April 2014

Little Theatre Technical Resource and Operation Guide

Jared Douglas Erb
Worcester Polytechnic Institute

Follow this and additional works at: https://digitalcommons.wpi.edu/mqp-all

Repository Citation

This Unrestricted is brought to you for free and open access by the Major Qualifying Projects at Digital WPI. It has been accepted for inclusion in Major Qualifying Projects (All Years) by an authorized administrator of Digital WPI. For more information, please contact digitalwpi@wpi.edu.
Little Theatre Technical Resource & Operation Guide

A Major Qualifying Project Report
Submitted to the Faculty of the
WORCESTER POLYTECHNIC INSTITUTE
In partial fulfilment of the requirements for the
Degree of Bachelor of Science
In Humanities and Arts: Drama/Theatre

By:

________________________________________
Jared Douglas Erb
Submission Date: April 30, 2014

________________________________________
Professor Susan Vick, Advisor
# Table of Contents

Abstract ................................................................................................................................. 1

Introduction ........................................................................................................................... 2

Concept ................................................................................................................................. 3

Section Introductions ........................................................................................................... 4

Scenic .................................................................................................................................... 6

  Floor Plans of the Little Theatre ......................................................................................... 6

Lighting ................................................................................................................................. 12

  CEM+ Control Module ................................................................................................. 12

  Color Frame Sizes ........................................................................................................ 93

  Dimmer Module ............................................................................................................. 98

  Fresnel ............................................................................................................................ 100

  Gobo Holders ................................................................................................................ 102

  Green Room Lighting .................................................................................................... 105

  Pipe Circuit Box .......................................................................................................... 106

  Guide to Color Filters ................................................................................................. 107

  House Lighting ............................................................................................................. 127

  Ion Operators Manual ................................................................................................. 128

  Scoop ............................................................................................................................. 568

  Selador ......................................................................................................................... 570

  Sensor Dimming System ............................................................................................ 590

  Source Four .................................................................................................................. 715

  Unison External Processor .......................................................................................... 763

  Wall Switch ................................................................................................................... 810

  Wall Flange ................................................................................................................... 812

  Wall Light ....................................................................................................................... 813

Rentals used in the Little Theatre ....................................................................................... 814

  JBLED A7 ....................................................................................................................... 814

  Colorblast ...................................................................................................................... 820

  Colorblast Controller ................................................................................................. 828
Elation ............................................................................................................... 840
Lighting Connector Guide ............................................................................. 900
**Sound** ....................................................................................................... 903
200 Series Headset ......................................................................................... 903
266XL Compressor ......................................................................................... 905
BP-1 Beltpack ................................................................................................. 923
GQX-3102 Graphic EQ .................................................................................... 932
LS-3 Talkback Station ..................................................................................... 951
Mac Pro ........................................................................................................... 955
Magic Trackpad .............................................................................................. 967
MS-200 Intercom Main Station ....................................................................... 979
CX Amplifier ................................................................................................. 986
PLX Amplifier ............................................................................................... 1038
Shure SM 57 .................................................................................................. 1070
UB42 Speaker ............................................................................................... 1074
UB22i Speaker .............................................................................................. 1084
XKeys Programmable Keypad ...................................................................... 1094
X32 Rack Sound Console ............................................................................... 1098
Sound Connector Guide ................................................................................ 1130
**Projection** .................................................................................................. 1133
Short Throw Projector Manual ...................................................................... 1133
Guide to Projector Screens ........................................................................... 1194
**Safety** .......................................................................................................... 1202
Fog Interest Form .......................................................................................... 1202
Little Theatre Terms of Use ......................................................................... 1204
Exit Signs ....................................................................................................... 1209
**Recommendations** .................................................................................... 1212
**Appendix** .................................................................................................... 1213
Theatre Resume ............................................................................................. 1213
Play List ......................................................................................................... 1214
Hours Log ....................................................................................................... 1217
**References** .................................................................................................. 1218
Abstract

Little Theatre Technical Resource & Operation Guide is a collection of resources for the proper use of and general information on equipment in the Little Theatre. This project covers the major departments in the theatre including Scenic, Lighting and Sound. This report has been designed to be updateable and sustainable. Also included are a set of documents that shows my four years of progress through the WPI theatre academic and production programs.
Introduction

In 2005 the theatre community at WPI changed in a big “little” way. The Little Theatre was built and opened on November 17th, 2005. This gave students a new style of theatre to work with and learn, and was a very different type of venue from Alden Memorial. But as with any theatre, though, the Little Theatre has elements of lighting, sound, scenic, multimedia and many other technologies available.

Over the last ten years there have been some major advances in theatre technology and the way theatre is performed. Unfortunately our available resources, like manuals and guides, have not advanced at the same rate. This has led to a need for a document like the one that follows.

This guide contains resources, references and recommendations for the technology in the Little Theatre. This guide will be completely digital, modular and easy to maintain. Information will be sourced from many locations, including previous academic projects in the space, exploration of the booth, the HUA D/T website and the HUA D/T Resource Library.
**Concept**

**Digital**

The idea of this MQP is to create resource guide that will be completely digital. This allows for two major things: the ability the host and distribute the guide on a large scale, and the advantage that it will be sustainable and “green.” This is important because as the theatre grows in technology applications keeping a physical resource set up to date would be unwieldy at best.

**Modular**

The Modular concept lends itself to the digital distribution system. This guide will be setup in a way so that if a piece of equipment becomes out of date or is replaced then just that one resource can be replaced -- not the entire guide. This also allows someone who is interested in learning about only lighting, for example, to open just the lighting section and receive only relevant information, instead of getting a tome of information that would not be needed.
**Scenic**

Most shows reply on a set in some way. The set could be furniture spread out across the stage or it could be building walls to create a church, scenic design is used to create the location of the production. There are many elements that go into each design but there are some key things that are in every design. These elements help crew build the design. Some examples of those are in this section.

**Lighting**

Theatre lighting has come a long way in its history, from candles on stage to LED robotic fixtures. These devices are used to light the stage during a production. There are many types of fixtures and systems to control them. Contained within this section are resources for use of the devices owned in the Little Theatre. There is also a cable reference of all the commonly used cables in the space.

**Sound**

Sound reinforcement is usually the easiest to forget but one of the most important departments in any production. Sound can make or break the feeling of a show. There are many steps to sound as a department. The first step is effect creation. Second is effect playback. Third is effect adjustment. These steps all require careful attention and are usually not understood by most people. Contained
within this section are resources for use of the devices owned in the Little Theatre. There is also a cable reference of all the commonly used cables in the space.

**Projection**

This is the newest element to be part of shows in the Little Theatre. Projection adds a new dimension to the ways productions can be done. Projection can be used to project an image or video or design. There are many different types of projectors and screens. These are described in this section.

**Safety**

Many resources maintained by the Little Theatre are used to keep personnel safe. This includes safety equipment and procedure for safe use of the space. Though these are not the most interesting to investigate they are the most important.
ETC

CEM+ Control Module

Sensor+ Series

GENERAL INFORMATION

The Sensor+ Control Electronics Module (CEM+) receives and manages Ethernet control signals as well as two DMX512 inputs. It controls dimmer output, and communicates feedback information to compatible lighting control devices and network peripherals.

APPLICATIONS
- Professional and educational theatre
- Production studios
- Performance halls
- Retail and dining
- Houses of worship
- High density architectural dimming
- Touring and Portable dimming

FEATURES
- Direct Ethernet connectivity for dimmer levels, feedback and system control
- Two DMX512 input connections
- Rugged industrial construction
- Modular design
- Local Menu-driven User Interface
- Advanced configuration editing
- 128 Presets with programmable fade times
- System and rack feedback standard
- Support for Advanced Features (AF) dimmer-specific reporting
- Supports ETC Dimmer Doubling™
- UL and cUL LISTED and CE Marked

ACCESSORIES
- Sensor+ Connect - a browser-based Graphical User Interface - accessible thru an Emphasis server, computer, or a PDA on the network
- Sensor+ Preset Stations
- Retrofits kits to upgrade existing Sensor racks to CEM+ modules

ORDERING INFORMATION

Control Modules

<table>
<thead>
<tr>
<th>Model#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEM+</td>
<td>Control Electronics Module</td>
</tr>
</tbody>
</table>

Compatible Systems

<table>
<thead>
<tr>
<th>Model#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S66A</td>
<td>Sensor+ 6 module rack</td>
</tr>
<tr>
<td>S812A</td>
<td>Sensor+ 12 module rack</td>
</tr>
<tr>
<td>S8124A</td>
<td>Sensor+ 24 module rack</td>
</tr>
<tr>
<td>S848A+</td>
<td>Sensor+ 48 module rack</td>
</tr>
<tr>
<td>S86AF+</td>
<td>Sensor+ 6 module Advanced Features rack</td>
</tr>
<tr>
<td>S812AF+</td>
<td>Sensor+ 12 module Advanced Features rack</td>
</tr>
<tr>
<td>S824AF+</td>
<td>Sensor+ 24 module Advanced Features rack</td>
</tr>
<tr>
<td>S848AF+</td>
<td>Sensor+ 48 module Advanced Features rack</td>
</tr>
<tr>
<td>H348A85AF+</td>
<td>Sensor+ 230V racks</td>
</tr>
<tr>
<td>S844AF+</td>
<td>Sensor GE1010 racks</td>
</tr>
<tr>
<td>S844X+</td>
<td>Sensor Delta racks</td>
</tr>
<tr>
<td>E3848+</td>
<td>Sensor CE racks</td>
</tr>
</tbody>
</table>

Sensor+ Touring Racks

<table>
<thead>
<tr>
<th>Model#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SN4820+</td>
<td>Sensor+ 24 module Touring Rack (48: 20A dimmers)</td>
</tr>
<tr>
<td>SP7220+</td>
<td>Sensor+ 36 module Touring Rack (72: 20A dimmers)</td>
</tr>
<tr>
<td>SP9620+</td>
<td>Sensor+ 48 module Touring Rack (96: 20A dimmers)</td>
</tr>
</tbody>
</table>

Accessories

<table>
<thead>
<tr>
<th>Model#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S60X</td>
<td>Sensor+ Preset Stations</td>
</tr>
<tr>
<td>RC</td>
<td>CEM to CEM+ Retrofit Kit for Standard Sensor racks</td>
</tr>
<tr>
<td>RC-AF</td>
<td>CEM to CEM+ Retrofit Kit for Sensor AE racks</td>
</tr>
</tbody>
</table>

ETC
**SPECIFICATIONS**

**GENERAL**
- Universal Control Electronics Module
- Direct Ethernet connectivity for dimmer levels, feedback and system control
- UL, CUL LITSEC and CE Marked

**PHYSICAL**
- Formed steel body finished with textured epoxy paint
- Injection molded face panel
- Slide-in modules installs and removes without tools
- Spring-loaded module release
- Airflow sensor to ensure adequate airflow

**ELECTRICAL**
- Accepts: Single phase, Three phase WYE or Delta
- Universal Voltage range 90-250 VAC
- Line feed frequencies from 47-63Hz
- Automatic frequency variation compensation
- 2-line by 20-character backlit LCD for system configuration, status display and error indication
- Backlit 7-button keypad includes Reset button
- 4 status LED indicators: Power, Network activity, DMX-A and DMX-B
- Two configurable DMX512 inputs (2500V opto-isolated)
- 128 user-programmable presets assignable to 4 rooms
- Maximum of 64 racks (64 groups of 16)
- Single rack circuit with flexible programming
- Complete group configuration stored in each CEM+
- Individual CEM+ failure does not disable multi-rack group
- Replacement CEM+ can download configuration from adjacent racks, rack back plane or online server
- Multi-rack configuration can be restored from a single CEM+
- Dimmer outputs are regulated to maintain constant power to loads ± 1V
- Individual output scale voltage settings for load wiring compensation (60 – 180V)

**CONTROL FEATURES**
- Selectable Dimmer Modes
  - Normal
  - Dimmer Doubled
  - Switched (Unregulated on/off with adjustable threshold)
  - Fluorescent with adjustable threshold
  - Always On
  - OFF
- Selectable Dimmer Output Curves
  - Linear
  - Modified Linear
  - Square
  - Modified Square
  - Sensor 2.0
- 40,000-step Resolution per half cycle
- Response speed ±0.3ms
- Selectable Data Loss Behavior

**FEEDBACK**
- All Sensor racks with CEM+ include basic system diagnostic reporting
- Remote monitoring, programming and backup functions over the network using Sensor+ Connect or WVIILink software program
- Standard rack feedback includes; DMX input status, Rack power status, and Rack temperature
- Advanced Features (AF) provides dimmer specific status and load feedback (requires AF dimmer rack and AF dimmer modules)

**LOCAL PROGRAMMING MENU**

**RACK ERRORS**
- View Error messages

**ABOUT**
- About Group: Software version, panic status, preset status, and group name
- About Network: IP address, SubNet mask and Gateway
- About Rack General: ambient temperature and airflow, rack type, and air filter status
- About Rack Power: frequency, voltage per phase, and voltage headroom
- About Rack Data: status for DMX, DMX, and Network activity
- About Rack Address: DMX, DMX or EDMX start address, Rack Address mode (Standard or Advanced)
- About Dimmer: module type, curve, scale voltage, output level, control source, and module location
- About Room: assign and monitor presets in a room
- Identify Rack: quick way to find and identify a single rack in a group

**LOGIN**
- Security Level passwords determine screens and modes available to user

**PRESSETS**
- Play, deactivate or clear presets
- Record presets from DMX, EDMX and set levels
- Set fade times and priority levels
- Name preset rooms
- Set maximum number of active presets per room

**PANIC**
- Activate, deactivate or clear group-wide panic
- Record panic from DMX, EDMX and set levels
- Record panic properties: normally open or closed, maintained or momentary, master level, and option to force all non-panic dimmers to zero

**DIMMERS**
- Set dimmers at levels and release
- Set dimmer curve
- Name the dimmer

**RACK SETUP**
- Name rack and set type of rack
- Capability
- Set first dimmer and address mode (standard or advanced)
- Set Temperature Alarm
- Set Power Balance – Column, Single Phase or Three Phase
- Set Air Filter Cleaning reminder based on hours of use
- Configure Fan as Always On or Off if no data/15 min.
  - Select Data Loss Behavior – Hold lost Look, Wait and fade, Crossfade to a preset

**GROUP SETUP**
- Name Group
- Setup Group network – IP Address, SubNet mask, Gateway Address and Enable/Disable Network
- Set Data Priority per DMX port
- Select Language – English, French, Spanish or German
- Select Temperature Reporting type – F° or C°
- Set Login Timeout
- Record Loads and Report Load Errors
CEM+ Control Module
Sensor++ Series

DIMENSIONS

Control Electronic Module Weight

<table>
<thead>
<tr>
<th>Model</th>
<th>Weight</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEM+</td>
<td>4.2 lbs 2.0 kgs</td>
<td>6.2 lbs 2.8 kgs</td>
</tr>
</tbody>
</table>

Maximum BTU Production per module

<table>
<thead>
<tr>
<th>Model</th>
<th>BTUs</th>
<th>Watts</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL CEM+</td>
<td>&lt;10</td>
<td>&lt;8</td>
<td>N/A</td>
</tr>
</tbody>
</table>

TYPICAL NETWORK SYSTEM RISER DIAGRAM
CEM+ Control Module

Sensor+ Series

**SENSOR+ CONNECT**

Sensor+ Connect duplicates the functions of the Control Electronics Module (CEM+), but on your Emphasis server, computer or even your PDA. This graphical user interface (GUI) allows you to monitor rack activity, reconfigure dimmer curves, record or activate presets – a whole lot more.

Offers all the features needed to create, edit and download specific information to the racks and modules.

**FEATURES**
- Configure rack and module information
- Patch/Address 2 DMXUniverses
- File transfer capabilities
- Record and activate 128 preset looks
- Assign presets to up to 4 rooms

**SYSTEM REQUIREMENTS**
- Emphasis server, Computer or PDA
- Internet Browser Software such as Internet Explorer 6.0 or better
- Network connection (wired or wireless) to a Sensor System with a CEM+ module

**BROWSER NAVIGATION**

**LOGIN**
- Security Level passwords determine screens and modes available to user

**HOME**
- System Summary – Rack status, Active Presets, Error List

**RAIDS**
- Select a rack or all racks
- View rack status, rack configurations, dimmer configuration and rack specific errors
- Rack Configuration
  - Name rack and set type of rack
  - Set Address mode: standard or advanced
  - Set Temperature Alarm
  - Select Power Balance – Column, Single Phase or Three Phase
  - Configure Fan Time mode as Always On or Off if no data/15 min.
- Dimmer Search
  - Search for dimmer/s by specifying a number of search criteria – quick, dimmer configuration

**DIMMER CONFIGURATION**
- Set dimmer name and module type
- Set dimmer mode: Normal, Dimmer Doubled Switched, Fluorescent, Always On, Off
- Set dimmer curve: Linear, Modified Linear, Square, Modified Square and Sensor 2.0
- Set Scale Voltage and Threshold levels
- Select On/Off for Voltage Regulation, Preheat, DC Output Prevention, and Inrush Protection
- Set Temperature Reporting mode as F or C

**PRESETS**
- Assign Dimmers:
  - Assign dimmers to Rooms
  - Room 1, 2, 3 or 4:
    - Play or deactivate presets
    - Record presets from DMX, ECDM and Set levels
    - Set fade times and priority levels
    - Set Room Properties – name and maximum number of active presets

**PHYSICAL CONFIG**
- Panic
  - Play or deactivate group-wide panic
  - Record and clear panic
  - Panic properties: normally open or closed, maintained or momentary, master level, and option to force all non-panic dimmers to zero

**Patch**
- Patch Configuration includes: Port
- Enable: DMX Loss Behavior, Dimmer Number Start, Length, Priority, Fade and Hold Time.

**Network**
- Setup Group Network – IP Address, Netmask, Gateway Address and Enable/Disable Network
- File Transfer
  - Copy configuration files to a computer (download)
  - Send updated configuration files to CEM+ (upload)

**Load Management**
- Load Load and Report Load Errors

**DIAGNOSTICS**
- Dimmer Check:
  - Set a dimmer to a level, with easy dimmer advancement
- Dimmer Level:
  - Set dimmer(s) to a specified intensity.
ETC
CEM+
CEM+ Control Module
Manual Quick Guide

What do these buttons do? ................................................................. Page 6
How do you use the main menu? What does it do? ............................... Page 7
........................................................................................................ Page 60
How do you use the web interface? ..................................................... Page 16
........................................................................................................ Page 69
How do you configure the equipment with the right settings? ............... Page 30
Something isn’t working? ................................................................. Page 44
........................................................................................................ Page 48
How do you remove/change parts? ....................................................... Page 45
What does this error message mean? How do I get rid of it? ............... Page 50

Need more help?
Look online: www.etcconnect.com
Call toll-free: (800) 775-4382
E-mail: service@etcconnect.com
# Table of Contents

## Introduction
- Congratulations: 1
- Using this Manual: 1

## Chapter 1 - Overview
- System Components: 2
- Sensor+ Connect Web Interface Overview: 3
- Sensor+ Dimming System Features: 3
- CEM+ Playback Priorities: 5

## Chapter 2 - Basic Navigation
- The CEM+ User Interface: 6
- CEM+ Basic Operation: 7
- The Main Menu: 7
- NoConfig: 7
- About: 8
- Login: 9
- Presets: 9
- Panic [Guest][User][Power]: 10
- Dimmer [Guest][User][Power]: 10
- Rack [User][Power]: 13
- Group [User][Power]: 15

## Chapter 3 - Sensor+ Connect Web Interface Overview
- Group: 17
- Summary Status: 17
- Dimmer Check: 18
- Racks & Dimmers: 18
- All Racks: 18
- Add Racks: 19
- Rack #: 19
- Search: 23
- Rooms & Presets: 24
- Assign Dimmers: 24
- Room (1-4): 25
- Configuration: 25
- Panic: 25
- Patch: 25
- Network: 28
- File Transfer: 28
- File Upload: 29
- Load Management: 29
Chapter 4  CEM+ Configuration Procedures  ........ 30

- CEM+ Configuration Overview  ................ 30
- Configuration Procedures  ....................... 30
- Configure Your Computer for an ETCNet2 Network  ................ 30
- Software Changes [Power]  ....................... 31
- Delete All Racks [Power]  ......................... 32
- Configure/Confirm Network Settings of CEM+  ................ 33
- Add Racks [Power]  .............................. 33
- Set Patch Mode  ................................ 34
- Port Settings (Standard Patch)  .................... 34
- Advanced Patch  ................................ 34
- Set Dimmer Properties  .......................... 35
- Assign Dimmers to Rooms  ......................... 35
- Create a Preset (Web Only)  ....................... 38
- Record vs. Snapshot a Preset  ...................... 39
- Activate/Deactivate a Preset  ...................... 39
- Panic  ........................................ 39
- Record Panic  ................................... 39
- Activate Panic  .................................. 39
- Record Loads  .................................. 40
- Clear Loads (Web Only)  .......................... 40
- Clear Errors  .................................... 40
- Download (config from selected IP)  .................. 41
- Backup (to all)  .................................. 41
- View a Configuration  ............................ 41
- Download a Configuration  ......................... 42
- Upload a Configuration  ........................... 42
- FTP Server  ..................................... 43

Chapter 5  Service  ......................... 44

- Contacting ETC about Equipment Problems  ................ 44
- Changing Installation Rack Modules  .................... 45
- CEM+ Fuses  ..................................... 47
- Make a Preliminary Examination of Your System  .......... 48
- If You Cannot Locate or Correct the Problem  ............ 48

Appendix A  CEM+ Error Messages  ............. 50

Appendix B  Dimmer Curves  .................... 52

- Linear curve  .................................. 52
- Modified linear curve  .......................... 53
- Square low curve  ................................ 53
- Modified Square law curve  ....................... 54
- Sensor 2.0 curve  ................................ 54
Appendix C  Sensor+ SineWave Dimming ............. 56
          SineWave Benefits .................................. 56
          Configuration ....................................... 56
          D205W Dimmer Module Default Properties .......... 57
          SineWave Differences You Need to Know ........... 57

Appendix D  UL924 Setup ............................... 58
          Introduction ....................................... 58
          Terminations ...................................... 58
          Configuration ...................................... 58
          Testing ............................................ 59

Appendix E  CEM+ LCD Menu ......................... 60
          No Config Menu .................................... 60
          Rack Errors ....................................... 61
          About Menu ....................................... 61
          Preset Menu ....................................... 62
          Login Menu ....................................... 62
          Panic Menu ........................................ 63
          Dimmers Menu ...................................... 64
          Rack Menu .......................................... 65
          Rack Menu (cont.) .................................. 66
          Rack Menu (cont.) .................................. 67
          Group Menu ........................................ 68

Appendix F  Sensor+ Connect Site Map .............. 69
Introduction

Congratulations...
on your purchase of an ETC Sensor®+ system. Sensor+ continues ETC's tradition of providing the highest quality products for the entertainment lighting market.

