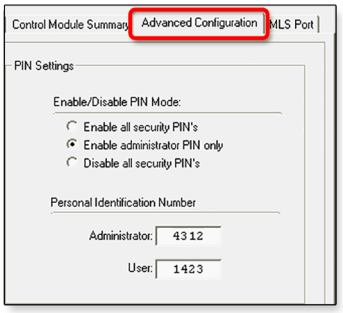
Figure 5. Enabling and Disabling Front Panel Lockout Via the Front Panel

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 allowed to unlock the front panel), or disable both PINs so that no one can access the front panel during front panel lockout (see image at right). 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 four MLC front panel input buttons, which is used as a numeric keypad. By default, both PINs are set to 1423. See the *Global Configurator Help* file for the PIN setup procedure.

Scheduling front panel lockouts

You can set the front panel of the MLC 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: Top Panel Receiver

In most cases, Extron has already produced a driver file for controlling the projector, display, or source device you plan to use. If a device driver file is not available, you can create your own using Extron IR Learner software, the remote control of the device, and the IR learning receiver sensor on the MLC, shown in the image at right. See 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 indicates the best distances and angles at which to hold the remote control.

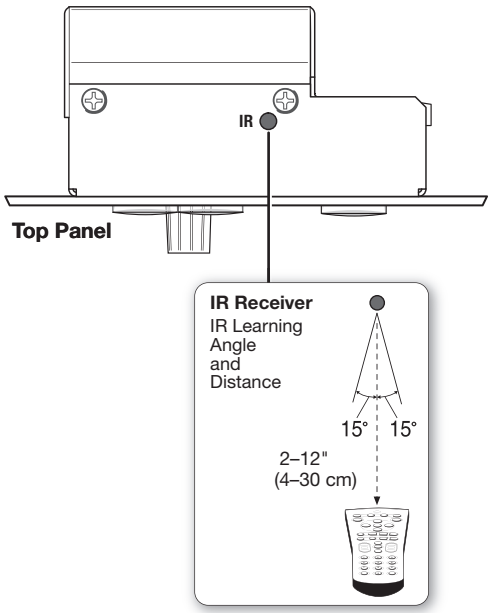


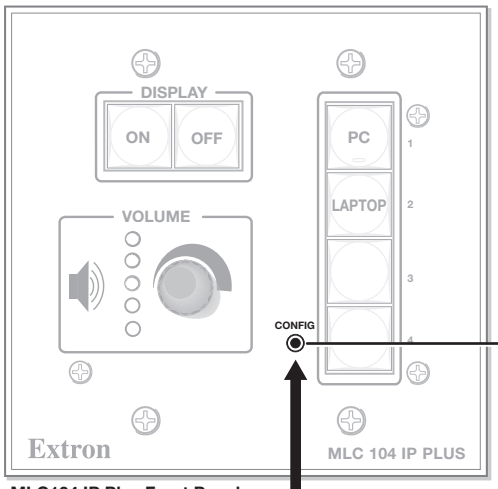
Figure 6. MLC 104 IP Plus Top Panel

Panel Features and Cabling

Config (Host) Port Cabling

NOTE: Extron recommends configuring and controlling the MLC via the LAN connector on the right side panel. Ethernet connections are faster and more reliable.

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 (see figure below). 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 can be used for this connection.



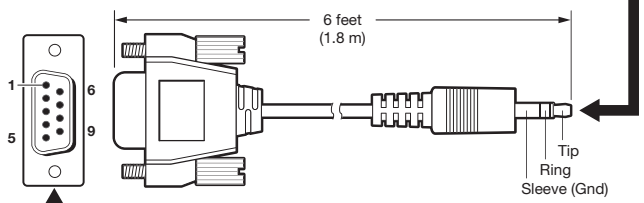
MLC104 IP Plus Front Panel

Config Serial (RS-232) Port

This port supports bidirectional RS-232 (-5 to +5 VDC) communication.

Protocol:
- 38400 baud
- 8 data bits
- 1 stop bit
- no parity
- no flow control

Front panel Config port:
- RS-232 only (Tx, Rx, ground)



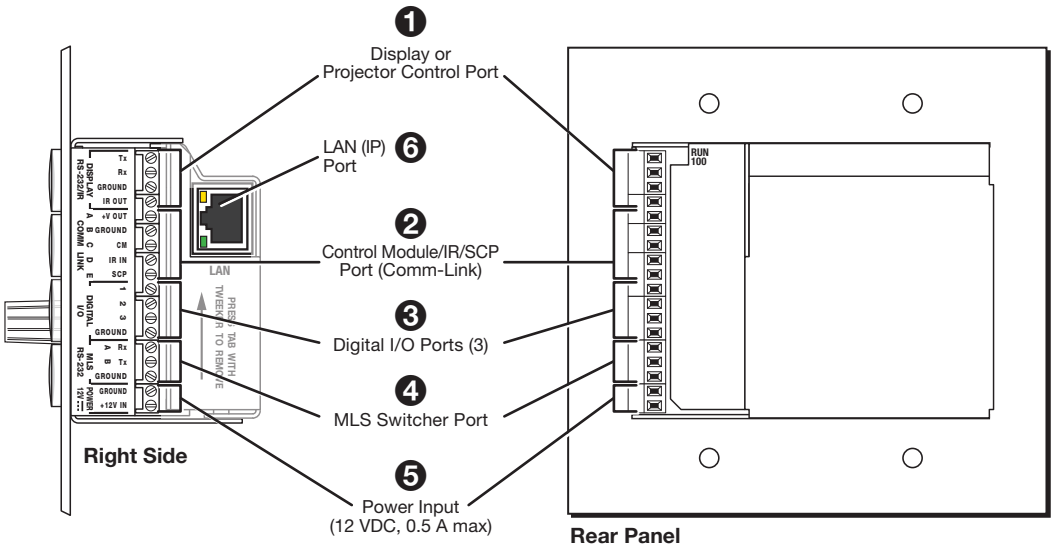
To/From the RS-232 Port on a PC

9-pin D	Connection	TRS Plug
Pin 2	Computer Rx line	Tip
Pin 3	Computer Tx line	Ring
Pin 5	Computer signal ground	Sleeve

NOTES:
- Use the front panel Config port only for sending basic SIS commands (such as those for IP setup and troubleshooting) and checking unit information and responses.
- You must use the LAN port (not the Config port) to set up the MLC and upload GC configuration files or firmware.

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 DataViewer, HyperTerminal, or a similar application, make sure the PC or control system connected to these ports is set for 38400 baud.

Right and Rear Panel Features and Cabling



❶ **Projector or display control (Display RS-232/IR) port** — page 17

❷ **Comm-Link** (CM/IR/SCP) **port** — page 19

❸ **Digital I/O ports** — page 22

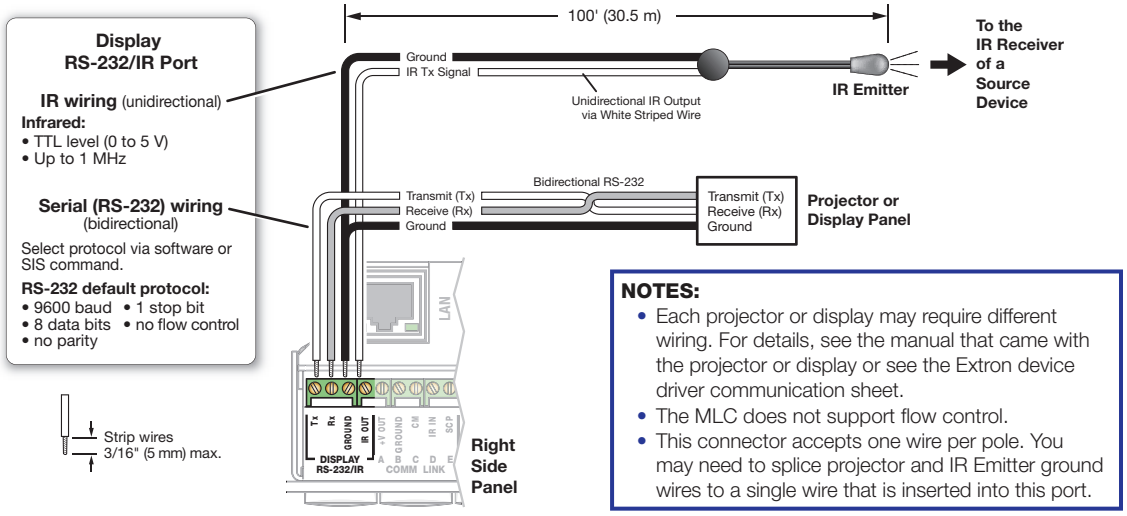
❹ **MLS RS-232 connector** — page 26

❺ **PWR (power) connector** — page 28

❻ **LAN port** — page 29

Projector or display connections

❶ **Display or projector 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 **left three poles** (Tx, Rx, Ground) of this 3.5 mm direct insertion captive screw connector for bidirectional RS-232 serial control. The IR Out and Ground pins (the right two poles) 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.



NOTES:
- Each projector or display may require different wiring. For details, see the manual that came with the projector or display or see the Extron device driver communication sheet.
- The MLC does not support flow control.
- This 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.

Figure 7. Wiring for RS-232 Display Control and IR Source Control

Wiring varies depending on the projector or display model. In most cases the drivers are bidirectional, but sometimes only the transmit (Tx) and ground connections are needed for projector or 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: 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.

For infrared (IR) output (0 to +5 VDC), wire an IR Emitter **(2 emitters, maximum, per port)** as shown below for a modulated or demodulated signal and ground. The MLC can use infrared signals to control up to two devices. You can connect one of these ports directly to the wired IR port of another device. Or you can insert the wires from up to two IR Emitters into the IR Out port and place the heads of the emitters over or next to the IR signal pickup windows of the controlled devices.

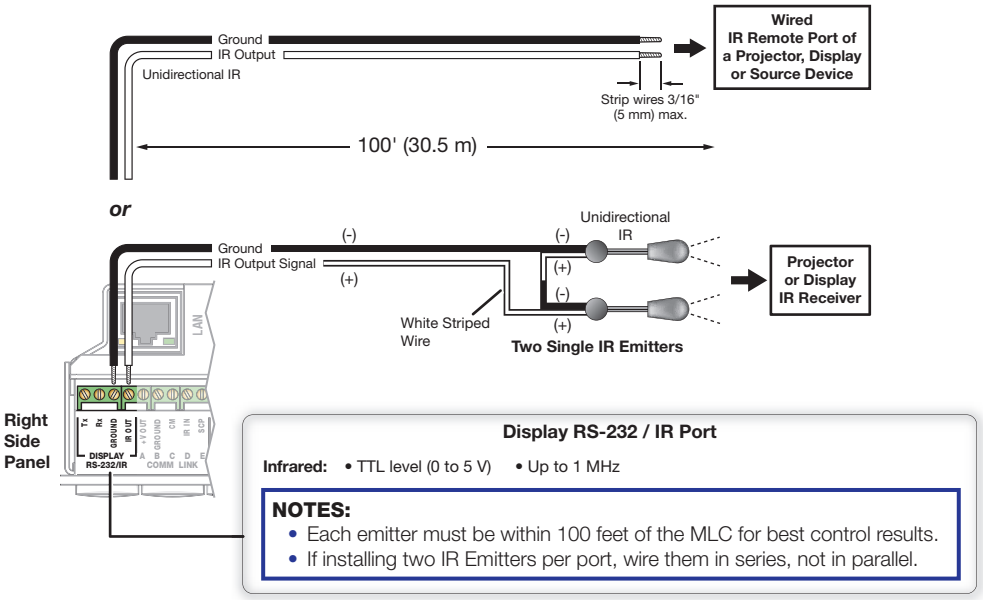


Figure 8. Wiring for IR Display Control

Alternatively, an MLC can use infrared signals and IR Emitters to control several source devices. However, the direct insertion captive screw connectors on the MLC 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 Display RS-232/IR port, then connect the IR Emitters to those wires. To wire emitters, see the following figures and the *IR Emitter Installation Guide*. Wiring directions depend on the number and type of IR Emitters (single or dual).

Installing One Single Emitter

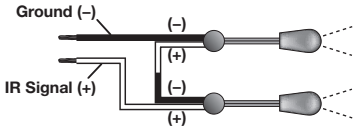
One Single IR Emitter

Installing One Dual Emitter

Dual IR Emitter

Installing Two Single Emitters

When installing only single emitters, tie them **in series** as shown at right.



Two Single IR Emitters

Figure 9. Wiring for IR Control of Up to Two Sources

Additional control connections

❷ **CM/IR/SCP (Comm-Link) port** — For remote control of the MLC 104 IP Plus Series controller or other items, you can connect up to four Extron control modules (IRCMs, CMs), one Extron infrared signal repeater (IRL 20), 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 **20** and **21**.

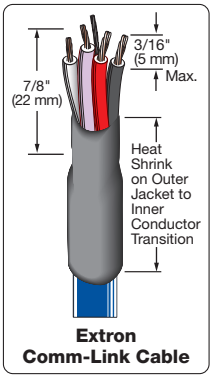
NOTE: The SCP must have firmware 1.01 or greater and DIP switch 4 in the On (up) position to operate with the MLC 104 IP Plus. See the *SCP 104 User's Manual* for more details.

The SCP 104 replicates the front panel controls of the MLC. The SCP and the IR signal repeater can receive IR signals from a 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. See the user guide for the appropriate device for details.

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#**, see page 107), you can turn off the ability of the MLC 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.

Before inserting wires in the connectors, strip the cable and apply heat shrink as shown at right.



Extron Comm-Link Cable

TIP: Comm-Link (CTL and CTLP) cable, shown at left, is recommended for these connections. For best results and to avoid short circuits, use 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 feet (61 m).

NOTE: The Comm-Link 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) used with the MLC **are** affected by front panel security lockout (executive mode) status changes.

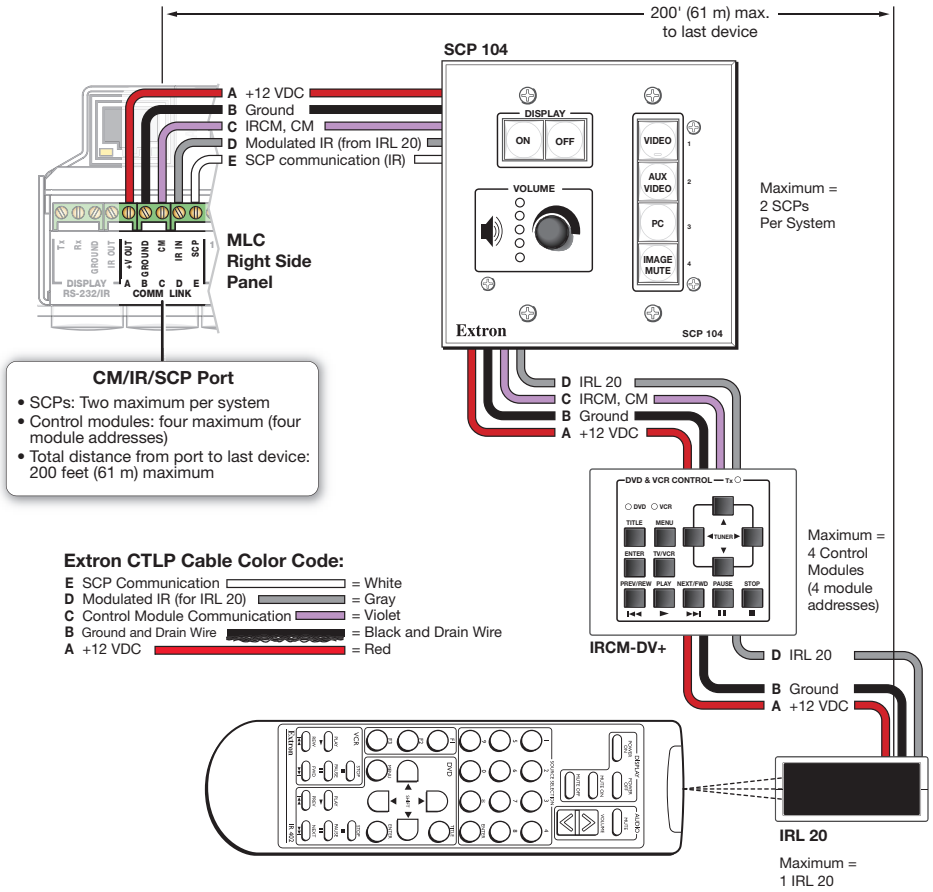
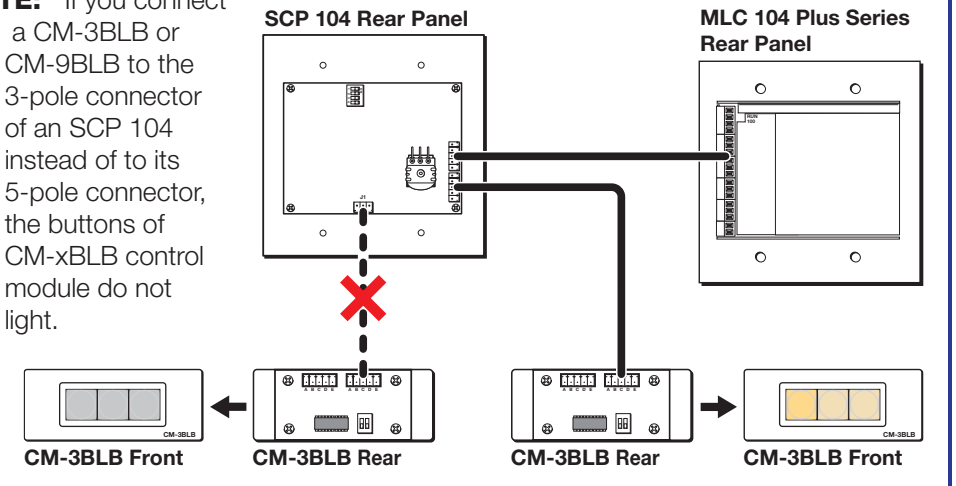


Figure 10. Basic Connections to an SCP, Control Module, and IR Signal Repeater

NOTE: Requirements for setting addresses for control modules differ depending on how they are connected. If a control module is connected to the 3-pole connector on an SCP, it can be addressed differently than it would if connected to the 5-pole connector on the SCP. See the user guide for the appropriate control module and see the *SCP 104/226 User's Manual* for instructions on addressing the control modules.

NOTE: If you connect a CM-3BLB or CM-9BLB to the 3-pole connector of an SCP 104 instead of to its 5-pole connector, the buttons of CM-xBLB control module do not light.



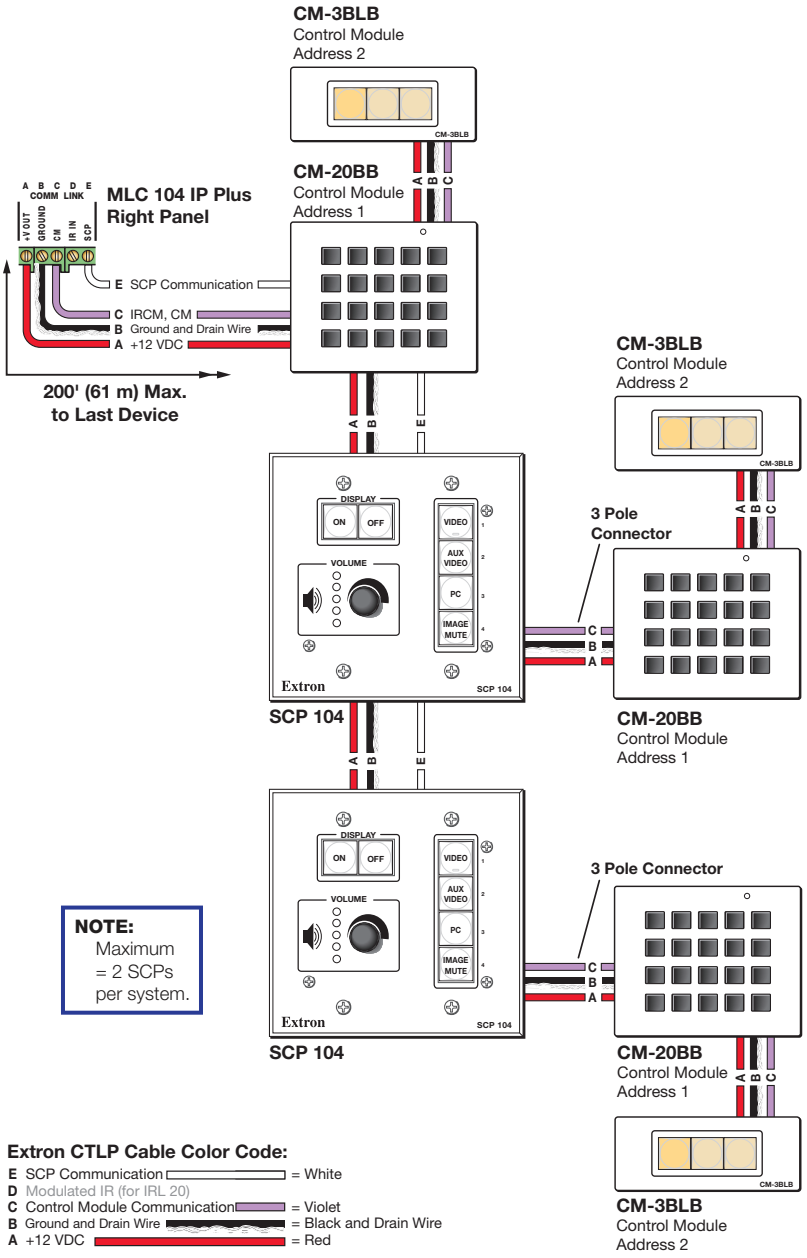


Figure 11. Connections to SCP 104 Control Panels and Control Modules Without an IR Signal Repeater

NOTE: The control module or modules connected via the 3-pole connector on an SCP must be the same models and set to the same DIP switch addresses as the control modules connected directly to the MLC. For example, if an IRCM-DV+ and a CM-5BB are connected to the port on the MLC, each SCP should have an IRCM-DV+ and a CM-5BB (and not other models) connected to its 3-pole connector.

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, and the IRCM-DV+ is the only type of control module that may be connected to each SCP 3-pole connector.

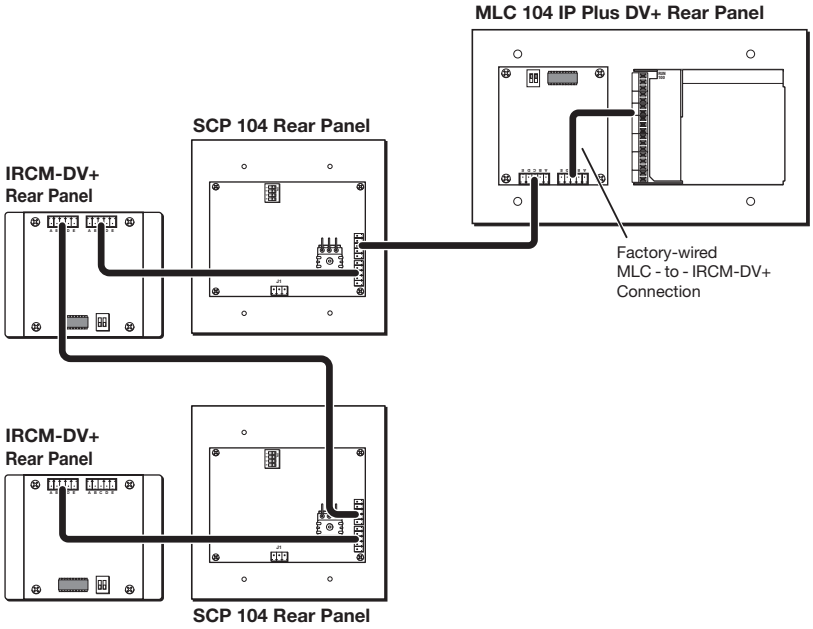


Figure 12. MLC 104 IP Plus DV+ with SCPs and Additional Control Modules

❸ **Digital I/O ports** —To allow the MLC to monitor devices to trigger events, connect switches, sensors, LEDs, relays, or similar items to these ports, which can be configured as a digital input or output, with or without +5 VDC pull-up (see **figure 13**). The digital I/O ports can trigger events or functions (such as triggering relays, issuing commands, or sending an e-mail) that have been configured using Global Configurator (GC) software.

ATTENTION:

- Configure the digital I/O ports using Global Configurator software or SIS commands first, and then connect wires to the port on the MLC. A mismatch between port configuration and wiring can cause malfunctions or unit failure.
- Configurez le port d'E/S numérique en utilisant au préalable le logiciel Global Configurator ou les commandes SIS, puis raccordez le câblage au port du MLC. Un défaut de concordance entre la configuration du port et le câblage peut entraîner le dysfonctionnement ou la défaillance de l'unité.

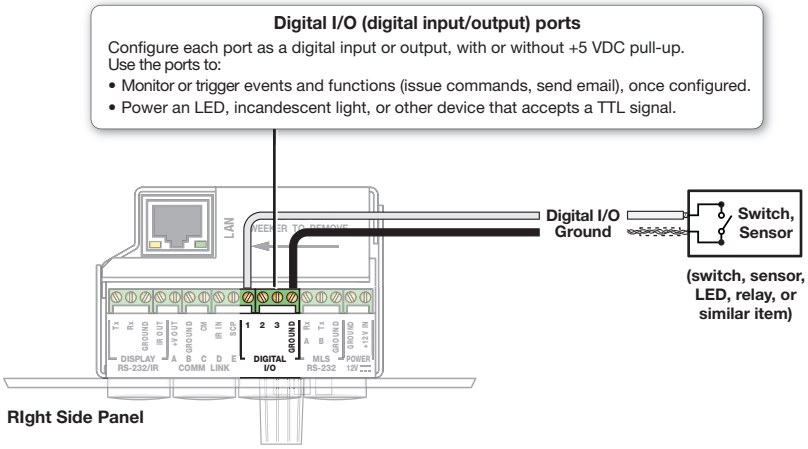


Figure 13. Digital I/O Port Wiring Example

- **Digital input** — To allow the MLC to monitor external devices that do not use RS-232 communication, connect a switch, motion sensor, moisture sensor, tally feedback output, button pad, or a similar item to this port (pin 1 and ground) and configure it for digital input. When configured as a digital input, the port measures two states: high and low. The port accepts 0 to 12 VDC input. Threshold voltages are <2.0 VDC = logic low, >2.8 VDC = logic high. There is also an internal, +5 VDC, selectable, pull-up resistor for this circuit. Below are some examples of how to use digital input.

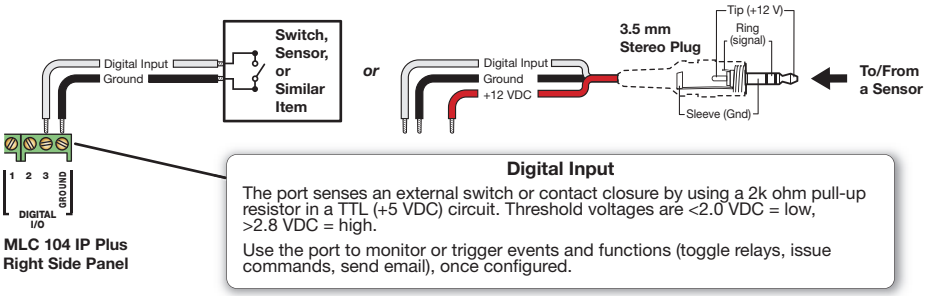
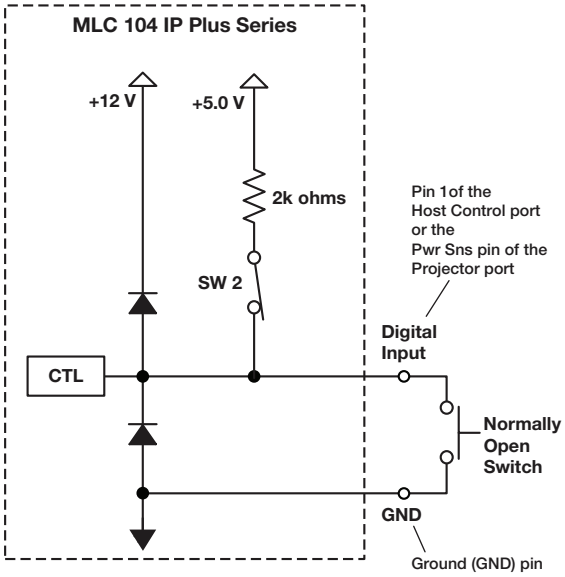


Figure 14. Wiring for Digital Input

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).

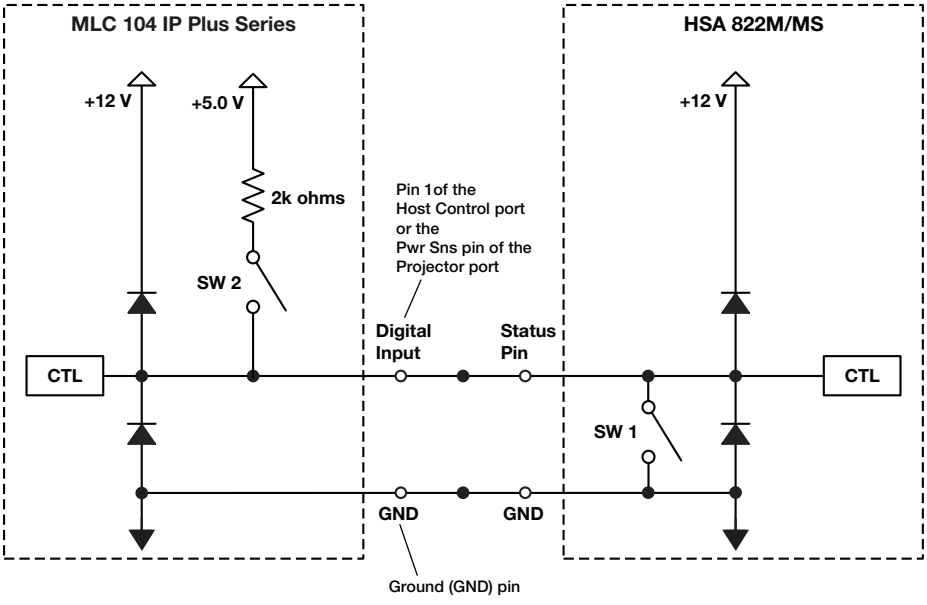


Using a motorized surface access enclosure to trigger digital input:

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.

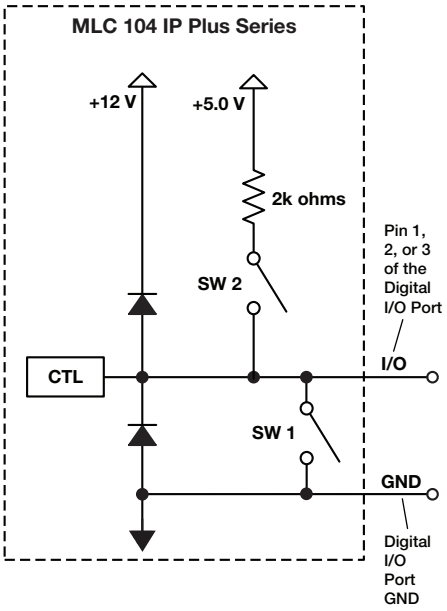
The MLC must have the pull-up resistor to +5.0 VDC activated (switch 2 is enabled/closed).



- **Digital output** — To power an LED, incandescent light, or other device that accepts a TTL signal, or to provide contact closure control for a projector lift, motorized screen, room or light switch via an Extron IPA T RLY4, you can use one or more of these ports as a digital output. When a port is configured for digital output, it offers two output states: on and off. When the port is set to an "on" state, (the circuit is closed), the I/O pin is connected to ground. The 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 not connected. 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.

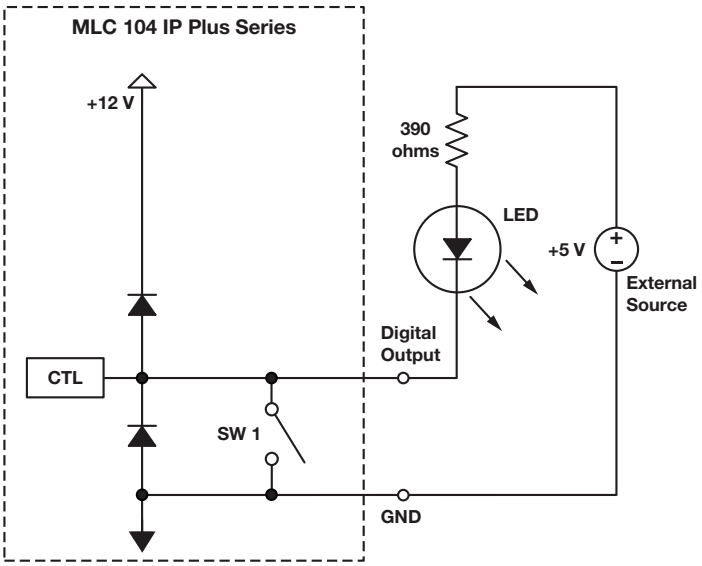
  The MLC 104 IP Plus cannot provide TTL level outputs like some of the IP Link interfaces. Switch 2 cannot be enabled when I/O pin is used as an output.

  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 at right 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.

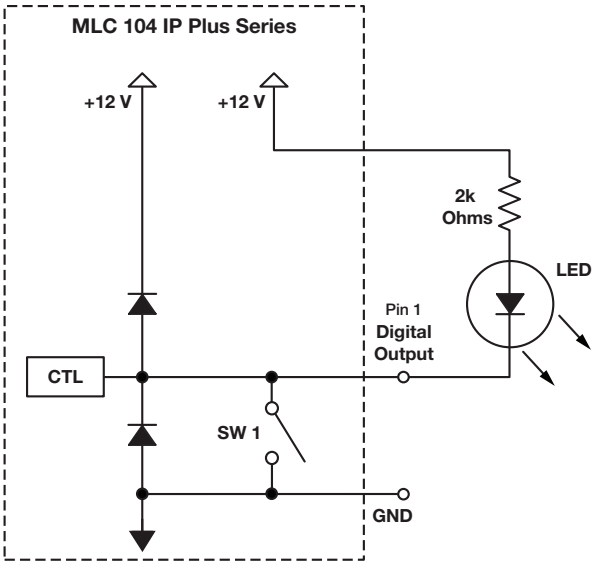
  The LED lights only when the I/O pin is set to "on" (switch 1 is closed).



NOTE: The digital 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.

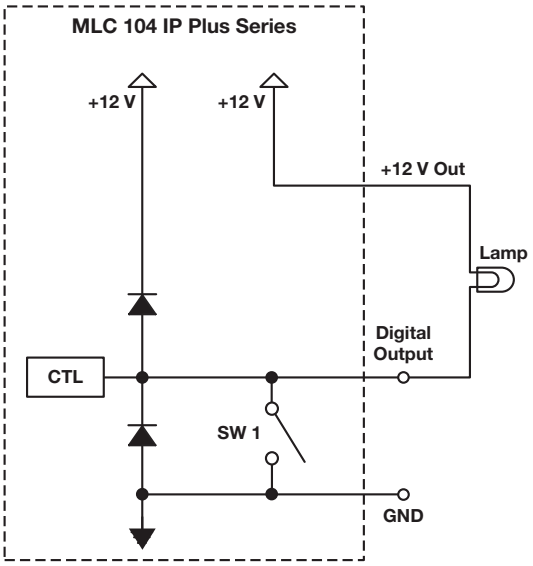
The LED lights only when the I/O pin is set to "on" (switch 1 is closed).



NOTE: The digital 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).



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

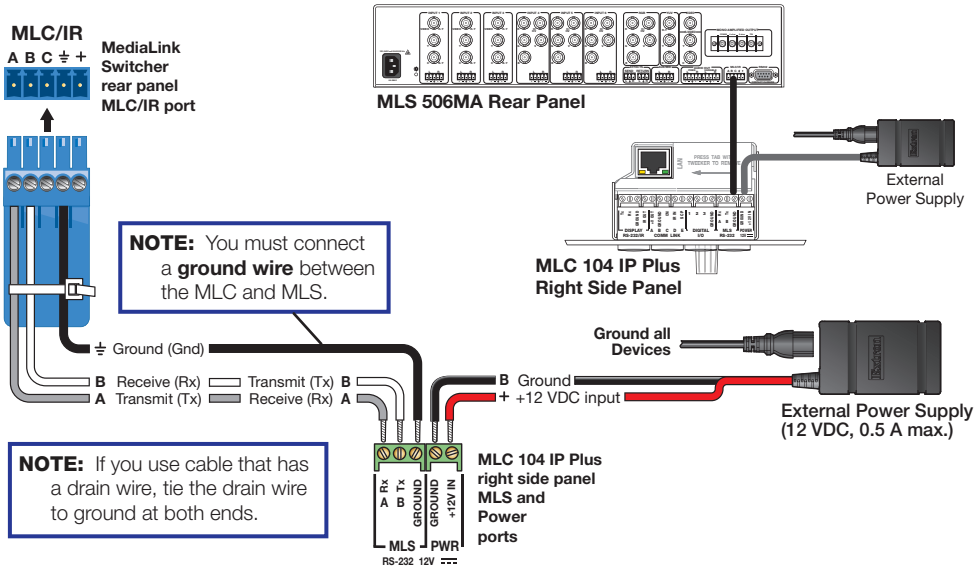
❹ **MLS RS-232 connector** — To control an optional Extron switcher or other RS-232 controllable device, connect a cable between this 3.5 mm direct insertion captive screw connector and the RS-232 port of the other device. By default this port supports any Extron switcher without additional drivers. 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:

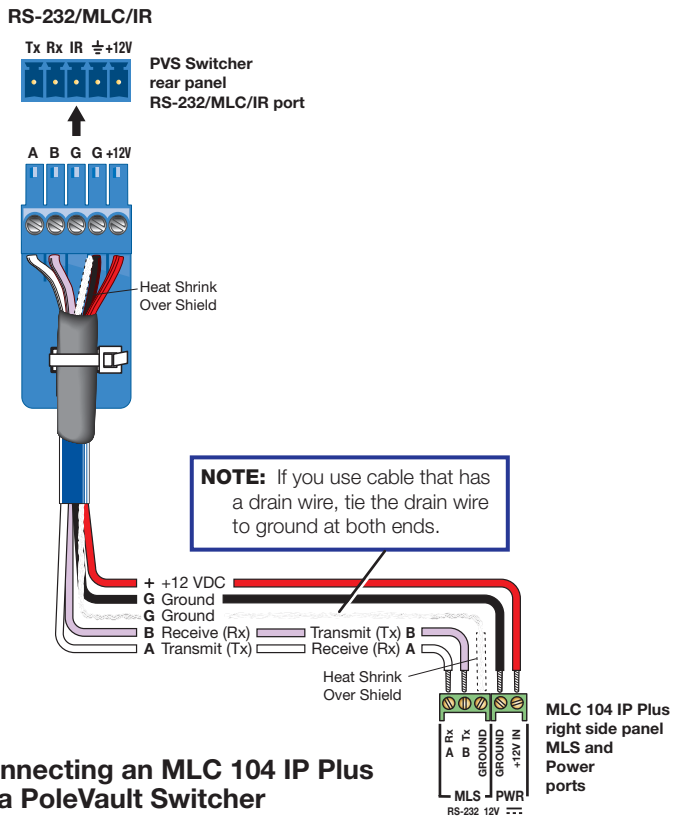
- 9600 baud
- 8 data bits
- 1 stop bit
- no parity
- no flow control

Supported Extron Devices	
MLS 406	MLS 608 D
MLS 406MA	MLS 608 D MA
MLS 406SA	MLS 608 D SA
MLS 506	PVS 305SA IP
MLS 506MA 70 V	MLA VC10 Plus
MLS 506SA	

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. Connecting an external power supply is optional depending on how many accessories are connected to the MLC.



Connecting an MLC 104 IP Plus to a MediaLink Switcher and an External Power Supply



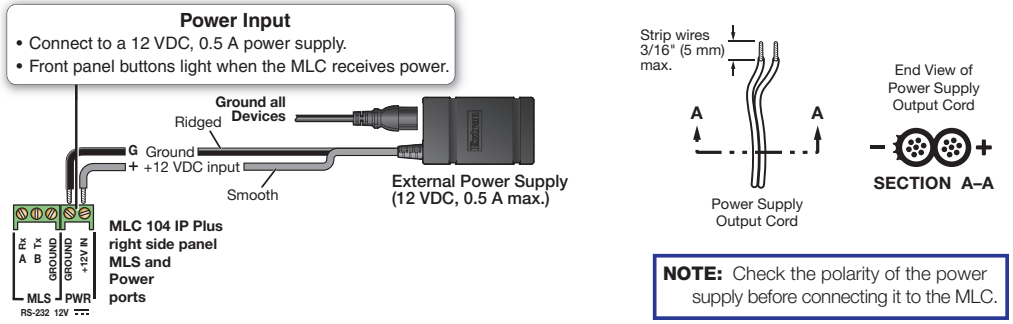
Connecting an MLC 104 IP Plus to a PoleVault Switcher

Power connection

❺ **PWR (power) connector** — To power the MLC, connect a cable between this port and the included 12 VDC, 0.5 amp (maximum) power supply.

Alternatively, the MLC can be powered by an Extron PVS or MLS switcher. See the diagrams for the **MLS connector** on page 27. Before powering the MLC from a switcher, determine the combined power draw of the MLC and all connected accessories to make sure it is lower than the power that can be provided by the switcher.

Power supply wiring is shown in the following diagram.