Using this Manual
The manual contains information on using and configuring features of the Sensor+ CEM+ in any Sensor+ rack or pack available up through the Power User login user level.
The following symbols are used in this manual to alert you to danger or important information.

**Note:** Provides important information about your installation.

**CAUTION:** Alerts you to important information relating to equipment performance or reliability.

**WARNING:** RISK OF ELECTRIC SHOCK! Warns you when electricity may cause injury.

**WARNING:** Warns you when there is the possibility of other types of injury.
Chapter 1
Overview

This manual covers functions and configuration of the CEM+ and Sensor+ Connect that are available to the Guest and User and Power User login levels.

<table>
<thead>
<tr>
<th>User Level</th>
<th>PIN</th>
<th>Login</th>
<th>Password</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default</td>
<td>none</td>
<td>Just click “Log On”</td>
<td></td>
</tr>
<tr>
<td>Guest</td>
<td>1111</td>
<td>guest</td>
<td>guestpass</td>
</tr>
<tr>
<td>User</td>
<td>2222</td>
<td>user</td>
<td>userpass</td>
</tr>
<tr>
<td>Power User</td>
<td>3333</td>
<td>power</td>
<td>powerpass</td>
</tr>
</tbody>
</table>

A Sensor+ dimming system controls lighting using EDMX™ control levels from a lighting control system on the ETCNet2™ network and/or DMX512 control levels from a lighting control system on the DMX network and/or architectural presets which can also be used as backup looks. The CEM+ can accept levels from EDMX and up to two DMX512A inputs. The configuration of your dimming system determines which input or combination of inputs will generate the output levels of your dimmers.

System Components

The Sensor+ system consists of Sensor+ racks or packs, CEM+ control modules and various dimmer module types, however a module may contain only a circuit breaker, a relay, or may contain no electronics at all.

CEM+ Control Module

The CEM+ control module is required for Sensor+ dimming systems - the system will not function without a properly configured CEM+. This module serves as the real time processor for incoming control signals and transmits that information to the individual dimmers. It also monitors the system status and reports any errors. The CEM+ module can be used to configure the system. Configuration and error data can be accessed either locally at the CEM+ keypad, or by using the Sensor+ Connect web browser interface.

Networked Sensor+ systems can be split into separately configured subsystems called Groups. Each configuration can support up to 16 CEM+ modules in a Group. The Group configuration is stored in all CEM+ modules in that group. A single ETCNet2 network may contain up to 64 Groups (up to 1024 racks total). One exception to these rules are racks which can contain two CEM+ in redundant tracking mode. In this mode, the number of racks in a Group are limited to 8 racks (still 16 CEM+ modules).

The CEM+ has an Ethernet data input for incoming EDMX data and two DMX512 input ports (Port A and Port B). DMX Port B can be used as a DMX output port for one universe of DMX on the last logical rack in the Group. Data management is determined in the Group configuration.
Sensor+ Connect Web Browser Interface Overview

The CEM+ module contains a web server that delivers graphical web pages for you to use during system configuration. The Sensor+ Connect Web browser interface can be used instead of the direct buttons on the CEM+ module itself. You can use an Ethernet-capable PC connected to the ETCNet2 network and running Windows 2000 or XP and Internet Explorer 6 or later to browse into any of the Sensor+ racks on the network.

If you are using a Emphasis Control System running version 1.8.0 software or later, there is a command in the WYSIlink menu that automatically opens a browser window and connects to Sensor+ racks.

Sensor+ Connect uses a navigation layout where the various main areas are selected on the left side of the page presenting sub-options. The right side of the page is used to view or edit the selected information.

**Note:** The Emphasis Server network settings are the default ETC values and ready for immediate use. No configuration is required.

You must set an IP address for any personal computer you plan to use on an ETCNet2 network. ETC recommends that the personal computer used on an ETCNet2 network is dedicated to that network so changes to network settings are kept to a minimum. Please see "Configure Your Computer for an ETCNet2 Network", page 30 for setting up your computer.

**Note:** If the computer you wish to use is currently being used on a non-ETCNet2 network please consult your Network Administrator before changing the IP address, Subnet Mask or Gateway IP addresses.

Sensor+ Dimming System Features

**Play back Presets from the CEM+.**

The CEM+ module provides 128 Presets that can be recorded from EDMX, DMX, or directly set levels. You can configure each Preset's name, fade times and playback priority. Presets can
be assigned to any one of four Rooms in the configuration. Sensor+ systems can also have the Group play back a Preset in case of data loss.

**Sensor+ Connect and WYSIWYG for Feedback**

Sensor+ Connect duplicates the functions of the CEM+ module on a PC or Emphasis Server on the ETCNet2 network. The Web browser interface allows you to monitor rack activity, reconfigure dimmer curves, record and activate presets, load and backup configurations, and many other features.

Access to the CEM+ and Sensor+ Connect configuration features is protected by specific user levels and passwords to limit system-altering features to selected personnel, while allowing basic operational functions to a wider range of users.

**Note:** Sensor+ Connect and Message logging are available on Emphasis Servers as a base functionality.

**Advanced Features**

Sensor+ Advanced Features (AF) racks provide additional reporting features that help you to quickly learn the status of your dimming system and diagnose problems. AF dimmer modules indicate the presence of data and the relative output of power with LED indicators on the modules themselves. Much more information can be displayed on the CEM+ module’s integral LCD display, a PC on the network running Sensor+ Connect in a Web browser or WYSIWYG with the WYSIWYG upgrade.

Advanced Features include the ability to record and monitor individual dimmer loads, dimmer removed, SCR fail, breaker trip and several other monitoring tools. Constant comparison of actual dimmer loads against the recorded value lets the system signal you when a load value changes. The change usually indicates a lamp has burned out or failed, allowing you to make an immediate replacement.

**Dimmer Doubling™ (60Hz systems only)**

ETC’s dimmer doubler technology allows you to double the number of controllable circuits in your system without adding dimmer modules or running additional cable. The key to this feature is the dimmer doubler two-fer.

The dimmer doubler two-fer is installed between a Sensor dimmer module and two ETC Source Four 77 volt fixtures. It splits the output of a single dimmer into two, separately-controlled outputs. You can then use an ETC control console to independently control the output of the two fixtures.

**Note:** For more information on using dimmer doubler two-fers, see the Dimmer Doubler User Manual. For more information configuring your system for use with Dimmer Doubler two-fers, see the CEM+ Configuration Manual.
CEM+ Playback Priorities

The CEM+ uses the same priority structure as all of the ETC products that use ETCNet2 and adds two more internally.

*Any incoming EDMX is re-prioritized internally on the CEM+ as set on the patch page. The priorities of the EDMX sources (Emphasis, Obsession II, Unison, ETCNet2 DMX Node) are used to determine what level information makes it to the CEM+. That level information is then flatly re-prioritized to the level specified on the patch page.*

That means that if (for the same set of EDMX addresses) you set your Emphasis to an EDMX priority of two (4), an Obsession II to a priority of nine (6) and an input port of a DMX Node to a priority of two (2), the level information will pile-on/HTP for the DMX Node and Emphasis and ignore the Obsession II's levels. Internally to a CEM+ that EDMX level information will be prioritized and used at the EDMX priority setting on the patch page (defaults to a priority of 10). The EDMX priority is set on a rack-by-rack basis just like the DMX ports.

Once inside the CEM+, the new priority is used when determining what source level information is used (EDMX, DMX Port A, DMX Port B, Presets, Set Levels and Panic).

EDMX, DMX Port A, DMX Port B, and Presets can all be set with their own priorities (1-20). Set Levels and Panic have fixed priorities above the other priorities. See the inset above.
Chapter 2
Basic Navigation

The manual covers functions and configuration of the CEM+ and Sensor+ Connect that are available to the Guest and User and Power User login levels.

The CEM+ User Interface

You can access all the menus described in this chapter using the buttons on the face of the CEM+ module. Menus and messages are displayed on the integral 2x20 LCD display.

<table>
<thead>
<tr>
<th>User Level</th>
<th>PIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default</td>
<td>None</td>
</tr>
<tr>
<td>Guest</td>
<td>1111</td>
</tr>
<tr>
<td>User</td>
<td>2222</td>
</tr>
<tr>
<td>Power User</td>
<td>3333</td>
</tr>
</tbody>
</table>

Basic use of the CEM+ user interface:

- Use the button to return to the main menu at any time.
- Use and to scroll through menus and through digits and letters in screens requiring user input.
- Use to accept settings and to view the error list.
- Use to stop back through menu.
- Use to access the Set Levels menu.
- Use to reset the CEM+.
CEM+ Basic Operation

The procedures covered in this section are available to users logged in as Guest, which requires no password or PIN, and User and Power User which do require a password or PIN.

The Main Menu

The main menu is accessed using the ↑ and ↓ buttons on the CEM+ face panel. Each of the main menu items is described in the following pages. Each main menu item contains a number of sub-menus, each of which is illustrated in each section. To return to the CEM+ resting display (the display at the top of the diagram to the right), press ↵.

No Config R / G
(Login)

This menu appears only when there is no configuration in the CEM+.

ETC CEM+ R / G
(Rack OK)

This menu appears when there is a configuration in the CEM+.

ETC CEM+ R / G
(About)

These menus are available to Guest.

ETC CEM+ R / G
(Login)

ETC CEM+ R / G
(Presets)

ETC CEM+ R / G
(Panic)

ETC CEM+ R / G
(Dimmer)

ETC CEM+ R / G
(Recipe)

ETC CEM+ R / G
(Group)

These menus are available to User & Power User.

For the full menu structure, see "Appendix B: CEM+ LCD Menu" on page 66.

No Config

The NoConfig menu provides a place to make initial base settings and begin to create a
configuration for the local CEM+. The NoConfig menu has no login requirements and anyone has access to these menu items.

**Set Group / Rack**

The Set Group / Rack menu allows you to set the rack number of your local rack and the group number it belongs to. It also provides a place to set the network information (IP address, subnet mask and gateway IP). This should be done before creating a configuration.

**Generate Defaults**

The Generate Defaults menu allows you to create an initial configuration for your local rack. You can set your group and rack numbers along with rack type and dimmer information. However, you can only add multiple racks of the same type. Additional racks or rack types must be added later via the Add Racks menu item. For the face panel menu see Add Rack [Power], page 14 and for the web interface see Add Racks, page 19.

- Rack Types: SRxx is the U.S. style permanent installation rack and SPxx is the U.S. style type of portable rack (including touring racks). ESRxx and ESPxx are for European installation racks and portable racks respectively. In all cases, the "xx" number is determined by the number of slots in the rack for modules (not the number of dimmers).

**Select Config**

After selecting this function, you will be prompted with the name of the rack you want to get the configuration from. Options will include Server which refers to an FTP server if one is configured on your lighting network. Please see the section FTP Server, page 43 for more information about setting up an FTP server for use with CEM+. It will then transfer the configuration to the local CEM+. After the transfer is complete, you will get a confirmation or error message for the transfer.

**Setup Network**

The Setup Network menu allows you to configure the IP addresses in the network table of the local CEM+. These are the IP addresses that the local CEM+ will use to communicate with other CEM+s in the group. Making changes in this menu does not change the actual IP addresses of other CEM+s, just what this CEM+ thinks they should be. You can also enable or disable a selected CEM+ network entry in the table. This will determine if the local CEM+ will attempt to share information with that unit. Lastly, you can enable or disable whether the local CEM+ will look for a bootp server for IP address information. Currently, it is strongly recommended that you leave the bootp setting disabled.

**About**

The About menu provides status information about the dimmers, racks, network and Group. Everything in the About menu is accessible by all users. No settings can be changed within the About menu. Data can only be viewed.

About Dimmer provides information about a selected dimmer, including recorded and actual loads, the dimmer type, curve and maximum voltage. You can also view the current output level, the source of that level, and the dimmer’s location.

**Rack General**

The Rack General menu provides the current ambient temperature and air flow status of the selected rack. It also displays the rack type, the air filter cleaning reminder setting, and the number of hours until the air filter cleaning reminder is due.

**Rooms & Presets**

About Rooms & Presets provides information on the room and preset settings for the rack you are currently browsing.
Network
About Network provides the network settings for the currently selected rack. You can view the settings for any rack in the Group.

Rack Data
About Rack Data provides status information for the DMX and EDMX inputs for any rack in the Group.

Rack Power
About Rack Power provides status information for the line feed power and the voltage headroom settings for any rack in the Group.

Identify Rack
Identify Rack flashes the LCD and buttons on the face panel of the selected rack.

Group
About Group provides the software version currently installed in the racks, the status of the Panic state and the name of the Group.

Rack Address
About Rack Address provides the DMX A and B starting addresses for each rack in the Group.

Login
The Login menu is where you enter the PIN number for the user level you want to access. Guests need no PIN to view the menu items accessible to them. You will need to enter a four-digit PIN to gain access to features that are restricted to higher user levels. Enter 2222 for User level access and 3333 for Power User level access. Use the arrow keys to scroll the digits and use the enter button to enter the set digit.

Presets
The Presets menus are used to activate and deactivate Presets at the rack. If you are logged in at the User level, you can also record and modify Presets from the CEM+.

There are four available Rooms and 128 available Presets in a single Group. A Room is a way of grouping dimmers - such as "Lobby" or "Auditorium". An individual Preset can only control dimmers assigned to the same Room. For example, a Preset with dimmers assigned to the Room named "Lobby" cannot also control dimmers in the Room "Auditorium".

Presets can also be assigned Priority. Priority is a function of ETCNet2 that defines how various sources of control interact with dimmers. The default priority for controllers on the network is 10. When controllers share the same priority level, a single dimmer assigned to those controllers will output the highest level it receives. If the controllers are at different priorities, the highest-priority controller (lowest priority number - a priority of 1 wins versus a priority 10) will win and the dimmer will output the level sent by that controller.

Activate Preset
The Activate Preset menu allows you to activate a selected preset.

Deactivate Presets
The Deactivate Preset menu allows you to deactivate a selected preset.

Clear Presets [User]
The Clear Presets menu allows a User to delete a selected preset.
Record Presets [User]

The Record Presets menu allows a User to assign a preset number, and set the source for levels, the fade time and playback priority and the room. If the preset number is already recorded, you can record over it with the new settings, or if the preset is empty, you can record these settings to that selected number.

Set Fade Time [User]

The Set Fade Time menu allows a User to customize the fade time for a recorded preset.

Set Priority [User]

The Set Priority menu allows a User to customize the priority for a recorded preset.

Set Preset Name [User]

The Set Preset Name menu allows a User to customize the name of a recorded preset. Names are alphanumeric and can be up to 20 characters long (not all 20 characters will be visible on the LCD). Presets are assigned a default name of "Preset###" where ### is a three-digit number up to 128.

Set Room Name [User]

The Set Room Name menu allows a User to set the name of a room.

Max Active Presets [User]

The Max Active Presets menu allows a User to set the maximum number of active presets for a selected room.

Panic [Guest][User][Power]

The Panic menu allows a Guest to activate and deactivate the Panic look and allows a User to record or clear the Panic look.

Activate Panic

The Activate Panic menu toggles between "Activate" and "Deactivate", depending on the status of the Panic look.

Record Panic [User]

The Record Panic menu allows you to record dimmers that currently have an output level at the Master Level (or greater) to the Panic look. You can set the Master Level to anything between 80% and 100%. When the Panic look is activated, the assigned dimmers will all output at the Master Level. You can also choose to set all other dimmers to turn off when panic is activated.

Clear Panic [User]

The Clear Panic menu allows you to clear the current Panic settings.

Configure Switches [Power]

The Configure Switches menu allows you to define the external switch action types (maintained vs. momentary) and resting states (normally-open vs. normally-closed).

Dimmer [Guest][User][Power]

The Dimmer menu allows Guest access to setting and releasing dimmer levels, and allows User access to module setup items such as setting the module type, curve, name, firing mode and properties. The Dimmer menu also allows a User to perform a dimmer check.

Set Levels

The Set Levels menu allows you to set a dimmer or a range of dimmers to a specified level.
at the CEM+. Levels set here take priority over any other level inputs, such as control consoles and architectural control systems. Levels set here do not take priority over levels generated by an active Panic lock.

The 📋 button on the CEM+ face panel accesses this menu directly.

**Release Levels.**

The Release Levels menu allows you to release the level of a dimmer or a range of dimmers. Once released, those dimmers are available to other control inputs.

**Set Module Type [User]**

The Set Module Type menu allows a User to set a dimmer or range of dimmers to a specific module type and firing mode. If the module is set to "Fluorescent", you also set the threshold in this menu. Threshold is the control level that must be present for the fluorescent dimmer to output voltage based on the selected curve.

**Set Curve [User]**

The Set Curve menu allows a User to set a dimmer or a range of dimmers to a specific curve. A dimmer curve is a mathematical function that maps control levels to RMS output voltage. Curves are scaled from the minimum voltage to the maximum voltage (settings that are not available to the User login). The CEM+ supports the following curves: Square, Mod Square, Linear, Mod Linear, Sensor 2.0. See Dimmer Curves, page 52, for more information.

**Set Dimmer Name [User]**

The Set Dimmer Name menu allows a User to name a dimmer. Names are alphanumeric and can be up to 20 characters long (not all 20 characters will be visible on the LCD). Dimmers are assigned a default name of "Dimmer####" where #### is a five-digit number up to 32767.

**Set Firing Mode [User]**

The Set Firing Mode menu allows a User to set a dimmer or a range of dimmers to a specific firing mode. Available modes include Normal, Off, Switched, Fluorescent and DD (Dimmer Doubled).

- Off: turns the dimmer off.
- Normal: operates as a standard incandescent dimmer.
- Switched: dimmers output unregulated AC voltage when the control level is above the threshold level.
- DD (Dimmer Doubled): dimmer operates as two controllable circuits. See Dimmer Doubling (60Hz systems only), page 4.

**Note:** Changing the dimmer firing mode will cause a change to default settings for curve, minimum voltage, maximum voltage, threshold and regulation. Whenever a dimmer mode is set the defaults for that mode will be applied to the other dimmer properties.

**Set Properties [User]**

The Set Properties menu allows a User to set Voltage Regulation, Dynamic Preheat, DC Output Prevent and Inrush Settings for a dimmer or range of dimmers.

- Voltage Regulation: when enabled, the dimmer will regulate to the desired output voltage. When disabled, the dimmer will be set to a constant firing time based on the control level. This setting defaults "on". The ability to disable regulation is sometimes useful when dimming non-tungsten loads.
• Dynamic Preheat: this setting allows quick blackouts on dimmers that are set to preheat. Preheat settings are not available to the User level login.

• DC Output Prevent: this setting offers protection on selected dimmers for loads that are sensitive to DC buildup, which can occur under certain conditions when positive and negative half-cycles become uneven.

• Inrush Protection: this setting protects against large voltage increases in a single AC cycle. This protection is useful for high-wattage loads (especially if comprised of many smaller wattage lamps) that may cause nuisance tripping of circuit breakers and to limit peak currents in wiring and switchgear. This protection is particularly useful in RCD/GFCI protected circuits. Settings for inrush protection include: Instant, 100mS (for loads up to 10A), 300mS (for loads up to 25A) and 800mS (for loads of 50 or 100A).

Set Threshold [Power]
The Set Threshold menu allows a Power User to set a dimmer or a range of dimmers to come on at a specific control level.

Set Max Scale Voltage [Power]
The Max Scale Voltage menu allows a Power User to set a dimmer or a range of dimmers to a maximum output voltage that is the top (100% control) of the scaled output of that dimmer.

Set Min Scale Voltage [Power]
The Min Scale Voltage menu allows a Power User to set a dimmer or a range of dimmers to a minimum output voltage that is the bottom (1%) control of the scaled output of that dimmer. The dimmer will switch on to an RMS output voltage of Min Scale Voltage when the control level reaches the value set for threshold. This is also the dynamic preheat value for the dimmer.

Assign Dim to Room [Power]
The Assign Dimmer to a Room menu allows a Power User to set a dimmer or a range of dimmers to a specific room for use with recording presets. A dimmer can only be assigned to a single room at a time. There are four (4) rooms available and all dimmers default to being assigned to Room 1.

Advanced Features [Power]
The Advanced Features menu allows a Power User to set Advanced Features (on/off), Report Load Errors, AF Sensitivity, and AF Reaction Time for a dimmer or range of dimmers.

• Advanced Features (on/off): additional feedback from a dimmer that provides load recording/reporting and advanced error reporting including a breaker trip, module removed, load changes, dc output and SCR failures.

• Report Load Errors (on/off): allows for messages to report load changes once initial loads have been recorded for a dimmer.

• AF Sensitivity (1 to 10): defines the resolution of the advanced features sensitivity in reporting load changes. One (1) is the most sensitive/highest resolution setting and the default is 5. AF sensitivity is based on a percentage of the recorded load.

• AF Reaction Time (5 to 60 seconds): this setting defines the hysteresis for an advanced feature error. The error must be present for the minimum set in the AF Reaction Time before an error will be reported.

Dimmer Check [User]
The Dimmer Check menu allows a User to set an output level and then step through dimmers at a selected starting point.
Rack [User][Power]

The Rack menu includes menus for setting the rack name and patch settings. The Rack menu is available only to those logged in at the User or Power User level.

Set Group / Rack [Power]

The Set Group / Rack menu allows you to set the rack number of your local rack and the group number it belongs to. This should be done before creating a configuration. Care and understanding should be used when making a change to these settings after a configuration is already loaded.

Set Rack Type [Power]

The Set Rack Type menu allows you to set the rack type of the selected rack. The options of this menu are determined by the operating voltage specified during the rack configuration creation.

Set Rack Name [User]

The Set Rack Name menu allows you to set the name of the rack you are currently browsing. Names are alphanumeric and can be up to 20 characters long (not all 20 characters will be visible on the LCD).