Connecting an MLC 104 IP Plus to the External Power Supply

ATTENTION: Risk of property damage: **ATTENTION : Risque de dommages matériels :**
• Always use a power supply supplied or specified by Extron. Use of an unauthorized power supply voids all regulatory compliance certification and may cause damage to the supply and the end product. • Utilisez toujours une source d'alimentation fournie ou recommandée par Extron. L'utilisation d'une source d'alimentation non autorisée annule toute certification de conformité réglementaire, et peut endommager la source d'alimentation et l'unité.
• Unless otherwise stated, the AC/DC adapters are not suitable for use in air handling spaces or in wall cavities. • Sauf mention contraire, les adaptateurs CA/CC ne conviennent pas à une utilisation dans les espaces d'aération ou dans les cavités murales.
• The installation must always be in accordance with the applicable provisions of National Electrical Code ANSI/NFPA 70, article 725 and the Canadian Electrical Code part 1, section 16. The power supply shall not be permanently fixed to building structure or similar structure. • Cette installation doit toujours être conforme aux dispositions applicables du Code américain de l'électricité (National Electrical Code) ANSI/NFPA 70, article 725, et du Code canadien de l'électricité, partie 1, section 16. La source d'alimentation ne devra pas être fixée de façon permanente à la structure de bâtiment ou à d'autres structures similaires.

Bidirectional Control and Communication Connection and Features

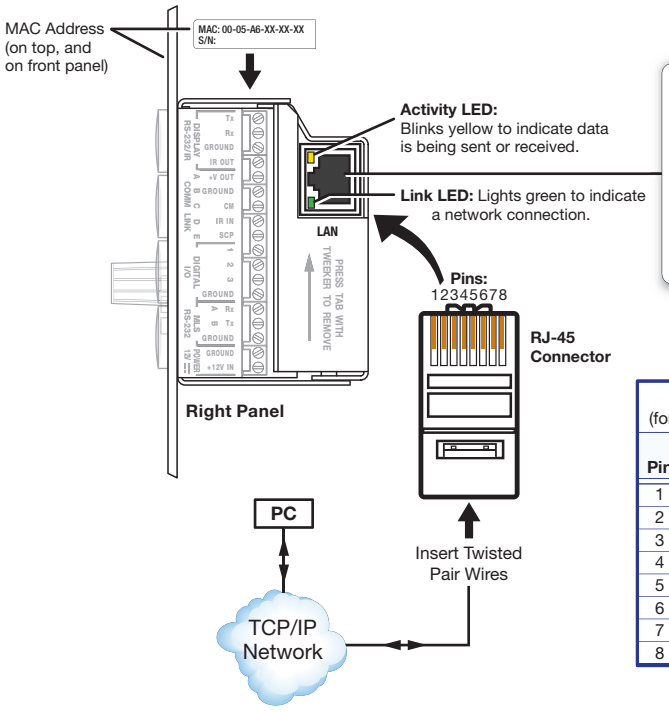
❻ **LAN (IP) connector and LEDs** — To connect and to control the MLC and the devices connected to it in an Ethernet network, plug a cable into this RJ-45 socket, and connect the other end of the cable to a network switch, hub, router, or PC connected to an Ethernet LAN or the Internet.

- 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 must configure this port before using it. Configure the settings for this port via either SIS commands or Global Configurator. See the programming sections of this guide (**Software-based Configuration and Control** starting on page 34 and **SIS Programming and Control** starting on page 69) for details.

- 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.



Ethernet (LAN)

Connect to an Ethernet network with a straight through cable. This port must be configured.

Default protocol:
- MLC IP address: 192.168.254.254
- Gateway IP address: 0.0.0.0
- Subnet mask: 255.255.0.0
- DHCP: off
- Link speed and duplex level: autodetected

Use this port to upload GC configuration files and firmware. All configuration can be performed via this port.

NOTE: MAC address information (ØØ-Ø5-A6-##-##-##) is located on the top of the enclosure.

Straight-through Cable
(for connection to a switch, hub, or router)

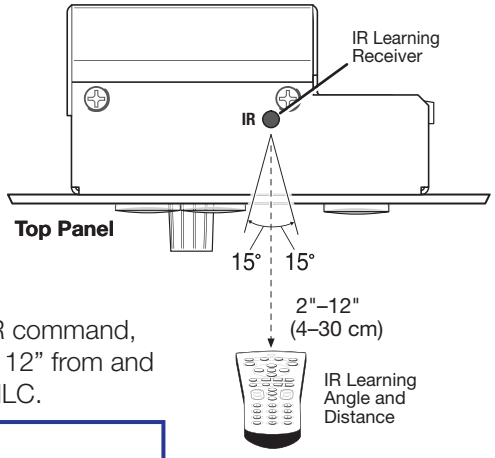
End 1		End 2	
Pin	Wire Color	Pin	Wire Color
1	white-orange	1	white-orange
2	orange	2	orange
3	white-green	3	white-green
4	blue	4	blue
5	white-blue	5	white-blue
6	green	6	green
7	white-brown	7	white-brown
8	brown	8	brown
T568B		T568B	

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
T568B		T568A	

Top Panel: IR Learning Sensor

In most cases, Extron has produced an IR driver 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 remote control of the projector or display, and the IR learning receiver sensor on the MLC, shown at right.

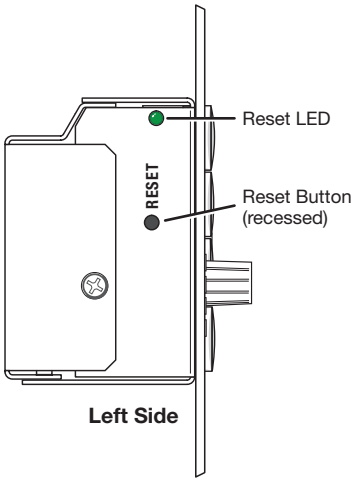


See the *IR Learner Help* file for instructions on how to create the driver file. When capturing an IR command, hold the projector remote control between 2” and 12” from and pointed directly at the IR learning sensor on the MLC.

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 depending on the selected reset mode (see **Resetting the Unit**, page 31 for details).



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 **reset modes table** below for a summary of the modes. The reset modes (with the exception of Mode 2) close all open IP and Telnet connections and close all sockets.

ATTENTION:

- 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.
- Analysez minutieusement les différents modes de réinitialisation. Appliquer le mauvais mode de réinitialisation peut causer une perte inattendue de la programmation de la mémoire flash, une reconfiguration des ports ou une réinitialisation du processeur.

NOTES:

- If you hold down the reset button continuously, every 3 seconds the LED blinks, the unit enters a different mode from Modes 3 through 5. For Mode 5, the LED blinks three times, the third blink indicating the last mode. The modes are separate functions, not a continuation from Mode 1 to Mode 5.
- The factory configured password for all accounts on this device have been set to the device serial number. In the event of a complete system reset, the passwords convert to the default, which is no password for this device.

MLC 104 IP Plus Series Controller Reset Mode Summary

	Mode	Activation	Result	Purpose and Notes
Use Factory Firmware	**1**	Hold down the recessed Reset button while applying power to the MLC. **NOTE:** After a mode 1 reset is performed, update the MLC firmware to the latest version. **Do not** operate the MLC controller firmware version that results from the mode 1 reset. This mode temporarily resets the unit to factory default until power is recycled. If you want to use the factory default firmware, you must up-load that version again (see the *Global Configurator Help* file for instructions).	**The controller reverts to the factory default firmware.** Event scripting does not start if the unit is powered on in this mode. All user files and settings such as drivers, adjustments, and IP settings are maintained. **NOTE:** If you do not want to update firmware, or you performed a mode 1 reset by mistake, cycle power to the unit to return to the firmware version that was running prior to the mode 1 reset. Use the **ØQ** 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 version if incompatibility issues arise with user-loaded firmware. **NOTE:** User-defined web pages may not work correctly if using an earlier firmware version.
Run or Stop Events	**3**	Hold down the Reset button for about 3 seconds until the Reset LED blinks **once**, then release and press Reset momentarily (<1 second) within 1 second*.	**Mode 3 turns events on or off.** If the events are currently stopped following the momentary press, the Reset LED flashes **twice** indicating the starting of events. If the events are currently running following the momentary press, the Power LED flashes **three** times indicating the stopping of events.	Mode 3 is useful for troubleshooting.
Reset All IP Settings	**4**	Hold down the Reset button for about 6 seconds until the Reset LED blinks **twice** (once at 3 seconds, again at 6 seconds). Then release and press Reset momentarily (for <1 second) within 1 second*.	**Mode 4:** • Enables ARP capability • Sets the IP address back to factory default (192.168.254.254) • Sets the subnet back to factory default (255.255.0.0) • Sets the default gateway address to the factory default (0.0.0.0) • Sets port mapping back to factory default • Turns DHCP off • Turns events off The Reset LED flashes four times in quick succession during reset.	Mode 4 enables you to set IP address information using ARP and the MAC address.

MLC 104 IP Plus Series Controller Reset Mode Summary				
	Mode	**Activation**	**Result**	**Purpose and Notes**
Reset to Factory Defaults	**5**	Hold down the Reset button for about 9 seconds until the Reset LED blinks **three** times (once at 3 seconds, again at 6 seconds, again at 9 seconds). Then release and press Reset momentarily (for <1 second) 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 miscellaneous options. This does not affect an optional MLS or PVS switcher, however. • Clears driver-port associations and port configurations (IR and serial) • Removes button configurations • Resets all IP options • Removes scheduling settings • Removes/clears all files from the MLC controller The Reset LED flashes four times in quick succession during reset.	Mode 5 is useful if you want to start over with configuration and uploading, and also to replace events. This is identical to SIS command ZQQQ↵.

*For modes 3, 4, and 5, nothing happens if the momentary press does not occur within 1 second.

Pinout Guides

The following illustration summarizes the pin assignments of all of the MLC bottom panel connectors that are covered in detail on the preceding pages.

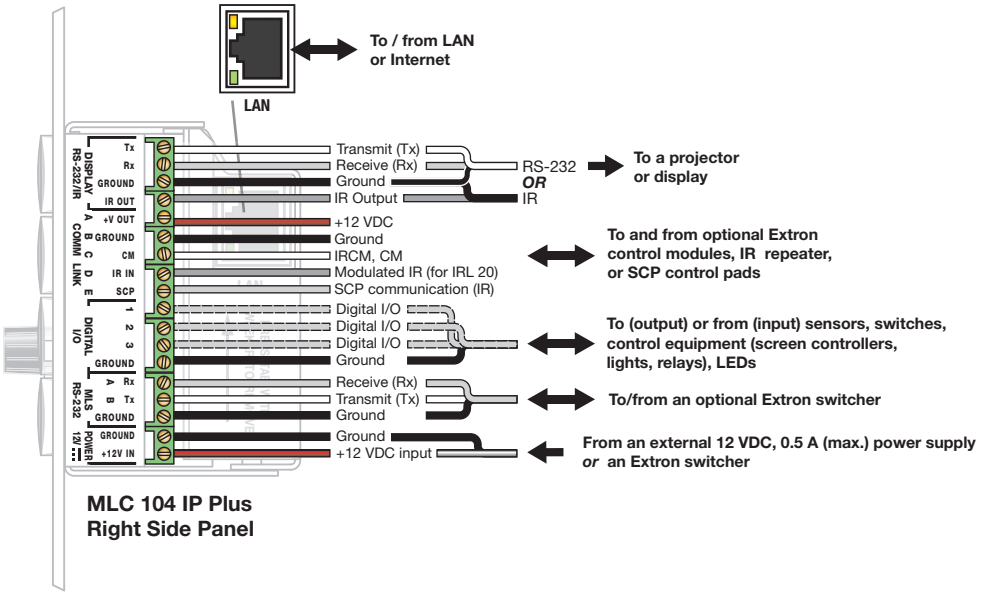


Figure 15. Right Side Panel Port and Pin Configuration Summary

The following figure provides examples of types of devices that can be connected to the right side panel ports on the MLC.

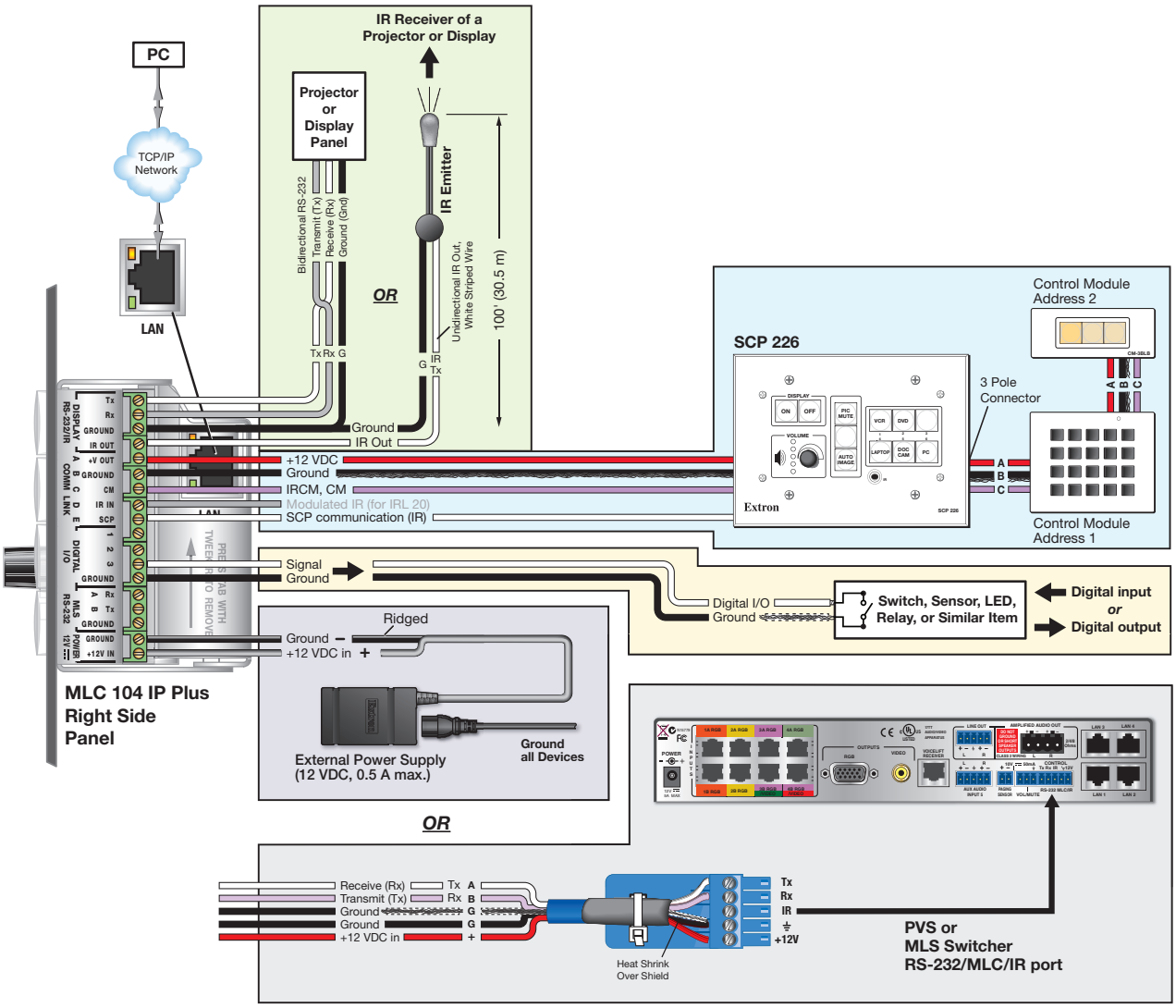


Figure 16. Example of Bottom Panel Connections

Software-based Configuration and Control

This section of the guide is divided into the following topics:

NOTE: In images of software or web pages, circled numbers correspond to the like-numbered procedural steps.

Configuration and Control: an Overview

An MLC 104 IP Plus Series controller **must** be configured before use in order to recognize and accept commands and pass them on to the controlled devices. It can be configured and controlled via a host computer attached to the right/rear panel LAN (local area network) port (preferred) or the front panel Config port.

NOTE: Extron recommends configuring and controlling the MLC via the LAN connector. Ethernet connections are faster and more reliable than RS-232 connections.

- 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 XP or a higher version of Windows installed. Global Configurator generates GlobalViewer web pages that are uploaded to the MLC and can be used to control the unit and make adjustments to its settings.

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

- Alternatively the default web pages embedded within the MLC provide a means to perform some setup, adjustment, and control via a web browser 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 Extron DataViewer software, Telnet, a web browser, or RS-232. SIS commands are discussed in detail in the **SIS Programming and Control** section starting on page 69.

The Basic Setup Steps: a Guide to This Section and Other Resources

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

1. **Configure the MLC for network communication**. See **Configuring the MLC for Network Communication** on the next page.
2. **Download or install Global Configurator and other Extron software (IR Learner, Firmware Loader) and device drivers.** See the *MLC 104 IP Plus Series Setup Guide*, the software disk that was shipped with the unit, and the Extron website for instructions.

   NOTE: The *MLC 104 IP Plus Series Setup Guide* is shipped with the unit. It is also available as a PDF file on the Extron website (**www.extron.com**). The disk included with the unit contains software, device drivers, a PDF file of the full user guide, and additional documentation that was 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 the 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, see the *IR Learner Help* file.
5. **Save and upload the configuration to the MLC.** See the *Global Configurator Help* file.
6. **Control the MLC and devices connected to it** by using the MLC embedded web pages or its GlobalViewer (GV) web pages (see **Controlling an MLC 104 IP Plus** on page 52).

Communicating with the MLC

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

- **Power:** see page 28 for **wiring** instructions. It is best to power the MLC using the 12 VDC (0.5 A) external power supply that is shipped with the unit.
- **Communication:** to connect the MLC to a network or to connect it directly to the PC using a serial cable, see page **16** for serial port wiring instructions. See **Configuring the MLC for Network Communication** on the next page to set the unit up to talk with the PC.

Configuring the MLC 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 must be set up so it can be connected to a LAN or other network. When you power on the MLC for the first time, you have a choice of several ways to set up the 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.
- User 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 MLC via IP, you may need to temporarily change the IP settings of the PC in order to communicate with the controller. See **Setting up the PC for IP Communication with an MLC 104 IP Plus** on page 40.

Then you must change the default settings (IP address, subnet mask, and [optional] administrator name and password) on the MLC 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.

NOTE: The factory configured password for all accounts on this device have been set to the device serial number. Passwords are case sensitive.

RS-232 protocol for the MLC:

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

NOTE: The 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 DataViewer, HyperTerminal, or a similar application, make sure the PC or control system connected to this port is set for 38400 baud.

LAN port defaults for the MLC:

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

NOTE: Both the 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 the Ethernet card of your computer.

The following instructions assume that you have already connected the PC to the LAN port or the Config port on the MLC and powered on the controller and the PC.

Configuring the MLC for Network Use Via Global Configurator

You can configure the IP address of the controller via an IP (Ethernet) connection using the Extron Global Configurator (GC) software. See the *Global Configurator Help* file for basic information on using Global Configurator software and setting up a project. Also see the *MLC 104 IP Plus Series Setup Guide* for step-by-step instructions of how to use GC to set up the IP address of the MLC.

Configuring the MLC for Network Use Via the ARP Command

The ARP (address resolution protocol) command tells your computer to associate the MAC (media access control) address of the MLC with the assigned IP address. You must then use the ping utility to access the controller, at which point the IP address of the controller is reconfigured.

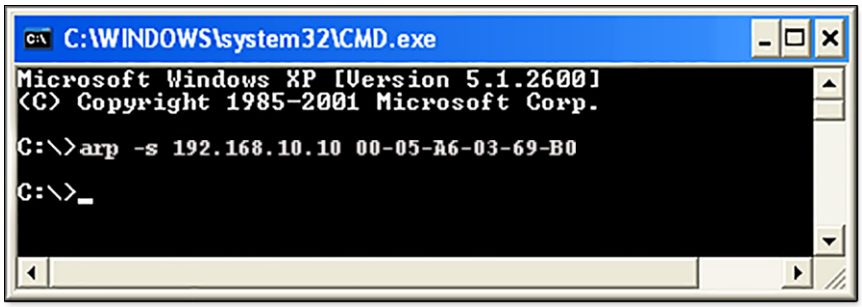
Use ARP to configure the IP address as follows:

1. Obtain a valid IP address for the controller from your network administrator.
2. Obtain the MAC address (UID #) from the label on top panel of the MLC. 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** on page 31 in the "Installation" section.

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

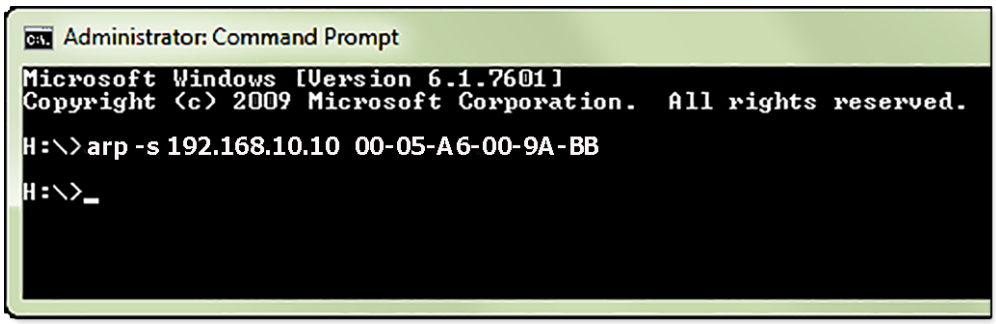
4. At the PC, access the command prompt, then enter the `arp –s` command. Type in the desired new IP address for the unit and the MAC address of the unit. For example:

   `arp –s 192.168.10.10 00-05-A6-03-69-B0`

   or

   `arp –s 192.168.10.10 00-05-A6-00-9A-BB`

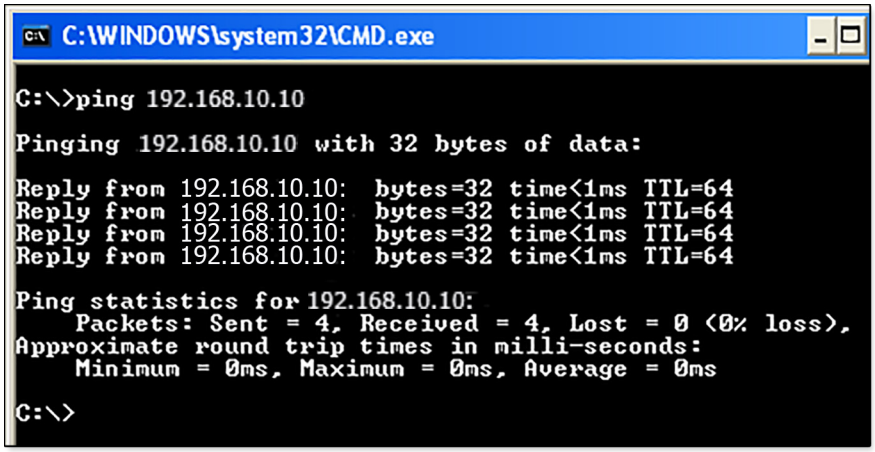
   NOTE: The MAC address is listed on the top panel.

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 192.168.10.10`

   You **must** ping the MLC in order for the IP address change to take place. The response should show the new IP address, as shown in the following image.



   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 prompt. For example:

   `arp –d 192.168.10.10` removes `192.168.10.10` from the ARP table.

   or

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

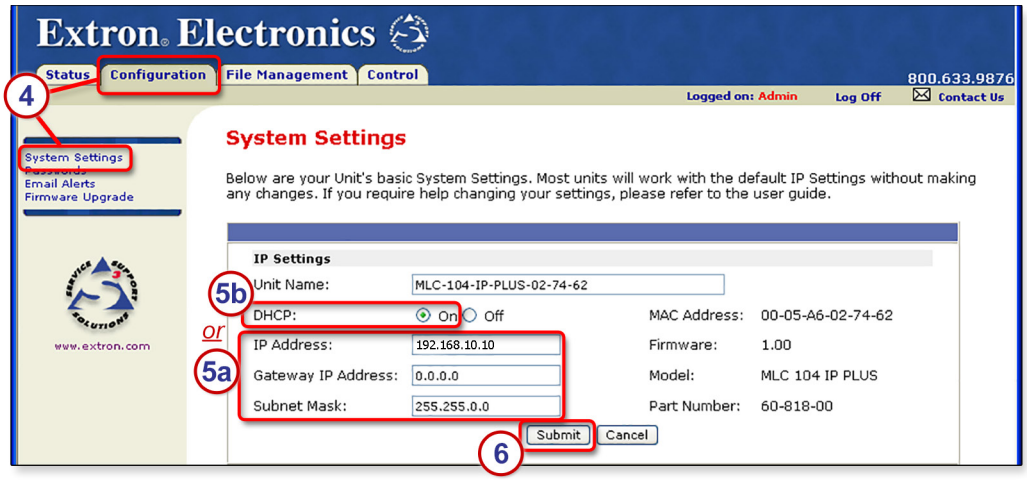
Configuring the MLC for Network Use Via a Web Browser

The default web pages that are preloaded on the MLC are compatible with popular web browsers such as 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 IP address of the PC to one that is on the same subnet as the default IP address of the MLC (192.168.254.254).

NOTES:

- This method requires a **crossover** cable (see **cabling** details on page 29).
- Make a note of the TCP/IP configuration of the host PC before changing its IP address and make sure the PC and MLC are on the **same** subnet.

1. Temporarily change the IP address of the host PC. See **Setting up the PC for IP Communication with an MLC 104 IP Plus** on page 40 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 default web page of the MLC is displayed.
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 image.



5. Set the MLC to the new IP address using either step **5a** or step **5b**.
   a. Enter the new IP address for the MLC, the corresponding subnet mask, and the gateway address. IP addresses and subnet masks follow standard naming and numbering conventions. The IP network administrator should provide the IP addresses and subnet mask to be used with this controller.
   b. Select **`DHCP On`**.
6. Click **`Submit`**. It takes a minute or more for the controller to store the new settings. Once the IP address is changed, you lose communication with the controller.
7. Close the browser.
8. After changing the controller's IP settings, change the TCP/IP settings of your PC back to their original configuration.

Configuring the MLC for Network Use Via SIS Commands and RS-232

The MLC can also be configured using serial (RS-232) communication and a terminal emulation program. For information on RS-232 port requirements (including 38400 baud) and on Simple Instruction Set (SIS) commands, variables, and syntax, see the **SIS Programming and Control** section starting on page 69.

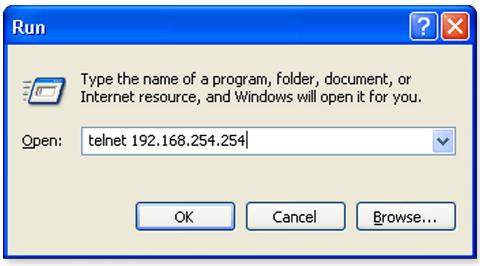
Configuring the MLC for Network Use Via SIS Commands and Telnet

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 IP address of the PC to one that is on the same subnet as the default IP address of the MLC (192.168.254.254).

NOTES:

- This method requires connecting the MLC to the **LAN port** on the PC using a **crossover** network cable (see page 29 for cabling details).
- Make a note of the TCP/IP configuration of the host PC before changing its IP address, and make sure the PC and MLC are on the **same** subnet.

1. Temporarily change the IP address of the host PC. See **Setting up the PC for IP Communication with an MLC 104 IP Plus** 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** field, and click **OK**.



3. Set the MLC to the new IP address by doing one of the following.
   - Enter SIS command Esc X14 `CI`←, where X14 is the new IP address (see the **Set IP address SIS command** on page 87) to set the IP address.
   - Enter SIS command `1DH`← to enable DHCP.
4. After changing the IP address of the controller, change the TCP/IP settings of the PC back to their original configuration.

Setting up the PC for IP Communication with an MLC 104 IP Plus

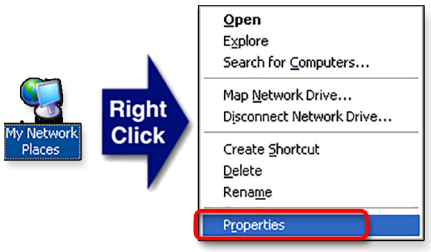
You need a Windows-based (Windows XP or higher) PC equipped with an operating network adapter. For your PC to work with Extron Ethernet-controlled products, the TCP/IP protocol must be installed and properly configured.

When setting up the MLC for network communication via a web browser, Extron DataViewer, or Telnet connection, you must change the IP address of the PC to one that is on the same subnet as the MLC.

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 for DHCP (Dynamic Host Configuration Protocol) to have an address assigned automatically when you sign on.

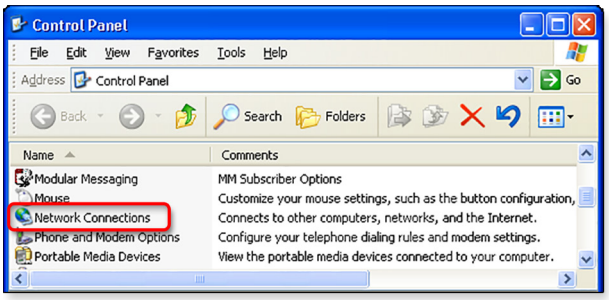
1. Open the Network Connections page as follows:

   - Locate and right-click on **My Network Places** on the Windows (XP or higher) desktop, then click on **Properties**.

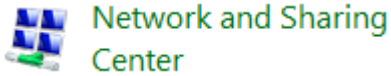


   or

   - Click on the **Start** menu, click on **Settings** (if needed), click on **Control Panel** to open the Control Panel window, and double-click on **Network Connections** (Windows XP, shown below),

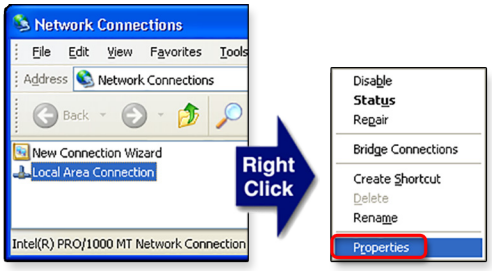


   or **Network and Sharing Center** (Windows 7, shown below).

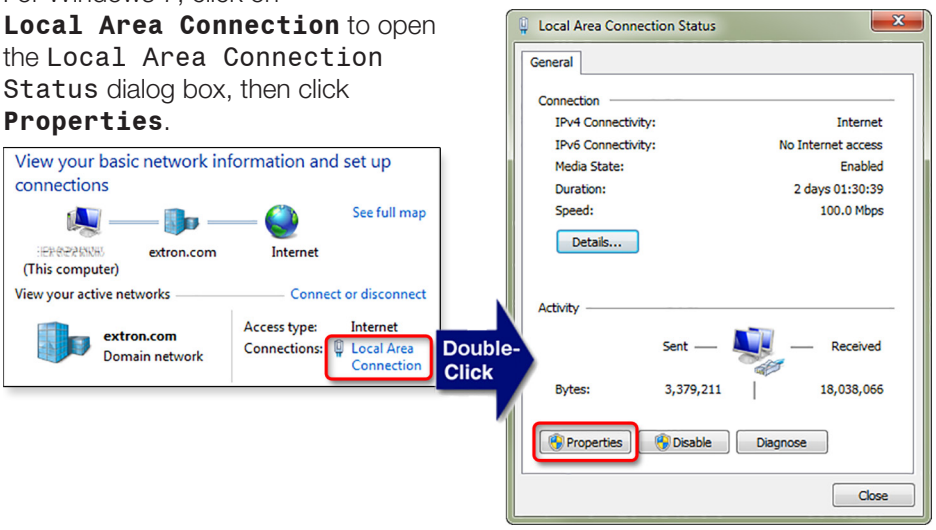


2. Access the Local Area Connections Properties dialog box.

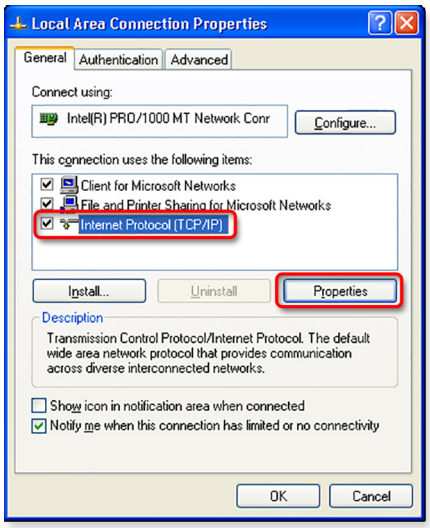
   - For Windows XP, right-click on **Local Area Connection**, then select **Properties**.

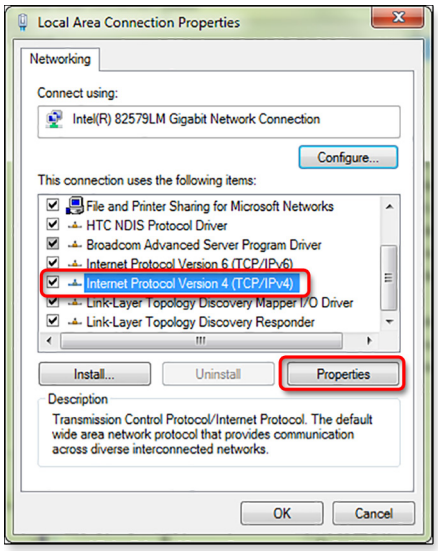


   - For Windows 7, click on **Local Area Connection** to open the Local Area Connection Status dialog box, then click **Properties**.



3. Select **Internet Protocol (TCP/IP)** and click on the **Properties** button, as shown below for Windows XP (left) and Windows 7 (right). If **Internet Protocol (TCP/IP)** is not on the list, it must be added (installed). See the Microsoft Windows user 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:

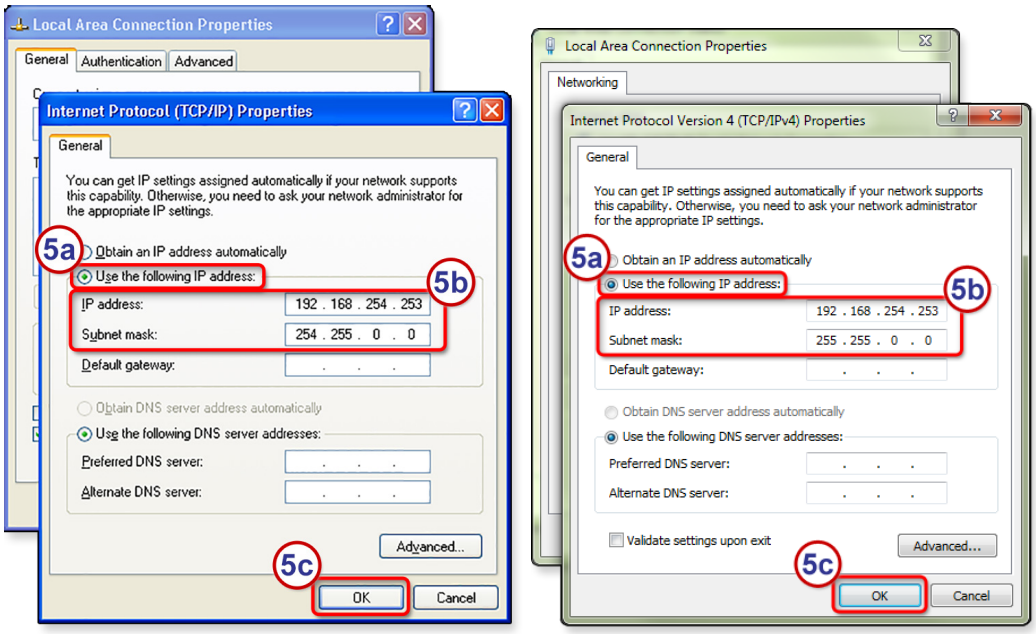
_____ . _____ . _____ . _____

5. Change the IP address of the **PC** so it can communicate with the MLC, and change the IP settings of the controller (see images below).

   a. Click the **`Use the following IP address`** button.

   b. Enter the following values, as shown in the following images for Windows XP (left) and Windows 7 (right):

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



   c. Click **OK** 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 CAT 5 Ethernet crossover cable into the LAN connector on the MLC. 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 **LAN (IP) connector** pin assignments on page 29).

7. Set up the IP address of the MLC using a web browser, or SIS commands as described earlier in this section.

8. Restore the previous IP configuration for the PC by following steps **1**, **2**, **3**, and **5** but use the original IP address settings for the PC that 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 or IP connection. GC provides the ability to generate a web browser-based GlobalViewer (GV) application and web pages for each IP Link-based device (MLC 104 IP Plus, IPL 250, IP Link interface, IPCP, System 5 IP, MLC 226 IP, or other Extron device) on a network. Once an MLC is configured, its GlobalViewer web pages allow the user to manage, monitor, and control the MLC and the devices connected to it.

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

Downloading the Software and Getting Started

Global Configurator software updates and a large variety of device drivers can be downloaded at no charge from the Extron website (**www.extron.com**). When you locate the desired software or driver package, follow the on-screen directions to download and install it.

NOTE: Ethernet, serial, and infrared (IR) device drivers (for controlling projectors, VCRs, DVD players, and so forth) are available on the Extron website:

- As individual device driver files
- As an IP Link driver package

If an IR driver does not already exist for an IR-controlled device in your system, you can download the optional IR Learner. It is a free software utility that makes it possible to capture infrared codes from a handheld IR remote control and create custom drivers for operating the corresponding IR-controlled device.

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

Read 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. The help file contains instructions on how to set the **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 this information from your network administrator and set the IP address before continuing.

PC System Requirements

See page **6** in the “Introduction” section for a list of the minimum hardware and software requirements.

NOTE: The MLC 104 IP Plus Series requires GC version 2.2 or higher.

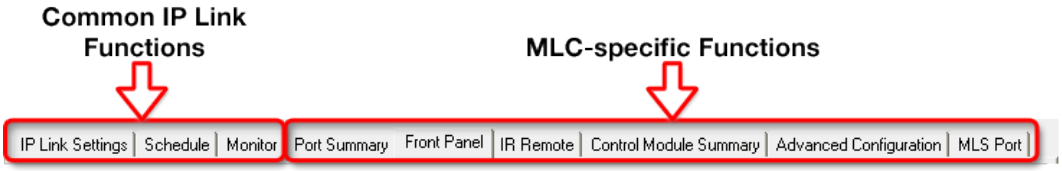
Using Global Configurator: Helpful Tips

Resources and notes

- The *MLC 104 IP Plus Series Setup Guide* is shipped with the unit, and it covers how to install the software and lists other available resources (software, drivers, instructions). It includes a quick reference to the front and rear panel features, and covers basic hardware installation and how to set the IP address of the unit using the ARP command.
- The *Global Configurator Help* file provides information on settings and how to use the Global Configurator program, itself. This help file, included with the software, covers basic setup steps and includes examples of how to use the basic tabs in GC and step by step instructions for typical configuration tasks.
- See **Front Panel Features and Operation** on page 10 and **Operation, Features, and Cabling** starting on page 7 in the "Operation, Features, and Cabling" section of this guide for features and settings for the ports you configure in GC.
- If you 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 controller. Saving a configuration is recommended before you perform a firmware upgrade.
- Global Configurator 3 is capable of loading all GC2 project files from GC version 2.0.3.3 and up. GCZ files can be opened by clicking **`File`** > **`Open`**, by clicking the toolbar icon, or by double-clicking on the GCZ file. GC2 and GCC files must be imported, however.
- The MLC can be set up to allow configuration access to only administrators to prevent other users from making changes to settings, events, and controls. If an administrator password is set for the controller, non-administrator users can select inputs, adjust volume, and trigger some other device commands from the GlobalViewer Control pages 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 (for example, Room144MLC104IPplus, Lab1241mlc104IP, ConfRoomSystem, LectureHall8-cntrlr) that you want to use to label a specific MLC 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 name.
  - Underscores (_) are not permitted.
  - Valid characters are A to Z, a to z, Ø to 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 tabs

In the upper right side of the GC 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. Tabs to the right of those three vary in quantity, type, and layout, depending on the product being configured. The figure below shows tabs that may be available when you configure an MLC 104 IP Plus.



To learn about the functions available on each of these tabs, see 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.

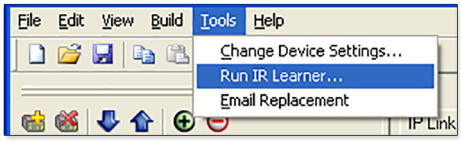
Advanced Configuration

IR Learning to Create Customized IR Driver Files

If you do not find a driver on the Extron website 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 the Global Configurator **Tools** menu, as shown at right. The IR Learner utility opens in a new window.



See the *IR Learner Help* file for instructions on how to create the driver file. During IR command capture, hold the remote control for the projector or other device so it is facing the IR learning receiver on the MLC within the angles and distance range shown in the figure on page **10**.

NOTE: The MLC 104 IP 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 14 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 107.
- **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 100 in the special function SIS commands table).

  NOTE: Global Configurator automatically sets the warm-up and cool-down delay times based on default values in the driver for the display or projector. 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 or 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-controlled projectors and displays must receive a second power down command. If selected, this feature automatically sends the power off or power down command twice. The MLC must be configured to send the IR power off command upon display power off button release (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 107). 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#** (see page 100).

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. See the 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#**, on page 106). If the maximum volume (47# command) is set, the limit audio level feature (SIS special command **11#**, on page 100) is automatically set to 25% of the maximum volume (47#).