Set Patch Mode [User]

The Set Patch Mode menu allows a User to set the patch mode for a selected rack. The patch mode can be set to "Standard" or "Advanced".

Set Patch [User]

The Set Patch menu allows a User to enable and disable DMX and EDMX inputs, set their priority and create the patch for those input ports. The choices that appear are dependent on the patch mode set in the previous menu.

In Standard patching, you set the first dimmer number to be addressed by a selected DMX or EDMX address and the length of the DMX or EDMX stream to be used for that port - for example: setting the first dimmer to 1 and the DMX Start to 101 and the DMX Length to 24 will cause dimmer #1 to respond to input levels on DMX channel 101, dimmer #2 to respond to DMX 102, and so on until dimmer #24.

In Advanced patching, you set a discrete DMX or EDMX address for each dimmer number.

Data Loss Behavior [User]

Data Loss Behavior can be set independently for each input port (DMX A, DMX B and EDMX) in each rack in the Group. Data loss behavior options are: Hold Last Look, Wait & Fade Out and Generate Event. When data is restored, the source look will fade in at a 2-second rate.

- Hold Last Look: the CEM+ will hold any active dimmers at whatever levels they were receiving when the data was lost. The dimmers will remain on until data is restored or the CEM+ is reset.
- Wait & Fade: the CEM+ will hold any active dimmers at whatever levels they were receiving when the data was lost for a user-defined amount of time and then fade those dimmers to zero (or to the levels generated by the next highest priority source) in a user-defined fade time. The maximum wait and fade time is 60.59 minutes.
- Crossfade To: this setting will play back Preset 128 when data is lost. The default fade time for Preset 128 is 2 seconds. If this time is changed, both sides of the crossfade (the fade into Preset 128 and the fade back into restored data) will use the new time.

Voltage Headroom [Power]

This menu allows you to specify the threshold for the incoming voltage at which a warning will appear to notify you about a drop in voltage.
**Set Network [User]**

Set Network allows a User to enable or disable the network, enable or disable BootP (defaults to disabled) and set the network addressing for a selected rack.

**Set First Dimmer [User]**

Set First Dimmer allows you to set the first dimmer number in a selected rack. For example, in a two SR48 rack Group, Rack 1 can be set with a First Dimmer of 1, and Rack 2 can be set with a First Dimmer of 97.

**Set Temp Alarm [User]**

The Temp Alarm is used to generate a warning when the ambient temperature monitored by the rack exceeds a user-defined level. Use the Set Temp Alarm menu to set that level for the selected rack.

**Set Phase Balance [User]**

The Set Phase Balance menu allows you to set the type of phasing used by the selected rack and the voltage of the line feed power. Available settings include: Balanced-3Phase, Balanced-1Phase, Straight-3Phase and Straight-1Phase.

- **Balanced-3Phase**: rack is fed 3-Phase power and dimmer numbers are distributed numerically by phase, rather than by rack position. Example: dimmers 1 and 2 are in the top slot of a rack; dimmers 3 and 4 are located first on the second phase, 1/3 of the way down the rack; dimmers 5 and 6 are located first on the third phase, 2/3 of the way down the rack.

- **Balanced-1Phase**: rack is fed split-phase power and dimmer numbers are distributed numerically by bus bar, rather than by rack position. Example: dimmers 1 and 2 are in the top slot of a rack; dimmers 3 and 4 are located in the first dimmer module of the bus bar, 1/2 of the way down the rack.

- **Straight3-Phase**: rack is fed 3-Phase power and dimmer numbers are distributed numerically from top to bottom in the rack. Example: dimmers 1 and 2 are in the top slot of a rack, dimmers 3 and 4 are located in the next slot, etc.

- **Straight1-Phase**: rack is fed 1-Phase power and dimmer numbers are distributed numerically from top to bottom in the rack. Example: dimmers 1 and 2 are in the top slot of a rack, dimmers 3 and 4 are located in the next slot, etc.

**Add Rack [Power]**

The Add Rack menu is the place to add additional racks to your existing configuration. You do this by specifying: the rack voltage, the rack type, first dimmer in the rack, the patch mode, the ambient alarm temperature, the default module type, the phase balancing, and whether or not to enable advanced features for the rack.

**Air Filter Timer [User]**

The Air Filter Timer menu allows you to set the amount of time between air filter cleaning reminders for a selected rack. This timer counts down only when the fan is running in the rack.

**Advanced Features [Power]**

The Advanced Features menu allows you to enable/disable Advanced Features (AF) for a selected rack in the group.

**Configure Fan [User]**

The Configure Fan menu allows you to configure the behavior of the fan in the selected rack. Available settings include: No Data/15 Min and Always On. No Data/15 Min will allow the fan to shut off if there have been no dimmer levels sent to that rack in 15 minutes. When levels are sent to dimmers in the rack, the fan will start up automatically. The fan will always
run for 15 minutes following a reset of the CEM+.

Get Config [Power]

After selecting this function, you will be prompted with the name of the rack (1-16) you want to get the configuration from. One option is Server which refers to an FTP server if one is configured on your lighting network. Please see the section FTP Server, page 43 for more information about setting up an FTP server for use with CEM+. It will then transfer the configuration to the local CEM+. After the transfer is complete, you will get a confirmation or error message for the transfer.

Send Config to All [Power]

Upon pressing 🔄 for this function, you will immediately send the locally contained configuration out to all of the other CEM+s in the group and to the FTP server if one is configured for the group. Please see the section FTP Server, page 43 for more information about setting up an FTP server for use with CEM+.

Delete All Racks [Power]

Immediately after pressing 🔄, this operation clears the rack configuration from the local rack (the one you are logged into), but does not clear everything from the CEM+. The network settings, and custom PIN for the face panel remain intact.

Network Defaults [Power]

Pressing 🔄 on this screen will immediately reset your network table (IP addresses, subnet masks, and gateway IPs) to their defaults for the current Group and Rack settings.

Group [User][Power],

The Group menu includes menus for recording loads, naming the group, setting the preferred units for temperature reporting, and language and login settings. The Group menu is available only to those logged in at the User level.

Record Loads [User]

The Record Loads menu is used to record the loads on each dimmer. This is useful in Advanced Features systems where load reporting is desired.

Name Group [User]

The Name Group menu allows a User to set the name of the Group. Names are alphanumeric and can be up to 20 characters long (not all 20 characters will be visible on the LCD).

Set Language [User]

The Set Language menu allows a User to set the language of the user interface.

Ambient Temp Type [User]

The Ambient Temp Type menu allows a User to set temperature reporting as either Fahrenheit or Celsius.

Set Login Time-out [User]

The Set Login Time-out menu allows a User to set the time after which the CEM+ will automatically log the current user out and return to the default access level as set in the Group configuration. The time-out is based upon inactivity at the keypad.

Set PIN [User][Power]

The Set PIN menu allows you to set the PIN for your current login access level and below. User can set the User level PIN and Power can set the Power and User level PINs. Guests require no PIN for access.
Chapter 3
Sensor+ Connect Web Interface Overview

This section covers functions and configuration of the CEM+ and Sensor+ Connect that are available to the Guest and User and Power User login levels.

The web interface is a set of web pages intended to give you easier access to all of a CEM+ module's features and settings. This section will provide you with screenshots of various key pages and provide further insight into how to use them. Setup and configuration procedures are covered in "Chapter 4: CEM+ Configuration Procedures" on page 30.

For a complete web interface site map outline, please see "Appendix F: Sensor+ Connect Site Map" on page 69.

The CEM+ module contains a web server that delivers graphical web pages for you to use during system configuration. The Sensor+ Connect Web browser interface can be used instead of the direct buttons on the CEM+ module itself. You can use an Ethernet-capable PC connected to the ETCONet2 network and running Windows 2000 or XP and Internet Explorer 6 or later to browse into any of the Sensor+ racks on the network. Any changes made in the web interface are not communicated to the CEM+ until you send that information by clicking Save Changes on that page.

If you are using an Emphasis Control System running version 1.8.0 software or later, there is a command in the WYSILink menu that automatically opens a browser window and connects to Sensor+ racks.
Sensor+ Connect uses a navigation layout where the various main areas are selected on the left side of the page presenting sub-options. The right side of the page is used to view or edit the selected information.

**Note:** The Emphasis Server network settings are the default ETC values and ready for immediate use. No configuration is required.

You must set an IP address for any personal computer you plan to use on an ETCNet2 network. ETC recommends that the personal computer used on an ETCNet2 network is dedicated to that network so changes to network settings are kept to a minimum.

**Note:** If the computer you wish to use is currently being used on a non-ETCNet2 network please consult your Network Administrator before changing the IP address, Subnet Mask or Gateway IP addresses.

---

**Group**

**Summary Status**

This is the Status Summary page. It's the first page after you login to a CEM+.

---

17

Sensor+ CEM+ Configuration Manual

38 of 1217
**Dimmer Check**

Also from the Group section is the Dimmer Check page. This page provides a quick and easy method to step through individual dimmers to do a dimmer check.

**Racks & Dimmers**

**All Racks**

All Racks provides a place to access and set the properties of all racks in the configuration.
Add Racks

This page is where you add racks to your configuration.

To change the rack and module types to the European models, click the 240V check box. After checking 240V, you must click Save Changes before you will see the available rack and module types change to European (ESR/ESP) models. Clicking Save Changes the first time after the 240V check box has been altered (checkmark vs. no checkmark) will not add a rack to the group.

Rack #

Status

This page displays the individual rack's power information, the dimmers' control source and current intensity level.

Displays which rack's data you are viewing which may be relevant to your configuration.
Configure Rack

This page is the individual rack equivalent to the All Racks/Configure Rack page listed above. See "All Racks" on page 18.

Configure Dimmers

This webpage provides a single place to set all of your dimmer's properties. Below is a list explaining each one of the settings.
Set Dimmer Name [User]
The Set Name menu allows a User to name a dimmer. Names are alphanumeric and can be up to 20 characters long (not all 20 characters may be visible on the LCD).

Set Module Type [Power]
The Set Module Type menu allows a User to set a dimmer or range of dimmers to a specific module type and firing mode. If the module is set to "Fluorescent", you also set the threshold in this menu. Threshold is the control level that must be present for the fluorescent dimmer to output voltage based on the selected curve.

Pos [Position] [Power]
This is a display only field. It lists the position of each circuit within a rack.

Set Firing Mode [Power]
The Set Firing Mode menu allows a User to set a dimmer or a range of dimmers to a specific firing mode. Available modes include Normal, Off, Switched, Fluorescent and DD (Dimmer Doubled):
- Off: turns the dimmer off.
- Normal: operates as a standard incandescent dimmer.
- Switched: dimmers output unregulated AC voltage when the control level is above the threshold level.
- DD (Dimmer Doubled): dimmer operates as two controllable circuits. See "Dimmer Doubling™ (60Hz systems only)", page 4.

Note: Changing the dimmer firing mode will cause a change to default settings for curve, minimum voltage, maximum voltage, threshold and regulation. Whenever a dimmer mode is set the defaults for that mode will be applied to the other dimmer properties.

Set Curve [User]
The Set Curve menu allows a User to set a dimmer or a range of dimmers to a specific curve. A dimmer curve is a mathematical function that maps control levels to RMS output voltage. Curves are scaled from the minimum voltage to the maximum voltage (settings that are not available to the User login). The CEM+ supports the following curves: Square, Mod Square, Linear, Mod Linear, Sensor 2.0. See "Dimmer Curves", page 52, for more information.

Set Threshold [Power]
The Set Threshold menu allows a Power User to set a dimmer or a range of dimmers to come on at a specific intensity level.

Set Min Scale Voltage [Power]
The Min Scale Voltage menu allows a Power User to set a dimmer or a range of dimmers to a minimum output voltage that is the bottom (1% control) of the scaled output of that dimmer.

Set Max Scale Voltage [Power]
The Max Scale Voltage menu allows a Power User to set a dimmer or a range of dimmers to a maximum output voltage that is the top (100% control) of the scaled output of that dimmer.

Voltage Regulation [Power]
When enabled, the dimmer will regulate to the desired output voltage. When disabled, the dimmer will be set to a constant firing time based on the control level. This setting defaults "on". The ability to disable regulation is sometimes useful when dimming non-tungsten
loads. When disabling Voltage Regulation, you should also set the Maximum Scale Voltage to a level well above the incoming line voltage to ensure that power wave is not clipped in any way.

**Preheat [Power]**
This setting enables/disables preheat for the selected dimmer. The preheat level is the Minimum Scale Voltage.

**Dynamic Preheat [Power]**
This setting allows quick blackouts on dimmers that are set to preheat. It sets the amount of time a dimmer will remain at a zero (0) level before returning to the preheat level. It can be set from 0.5 seconds to 15 seconds and has a default of 2 seconds.

**DC Output Prevent [Power]**
This setting offers protection on selected dimmers for loads that are sensitive to DC buildup, which can occur under certain conditions when positive and negative half-cycles become uneven.

**Inrush Protection [Power]**
This setting protects against large voltage increases in a single AC cycle. This protection is useful for high-wattage loads that may cause nuisance tripping of circuit breakers and to limit peak currents in wiring and switch gear. This protection is particularly useful on RCD/GFCI protected circuits. Settings for inrush protection include: Instant, 100ms (for loads up to 10A), 300ms (for loads up to 25A) and 500ms (for loads of 50 or 100A).

**Advanced Features (AF) [Power]**
Enables/disables additional feedback from a dimmer that provides load recording/reporting and advanced error reporting including a breaker trip, module removed, load changes, dc output and SCR failures.

**Report Load Errors [Power]**
Enables/disables messages to report load changes once initial loads have been recorded for a dimmer. Load errors must be enabled to record loads in Load Management. See "Load Management" on page 29.

**AF Sensitivity (1-10) [Power]**
This setting defines the resolution of the advanced features sensitivity to report load changes. One (1) is the most sensitive/highest resolution setting and the default is 5. AF sensitivity is based on a percentage of the recorded load.

**AF Reaction (Time) [Power]**
This setting defines the hysteresis for an advanced feature error. The error must be present for the minimum set in the AF Reaction Time before an error will be reported. Five (5) seconds is the shortest amount of time and 60 seconds is the longest allowed.

**Scale Load [Power]**
This setting adjusts the choke correction curve based on the specified percent load of the maximum for that dimmer type. Scale Load can be set from 1% to 100% and should reflect the approximate percent load on a given dimmer to precisely match all dimmed load. The default setting is 35% which is based on a single Source Four 750w fixture on a D20 dimmer with a max scale voltage of 115Vac.
Errors

Errors for a rack can be viewed and cleared on this webpage.

1) To clear a specific error, click in the
2) Click the Clear Error(s) button.

...or...

Click the Clear All Error(s) button to clear all errors regardless of

Search

The Search pages (search appears multiple times within the CEM+) allow you to find dimmers based on multiple search criteria. For example, you can search for all of the D20AF modules in rack 3 with a specific dimming curve.

The results of that search are presented on a dimmer status page (the next tab).

Using the Configure Dimmers webpage within the Search function provides an easy way to set one property or properties on the top of the page and have it apply those settings to every found dimmer in the group.

These are the same dimmer properties as explained above. See "Configure Dimmers" on page 20.
You can also use the Configure Dimmers tab to modify the properties of all the found dimmers at once. (See below.)

Apply to All makes the changes to the table. Save Changes updates the information.

This section gets the changes applied to it.
Use this section to make changes that will get applied to all found dimmers below.

Rooms & Presets

Assign Dimmers

All dimmers in a group default to being in (and thus available only to) Room1. You can assign a dimmer or range of dimmers to any of the rooms (1-4) only once. Shown below, dimmers 101-112 are assigned to Room1 and dimmers 201-212 are assigned to Room2.

Use this section to assign a range of dimmers to a room.
Use this section to assign an individual dimmer to a room. Dimmers may only be assigned to a single room at a time.
Room (1-4)

Clicking on a room in the navigation bar will bring up the display shown below. This is where you create presets, name presets, record or snapshot presets to give them level information or clear a preset to remove all level information from it.

Configuration

Panic

This is the page where you configure Panic for switch mode and type as well as record or clear the Panic preset.

Patch

Port Settings (Standard Patch)

The port settings page is where you can enable/disable any of the data input ports as well.
as the port relative priority inside the CEM+, and any port's data loss behavior on any of the Sensor+ racks. Along with the port settings are the standard patch settings. You can assign the starting DMX address for each rack's data port (DMX & EDMX).

DMX Port B Output is also enabled here. You need to enable both the Port B Output and the DMX B port of the last logical rack in the group. DMX Port B Output takes patched EDMX and outputs 512 channels of DMX.

To find the first EDMX address that will be used for the Port B DMX Output, you need to do some math (not much thought). In a patch that is not 1-to-1, the first EDMX address used is not clearly shown.

Find EDMX Address for Port B DMX Output

For a patch that is not 1-to-1 (like one shown here) This is not the EDMX start

Advanced Patch

Standard Patch and Advanced Patch are handled as two completely separate patches including port enables and data loss behaviors. This means that if you configure the ports while in standard patch mode, switching to advanced patch mode will also switch those ports enables and data loss behaviors to a different configuration.
While in Advanced Patch mode, port enable and data loss behavior are still set on the Port Settings page.

<table>
<thead>
<tr>
<th>Device</th>
<th>Port</th>
<th>Enable</th>
<th>Data Loss Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Use this section to do range patching.

Use this section to edit dimmer by dimmer for all ports.

Port enables and data loss behaviors are still made on the Port Settings page.
**Network**

The Network screen displays the network table for the CEM+. This information is local to the CEM+ and changing IP information here does not change the corresponding CEM+'s actual IP address. It only serves as a place to store and lookup the IP addresses of other CEM+'s in the same group. This table does get shared to the other CEM's in the group.

- **Save Changes** must be clicked to send your changes to the CEM's.
- **Restore Defaults** resets the network table IP information to a default state based on the filled in Rack and Group settings.

To change the entire network table at once from the web interface, set the Group and Rack numbers and click Restore Defaults. This will repopulate the network table with the default addresses.

**Note:** To edit the IP addresses directly from the web interface, you need to contact ETC Technical Services.

**File Transfer**

This webpage is used to initiate configuration transfers between the CEM+ module and an FTP server if one is configured and available. Please see the section "FTP Server", page 43 for more information about setting up an FTP server for use with CEM+.
File Upload

The File Upload webpage is where you send either a configuration file or a software file to the CEM+ you are logged into. The CEM+ looks at the file being sent to automatically handle the file type or part of the configuration file.

Load Management

From this webpage, you can record, check, and clear load information for Advanced Feature modules (such as the D20AF).

For the functions on this page to work properly, you must turn on Load Errors for each of the advanced features (AF) dimmer modules you want to use in load management. Please see "Configure Dimmers", page 20 for more information about enabling load errors for a dimmer.

<table>
<thead>
<tr>
<th>Dimmer #</th>
<th>Baseline</th>
<th>Actual Load</th>
<th>Level</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>700 W</td>
<td>700 W</td>
<td>50</td>
<td>Lobby</td>
</tr>
<tr>
<td>102</td>
<td>700 W</td>
<td>700 W</td>
<td>50</td>
<td>Lobby</td>
</tr>
<tr>
<td>103</td>
<td>700 W</td>
<td>700 W</td>
<td>50</td>
<td>Lobby</td>
</tr>
<tr>
<td>104</td>
<td>700 W</td>
<td>700 W</td>
<td>50</td>
<td>Lobby</td>
</tr>
<tr>
<td>105</td>
<td>700 W</td>
<td>700 W</td>
<td>50</td>
<td>Lobby</td>
</tr>
<tr>
<td>106</td>
<td>700 W</td>
<td>700 W</td>
<td>50</td>
<td>Lobby</td>
</tr>
<tr>
<td>107</td>
<td>700 W</td>
<td>700 W</td>
<td>50</td>
<td>Lobby</td>
</tr>
<tr>
<td>108</td>
<td>700 W</td>
<td>700 W</td>
<td>50</td>
<td>Lobby</td>
</tr>
<tr>
<td>109</td>
<td>700 W</td>
<td>700 W</td>
<td>50</td>
<td>Lobby</td>
</tr>
<tr>
<td>110</td>
<td>700 W</td>
<td>700 W</td>
<td>50</td>
<td>Lobby</td>
</tr>
<tr>
<td>111</td>
<td>700 W</td>
<td>700 W</td>
<td>50</td>
<td>Lobby</td>
</tr>
<tr>
<td>112</td>
<td>700 W</td>
<td>700 W</td>
<td>50</td>
<td>Lobby</td>
</tr>
<tr>
<td>113</td>
<td>700 W</td>
<td>700 W</td>
<td>50</td>
<td>Lobby</td>
</tr>
<tr>
<td>114</td>
<td>700 W</td>
<td>700 W</td>
<td>50</td>
<td>Lobby</td>
</tr>
<tr>
<td>115</td>
<td>700 W</td>
<td>700 W</td>
<td>50</td>
<td>Lobby</td>
</tr>
<tr>
<td>116</td>
<td>700 W</td>
<td>700 W</td>
<td>50</td>
<td>Lobby</td>
</tr>
</tbody>
</table>

Perform a Load Check by running the levels of dimmers up & down checking for differences between recorded and actual loads.

Record Loads runs the dimmers levels up & down to record the loads.

You must turn on (check) Load Errors for Record Loads to work properly. Just turning on AF does not turn on Load Errors by default.

Clear Loads will delete the previously recorded loads.

Level & Source display the current dimmer level and the control source for the dimmer.

Shown above, dimmers 101-106 are controlled by the Lobby preset.
Chapter 4
CEM+ Configuration Procedures

CEM+ Configuration Overview

Configuring a CEM+ from either the face panel via the LCD and buttons or the Sensor+ Connect web interface are basically the same procedures done in the same order. The web interface is more intuitive and you are able to make more changes simultaneously; making it a more efficient way to configure the modules.

Please refer to the LCD menu structures and web interface site map for navigation details.

Since there are nearly an infinite number (at least for practical purposes of counting them) of ways for you to configure your racks and dimmers, the procedures in this section are intended to be building blocks for you to use to configure your unique system.

The headings for each procedure will contain either a [Power], [User] or [Guest] to denote the minimum required access level. [Web] or [FP] will note whether a specific navigation path is for the web interface or the CEM+ face panel.