- **`Volume encoder scaling factor (Ø-255)`** — This feature allows you to slow down the volume knob (the encoder) on the front panel of the MLC. This feature addresses a scenario that occurs with some projectors that use range type volume control. When the MLC Volume 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 turn 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 54.
- **`Upload enhanced web pages`** — See **User Mode** on page 60 to see examples of both basic and enhanced web pages (which show screen views of the front panels of the MLC and control modules).
- **`Enable/Disable IR Receiver`** determine the ability of the MLC to receive IR signals through the CM/IR/SCP port on the bottom panel. This feature is the same as the **65#** SIS command (see page 107).

Configuring an Auxiliary (MLS, PVS) Switcher

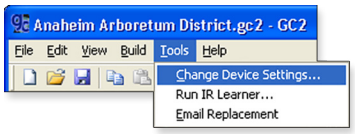
An Extron MediaLink Switcher (MLS) or PoleVault switcher (PVS) can be connected to the MLC to expand the number of inputs available to the projector/display. However, if the MLS or PVS switcher is disabled, the MLS RS-232 port can be used as an auxiliary, bidirectional RS-232 port, just like the Display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

Setting up Passwords

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 IP Plus Series Setup Guide* or the *Global Configurator Help* file section on advanced configuration.

NOTE: The factory configured password for all accounts on this device have been set to the device serial number. In the event of a complete system reset, the password converts to the default, which is no password. A new password will need to be configured to secure the device.

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 ports on the MLC. The diagram includes model names, DIP switch settings for control modules, and the type of communication (IR or RS-232) configured for each port. For more details, in the *Global Configurator Help* file, read about the **File** menu within the "Reference Information" section.

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

Procedure overview:

1. In Global Configurator, click on the **File** drop-down menu and select **Print** and then **Wiring Diagrams/GUI Configuration Report**.
2. In the Print Wiring Diagrams/GUI Configuration Report window, select the devices to include in the diagram.

3. Click the **Print Wiring Diagrams** button. GC processes the information about the selected device(s), generates a document containing the wiring diagram and opens that document in Word.
4. Print the diagram and, if desired, save the file.
5. Exit Word.
6. Close the Global Configurator Print Wiring Diagrams/GUI Configuration Report window.

Updating Firmware

If the need arises, you can replace the MLC firmware without opening the unit or changing firmware chips. See the **Firmware Updates** section starting on page 152, for instructions on how to update the MLC firmware.

NOTE: Save the existing GC configuration project before replacing the firmware.

Advanced Serial Port Control: Direct Port Access (Ports 2001 Through 2003)

Direct port access allows a direct, one-to-one connection to any one of the MLC serial ports using a TCP/IP connection. When a TCP session is initiated to a serial port, all data sent and received passes directly to and from that port without any processing. Set serial port parameters (baud rate, parity, stop bits) within the MLC prior to using direct access.

NOTE: The reserved TCP port numbers (2001-2003) are assigned by default as follows:

- 2001 = front panel Config port
- 2002 = Display RS-232/IR (projector) port
- 2003 = MLS (auxiliary switcher) port

You can use **SIS commands** (see page 90) to assign a different port number to any of these serial ports, if needed.

To initiate direct port access using Extron DataViewer software:

1. Connect the MLC to a network.
2. If necessary, use GC (see the help file for details) or **SIS commands** on page 80 to set port parameters (baud rate, parity, stop bits) for the desired serial port on the MLC.
3. Launch the DataViewer program.
4. Click **File** > **Connect** to open the Communication Setup dialog box.
5. Click the **TCP/IP** tab.

6. Complete the fields with the IP address of the MLC and the TCP/IP port number (2001 through 2003) of the serial port (on that same MLC unit) that are used, as shown in the screen at right and figure 17 below.

NOTE: A password is not required for direct port access.

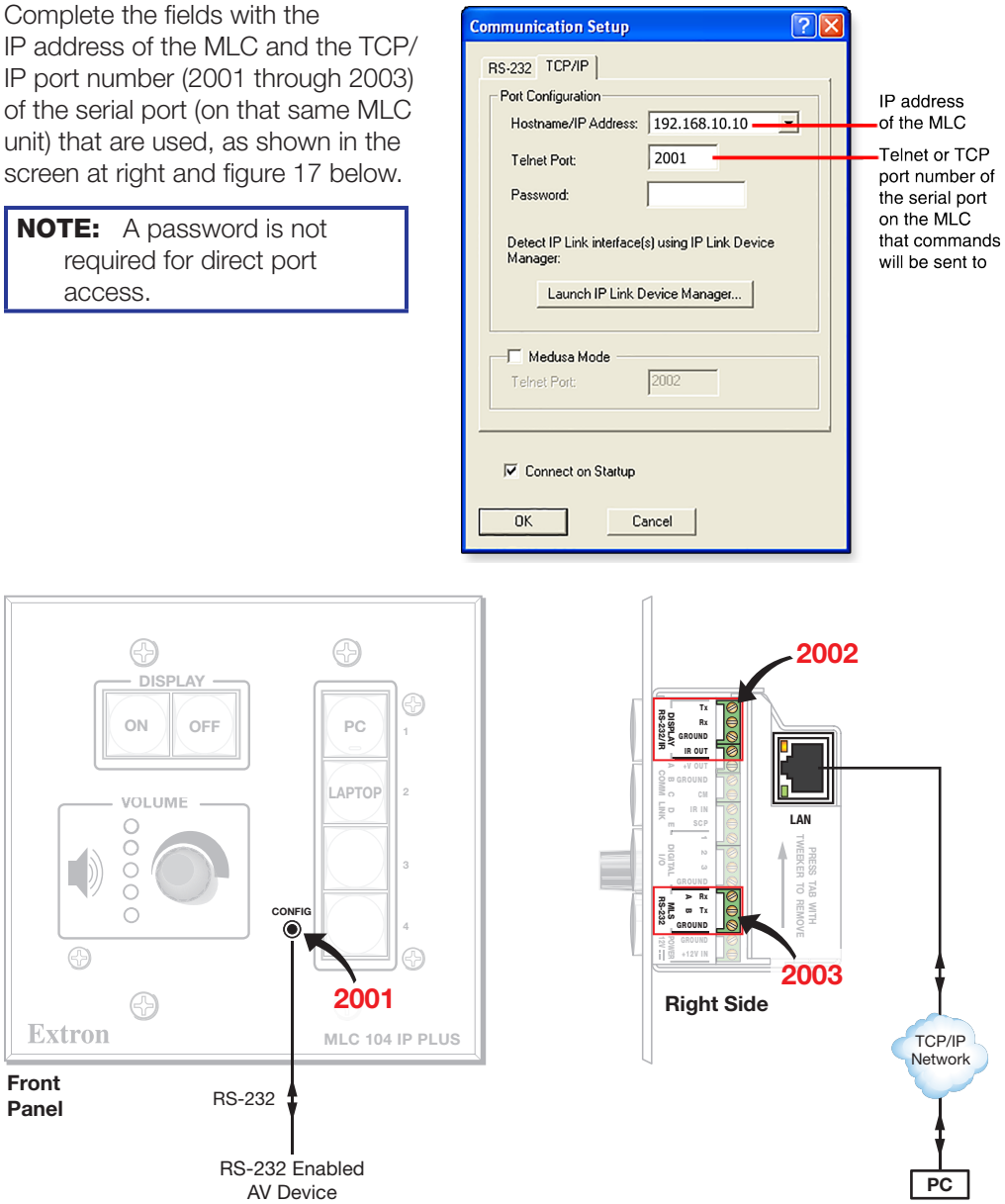


Figure 17. DataViewer Communication Setup Dialog Box and Direct Access Default Port Numbers

7. Click **OK**. The DataViewer commands window opens.
8. Type serial commands into the Commands area in the left of the window to send serial commands directly to the attached AV device through the selected COM port.
9. To end the direct access session, close DataViewer.

NOTE: You can force the direct access session closed by logging on to the MLC as an administrator and entering Esc X1 *ØCD←, where X1 is the selected serial port.

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 MLCs. See the *Global Configurator Help* file for instructions.

Controlling an MLC 104 IP Plus

You can control the MLC and devices connected to it by using a shared network and one or more of the following tools:

- The **factory-embedded web pages** stored within the MLC
- The **GlobalViewer (GV) web pages** that are created when you upload the GC configuration to the MLC (see page 63)
- An SCP control panel

Embedded Web Pages

The MLC 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 unit via a web browser. This section provides an overview of these web pages, which provide some of the features of the configuration program.

NOTE: The factory configured password for all accounts on this device have been set to the device serial number. Passwords are case sensitive.

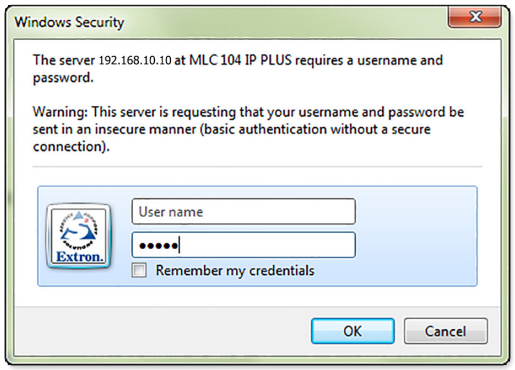
To access the embedded web pages,

1. Launch a web browser (Internet Explorer, Mozilla Firefox) on the connected PC, enter the IP address of the MLC in the address field, and press the **Enter** key.

   NOTE: After GlobalViewer web pages have been uploaded to the MLC, the GV web pages open by default (instead of the factory-set web pages) if you enter just the IP address (such as `192.168.10.10` or `http://192.168.10.10`) of the MLC unit. To view the factory-set web pages on a GV-enabled MLC unit, add `/nortxe_index.html` after the IP address before pressing <Enter>. For example, enter `http://192.168.10.10/nortxe_index.html`.

2. In the `Connect to {IP address}` or `Windows Security` dialog box, shown at right, enter the IP address of the MLC or text of your choice in the **User Name** field, type in the administrator password in the **Password** field, and click **OK**. The default web page of the MLC appears.

   If the MLC has not 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 (**System Status** and **Statistics**) provide only information. Changes must be made via the `Configuration` web page, the Global Configurator software, or SIS programming. Personnel who have user access can view these pages but do not have access to configuration pages. All MLC units display a `System Status` page. Once an MLC has been configured using Global Configurator, a `Statistics` page is also available.

System Status

The `System Status` page provides information about the MLC model, part number, firmware version, 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.

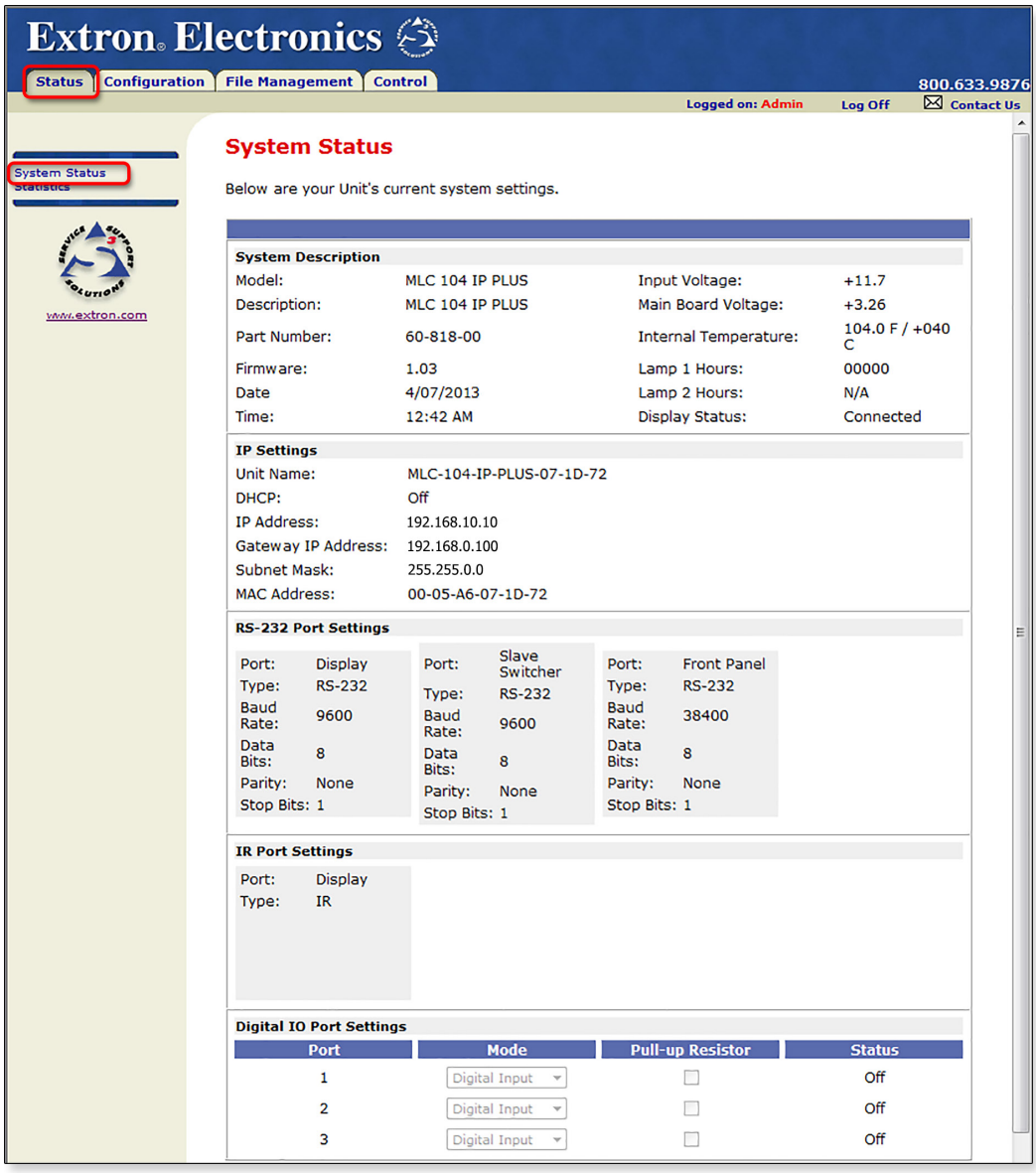


Figure 18. A System Status Embedded Web Page

NOTE: Projector lamp hours reflect time elapsed since the lamp was changed as determined by the driver or events associated with the Display RS-232/IR port on the MLC. Lamp hours can also be viewed using SIS command **6S** (see page 79).

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 Ø 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 version 2.x or higher.

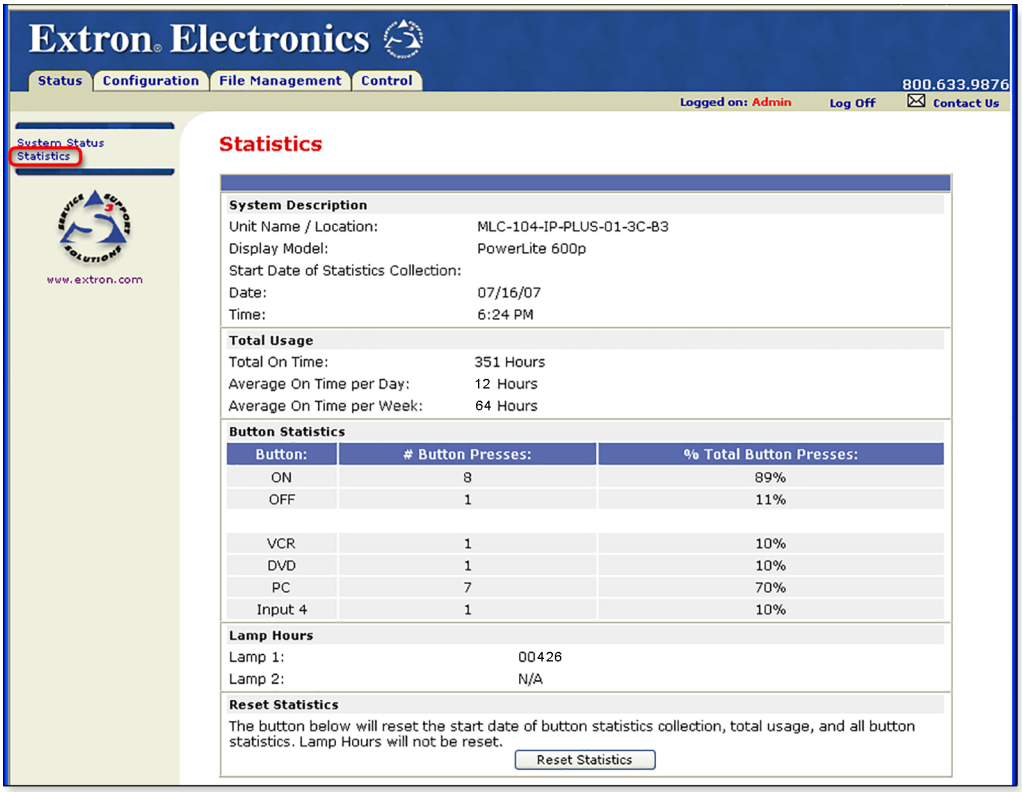


Figure 19. A Statistics Embedded Web Page

Configuration

There are four Configuration web pages, which only administrators can access:

- **System Settings**
- **Passwords**
- **Email Alerts**
- **Firmware Upgrade**

System Settings

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

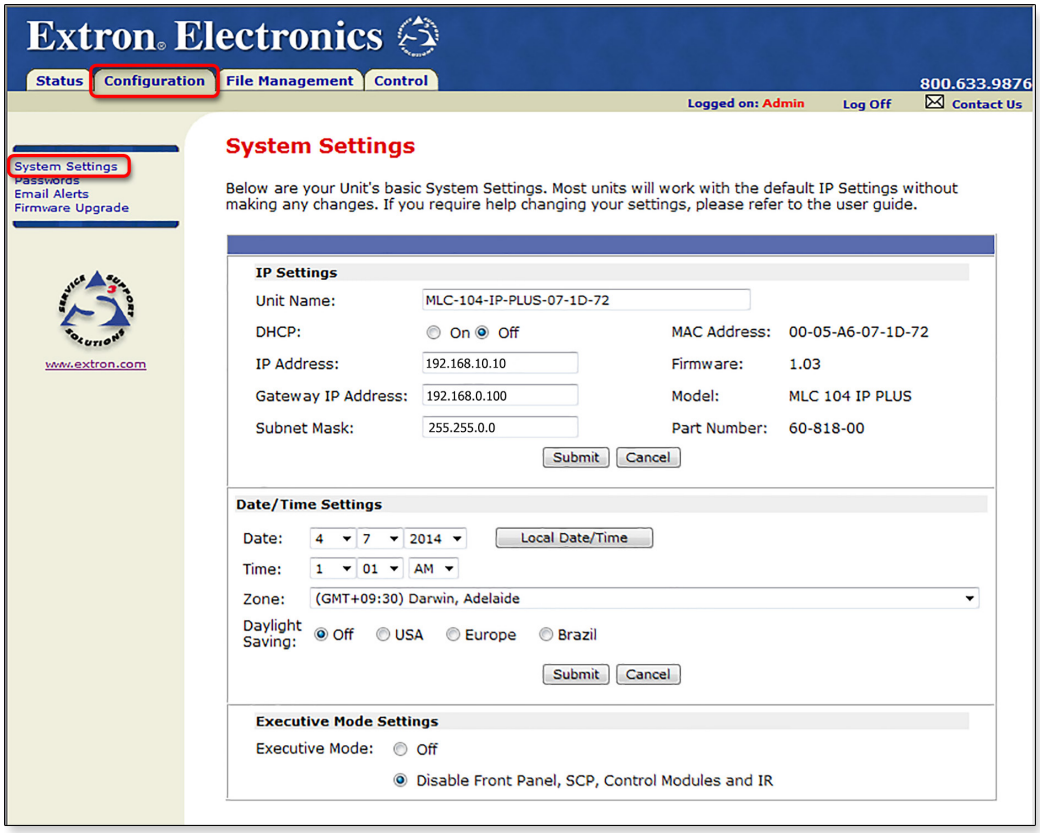


Figure 20. System Settings Embedded Web Page

NOTE: Unit Name is any name (such as Room108MLC104IPplus, Lab1234mlc104 IP, ConfRoomSystem, LectureHall8-cntrlr) that you use to label this specific MLC. The default is a combination of the product name and part of the hardware address. The unit name can be changed to one of your choice using up to 24 alphanumeric characters and hyphens (-). See **Using Global Configurator: Helpful Tips** on page 45 for examples.

- Spaces ( ) and underscores (_) are not permitted within the name of an MLC.
- Valid characters are Ato Z, a to z, 0 to 9, and - (hyphen).
- The name cannot start with a number or hyphen. It cannot end with a hyphen.

Passwords

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

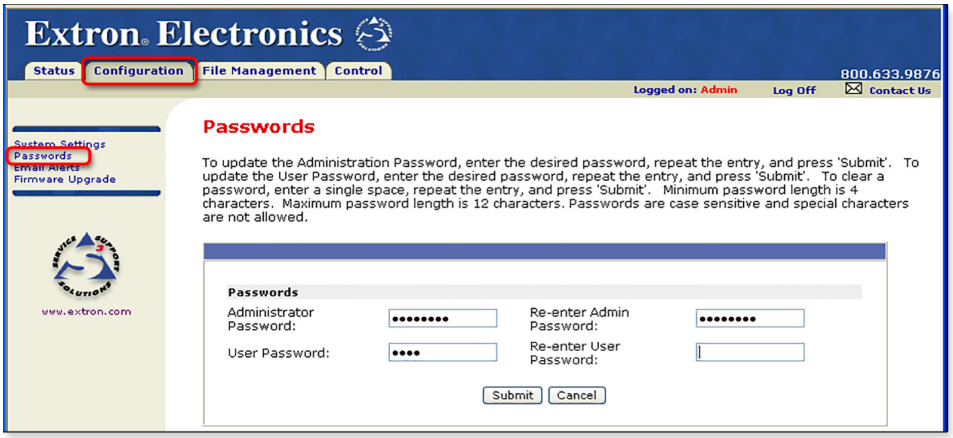


Figure 21. Passwords Embedded Web Page

NOTES:

- The factory configured passwords for all accounts on this device have been set to the device serial number.
- If the device is reset, the password will be the original password configuration, which is no password.
- 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.
- A user password cannot be assigned if an administrator password does not exist.
- If the administrator password is cleared, the user password is also cleared.

Email Alerts

On this page you can specify the IP address and domain name of the web server, set up SMTP verification credentials, and specify e-mail alert recipients' addresses and which e-mail file they are sent.

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

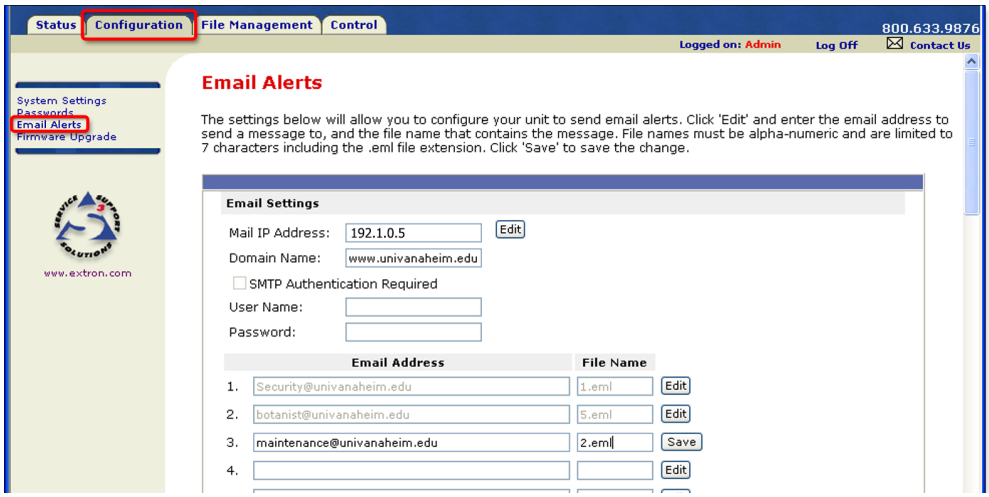
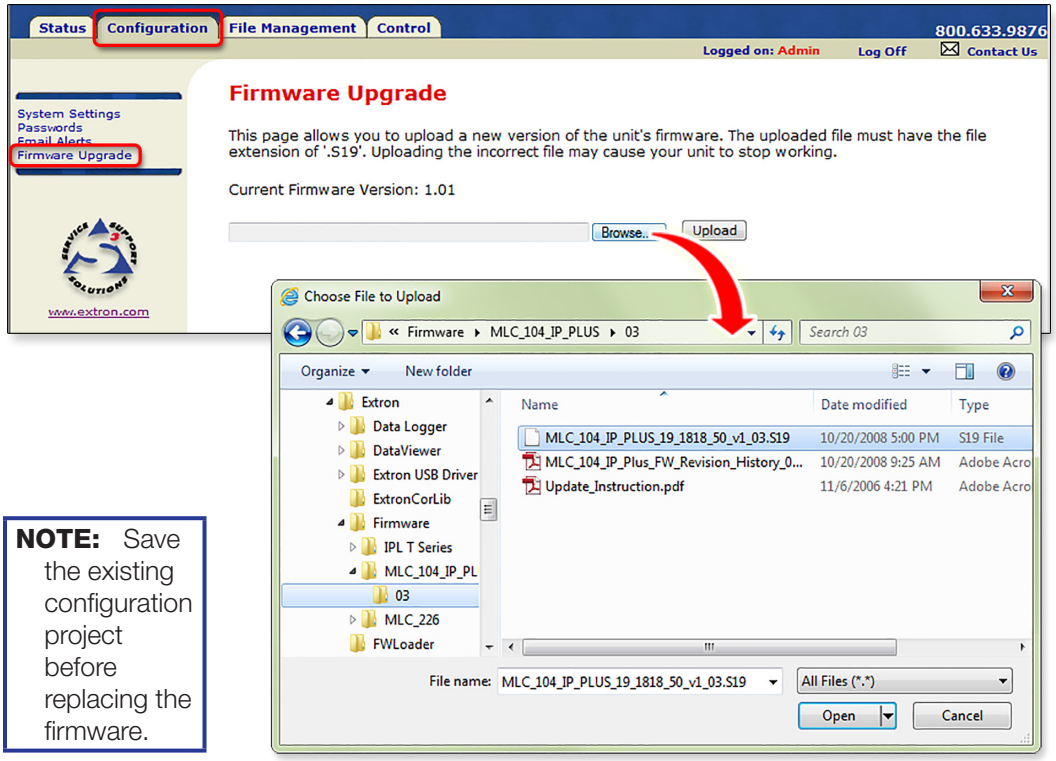


Figure 22. Email Alerts Embedded Web Page

Firmware Upgrade

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



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

Figure 23. Firmware Upgrade Embedded Web Page

NOTE: See the **Firmware Updates** section (page 152) for instructions on how to update the firmware.

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 see **File Types: a Key to Extron-specific File Names** on page 142.

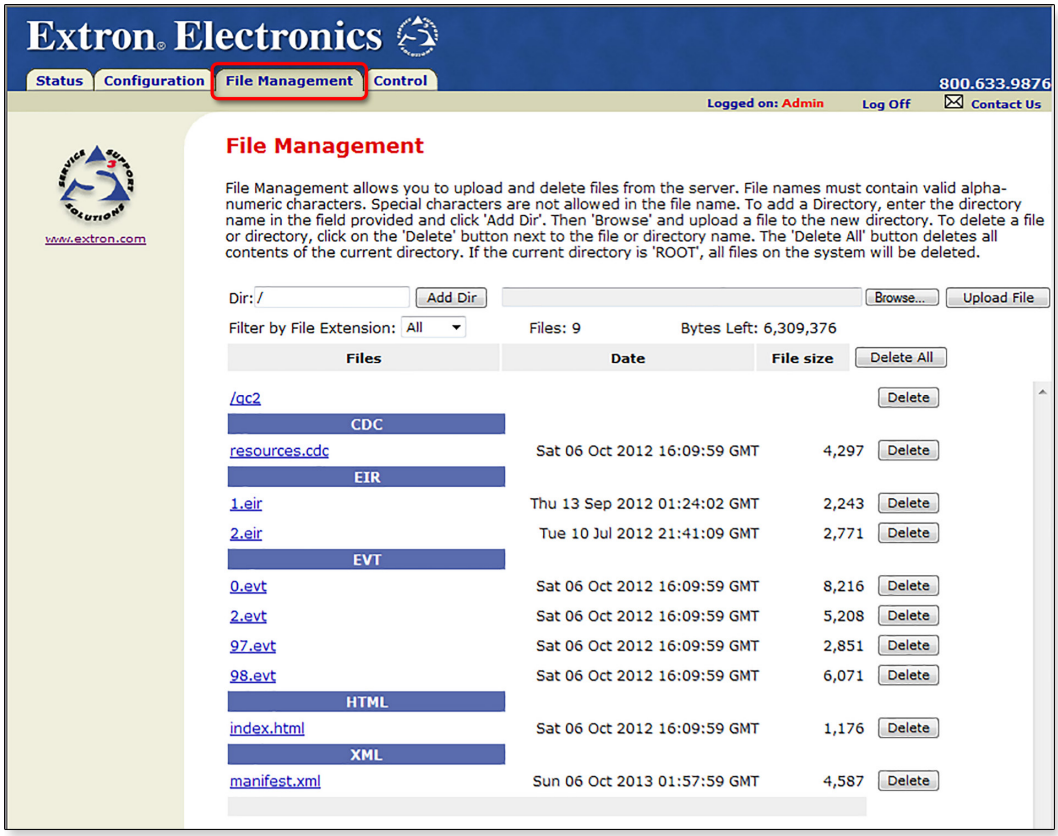


Figure 24. Typical File Management Page with Filtering by File Extension

ATTENTION:

- Files with the .cdc extension (**`___.cdc`** files) should NOT be deleted.
- Les fichiers contenant l'extension .cdc (fichiers __.cdc) NE doivent PAS être supprimés.

ATTENTION:

- **Potential for product malfunction.** Event files (**`__.evt`**) should NOT be deleted. They are necessary for the operation of the controller. **Never** delete the main event file (**`Ø.evt`**).
- **Possibilité de dysfonctionnement du produit.** Les fichiers Événement (__.evt) NE doivent PAS être supprimés. Ils sont nécessaires au fonctionnement du contrôleur. Ne jamais supprimer le fichier Événement principal (0.evt).

You can also view files in subfolders, including those containing GlobalViewer files or IP Intercom files if they have been installed on the MLC. The following screen view shows an example of the file management page for subfolders.

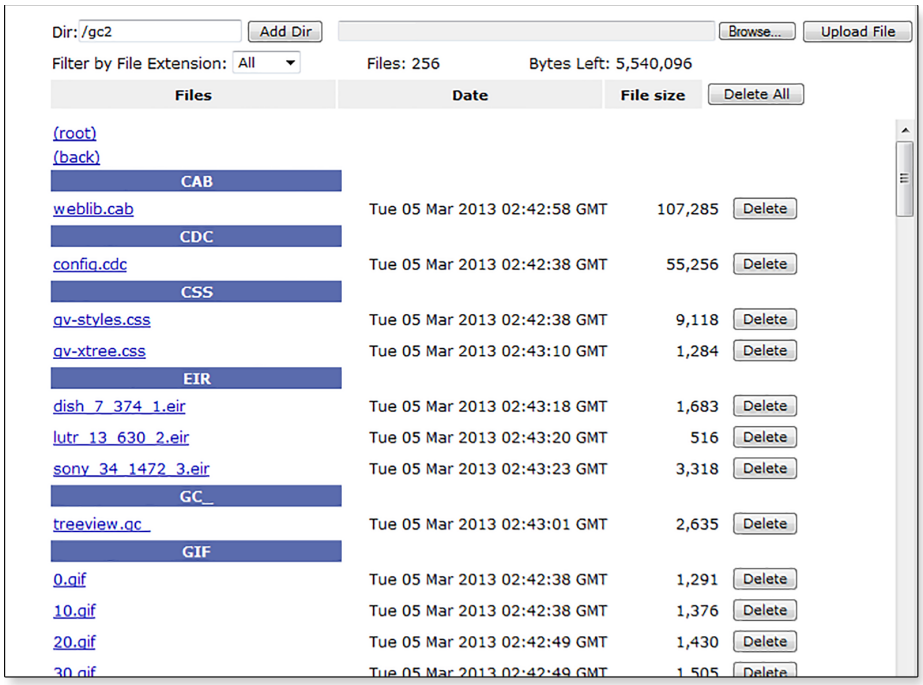


Figure 25. File Management Page For a Subfolder

Control

There are up to seven `Control` web pages, depending on the configuration of the MLC:

- **User Mode**
- **IR Drivers**
- Up to five `Serial Devices` pages (`Display Port`, `Port A`, `Port B`, `Port C`, `MLS Port`)

User Mode

The first of the `Control` web pages, `User` Mode, is a representation of the MLC front panel buttons, volume control, and any optional control modules (IRCMs, CMs) 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 front panel controls and the buttons of any optional attached control modules. See the following example.

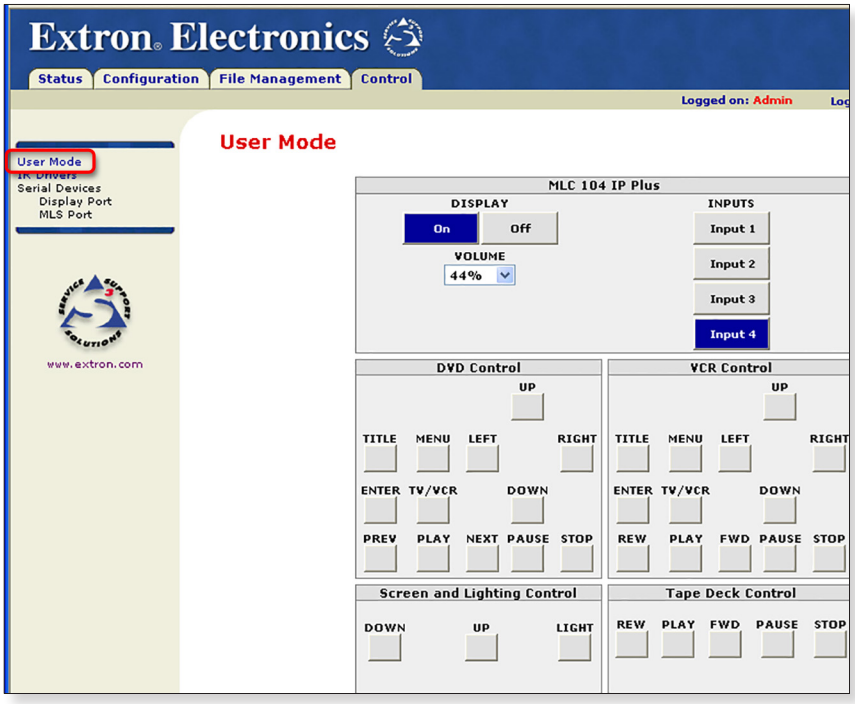


Figure 26. Typical User Mode Embedded Web Page

Web pages that show a more lifelike representation of the MLC front panel and of control modules (as shown in figure 27 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.

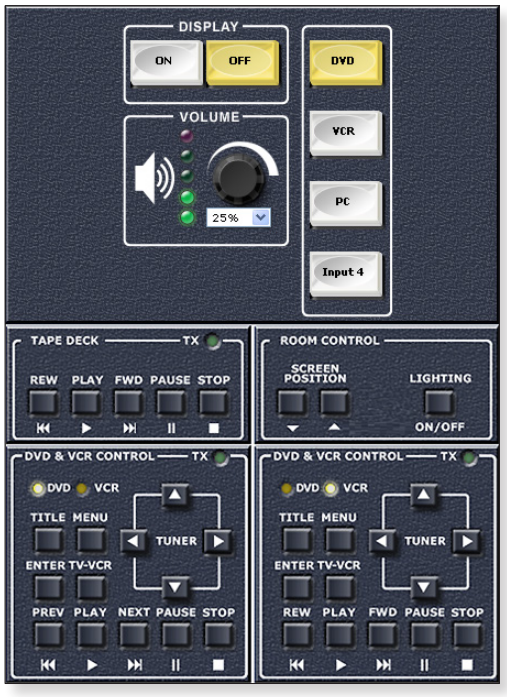


Figure 27. Enhanced User Mode Embedded Web Page

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 them. This page is available only to those logged in with administrator level access.

NOTE: The MLC must first be configured with Global Configurator before this page can be used.

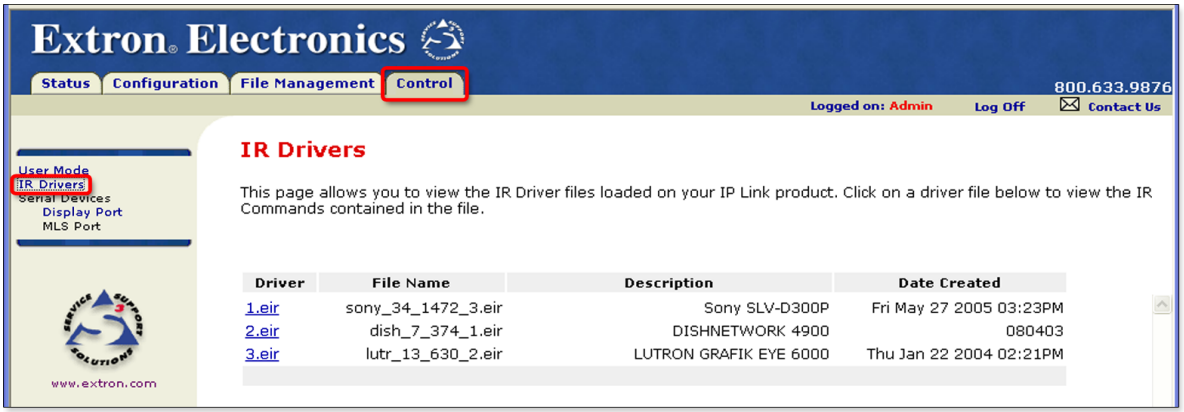


Figure 28. Typical IR Drivers Embedded Web Page

If you click on the name of an IR driver file, the view changes to show the commands for the selected driver. Each command can be selected and sent to the designated IR port.

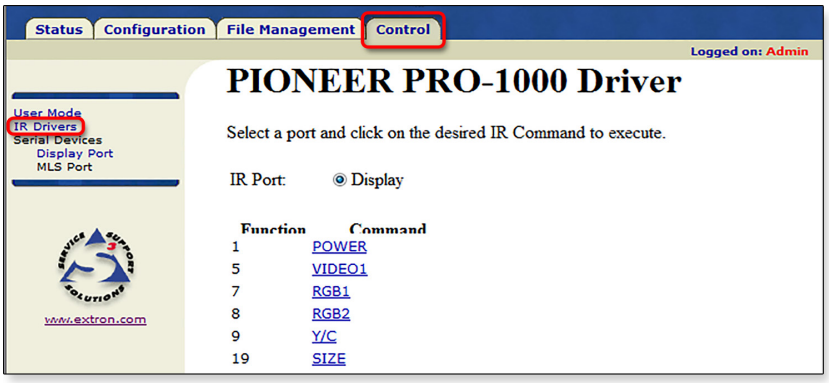


Figure 29. Example of a Page For a Specific IR Driver

Serial Devices (Serial Device Drivers)

Once the ports have been configured via software, each configured serial port (Display port and MLS port) is listed in this section of the `Control` page menu (see image at left).

Click on a port name to open a page that shows the available commands for the device cabled to that port. See the sample screen shots 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 Active X enabled in order to use the control pages for the serial devices.