Configuration Procedures

Configure Your Computer for an ETCNet2 Network

Prior to changing any Network settings on your personal computer please record the current settings in the following spaces below.

- IP Address
- Subnet Mask
- Gateway IP

To use your personal computer on an ETCNet2 network that does not use a network router (i.e. hub and/or switch only), ETC recommends the following default settings:

- IP Address: 10.101.1.101
- Subnet Mask: 255.255.0.0
- Gateway IP: 10.101.1.101

**Note:** If you are setting this computer up to be an FTP server, then you should set the IP address to 10.101.1.117 — the default FTP server IP address of CEM+ modules.

If you have a network that does include a network router, you must set the Gateway IP address to the appropriate port on the router.

Each additional computer on an ETCNet2 network must have its own IP address which must be different from any other computer on the same ETCNet2 network. Select from the following default range of IP addresses for an additional personal computer on the network:

- 10.101.1.101 thru 10.101.1.249
Browse into a CEM+ from Internet Explorer 6:

Step 1: Open Internet Explorer 6.

Step 2: Type the IP address of the rack you want to browse to in the address box and press RETURN. Sensor+ Connect will open in the browser window if the CEM+ at the entered address is online.

Note: 10.101.101.101 is the default address for a CEM+ in the first rack of the first group. Your system may use a different addressing scheme. If that is the case, simply enter the IP address of one of the racks in the group you want to browse.

The default IP address scheme for CEM+ follows the two-digit Group and Rack numbers of each module.

- 10.101.1XX.1RR where GG is the two-digit Group number and RR is the two-digit rack number.

To browse into a CEM+ that is in Group 2, Rack 3 (for instance) the default IP address is 10.101.102.103.

Software Changes [Power]

Software changes must be done via the web interface.

Changing the software in a CEM+ is done by uploading a software file to a CEM+. Once the upload is complete, the CEM+ will automatically start the software replacement process.

Once the software replacement begins, the CEM+ will turn off all of its dimmers and stop responding to all level information data.

These steps begin after you have the CEM+ software file on your computer in a known location.

Upload software to a CEM+:

Step 1: Launch Internet Explorer 6 (or later) from a PC and browse to the CEM+ by typing in the IP address of the CEM+.

Step 2: Login to the CEM+ at the Power User level (User name: power / Password: powerpass)

Step 3: Browse to the File Upload page by clicking the Configuration button on the side navigation bar then the File Upload icon.

Step 4: From the File Upload page, click Browse and locate the CEM+ software file.

Step 5: Click Install.
• After clicking install, the software will be uploaded to the CEM+. While the software is being sent to the CEM+, the browser will no longer respond. After several minutes, there will be a pair of errors indicating that the CEM+ is done transferring the file and is now installing the software (and no longer communicating with Internet Explorer which is what causes the errors).

Step 6: After seeing the errors, it is safe to clear the errors (click OK) and close Internet Explorer.

• The following screens will be seen on the face panel display during software installation:

<table>
<thead>
<tr>
<th>Screen Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loading New SW</td>
</tr>
<tr>
<td>Please Wait...</td>
</tr>
<tr>
<td>Installing Software</td>
</tr>
<tr>
<td>&lt;various messages&gt;</td>
</tr>
<tr>
<td>CEM+ 1.0.2</td>
</tr>
<tr>
<td>Loading SW For</td>
</tr>
<tr>
<td>Dimming Processor</td>
</tr>
<tr>
<td>Loading SW For</td>
</tr>
<tr>
<td>AV Card</td>
</tr>
<tr>
<td>ETC CEM+ R 1/4 0 1</td>
</tr>
<tr>
<td>[Back OK]</td>
</tr>
</tbody>
</table>

While the software is being downloaded.
While the individual components are being decompressed and installed.
While the CEM+ reads the new software.
While the CEM+ transfers some software to the dimming engine.
While the CEM+ transfers some software to the Advanced Features (AF) cards (if installed).
Installation is complete. The CEM+ returns to its normal facing display.

Step 7: Repeat for any remaining CEM+s in the system.

Delete All Racks [Power]

Step 1: Log in as a Power User

Step 2: Delete the config from the local rack (the one you are logged into).

• [Web] Racks & Dimmers>Add Racks>Delete All Racks

Step 3: Send the local rack’s configuration to the other racks. This will send the “noconfig” configuration to the other CEM+s in the group and effectively delete their configuration as well.

• Configuration>File Transfer>Backup

• [FP] Rack>Send Config to All

This operation clears the rack configuration from the local rack (the one you are logged into), but does not clear everything from the CEM+. The network settings, and custom PIN for the face panel remain intact.
Build New Configuration (from NoConfig State)

This overall procedure is made up of the next several smaller procedures.

When a CEM+ is in the state of "NoConfig", the face panel menu is different than during normal operation. It changes to options that are centered around getting the CEM+ configured. That menu can be found on the first page of "Appendix E: CEM+ LCD Menu" on page 80. From the NoConfig menu at the face panel you can Generate Defaults for that rack with a any user level including Guest.

Configure/Confirm Network Settings of CEM+

The IP address settings of each CEM+ module must point to each other in order for the configuration information to transfer between racks/CEM+s.

The first part of this process is to confirm/set the individual network settings of each CEM+.

The easiest way to do this is at the CEM+ face panel.

- [Web] Configuration>Network
- [FP] Setup Network

From the Set Group / Rack menu, specify:

- **Group** - Specifies a selection of racks that share a common config and relay preset, panic and level information between themselves. Groups can be numbered from 1 - 64.
- **Rack** - Specifies the number of a rack within the Group. Racks can be numbered from 1-16. All Groups must start with Rack 1.
- **Network Enable** - Makes the specified unit active in the network table.
- **IP address** - Specifies the IP address for the CEM+ you are using (the local CEM+).
- **Subnet Mask** - Specifies the subnet mask for the CEM+ you are using (the local CEM+).
- **Gateway IP** - Specifies the gateway IP address for the CEM+ you are using (the local CEM+).

This must be done for each CEM+ module. It works best if the IP addresses adhere to the default IP address scheme:

- 10.101.1GG.1RR where GG is the two-digit Group number and RR is the two-digit rack number.

Once the racks have all been assigned their group and rack numbers, login to Rack #1 and confirm that the IP addresses that Rack #1 has for each of the other racks matches what was set for each of the previous racks.

To change the entire network table at once from the web interface, set the Group and Rack numbers and click Restore Defaults. This will repopulate the network table with the default addresses.

---

**Note:** To edit the IP addresses directly from the web interface, you need to contact ETC Technical Services.

---

Add Racks [Power]

Racks can be added individually or multiples of the same rack type and dimmer type. Adding racks is very easy and you are asked for everything needed to create a rack.

However, there are a couple of points you need to be aware of:
• Every Group of racks must have a Rack 1.
• Racks must be added sequentially, starting with rack 1 to a maximum of 16 racks.
• For European rack and module options, set the voltage to 240V.
  • [FP] This is straightforward in the face panel LCD menu (it's the first setting).
  • [Web] However, the web interface requires that you click the 240V check box then
    Save Changes before the options will change. The first click of Save Changes
    after altering the 240V setting will not add another rack (it changes the options),
    the next click of Save Changes will add the specified rack(s).
• Rack Types: SRxx is an permanent installation rack and SPxx is any type of portable
  rack (including touring racks). ESRxx and ESPxx are for European installation rack
  and portable racks respectively. In all cases, the “xx” number is determined by the
  number of slots in the rack for modules (not the number of dimmers).

**Set Patch Mode**

Standard Patch and Advanced Patch are handled as two completely separate patches
including port enables and data loss behaviors. This means that if you configure the ports
while in standard patch mode, switching to advanced patch mode will also switch those
ports enables and data loss behaviors to a different configuration.

**Port Settings (Standard Patch)**

Standard patch gives every port on every rack a starting address and sequentially
addresses the rest of the dimmers in the rack from that point. To edit the dimmer’s
addressing individually, you need to switch the patch mode of the rack to Advanced.

By default every rack added will be set to an incremental DMX address starting at one (1)
and continuing with the next available DMX channel available with only port A enabled on
each rack (Port B and EDMX are disabled by default).

You can edit the DMX start channel for each rack from the Patch/Port Settings page. You
can enable/disable the data ports here as well.

**Note:**

To output DMX from port B of the last rack BOTH the checkbox for “Enable Port B Output” and the checkbox to enable port B on the last rack must be checked for
this to work.

Port B DMX Output is only available from the last logical rack in a group,
regardless of its physical position within the group.

This is also where you set the data priority and data loss behavior for each port of each rack.
Priority is the preference given to each control source internally to the CEM+ (it is not
broadcast to other ETCNet2 devices, nor does it use the source device’s priority once
inside the CEM+) Priorities can be set for each port of each rack as well as recorded
Presets. Data Loss Behavior tells the port what you want to happen when data is no
longer being received on that port.

**CAUTION:**

An EDMX port will not currently go into a specified data loss behavior. If all EDMX
is lost, the dimmers will maintain the last known level until they have new level
information to use.

**Advanced Patch**

Advanced Patch mode gives you direct dimmer to address patching for each port of each
rack with advanced patch enabled. Port enable, priority and data loss behavior are still set
from the Port Settings webpage. Dimmer Doubled addresses are always shown in
advanced patch mode, however dimmers are not actually in dimmer doubling mode unless they are set with a Dimmer Double firing mode.

It's worth restating, that Standard Patch and Advanced Patch are handled as two completely separate patches including port enables, priorities and data loss behaviors. This means that if you configure the ports while in standard patch mode, switching to advanced patch mode will also switch those ports enables and data loss behaviors to a different configuration.

Set Dimmer Properties

When a rack initially gets defined, it contains the default dimmer type with default properties throughout the rack. If you have a mix of dimmer types in a rack, you need to configure these after the racks have been added to the group.

You can either edit the dimmer properties (dimmer type, fire mode, voltage regulation...) individually, or by searching for dimmers by several criteria and edit those found dimmers at the same time.

For specific dimmer configurations:

Switched

Change the firing mode to Switched and click Save Changes. After saving changes, the remaining dimmer properties will change automatically or can now be set to your desired values. Currently when Switched firing mode is selected, all other properties for that dimmer are ignored.

<table>
<thead>
<tr>
<th>Property</th>
<th>120V</th>
<th>230V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firing Mode</td>
<td>Switched</td>
<td>Switched</td>
</tr>
<tr>
<td>Curve</td>
<td>Linear</td>
<td>Linear</td>
</tr>
<tr>
<td>Threshold</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Min. Scale Voltage</td>
<td>140V</td>
<td>265V</td>
</tr>
<tr>
<td>Max. Scale Voltage</td>
<td>140V</td>
<td>265V</td>
</tr>
<tr>
<td>Voltage Regulation</td>
<td>Unchecked</td>
<td>Unchecked</td>
</tr>
<tr>
<td>Preheat</td>
<td>Unchecked</td>
<td>Unchecked</td>
</tr>
<tr>
<td>Dynamic Preheat</td>
<td>0 sec.</td>
<td>0 sec.</td>
</tr>
<tr>
<td>DC Output Prevent</td>
<td>Unchecked</td>
<td>Unchecked</td>
</tr>
<tr>
<td>InRush Protect</td>
<td>Unchecked</td>
<td>Unchecked</td>
</tr>
</tbody>
</table>

Non-Dim

Change the firing mode to Normal and click Save Changes. After saving changes, make the remaining changes to the dimmer properties as listed below. Currently, setting the firing
mode to Switched and turning on Voltage Regulation does not work.

<table>
<thead>
<tr>
<th>Property</th>
<th>120V</th>
<th>230V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firing Mode</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>Curve</td>
<td>Linear</td>
<td>Linear</td>
</tr>
<tr>
<td>Threshold</td>
<td>1% or desired setting</td>
<td>1% or desired setting</td>
</tr>
<tr>
<td>Min. Scale Voltage</td>
<td>115V or desired setting</td>
<td>265V</td>
</tr>
<tr>
<td>Max. Scale Voltage</td>
<td>115V or desired setting</td>
<td>265V</td>
</tr>
<tr>
<td>Voltage Regulation</td>
<td>Checked</td>
<td>Checked</td>
</tr>
<tr>
<td>Preheat</td>
<td>Unchecked</td>
<td>Unchecked</td>
</tr>
<tr>
<td>Dynamic Preheat</td>
<td>0 sec.</td>
<td>0 sec.</td>
</tr>
<tr>
<td>DC Output Prevent</td>
<td>Unchecked</td>
<td>Unchecked</td>
</tr>
<tr>
<td>InRush Protect</td>
<td>Unchecked</td>
<td>Unchecked</td>
</tr>
</tbody>
</table>

**Fluorescent**

Change the firing mode to Fluorescent and click Save Changes. After saving changes, the remaining dimmer properties will change automatically or can now be set to your desired values.

<table>
<thead>
<tr>
<th>Property</th>
<th>120V</th>
<th>230V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firing Mode</td>
<td>Fluorescent</td>
<td>Fluorescent</td>
</tr>
<tr>
<td>Curve</td>
<td>Linear</td>
<td>Linear</td>
</tr>
<tr>
<td>Threshold</td>
<td>1% or desired setting</td>
<td>1% or desired setting</td>
</tr>
<tr>
<td>Min. Scale Voltage</td>
<td>56V or desired setting</td>
<td>56V</td>
</tr>
<tr>
<td>Max. Scale Voltage</td>
<td>120V or desired setting</td>
<td>240V</td>
</tr>
<tr>
<td>Voltage Regulation</td>
<td>Checked</td>
<td>Checked</td>
</tr>
<tr>
<td>Preheat</td>
<td>Unchecked</td>
<td>Unchecked</td>
</tr>
<tr>
<td>Dynamic Preheat</td>
<td>0 sec.</td>
<td>0 sec.</td>
</tr>
<tr>
<td>DC Output Prevent</td>
<td>Checked</td>
<td>Checked</td>
</tr>
<tr>
<td>InRush Protect</td>
<td>Unchecked</td>
<td>Unchecked</td>
</tr>
</tbody>
</table>

**Dimmer Doubling™**

Change the firing mode to DimDBl and click Save Changes. After saving changes, the remaining dimmer properties will change automatically or can now be set to your desired values.
values. Dimmer Doubling is only available for 120V systems.

<table>
<thead>
<tr>
<th>Property</th>
<th>120V</th>
<th>230V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firing Mode</td>
<td>DimDb1</td>
<td>---</td>
</tr>
<tr>
<td>Curve</td>
<td>Mod-Sq</td>
<td>---</td>
</tr>
<tr>
<td>Threshold</td>
<td>1%</td>
<td>---</td>
</tr>
<tr>
<td>Min. Scale Voltage</td>
<td>6V</td>
<td>---</td>
</tr>
<tr>
<td>Max. Scale Voltage</td>
<td>115V</td>
<td>---</td>
</tr>
<tr>
<td>Voltage Regulation</td>
<td>Checked</td>
<td>---</td>
</tr>
<tr>
<td>Preheat</td>
<td>Unchecked</td>
<td>---</td>
</tr>
<tr>
<td>Dynamic Preheat</td>
<td>0 sec.</td>
<td>---</td>
</tr>
<tr>
<td>DC Output Prevent</td>
<td>Checked</td>
<td>---</td>
</tr>
<tr>
<td>InRush Protect</td>
<td>Unchecked</td>
<td>---</td>
</tr>
</tbody>
</table>

Currently, Dimmer Doubling works in Advanced Patch mode only. To configure a dimmer for Dimmer Doubling:

Step 1: Set the rack that contains the dimmer to Advanced Patch mode.
Step 2: Set the dimmer's firing mode to DimDb1.
Step 3: Re-configure your port settings and data loss behavior for that rack if they were modified from the defaults.
Step 4: Use advanced patch to patch your dimmers.
   - You may need to re-patch all of the dimmers if you are not using the default patch.
   - You will need to patch the Dimmer Doubled side of the dimmer for each port you are using (DMXA DD, DMXB DD, EDMX DD).
Rooms & Presets

Assign Dimmers to Rooms

All dimmers in a group default to being in (and thus available only to) Room1. You can assign a dimmer or range of dimmers to any of the rooms (1-4), but to only one room at a time. Shown below, dimmers 101-112 are assigned to Room1 and dimmers 221-232 are assigned to Room2.

Create & Preset (Web Only)

In the web interface, you must create a preset before you can record levels into it. The face panel LCD combines creating a preset with recording it.

Click on Create New and the web interface will add a new preset to the list below. It will add an incremental preset (Preset1, Preset2, Preset3 and so on) or if an older preset was recorded, it will recycle the old preset first before making a new one. Once it appears in the list, you can record and modify it as needed.
Record vs. Snapshot a Preset

Record and Snapshot are two different operations.
Record will only use level information from Set Levels from the CEM+ modules in the group when storing a preset.
Snapshot will use level information from all available sources to the CEM+ modules (DMXA, DMXB, EDMX, and Set Levels) when storing a preset.

Activate/Deactivate a Preset

You can toggle any preset on or off from either the web interface or the face panel LCD. Stations are currently not supported and therefore can not be used to turn presets on or off.

Max Active Presets

Maximum Active Presets defines how many presets can be active in any one given room at a time. It can be set from a minimum of one (1) and to a maximum of four (4) at a time. Activating one preset more than allowable by Max Active Presets will deactivate the active preset with the lowest priority or if all active presets are at the same priority, the oldest previously activated priority.

Max Active Presets defaults to one (1) which results in a "last action" activation/deactivation manner. (Turning on one preset turns off the previous preset.)

Panic

Panic is configurable for different external switch action types (maintained vs. momentary) and switch resting states (normally-open vs. normally-closed). Panic always operates at the highest priority in the CEM+ and no other control source can pile-on with it or override it.

Record Panic

Create the desired panic look by setting dimmer levels from the CEM+ or from a external control source. Keep in mind that the Master Level acts as an intensity threshold for dimmers and determines whether or not they are included in the panic. Only dimmers with an intensity level equal to or greater than the Master Level will be included in Panic. When Panic is active, the dimmers will also playback at the set Master Level.

Set the Panic Master Level to your desired level (80% to 100%).
Enable Force Others Off if you want load shedding to occur when Panic becomes active. What this means is when Panic becomes active, any dimmers that are not included in Panic will be turned off.
Lastly, record Panic.

Activate Panic

Panic can be activated via an external switch closure or locally via the face panel LCD menu. It cannot be activated/deactivated via the web interface. Deactivation is also done by a switch closure (or lack of one, depending on the switch action type) or locally via the face panel LCD menu.
Load Management

Load management can be used after your system is setup and your loads (lights) are connected to dimmers. For load management to work properly, Load Errors must be enabled for each dimmer you want to monitor. Load Errors is not enabled on any dimmers by default.

Record Loads

When you record loads, the CEM+ steps through a series of dimmer intensities and monitors the wattage as it proceeds. Only dimmers that have an initial intensity level greater than zero (0) are included in the process.

Once loads have been recorded, load changes and missing loads are reported at the face panel LCD menu and in the web interface.

Clear Loads (Web Only)

Clearing loads will clear all previously recorded loads. Clearing loads is only available via the web interface.

Clear Errors

Errors will appear on both the face panel LCD and in the web interface.

When viewing errors on the face panel LCD at an access level of User or higher, pressing will clear that error. Continuing to press will cycle through the remaining errors and clear any that are capable of being cleared. Errors that are still current will quickly reappear in the list (such as No Data Port B or Module Removed).

From the web interface, you can view the errors present from a couple of locations, however you can only clear errors from the individual rack’s errors tab webpage. From this page you will have the option to checkmark and clear individual errors or to clear all errors.
File Transfers

The configuration files that are shared from CEM+ to CEM+ in a group are XML files that are sent and received via FTP (File Transfer Protocol). They are then parsed at each CEM+ for use locally within that CEM+ depending on the rack number (the CEM+ knows what rack number it is and looks to that part of the configuration to get it’s settings).

There are four (4) separate files that make up the user-defined configuration.

- **Sensor.rak** - Contains all of the rack configurations and dimmer information including the patch.
- **Preset.pre** - Contains the preset information for the group.
- **Arch.rm** - Contains the room/dimmer assignments for the group.
- **Panic.pan** - Contains the settings for Panic within the group.

Understanding these few pieces of information first makes the rest of this section easier to use and understand.

**Download (config from selected IP)**

This function will make the local CEM+ (the one you are logged into) get the group configuration (all of the racks configurations in one) from the specified device and IP address in the pull-down menu. The configuration will go from the specified device to only the one device asking for the configuration.

This is useful to get an existing configuration into a new or replacement CEM+.

**Backup (to all)**

This function will send the local CEM+’s group configuration to all other devices (CEM+s and FTP if one is configured) in the group as set in the network table.

This is useful to send a newly uploaded/modified configuration to the other CEM+s in the group.

**View a Configuration**

To view a configuration file’s raw XML content on screen, just left-click on the configuration file name you want to see. Once you are viewing the configuration, click back in your browser to get back to the File Transfer page. (You can not make any edits to the configuration file while viewing it like this.)
Download a Configuration

To download a configuration file to disk, just right-click on the file name and select "Save Target As...". This will bring up a standard dialog box asking you to name the file and to pick a location to save it. It will append the file name with "xml" instead of the file extension listed on the web page. This will not prevent you from uploading the configuration file to a CEM+ later.

Upload a Configuration

Browse to the File Upload web page and click Browse to select a file to upload to the local CEM+. Once the file is selected, click Install and the file will begin to transfer to the CEM+. This is the same place and manner to send either a configuration file or a software file. The CEM+ looks at the file being sent to automatically handle the file type or part of the configuration file. In the same way, it doesn't matter if the file ends with .rak or .xml when it is sent.
FTP Server

An FTP server can be configured to be on the ETCNet2 network and act as a file storage location for the configuration files of the group.

An FTP server is not provided as standard with a CEM+.

CEM+ modules can access any stock FTP server that is configured with the following minimum settings:

- IP address of the FTP server needs to match the one specified in the network table in the configuration.
- The CEM+ uses an authenticated login so the FTP server must have a user created and configured for the CEM+. (The user name and password are usually case-sensitive.)
  - User name: etc
  - Password: sensor
- The FTP server must have a specified default file storage location. The CEM+ does not specify any path to write the file to on the server. They will only go in the default root directory.

**WARNING:** By default, you cannot currently use an FTP server with more than one (1) group of CEM+s at the same time. All CEM+s will send their configurations to the FTP server with the same file names and the same directory (root) and will overwrite other configuration files present.

Contact ETC Technical Services if this is a requirement of your system.
Chapter 5
Service

Contacting ETC about Equipment Problems

If you are having difficulties, your most convenient resources are provided in this user manual. To search more widely, try the ETC website at www.etcconnect.com. If none of these resources is sufficient, contact ETC Technical Services directly at one of the offices identified below.

If possible, please have this information available before contacting ETC about an equipment problem:

• Your location and job name
• Any error messages on the CEM+ status LCD display
• Related system problems or equipment failures

Americas
Electronic Theatre Controls Inc.
Technical Services Department
303' Pleasant View Road
Middleton, WI 53562
800-775-4382 (USA, toll-free)
+1-203 831-4116
service@etcconnect.com

Yeard
Electronic Theatre Controls Ltd.
Technical Services Department
5 Victoria Industrial Estate
Victoria Road,
London W8 6UJ England
+44 (0)20 8899 1000
service@etc-europe.com

Asia
Electronic Theatre Controls Asia, Ltd.
Technical Services Department
Room 605-606
Tower III, Enterprise Square
9 Steung Yeet Road
Kowloon Bay, Kowloon, Hong Kong
+852 2769 1222
service@etc-asia.com

Germany
Electronic Theatre Controls GmbH
Technical Services Department
Ohstrasse 3
83907 Holzkirchen, Germany
+49 (89) 24 47 00-0
techserv-hkx@etcconnect.com

Note: For the best service results, always tell your service representative you are using the CEM+ version of Sensor dimming system.

WARNING: RISK OF ELECTRIC SHOCK! Servicing Sensor CEM+ dimming equipment exposes high amperage power connections inside the rack. If possible, always turn off power at the main circuit breaker before servicing your system.
Changing Installation Rack Modules

All Sensor+ rack dimmer modules can be easily replaced without tools. Modules slide in and out of their slots and are ready to start dimming immediately.

Although Sensor modules, including the CEM+, can be replaced with power on, always turn rack power off at the main circuit breaker, if possible, before changing modules.

Releasing and Securing Module Safety Stops (ESR Racks Only)

To prevent unauthorized access to rack modules and interior wiring, Sensor+ CE Installation Racks (ESR) are provided with module safety stops that hold modules in place until released by a service technician.

Step 1: Turn off rack power at the main breaker.

Step 2: Open the rack door. The safety stops are along the left side of the dimmer modules. See the illustration.

- To release the safety stop, loosen the three safety stop securing screws and slide the stop to the left to release the modules. It is not necessary to remove the stop.
- To secure the safety stop, slide it back to the right and tighten the three safety stop screws.

Step 3: Follow the appropriate instructions below to remove or replace the desired dimmer or control modules.

**CAUTION:** Operating a dimmer rack with open module slots disrupts airflow inside the rack, which can lead to rack overheating and subsequent rack shutdown.

Remove and Replace a Dimmer or Airflow Module:

Step 1: Turn off rack power at the main breaker, if possible.

Step 2: Open the rack door.

Step 3: Switch the dimmer module's circuit breaker(s) to the “off” position (breaker to the right).

- Please see Releasing and Securing Module Safety Stops (ESR Racks Only) above if appropriate.

Step 4: Grasp the dimmer module by the center of the main air vent.

Step 5: Pull the dimmer straight out.

Step 6: Ensure the circuit breaker(s) on the replacement module are in the “off” position.

Step 7: Insert the replacement dimmer or airflow module into the correct slot and firmly press the module into the slot until you feel the connectors seat (the module face will be flush with the other modules).

Step 8: Switch the module's circuit breaker(s) to the “on” position (to the left).

Step 9: Close and lock the Sensor rack door before applying power.
Remove a CEM+ Module:

Step 1: Turn off rack power at the main breaker.

Step 2: Open the rack door.

- Please see Releasing and Securing Module Safety Stops (ESR Racks Only) above if appropriate.

Step 3: Press the "eject" symbol on the right end of the spring-loaded handle and grab the other end of the handle, pulling it until it is perpendicular to the face of the CEM+. The CEM+ will be gently pushed out of the rack as you move the handle.

Step 4: Pull the CEM+ straight out.

---

Replace a CEM+ Module:

Step 1: Firmly press the new CEM+ module into the correct slot by pressing on the outside edges until you feel the connections seat (the module face will be flush with the other modules).

---

**WARNING:** Do not press on the center of the CEM+ to insert it into a rack. Doing so may result in damage to the CEM+.

---

Step 2: Close and lock the Sensor rack door before applying power.

Step 3: ONLY if directed to do so by an ETC-authorized service representative, transfer the configuration files/information to your new CEM+.
**CEM+ Fuses**

The CEM+ has two fuses:

- The F1 fuse is a 250V, 0.75 amp, fuse. CEM+ operating power and power for the dimmer module electronics, is drawn through this fuse. If F1 fails, the CEM+ will not operate and dimming will not work. The Sensor+ rack beacon will be dark. The fuse in the F2 position is a spare 0.75 amp fuse.

- Phase F3 fuse is a 250V, 5 amp fuse. Power for the rack’s fan is drawn through this fuse. If F3 fails, the fan will stop running and the CEM+ will display an air flow error. The Sensor+ rack beacon will flash to signal a problem. The rack may shut down due to overheating. The fuse in the F4 position is a spare 5 amp fuse.

**Replacing a Fuse:**

**Step 1:** Remove the CEM+ module (See Changing Installation Rack Modules, page 45).

**Step 2:** Locate and replace the defective fuse. Fuses are held in vertical fuse holders,

a: Use a slotted screwdriver to gently turn the cap of the fuse holder to the left until it comes free.

b: Lift the cap and the fuse straight out of the fuse holder.

c: Remove the defective fuse and replace it with a fuse of the same type. A spare fuse of each type is provided on the CEM+.

d: Replace the fuse and cap in the fuse holder and use a slotted screwdriver to gently turn the cap to the right to fully capture the fuse.

**Step 3:** Replace the CEM+ module and close the door.
Troubleshooting

Your Sensor+ system helps you identify system problems with status reporting and diagnostic testing capabilities.

You will usually notice a system problem in one of two ways:

- The Sensor+ beacon on the dimmer rack begins blinking, indicating the CEM+ has detected a problem. The system may still continue to dim normally.
- You notice a problem with system performance. The beacon may be flashing, or the problem may be caused by another part of your lighting control system.

When either of these situations occur, you can follow these steps to isolate and correct the cause.

Make a Preliminary Examination of Your System...

☐ Check the CEM+ display, Sensor+ Connect or WYSILink for error messages. For an explanation of error message causes and possible corrections, see CEM+ Error Messages, page 50.

If lights are stuck on...

☐ Check for an activated Preset at your CEM+. (This can lock some or all of your dimmer circuits at one level.)
☐ Make sure your Panic circuit is not activated. (This will drive some of your dimmer circuits to full and hold them there.)
☐ Make sure all direct dimmer levels at the CEM+ are cleared. (This can lock some or all of your dimmer circuits at one level.)

If lights won't come on...

☐ Look for obstructions on top or in front of your installation rack that may be blocking rack ventilation.
☐ Open the door and look for dust buildup on the air filter or rack modules.
☐ Check for tripped dimmer module circuit breakers.
☐ Check for tripped breakers on your main circuit breaker panel.
☐ Check for loose or damaged control cables coming into your dimmer rack.
☐ Check to see if Panic is activated (circuits set to load-shed will not come on).
☐ EDMX sources with a higher priority and a level of zero will override other lower priority levels.

When you think you've found the problem...

☐ Correct any of these problems you find, press the reset button on the front of the CEM+ module and observe the system to see if the problem still exists.

If you Cannot Locate or Correct the Problem...

If you are unable to eliminate the problem, contact your authorized ETC representative. See Contacting ETC about Equipment Problems, page 44, for procedures on contacting ETC for technical help.
Appendix A

CEM+ Error Messages

If the CEM+ detects an error, it will flash the beacon and display the appropriate error message on the LCD display. A CEM+ will only display error messages for the same rack it is in - you can't browse to other racks to view their errors from a single CEM+.

Errors are also displayed in the WYSILink Message Log on Emphasis Control Systems and WYSILink PCs on the network. You can also view rack error messages in the Sensor+ Connect interface on Emphasis Control Systems or by browsing into a CEM+ using Internet Explorer 6 on a PC on the network.

View error messages on the CEM+ LCD display:

Step 1: Open the door of the rack with the blinking beacon. The CEM+ will display the message [Rack Errors].

Step 2: Press ▲ to enter the error list. The number of errors and which error is currently displayed is displayed at the top of the display.

Step 3: Press ▼ and ▲ to increment and decrement through the list, if necessary.

<table>
<thead>
<tr>
<th>CEM+ Error Message</th>
<th>Probable Cause</th>
<th>Possible Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMBIENT OVERTEMP</td>
<td>Ambient temperature is higher than 115°F (46°C)</td>
<td>Lower dimmer room temperature.</td>
</tr>
<tr>
<td>AMBIENT TEMP HIGH</td>
<td>Ambient temperature is higher than 104°F (40°C)</td>
<td>Lower dimmer room temperature.</td>
</tr>
<tr>
<td>AMBIENT TEMP LOW</td>
<td>Ambient temperature is lower than 32°F (0°C)</td>
<td>Raise dimmer room temperature.</td>
</tr>
<tr>
<td>DIMMER ERROR</td>
<td>A dimmer in this rack has an error.</td>
<td>Use About Dimmer to check the specific error.</td>
</tr>
<tr>
<td>DATA ERROR PORT (A or B)</td>
<td>DMX512 data error</td>
<td>Check DMX512 port input cable and termination.</td>
</tr>
<tr>
<td>FREQUENCY ERROR</td>
<td>Feed power is not 50 or 60Hz. (±2.5Hz)</td>
<td>Check input frequency.</td>
</tr>
<tr>
<td>NO AIRFLOW</td>
<td>Insufficient airflow detected.</td>
<td>Check fan and air filter for obstruction.</td>
</tr>
<tr>
<td>NO DATA PORT (A or B)</td>
<td>No DMX512 data has been received by Port (A or B).</td>
<td>Check DMX512 source devices and input cables.</td>
</tr>
<tr>
<td>MODULE _ OVERTEMP</td>
<td>Dimmer module has overheated and shut down.</td>
<td>Check airflow</td>
</tr>
<tr>
<td>PHASE (A, B or C) O’F</td>
<td>No voltage on phase (A, B or C).</td>
<td>Check line feed.</td>
</tr>
<tr>
<td>PHASE DETECT FAIL</td>
<td>CEM+ could not read the line feed phasing.</td>
<td>Re-seat the CEM+ and try again. If problem persists, replace the CEM+.</td>
</tr>
<tr>
<td>TEMP SENSOR STUCK</td>
<td>Ambient temperature sensor is stuck.</td>
<td>Replace CEM+.</td>
</tr>
<tr>
<td>ZERO CROSS ERROR</td>
<td>CEM+ hardware failure.</td>
<td>Replace CEM+.</td>
</tr>
<tr>
<td>SOFTWARE ERROR</td>
<td>CEM+ units running different versions of software are on the same network.</td>
<td>Install the same version of software on all CEM+ units.</td>
</tr>
<tr>
<td>PHASE (A, B or C) VOLTS HIGH</td>
<td>Voltage on phase (A, B or C) is higher than 140Vac.</td>
<td>Check line feed.</td>
</tr>
<tr>
<td>CEM+ Error Message</td>
<td>Probable Cause</td>
<td>Possible Corrective Action</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>PHASE (A, B or C) VOLTS LOW</td>
<td>Voltage on phase (A, B or C) is lower than 80 Vac.</td>
<td>Check line feed.</td>
</tr>
<tr>
<td>LOW AIRFLOW</td>
<td>Airflow is low.</td>
<td>Check fans and air filter for obstruction.</td>
</tr>
<tr>
<td>CLEAN YOUR FILTER</td>
<td>This is a reminder to clean your air filter. It appears when the &quot;Clean Time&quot; clock has counted down to zero.</td>
<td>Reset the &quot;Clean Time&quot; counter to the number of hours you want between filter cleaning.</td>
</tr>
<tr>
<td>PHASE (A, B or C) HEADROOM</td>
<td>Incoming line voltage on phase (A, B or C) has dipped below the configuration-defined Headroom level.</td>
<td>Reduce the load on the indicated phase through repatching or lowering output levels of associated dimmers.</td>
</tr>
<tr>
<td>CONFIG MISMATCH _</td>
<td>Configuration error.</td>
<td>Transfer configuration data from another rack.</td>
</tr>
<tr>
<td>BREAKER _ TRIP</td>
<td>The circuit breaker on dimmer __ has tripped.</td>
<td>Check circuit for cause of circuit breaker trip, such as too many lamps on the dimmer, or bad cabling.</td>
</tr>
<tr>
<td>SCR __ STUCK ON</td>
<td>The SCR in dimmer __ has failed on.</td>
<td>Replace dimmer module.</td>
</tr>
<tr>
<td>SCR __ STUCK OFF</td>
<td>The SCR in dimmer __ has failed off.</td>
<td>Replace dimmer module.</td>
</tr>
<tr>
<td>RCD __ TRIP</td>
<td>The RCD in __ has tripped.</td>
<td>Replace RCD module.</td>
</tr>
<tr>
<td>MODULE __ REMOVED</td>
<td>Module has been removed from the rack.</td>
<td>Reinsert or replace module.</td>
</tr>
<tr>
<td>LOAD __ CHANGE HIGH</td>
<td>Load is currently higher than the recorded load for this dimmer.</td>
<td>Rerecord the load, or check for additional or higher wattage lamp(s) on the circuit.</td>
</tr>
<tr>
<td>LOAD __ CHANGE LOW</td>
<td>Load is currently lower than the recorded load for this dimmer.</td>
<td>Rerecord the load, or check for missing or burned-out lamp(s) on the circuit.</td>
</tr>
<tr>
<td>LOAD __ NO LOAD</td>
<td>A load is recorded, but there is currently no load present on this dimmer.</td>
<td>Rerecord this load, or check for missing or burned-out lamp(s) on the circuit.</td>
</tr>
</tbody>
</table>
Appendix B
Dimmer Curves

Dimmer curves determine how dimmers set voltage output in response to control signal input. To accommodate designer preferences and load response variations, Sensor offers five dimmer curve choices, which can be applied to individual dimmers.

**Linear curve**

The linear curve matches the control input percentage to Root Mean Squared (RMS) voltage output. Each percent increase in control level increases dimmer voltage output by the same amount.
**Modified linear curve**

A modified linear curve reduces the voltage change at low control levels for better performance in low-wattage fixtures.

**Square law curve**

At low control levels, much of traditional incandescent fixture's light output is in the invisible infrared spectrum. This results in poor visible response to low control levels. A square law curve is derived from the square root of the control level (with full output equal to 1.00) to increase voltage response at low control levels to compensate for the infrared loss.
Modified Square law curve

A standard square law curve may overcompensate for infrared loss, resulting in “steppy” response to incremental control changes at low levels. ETC’s modified square law curve modifies the standard square law curve for more uniform response to control levels changes across the entire range of dimmer output.

Sensor 2.0 curve

The Sensor 2.0 curve is the previous version of ETC’s modified square law curve. It provides backwards compatibility for shows created using earlier versions of ETC equipment and familiar response for designers who prefer the earlier version.
Appendix C
Sensor+ SineWave Dimming

This appendix provides information for configuring a Sensor+ system that includes one or more UL and cUL approved Sensor+ SineWave dimmer installation racks.

SineWave Benefits

Sine wave dimming provides "silent dimming" by controlling the power in a way that maintains a clean sinusoidal wave form to your fixtures and does not create any "lamp noise" or "buzz". Due to the added level of control, ETC SineWave dimming also provides superior voltage regulation.

Other sine wave benefits include:
- Saves energy compared with phase-controlled dimmers
- Reduces volt-drop which means less heat dissipation
- Improves lamp life – lower maintenance costs
- Harmonic distortion is virtually eliminated
- Reduces cost of electricity by removing reactive component (Unity Power Factor)
- Saves on infrastructure costs – reduced size of wiring and containment plus lower-rated switch gear and transformers
- Accommodates generator supplies and poor mains
- Controls virtually all types of light source, even HMI

Configuration

SineWave (SW) racks are configured in the same way as SR racks. However, SW racks only use D20SW dimmers. All other rack and dimmer properties are set in the same way and coexist in your same rack configuration file.
- When adding a rack, select SW24 from the rack type list.
- When selecting module type, choose D20SW.
### D20SW Dimmer Module Default Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>120V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firing Mode</td>
<td>Normal</td>
</tr>
<tr>
<td>Curve</td>
<td>Mod-Square Law</td>
</tr>
<tr>
<td>Threshold</td>
<td>1%</td>
</tr>
<tr>
<td>Min. Scale Voltage</td>
<td>6V</td>
</tr>
<tr>
<td>Max. Scale Voltage</td>
<td>115V</td>
</tr>
<tr>
<td>Voltage Regulation</td>
<td>Checked</td>
</tr>
<tr>
<td>Preheat</td>
<td>Unchecked</td>
</tr>
<tr>
<td>Dynamic Preheat</td>
<td>2 sec.</td>
</tr>
<tr>
<td>DC Output Prevent *</td>
<td>Unchecked</td>
</tr>
<tr>
<td>InRush Protect **</td>
<td>Unchecked</td>
</tr>
<tr>
<td>Advanced Features (AF)</td>
<td>Checked</td>
</tr>
<tr>
<td>Load Errors</td>
<td>Checked</td>
</tr>
<tr>
<td>AF Sensitivity</td>
<td>5</td>
</tr>
<tr>
<td>AF Reaction</td>
<td>10 sec.</td>
</tr>
<tr>
<td>Scale Load</td>
<td>35%</td>
</tr>
</tbody>
</table>

*ETC sine wave dimming produces no DC component so this function is unnecessary. Checking this may reduce the dimmer's response time by up to 8.3 msecs.

**This feature is automatically in effect regardless of the setting because of the nature of ETC's sine wave dimming.

### SineWave Differences You Need to Know

The SineWave rack (SW24+) and module (D20SW) are very similar in most operational respects to SR racks and D20AF dimmers. However, there are a few notable differences listed here:

- D20SW dimmers have built-in electronic overcurrent protection and it is unlikely that you will ever see a breaker trip on a dimmer module. When an overcurrent event occurs the dimmer will shut itself off and the red overcurrent LED will come on. To reset the dimmer, bring the level of the dimmer to zero (0) for a minimum of 1 second and the dimmer will reset itself and begin to operate again.

- The power LED on D20SWs is blue instead of red as on other D20-family modules.

- The green signal LED on the D20SW module will not come on if the dimmer’s breaker is turned off. On other D20-family modules, the green signal LED will continue to show the presence of level for the dimmer even if the dimmer breaker is turned off.

- If you pull the CEM out of a SineWave rack, the D20SW dimmers will remain on at the last level they had for 3 seconds and then fade out. This is a function of the dimmers losing communication with the CEM+.
Appendix D
UL924 Setup

Introduction
This appendix provides information for configuring a Sensor+ system to operate within the UL924 specification.

WARNING: RISK OF ELECTRIC SHOCK! Failure to disconnect all power to the rack before working in the rack could result in serious injury or death.

Terminations
A dry contact closure (maintained recommended) must be wired to each rack containing dimmers in the emergency look.

Configuration
Step 1: Login to the CEM+ with at least Power User Level of access.
- CEM+ face panel PIN: 3333
- Sensor+ Connect web interface - Login: power / password: powerpass

Step 2: Set the levels of the dimmers/lights you want in the emergency look to level of at least the Panic Master Level in the CEM+ (80 to 100% - defaults to 100%).

Step 3: Record Panic on the CEM+. Be sure the configuration closure type matches your actual physical closure type.
Testing

Local testing can be done by either installing a local test switch or by local activation of Panic via the CEM+ face panel.
Appendix E: CEM+ LCD Menu

This appendix contains the entire LCD menu structure. Note that the different looks of the screens denotes a different user level required for access.
This is an outline of the Sensor+ Connect web interface.

**Login Screen**
- Summary
  - General task status
  - Active/inactive tasks
  - Task errors

- Groups
  - Search
- Status
  - Status of Sensor+ Connect
- Status of individual Sensor+ Connect

**Racks & Derrers**
- All racks
  - All racks
  - Individual rack select
  - Search
  - Status of individual rack
  - Status of all racks

**Search**
- Find racks in group
- Status of all racks

**Configure Racks**
- Configure rack properties
- Configure rack properties of selected rack

**Status**
- Status of Sensor+ Connect
- Status of individualSensor+ Connect

**Define Group**
- Define group properties
- Define group properties of selected group

**General Commands**
- General commands
  - General task status
  - Active/inactive tasks
  - Task errors

**Appendix F**
Sensor+ Connect Site Map
Color Frame Sizes

Bill Williams (c) 1999-2013 (Version 2.0)

This is a list of color frame 'sizes' for many common stage lighting fixtures. This list is intended to assist lighting technicians and designers in calculating color media (gel) requirements if an 'unknown' fixture type is encountered and the fixture is not at hand.

Many designers believe 'A job worth doing is worth doing at the last minute'. As a result of this thinking, I have been stuck in many a hotel room at 4:00 a.m., preparing a color order for the next mornings' crew call at 8:00 a.m. I hope that this helps others in similar situations.