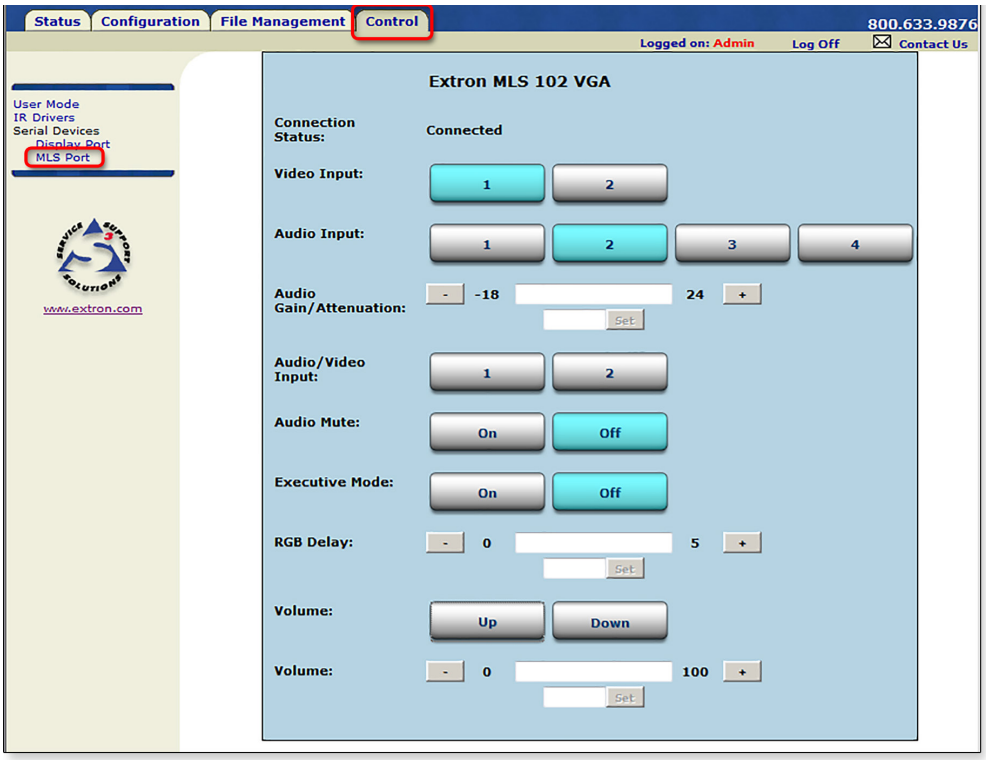


Figure 30. Example Page For an Extron MLS Switcher Connected to the MLS Port When "Disable MLS support (Enable serial driver support)" is Selected in GC

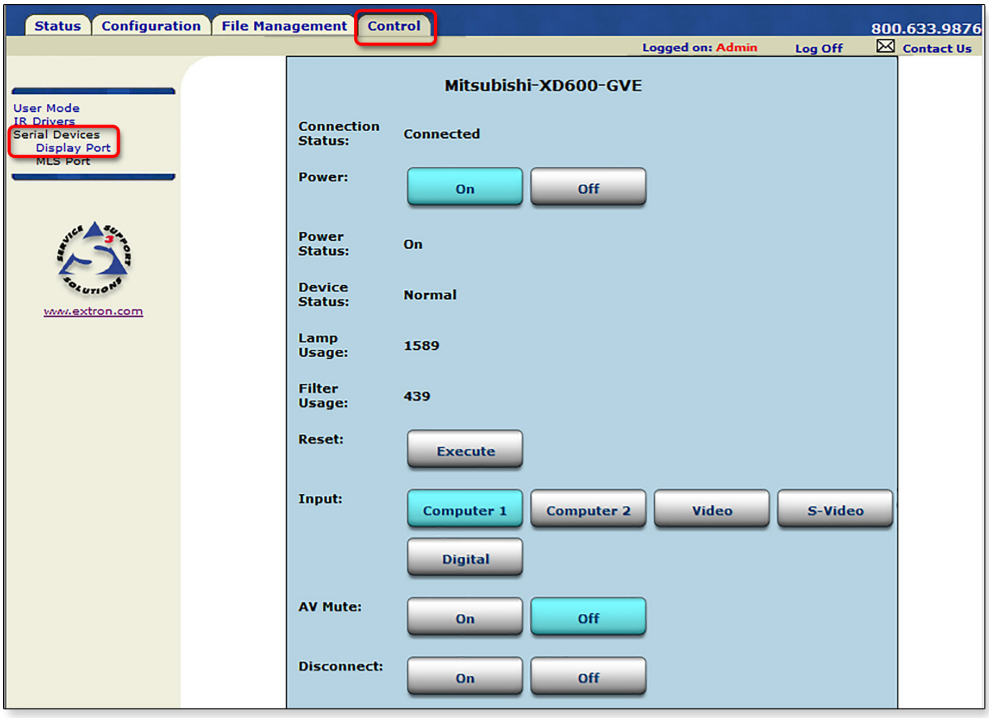


Figure 31. Example Page For a Projector Driver Associated With the Display Port on the MLC

GlobalViewer Web Pages

Once an MLC (or other IP Link-based device) is configured using Global Configurator, GC generates the web browser-based GlobalViewer (GV) application for that unit. Once uploaded to the MLC, the GlobalViewer web pages allow the user to manage, monitor, and control the MLC and the devices connected to it.

NOTE: To work with GlobalViewer web pages, you must use Microsoft Internet Explorer version 6.0 or higher with ActiveX enabled.

See the *Global Configurator Help* file for specific information on how to use the software and perform basic setup tasks.

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, non-administrators (personnel with only user access) are able to access only the Status default web page and some GlobalViewer Control pages.

Four screens for the MLC are available via GlobalViewer: `Control`, `Monitor`, `Schedule`, and `Info` (

). Screens such as `Monitor` and `Schedule` appear only for ports and controlled devices that have been included in specific monitors or schedules that can be set up using GC. The `Info` screen appears for the overall system, not for specific connected devices.

See the *Global Configurator Help* file for details about each screen and how to use the GlobalViewer pages.

The following figures are examples of MLC GlobalViewer pages.

Control

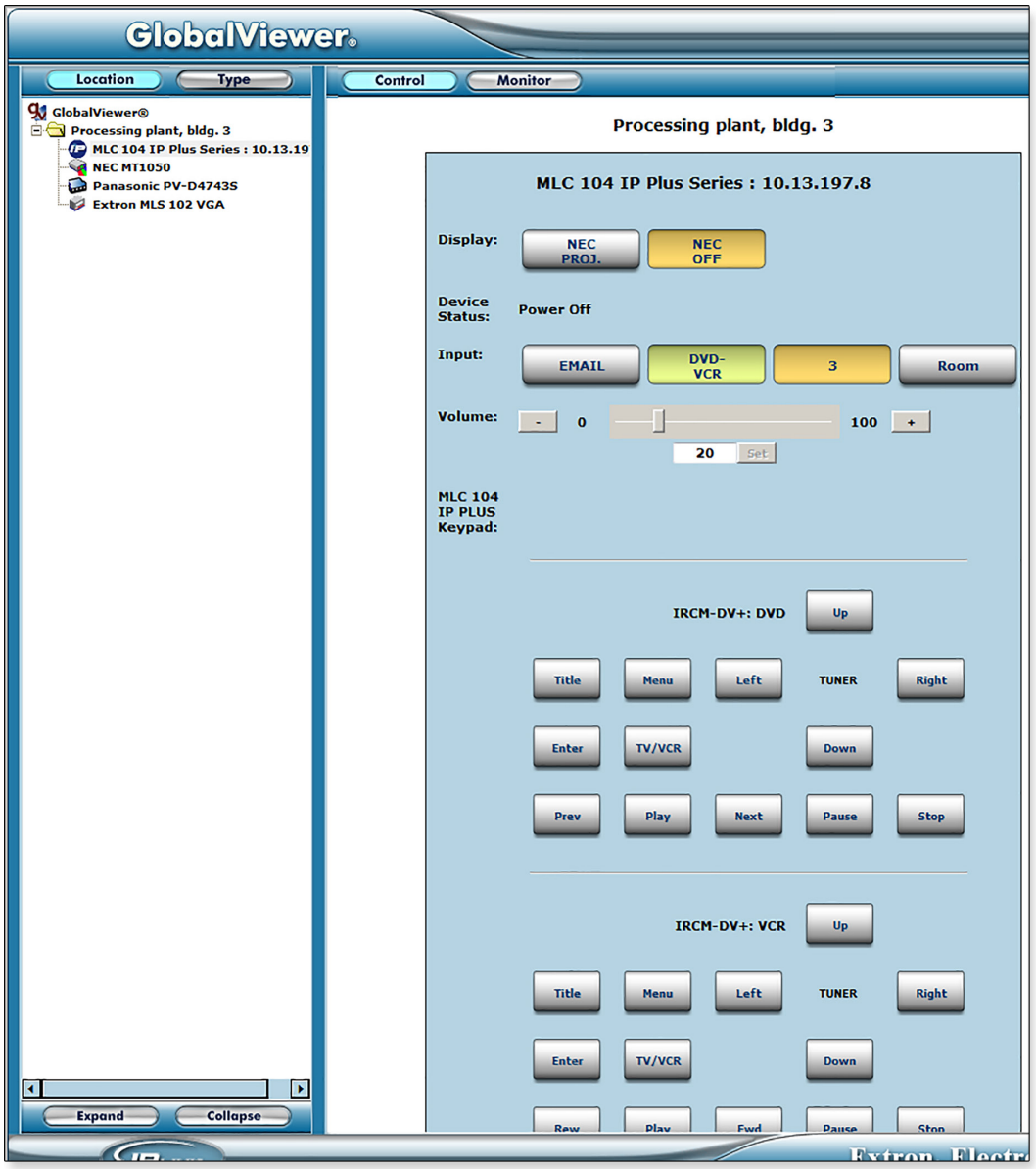


Figure 32. Typical GlobalViewer Control Page

- The `GlobalViewer` tree view area at the left of the screen displays a list of IP Link-based devices in the same network that have GlobalViewer web pages installed. Listed beneath each device are any connected devices that can be remotely controlled or monitored.
- If a device listed in the `GlobalViewer` tree view area on the left of the screen has been set up with an IR or RS-232 driver, click on the name of the device to open a `Control` page that shows the available commands for all of the controlled devices or for that one specific device.
- The larger `Control` window on the right side of the screen functions just like the `Control` embedded web page. It provides buttons that correspond to those on the MLC front panel, volume control, and additional buttons that let you execute any command uploaded for each connected and configured device (the projector or display and input devices).
  You can click the `GlobalViewer` on-screen buttons to send the corresponding command from the MLC to that device.

Monitor

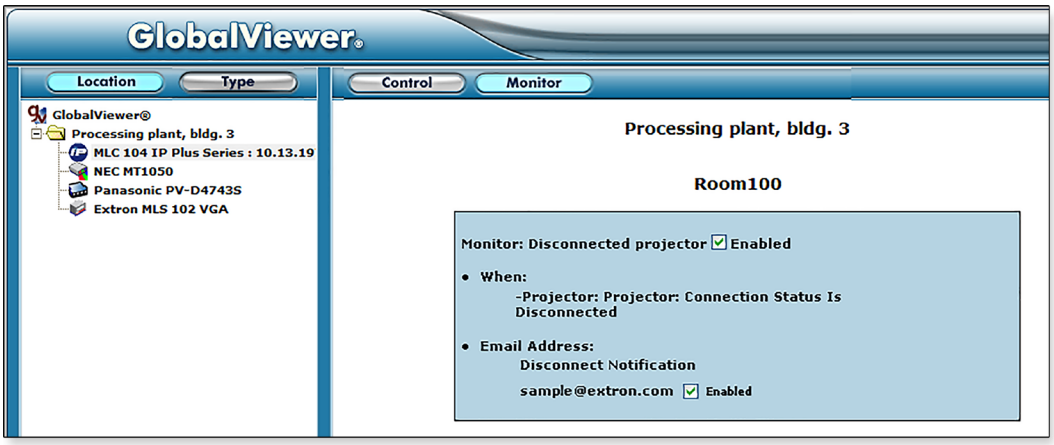


Figure 33. Typical GlobalViewer Monitor Page

- The `Monitor` window on the right side of the screen displays information on what things (projector disconnection, lamp hours, and the like) are being monitored, under what conditions, and who receives an e-mail notification about each condition. This information appears only if the MLC has been configured to monitor such conditions.

Schedule

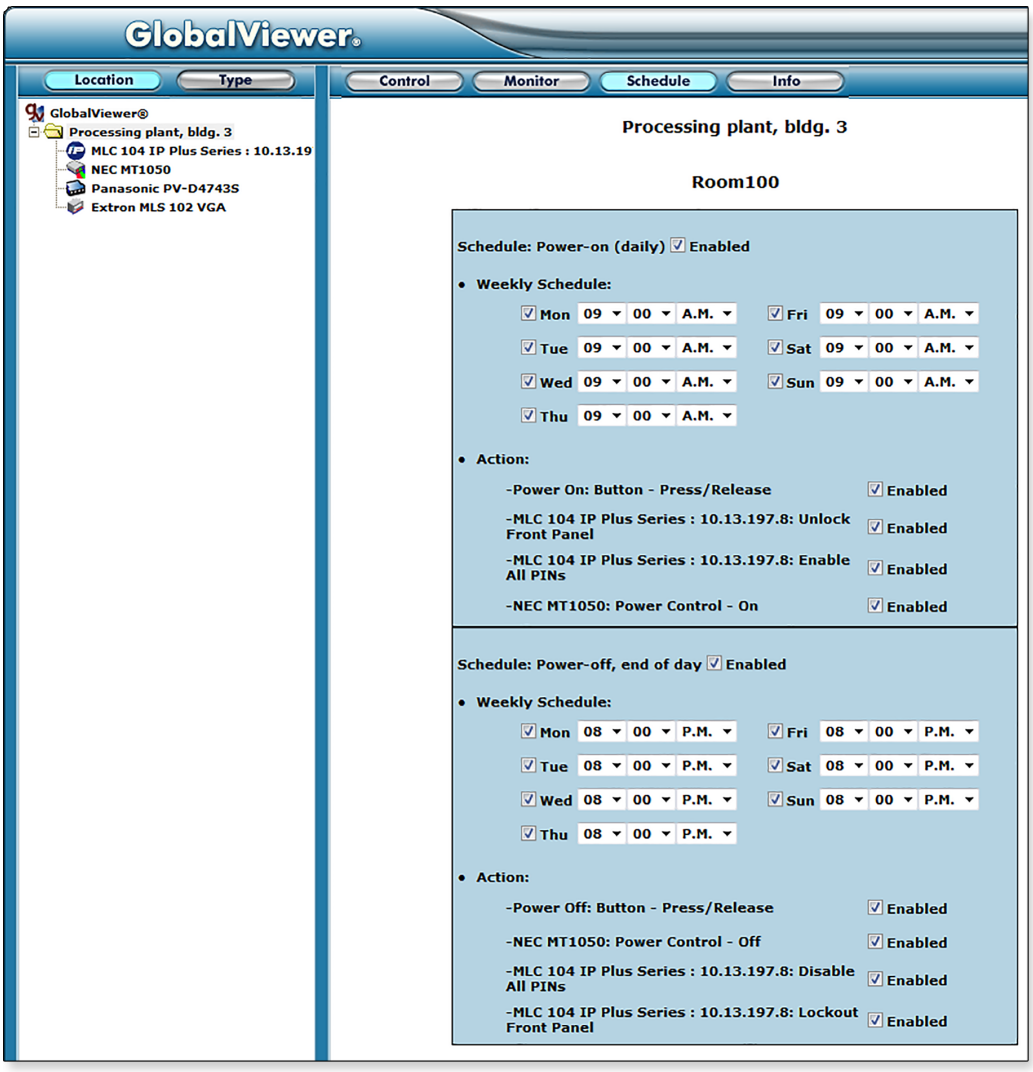


Figure 34. Typical GlobalViewer Schedule Page

- The `Schedule` window on the right side of the screen displays and allows you (if you are logged in as an administrator) to change the times the projector or panel display is automatically powered down each day, and also the times when the MLC front panel controls are locked and unlocked. You can also see what actions are associated with each schedule and to enable or disable each action.

Info

The `Info` window on the right side of the screen displays basic information about the MLC, its IP address, attached devices, display/projector (or other device) connection status, and elapsed projector lamp hours. Projector or display power connection status reflects information the MLC obtains by power polling the display.

NOTES:

- To view the `Info` page, you must click on the location folder (in the GlobalViewer area on the left of the screen) rather than on the device name of the MLC.
- The layout and connection status icons differ depending on the version of Global Configurator and on what devices are connected in a system.

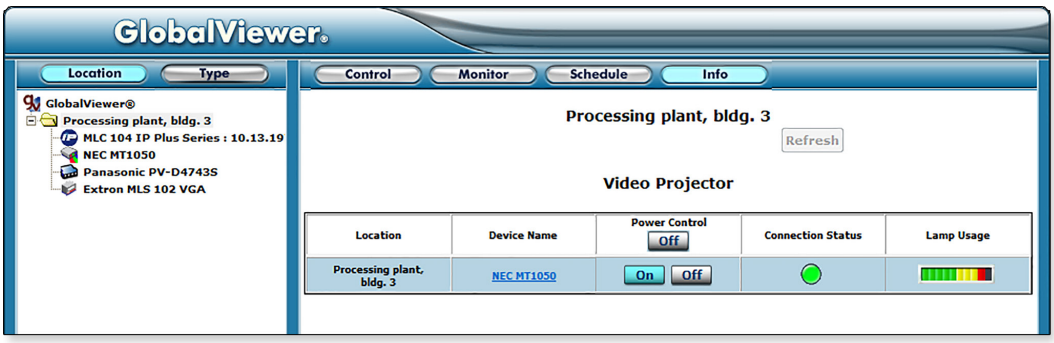


Figure 35. GlobalViewer Info Page Showing One Projector its Status

Customizing the MLC Control Web Pages

Extron offers web page templates that can be customized using standard HTML editing tools or third-party software such as Microsoft® FrontPage® or Adobe® Dreamweaver® 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 specific requirements of your user. For example, a university with dozens of devices and rooms to control may wish to create customized web pages with the school colors and logo of the university. End users can control the system using these customized pages instead of the standard GV pages.

Alternatively, Extron can create a customized 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 turns the following items into files ready to upload to the unit:

- Your GlobalViewer project file containing system configuration details
- Your choice of available color schemes
- Your choice of labels for panel buttons
- A company or institution logo

Visit the Extron website (**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.

Troubleshooting

Turn on the input devices (DVD players, VCRs, PCs, and other sources), output devices (display screens, projectors), the MLC, and the PC. Via a PC, click a control button on the MLC embedded Control web pages. If an input or output AV device cannot be remotely controlled (does not respond as expected), check the following:

Power Connections

- Ensure that all devices are plugged in.
- Make sure that each device is receiving power. The MLC front panel buttons light if the device is receiving power.

Data Connections

1. Check the **cabling** connections and make adjustments as needed. The Link LED on the MLC and on the PC should be lit solid green if a network connection is detected. If these LEDs are not lit, either the cable is faulty or not plugged in, or the wrong type of cable is being used.
2. Try to "ping" the unit by entering `ping 192.168.254.254` at the command prompt, or use the IP or web address provided to you by your system administrator. If you get no response:
   - Make sure your unit is using the appropriate subnet mask (check with your system administrator).
   - Make sure your PC and network do not have a software firewall program that might block the IP address of the MLC unit.
3. If contact is established with the unit, but the MLC web pages cannot be accessed by your web browser, verify (via an Internet network options or preferences menu) that your web browser is configured for direct network connection and is not set up to use a proxy server.

Device Control Connections and Configuration

- Verify that ports are wired correctly and that ground (earthing) wires are connected to the proper pins on the MLC and, if applicable, on the controlled device.
- Ensure that each IR emitter head is placed adjacent to or directly over the IR pickup window on the controlled device.
- Verify that the appropriate drivers were used while creating the GC configuration file and that the correct commands and signal types (IR or RS-232) are associated with the correct ports on the MLC and on the other devices.

If you are still experiencing problems, call the **Extron S3 Sales & Technical Support Hotline**.

SIS Programming and Control

This section covers the following topics:

- **Host-to-MLC Communications** — This section covers protocol and general communication information, error responses, and how to use the command/response tables.
- **Commands and Responses** — This includes both the standard SIS commands that can be sent using either IP or RS-232 communication and the special function commands that can be sent using RS-232 only.

The MLC 104 IP Plus Series controller can be remotely controlled via a host computer or other device (such as a control system) attached to the front panel Config port, or to the rear panel LAN port connected to a shared network.

The MLC must be configured before use. As shipped, the controller can trigger basic input switching on an optional Extron MLS or PVS switcher, but it cannot control any other devices until it has been configured. Set up the MLC or control it by using Extron Simple Instruction Set (SIS) commands or Global Configurator software (version 2.2 or higher), preferably via Ethernet LAN connection. See page 29 in the "Operation, Features, and Cabling" section for **LAN connector pin assignments**. For information on the software and the embedded web pages, see **Software-based Configuration and Control** starting on page 34 and see the help files for the software.

MLC 104 IP Plus RS-232 protocol:

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

NOTE: The configuration port requires 38400 baud communication, a higher speed than many other Extron products use. Global Configurator (version 2.2 or higher) automatically sets the connection for the appropriate speed. If using DataViewer, 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 LAN port defaults:

- **IP address:** 192.168.254.254
- **Gateway 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 a **verbose** 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.

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

`Vol`X8↵ (where X8 is the volume step number)
The unit sends this response when the volume knob is rotated.

`(c) Copyright 2008, Extron Electronics, MLC 104 IP PLUS, Vx.xx, 60-818-00↵`
`Day, DD Mon YYYY  HH:MM:SS↵`
V*x.xx* is the firmware version number.

Example:
`(c) Copyright 2008, Extron Electronics, MLC 104 IP PLUS, V1.03, 60-818-00`
`Tue, 30 Apr 2017 14:34:31`

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 DataViewer or HyperTerminal is open), the connected unit sends these messages via RS-232 when it is first powered on.
- If the MLC is on, it sends the boot and copyright messages when you first open a Telnet connection to the MLC. The day of the week, date, and time are displayed if the unit is connected via Telnet, but not via RS-232. If you use a Telnet connection, the copyright message, date, and time may be 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

NOTE: The factory configured password for all accounts on this device have been set to the device serial number. In the event of a complete system reset, the password converts to the default, which is no password. Passwords are case sensitive.

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↵`", "`*****↵Login Administrator↵`", or "`*****↵Login User↵`", depending on the password entered. If passwords are the same for both administrator and user, the unit defaults 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) or parameter
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 a colon and a 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 yield an E14 (not valid for this configuration) response if the current configuration of the unit does not support that command.

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

[24] = Commands that yield 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 yield an E28 (file not found) response.

Commands and Responses

Using the Command/Response Tables

The MLC can be controlled via either a Telnet (port 23) or RS-232 connection using ASCII commands, or via a web browser (port 80) connection using URL-encoded commands. The ASCII and URL commands listed in the **tables** starting on page 77 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 below is for use with the command/response tables.

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 responses of the MLC to the host, and a description of the function of the command or the results of executing the command.

ASCII to Hex Conversion Table

Space →	20	!	21	"	22	#	23	$	24	%	25	&	26	'	27	Esc	1B
(	28	)	29	*	2A	+	2B	,	2C	-	2D	.	2E	/	2F	CR	0D
0	30	1	31	2	32	3	33	4	34	5	35	6	36	7	37	LF	0A
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		

Figure 36. ASCII to Hex Conversion Table

Entering SIS Commands: Helpful Tips

- 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. For example: `8V` = `Ø8V` = `ØØ8V.`
- 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 (such as `http://192.168.1ØØ.1Ø/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 are misinterpreted by the MLC. For example, the ASCII command `+V` must be encoded as `%2BV` for web browser use.

Character Type	Examples
Alphanumerics	0-9 a-z A-Z
Special characters	$ _ . + ! * ( ) ,
Reserved characters	‘ / ? : @ = & When used for their reserved purposes, these characters do not require encoding within a URL.

Reserved Characters
(for web encoding purposes)

Character	Hex	Dec
$ dollar	24	36
& ampersand	26	38
+ plus	2B	43
, comma	2C	44
/ forward slash/virgule	2F	47
: colon	3A	58
; semicolon	3B	59
= equal	3D	61
? question mark	3F	63
@ “at” symbol	40	64

- 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 is be directed to a specified port and **must** be hex encoded if non-alphanumeric.

NOTE: If you make adjustments (such as changes to volume), whether via the front panel or via RS-232 or IP communication, it takes up to 1 minute 40 seconds (100 seconds) for the data in the RAM of the MLC 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)
(for URL-encoded commands, use **W** instead of **Esc**)

X1 = Specific port number
1 = front panel Config (RS-232 host) port
2 = Display RS-232/IR (display/projector) port
3 = MLS port (peripheral or auxiliary switcher)
0 = reserved

> **NOTE:** Port numbers are two ASCII characters (2 bytes) in the response. For example, port 1 is represented as 01 (hex 30 31).

X2 = Command data section.

> **NOTE:** **For web encoding only**: data is directed to the specified port and **must** be encoded (URL encoding) if it is non-alphanumeric. Change any **non-alphanumeric** character (%, +, |, ←, and the like) 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; for example, `x.xx`)

X12 = MLC unit 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 or hyphen.

X13 = Local date and time format

Set format (MM/DD/YY-HH:MM:SS).
Example: `01/15/18-10:54:00`.

Read format (day of week, date month year HH:MM:SS).
Example: `Thu, 02 May 2018 09:59:43`.

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

X15 = Email 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). The MAC address is shown on a label on the top of the unit.

X19 = Subnet mask (xxx.xxx.xxx.xxx). Leading zeros are optional in setting values in each of the 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.)

See the note for X17, as it pertains to this variable, as well.

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/tagged response mode status:

NOTE: In verbose/response mode, the device (the MLC) responds with more information than it usually would. For example, the MLC can send out a notice of a change in some setting without receiving a query via your PC. That change could have been a result of an internal process (a script execution), a selection made using a touchpanel or keypad, a change made using GV or a web page, or input from a connected sensor or switch.

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.

0 = clear, default for Telnet connections
1 = verbose mode is on (enabled)
2 = verbose mode is off, tagged responses are sent for queries (tagged responses are enabled)
3 = verbose mode is on (enabled) and tagged responses are enabled and sent for queries

X22 value	Verbose Responses **Receive unsolicited responses (messages) for all actions** initiated via any source (touchpanel, port input, internal web page changes, or commands) instead of only for SIS commands	Tagged Responses **Receive tagged responses to read/view requests** (Responses to SIS commands are always tagged. Turning tagged responses on adds tags to the responses to SIS read requests.)
0		
1	✓	
2		✓
3	✓	✓

See the **verbose mode command** (Esc CV ←) on page 88 within the IP commands section in the command/response table for a brief explanation of what this communication mode is and what it does.

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

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 (default), 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: use alpha-numeric characters. Passwords are case sensitive. Disallowed characters are shown below.

Character		Hex	Dec
	Space	20	32
‘ “	Quotation marks	22	34
<	“Less than” symbol	3C	60
>	“Greater than” symbol	3E	62
#	Pound (hash mark)	23	35
%	Percent	25	37
{	Left curly brace	7B	123
}	Right curly brace	7D	125
|	Vertical bar / pipe	7C	124
\	Backslash	5C	92
^	Caret	5E	94
~	Tilde	7E	126
[	Left square bracket	5B	91
]	Right square bracket	5D	93
`	Grave accent	60	96

NOTES:

- The factory configured password for all accounts on this device have been set to the device serial number. In the event of a complete system reset, the password converts to the default, which is no password.
- A user password cannot be assigned if no administrator password exists; the E14 error code is 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** (default)
1 = **USA on** – 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.
3 = **Brazil on**

X35 = Event number: 0 - 99
This is 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 unit 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 has been cleared.

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 address of recipient (such as *JDoe@extron.com*) for the person to whom messages are sent. The e-mail address has a 31 character maximum.

X47 = Name (for CR commands) or numeral (1 - 999, for SM commands) of the e-mail file to be sent

NOTE: E-mail files must have a file extension of `.eml`. The first line of the file is the subject, the rest is the body of the e-mail.

X49 = Default name: a combination of the model name and the last 3 pairs of the MAC address of the unit (for example, `MLC-1Ø4-IP-PLUS-Ø2-74-62`)

X52 = Security level of the connection:
0 = not logged in
11 = user
12 = administrator
The response includes leading zeros.

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
The response includes leading zeros.

NOTE: Send the command again with mode = 0 to stop mode 1 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).

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 (0 - 65535) to insert into an e-mail message if an *.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 Ø 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. If a password is set, the response is not the actual password characters but asterisks (****).

X200 = Specific input number (1 – 4)
1 = input 1
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 97 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 98 for details.

X215 = IR (IR/serial) output port number
1 = projector/display port

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

X217 = Firmware 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

Default port numbers for direct port access (serial ports):
2001 = front panel Config port
2002 = Display RS-232/IR (projector port)
2003 = MLS (peripheral switcher) port

See page 90 for the **SIS commands** and see page 50 for more about **direct access**.

NOTE: For commands and examples of computer or device responses mentioned in this guide, the character "Ø" is used for the number zero and "O" represents the capital letter "o".

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	ØP	ØP	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 display power status	X208*ØP	X208%2AØP	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, Ø = display power is off 1 = display power is on 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 events for the buttons.				
Display mute				
NOTE: The 1M and ØM commands emulate the Display Mute On and Display Mute Off buttons of a remote control. You must program these buttons on the remote for the 1M and ØM commands to function.				
Turn display mute on	1M	1M	Mut X216 ↵	Mute. X216 = Ø (off), 1 (on), or 2 (unknown).
Turn display mute off	ØM	ØM	Mut X216 ↵	Unmute.
View display mute status	M	M	X216 ↵	Show display mute status.
Set mute status	X216*ØM	X216%2AØM	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]	X8V	X8V	Vol X8 ↵	This command sets a specific volume level for the audio output either at the display device or via an optional peripheral Extron MediaLink (MLS) switcher. X8 = volume level (Ø to 1ØØ). Default volume = 25. When no MLS is detected at the MLS port, the maximum volume level is limited by the **max. volume range command** (X? *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.
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).				
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. This is **not** the same as selecting input Ø.
Mute off	ØZ	ØZ	AmtØ ↵	Unmute all audio outputs.
View the audio mute status	Z	Z	X5 ↵	Show the status of audio mute. X5 = Ø (off) or 1 (on).
Front panel security lockout modes (executive modes)				
Disable lockout modes[24]	ØX	ØX	Exe Ø ↵	Default setting. Adjustments and selections can be made from the front panel in addition to via RS-232, Telnet, DataViewer,or web browser. [24] = The MLC responds with an E24 error (privilege violation) if the connected user is not logged in at administrator security level.
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 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	Ø↵	*Example:* executive mode is off.
Status commands (an assortment)				
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 the status of a lamp 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%2A6S	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). [24] = The MLC responds with an E24 error (privilege violation) if the connected user is not logged in at administrator security level.
Set lamp hours status for 2 lamps[24]	X205*X205*6S	X205%2AX205%2A6S	Lhr*X205*X205↵	
Set display connection status[24]	X216*7S	X216%2A7S	PcsX216↵	This command resets the projector/display connection status flag (X216) used by scripts. Ø = projector not connected. 1 = projector is connected. 2 = undetermined status.
View connection status	7S	7S	X216↵	This command lets you know whether the MLC scripts have determined if the display is still connected to the MLC. X216 = Ø (disconnected), 1 (connected), or 2 (unknown).
View all voltages and temperature status	11S	11S	*responses from commands* 12S•13S•14S•15S•16S•2ØS↵	View all voltages and the internal temperature of the MLC at once. See the following six commands below.
View +12 V power supply voltage	12S	12S	+X206↵	Display the operating voltage of the power input to the MLC. 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↵	
View +1.5 V FPGA voltage	15S	15S	+X206↵	
View internal temperature status	2ØS	2ØS	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 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

Esc X1 * X17 * X20 * X21 RS ← X2

W X1 %2A X17 %2A X20 %2A X21 RS | X2

response from command ↵

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, b) be nonzero, or c) both be omitted.

NOTE: **For web encoding** for X2, convert non-alphanumeric characters to hex numbers. A space (hex = 2Ø) is encoded as %2Ø. A plus sign (hex = 2B) is encoded as %2B.

Example:

Esc Ø5*4*7*3L RS ←*<data>*

WØ5%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 when using a delimiter (D).

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	(	)	*	+	,	-	.	/	Ø	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

X1 = Specific port number (01-99):
- 1 = front panel Config (RS-232 host) port
- 2 = Display RS-232/IR (projector) port
- 3 = MLS port (peripheral or auxiliary switcher
- Ø = reserved or all ports.

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 = 1Ø = 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. X21:
- **L** indicates the length of the message to be received.
- **D** indicates the delimiter value that ends the response.
- # = byte count (for L) or a single ASCII character expressed in decimal form (for D). Byte count # can be from Ø to 32767, default = Ø. The ASCII decimal delimiter # value can be from Ø to ØØ255, default = ØL.

For #L, # is a regular ASCII (character) numeral. If the length is 50 bytes, # = 5Ø.

For #D, # can be any character(s) or number(s), but it is translated into decimal format for use in the command.

Examples: A 3-byte message length = 3L. A delimiter of $ would be entered as 36D (36 is the decimal equivalent of the dollar sign). A delimiter of ASCII ØA = 1ØD (line feed).

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. X1 = serial port number: Ø1 = front panel Config (RS-232 host) port Ø2 = Display RS-232/IR (projector) port Ø3 = MLS port (peripheral or auxiliary switcher ØØ = reserved or all ports. X25 = baud rate (300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600, 14400, 19200, 28800, 38400, 57600, or 115200 baud). X26 = parity (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).
	NOTE: The MLC does not support flow control.			
Example:	Esc 4*96ØØ,N,8,1CP ←	W4%2A96ØØ%2CN%2C8%2C1CP |	Cpn4•Ccp96ØØ,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 , X28 ↵	
Example	Esc 2CP ←	W2CP |	96ØØ,N,8,1 ↵	
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: Ø = 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 ↵	
Ethernet port configuration and use				
	NOTES: • X69 and these timeout period commands are 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. • If no data is received during the specified period, the Ethernet connection closes.			
Set current Ethernet connection timeout period[24]	Esc Ø* X69 TC ←	WØ%2A X69 TC |	Pti0* X69 ↵	X69 = IP timeout period specified in 10-second steps (1 - 65000, default = 3Ø = 300 seconds). Responses include leading zeros.
	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.			
View current connection timeout period[13]	Esc ØTC ←	WØTC |	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
Set global Ethernet connection timeout period[24]	Esc 1*X69TC↵	W1%2AX69TC|	Pti1*X69↵	The global port timeout is the default timeout period for all Telnet sessions.
	NOTE: You must be logged in as an administrator to change this setting.			
View global connection timeout period	Esc 1TC↵	W1TC|	X69↵	
IR port use				
The following variables are used for these IR port commands: X215 = IR output port number: Ø1 = projector/display port Port numbers are two ASCII characters (2 bytes). For example, port 1 is represented as Ø1 (hex 3Ø 31). X57 = the IR file number (Ø-99), as in files 1.eir, 2.eir, 3.eir, and so on, stored in the controller. Each .eir file contains commands for a specific device.			X58 = IR playback function number (1-137), of a specific function or command set contained within the file. IR function numbers Ø and 127 or higher can return information only. Ø = return all data 129 = manufacturer 13Ø = 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 Ø = play once 1 = play continuously 2 = stop.	
Send an IR command[28]	Esc X215,X57,X58,X59IR↵	WX215%2CX57%2CX58%2CX59IR|	IrsX215,X57,X58,X59↵	Send an IR command via IR output port number X215. The response includes leading zeros.
	NOTE: To stop mode 1 IR command playback (continuous playback), send the IR command again but with playback mode (X59) = 0.			
Get IR command info[13, 28]	Esc X57,X58IR↵	WX57%2CX58IR|	{*descriptive text*}↵	The response to this command is the name/description (such as Power On, Power Off, Enter, Play, Stop, RGB, Menu) of the specific command you ask about.
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
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%2AX40%5B	IomX223*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: Ø = 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 digital I/O port on the MLC can drive devices such as relays and LEDs. When set for **power sensor**, the input state is triggered when an optional power sensor connected to the power sense port detects a state change.				
View the digital I/O mode	X223[	X223%5B	X40↵	
Pulse the digital I/O state[14]	X223*3*X63]	X223%2A3%2AX63%5D	SioX223*X43↵	Briefly change the I/O state. X63 = Pulse time in 20 ms per count. If this parameter is missing or = Ø, then pulse length = default (25 = 500 ms). 65535 (1310 s) = max. pulse time. X43 = I/O state: Ø = 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.				
Toggle the I/O state[14]	X223*2]	X223%2A2%5D	SioX223*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	SioX223*1↵	
Set the I/O state to off[14]	X223*Ø]	X223%2AØ%5D	SioX223*Ø↵	
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: Responses to commands differ depending on which, if any, verbose response mode the MLC is in. See the **CV command** (Esc X22 CV↵, page 88) under IP setup commands later in this table.				
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.				
Query firmware version number	Q *or* 1Q	Q *or* 1Q	X11↵ *or* Ver01*X11↵	Show the firmware version (X11) of the MLC 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 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)-1.03*(1.74-MLC104IP -Tue, 25 May 2010 19:36:27 GMT)↵	
Query firmware version	1Q	1Q	X11↵ *or* Ver01*X11↵	This command shows the currently-running firmware.
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	2.16↵	
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 the "Operation, Features, and Cabling" section).
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, dated 16 January 2003.
NOTE: 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 page 31 in "Operation, Features, and Cabling").				

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	1.03*(1.74-MLC104IP	-Tue, 25 May 2010 19:36:27 GMT)↵ In this example the current firmware version is 1.03, the IP Link kernel version is 1.74, and the last firmware upload was on May 25, 2010.
NOTE: Responses to commands differ depending on which, if any, verbose response mode the controller is in. See the **CV command** (Esc X22 CV↵, page 88) 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 part number	N	N	60-818-00↵ *or* Pno60-818-00↵	Show the MLC base part number. This indicates the basic controller, regardless of faceplate.
Request the AV input number[14]	I	I	Chn X200↵	Show which input (X200) is active (selected). X200 = 1 = input 1, 2 = input 2, 3 = input 3, 4 = input 4. 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 (the basic name, regardless of model).
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.
Example:	3I	3I	Inf03*7680 Bytes Used out of 1024 KBytes↵	
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	1099264 Bytes Used out of 7104 KBytes	

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
Request status of attached hardware	32I	32I	P1##•P2##•K1##•K2##•K3##•K4##•S**↵ *or* P1##•P2##•K1##•K2##•K3##•K4##•S**•IPI???↵	Show the absence of or types of connected devices.

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 peripheral MLS switcher.

For ##:

ØØ = not present	Ø8 = IRCM-Tape
Ø1 = present (SCP) *or* IRCM-VCR	Ø9 = CM-5BB
Ø2 = IRCM-DVD	1Ø = CM-20BB
Ø3 = IRCM DVD+	11 = IRCM-DV+
Ø4 = ACM-Level	12 = CM-9BLB
Ø5 = ACM-Tone	13 = CM-3BLB
Ø6 = RCM-SC	14 = CM-19AC
Ø7 = RCM-SCLT	99 = a device is present, but unrecognized.

For ** :

ØØ = not present	11 = MLS 304MA
Ø1 = MLS 306	12 = MLS 406
Ø2 = MLS 506	13 = MLS 406MA
Ø3 = MLS 506MA 70 V	14 = MLS 406SA
Ø4 = MLS 506SA	15 = MLS 304SA
Ø5 = MLS 506MA 100 V	16 = PVS 204SA
Ø6 = MLS 100 A	17 = PVS 204SA Plus
Ø7 = MLS 103 V	
Ø8 = MLS 103 SV	
Ø9 = MLS 102 VGA	99 = unrecognized.
1Ø = MLA-VC10	

Examples:	32I	32I	P1Ø1•P2ØØ•K1Ø2•K2Ø1•K3Ø8•K4Ø7•SØØ↵	This example includes one SCP (**P1Ø1**), an IRCM-DVD (**K1Ø2**), an IRCM-VCR (**K2Ø1**), an IRCM-Tape (**K3Ø8**), and an RCM-SCLT (**K4Ø7**). There is no peripheral switcher.
	32I	32I	P1ØØ•P2Ø1•K111•K211•K3Ø2•K4Ø1•SØ9↵	This example includes one SCP (**P2Ø1**), an IRCM-DVD+ (**K111** and **K211**), an IRCM-DVD (**K3Ø2**), an IRCM-VCR (**K4Ø1**), and an MLS 102 VGA (**SØ9**).
IP setup commands				
Set the unit name[24]	Esc X12 CN↵	W X12 CN|	Ipn• X12↵	Change the MLC unit name to one of your choosing (X12), such as "AuditoriumMLC", "Rm316-AVcenter", or "exec-boardroom-ctrl".
Set unit name to factory default[24]	Esc •CN↵	W%2ØCN|	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 MAC address of the controller (for example, MLC-1Ø4-IP-PLUS-Ø2-74-62).
Read the unit name	Esc CN↵	WCN|	X12↵ *or* X49↵	X12 is the current, user-defined unit name of the MLC. X49 is the factory default name of the MLC.

NOTE: 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). Spaces may not be used. Either case (upper, lower) is OK.

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:* Ø1/31/11-1Ø:54:ØØ.
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:* Thu, Ø2 May 2Ø13 14:59:35.
Set GMT offset[24]	Esc X3 CZ↵	W X3 CZ|	Ipz X3↵	Set the Greenwich Mean Time (GMT) offset value (X3) for the location of the MLC installation. The leading zero is optional. For example, 5:30 = Ø5:3Ø. Do not use a plus (+) sign if the GMT offset is positive.
	GMT offset (-12.00 to +14.00) represents the time difference in hours and minutes (+/-hh:mm) relative to Greenwich, England.			
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. **Ø = off/ignore** (default) **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. **3 = Brazil on**.			
Read daylight saving time	Esc CX↵	WCX|	X34↵	
Set DHCP on[24]	Esc 1 DH↵	W1DH|	Idh 1↵	
Set DHCP off[24]	Esc Ø DH↵	WØDH|	Idh Ø↵	
	NOTE: Changing DHCP from on to off also resets the IP address to the factory default (192.168.254.254).			
View DHCP on/off mode	Esc DH↵	WDH|	X5↵	X5 = Ø (off, default) 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 (ØØ-Ø5-A6-xx-xx-xx).
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↵	

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
Get a connection listing	Esc CC ←	WCC|	{*number of connections*}↵ *or* Icc{*number of connections*}↵	Display the number of currently active IP client connections.
Example:	Esc CC ←	WCC|	Ø02↵	*Example:* This shows two client connections.
Set verbose/response mode[24]				

This command controls both verbose responses/messages and tagged (labeled) responses.

Verbose mode is a communication mode in which the device responds with more information than it usually would. For example, the MLC can send out a notice of a change in some setting without receiving a query via your PC. That change could have been a result of an internal process (a scheduled script execution), a selection made using a touchpanel or keypad, a change made using GV or the embedded web pages of the device, or input (a voltage or resistance change at a port) from a connected sensor or switch. That is an example of a verbose (wordy) relationship between the control processor and a connected device.

- With verbose mode **off**, you receive no notification of those changes or events.
- With verbose mode **on**, you receive status messages, such as X85↵ when the switched power ports change from normal operation to an overload state, or X5↵ when a relay is opened, closed, or toggled. These are not replies to a command that you send, but they are unsolicited messages that are generated by the equipment.