STANDARD COLOR MEDIA SIZES:

GAMCOLOR 20" x 24" (50.8cm x 61cm) - and rolls 24" x 50 ft. (61cm x 15.24m)
LEE FILTERS 21" x 24" & 21" x 48" - and rolls 48" x 25 ft. (122cm x 7.62m)
ROSCOLUX 20" x 24" (50.8cm x 61cm) - and rolls 48" x 25 ft. (122cm x 7.62m)
ROSCO SUPER GEL 20" x 24" (50.8cm x 61cm) - and rolls 24" x 25 ft. (61cm x 7.62m)
ROSCO E COLOUR 21" x 24" (53cm x 61cm) - and rolls 48" x 25 ft. (122cm x 7.62m)

ADB - (Belgium) (Website)

<table>
<thead>
<tr>
<th>Product</th>
<th>X Size</th>
<th>Y Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>A56C/A57F/A59Z</td>
<td>6&quot; x 6&quot;</td>
<td>155 mm x 155 mm</td>
</tr>
<tr>
<td>EUROSPOT 300/500 Watt</td>
<td>4.9&quot; x 4.9&quot;</td>
<td>125 mm x 125 mm</td>
</tr>
<tr>
<td>EUROPE C101/C103/F101</td>
<td>7.3&quot; x 7.3&quot;</td>
<td>185 mm x 185 mm</td>
</tr>
<tr>
<td>EUROPE C201/C203/F201</td>
<td>9.6&quot; x 9.6&quot;</td>
<td>245 mm x 245 mm</td>
</tr>
<tr>
<td>EUROPE Dx105 Series</td>
<td>7.3&quot; x 7.3&quot;</td>
<td>185 mm x 185 mm</td>
</tr>
<tr>
<td>EUROPE Dx205 Series</td>
<td>9.6&quot; x 9.6&quot;</td>
<td>245 mm x 245 mm</td>
</tr>
<tr>
<td>SH10/SP10/CH20/CP20 Fres.)</td>
<td>10.8&quot; x 10.8&quot;</td>
<td>275 mm x 275 mm</td>
</tr>
<tr>
<td>SH20/SP20/CH50/CP50 Fres.)</td>
<td>13.3&quot; x 13.3&quot;</td>
<td>340 mm x 340 mm</td>
</tr>
<tr>
<td>SH50/SP50 (Fresnel)</td>
<td>15.7&quot; x 15.7&quot;</td>
<td>400 mm x 400 mm</td>
</tr>
</tbody>
</table>

Altman Stage Lighting - (USA) (Website)

<table>
<thead>
<tr>
<th>Product</th>
<th>X Size</th>
<th>Y Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5Q Series</td>
<td>4-1/8&quot; x 4-1/8&quot;</td>
<td>104 mm x 104 mm</td>
</tr>
</tbody>
</table>

http://www.mts.net/~william55/library/frames.htm
### Color Frame Sizes

<table>
<thead>
<tr>
<th></th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5 - 1530, 2550, 3060 (Zoom)</td>
<td>6-1/4&quot;</td>
<td>6-1/4&quot;</td>
</tr>
<tr>
<td>360, 360Q 360X (6&quot; ER)</td>
<td>7-1/2&quot;</td>
<td>7-1/2&quot;</td>
</tr>
<tr>
<td>Shakespeare S6-50, 40, 30, 20</td>
<td>6-1/4&quot;</td>
<td>6-1/4&quot;</td>
</tr>
<tr>
<td>Shakespeare 10 degree</td>
<td>12&quot;</td>
<td>304 mm</td>
</tr>
<tr>
<td>Shakespeare 5 degree</td>
<td>14&quot; x 14&quot;</td>
<td>356 mm x 356 mm</td>
</tr>
<tr>
<td>Sharespeare 6-1535, S6-3055</td>
<td>7-1/2&quot; x 7-1/2&quot;</td>
<td>190 mm x 190 mm</td>
</tr>
<tr>
<td>1KL6, 1KL6-2040Z</td>
<td>7-1/2&quot; x 7-1/2&quot;</td>
<td>190 mm x 190 mm</td>
</tr>
<tr>
<td>1KL8, 1KL8-1424Z</td>
<td>10&quot; x 10&quot;</td>
<td>254 mm x 254 mm</td>
</tr>
<tr>
<td>1KL10-5</td>
<td>12&quot; x 12&quot;</td>
<td>304 mm x 304 mm</td>
</tr>
<tr>
<td>100 (3&quot; Fresnel)</td>
<td>3-3/4&quot; x 3-3/4&quot;</td>
<td>95 mm x 95 mm</td>
</tr>
<tr>
<td>65, 165, 1K-AF (6&quot; Fresnel)</td>
<td>7-1/2&quot; x 7-1/2&quot;</td>
<td>190 mm x 190 mm</td>
</tr>
<tr>
<td>75, 175, (8&quot; Fresnel)</td>
<td>10&quot; x 10&quot;</td>
<td>254 mm x 254 mm</td>
</tr>
<tr>
<td>Zip-strip (per 2 lamps)</td>
<td>4-3/4&quot; x 4-3/8&quot;</td>
<td>120 mm x 85 mm</td>
</tr>
</tbody>
</table>

### CCT Lighting - (U.K.) (Website)

<table>
<thead>
<tr>
<th></th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minette series</td>
<td>4.9&quot; x 4.9&quot;</td>
<td>125 mm x 125 mm</td>
</tr>
<tr>
<td>Silhouette 10</td>
<td>12&quot; x 12&quot;</td>
<td>305 mm x 305 mm</td>
</tr>
<tr>
<td>Silhouette 15, 25</td>
<td>9.8&quot; x 9.8&quot;</td>
<td>250 mm x 245 mm</td>
</tr>
<tr>
<td>Silhouette 30, 40</td>
<td>7.5&quot; x 7.5&quot;</td>
<td>190 mm x 190 mm</td>
</tr>
<tr>
<td>Starlette 1Kw. series</td>
<td>7.5&quot; x 7.25&quot;</td>
<td>190 mm x 185 mm</td>
</tr>
<tr>
<td>Starlette 2Kw. series</td>
<td>9.8&quot; x 9.6&quot;</td>
<td>249 mm x 245 mm</td>
</tr>
</tbody>
</table>

### Century Lighting - (U.S.A.)

<table>
<thead>
<tr>
<th></th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>1400 series (6&quot; Lekolites)</td>
<td>7-1/2&quot; x 7-1/2&quot;</td>
<td>190 mm x 190 mm</td>
</tr>
<tr>
<td>1575 (8x9)</td>
<td>10&quot; x 10&quot;</td>
<td>254 mm x 254 mm</td>
</tr>
<tr>
<td>All 6&quot; Fresnels</td>
<td>7-1/2&quot; x 7-1/2&quot;</td>
<td>190 mm x 190 mm</td>
</tr>
</tbody>
</table>

### Colortran / NSI - (U.S.A.)

<table>
<thead>
<tr>
<th></th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>213 - 165 Zoom-Ellipse</td>
<td>7-1/2&quot; x 7-1/2&quot;</td>
<td>190 mm x 190 mm</td>
</tr>
<tr>
<td>231 series ER's</td>
<td>7-1/2&quot; x 7-1/2&quot;</td>
<td>190 mm x 190 mm</td>
</tr>
<tr>
<td>650 series, 5/50 Ellipsoidal</td>
<td>7-1/2&quot; x 7-1/2&quot;</td>
<td>190 mm x 190 mm</td>
</tr>
</tbody>
</table>

### Electro Controls

<table>
<thead>
<tr>
<th></th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parellipsphere</td>
<td>7-1/2&quot; x 7-1/2&quot;</td>
<td>190 mm x 190 mm</td>
</tr>
</tbody>
</table>
### Electronic Theatre Controls - (U.S.A.)  (Website)

<table>
<thead>
<tr>
<th>Source</th>
<th>Degree</th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source-4 19, 26, 36, 50 degree</td>
<td>6-1/4&quot; x 6-1/4&quot;</td>
<td>159 mm x 159 mm</td>
<td></td>
</tr>
<tr>
<td>Source-4 14, 70, 90 degree</td>
<td>7-1/2&quot; x 7-1/2&quot;</td>
<td>190 mm x 190 mm</td>
<td></td>
</tr>
<tr>
<td>Source-4 10 degree</td>
<td>12&quot; x 12&quot;</td>
<td>305 mm x 305 mm</td>
<td></td>
</tr>
<tr>
<td>Source-4 5 degree</td>
<td>14&quot; x 14&quot;</td>
<td>356 mm x 356 mm</td>
<td></td>
</tr>
<tr>
<td>Source-4 Zooms</td>
<td>7-1/2&quot; x 7-1/2&quot;</td>
<td>190 mm x 190 mm</td>
<td></td>
</tr>
<tr>
<td>Source-4-PAR</td>
<td>7-1/2&quot; x 7-1/2&quot;</td>
<td>190 mm x 190 mm</td>
<td></td>
</tr>
<tr>
<td>Source-4 Junior &amp; Junior Zoom - (ellipsoidal)</td>
<td>6-1/4&quot; x 6-1/4&quot;</td>
<td>159 mm x 159 mm</td>
<td></td>
</tr>
<tr>
<td>ETC Parnel</td>
<td>7-1/2&quot; x 7-1/2&quot;</td>
<td>190 mm x 190 mm</td>
<td></td>
</tr>
<tr>
<td>ETC Fresnel</td>
<td>7-1/2&quot; x 7-1/2&quot;</td>
<td>190 mm x 190 mm</td>
<td></td>
</tr>
</tbody>
</table>

### L & E Inc. - (U.S.A.)  (Website)

<table>
<thead>
<tr>
<th>Fixture</th>
<th>Description</th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Echo Cyc Striplight - 6551</td>
<td>10-1/4&quot; x 11-3/4&quot;</td>
<td>260 mm x 273 mm</td>
<td></td>
</tr>
<tr>
<td>Edge 4-1/2&quot; Fresnel 575 Watt - (SL4.5 6004)</td>
<td>6&quot; x 6&quot;</td>
<td>152 mm x 152 mm</td>
<td></td>
</tr>
<tr>
<td>Edge 6&quot; Fresnel 1000 Watts - (SL6.1k 6010a)</td>
<td>7-1/2&quot; x 7-1/2&quot;</td>
<td>190 mm x 190 mm</td>
<td></td>
</tr>
<tr>
<td>Ellipsoidal spotlight AQ35-20/30 (Zoom)</td>
<td>4-1/4&quot; x 4-3/8&quot;</td>
<td>108 mm x 111 mm</td>
<td></td>
</tr>
<tr>
<td>Ministrip (MR16 lamp)</td>
<td>4-11/16&quot; x 3-5/16&quot;</td>
<td>120 mm x 84 mm</td>
<td></td>
</tr>
<tr>
<td>Broad Cyc 2000 watts</td>
<td>10-1/4&quot; x 11-3/4&quot;</td>
<td>260 mm x 273 mm</td>
<td></td>
</tr>
<tr>
<td>65-7-1/4 Ground Cyc</td>
<td>9&quot; x 13&quot;</td>
<td>228 mm x 330 mm</td>
<td></td>
</tr>
</tbody>
</table>

### Par Fixtures

<table>
<thead>
<tr>
<th>Fixtures</th>
<th>Altman</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAR64 - Altman</td>
<td>10&quot; x 10&quot;</td>
</tr>
<tr>
<td>PAR56 - Altman - (others may be 9.0&quot; x 9.0&quot;)</td>
<td>7.5&quot; x 7.5&quot;</td>
</tr>
<tr>
<td>PAR46 - Altman - (others may be 7.5&quot; x 7.5&quot;)</td>
<td>6.25&quot; x 6.25&quot;</td>
</tr>
</tbody>
</table>

### Robert Juliat - (France)  (Website)

<table>
<thead>
<tr>
<th>Spotlights</th>
<th>Wattage</th>
</tr>
</thead>
<tbody>
<tr>
<td>306 Spotlight - 1000 watt</td>
<td>7.0&quot; x 7.0&quot;</td>
</tr>
<tr>
<td>310 Spotlight - 650/1000 watt</td>
<td>8.46&quot; x 8.46&quot;</td>
</tr>
<tr>
<td>329 Spotlight - 1000/1200 watt</td>
<td>9.64&quot; x 9.64&quot;</td>
</tr>
<tr>
<td>312L, 325L, 326L, 350L - Fresnel</td>
<td>13.1&quot; x 13.1&quot;</td>
</tr>
<tr>
<td>600SX Series 1000 watt - (SX611, 613, 614) -</td>
<td>7.0&quot; x 7.0&quot;</td>
</tr>
</tbody>
</table>
### Zoom

<table>
<thead>
<tr>
<th>Product</th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>700SX2 Series 2000 watt - (SX710, 711, 713, 714) - Zoom</td>
<td>8.46&quot;</td>
<td>8.46&quot;</td>
</tr>
<tr>
<td>Aledin 330 Led Spotlight</td>
<td>8.46&quot;</td>
<td>8.46&quot;</td>
</tr>
<tr>
<td>Aramis Followspot - 2500 watt</td>
<td>11.81&quot;</td>
<td>11.81&quot;</td>
</tr>
<tr>
<td>Cyrano 1015 Followspot - 2500 watt HMI</td>
<td>8.26 diam</td>
<td>210 mm diam</td>
</tr>
<tr>
<td>D'Artagnnan Profile - 2500 watt</td>
<td>8.46 x 8.46</td>
<td>215 mm x 215 mm</td>
</tr>
<tr>
<td>Korrigan Followspot - 1200 watt</td>
<td>8.46&quot; x 8.46&quot;</td>
<td>255 mm x 255 mm</td>
</tr>
<tr>
<td>Quincy Profile - 575 watt</td>
<td>7.0&quot; x 7.0&quot;</td>
<td>180 mm x 180 mm</td>
</tr>
</tbody>
</table>

### Selecon - (New Zealand)  ([Website](http://www.mts.net/~william/library/frames.htm))

<table>
<thead>
<tr>
<th>Product</th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCLAIM range - Fresnel, PC and Axial Zoomspots</td>
<td>4.92&quot;</td>
<td>4.92&quot;</td>
</tr>
<tr>
<td>ARENA - Fresnel, PC, 14°-32° Zoomspot and 20°-37° Zoomspot</td>
<td>9.64&quot;</td>
<td>9.64&quot;</td>
</tr>
<tr>
<td>ARENA - High Performance Fresnel and 9°-18° Zoomspot</td>
<td>12.20&quot;</td>
<td>9.64&quot;</td>
</tr>
<tr>
<td>AURORA Cycs and Floods</td>
<td>12.40&quot;</td>
<td>12.00&quot;</td>
</tr>
<tr>
<td>HUI and LUI Cycs and Floods</td>
<td>10.43&quot;</td>
<td>8.00&quot;</td>
</tr>
<tr>
<td>PACIFIC 5° HE Fixed Beam</td>
<td>14&quot; x 13.5&quot;</td>
<td>356 mm x 344 mm</td>
</tr>
<tr>
<td>PACIFIC 5.5°-13° Zoomspot</td>
<td>9.64&quot; x 9.64&quot;</td>
<td>245 mm x 245 mm</td>
</tr>
<tr>
<td>PACIFIC 12°-28°, 14°-35° and 45°-75° Zoomspots &amp; PACIFIC 90°</td>
<td>7-1/4&quot; x 7-1/4&quot;</td>
<td>185 mm x 185 mm</td>
</tr>
<tr>
<td>PACIFIC 23°-50° Zoomspot and PACIFIC 20°, 30°, 50°</td>
<td>6-1/4&quot; x 6-1/4&quot;</td>
<td>158 mm x 158 mm</td>
</tr>
<tr>
<td>PACIFIC 7.5°-19° Followspot</td>
<td>10&quot; diameter</td>
<td>254 mm diameter</td>
</tr>
<tr>
<td>RAMA Fresnels and PCs</td>
<td>7-1/4&quot; x 7-1/4&quot;</td>
<td>185 mm x 185 mm</td>
</tr>
<tr>
<td>TAHI &amp; RUA Performer Series Followspots</td>
<td>10.8&quot; diameter</td>
<td>275 mm diameter</td>
</tr>
</tbody>
</table>

### Strand Electric (England) - see also Strand Lighting  ([The Strand Archive](http://www.mts.net/~william/library/frames.htm))

<table>
<thead>
<tr>
<th>Product</th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patt 23, 23II, 23FII, 23WII</td>
<td>4&quot; x 4&quot;</td>
<td>100 mm x 100 mm</td>
</tr>
<tr>
<td>Patt 23N</td>
<td>7-1/2&quot; x 7-1/2&quot;</td>
<td>190 mm x 190 mm</td>
</tr>
<tr>
<td>Patt 60</td>
<td>11-3/4&quot; x 11-3/4&quot;</td>
<td>300 mm x 300 mm</td>
</tr>
<tr>
<td>Patt 123, 123W</td>
<td>6-1/2&quot; x 6-1/2&quot;</td>
<td>165 mm x 165 mm</td>
</tr>
<tr>
<td>Patt 137</td>
<td>8&quot; x 9-1/4&quot;</td>
<td>210 mm x 235 mm</td>
</tr>
<tr>
<td>Patt 223, 223C</td>
<td>8-1/2&quot; x 8-1/2&quot;</td>
<td>215 mm x 215 mm</td>
</tr>
<tr>
<td>Patt 243, 243BP</td>
<td>11-3/4&quot; x 11-3/4&quot;</td>
<td>300 mm x 300 mm</td>
</tr>
<tr>
<td>Pattern</td>
<td>Size</td>
<td>Dimensions</td>
</tr>
<tr>
<td>---------</td>
<td>--------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Patt 263, 264, 264W</td>
<td>6-1/2&quot; x 6-1/2&quot;</td>
<td>165 mm x 165 mm</td>
</tr>
<tr>
<td>Patt 265</td>
<td>8-1/2&quot; x 8-1/2&quot;</td>
<td>215 mm x 215 mm</td>
</tr>
<tr>
<td>Patt 253, 293</td>
<td>11-3/4&quot; x 11-3/4&quot;</td>
<td>300 mm x 300 mm</td>
</tr>
</tbody>
</table>

### Strand Lightting - (U.S.A./Scotland) - see also Strand Electric (Website)

| Lekolite - SL50, 36, 26, 19 (1999 series) | 6-1/4" x 6-1/4" | 159 mm x 159 mm |
| Lekolite - SL10 Coolbeam 600 watt - (1999 series) | 12" x 12" | 305 mm x 305 mm |
| Lekolite - SL-5 Coolbeam 600 watt - (1999 series) | 15.9" x 15.9" | 405 mm x 405 mm |
| Lekolite - SL-1532, 2350, Zooms - (1999 series) | 6-1/4" x 6-1/4" | 159 mm x 159 mm |
| All 6" Lekolites, pre 1999: (6x9, 6x12, 6x16, 6x22) | 7-1/2" x 7-1/2" | 185 mm x 185 mm |
| Alto series (2 Kw.) | 9.6" x 9.6" | 243 mm x 243 mm |
| Coda series (500 w.) | 8-1/2" x 9-1/2" | 215 mm x 240 mm |
| Cantata series (1 Kw.) | 7-1/2" x 7-1/2" | 185 mm x 185 mm |
| Cadenza series (2 Kw.) | 9.7" x 9.7" | 245 mm x 245 mm |
| Minim series (300w) | 4.92" x 4.92" | 125 mm x 125mm |
| Optique series (1.2 Kw.) | 7-1/2" x 7-1/2" | 185 mm x 185 mm |
| Prelude series | 6" x 6" | 150 mm x 150 mm |
| Quartet series | 6" x 6" | 150 mm x 150 mm |
| Toccata | 9.6" x 9.6" | 245 mm x 245 mm |
| 2205 (4.5" - 500 w. Zoom) | 6-1/4" x 6-1/4" | 158 mm x 158 mm |
| 2206 (6" - 1000 w. Zoom) | 7-1/2" x 7-1/2" | 190 mm x 190 mm |
| 2113 (8x13) | 10" x 10" | 254 mm x 254 mm |
| 3380 (6" Fresnel) | 7-1/2" x 7-1/2" | 190 mm x 190 mm |
| 3480 (8" Fresnel) | 10" x 10" | 254 mm x 254 mm |

Thanks to: ADB, Altman, Strand, ETC, Ken Heaton, and Moz
ELECTRONIC THEATRE CONTROLS

15-20 Amp Dimmer Modules

Standard Dimmer Series

GENERAL INFORMATION

D15 and D20 modules provide cost-effective digital phase angle dimming for standard incandescent fixtures.

APPLICATIONS
- All Sensor® installation racks (except Delta)
- All Sensor Touring Racks

FEATURES
- Two 1.8 or 2.4kW dimmers per module
- 350µs risetime toroidal filters standard version
- 500µs risetime toroidal filters enhanced version
- Die-cast aluminum chassis
- Tool-free installation and removal
- Dual back-to-back SCRs for each circuit
- Fully magnetic circuit breakers
- 100% duty cycle at full rating
- Breakers will not derate over product life cycle
- 100k AIC rating
- UL and cUL listed

ORDERING INFORMATION

Standard Sensor Dimmer Modules

<table>
<thead>
<tr>
<th>Model#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D15</td>
<td>Dual 15 amp Dimmer Module with 350µs chokes</td>
</tr>
<tr>
<td>D20</td>
<td>Dual 20 amp Dimmer Module with 350µs chokes</td>
</tr>
<tr>
<td>D15E</td>
<td>Dual 15 amp Dimmer Module with 500µs chokes</td>
</tr>
<tr>
<td>D20E</td>
<td>Dual 20 amp Dimmer Module with 500µs chokes</td>
</tr>
</tbody>
</table>

Compatible Systems

<table>
<thead>
<tr>
<th>Model#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR6</td>
<td>6 slot Installation Rack(s)</td>
</tr>
<tr>
<td>SR12</td>
<td>12 slot Installation Rack(s)</td>
</tr>
<tr>
<td>SR24</td>
<td>24 slot Installation Rack(s)</td>
</tr>
<tr>
<td>SN48</td>
<td>48 slot Installation Rack(s)</td>
</tr>
</tbody>
</table>

Sensor Portable Packs

<table>
<thead>
<tr>
<th>Model#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP6</td>
<td>6 slot Portable Pack with MPE module</td>
</tr>
<tr>
<td>SP12</td>
<td>12 slot Portable Pack with MPE module</td>
</tr>
</tbody>
</table>

Sensor Touring Racks

<table>
<thead>
<tr>
<th>Model#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP24</td>
<td>24 slot Touring Rack</td>
</tr>
<tr>
<td>SP36</td>
<td>36 slot Touring Rack</td>
</tr>
<tr>
<td>SP48</td>
<td>48 slot Touring Rack</td>
</tr>
</tbody>
</table>
**SPECIFICATIONS**

**DIMMER MODULES** Dimmers are UL and cUL listed for continuous duty at 100% of rated load
- D1S = 1.0W
- D20 = 2.4W

Dimmer modules are plug-in, and may be replaced without tools
- Cast aluminum chassis, finished with textured epoxy paint
- Includes circuit breaker(s), toroidal filter(s), SCR modules, power and control connectors
- Keyed to prevent insertion in inappropriately rated rack positions

**CIRCUIT BREAKERS** Fully magnetic to eliminate nuisance tripping
- 20A instantaneous rating
- 125%, 10-120 seconds, must-trip rating
- Rated for 10% switching duty applications

**SCR ASSEMBLY**
- Sealed, patented assembly
- Field replaceable with screwdriver
- Two back-to-back SCRs per circuit
- One ControlLED per circuit
- 400V isolation between control and power components
- Integral bussed heatsink
- Integral temperature sensor

**CHOKES**
- High-quality 35uH, toroidal filters
- 50uH toroidal filters in the Enhanced version
- 100W AIC rating

**ELECTRICAL RATINGS**
- Heat-patching dimmers shall withstand heat-patching of cold incandescent loads up to the dimmer's full rating, without tripping
- Rated for continuous operation at full load

*Routine measured at full load, at worst case firing angle (about 50%), from 10-100% of output waveform

---

**PHYSICAL**

**Module Weights**

<table>
<thead>
<tr>
<th>Module</th>
<th>Weight</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>D15/20</td>
<td>5 lbs</td>
<td>2.3 kgs</td>
</tr>
<tr>
<td>D15E/20E</td>
<td>5 lbs</td>
<td>2.3 kgs</td>
</tr>
</tbody>
</table>

**Maximum BTU Production per Module**

<table>
<thead>
<tr>
<th>Module</th>
<th>BTUs</th>
<th>Watts</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1S</td>
<td>70</td>
<td>70</td>
<td>97.9%</td>
</tr>
<tr>
<td>D20</td>
<td>250</td>
<td>250</td>
<td>95.8%</td>
</tr>
<tr>
<td>D15E</td>
<td>475</td>
<td>475</td>
<td>95.1%</td>
</tr>
<tr>
<td>D20E</td>
<td>950</td>
<td>950</td>
<td>95.0%</td>
</tr>
</tbody>
</table>

These values should be provided to a qualified HVAC design engineer, along with dimmer quantities, types and dimmer room dimensions, to calculate the dimmer room air handling requirements.

**SCR Rating**

<table>
<thead>
<tr>
<th>Module</th>
<th>15/20 Amp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single cycle peak surge current</td>
<td>625 amp</td>
</tr>
<tr>
<td>Half cycle peak surge current</td>
<td>1620 amp</td>
</tr>
<tr>
<td>Transient over voltage</td>
<td>600V</td>
</tr>
</tbody>
</table>
A lightweight, short-throw, all-purpose lighting device, the 6" fresnel produces a soft-edged beam varying in diameter from 4.2 feet to 21 feet at a throw distance of 15 feet.

The 65Q and 165Q are designed for operation with long-life, high-intensity tungsten-halogen lamps. The luminaire is used in theatre for acting area lighting where beam shaping is not required, or in television studios for key and back lighting. Other uses include nightclubs, museums and show windows where soft-edged controlled lighting is required.

Specifications subject to change without notice.

### 750-WATT 6" FRESNEL

**Features**

- Sheet-steel welded construction
- Specular spherical Alzak aluminum reflector
- Spot-to-flood focus adjustment
- Screw-feed focus (165Q only)
- 6" heat-resistant fresnel lens
- Medium prefocus socket
- Color frame and safety cable with spring clip included
- Three 36" Teflon lead wires
- Up to 25' of Hi-Temp rubber cable optional
- U.L., c.U.L., and CE-listed for 750 watts
- Made in the U.S.A.
**750-WATT 7° FRESNEL**

**Specifications**

**Housing:** Sheet-steel construction.

**Materials:** Corrosion-resistant materials and hardware.

**Yoke:** Rigid flat steel with clearance hole for ½" bolt.

**Reflector:** Aluminum, spherical design.

**Lens:** Pyrex fresnel lens with stepping on flat surface.

**Socket:** Altman medium prefix, tool-free relamping.

**Rating:** 120/240 volts AC/DC operation, 6.3/3.1 amps, 750 watts maximum.

**Cable:** 36" Teflon® leads enclosed in black fiberglass sleeving. Up to 25°F Temp rubber cable optional.

**Access Door:** Hinged, allows tool-free access to lens, reflector and lamp.

**Focusing:** For the 65Q, adjusted with locking thumb screw on bottom surface. For the 165Q, adjusted with ease-operation rear-mounted screw feed.

**Accessories:** Accepts standard 7½" accessories.

**Finish:** Black epoxy Sandtex, electrostatic application.

**Weight:** Approx. 9.0 lbs. (4.1 Kg) for the 65Q and approx. 10.5 lbs. (4.7 Kg) for the 165Q.

---

### LAMP INFORMATION

<table>
<thead>
<tr>
<th>fixture series</th>
<th>watts</th>
<th>ANSI code</th>
<th>manufacturer lamp code</th>
<th>color temp (K)</th>
<th>rated life (hrs)</th>
<th>rated lumens</th>
<th>correction factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>6° Fresnel</td>
<td>500</td>
<td>B1L</td>
<td>Q500 T6/CL/P</td>
<td>3000</td>
<td>500</td>
<td>11,000</td>
<td>0.65</td>
</tr>
<tr>
<td>*</td>
<td>500</td>
<td>B1M</td>
<td>Q500 CL/300</td>
<td>3200</td>
<td>100</td>
<td>13,000</td>
<td>0.66</td>
</tr>
<tr>
<td>*</td>
<td>/50</td>
<td>B1P</td>
<td>Q750 17/CL/10</td>
<td>3000</td>
<td>100</td>
<td>17,000</td>
<td>1.00</td>
</tr>
<tr>
<td>*</td>
<td>/50</td>
<td>B1F</td>
<td>Q750 17/CL/20</td>
<td>3200</td>
<td>200</td>
<td>20,000</td>
<td>1.20</td>
</tr>
</tbody>
</table>

---

### SPOT FOCUS

<table>
<thead>
<tr>
<th>Field Angle</th>
<th>16°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beam Angle</td>
<td>9°</td>
</tr>
<tr>
<td>Footcandles</td>
<td>925</td>
</tr>
<tr>
<td>2.8</td>
<td></td>
</tr>
<tr>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td>5.6</td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td>8.4</td>
<td></td>
</tr>
</tbody>
</table>

### FLOOD FOCUS

<table>
<thead>
<tr>
<th>Field Angle</th>
<th>70°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beam Angle</td>
<td>59°</td>
</tr>
<tr>
<td>Footcandles</td>
<td>88</td>
</tr>
<tr>
<td>14</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td></td>
</tr>
</tbody>
</table>

---

**Catalog Numbers**

<table>
<thead>
<tr>
<th>65Q</th>
<th>165Q</th>
</tr>
</thead>
</table>

---

**Spot Focus**

- **Field Angle:** 16°
- **Beam Angle:** 9°
- **Candlepower:** 9,250
- **Efficiency:** 14.8%

**Flood Focus**

- **Field Angle:** 70°
- **Beam Angle:** 59°
- **Candlepower:** 8,800
- **Efficiency:** 47.3%
SANDWICH HOLDERS

Aluminum construction acts as a heat sink to minimize pattern warpage.

<table>
<thead>
<tr>
<th>Name</th>
<th>A</th>
<th>B</th>
<th>Cat. #</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>S4 &quot;A&quot;</td>
<td>3 11/16&quot;</td>
<td>3 3/16&quot;</td>
<td>2150</td>
<td>7.35</td>
</tr>
<tr>
<td>S4 &quot;B&quot;</td>
<td>3 11/16&quot;</td>
<td>2 3/4&quot;</td>
<td>2160</td>
<td>7.25</td>
</tr>
<tr>
<td>S4 Jr. &quot;M&quot;</td>
<td>2 11/16&quot;</td>
<td>2 5/32&quot;</td>
<td>2165</td>
<td>7.35</td>
</tr>
<tr>
<td>SL &quot;B&quot;</td>
<td>4 3/16&quot;</td>
<td>2 3/4&quot;</td>
<td>2144</td>
<td>8.33</td>
</tr>
<tr>
<td>360Q/Shakespeare</td>
<td>3 5/16&quot;</td>
<td>2 3/4&quot;</td>
<td>2120</td>
<td>8.95</td>
</tr>
<tr>
<td>Coloran Style (S50 Series)</td>
<td>4&quot;</td>
<td>3 1/16&quot;</td>
<td>2190</td>
<td>13.50</td>
</tr>
<tr>
<td>Juliet &quot;A&quot;</td>
<td>4 11/16&quot;</td>
<td>3 3/16&quot;</td>
<td>3500</td>
<td>24.95</td>
</tr>
<tr>
<td>Juliet &quot;B&quot;</td>
<td>4 11/16&quot;</td>
<td>2 3/4&quot;</td>
<td>3501</td>
<td>24.95</td>
</tr>
</tbody>
</table>

GLASS HOLDERS

Will hold either glass or metal patterns.

<table>
<thead>
<tr>
<th>Name</th>
<th>A</th>
<th>B</th>
<th>Glass OD</th>
<th>Cat. #</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>S4 &quot;A&quot;(pins slot)</td>
<td>4 11/16&quot;</td>
<td>3 3/16&quot;</td>
<td>100mm</td>
<td>2171</td>
<td>21.65</td>
</tr>
<tr>
<td>S4 &quot;B&quot;</td>
<td>3 3/4&quot;</td>
<td>2 3/4&quot;</td>
<td>82mm</td>
<td>2170</td>
<td>10.00</td>
</tr>
<tr>
<td>Description</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>Cat. #</td>
<td>List Price</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>--------</td>
<td>------------</td>
</tr>
<tr>
<td>S4, SL, SH, PC*</td>
<td>6 1/4&quot;</td>
<td>6 1/4&quot;</td>
<td>5&quot;</td>
<td>2350</td>
<td>5.25</td>
</tr>
<tr>
<td>6&quot; Ellipsoidal</td>
<td>7 1/2&quot;</td>
<td>7 1/2&quot;</td>
<td>6&quot;</td>
<td>2300</td>
<td>5.80</td>
</tr>
<tr>
<td>S4 PAR</td>
<td>7 1/2&quot;</td>
<td>7 1/2&quot;</td>
<td>6 3/4&quot;</td>
<td>2487</td>
<td>6.10</td>
</tr>
<tr>
<td>S4 PAR (Round)</td>
<td>7 1/2&quot;</td>
<td>7 1/2&quot;</td>
<td>6 3/4&quot;</td>
<td>2497</td>
<td>8.00</td>
</tr>
</tbody>
</table>

*Fits Rosco 86mm “Std B” size glass

**COLOR FRAMES**

Fabricated from durable cold rolled steel with hemmed edges
Tough black powdercoat finish

Round style PAR units are available for architectural use
<table>
<thead>
<tr>
<th>Product</th>
<th>Width</th>
<th>Height</th>
<th>Color</th>
<th>Part No</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>City Ground Cyc</td>
<td>8 3/4&quot;</td>
<td>13&quot;</td>
<td></td>
<td>2321</td>
<td>10.80</td>
</tr>
<tr>
<td>PAR 64</td>
<td>10&quot;</td>
<td>10&quot;</td>
<td></td>
<td>2322</td>
<td>8.95</td>
</tr>
<tr>
<td>S4 10&quot;, SL 10&quot;</td>
<td>12&quot;</td>
<td>12&quot;</td>
<td>8&quot;</td>
<td>2328</td>
<td>13.40</td>
</tr>
<tr>
<td>S4 5&quot;</td>
<td>14&quot;</td>
<td>14&quot;</td>
<td>12&quot;</td>
<td>2329</td>
<td>18.70</td>
</tr>
<tr>
<td>City Sky Cyc</td>
<td>15 1/2&quot;</td>
<td>15 7/8&quot;</td>
<td>15&quot;</td>
<td>2330</td>
<td>17.00</td>
</tr>
<tr>
<td>City Far Cyc</td>
<td>14 3/4&quot;</td>
<td>15 1/2&quot;</td>
<td></td>
<td>2338</td>
<td>31.40</td>
</tr>
<tr>
<td>SL5&quot;</td>
<td>16&quot;</td>
<td>16&quot;</td>
<td>14&quot;</td>
<td>2348</td>
<td>24.50</td>
</tr>
<tr>
<td>125mm New</td>
<td>125mm</td>
<td>125mm</td>
<td>100mm</td>
<td>2302</td>
<td>5.25</td>
</tr>
<tr>
<td>185mm New</td>
<td>185mm</td>
<td>185mm</td>
<td>150mm</td>
<td>2304</td>
<td>5.80</td>
</tr>
<tr>
<td>245mm New</td>
<td>245mm</td>
<td>245mm</td>
<td>205mm</td>
<td>2306</td>
<td>8.95</td>
</tr>
</tbody>
</table>

*Source Four, Strand SL, Shakespeare, Pacific (19-50")

Available in white at no additional charge. Add a "W" to the Cat.# when ordering.
Finishes: -10 = Polished Brass, -11 = Antique Brass, -15 = Chrome, -30 = White, -53 = Brushed Nickel
Lamps: m = Medium Base
Catalog # PB612-6B

Pipe Box, 6" x 12", with two (2) Pipe Brackets.
Connectors: Six (6) flush, 2P&G.

Product Description:

Box and cover are fabricated of 18 gauge CRS.
Conduit knockouts exist on the top and both sides.
Pipe mounting brackets (2) with u-bolts are supplied.
Only specification grade 20Amp receptacles are used.
Ground lug is installed.
White die-cut circuit designations are included.
As a producer of color filters for the performing arts, Rosco has focused on the science of color for nearly 100 years. But stage lighting is an art, not a science. The people who use Rosco filters are artists who manipulate the spectrum to enhance stage pictures, dealing with appearance, reflectance, perception, contrast and psychological impact. This guide was developed with two objectives. First to provide some background in the science to those who utilize color artistically and second, to offer some recommendations for color selection.

Most of the colors in the Rosco range have been created by designers over the years to achieve specific effects and the range is extensive. By additive mixing using multiple sources and by using multiple filters in units, a virtually unlimited palette can be achieved. Apparent color can also be made to appear “cooler” at a higher dimmer setting and “warmer” at a lower intensity, permitting further variation. It is unlikely, however, that the range is complete. Designers will continue to innovate and the artistic needs will evolve. Coincidently new dye chemistry and plastics technology will permit the development of new Rosco filters not currently possible.

**USING THIS GUIDE**

This guide was developed to provide designers with suggestions on how specific Roscolux colors might be used for lighting the stage. We have grouped the colors according to some commonly accepted categories.

**Front Light** is divided among Warm, Cool, and Neutral groups for lighting acting areas. These color distinctions help to establish mood, emotion, time and place. The colors included are generally flattering to skin tones and enhance scenery and costumes.

**Accent Lighting** is also divided between Warm and Cool. These slightly more saturated colors may be used to shape and define an object or person. Typically, accent lighting is focused from side or back positions or, on occasion, as down light.

**Natural Light** on stage usually comes in one of four variants: warm sunlight, cool daylight, moonlight, and cyclorama wash lighting used to create the illusion of a sky/horizon line. This section of the guide makes recommendations for choosing colors appropriate to each of these applications. Here you will find suggestions that render both true, natural lighting and strong, stylized sky lighting. Your design and the needs of the play will determine which is the right choice for you.

**Special Effects** lighting encompasses a broad category. Listed in this section are strong, saturated colors that can be used to create dramatic lighting effects from fire and rain to surreal, ominous atmospheres. Again, the choice of color is purely personal and determined by the needs of the overall design.

Choices are not immutable. As Tharon Musser has said, “If a color doesn’t look right on stage, just change it!”

---

### Contributors to this guide

**Ken Billington**

He has designed the lighting for over 90 Broadway productions and garnered six Tony nominations in the process. The long term Principal Lighting Designer for New York’s Radio City Music Hall, he has worked extensively in television and architectural design.

**Donald Holder**

Donald Holder’s brilliant lighting design for the Broadway production of “The Lion King” earned him the triple crown of theatrical awards: The Tony Award, the Drama Desk Award and the Outer Critics Circle Award.

**Brian MacDevitt**

Brian MacDevitt has designed lighting on and off Broadway in New York and in major regional theatres around the country. His awards include an Obie, the LA Ovation and Drama Logie, a Bretis and Lucille Lortel Award. He teaches at NYU Tisch School of the Arts and Purchase College.

**Peter Maradudin**

He has designed the lighting for over 200 productions for virtually every major regional theatre in the country. He has earned nearly a dozen Drama Critics Circle awards in six different West Coast cities. He is the founding principal of the lighting design company Light and Truth.

**Richard Pilbrow**

Widely regarded as the dean of lighting designers for both the West End and Broadway, he also heads Theatre Projects Consultants. He has authored two much acclaimed books on stage lighting.

**Kevin Rigdon**

Kevin Rigdon is now the Associate Director of the Alley Theatre in Houston and Professor of Design at the University of Houston. His Broadway credits include “Grapes of Wrath”, for which he received Tony Award nominations for both scenery and lighting. “Buried Child” and the revivals “A Streetcar Named Desire” and “Our Town”.

**Jennifer Tipton**

Jennifer Tipton’s many awards for lighting in dance, theatre and opera include two Tonys, two Beos, two American Theatre Wing awards, two Obies and two Drama Desk Awards. A veteran teacher at Yale University, School of Drama, she has influenced a generation of lighting designers.
Designers On Color

Color has been an important component of stage lighting since the days of candles and silk. We reproduce here comments on the subject from the published works of some leading lighting designers:

Gilbert V. Hemsley, Jr.

"I think one of the greatest joys of lighting design is communicating to an audience how you, as a designer, feel about and understand color. Walking out from a darkened theatre on a sunny Spring afternoon and feeling my response to the R62 of the warm sunshine, the R84 of the blue sky and the R07 light green shadows of the new leaves makes my head spin with the realization that I can translate my color excitement to a production of 'You Can't Take It With You.' I can make an audience see and feel the excitement of a beautiful Spring afternoon when the curtain goes up in a darkened theatre.

It may sound strange, but I carry a color swatchbook around in my head. As I see, feel, and respond to color and color combinations in the real world, I make mental notes of the colors I see and my responses to them. I have a storehouse of emotional and rational responses and the colors that go with them.

In learning to be artists as lighting designers it is exhilarating to have a full personal response to color and color combinations in the real world and then communicate them to the real audiences of the theatre world."

Tharon Musser

"The important thing to remember is that there are no rules in lighting with color. The design has to look right to you -- it has to reflect your taste.

My advice about color is this: Don't sweat it! It's the easiest, cheapest thing to change. If a color doesn't look right on stage, just change it."

Nanann Porcher

"How does one learn what color will do? The obvious answer is, light a lot of shows. But that is hard on the directors and performers you learn on.

So learn by experimenting. Get samples of a wide range of colors in various densities. Set up a couple of spotlights in separate dimmers. Mix and blend and dim your colors . . . and look and remember . . . and if nature has provided you with a retentive visual memory, you are on your way to understanding color.

You should never stop learning and remembering. Store up in your sight banks every sunset, every dawn, how light reflects off snow, what happens when street lights fall on a new color . . . and change that color . . . how everything is black and white at a low light level. Make the human eye work for you as a designer. And make your own eyes work for you all the time."

Richard Pilbrow

"Fractured white light reveals color. Part of the magic of stage lighting is taking complex multi-directional palettes of color and re-combining them into lucid, dramatic light for the stage.

When I began lighting, only about fifty shades of Cinemoid were available. I often used them two or three to a frame seeking new possibilities. Then I discovered the Rosco range and first brought this wonderful range to Britain. Now the possibilities are almost limitless.

Color brings life, texture and vibrancy to the stage. I love it!"

Jennifer Tipton

"The use of color is key to a lighting designer's craft. I am constantly reminded as I watch the light change from the brilliance of a sunny morning to the early dusk of a winter afternoon, how much color there is in nature. So-called 'white light' and how much variety in color can be made by simply brightening and dimming a light. It is a wonderfully juicy thing to 'paint' with colored light -- to use light expressively -- to make the audience feel the scream, live the blues or dance with danger. Or to paint with colored light can simply be about the beauty of juxtaposing one color next to another and being able to change it from one moment to the next for purely compositional reasons. But I am also madly in love with the ravishing light that can be made from the use of the very limited range of colors -- lavender, blue and clear -- that makes the skin glow no matter what color the skin may be."

David Belasco

"The greatest part of my success in the theatre I attribute to my feeling for colors, translated into effects of light." (1919)

"Color brings life, texture and vibrancy to the stage", according to Richard Pilbrow. His lighting design for "Show Boat", shown at left above illustrates this idea vividly. The late Gilbert V. Hemsley, Jr. said that "I carry a color swatchbook around in my head". An example of his brilliant application of color is shown in the photo at right.
Visible light is the small part of the spectrum of electromagnetic radiation between approximately 400 and 700 nanometers. Each wavelength has a “spectral signature”, or color, ranging from violet at 400 through indigo, blue, green, yellow and orange to red at 700. The combination of these colored wavelengths creates white light. Colored light can be described as the presence of certain wavelengths and the absence of others.

A color filter functions by selectively transmitting or blocking (absorbing) spectral elements of a beam of white light emanating from a light source. For example, a Roscolux 27 Medium Red filter will allow red light frequencies to pass through and absorb blue and green. Of the radiant energy which is blocked, by far the largest part is absorbed by the filter as heat. This is why heat stability is a significant consideration in filter design. The heat created by the absorption of energy leads to degradation of the filter.

Lighting designers mix or blend colors through an additive or subtractive process. Blending light beams of different colors on a surface is an additive process. Creating a colored beam by filtering white light is a subtractive process – the desired color is transmitted while the other wavelengths are absorbed (or “subtracted”).

A Spectral Energy Distribution (SED) curve is a graph of the transmission of energy plotted by wavelength. These curves are included in the swatchbooks of Rosco filters. In Fig. 1, the curve for R27 shows that frequencies above 620 nm will pass through the filter at varying percentages, while the wavelengths below will not. With this information, you can predict what color the filter will render.

As a reference, the peak intensity for violet is 440, blue 480, green 520, yellow 570 and red, 650.

Most Rosco colors are blends so the curve will have multiple peaks. The graph for R34 Lavender for example, shows a high component of both violet and red. (Fig. 2)

Lighting a scene with both a 4000°K Metal Halide lamp and also a 3200°K incandescent lamp will result in either the Metal Halide appearing very blue, or the incandescent very red, depending on the overall balance of light on stage. To correct for this, either raise the color temperature of the incandescent to 4000°K using R3204 (1/2 CTO Blue), or lower the Metal Halide to 3200°K with R3409 (1/4 CTO Orange). For more information on color correction filters, see the Rosco publication “Filter Facts” or visit the web site.