NOTE: 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.

- By default, when the MLC is connected via Ethernet, verbose mode is disabled in order to reduce the amount of communication traffic on the network.
- For a direct RS-232 connection, the controller is set for verbose mode by default.
- If you want to use the verbose mode (other than mode Ø) with a controller, this mode must be set to "on" each time you reconnect to the controller.

X22 value	Verbose Responses: Receive unsolicited messages for all actions initiated via any source (touchpanel, port input, internal web page changes, or commands) instead of only for SIS commands	Tagged Responses: Receive tagged responses to read/view requests (Responses to SIS commands are always tagged. Turning tagged responses on adds tags to the responses to SIS read requests.)
0		
1	✓	
2		✓
3	✓	✓

	Esc X22 CV ←	W X22 CV|	Vrb X22↵	Set the verbose mode. For X22: Ø = clear/off (responses are plain, untagged), default 1 = verbose mode is on (enabled) 2 = verbose mode is off, tagged responses are sent for queries (tagged responses are enabled) 3 = verbose mode is on (enabled) and tagged responses are enabled and sent for queries.

NOTE: If tagged responses are enabled, all read commands return the constant (tagged) string and the data or value, the same as in responses for setting a value. For example, for Esc CN ←, the response is Ipn· X12↵ rather than just the data (X12↵).

Read verbose mode status	Esc CV ←	WCV|	X22↵	
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 subnetwork the MLC broadcasts a message. X64 = Broadcast repetition interval in seconds (Ø to 255 [4.25 minutes], default = Ø = 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 Ø EB ←	WØEB|	BmdØØØ,255.255.255.255↵	This command sets the repeat interval to zero, turning off the broadcast mode.
View the broadcast mode	Esc EB ←	WEB|	X64 , X14↵	

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
Password and security settings				
NOTE: The factory configured passwords for all accounts on this device have been set to the device serial number. In the event of a complete system reset, the passwords convert to the default, which is no password for this device. A new password will need to be configured to secure the device.				
Read the security level of the connection	Esc CK ←	WCK |	X52 ↵ *or* Pvl X52 ↵	For X52: Ø = not logged in, 11 = user, 12 = administrator. The response includes leading zeros.
Set administrator password[24]	Esc X33 CA ←	W X33 CA |	Ipa• X41 ↵	Set the administrator access password (X33, 4 to 12 alphanumeric characters). X41 = Password to display on screen (response to password query): • the password (X33), itself, if connected via RS-232 • 4 asterisks (****) if connected via IP and a password has been assigned • an empty field ( ) if connected via IP and a password has not been assigned.
NOTE: The password is case sensitive. Special characters (spaces, symbols) are not allowed.				
Clear administrator password[24]	Esc • CA ←	W%2ØCA ↵	Ipa• ↵	Clear/remove all passwords (administrator and user).
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.				
Read administrator password	Esc CA ←	WCA |	X41 ↵	
Set user password[14, 24]	Esc X33 CU ←	W X33 CU |	Ipu• X41 ↵	Set the user password (X33 is 4 to 12 alphanumeric characters). X41 = Password that is displayed on screen.
NOTE: The password is case sensitive. Special characters (spaces, symbols) are not allowed.				
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.				
Clear user password[24]	Esc • CU ←	W%2ØCU |	Ipu• ↵	This clears the user password only.
Read user password	Esc CU ←	WCU |	X41 ↵	

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
Remapping port designations				
For security reasons the network administrator may wish to assign new/different port numbers to the Telnet, web browser, and direct access ports of the controller or to disable one or more ports. Typically Telnet uses port 23, web access is via port 80 (HTTP), and direct access (to a serial port) is via port 2001.				
ATTENTION: • 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. • Ne pas installer deux ports ou plus sur le même numéro de port. Paramétrer deux ports sur le même numéro pourrait créer des conflits réseau et provoquer également une erreur E13 (paramètre erroné).				
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 Ø.				
Set the Telnet port map[24]	Esc *port#*MT←	W*port#*MT|	Pmt*port#*↵	Select a number (*port#*) for the port that does not conflict with any other ports.
Reset the Telnet port map[24]	Esc 23MT←	W23MT|	PmtØØØ23↵	This resets the Telnet port to port 23.
Disable the Telnet port map[24]	Esc ØMT←	WØMT|	PmtØØØØØ↵	Setting the port number to 0 disables the port.
Read the Telnet port map	Esc MT←	WMT|	*port#*↵	If set to the default port number, the response is ØØØ23.
Set the web (HTTP) port map[24]	Esc *port#*MH←	W*port#*MH|	Pmh*port#*↵	
Reset the web (HTTP) port map[24]	Esc 8ØMH←	W8ØMH|	PmhØØØ8Ø↵	This resets the web port to port 80.
Disable the web (HTTP) port[24]	Esc ØMH←	WØMH|	PmhØØØØØ↵	
Read the web (HTTP) port map	Esc MH←	WMH|	*port#*↵	
Set the initial port number for the direct access port map[24]	Esc *port#*MD←	W*port#*MD|	Pmd*port#*↵	This command sets the initial (lowest) port number for the range numbers assigned to the serial ports for direct port access (see pages **16** and **17** for port locations and see page 50 for more on **direct access**). Default port numbers for direct access start at 2001 and go up to 2007 (see the note at left or the **diagram** on page 51).
NOTE: The reserved TCP port numbers (2001-2003) for direct port access are assigned by default as follows: • 2001 = front panel Config port • 2002 = Display RS-232/IR port • 2003 = MLS port				
Reset the direct access port map[24]	Esc 2ØØ1MD←	W2ØØ1MD|	PmdØ2ØØ1↵	This resets the initial direct access port to port 2001.
Disable the direct access port[24]	Esc ØMD←	WØMD|	Pmd ØØØØØ↵	
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* %2F *directory* %2F CJ |	Dir• *path/directory/* ↵	The directory 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 (such as /) 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* %2F CJ |	Dir• *custompages/HTMLfiles/* ↵	This example just created a subdirectory for storing custom-made HTML files from the user. 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 basis. 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 ↵	
Erase the current directory and its subdirectories[24,28]	Esc //EF ←	W%2F%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
List files from the current directory	Esc DF↵	WDF|	[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 file name and its corresponding file size. The last line of the response indicates how much available file space there is.
When working with the embedded web pages of the MLC, 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↵	WDF|	2.eml Sat, 15 Dec 2007 02:04:40 GMT 117↵ 0.evt Tue, 30 Apr 2013 16:34:07 GMT 11371↵ 1.eir Tue, 30 Apr 2013 16:34:07 GMT 4783↵ 1.eml Tue, 30 Apr 2013 16:34:12 GMT 219↵ 2.evt Tue, 30 Apr 2013 16:34:12 GMT 22139↵ 3.evt Tue, 30 Apr 2013 16:34:12 GMT 16258↵ 97.evt Tue, 30 Apr 2013 16:34:12 GMT 2781↵ 98.evt Tue, 30 Apr 2013 16:34:12 GMT 6027↵ 99.evt Tue, 30 Apr 2013 16:34:14 GMT 4435↵ def.eml Tue, 30 Apr 2013 16:34:14 GMT 95↵ index.html Tue, 30 Apr 2013 16:34:14 GMT 1176↵ resources.cdc Tue, 30 Apr 2013 16:34:14 GMT 4575↵ 3.eml Wed, 21 Nov 2007 22:05:12 GMT 146↵ 6175232 Bytes Left↵↵	
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 file names for files within the subdirectories.

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
File streaming commands				
NOTE: File streaming commands should be used by advanced programmers only.				
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↵	
or				
Load file to user flash memory via Telnet or RS-232 and set specific time and date for the uploaded file[24, 28]	Esc+ UF *filesize**<day-of-week>●<month>●<day>●<year>●<hour>●<minute>●<second>, filename*←{raw, unprocessed data in a file of up to *filesize*}		Upl↵	<*day-of-week*> = 1-7 where 1 = Sunday. <*month*> = 1-12 where 1 = January. <*day*> = 1-31. <*hour*> = 0-23.
NOTES: • If the MLC has insufficient memory available to store the sent file, it responds with Fld↵ (failed) instead of with Upl↵ (uploaded). • Firmware can be updated by using these commands 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.				
Retrieve a file from user flash memory via Telnet or RS-232[28]	Esc*filename* SF←	W*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				
Read response from last URL command	Esc UB←	WUB|	{response from command}↵	

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
E-mail commands				
Configure e-mail events (mailbox)[24]	Esc X45,X46,X47 CR ←	W X45%2CX46%2CX47CR |	Ipr X45,X46,X47 ↵	X45 = e-mail event number (1 - 64). X46 = e-mail recipient address (for example, JDoe@extron.com) for the person to whom messages are 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 ↵	*Example:* For e-mail event 5, send file 7.eml to jdoe@extron.com.
Read e-mail event	Esc X45 CR ←	W X45 CR |	X46,X47 ↵	
Example:	Esc 3 CR ←	W3CR |	repairs@aavsc.com,def.eml ↵	*Example:* E-mail event 3 sends the default e-mail file (def.eml) to "repairs@aavsc.com".
Send e-mail file specified in the e-mail event configuration[24]	Esc X45 SM ←	W X45 SM |	Eml X45 ↵	X45 = e-mail event number (1 - 64).
Send a different e-mail file (one not configured for an e-mail event) or send an e-mail file using a different e-mail address (one that has not been specified via the CR command during e-mail configuration)[24]	Esc X46,X45,X70,X47 SM ←	W X46%2CX45%2CX70%2CX47SM |	Eml X45 ↵	X46 = e-mail recipient address, limited to 240 characters. 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 Ø as a placeholder if the optional X47 variable is used but X70 is not needed. X47 = *xxx*, where *xxx* = a number 1 - 999 corresponding to the e-mail file name (*xxx*.eml). If *xxx* = Ø or no parameter is given, the unit 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/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 e-mail server IP address and user domain name[24]	Esc X14,X15,X73,X74 CM←	W X14%2C X15%2C X73%2C X74 CM|	Ipm•X14,X15,X73,X74↵	X14 = IP address (*xxx.xxx.xxx.xxx*). Leading zeros are optional in setting values; they are suppressed in returned values. X15 = E-mail domain name; `extron.com`, for example X73 = An e-mail account username (for SMTP authentication) of up to 31 characters. This parameter is **optional** during setup. X74 = An e-mail account password (for SMTP authentication) of up to 31 characters. 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.
Example:	Esc 1Ø.1.5.49,extron.com,JaneQInstaller,s3cretK3y CM←	W1Ø.1.5.49%2Cextron.com%2CJaneQInstaller%2Cs3cretK3y CM|	Ipm•1Ø.1.5.49,extron.com,JaneQInstaller,****↵	
Read e-mail server IP address and user domain name	Esc CM←	W CM|	X14,X15,X73,X74↵	

NOTES:
- The variables X73 and X74 are optional for this command. However, if you use them, you must use **both** variables together.
- Do not use commas in the names or passwords.

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[24,27]	Esc 1AE←	W1AE|	Ego↵	Start all events.
Stop events[24,27]	Esc ØAE←	WØAE|	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 ØØØØ2↵.
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 (Ø - 99). The default value of X35 after a system reset is 255. X217 = event status polling period (length of time between event status checks) of the firmware from Ø to 255 in 20 ms increments. X217 is optional: if it is not set, it defaults to 1ØØ (2 seconds) and is not shown in the response from the command. If X217 is set to Ø, the firmware does not poll for event status.
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).

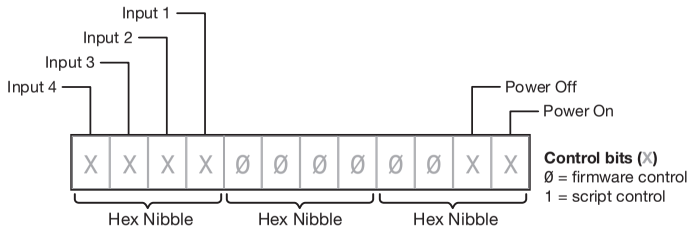
NOTE: "Hooking" an event involves associating the event with a specific button so that event is automatically executed when the designated button is pressed.

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 (Ø.evt) with hardware events and button presses. Once that event file has been compiled, it is capable of receiving information from the register in the MLC 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/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.

Binary bit map for script control of button enabling



Convert binary to hexa-decimal. → ØØØØØ#Ø# → Insert number into command. → Esc ØØØØØ#Ø# LZ ←

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

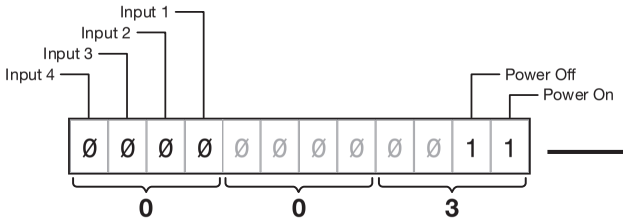
X211 = Status of which buttons are controlled by script(s) and which are controlled by firmware.

This variable is an 8-digit hexadecimal number. See the diagrams at left to see how this number is calculated. This variable is case-sensitive and requires capital letters.

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.

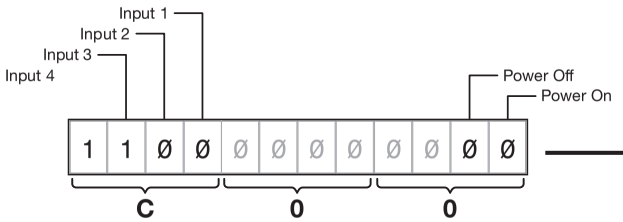


Convert binary to hexa-decimal. → ØØØØØØ03 → Insert number into command. → Esc ØØØØØØ03 LZ ←

Add 5 leading zeros for a total of 8 characters.

Example:

Change the input 3 - 4 buttons from firmware control to script control.

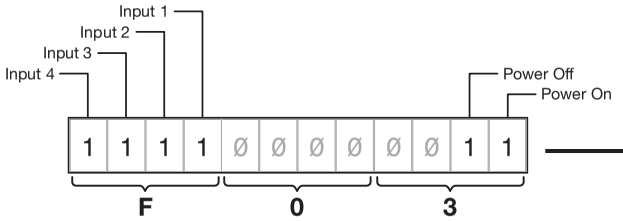


Convert binary to hexa-decimal. → ØØØØØCØØ → Insert number into command. → Esc ØØØØØCØØ LZ ←

Add 5 leading zeros for a total of 8 characters.

Example:

Change **all** front panel buttons from firmware control to script control.



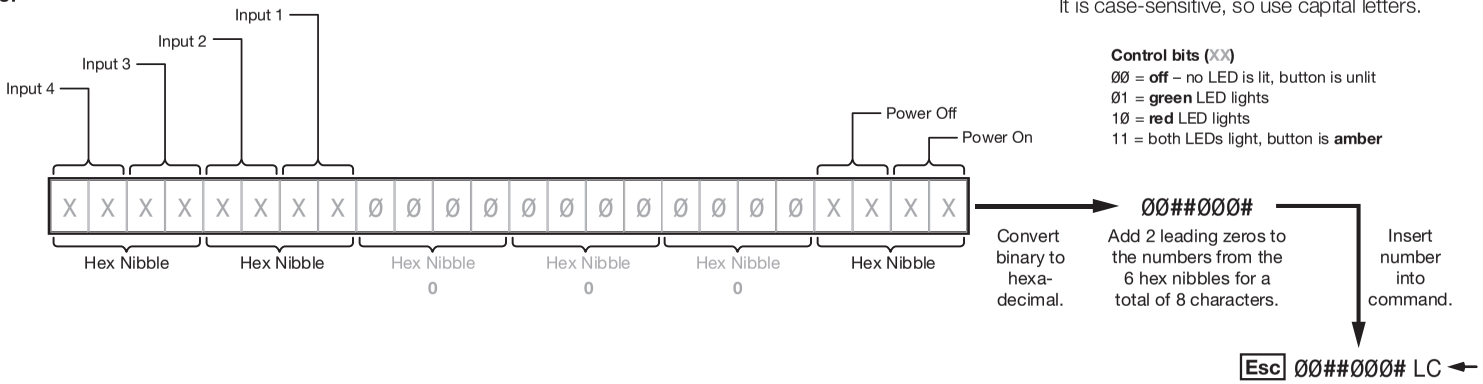
Convert binary to hexa-decimal. → ØØØØØFØ3 → Insert number into command. → Esc ØØØØØFØ3 LZ ←

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)	Esc X212 LC↵	WX212LC|	Lse X212↵	This command specifies which front panel buttons (Power On, Power Off, 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.
Read button LED color status	Esc LC↵	WLC|	X212↵	See the previous command for how to determine X212.
Set button LEDs to blink slowly[24]	Esc 1*X212LX↵	W1%2AX212LX|	Lbk*1*X212↵	
Read which button LEDs are set to blink (whether slowly or fast)	Esc 1LX↵	W1LX|	X212↵	

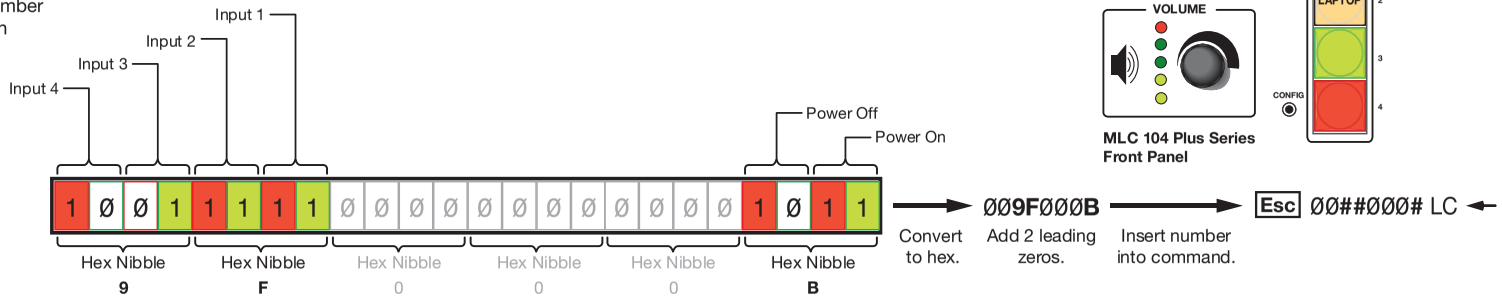
Binary bit map for button LED status

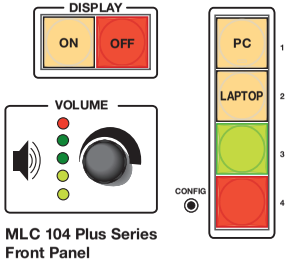


Control bits (XX)
ØØ = **off** – no LED is lit, button is unlit
Ø1 = **green** LED lights
1Ø = **red** LED lights
11 = both LEDs light, button is **amber**

Example

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





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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 fast[24]	Esc 2*X212 LX ←	W2%2AX212LX |	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 the LEDs for a button are set to blink both fast and slowly, the LEDs blink fast.

Reset (zap) commands and erase commands

ATTENTION:

- 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.
- Analysez minutieusement les différents modes de réinitialisation. Appliquer le mauvais mode de réinitialisation peut causer une perte inattendue de la programmation de la mémoire flash, une reconfiguration des ports ou une réinitialisation du contrôleur.

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.

NOTES:
- The factory configured passwords for all accounts on this device have been set to the device serial number. In the event of a complete system reset, the passwords convert to the default, which is no password for this device.
- 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.
- Receive timeout periods are reset to defaults, port redirection settings are cleared and ended.

Reset all device settings and delete files[24]	Esc ZY ←	WZY |	Zpy ↵	

NOTES:
- This command is intermediate between the ZXXX 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. Files, file directories, and passwords are erased by this command. This reset is recommended after you perform a firmware update.
- This command is supported by MLCs with firmware of version 1.03 or higher.

Absolute system reset[24] (mode 5 reset)	Esc ZQQQ ←	WZQQQ |	Zpq ↵	Reset all settings/memories. The ZQQQ command resets everything (all settings, adjustments, the IP address, and subnet mask) to the factory default values. Files in flash memory are also erased by this command. The firmware version does not change. The IP address is reset to 192.168.254.254, the subnet mask is reset to 255.255.0.0.

NOTES:
- The factory configured passwords for all accounts on this device have been set to the device serial number. In the event of a complete system reset, the passwords convert to the default, which is no password for this device.
- This command is identical to **reset mode 5**, discussed in **Resetting the Unit** on page 31 in "Operation, Features, and Cabling."

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

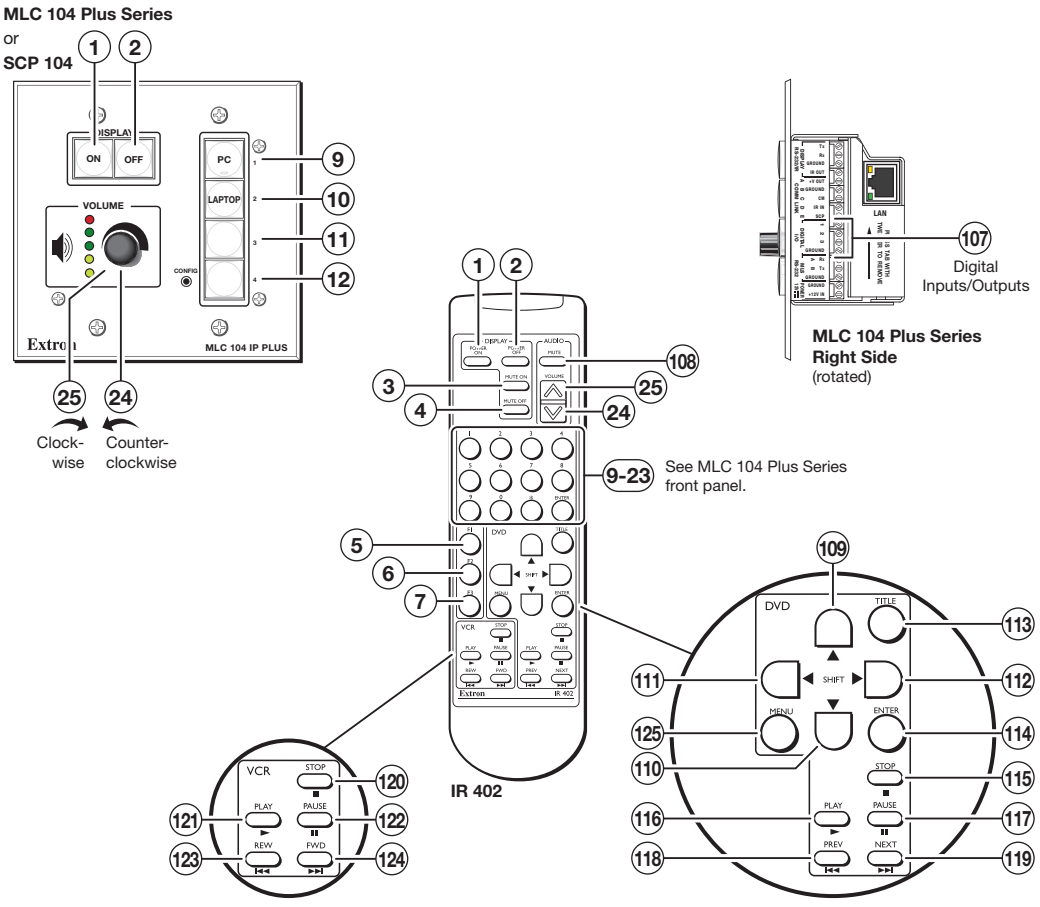
Command/Response Table for Special Function SIS Commands

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. Once you have set the input selection lock during power on/off command (**53#**, page **107**), 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.			
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*ØØ8	*Example:* set a 16 second power on delay.
Example:	1#	WarmUp*Ø23	*Example:* view the power on delay setting (23 = 46 seconds).
Power off delay[24]	X?*2#	CoolDown*X?↵	Ø = 0 seconds, 1 = 2 seconds, 2 = 4 seconds,... in 2 second steps up to 15Ø = 300 seconds.
Example:	23*2#	CoolDown*Ø23↵	*Example:* set a 46 second power off delay.
Power off button delay[24]	X?*22#	PwrOffDly*X?↵	Ø = 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. Ø = audio off, ..., 2Ø = default value, ..., 1ØØ = no limit on audio level at power-on.
NOTE: The MLC responds with an E14 error code when volume mode = 1 (increment/decrement).			
NOTE: The maximum is limited by the maximum volume setting (**47#**, see page 106). 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#).			
Example:	28*11#	VolLimit*Ø28↵	*Example:* limit power-up volume to 28% of maximum volume.

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 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. See the *Control Modules User's Manual*. To use an optional IRCM-DV+ with an MLC 104 IP Plus, 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 addresses (1&2 or 3&4) of the IRCM-DV+ 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.			
Here is how to determine the value of X? for the following commands: **(A x 16) + (B) = X?** **A** — Button to associate the **VCR** half (even address, 2 or 4) with **B** — Button to associate the **DVD** half (odd address, 1 or 3) with			X? is a decimal number from ØØ to 1Ø1.
IRCM-DV+ address 2, address 1 button association			
Associate MLC buttons with IRCM-DV+[24]	X?*25#	DVA_VMap*X?↵	Associate specific MLC 104 IP Plus input selection buttons with the VCR and DVD halves of the IRCM-DV+ that has DIP switch-based addresses of 1 and 2. X? can be from Ø to 1Ø1.
Example:	52*25#	DVA_VMap*Ø52 **X? = (3 x 16) + (4) = 52** **3** — Button to associate the **VCR** half (even address, 2) with **4** — Button to associate the **DVD** half (odd address, 1) with	*Example:* Associate the MLC input 4 button with IRCM-DV+ address 1 (DVD functions) and the MLC input 3 button with IRCM-DV+ address 2 (VCR functions). See the illustration at left.
IRCM-DV+ address 4, address 3 association			
Associate MLC buttons with IRCM-DV+[24]	X?*26#	DVB_VMap*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 one half (DVD or VCR) or to turn off	X?*Y?*24#	DV_Force*X?*Y?	X? = DIP switch address (1, 2, 3, or 4) of the IRCM-DV+. For Y?: Ø = 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 also does *not* require each half of the IRCM-DV+ to be associated with an input button.			
Read the status of an IRCM-DV+	X?*24#	Y?	See the X? and 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 ØP). See the diagrams below and on the next page to determine the number of the memory block associated with each button. **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 switcher connected to the MLS port.			
Button/Switch Memory Block Numbering for the MLC 104 IP Plus Series, SCP 104 Series, and IR 402  			
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 above and on the next page.**
Emulate a button or switch **release**	X?*43#	SwRls*X?↵	This makes the MLC issue the commands associated with a button release. X? = the memory block number (1-128) of the button or switch.

Command/Response Table for Special Function SIS Commands (continued)

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

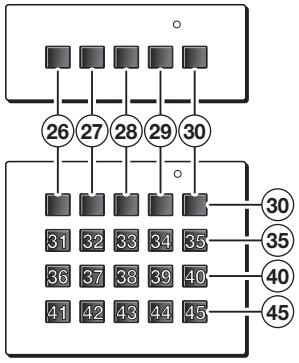
Each control module (IRCM, ACM, RCM, CM) has 20 memory blocks reserved for it, no matter how many buttons are physically present on the module:

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

Memory block numbers 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)

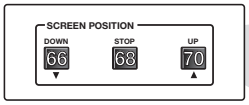
Memory Block Numbering for Any Control Module with Black Buttons
(Example is for Control Module 1)



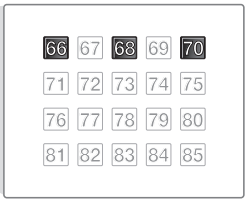
Buttons and memory blocks are numbered in a grid of 5 columns and 4 rows of buttons on each module, as on the CM-20BB, shown above.

Memory Block Numbering Examples for Modules with Black Buttons

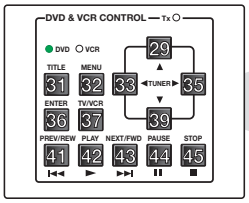
RCM-SC with DIP switch set for address 2 (module 3)



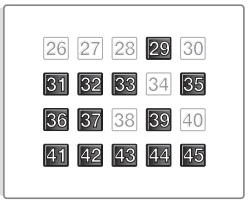
Module 3 has memory blocks 66-85.



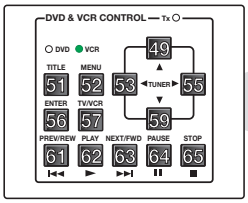
IRCM-DV+ with DIP switch set for addresses 0 and 1 (modules 1 and 2)



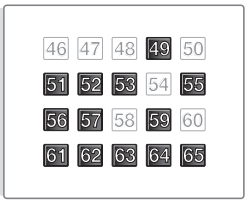
Module 1 has memory blocks 26-45.



DVD Half (module 1)

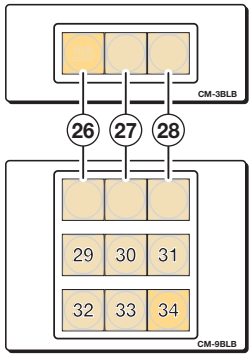


Module 2 has memory blocks 46-65.



VCR Half (module 2)

Memory Block Numbering for Control Modules with Clear, Backlit Buttons



CM-3BLB

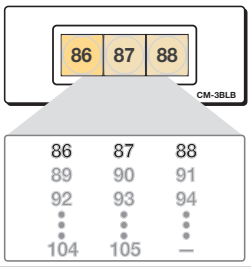
Backlit button modules feature a grid of 3 columns and 1 or 3 rows of buttons, as shown at left.

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-9BLB

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 **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 memory block number (1-128) of the button or switch. See the diagrams on pages **102** and **103**.
Example:	25*44#	SwCmd*25↵	*Example:* emulate pressing and releasing the volume up button on the remote control or rotating the MLC 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.

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 control			
Set peripheral map[24]	X?*3Y?#	SlaveMapY?*X?↵	This command associates an MLC input button with a specific input on a connnected switcher.
	X? values Default: **X?** = **Y?** ØØ = input 0 Ø1 = input 1 Ø2 = input 2 ... 98 = input 98 99 = input 99	**Y? values** 1 = input button 1 2 = input button 2 3 = input button 3 4 = input button 4	X? is the actual input channel (including inputs on a peripheral switcher) to select when button Y? is pressed. The values for these variables are shown at left.
Example:	6*34#	SlaveMap4*6↵	*Example:* Map input 6 (an input on a peripheral switcher) to the MLC input button 4. When button 4 is pressed, the AV 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.
Set and trigger a button press repeat	X?*Y?*45#	RptRate*X?*Y?↵	This command tells the MLC to repeat the press commands of a specific button at a fixed interval (a set frequency). X?= the number of the button/ switch (1 - 128). See the diagrams on pages 102 and 103. Y? is the repeat interval: Ø 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? = Ø, the MLC stops repeating the commands of the selected button.
Example:	9*85Ø*45#	RptRate*9*85Ø↵	*Example:* The commands associated with the input 1 button press are executed every 85Øx20 ms (= 17,000 ms = 17 seconds) until the repeat rate for that button is set to Ø ("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 Ø when the button is released or input is no longer selected.			
Query button repeat rate status	45#	X?*Y?↵	See the variables for the command shown above.
Clear (turn off) the button repeat[24]	Ø*Ø*45#	RptRate*ØØØ*ØØØØØ↵	This command clears the button repeat setting and turns off the button repeat function.

Command/Response Table for Special Function SIS Commands (continued)

Command	ASCII Command (host to MLC)	Response (MLC to host)	X? values and additional descriptions
Front panel button LED control[24]	X?*Y?*51#	Lmp Y?*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, input, or other button to control. See the list of values at left or the diagrams on pages 102 and 103.
	X? values Ø = 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 1Ø = input button 2 11 = input button 3 12 = input button 4 To control the LEDs for CM-3BLB or CM-9BLB buttons, see the button memory block map for control modules (page 105).	
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 98) to set a button for an LED combination other than those listed above for X?, the MLC responds with a zero (Ø). For example, if a button is set for its green LED to blink slowly and its red LED to blink fast, the MLC sends Ø in response to the Y?*51# command.			
Miscellaneous settings			
Enable peripheral switcher	X?*41#	Slave*X?↵	For X?, Ø = disable control of a peripheral MLS switcher, 1 = enable (default) MLS peripheral switcher control.
Volume knob mode[24]	X?*46#	VolMode*X?↵	For X?, Ø = discrete volume values, 1 = continuous increment/ decrement.
Max. volume range[24]	X?*47#	VolMax*X?↵	For maximum volume, X? is 1 to 1ØØ. 1ØØ = default.
NOTE: Maximum volume range cannot be changed while an MLS switcher is detected at the MLS switcher port on the MLC.			
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]	X?*49#	EncScale*X?↵	For X?: Ø = no scaling (default), 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 more the encoder speed decreases, the more turns or button presses it takes to change the volume by the same amount.			

Command	ASCII Command (host to MLC)	Response (MLC to host)	X? values and additional descriptions
Front panel lockout			
Lock out input selection during power-on/power off[24]	X?*53#	PwrLock*X?↵	For X?: Ø = 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).			
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 Ø 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?, Ø = 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?, Ø = administrator level, 1 = user level. For Y?, the PIN is any 4-digit combination of the numbers 1 through 6. • Administrator default PIN = 1346. • User default PIN = Ø.
Query PIN[24]	X?*61#	Y?↵	For X?, Ø = administrator level, 1 = user level. Y? is the corresponding 4-digit PIN.
IPI lockout[24]	X?*62#	IPILock*X?↵	For X?, Ø = IPI buttons are always enabled (default), 1 = IPI button lockout status matches that of the MLC front panel lockout.
IR receiver commands			
Disable IR reception	X?*65#	IRDisable*X?↵	For X?: Ø = enable all IR ports (default), 2 = disable the rear panel IR port (input from IR devices and SCPs through the CM/IR/SCP port).

Special Applications

There are numerous ways to use a MediaLink Controller or another IP Link device to control and monitor AV systems. The *Global Configurator Help* file and earlier sections of this guide cover typical uses and features. This section shows you how to set up the MLC for a few specialized applications:

- **Using Monitoring to Make Functions Track Actual Conditions**
- **Working With Combination Source Devices**
- **Scheduling Front Panel Lockout Periods**
- **Sending E-mail by Pressing a Button**
- **Working with a Non-MediaLink Extron Switcher**
- **Using Digital Inputs**
- **Using Digital Outputs**
- **Using an Amplifier and Volume Controller with the MLC**
- **Customizing HTML Files to Control Devices, Modify Embedded Web Pages, and Send E-mail Alerts**

Before configuring the MLC,

1. Connect cables between the MLC, the controlled devices, any optional control panel (SCP) or control module (IRCM, CM), and the PC as described in **Operation, Features, and Cabling** starting on page 7.
2. Install and start the Global Configurator software, create or open a GC project, and add an MLC to the project, if that has not already been done. For instructions, see the *Global Configurator Help* file.
3. In Global Configurator, add device drivers and assign them to the appropriate ports. Instructions on these tasks are included in the *Global Configurator Help* file.

Using Monitoring to Make Functions Track Actual Conditions

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. This can create a discrepancy between the actual status of the device and the status known to 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 front panel while video is muted at the projector, the projector unmutes itself, and the MLC is not aware of that change. To avoid those discrepancies when configuring MLC 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 (such as the input 4 button) in toggle mode to send the projector a video mute command on one press and a video unmute command on 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 remote control of the projector 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 AV mute status of the projector each time the input 4 button is pressed, you can make the MLC act (or not) based on the actual device status. That way, the MLC executes the correct action regardless of what happened the last time the button was pressed on the MLC. This keeps the toggle button synchronized with the status of the controlled device.

Prerequisite Setup Steps

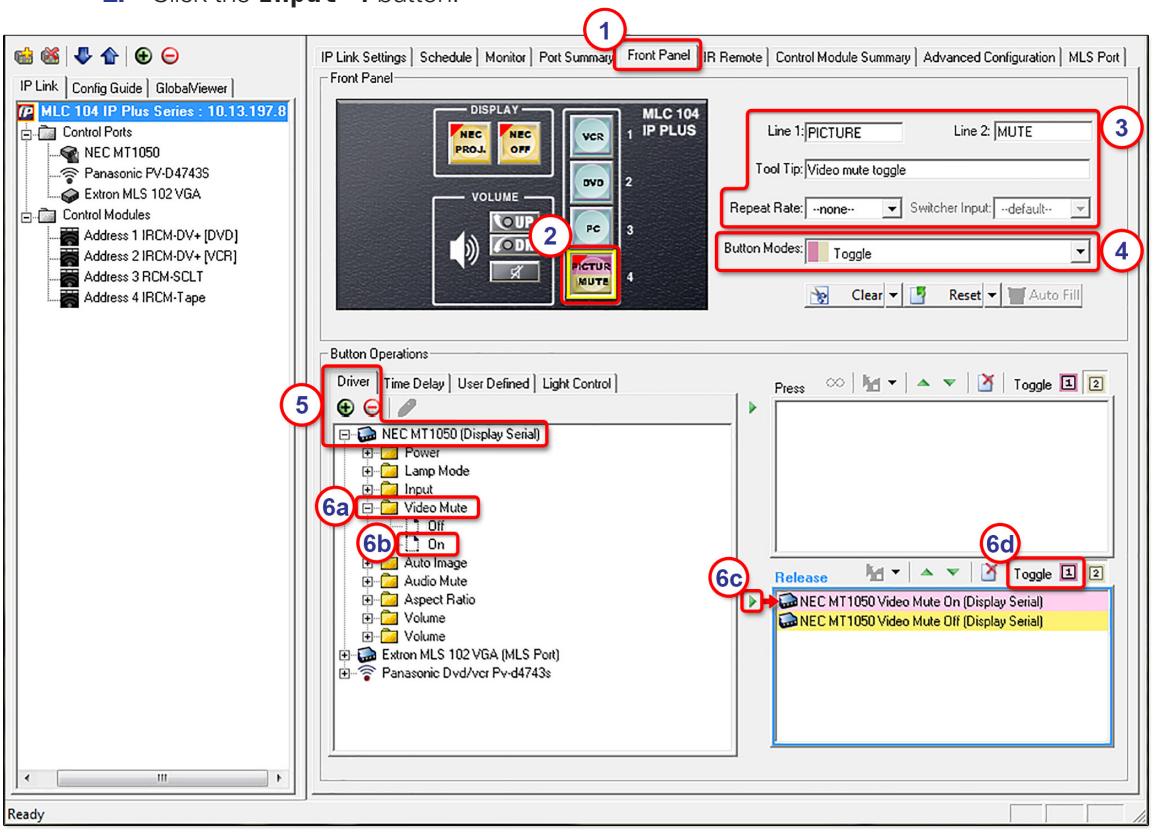
1. Connect cables between the MLC, the input and output devices, and the PC, as described in **Operation, Features, and Cabling** starting on page 7.
2. Install and start the Global Configurator software.
3. Create or open a GC project.
4. Add an MLC to the project, if that has not already been done. For instructions, see the *Global Configurator Help* file.
5. In Global Configurator, add device drivers and assign them to the Projector RS-232/IR port or MLS port (see the *Global Configurator Help* file for detailed procedures).

NOTE: For monitoring, the device must be connected to one of the bidirectional ports on the MLC.

Setting Up the 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 108. You can tailor this procedure to other functions that you may want to set up. This example assumes that you performed the prerequisite setup steps. Ensure that the Global Configurator project is open and the MLC is selected within the project.

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



3. If desired, type in text for the on-screen button label and the tool tip (text that appears when the mouse pointer hovers over that button).
4. In the **Button Modes** panel, select **Toggle**. This changes sets 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 **Driver** tab within the **Button Operations** panel, double-click the name of the projector. A list of available driver functions is displayed below the driver name.
6. Set the button press actions for projector AV mute.
   a. Double-click **Video Mute**.
   b. Click **On**.
   c. 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.

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

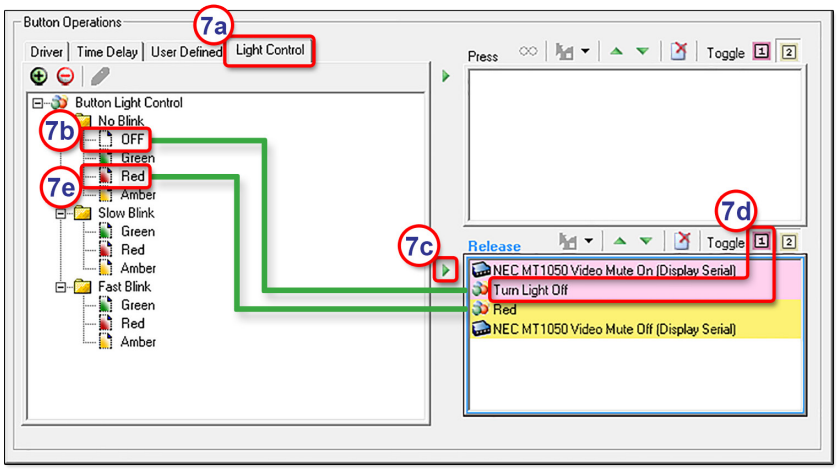
e. Click **Video Mute**.

f. Click **Off**.

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

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

7. If desired, configure the button lights.



a. In the **Button Operations** panel, 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. With the name of the light setting selected in the **Release** area, 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.

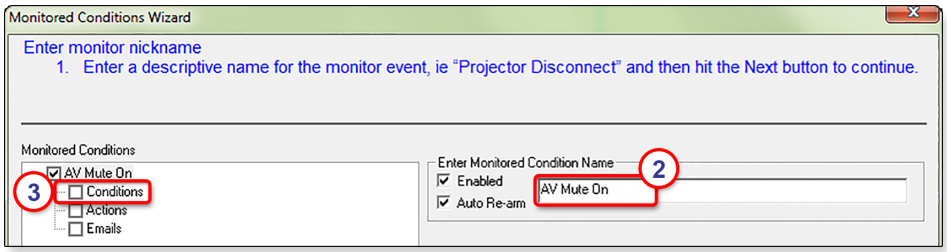
f. Click on the newly added button lighting command in the **Release** area.

g. Click **Toggle 2**.

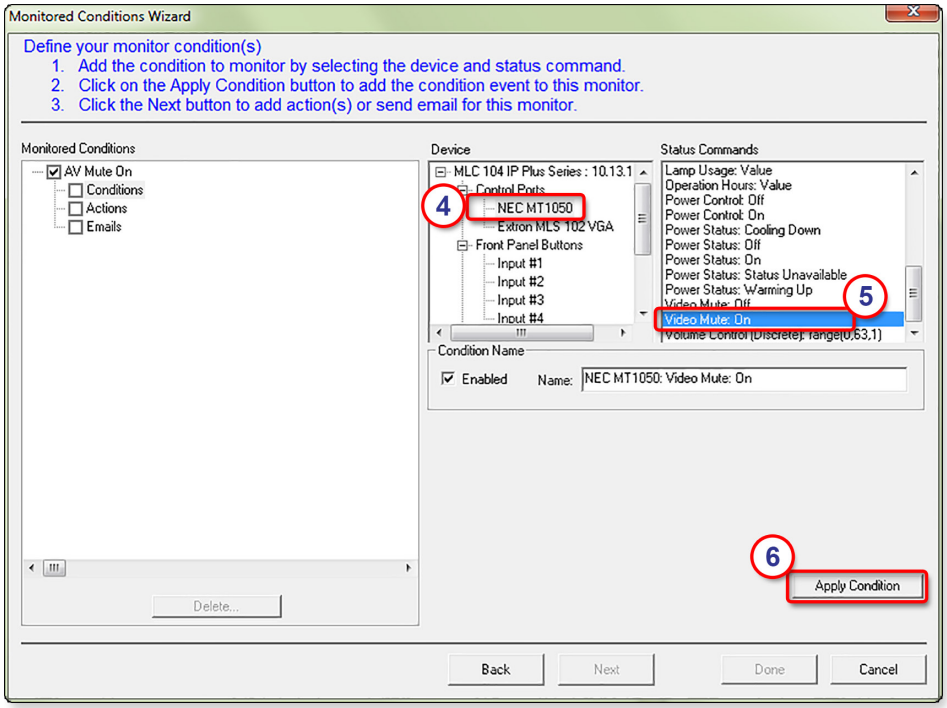
TIP: Basic button setup is covered in the front panel tab section of the *Global Configurator Help* file, in case you want to review those steps during configuration.

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 **Monitored Conditions Wizard** window appears.
2. Type in the name of the first monitored condition: **A/V Mute On**, as shown in the following image.

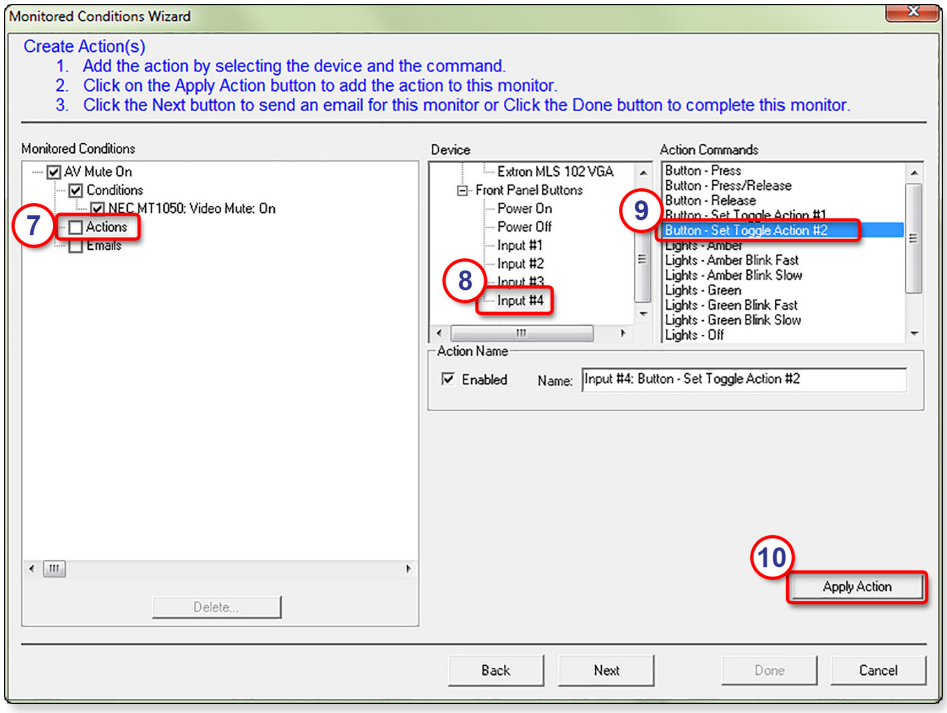


3. Select **Conditions** in the **Monitored Conditions** panel. The right side of the window now shows a list of ports and the devices connected to them, and MLC buttons, as well as available status commands.
4. Click on the name of the projector in the **Device** panel (**NEC MT1050**, in this example, as shown below).

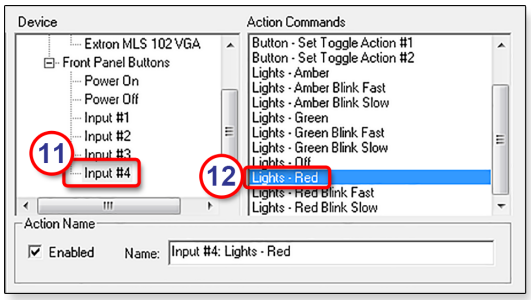


5. Click the **Video Mute: On** command in the **Status Commands** panel.
6. Click the **Apply Condition** button.

7. Click **Actions** in the Monitored Conditions panel (see image below).

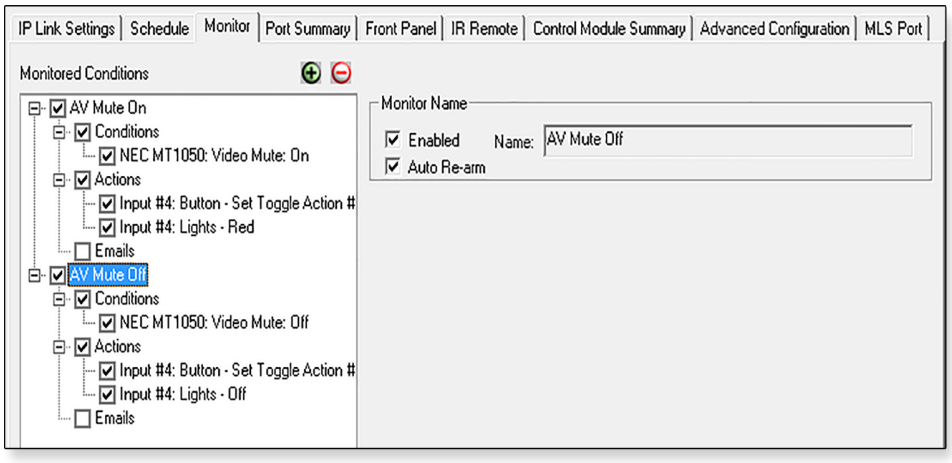


8. Scroll through the Device panel and click on **Input 4** in the Front Panel Buttons group.
9. Click **Button - Set Toggle Action #2** in the Action Commands panel. This sets the state of the Input 4 button so that the next press of Input 4 triggers the operations on toggle action #2.
10. Click the **Apply Action** button.
11. Scroll through the Device panel and click on **Input 4** in the Front Panel Buttons group (see image at right).



12. Click **Lights - Red** in the Action Commands panel.
13. Click the **Apply Action** button.
14. Click **Done**. The Monitored Conditions Wizard window closes.
15. Click **Add Monitor** (near the bottom of the GC window). The Monitored Conditions Wizard window opens.
16. Type in the name of the second monitored condition: AV Mute Off.
17. Select **Conditions** in the Monitored Conditions panel.
18. Click on the name of the projector in the Device panel.
19. Click the **Video Mute: Off** command in the Action Commands panel.
20. Click the **Apply Condition** button.
21. Click **Actions** in the Monitored Conditions panel.

22. Scroll through the `Device` panel and click on **`Input 4`** in the `Front Panel Buttons` group.
23. Click **`Button - Set Toggle Action #1`** (which triggers the `Video Mute Off` command) in the `Action Commands` panel.
24. Click the **`Apply Action`** button.
25. Scroll through the `Devices` panel and click **`Input 4`** in the `Front Panel Buttons` group.
26. Click **`Lights - Off`** in the `Action Commands` panel.
27. Click the **`Apply Action`** button.
28. Click **`Done`**. The `Monitored 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 *Global Configurator Help* file, then save the project.
30. 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.

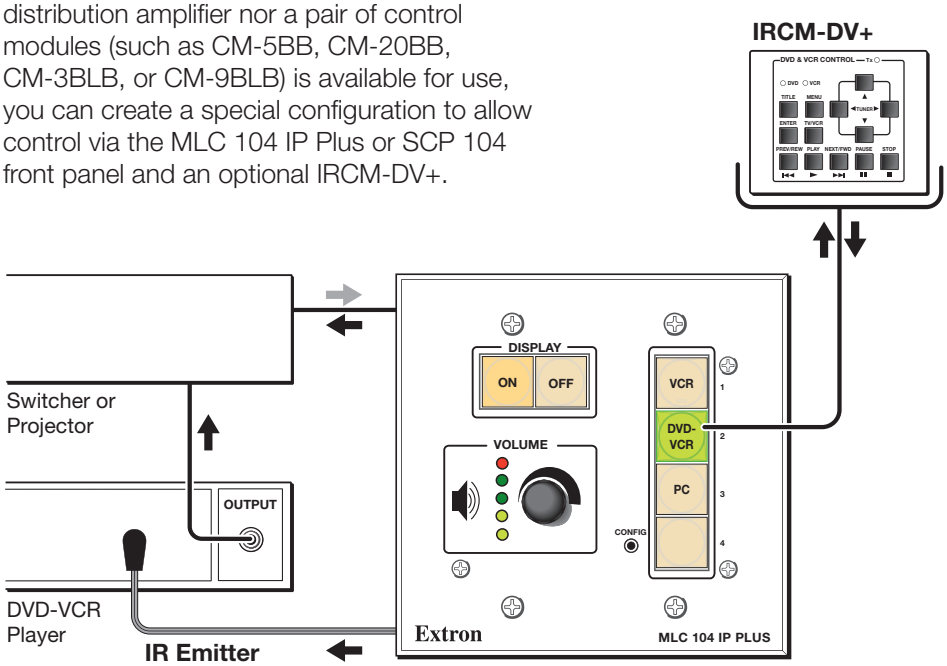
Available Methods

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 (such as CM-5BB, CM-20BB, CM-3BLB, or CM-9BLB) is available for use, you can create a special configuration to allow control via the MLC 104 IP Plus or SCP 104 front panel and an optional IRCM-DV+.



MLC 104 IP Plus Front Panel

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 are associated with the same input.

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

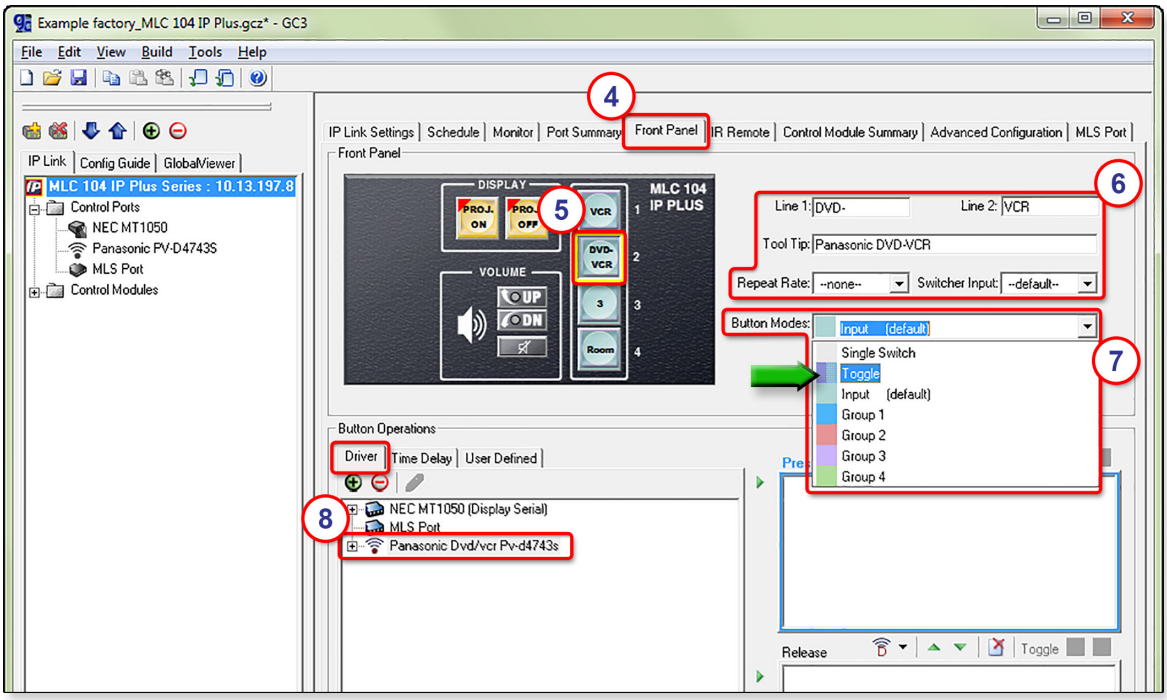
NOTE: Detailed instructions on basic configuration via software are available in the *Global Configurator Help* file.

NOTE: The numbers in the following sample screen images correspond to the step numbers of the procedure.

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

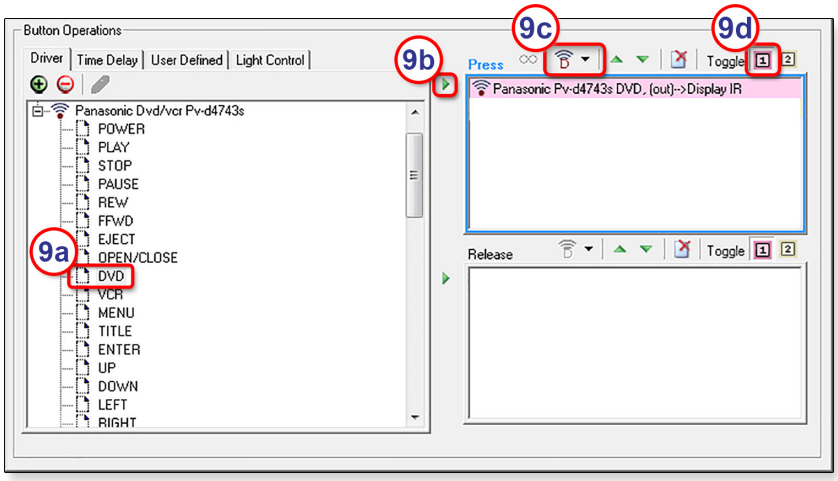
1. Connect cables between the MLC, input and output devices, and the PC as described in **Operation, Features, and Cabling** starting on page 7. In this example the DVD-VCR player are connected to the IR portion of the Display RS-232/IR port. See page 17 for a **port wiring diagram**. Place the head of the IR emitter near the receiver of the DVD-VCR player.
2. Install and start the Global Configurator software, create or open a GC project, and add an MLC to the project, if that has not already been done. For instructions, see the *Global Configurator Help* file.
3. In Global Configurator, add device drivers and assign them to the Display RS-232/IR port. For instructions on these tasks, see the *Global Configurator Help* file.

4. Click on the **Front Panel** tab (see image below).



5. Click the input button (button **2** for this example) that is used with the DVD-VCR player.
6. If desired:
   - Type in text for the on-screen button label.
   - Type in the tool tip (text that appears when the mouse pointer hovers over that button in GlobalViewer).
   - 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 **Driver** tab within the **Button Operations** panel, 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 (see image below).



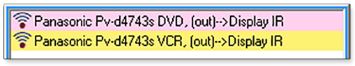
a. Click **DVD**.

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

c. Optional: with the DVD command selected, click the **Port Select** button and choose the IR output port (**Display IR**) that sends commands to the DVD-VCR player, as shown at right.

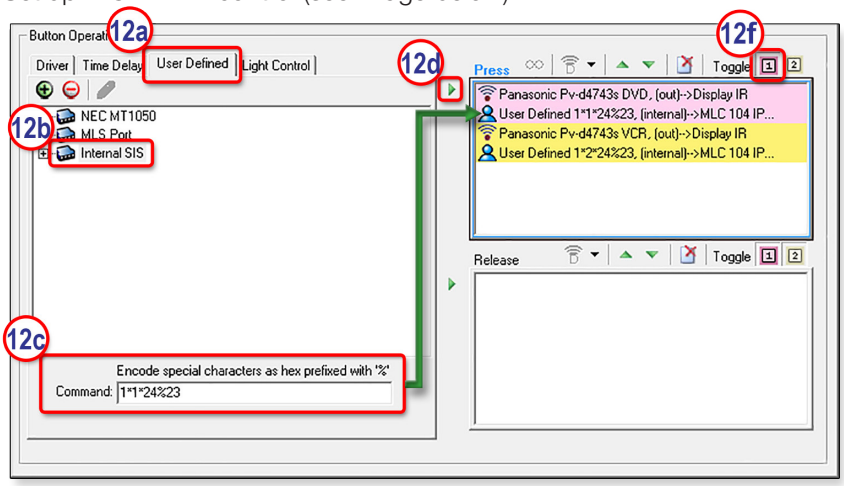
d. For **Toggle**, click **1** to indicate which press (the first) to associate the DVD command with. In the example shown above, the DVD is associated with button press 1, the VCR is associated with button press 2.

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 (see image below):



a. In the `Button Operations` panel, click the **`User Defined`** tab.

b. Click **`Internal SIS`**.

c. Type in the SIS command to activate the DVD half of the IRCM-DV+: `X?*1*24%23` where `X?` is the DIP switch setting (1, 2, 3, or 4) of the IRCM-DV+ and `%23` is the URL-encoding for the pound symbol character (#).

> **TIP:** 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. In the `Press` area, select the user-defined command added in step 12d.

f. For **`Toggle`**, click **1** to associate the DVD control of the IRCM-DV+ with the first button press.

g. Click **`Internal SIS`**.

h. Type in the SIS command to activate the VCR half of the IRCM-DV+: `X?*2*24%23` where `X?` is the DIP switch setting (1, 2, 3, or 4) of VCR portion of the IRCM-DV+ and `%23` is the URL-encoding for the pound symbol character (#).

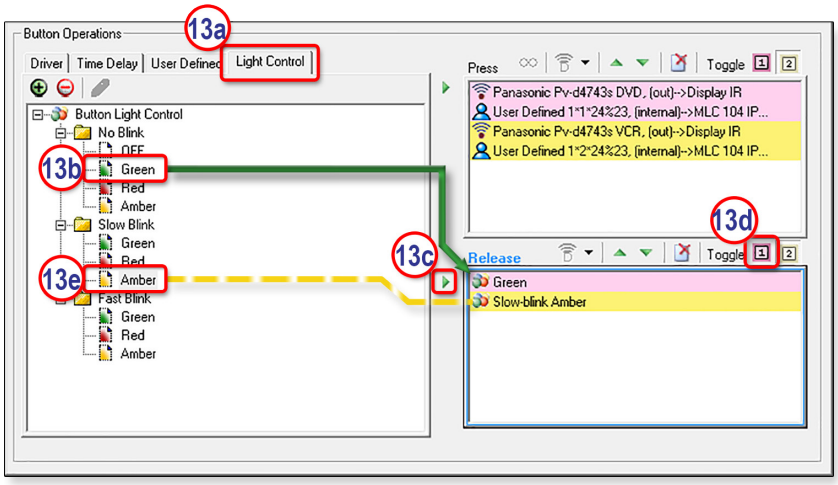
i. Click the green arrow adjacent to the `Press` area.

j. In the `Press` area, select the user-defined command added in step 12i.

k. For **`Toggle`**, click **2** to associate the DVD control of the IRCM-DV+ with the second button press.

> **NOTE:** This special function SIS command, **X?*Y?*24#**, is explained on page 101.

13. If desired, configure the MLC button lights (see image below).



a. In the **Button Operations** area, click the **Light Control** tab.

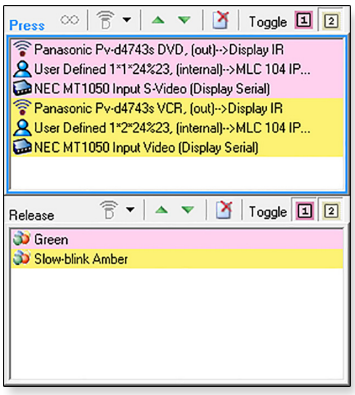
b. Click on the desired button light setting, a combination of color and action (nonblinking, slowly blinking, fast blinking).

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 lights green (nonblinking) at the first button release.

e. Repeat steps 13**b** through 13**d** to select a 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. Click the **Button Operations** **Driver** tab and select the appropriate commands from the driver for the projector or switcher. See the *Global Configurator Help* file for details, if needed. Upon completion, the button operations fields look similar to the excerpt shown at right.



15. Complete the rest of the configuration as described in the *Global Configurator Help* file:
    - Configure all control ports for IR or RS-232 communication as needed.
    - Select device drivers.
    - Configure the rest of the buttons (including IRCM-DV+ buttons).
    - Configure e-mail settings.
    - Set scheduling as appropriate.
16. Save the project.
17. Build and upload the configuration to the MLC.

Scheduling Front Panel Lockout Periods

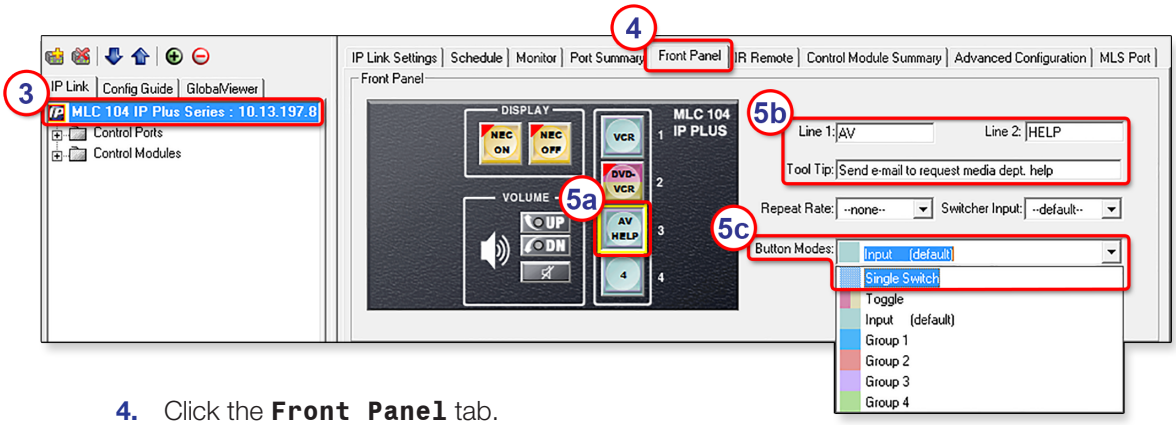
For additional security you can set up an automated schedule to either completely prevent front panel changes or to restrict who can make front panel selections and adjustments during certain hours and days. For basic instructions on how to schedule front panel lockout periods, see **Front Panel Security Lockout (Executive Mode)** starting on page 13 and see **Preparing the MLC for Front Panel Lockout** starting on page 15. See the *Global Configurator Help* file for detailed steps on using the software to set up a scheduled action for a lockout period.

Sending E-mail by Pressing a Button

For some installations, you may want to set up an MLC button to send an e-mail requesting projector repairs or requesting assistance from the front office or the 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.

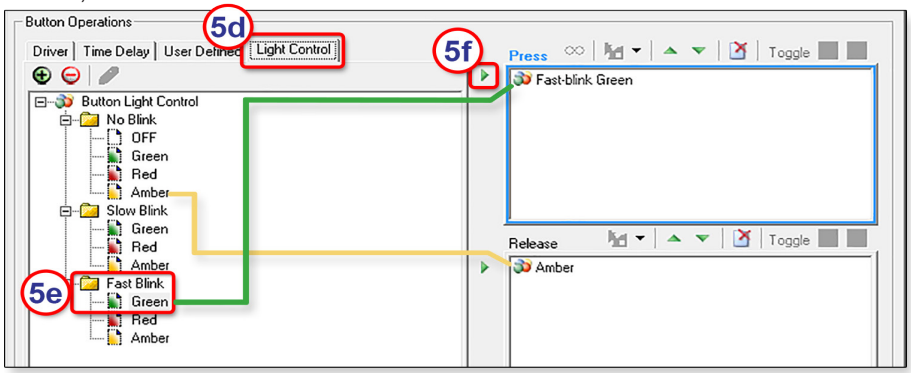
NOTE: This application requires Global Configurator version 2.2.1 or higher.

1. Connect cables between the MLC, input/output devices, and the PC as described in the **Operation, Features, and Cabling** section starting on page 7.
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, see the *Global Configurator Help* file.
3. In the `IP Link` tree view window, click on the `MLC` to be configured (see image below).



4. Click the **`Front Panel`** tab.
5. Configure the front panel button.
   a. In the `Front Panel` area, click the button that triggers the e-mail. For this example, use **`input button 3`**.
   b. Type in text for the on-screen 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 (see image below).



e. Click on the desired combination of button light color and blink frequency.

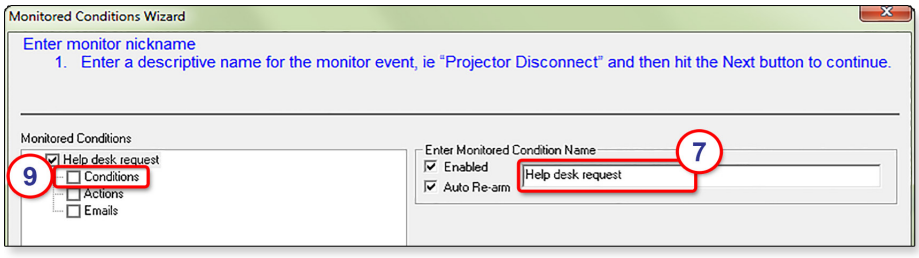
f. Click the green **Add Operation** arrow next to the Press area.

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 Monitored Conditions Wizard window appears.

7. Type in the name of the monitored condition: *Help Desk Request*, as shown in the following picture.



8. Click the **Next** button.

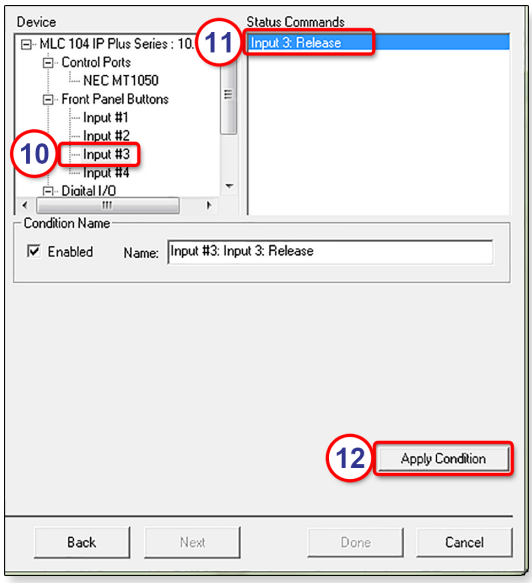
9. Select **Conditions** in the Monitored Conditions area. The right side of the window changes to show devices and their ports and buttons, and also available options or commands.

10. With the MLC selected, scroll to the Front Panel Buttons list in the Devices area and select **Input #3** for the input 3 button .

11. Select **Input 3: Release** from the Status Commands area.

12. Click **Apply Condition**. Input #3: Input 3: Release appears in the Condition Name area.

13. Click **Emails** in the Monitored Conditions area on the left. The right side of the window changes to show areas for e-mail messages and contacts (e-mail recipients).



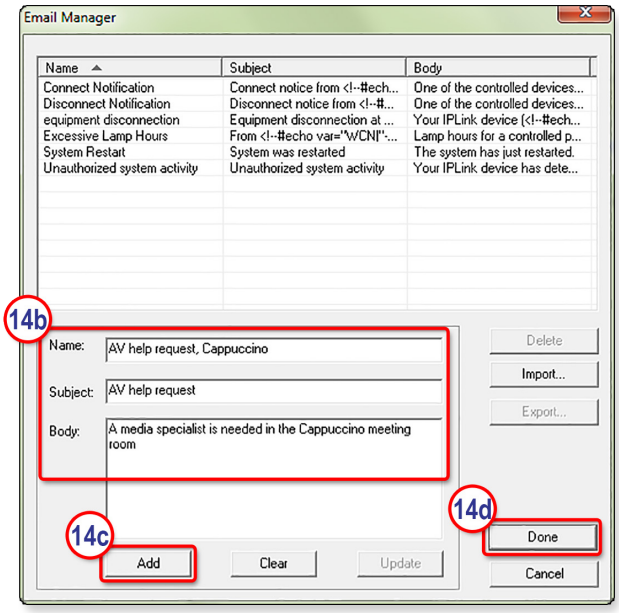
14. Create the e-mail file that the input **3** button sends (see image below right).

    a. Click Email Manager... near the bottom of the **Monitored Conditions Wizard** window. The **Email Manager** window opens.

    b. Type in the e-mail name (this appears 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 contents of the e-mail).

    c. Click **Add**.

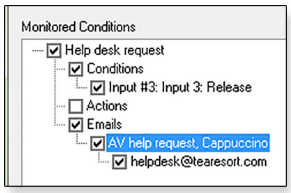
    d. Click **Done**. The **Email Manager** window closes.

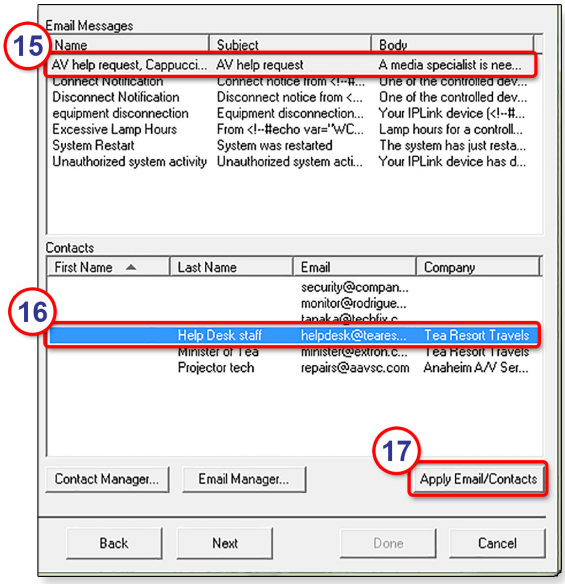


15. Click to select one e-mail (the one you just created) in the **Email Messages** list, as shown at right.

16. Click to select one or more e-mail recipients in the **Contacts** list.

17. 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.





18. Click the **Done** button at the bottom of the **Monitored Conditions Window**, which then closes.

19. Complete the rest of the configuration as desired.

20. Save the project.

21. Build and upload the configuration to the MLC.

Working With a Non-MediaLink Extron Switcher

Although the MLS port on the MediaLink Controller 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 buttons on the MLC.

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 IN1606. The MLC supports bidirectional communication for input switching and volume control, just as it does for the MLS and PVS switchers.

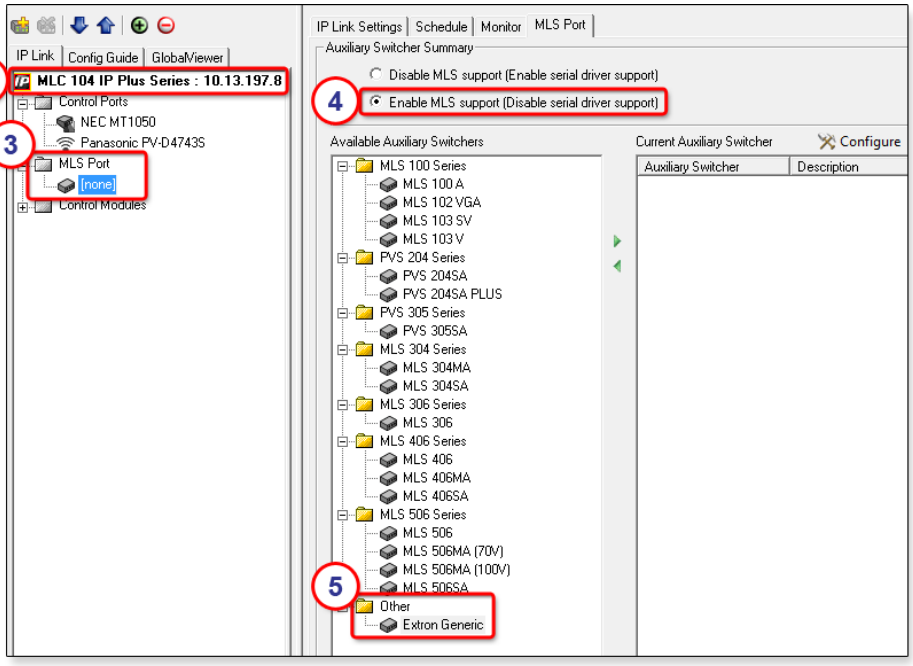
You can control an Extron switcher such as an MPS 112 or MPS 112 CS via the MLS port if all of the following conditions are met:

- The MPS switcher uses firmware version 1.12 or higher.
- The MPS is in single switcher mode. It must 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 bidirectionally track inputs greater than 6.

Also, if the 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 MPS 112 Series switcher, cable the MLC and connect the MPS switcher to the MLS port on the MLC, then follow these steps:

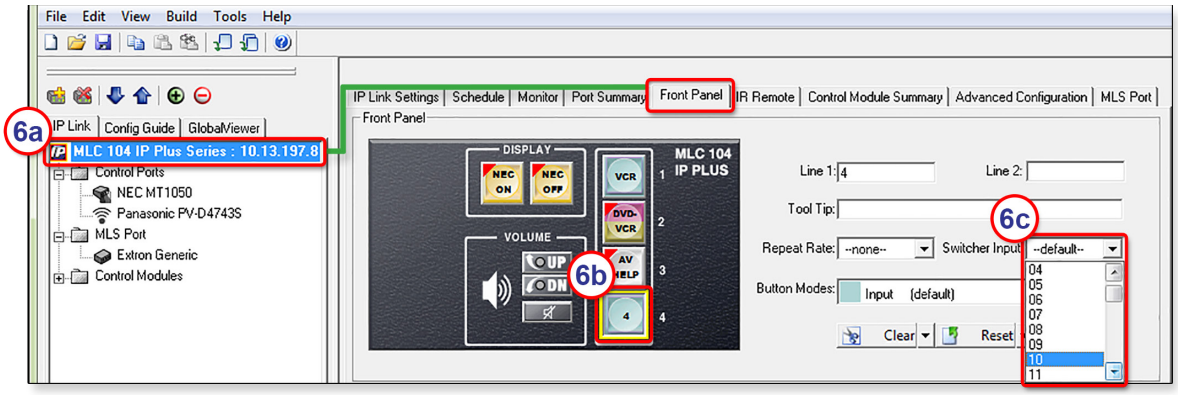
1. Create a new Global Configurator project that includes an MLC.
2. In the `IP Link` tree view panel, click on the `MLC` to be configured (see image below).



3. Click on the **`MLS Port`** within the `IP Link` tree view. 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 "Switcher" instead.

4. Make sure the port is set to support MediaLink switchers. The list of available switchers should be active and selectable. If not, click the **`Enable MLS support (Disable serial driver support)`** radio button.
5. Select (double-click) **`Extron Generic`** switcher.
6. If you want to use the buttons on the MLC to control MPS switcher inputs other than the default inputs 1 through 4, remap the front panel buttons.



a. In the `IP Link` tree view panel on the left side of the window, click on the MLC that you are configuring. The right side of the window changes to show the front panel of the MLC and more tabs. By default, the **`Front Panel`** tab is selected.

b. Within the `Front Panel` panel, click an input button.

c. Select the desired MPS switcher input number from the `Switcher Input` list box.

d. Repeat steps 6b and 6c as desired to remap additional buttons to other switcher inputs.

7. Complete the rest of the configuration as desired.
8. Save the project.
9. 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 example tells how you can use these pins for digital input.

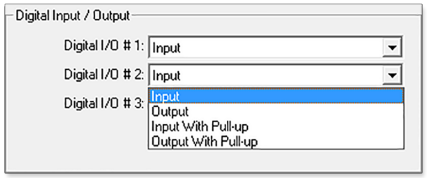
Using Digital Input For an Alert Notification System

One 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.

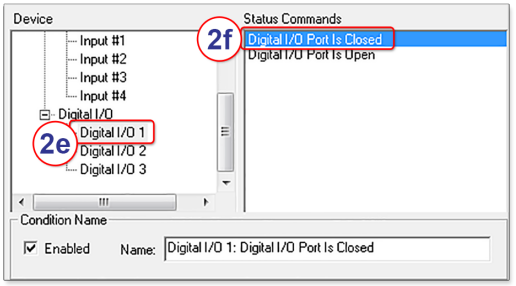
NOTE: This feature can be used as an alert notification and should not be used as a life safety feature, as it operates over a local network and offers no redundant means of communication if the network goes down.

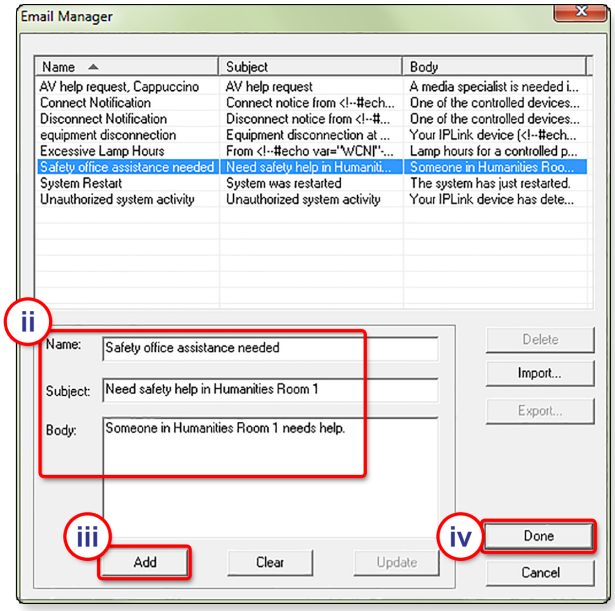
In this example, a 2-button switch is configured to have the MLC send e-mail alerts to alerts to a security desk or to an administrative office when a button is pressed.

1. In the Global Configurator **Advanced Configuration** tab, configure the digital I/O ports (ports 1 and 2 in this example) on the MLC for digital input, as shown at right.



2. Set up a monitor for each port.
   a. Click the **Monitor** tab (IP Link Settings | Schedule | Monitor | Port Summary | Front Panel).
   b. Click **Add Monitor** (near the bottom of the GC window). The Monitored Conditions Wizard window appears.
   c. Type in the name of the first monitored condition: Safety office alert.
   d. Select **Conditions** in the Monitored Conditions area.
   e. Select **Digital I/O 1** as the device.
   f. Select **Digital I/O Port is Closed** as the Status Command.
   g. Click **Apply Condition**.
   h. Select **Email** in the Monitored Conditions panel.
   i. Create a notification e-mail if you have not already done so.
      i. Click **Email Manager** (the Email Manager window opens).
      ii. Type in the name, subject, and main text.
      iii. Click **Add**.
      iv. Click **Done** to return to the Monitored Conditions Wizard window.



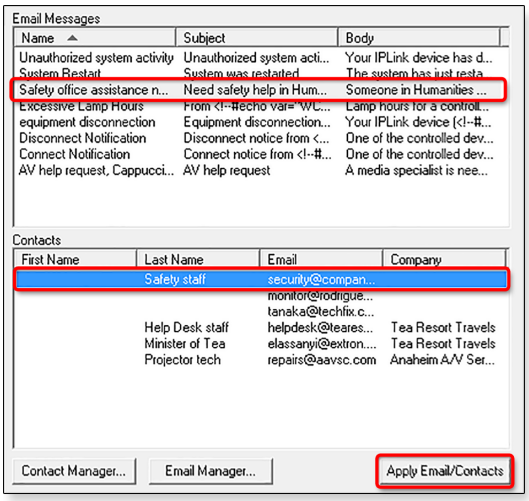


   j. If the contact person for this alert is not listed in the Contacts panel, create a contact entry.
      i. Click **Contact Manager**. The Contacts Manager window opens.
      ii. Type in the recipient name, e-mail address, and company information.

iii. Click **Add**.

iv. Click **OK** to save the contact and return to the `Monitored Conditions Wizard` window.

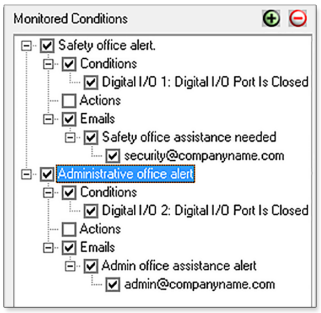
k. Click on the desired alert e-mail and on the name of the contact to whom the e-mail is be sent, as shown at right, then click **`Apply Email/Contacts`**.



l. Click **`Done`**.

m. Set up the second monitored condition by following steps **2a**-**2l** but typing in the name of the second condition name (`Administrative office alert`), selecting **`Digital I/O 2`** as the device, and selecting a different e-mail and contact in the `Email Manager`.

The monitored conditions are summarized in the `Monitored Conditions` panel, as shown at right.



3. Save the configuration, then build and upload it to the MLC.

4. Cable the digital input ports on the MLC to the appropriate pins of the button panel or switch, as shown in the following diagram.

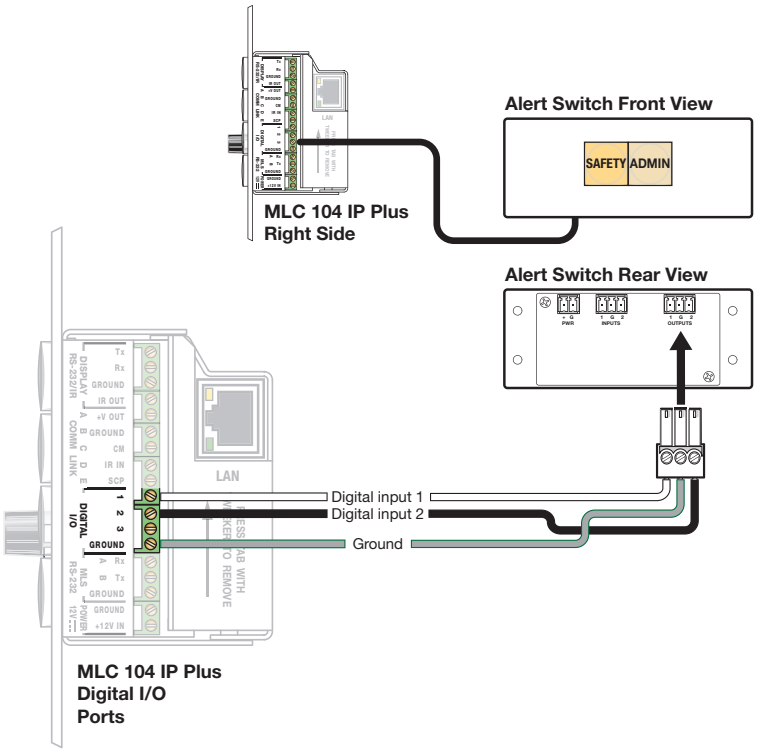


Figure 37. Connecting MLC 104 IP Plus Digital Input Ports to Alert Buttons

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 monitor set up in the MLC 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 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 2 k ohm pull-up resistor to +5 VDC.

Controlling a Low Voltage Screen Motor Controller

The MLC 104 IP 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.

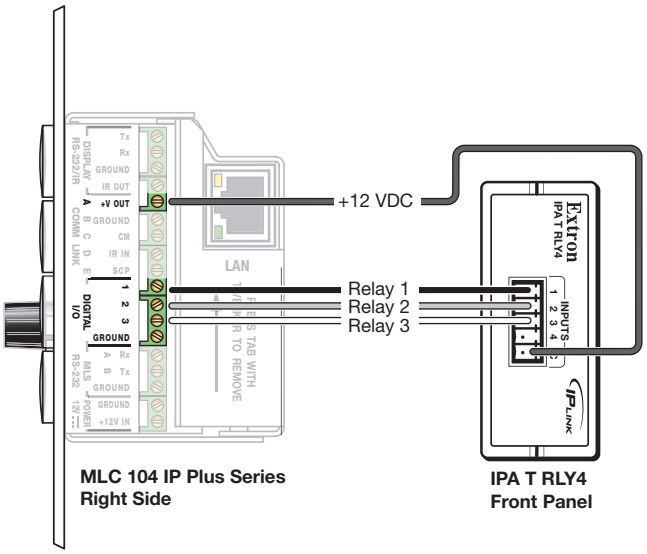
Follow the procedures in this section to cable the devices and then configure the MLC for this application.

Cabling the equipment

1. Connect the MLC to front panel inputs on an IPA T RLY4 as shown below.

   - The MLC provides 12 VDC to the common voltage pin (C) on the IPA.
   - Each MLC digital I/O port (1, 2, 3) connects to the corresponding relay input pin (1, 2, 3) on the IPA.

   NOTE: An Extron Comm-Link cable can be used for these connections.



2. Connect the IPA T RLY4 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. **See the specific wiring instructions from the manufacturer for the screen controller you are using.**

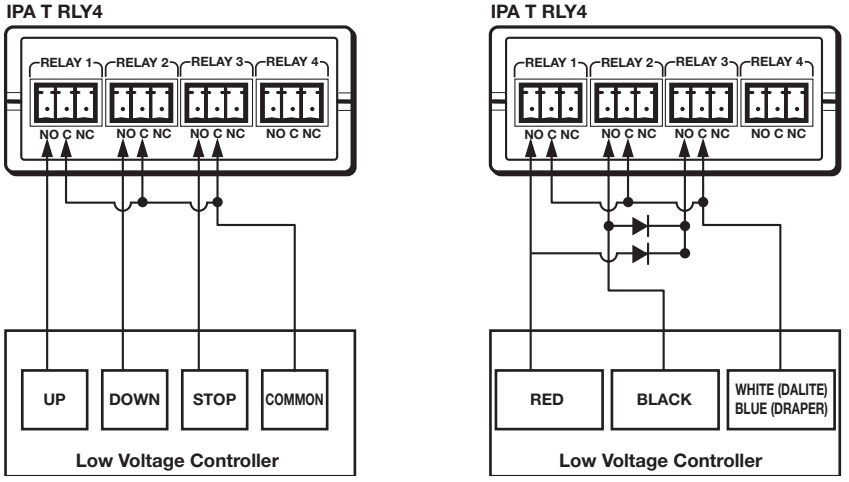


Figure 38. Examples of Wiring an IPA T RLY4 to Low Voltage Screen Controllers

3. Cable the screen controller to the drive motor for the screen 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 front panel buttons with the digital output ports and, therefore, with relays that trigger screen controller actions.

The `Display Power On` button is used to turn the display/projector power on and also make the screen go down. Set up this button to pulse digital output 1 for 2 seconds to make the screen controller lower the screen. Likewise, 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.

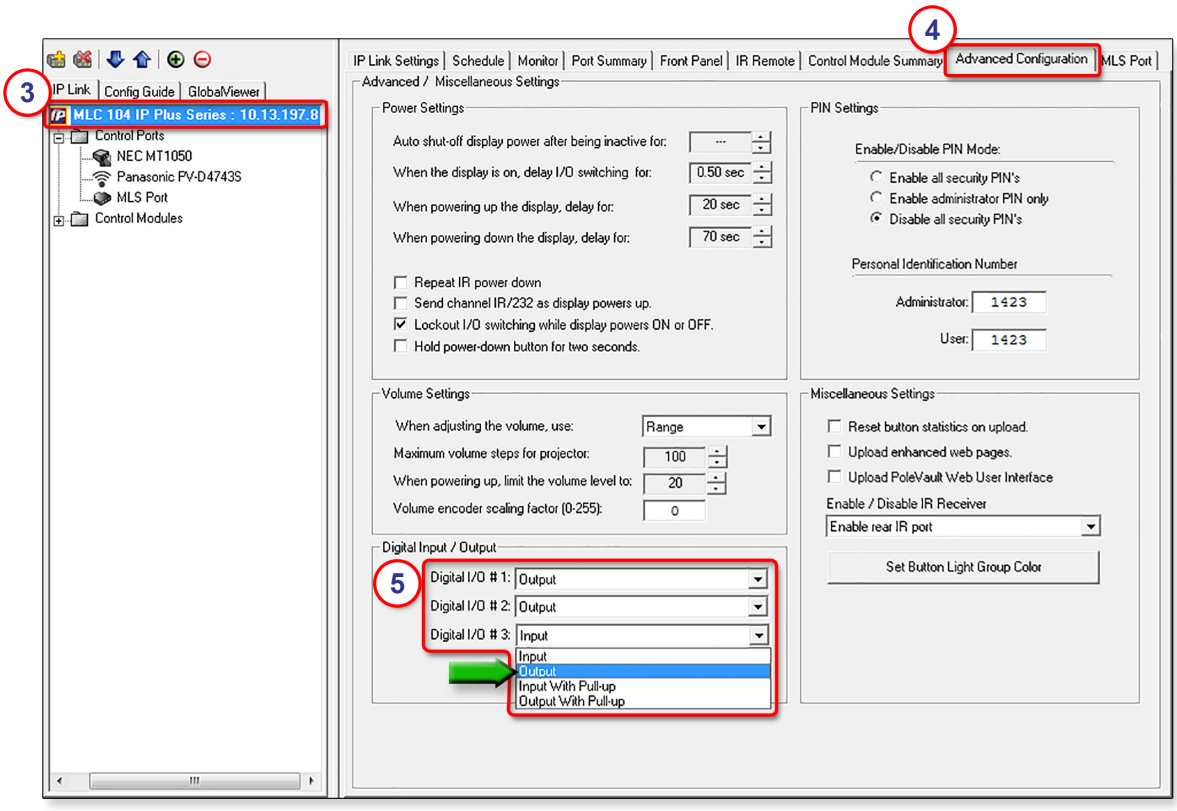
To configure the MLC, perform these steps:

Configure the digital I/O ports on the MLC to control relays on the IPA T RLY4

1. Connect the MLC to a PC using an **RJ-45 crossover cable** on page 29 or a **serial cable** on page 16, 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: See 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 panel, click on the MLC to be configured.

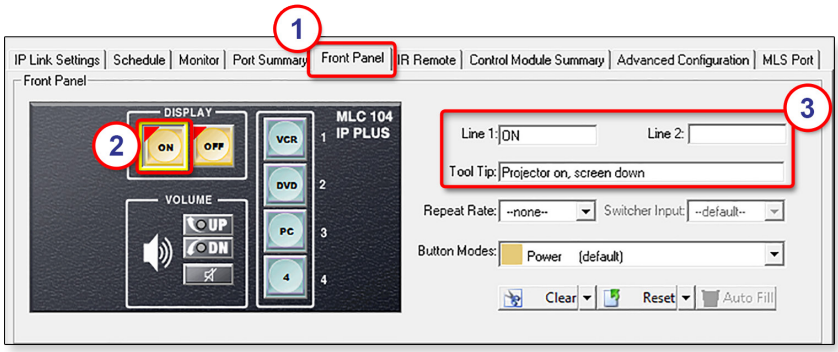


4. Click on the **`Advanced Configuration`** tab.
5. In the Digital Input/Output panel, use the drop-down menus to set each of the three ports to **`Output`**.

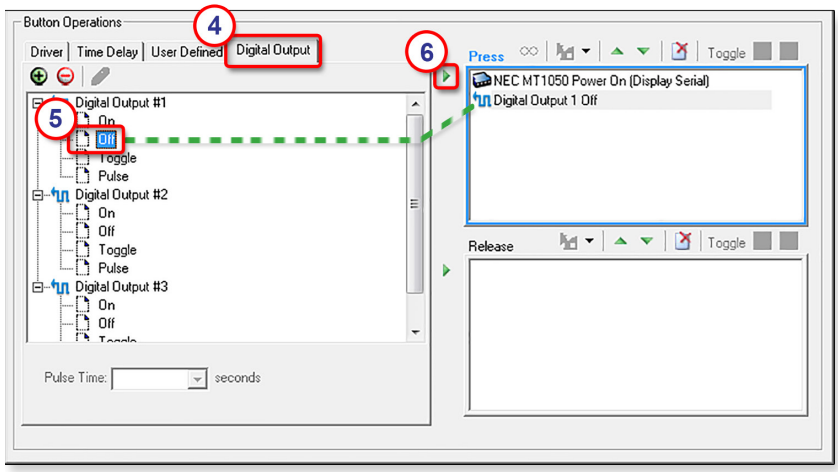
Configure the Display Power buttons on the MLC to operate the digital outputs

1. Click the **Front Panel** tab (see image below).
2. Click on the MLC **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.



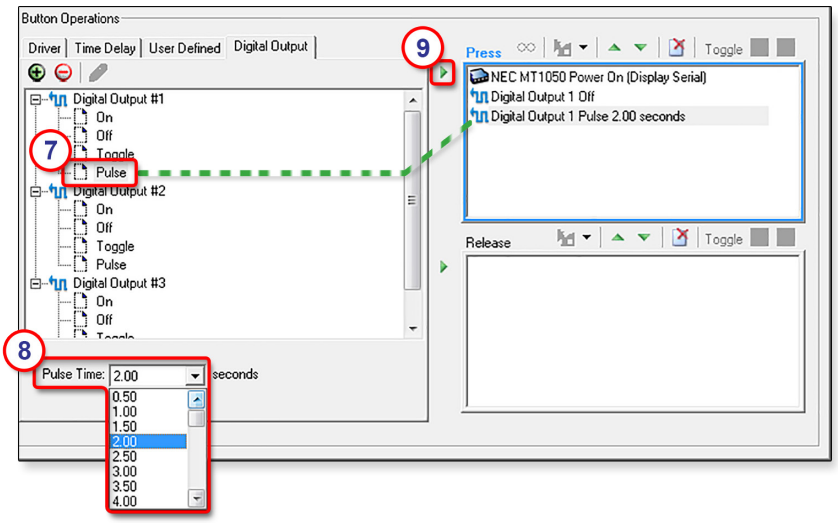
3. Type in text for the onscreen button label and the tool tip (text that appears when the mouse pointer hovers over that button in GlobalViewer), if desired.
4. In the `Button Operations` panel, click the **Digital Output** tab (see image below).



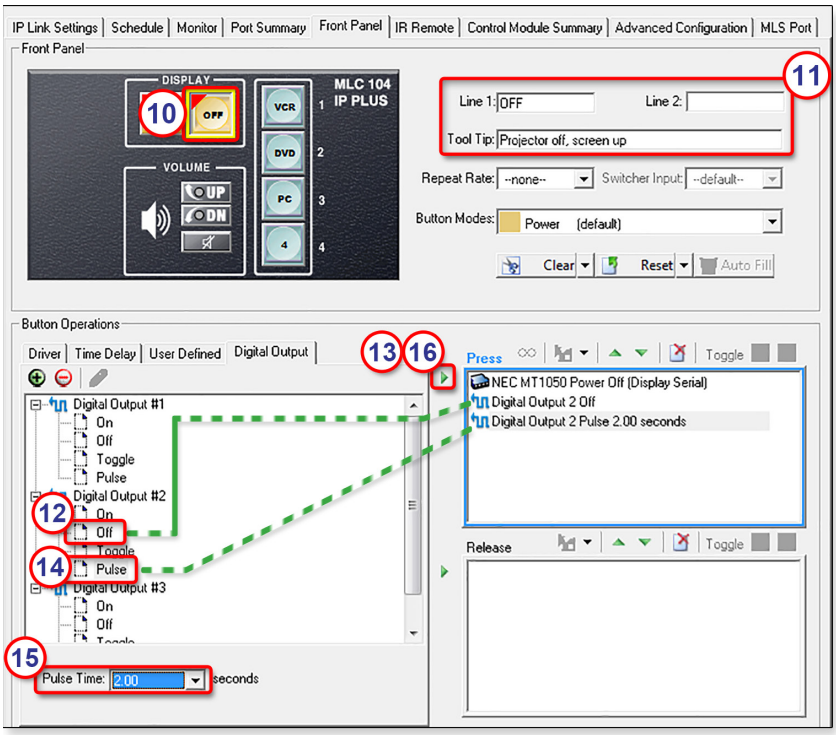
5. Under `Digital Output #1`, click **Off**.

   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** (see image below).



8. Select a **Pulse Time** (duration) of **2.00** seconds.
9. Click the green arrow (▶) adjacent to the **Press** area or drag the **Pulse** command to the **Press** area.
10. Click the MLC **Display Off** button.
11. Type in text for the onscreen button label and, if desired, the tool tip (see image below).



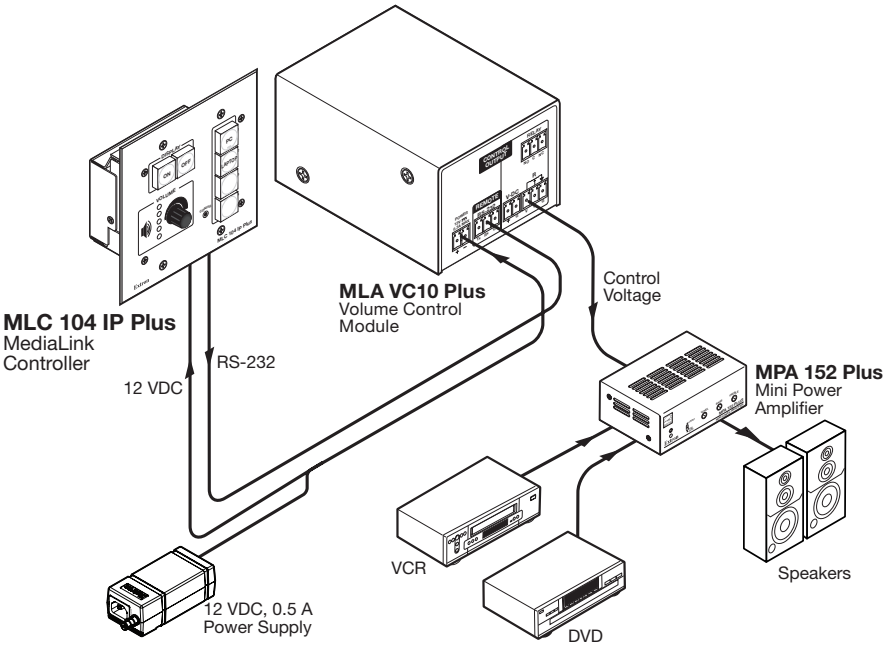
12. In the Button Operations panel, under the **Digital Output** tab, locate **Digital Output #2** and click **Off**. This command ensures that the relay is open (off) before it is pulsed.
13. Click the green arrow (▶) adjacent to the **Press** area or drag the command to the **Press** area.

14. Under `Digital Output #2`, click **`Pulse`**.
15. Select a `Pulse Time` (duration) of **`2.00`** 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 a volume controller such as an Extron MLA VC10 Plus. The MLA VC10 Plus provides a variable control voltage (supply voltage) of between 0 VDC and 10 VDC to remotely control the volume output of the amplifier.

The following picture shows a typical MLC 104 IP Plus Series system featuring an amplifier and volume controller.



Volume Control Hardware Setup

1. Cable these products as shown in the following diagrams, and see the user manual for each product as needed.

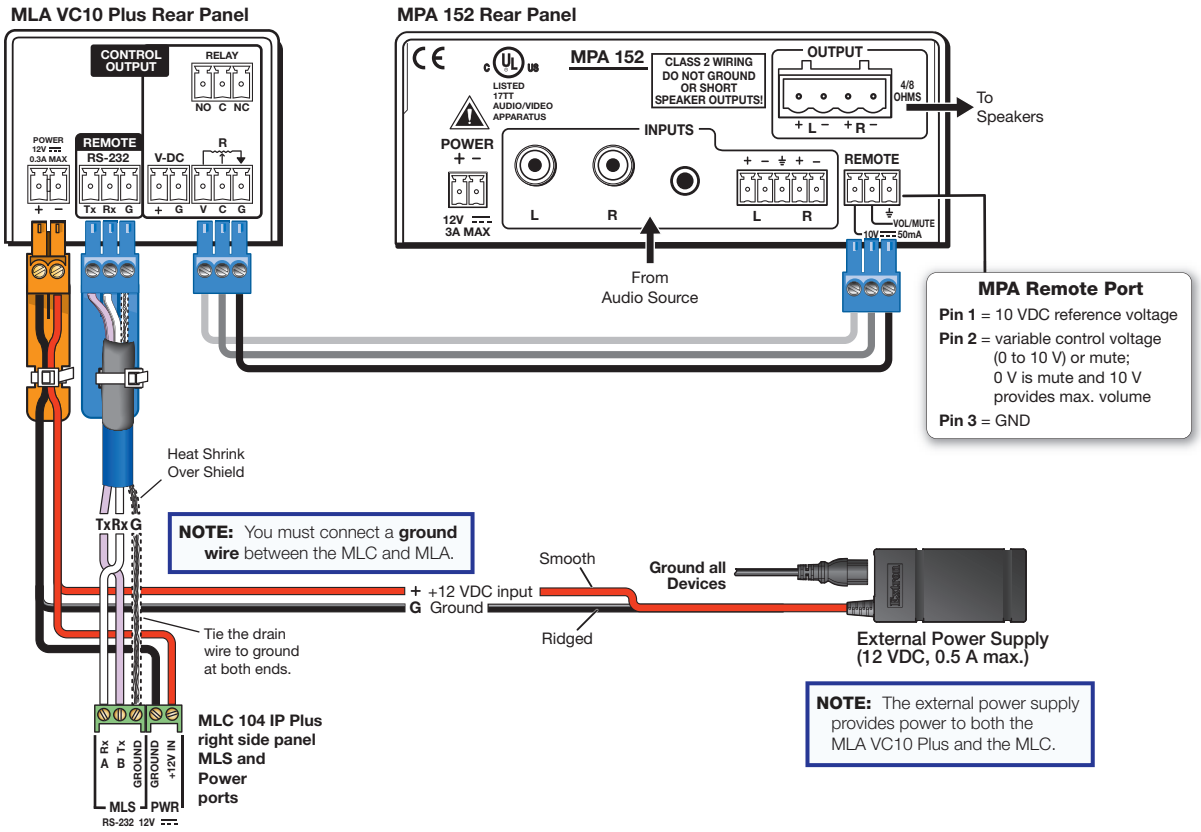


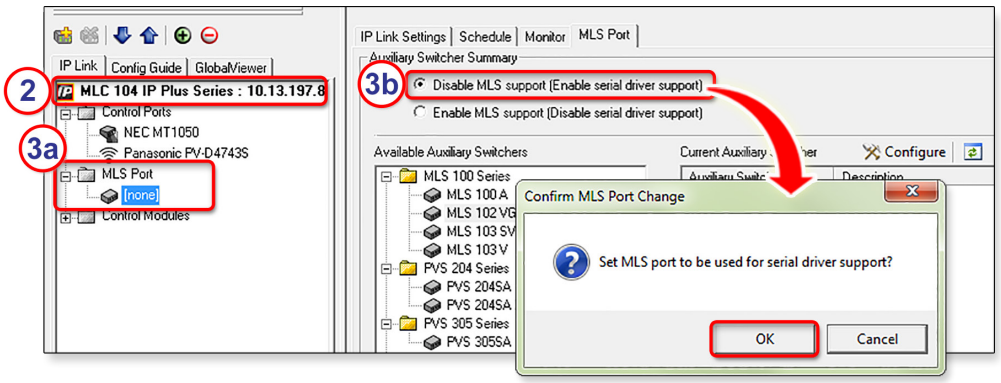
Figure 39. Connecting the MLC to an MLA VC10 Plus Volume Controller and Connecting the MLA to an MPA Mini Power Amplifier

2. If necessary, configure the MLA volume controller for the control voltage required by the amplifier. The MLA VC10 Plus does not require configuration. The MLA-VC10 requires DIP switches to be set for the appropriate output voltage (see the *MLA-VC10 User Guide* for details). The Extron MPA 122, MPA 181T, and MPA 152 accept up to 10 VDC.

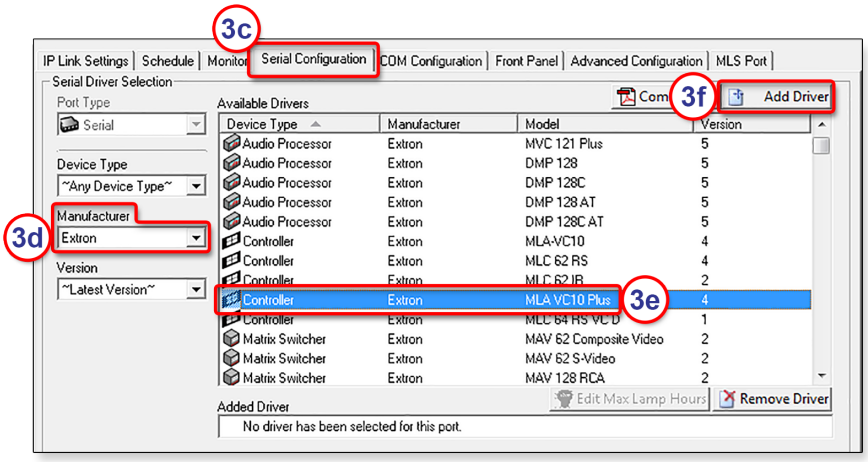
Volume Control Software Setup

To configure the MLC to work with the MLA volume controller, perform these steps:

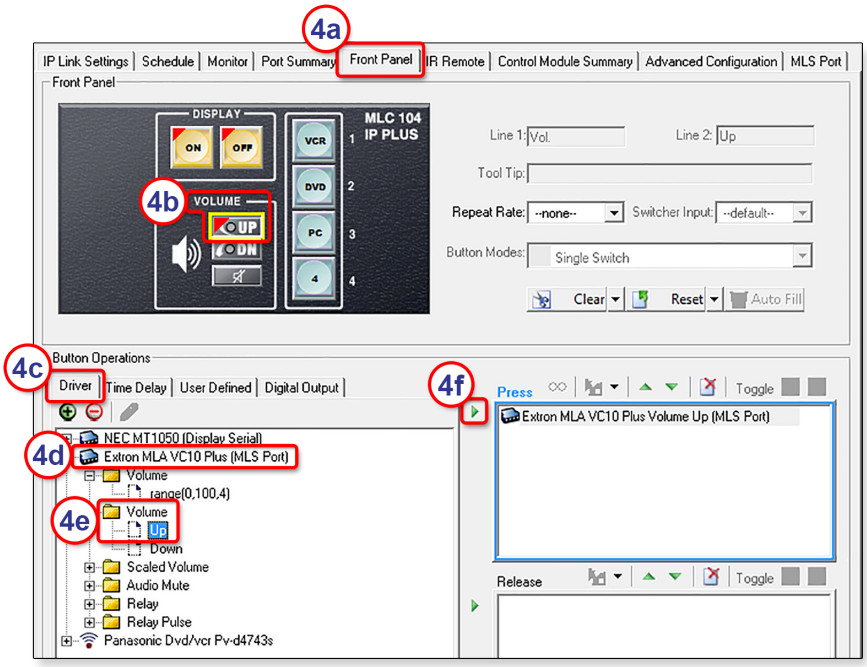
1. Start the Global Configurator software and open a project that includes an MLC 104 IP Plus Series unit.
2. In the **IP Link** tree view panel, click on the MLC to be configured (see image below).



3. Configure the MLS port with the correct driver.
   a. Click **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 the **Serial Configuration** tab.
   d. Select the manufacturer (**Extron**, in the example below).



   e. Locate and select (click on) the model name (**MLA VC1Ø Plus**) in the **Available Drivers** area.
   f. Click **Add Driver**. The name of the MLA VC10 Plus appears in the **Added Driver** field, and the commands available in its driver appear in the **GlobalViewer** area at the bottom of the window.
4. Configure the MLC front panel volume control knob to control the MLA VC10 Plus (see image on next page).
   a. Click the **Front Panel** tab.
   b. Click the **Volume Up** button.



c. Click the **Driver** tab in the Button Operations panel.

d. Double-click the **MLA VC1Ø Plus** driver. A list of available driver functions displays below the driver name.

e. Double-click the second **Volume** folder and select **Up**.

f. Click the green arrow adjacent to the **Press** area or drag the command to the **Press** area.

g. Click the **Volume Dn** (down) button.

h. In the **Driver** tab, select **Up** within the **Volume** folder.

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.

Customizing HTML Files to Control Devices, Modify Embedded Web Pages, and Send E-mail Alerts

This section discusses methods that someone familiar with HTML can use to make the MLC perform customized functions or to alter the MLC 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 detail SSIs, 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 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 ports on the MLC. 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 internal web server of the MLC.

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`.

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.

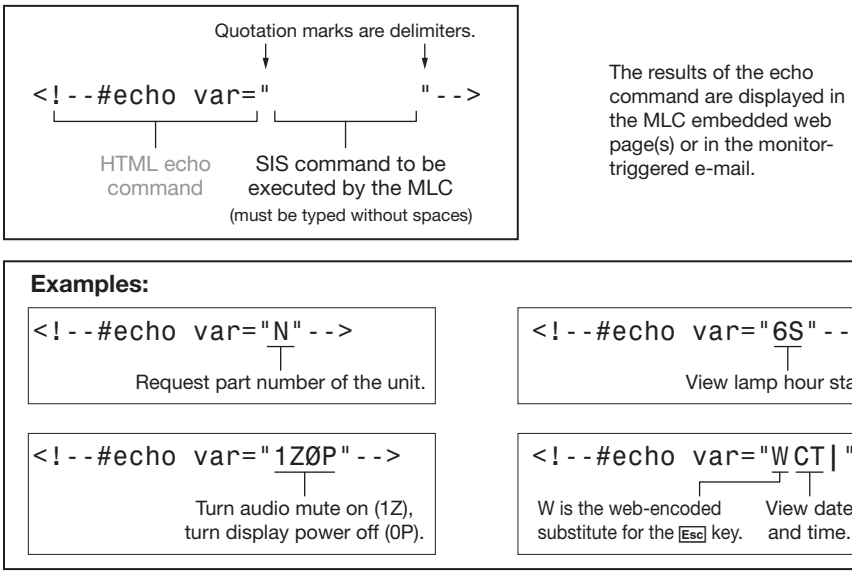
Command syntax

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



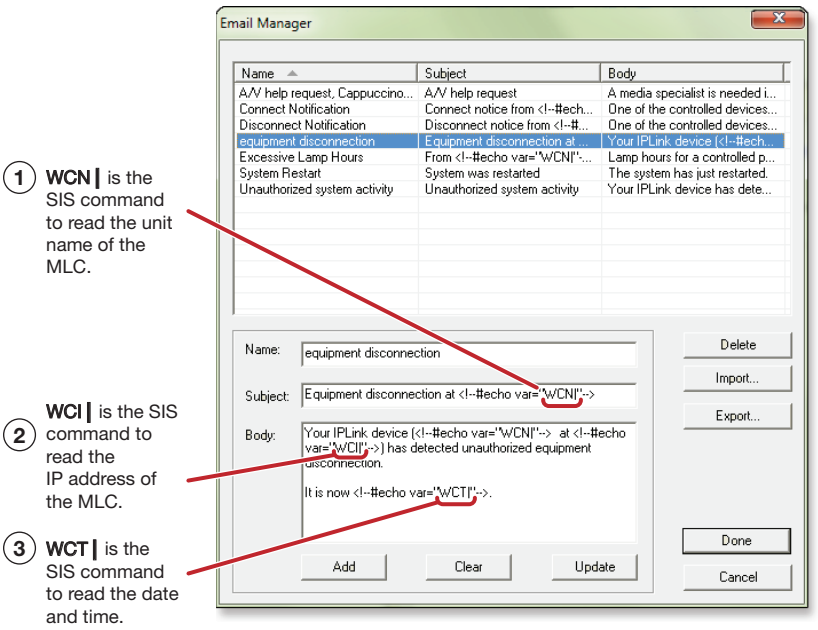
NOTE: Do not use spaces between SIS commands. Do use web encoding. See page 72 in the SIS section for details about how to **encode** SIS commands for web use.

Example: SSI use in notification e-mails

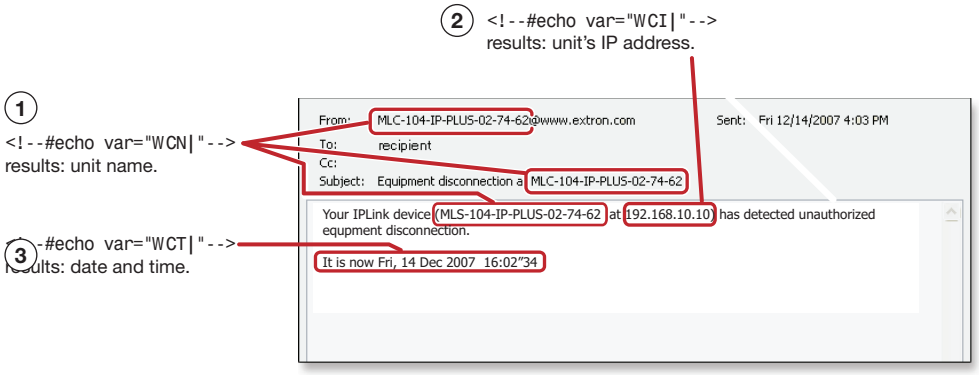
One simple way to use host SSI commands is to customize e-mail messages that the MLC sends in response to a monitored condition. In the following example the disconnection e-mail uses SSIs to insert the unit name, IP address, and time into an e-mail that is sent when the MLC detects that a device attached to it has been disconnected. For more

information on commands, see the **command and response table** for Simple Instruction Set (SIS) commands starting on page 77.

How these commands are typed into the Global Configurator Email Manager:



Resulting e-mail that is sent out upon equipment disconnection:



SSI use in an MLC embedded web page

Reference notes:

An __`.shtml` file can be uploaded to the MLC by using one of the following:

- The `File Management` tab of an MLC factory embedded web page (http://*<IP address of the MLC>*/nortxe_index.html)
- An SIS command (see **File streaming commands** in the SIS section) via DataViewer, Telnet, or HyperTerminal
- A web browser by sending a Post command on port 80 followed by the delimited data in the `.shtml` file

Reference Material

This section of the guide includes the following reference items:

- **Glossary**
- **File Types: a Key to Extron-specific File Names**
- **Cut-Out Templates**
- **Dimensions**
- **Mounting Instructions**

Product specifications are available via the MLC 104 IP Plus web pages at **www.extron.com**.

Glossary

10/100Base-T

10/100Base-T is Ethernet that uses unshielded twisted pair (UTP - CAT 5, and so forth) 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)

ARP is a protocol that assigns an IP address to a device based on the MAC or physical machine address of the device.

Custom web page

This is any file that can be loaded into an MLC and served by the internal web server of the MLC. The MLC can be used 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, and 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 nonvolatile memory of the controller, web pages can be created so that they can be served from another web server using Microsoft Internet Information Services (IIS).

DHCP (Dynamic Host Configuration Protocol)

DHCP is a standardized communications protocol that enables network administrators to locally and automatically manage the assignment of IP addresses within the network of an organization.

Driver

A driver is a software package that controls the interface between the controller and peripheral devices.

Ethernet

This 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

An event script is a program that controls an IP Link product. 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. 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)

HTTP is a web protocol based on TCP/IP that is used to fetch HyperText objects from remote web pages.

IP (Internet Protocol) IP is the protocol or standard used to send information from one computer to another on the Internet.

IP address An 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)

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

A MAC address is a unique hardware number given to devices that connect to a network such as the Internet. When a computer or networking device (router, hub, interface) is connected to a LAN or the Internet, a table (see ARP) relates the IP address of the device to its corresponding physical (MAC) address on the LAN.

Ping 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 This 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 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 help achieve these goals. Visit **www.extron.com** to see how the MLCs comply with Section 508.

SSI (server side include)

An SSI 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 Static IP refers to an IP address that has been specifically (instead of dynamically—see **DHCP**) 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 The portion of an IP address that is specifically identified by the subnet mask as the subnetwork.

Subnet mask 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 — A 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 — This 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 AV switchers.

Switching rotation — Switching rotation is another 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)

TCP 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)

TCP/IP 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 — Telnet is a standard terminal emulation utility or 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 — A tool tip is text that appears when the mouse pointer hovers over a button or other item on screen.

UDP (User Datagram Protocol)

UDP 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)

A URL is the address (such as www.extron.com) that lets a resource on the internet be identified, located, and accessed.

Verbose — 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. For detailed information, see the **verbose mode SIS commands** on page 88 in the “SIS Programming and Control” section. Verbose mode is usually enabled for 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 the 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.

ATTENTION:

- **___.cdc** files should **NOT** be deleted.
- ___.les fichiers .cdc NE doivent PAS être supprimés.

___.eir — These are IR 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 an IR port on the MLC.

___.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 controller, 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, **Ø.evt**. The other event files perform device driver functions. When the 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 internal operations of the MLC, while 2.evt is related to the Display port.

ATTENTION:

- Event files (__.evt) should NOT be deleted. They are necessary for the operation of the controller. Never delete the main event file (**Ø.evt**).
- Les fichiers Événement (__.evt) NE doivent PAS être supprimés. Ils sont nécessaires au fonctionnement du contrôleur. Ne jamais supprimer le fichier Événement principal (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. Global Configurator 3 is capable of loading all GC2 project files from GC version 2.0.3.3 and up. GCZ files can be opened by clicking **File** > **Open**, by clicking the toolbar icon, or by double-clicking on the GCZ file. GC2 and GCC files must be imported, however.

____.s19 — This is an Extron-supplied firmware update file. This file is not displayed on the **File Management embedded web page** (see page 58). See the **Firmware Updates** section starting on page 152 for details on firmware updates. Firmware cannot be updated by loading an **.s19** file through the File Management page, but it can be updated via the **Firmware Upgrade web page** (see page 57).

Cut-out Templates

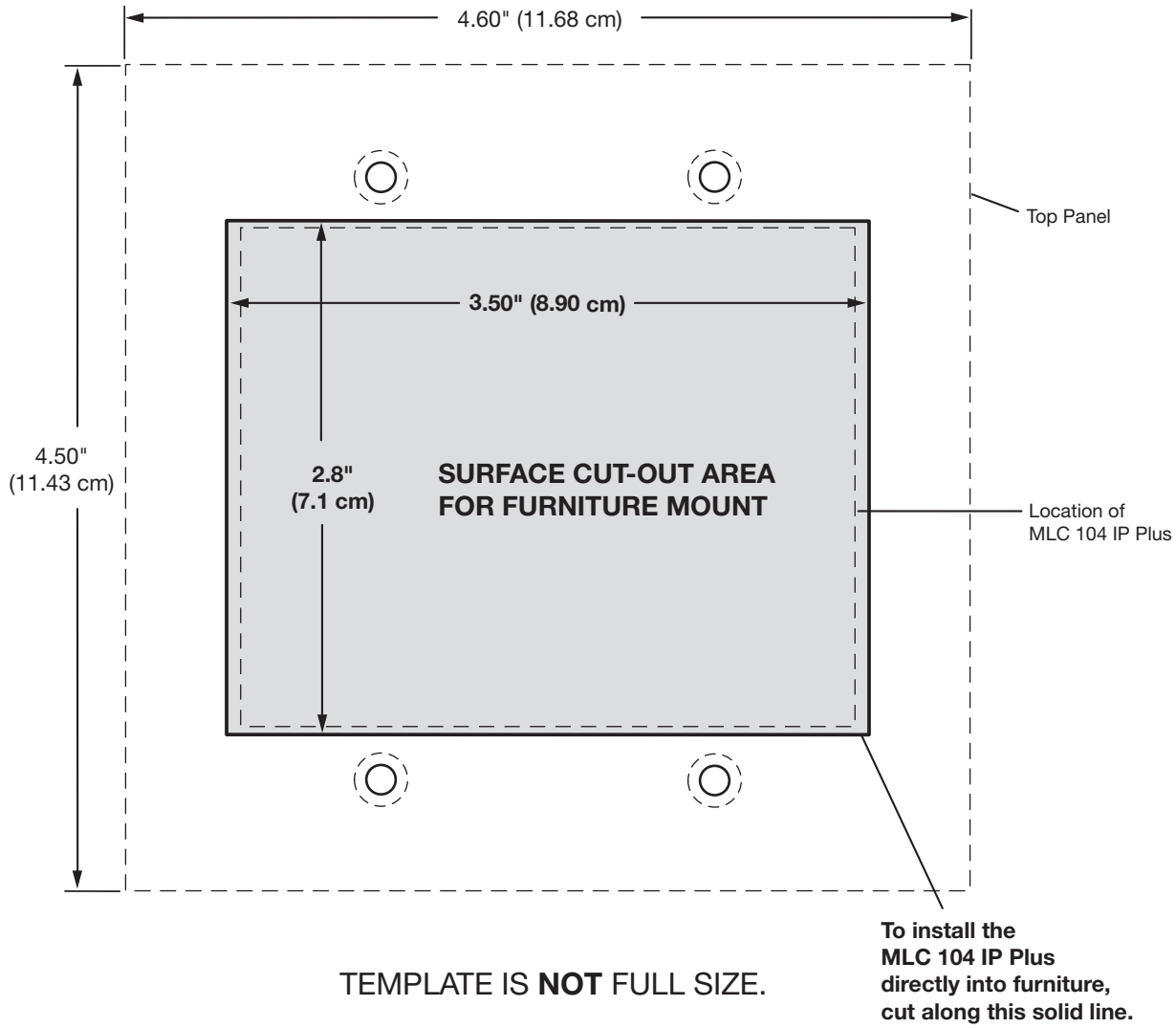
This section includes templates for the MLC 104 IP Plus, MLC 104 IP Plus AAP, MLC 104 IP Plus DV+, MLC 104 IP Plus L; and for the MLM 104 LAAP faceplate. Templates for MLM 104 Series faceplates are available in the *MLM 104 Faceplates Installation Guide*, which you can download from **http://www.extron.com**.

NOTE: The solid lines on the templates define the cut-out area, not the dashed line.

MLC 104 IP Plus

Cut-Out Template for the Extron

MLC 104 IP Plus

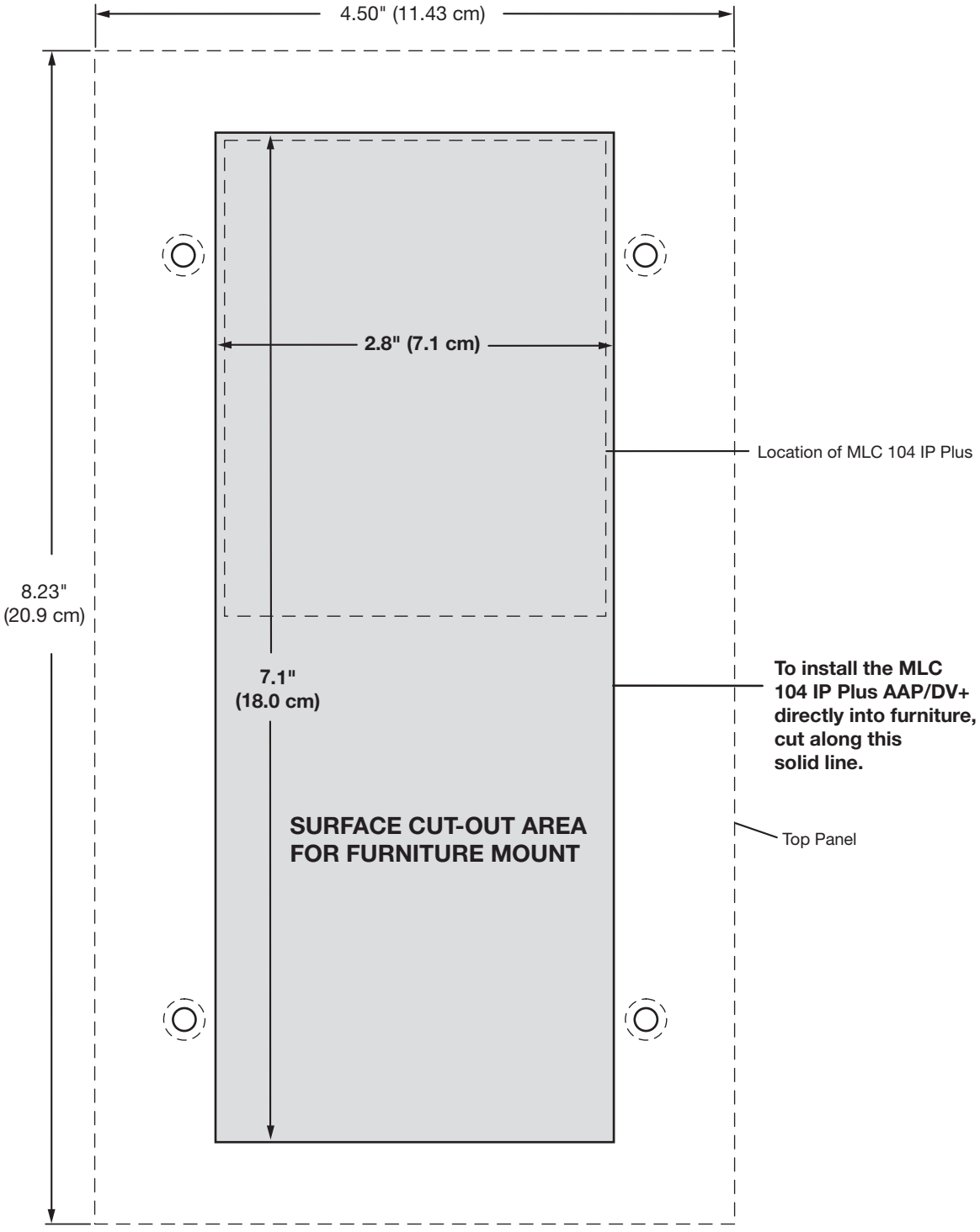


TEMPLATE IS **NOT** FULL SIZE.

MLC 104 IP Plus AAP and MLC 104 IP Plus DV+

Cut-Out Template for the Extron

MLC 104 IP Plus AAP
MLC 104 IP Plus DV+

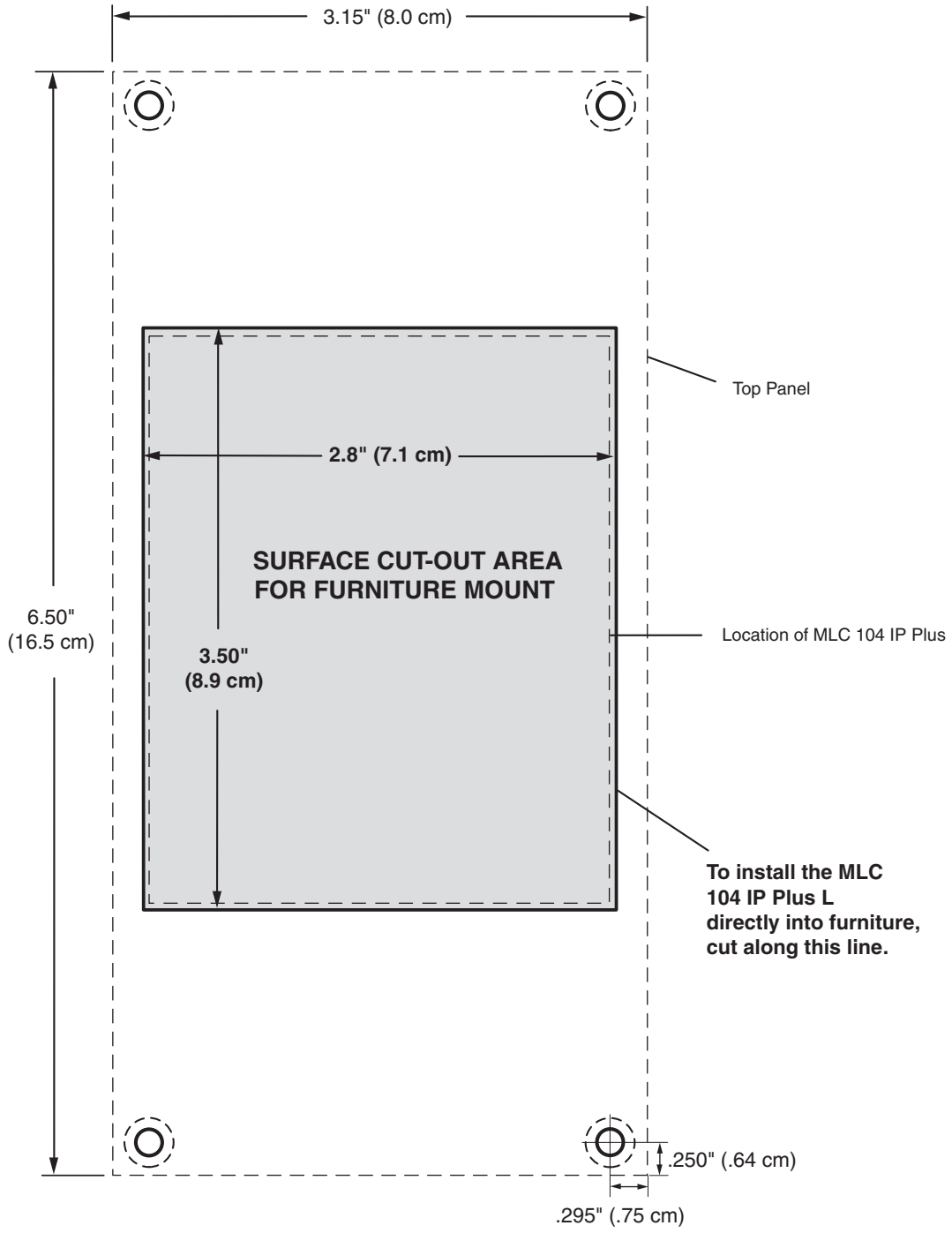


TEMPLATE IS **NOT** FULL SIZE.

MLC 104 IP Plus L

Cut-Out Template for Extron's

MLC 104 IP Plus L

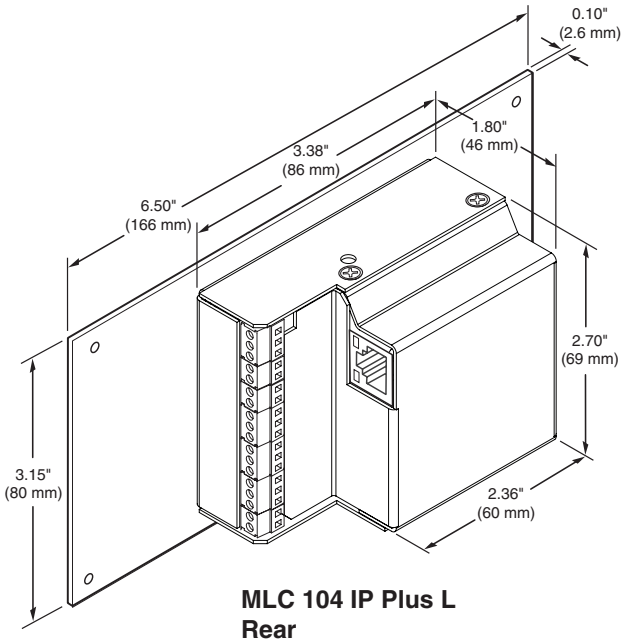


TEMPLATE IS **NOT** FULL SIZE.

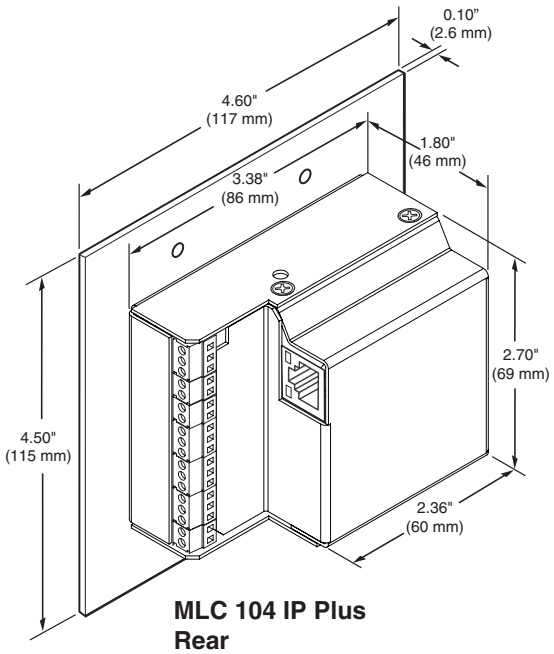
Dimensions

When preparing the installation location and surface, you may need to know the dimensions of the controller so you can plan where to place the MLC and how much room to leave in the wall or furniture.

MLC 104 IP Plus L and MLC 104 IP Plus Dimensions

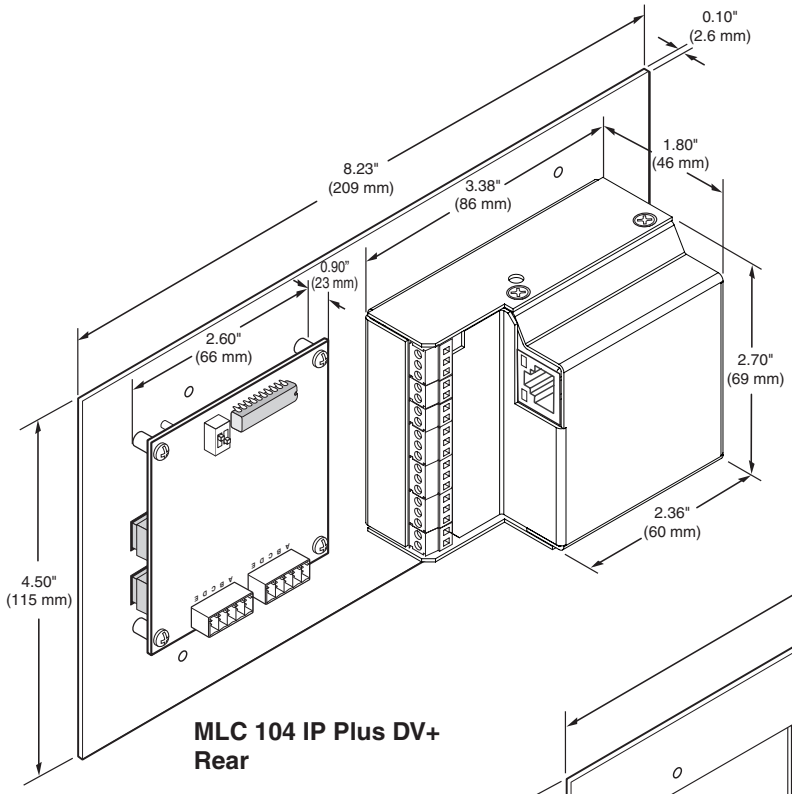


MLC 104 IP Plus L Rear

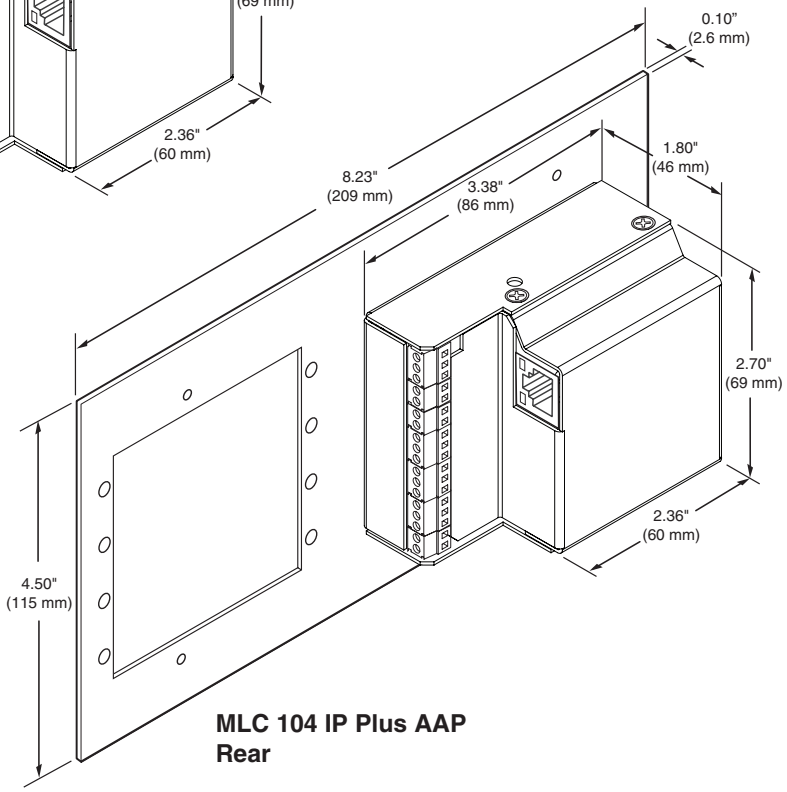


MLC 104 IP Plus Rear

MLC 104 IP Plus DV+ and MLC 104 IP Plus AAP Dimensions



MLC 104 IP Plus DV+
Rear

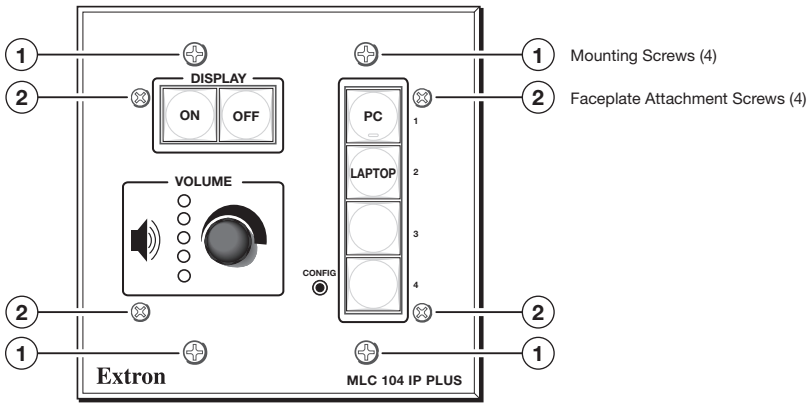


MLC 104 IP Plus AAP
Rear

Mounting Instructions

General Information and Guidelines for All Installations

Once the system has been cabled, configured, and tested, the controller can be installed in the wall, furniture, equipment rack. General mounting guidelines are outlined in this section. Detailed instructions may be available with any optional mounting kits used in the installation.



MLC 104 IP Plus Front Panel

① **Mounting screws (4)** — Use these to attach the MLC to a wall, furniture, or other mounting surface (see image above).

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 causes the MLC to detach, and it may then fall down into the wall or furniture.

ATTENTION:

- Do not mount the power supply in air handling spaces or in wall cavities.
- Ne pas installer la source d'alimentation dans des espaces d'aération ou dans des cavités murales.

NOTE: If the MLC (and any accessories such as control modules or an IR Link) is not mounted to a grounded metal wall box or grounded metal equipment rack,

- 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 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.

Americans with Disabilities Act (ADA) Compliance

When planning where to install the MLC, you may need to consider factors affecting accessibility of the controller such as height from the floor, distance from obstructions, and how far a user must reach to press the buttons. For guidelines, see sections 307 ("Protruding Objects") and 308 ("Reach Ranges") of the *2010 ADA Standards for Accessible Design* available at **http://www.ada.gov/regs2010/2010ADAStandards/2010ADAStandards.pdf**.

Mounting the MLC to an Electrical Box or Mud Ring

1. With power disconnected at the source, insert the MLC into the wall or furniture.
2. 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: For the installation to meet UL requirements and to comply with National Electrical Code (NEC), the MLC must be installed in a UL Listed junction box. The end user or installer must furnish the junction box; it is not included with the MLC.

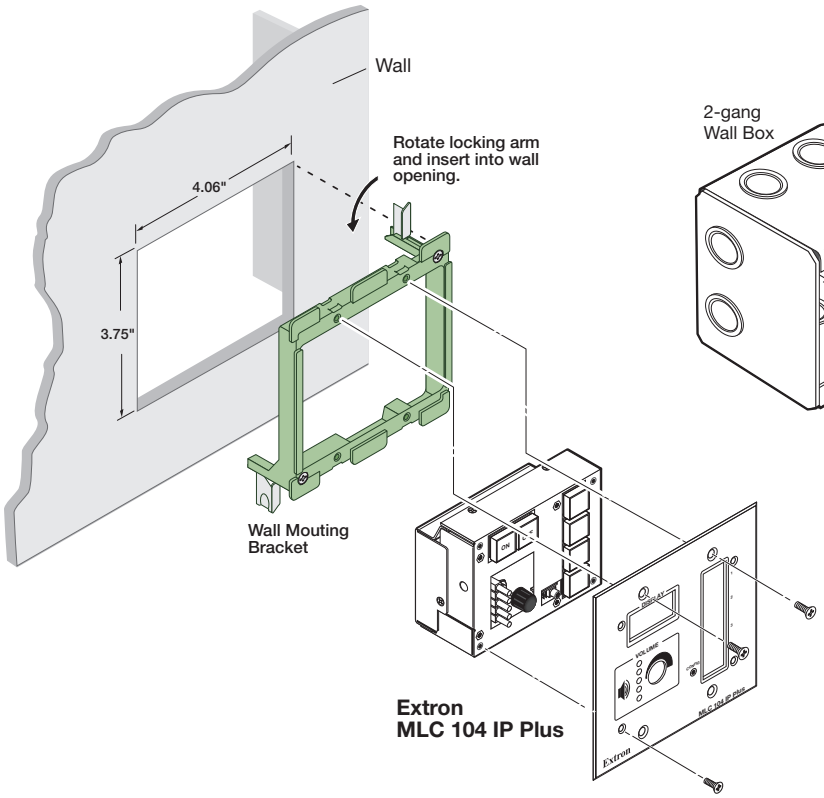


Figure 40. **Mounting the MLC to a Mud Ring**

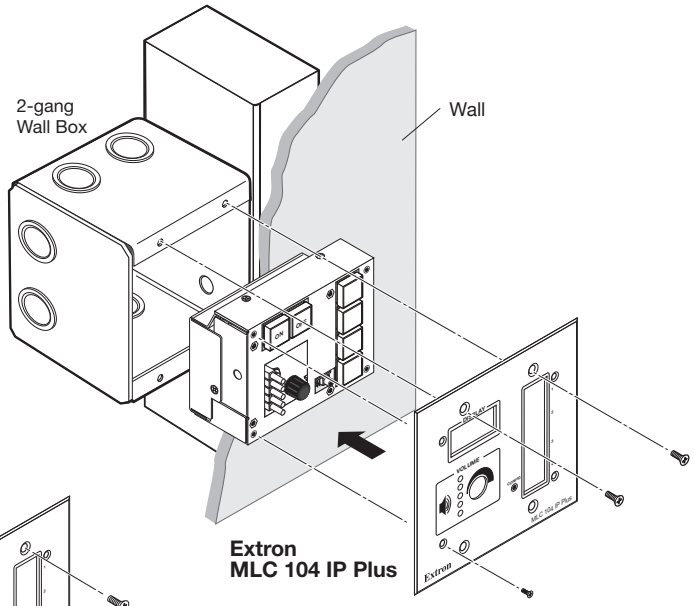


Figure 41. **Mounting the MLC to an Electrical Box**

Mounting the MLC to a Wall or Furniture

These instructions assume that the correct size of opening has been cut in the wall or furniture. See the **cut-out templates** starting on page 143. Take care in cutting the opening so as not to damage the furniture. A licensed, bonded craftsperson is recommended for that task.

1. If you have an MLC 104 IP Plus Series model other than the MLC 104 IP Plus L, 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 or grounded metal equipment rack,

- 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 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 Listed 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

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 (such as use of power strips).

Rack mounting instructions

Detailed installation instructions are available with the optional rack mounting kit.

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 following illustration.

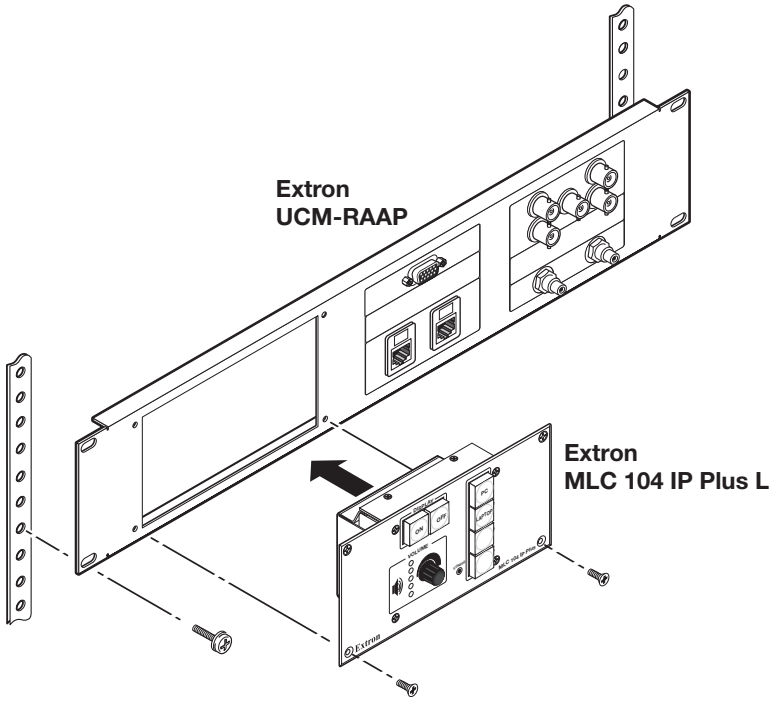


Figure 42. Rack Mounting the MLC 104 IP Plus L

Firmware Updates

If the need arises, you can replace the main firmware for the MLC without opening the unit or changing firmware chips. This section discusses the following aspects of how to do that:

- **Determining the Firmware Version**
- **Updating the Main Firmware**

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 MLC embedded web pages
- The GlobalViewer web pages (if they have been installed on the MLC)
- The response from the MLC to an SIS command of **1Q** (see page 84) or **0Q** (see page 10)

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 *Global Configurator Help* file and see the **Software-based Configuration and Control** section starting on page 34 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 version.
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

The controller comes with a set of factory default embedded web pages. Also, if the MLC is used as part of a network of devices based on IP Link technology, such as IP Link control processors and MediaLink controllers, the GlobalViewer (GV) application could be installed in the MLC as well as in other IP Link devices within the network. See the *Global Configurator Help* file for information on how to use that software and the resulting web pages. Either type of web page (factory default or GV) can be used to find the part number.

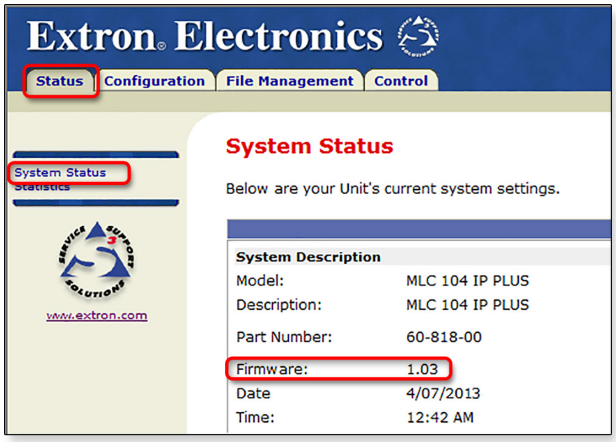
1. Connect the controller to a PC via an Ethernet connection, or connect the controller and the PC to a network/LAN. For details see the **Operation, Features, and Cabling** section starting on page 7, the **Software-based Configuration and Control** section starting on page 34, and the *MLC 104 IP Plus Series Setup Guide*.
2. Start a web browser program (such as Microsoft Internet Explorer).
3. Type the IP address of the MLC into the browser in the address field and log on to the internal web page (see the **Software-based Configuration and Control** section starting on page 34) 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®, Google Chrome™, 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 address area of the browser, substituting the actual IP address of the MLC for "`<IP address>`". For example, `http://192.168.10.10/nortxe_index.html`.

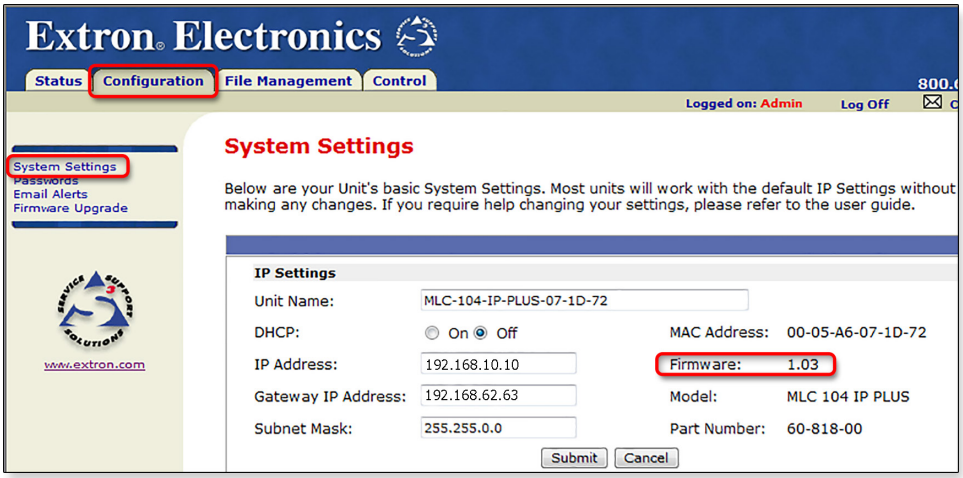
4. In the factory default web pages:

   - Select the **`Status`** tab and the **`System Status`** page. The firmware version is listed in the `System Description` panel, as shown at right.

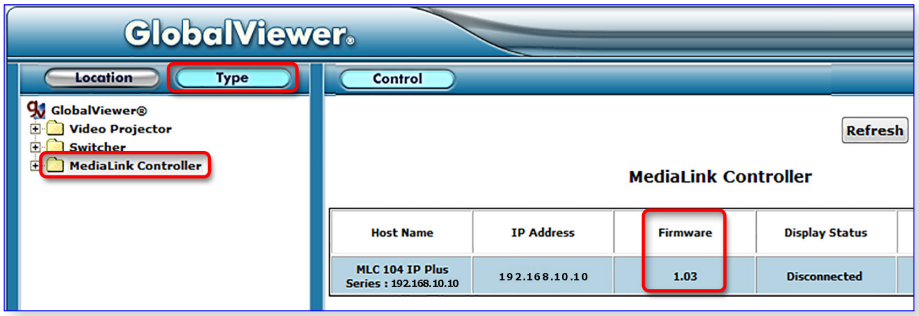


Or

   - Select the **`System Settings`** page within the **`Configuration`** tab. The firmware version is listed in the IP Settings panel, as shown below.



If using the GlobalViewer pages, click the **Type** button and click on the **MediaLink Controller** folder. The firmware version is listed in the **Control** window, as shown below.



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 firmware assume you have installed the appropriate software on your PC first.

NOTES:

- Because the MLC must be reset after a firmware update, the existing configuration is erased. You should save the existing configuration to a file (see the *Global Configurator Help* file for instructions) before replacing the firmware. If the file is saved, the configuration can be restored to the MLC later using Global Configurator.
- Check the Extron website (**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

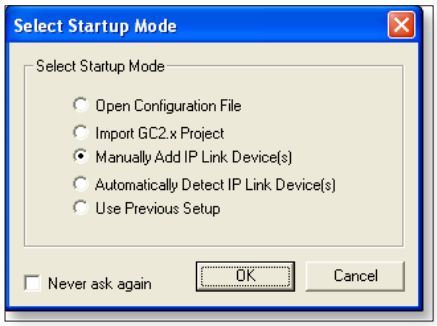
1. Visit the Extron website to find the latest firmware file for the MLC.
2. Download the executable installer file (`*.exe`) from the website and run the installer program. The program automatically stores the firmware file on the PC in `C:\Program Files\Extron\Firmware\MLC_104_IP_Plus\xx` (a folder 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_vxxx.s19` where *xxx* is the version number (*x.xx*) or `MLC_104_IP_PLUS_19_1818_50_vx.xx.S19` where v*x_xx* indicates the version number.

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

Updating Firmware via Extron IP Link File Manager Software

This is the **recommended method** for updating the firmware for an MLC. It allows you to update one or several MLCs at a time via an IP connection.

1. Download the `.s19` 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 an MLC to the firmware update list, click **`OK`**, and follow any on-screen instructions to add MLCs.

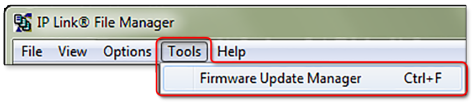


   - **`Open Configuration File`** — Select this mode to open an existing configuration file.
   - **`Import GC2.x Project (recommended)`** — Select this mode to import a GC2.x project file and the names and IP addresses of the devices in it.
   - **`Manually Add IP Link Device(s)`** — Select this mode 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.

   See the *IP Link File Manager 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 controller to perform a ZY reset, which resets all device settings and deletes all files from the controller after the firmware is updated. See **ZY** command details on page 99 in the SIS section.
5. Click on the **`Tools`** menu and select **`Firmware Update Manager`**.

   The `Firmware Update Manager` window appears (see image at right).



6. Set the maximum number of firmware uploads that can take place at the same time. The firmware files are uploaded to 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 (see image below).

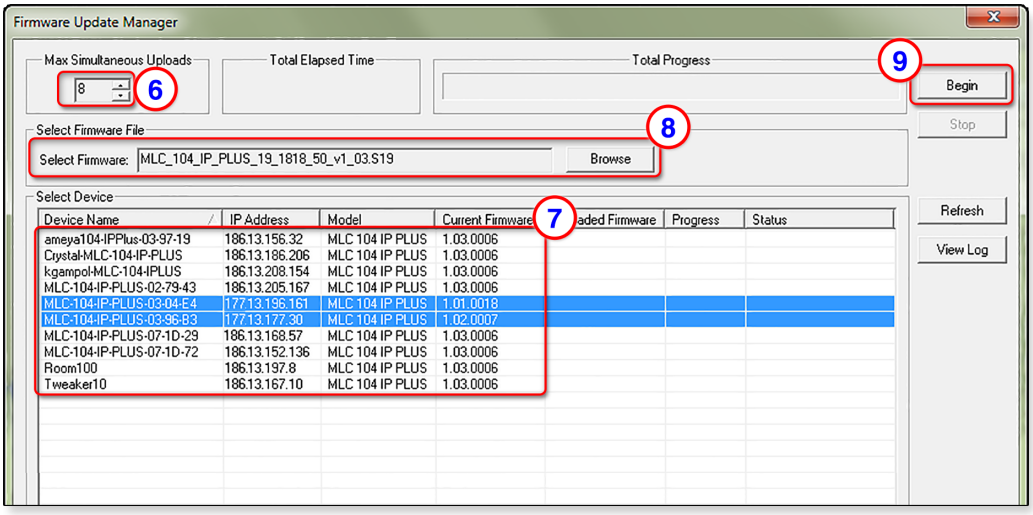


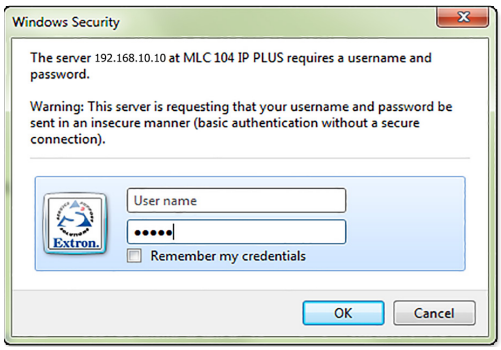
Figure 43. The Firmware Update Manager Window Prior to Uploading

7. In the **Select Device** list, select the devices for the firmware update. The process is identical for any IP Link-enabled product.
   - <**Ctrl**>-click on the name(s) of the unit(s) to select (or deselect) more than one unit in the list.
   - Click on the name of one unit and <**Shift**>-click on the name of another unit to select those two MLCs and the identical model MLCs listed between them.
8. Click **Browse** in the **Select Firmware File** panel , then locate and select the firmware file you downloaded in step 1.
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.

Updating Firmware Via the MLC 104 IP Plus Embedded Web Page

Firmware uploads may be performed via a web browser and the internal web page of the MLC controller. This method allows you to update one MLC at a time via an IP connection.

1. Download the `.s19` firmware file.
2. Launch a web browser (Microsoft Internet Explorer) on the connected PC and type the IP address of the controller in the address area.
3. If a password was previously set for the MLC, an `Enter Network Password, Connect to...`, or `Windows Security` dialog box appears (see image at right). Type the IP address of the controller or text of your choice in the **`User Name`** field, type in the administrator password in the **`Password`** field, and click **`OK`**. The MLC default web page appears.



NOTES:

- The factory configured password for all accounts on this device have been set to the device serial number. In the event of a complete system reset, the passwords convert to the default, which is no password. A new password will need to be configured to secure the device.
- Passwords must contain 4 to 12 alphanumeric characters. Symbols and spaces are not allowed, and the passwords are case-sensitive.
- If the unit has been previously configured with GC, a GlobalViewer web page appears instead. To access the factory-embedded web page, in the address field of the browser, type the IP address of the unit followed by `\nortxe_index.html`. For example, `192.168.10.10\nortxe_index.html`.

4. Click on the **`Configuration`** tab, then select **`Firmware Upgrade`** from the list on the left of the screen. A screen like the one shown on the following page appears.
5. Click the **`Browse`** button. A `Choose File to Upload` dialog box opens.

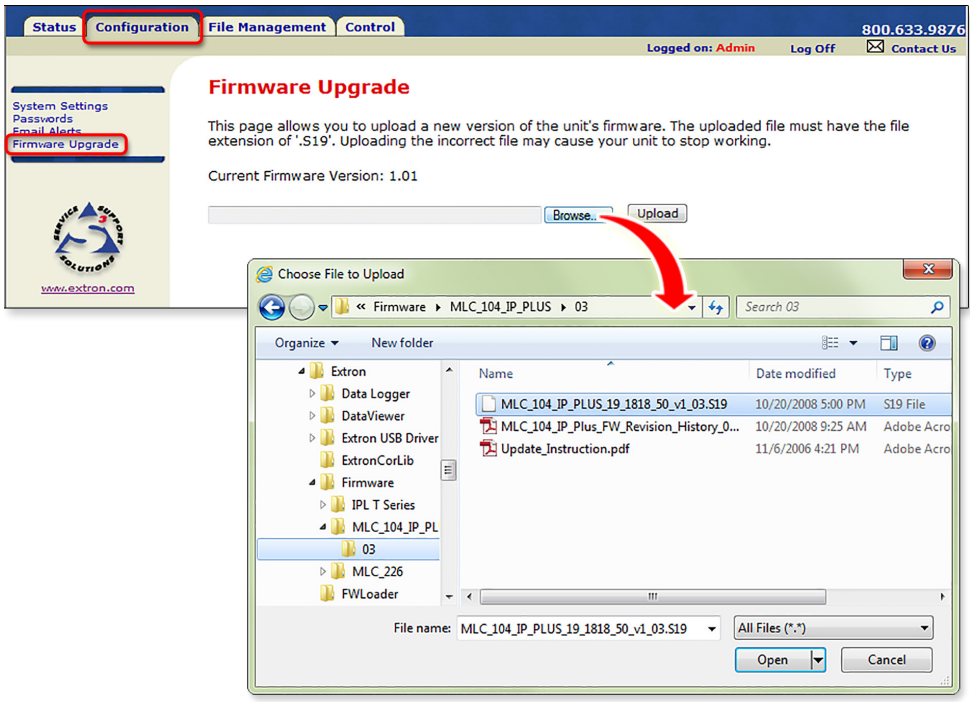


Figure 44. Selecting the New Firmware File for the Upgrade

6. In the `Choose File to Upload` dialog box, locate and select the firmware file (*.`s19`) you downloaded to `C:\Program Files (x86)\Extron\Firmware\MLC_104_IP_PLUS\xx`, and click the **`Open`** button.
7. Click **`Upload`** button on the web page to upload the firmware to the controller. It takes a while to load the file into the controller. You do not see any on-screen indication when the upload has finished. Once the firmware upload is completed, the MLC performs a reset.
8. If needed, see **Resetting the Unit** starting on page 31 in the "Installation" section and see the *Global Configurator Help* file for instructions on how to restore a configuration.

Updating Firmware Via Extron Firmware Loader Software

This method allows you to update one MLC at a time via IP or RS 232 communication using Firmware Loader software (available free from **www.extron.com**).

NOTE: The MLC 104 IP Plus requires Firmware Loader version 4.0 or higher.

1. If not already installed, download Firmware Loader from the Extron website and follow the on-screen instructions to install it.
2. Download the `.s19` firmware file to the PC.
3. Start the Firmware Loader (FWLoader, ) software on the connected PC. The `Add Device` dialog box opens.
4. In the `Add Device` dialog box, choose the type of device (MLC 104 IP Plus).
5. Select the communication type (connection method) and settings.
   - For **IP communication**, select **`TCP/IP`**, enter the IP address of the controller, verify or change the Telnet port number, and enter an administrator password if a password has been set for the unit.

NOTES:

- The factory configured password for all accounts on this device have been set to the device serial number. In the event of a complete system reset, the passwords convert to the default, which is no password. A new password will need to be configured to secure the device.
- Passwords must contain 4 to 12 alphanumeric characters. Symbols and spaces are not allowed, and the passwords are case-sensitive.

- For **serial communication**, select **RS-232** and set the communications settings to 38400 baud.

6. Click the **Connect** button. If the connection is unsuccessful, an error message or timeout message is displayed. If the connection is successful, the model name is displayed within the dialog box and the `New Firmware File` panel becomes accessible.
7. Click the **Browse** button. The `Open` window appears.
8. Locate and select the firmware file on your PC that you downloaded for the MLC, then click the **Open** button. The `Open` window closes.
9. Click **Add**. The `Add Device` dialog box closes, and the MLC you just added appears in the device list within the main Firmware Loader window. The version of the currently installed firmware, the name of the firmware file you selected to load onto the unit, and the IP address are also listed.
10. With that MLC unit selected, click **Begin**. The PC uploads the new firmware to the MLC. Once the firmware is uploaded, the MLC restarts events.
11. Firmware Loader displays the new firmware version in the `Firmware` column.
12. Close or exit Firmware Loader.
13. Verify that the MLC is connected to the network and is functioning as expected.

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 configuration of the MLC after resetting.

1. Perform a ZY reset, which 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.
   - If using DataViewer, Telnet, or HyperTerminal, enter Esc `ZY`←.
   - If using a web browser connection, enter `WZY|`.

   NOTES:

   - This command is supported by MLCs with firmware of version 1.03 or higher.
   - The ZY reset is different from reset modes 1 through 4. For details about reset modes available using SIS commands, see **Reset (zap) commands and erase commands** on page 99.
2. Using Global Configurator, restore (build) the previously saved project to the MLC.

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Extron Warranty

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

USA, Canada, South America, and Central America:
Extron Electronics
1230 South Lewis Street
Anaheim, CA 92805
U.S.A.

Japan:
Extron Electronics, Japan
Kyodo Building, 16 Ichibancho
Chiyoda-ku, Tokyo 102-0082
Japan

Europe and Africa:
Extron Europe
Hanzeboulevard 10
3825 PH Amersfoort
The Netherlands

China:
Extron China
686 Ronghua Road
Songjiang District
Shanghai 201611
China

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

Middle East:
Extron Middle East
Dubai Airport Free Zone
F13, 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 if modifications were made to the product that were not authorized by Extron.

NOTE: If a product is defective, please call Extron and ask for an Application Engineer to receive an RA (Return Authorization) number. This will begin the repair process.

USA: 714.491.1500 or 800.633.9876
Asia: 65.6383.4400
Europe: 31.33.453.4040
Japan: 81.3.3511.7655

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

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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.