It is important to remember that filtration is a subtractive process … filters can only transmit or block frequencies of light, not add them to a source. This is significant when using lamps that are deficient in particular wavelengths. Although many lamp types seem attractive because they offer the economy of long life, they have a limited spectrum. A typical metal halide source, (Fig. 3) for example, has very little energy in the red end of the spectrum. Note that even the most common theatrical sources, the tungsten-halogen or incandescent lamp (Fig. 4) although rich in red/yellow, is deficient in blue/green. These characteristics of sources and filters are most obvious when one becomes familiar with the relevant SED curves.
A color filter combines light refracting elements, normally organic dyes, which are suspended in or coated on a transparent base. Rosco began producing gelatin filters in 1910, but since the 1990s, color filters have been fabricated on plastic bases. Polycarbonate, the base used for most of the Roscolux range, is the most durable of the polymers currently utilized.

There are three methods currently employed to integrate dyes with polymer bases in order to create color filters. The products are described as:

- Surface Coated
- Deep Dyed
- Body Colored

### Surface Coated Polyester
(Rosco E-Colour, Lee Filter, Apollo Gel)

The easiest way to produce a color filter is to simply coat the color on top of a plastic film base. Polyester film (PET) is widely used as a base material for coloring since it is relatively inexpensive and will accept coatings of solvent-based coloring agents. Since no heat is involved in the process, dyes used need not necessarily be heat-resistant. Coated polyester filters begin as a roll of clear film which is then “painted” with a dye solution on one or both sides. To identify the coated surface, apply a simple solvent like nail polish remover and the dye and lacquer carrier will dissolve.

### Deep-Dyed Polyester
(Rosco Cinegel, GAM Filter)

Like surface coated PET, deep dyed film begins with a roll of clear polyester. The film is passed through a bath of heated solvent suffused with dye. The solvent causes the PET film to swell expanding the polymer structure of the film and allowing the dye molecules to penetrate the surface. The film is then washed and the polymer contracts to its normal form, trapping the dye molecules below the surface. Compared to surface coating, more extreme temperatures are required to cause the dye particles to sublime through the surface. Deep-dyed filters are, therefore, more resistant to fading than surface coated.
In a body-colored color filter, like Roscolux, the colorant is inherent within the plastic substrate. The process starts with powdered resin and dye being fed into an extruder. Under intense pressure and heat approaching 600°F, the drive screw combines the melted resin and dye into a through-colored "honey". This colored mixture is extruded through a die which forms it into a film 24" wide.

The excellent performance of this engineered filter is a function of both the higher temperature resistance of the polycarbonate resin and our exclusive color compounding.

One advantage of Rosco's extrusion process is that the filter is not oriented during manufacturing. Typically, large plastic manufacturing plants will extrude a thicker gauge of plastic than the desired finished thickness. As it is extruded, the thicker film is pulled and stretched down to its final thickness. This stretching orients the plastic, and under the heat of a spotlight, the film will try to shrink back to its original shape. Polyester is an oriented film and these stress distortions are quite apparent on color frames of hot lights and will create significant problems when used in scrollers. Because Roscolux is extruded to its finished gauge without orienting, these problems do not occur.

In any color filter the dye eventually migrates away from the hottest area. The rate at which the filter fades is a function of the stability of the dye employed and the process used to add the dye to the base plastic. Obviously, when simply coated on the surface, a dye will sublimate from the base into the air as a gas more easily than a dye which has been locked in with the core resin.

A color filter also degrades when the plastic softens under heat. In this semi-molten state, dyes can begin to move and concentrate, distorting the color and absorbing more energy as heat. The polycarbonate used in Roscolux softens at a higher temperature than the polyester used in other filters, making a "high temperature" filter more resistant to this type of fading.

Durability is an important consideration to the filter user for several reasons. A filter which lasts longer must be replaced less often and, therefore, is more economical ... more "blue for the buck". Longer lasting filters can also be relied upon to perform longer on lights in less accessible positions.

An additional advantage of manufacturing Roscolux polycarbonate filters from the raw resin is our ability to modify the chemistry of the plastic. Recognizing the global importance of fire prevention, Rosco includes a fire retardant additive in our resin formulation to create the only inherently flame retardant color filter in the world.

Together, these unique features make extruded, body-colored polycarbonate filters the most durable, most fade resistant color filters available.
Lighting The Acting Areas

Filters for warm acting areas

<table>
<thead>
<tr>
<th>ROSCOLUMX</th>
<th>APPLICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Light Bastard Amber</td>
<td>Enhances fair skin tones. Suggests strong sunlight.</td>
</tr>
<tr>
<td>02 Bastard Amber</td>
<td>Good where a tint of color is needed. Excellent for natural skin tones.</td>
</tr>
<tr>
<td>03 Pale Bastard Amber</td>
<td>Very pale warm white. Perfect for enhancing HPL lamp in a Source Four™.</td>
</tr>
<tr>
<td>04 Dark Bastard Amber</td>
<td>Most saturated Bastard Amber.</td>
</tr>
<tr>
<td>05 Warm Peach</td>
<td>Strong amber with undertones of pink. Useful for warm sunrise and sunsets.</td>
</tr>
<tr>
<td>06 Medium Bastard Amber</td>
<td>Excellent for natural sunlight.</td>
</tr>
<tr>
<td>07 Rose Tint</td>
<td>A clean pale pink; useful as a &quot;blush&quot; for skin tones.</td>
</tr>
<tr>
<td>08 Rose Gold</td>
<td>A pale blush amber for skin tones and backlight.</td>
</tr>
<tr>
<td>09 RoscoSun 0 1/2 CTO</td>
<td>Converts 5500K to 4900K.</td>
</tr>
<tr>
<td>10 RoscoSun 1A CTO</td>
<td>Converts 5500K to 4500K.</td>
</tr>
<tr>
<td>11 RoscoSun 1/2 CTO</td>
<td>Converts 5500K to 3800K.</td>
</tr>
<tr>
<td>12 RoscoSun 3/4 CTO</td>
<td>Converts 5500K to 3200K. Nice strong amber. Less pink than R04.</td>
</tr>
<tr>
<td>13 RoscoSun Full CTO</td>
<td>Converts 5500K K to 2900°K. Dominant amber.</td>
</tr>
<tr>
<td>14 No Color Straw</td>
<td>Slightly off white. Good for interiors.</td>
</tr>
<tr>
<td>15 Pale Yellow</td>
<td>Double saturation of 06.</td>
</tr>
<tr>
<td>16 Pale Gold</td>
<td>Warmer straw. Flattering to skin tones.</td>
</tr>
<tr>
<td>17 Pale Amber Gold</td>
<td>Deep straw. Good for late afternoon sunsets or firelight.</td>
</tr>
<tr>
<td>18 CC 15 Yellow</td>
<td>Very pale yellow. Interior lighting to create industrial mood.</td>
</tr>
<tr>
<td>19 Deep Straw</td>
<td>Warm golden amber with some green. Useful for candlelight, firelight.</td>
</tr>
<tr>
<td>20 Light Amber</td>
<td>Excellent area light. Light pink-amber tint. Safe for most light skin tones.</td>
</tr>
<tr>
<td>21 Gallo Gold</td>
<td>A pale reddish gold, good for creating sunrise or sunset, or simulating incandescent light. A flattering naturalistic backlight color.</td>
</tr>
<tr>
<td>22 Light Flame</td>
<td>Heavier pink-amber tint. Useful for dance. Especially useful when balanced with a cool color. Good general warm tint in strip lights.</td>
</tr>
<tr>
<td>23 Apricot</td>
<td>A rosy amber which produces a romantic sunset color.</td>
</tr>
<tr>
<td>24 Mayan Sun</td>
<td>A medium salmon color which evokes feelings of a tropical island. A good sunset color. Good for warm tonal effects.</td>
</tr>
<tr>
<td>25 Henna Sky</td>
<td>Toasted red-amber color. Useful in re-creating setting sun or as a dramatic cyc.</td>
</tr>
<tr>
<td>26 CC 15 Red</td>
<td>Very pale red. Subtle warming on skin tones. Warmer than R03.</td>
</tr>
<tr>
<td>28 Light Salmon Pink</td>
<td>Excellent for general area washes. Gives overall warming effect to skin tones.</td>
</tr>
<tr>
<td>29 Salmon Pink</td>
<td>General wash. Good for follow spots.</td>
</tr>
<tr>
<td>30 Shell Pink</td>
<td>Beautiful blush pink. Nice on skin tones.</td>
</tr>
<tr>
<td>31 No Color Pink</td>
<td>A pale almost colorless pink.</td>
</tr>
<tr>
<td>32 Blush Pink</td>
<td>A pink tint excellent for most skin tones.</td>
</tr>
<tr>
<td>33 Flesh Pink</td>
<td>Useful for bright musicals. Creates a happy atmosphere.</td>
</tr>
<tr>
<td>34 Light Pink</td>
<td>Similar to 33, but slightly deeper with less violet.</td>
</tr>
<tr>
<td>35 CC 15 Pink</td>
<td>Excellent on all skin tones. Not as cool as 333.</td>
</tr>
<tr>
<td>37 Medium Pink</td>
<td>Good for general washes and cross lighting.</td>
</tr>
<tr>
<td>38 Pale Rose Pink</td>
<td>Blue Pink. Use in general washes and toning.</td>
</tr>
<tr>
<td>39 True Pink</td>
<td>A cool pink excellent for washes and general illumination. A good follow spot color.</td>
</tr>
<tr>
<td>40 Light Rose</td>
<td>Similar uses as 37, but with greater saturation.</td>
</tr>
</tbody>
</table>
## Filters for Cool Acting Areas

<table>
<thead>
<tr>
<th>Filter</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>3216 Eighth Blue (1/16 CTB)</td>
<td>Boosts 3200°K sources to 3300°K.</td>
</tr>
<tr>
<td>3220 Quarter Blue (1/4 CTB)</td>
<td>Boosts 3200°K sources to 3500°K.</td>
</tr>
<tr>
<td>3206 Third Blue (1/3 CTB)</td>
<td>Boosts 3200°K sources to 3800°K.</td>
</tr>
<tr>
<td>3204 Half Blue (1/2 CTB)</td>
<td>Boosts 3200°K sources to 4100°K.</td>
</tr>
<tr>
<td>3202 Full Blue (CTB)</td>
<td>Converts 3200°K sources to nominal daylight.</td>
</tr>
<tr>
<td>3220 Double Blue</td>
<td>Boosts 3200°K sources to 3800°K.</td>
</tr>
<tr>
<td>4215 CC 15 Blue</td>
<td>Very pale blue tint with a hint of red. Nice no-color definition when crossed with blue.</td>
</tr>
<tr>
<td>4230 CC 30 Blue</td>
<td>Double 4215. Pale blue with a reddish cast.</td>
</tr>
<tr>
<td>4260 CC 60 Blue</td>
<td>Double 4230. Medium blue with red tones. Nice cool crosstalk on most skin tones.</td>
</tr>
<tr>
<td>60 No Color Blue</td>
<td>Helps maintain white light when dimmer is at low intensity.</td>
</tr>
<tr>
<td>360 Clearwater</td>
<td>The slightest blue tint. Excellent for eliminating amber shift when lights are running low on a dimmer. Good for cool area light.</td>
</tr>
<tr>
<td>61 Mist Blue (greener)</td>
<td>Excellent for general area washes. Very light cool tint of blue.</td>
</tr>
<tr>
<td>361 Hensley Blue</td>
<td>A sharp, cold blue that stays clean when dimmed.</td>
</tr>
<tr>
<td>62 Booster Blue</td>
<td>Helps maintain white light when dimmer is at low intensity.</td>
</tr>
<tr>
<td>362 Tipton Blue</td>
<td>A soft, clean blue. Good choice for cool area lighting. Can also be used to shift the amber of lamps running at low dimmer levels.</td>
</tr>
<tr>
<td>63 Pale Blue (greener)</td>
<td>Good for creating an overcast look and feeling.</td>
</tr>
<tr>
<td>363 Aquamarine</td>
<td>A pale blue-green color. Can be used for area lighting. A soft backlight color.</td>
</tr>
<tr>
<td>64 Light Steel Blue</td>
<td>Useful for beams of realistic moonlight.</td>
</tr>
<tr>
<td>364 Blue Bell</td>
<td>A clean light red blue. Creates naturalistic daylight fill color.</td>
</tr>
<tr>
<td>65 Daylight Blue</td>
<td>Useful for achieving depressed moods and dull skies.</td>
</tr>
<tr>
<td>365 Tharan Drift Blue</td>
<td>Clean blue with more red than 364. A true color correction filter for film. Converts 3200° Kelvin to 5500° Kelvin. Good for area light.</td>
</tr>
<tr>
<td>66 Cool Blue</td>
<td>A pale green shade of blue. Good for area or general washes. Creates an icy feeling on stage.</td>
</tr>
<tr>
<td>67 Light Sky Blue</td>
<td>Excellent sky color. Useful for eye and border lights.</td>
</tr>
<tr>
<td>368 Wilkens Blue</td>
<td>A silvery blue, used for front light and moonlight.</td>
</tr>
<tr>
<td>70 Nile Blue</td>
<td>Useful for very light midday skies.</td>
</tr>
<tr>
<td>71 Sea Blue</td>
<td>Occasionally used for area cool tint and non-realistic washes.</td>
</tr>
<tr>
<td>72 Azure Blue</td>
<td>A clean, slightly green blue. Good moonlight fill.</td>
</tr>
<tr>
<td>371 Theatre Booster 1</td>
<td>Full blue for cooling incandescent lights to daylight. Clean with no red.</td>
</tr>
<tr>
<td>372 Theatre Booster 2</td>
<td>Half blue for cooling incandescent lights to daylight. Clean with no red.</td>
</tr>
<tr>
<td>373 Theatre Booster 3</td>
<td>Quarter blue for cooling incandescent lights. Cool crisp “white light”.</td>
</tr>
<tr>
<td>376 Bermuda Blue</td>
<td>A soothing green blue. More blue than 76. A good conventional moonlight color. Interesting tonal color.</td>
</tr>
</tbody>
</table>

"I use a lot of stark looks in the shows I light and to the naked eye in the audience there is nothing more stunning or iconic than the likes of The Who or David Bowie in a pool of beautiful blue light. That light is often R3208."

Tom Kenny


**Filters for Neutral Acting Areas**

<table>
<thead>
<tr>
<th>ROSCOLUX</th>
<th>APPLICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3311 U8 Minus Green</td>
<td>Very light magenta correction. Removes slight green cast in HPL lamps.</td>
</tr>
<tr>
<td>3314 U4 Minus Green</td>
<td>Pale magenta correction. Nice tone on skin without adding color.</td>
</tr>
<tr>
<td>3313 1/2 Minus Green</td>
<td>Light magenta brightens blues and pinks. Warmer than lavender.</td>
</tr>
<tr>
<td>3306 Tough Minus Green</td>
<td>Nice pale lavender. Use a cool crosslight when paired with pink or amber. Or as a warm crosslight when paired with a blue or violet crosslight.</td>
</tr>
<tr>
<td>4715 CC 15 Magenta</td>
<td>Pale magenta. Cooler than 3311. Useful on many skin tones.</td>
</tr>
<tr>
<td>4730 CC 30 Magenta</td>
<td>Double 4715. Medium cool magenta. Nice fill light without adding warmth.</td>
</tr>
<tr>
<td>51</td>
<td>Surprise Pink. Touch of color when white light is not desirable.</td>
</tr>
<tr>
<td>52</td>
<td>Light Lavender. Excellent for general area or border light washes. It is a basic foliespots color.</td>
</tr>
<tr>
<td>353</td>
<td>Lily Lavender. Nice cool lavender. Slightly warmer than 55.</td>
</tr>
<tr>
<td>53</td>
<td>Pale Lavender. Use when a touch of color is needed.</td>
</tr>
<tr>
<td>54</td>
<td>Special Lavender. Same as 53, but warmer.</td>
</tr>
<tr>
<td>4915 CC 15 Lavender</td>
<td>Pale no color lavender. Slightly cooler than 351. Tones without adding color.</td>
</tr>
<tr>
<td>4930 CC 30 Lavender</td>
<td>Double 4915. Excellent cool on skin tones. Nice warm tones during nighttime.</td>
</tr>
<tr>
<td>355</td>
<td>Lilac (blue). Same as 53, but cooler.</td>
</tr>
<tr>
<td>356</td>
<td>Pale Violet. A cool lavender which acts as a neutral in a three color area lighting system. Will work well as a wash for drops or set pieces. Tones the space. Effective as moonlight shadows.</td>
</tr>
<tr>
<td>356</td>
<td>Gypsy Lavender. Highly saturated, good for side and backlighting and non-realistic effect.</td>
</tr>
<tr>
<td>356</td>
<td>Middle Lavender. A lavender halfway between 52 and 57 in hue and value. Useful for general illumination and side-lighting.</td>
</tr>
<tr>
<td>57</td>
<td>Lavender. Gives good visibility without destroying night illusions.</td>
</tr>
<tr>
<td>357</td>
<td>Royal Lavender. A rich lavender which will enhance blue and red costumes and scenic pieces.</td>
</tr>
<tr>
<td>359</td>
<td>Medium Violet. A lavender with a strong blue component, ideal for backlighting.</td>
</tr>
<tr>
<td>99</td>
<td>Chocolate. Warms light and reduces intensity.</td>
</tr>
</tbody>
</table>
Using Sidelights, Downlights And Backlights For Accents

<table>
<thead>
<tr>
<th>Filters for warm accents</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROSCO LUX 4590 CC 90 Yellow</td>
</tr>
<tr>
<td>4530 + 4560. Saturated pure yellow. Enhances greens in sets and costumes.</td>
</tr>
<tr>
<td>10 Medium Yellow</td>
</tr>
<tr>
<td>310 Daffodil</td>
</tr>
<tr>
<td>11 Light Straw</td>
</tr>
<tr>
<td>12 Straw</td>
</tr>
<tr>
<td>312 Canary</td>
</tr>
<tr>
<td>313 Light Relief Yellow</td>
</tr>
<tr>
<td>14 Medium Straw</td>
</tr>
<tr>
<td>15 Deep Straw</td>
</tr>
<tr>
<td>316 Gala Gold</td>
</tr>
<tr>
<td>18 Flame</td>
</tr>
<tr>
<td>318 Mayan Sun</td>
</tr>
<tr>
<td>20 Medium Amber</td>
</tr>
<tr>
<td>21 Golden Amber</td>
</tr>
<tr>
<td>321 Soft Golden Amber</td>
</tr>
<tr>
<td>2002 V5 Orange</td>
</tr>
<tr>
<td>23 Orange</td>
</tr>
<tr>
<td>4660 CC 60 Red</td>
</tr>
<tr>
<td>4690 CC 90 Red</td>
</tr>
<tr>
<td>331 Shell Pink</td>
</tr>
<tr>
<td>32 Medium Salmon Pink</td>
</tr>
<tr>
<td>332 Cherry Rose</td>
</tr>
<tr>
<td>4830 CC 30 Pink</td>
</tr>
<tr>
<td>4860 CC 60 Pink</td>
</tr>
<tr>
<td>4890 CC 90 Pink</td>
</tr>
<tr>
<td>4760 CC 60 Magenta</td>
</tr>
<tr>
<td>39 Skelton Exotic Sangria</td>
</tr>
<tr>
<td>339 Broadway Pink</td>
</tr>
<tr>
<td>40 Light Salmon</td>
</tr>
<tr>
<td>44 Middle Rose</td>
</tr>
<tr>
<td>344 Folies Pink</td>
</tr>
<tr>
<td>47 Light Rose Purple</td>
</tr>
<tr>
<td>347 Belladonna Rose</td>
</tr>
<tr>
<td>48 Rose Purple</td>
</tr>
<tr>
<td>348 Purple Jazz</td>
</tr>
<tr>
<td>49 Medium Purple</td>
</tr>
<tr>
<td>349 Fisher Fuchsia</td>
</tr>
<tr>
<td>50 Mauve</td>
</tr>
<tr>
<td>358 Rose Indigo</td>
</tr>
<tr>
<td>96 Lime</td>
</tr>
</tbody>
</table>

“The set for Spalding Gray was a very simple deck and a backdrop of white crumpled notebook paper that acted as a cyc. I used R04+R132 as a warm cross light color and R305 in 6 A duvets - 3 dedicated as front light and 3 down lights.”

Ben Stanton
“Each number in BLAST It! Music in X-treme is defined by its own unique, very controlled color palette. For Tribal Towers, which features eight bungee jumpers and a flying drum rack, the look is industrial, lots of steel blue against warm incandescent whites. For this number, the performers are picked out with steel blue R-3202 sidelight, and R-54 Special Lavender front light.”

Mike Baldassari

<table>
<thead>
<tr>
<th>Filters for Cool Accents</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROSCOLUX 3306 Tougheh Minus Green</td>
<td>Cool pale lavender for beautiful, subtle backlighting.</td>
</tr>
<tr>
<td>4990 CC 90 Lavender</td>
<td>4960 + 4930. Dynamic, lush backlight. More red than 357.</td>
</tr>
<tr>
<td>4260 CC 60 Blue</td>
<td>Double 4230. Good for accents and backlighting, especially dance. Slightly red.</td>
</tr>
<tr>
<td>367 Slate Blue</td>
<td>Clean medium blue. Good for sky color or moonlight.</td>
</tr>
<tr>
<td>68 Sky Blue</td>
<td>Excellent for early morning sky tones. Popular among designers for cyc and borders.</td>
</tr>
<tr>
<td>69 Brilliant Blue</td>
<td>Used for dramatic moonlight effects.</td>
</tr>
<tr>
<td>73 Peacock Blue</td>
<td>Good for fantasy, moonlight and water effects.</td>
</tr>
<tr>
<td>74 Night Blue</td>
<td>Popular as a backlight or sidelight in contrast to area light.</td>
</tr>
<tr>
<td>375 Cerulean Blue</td>
<td>A crisp, clean blue-green. Useful as a water effect or as a sidelight for dancers.</td>
</tr>
<tr>
<td>76 Light Green Blue</td>
<td>Distinctive greenish blues.</td>
</tr>
<tr>
<td>376 Bermuda Blue</td>
<td>A soothing green blue. More blue than 76. A good conventional moonlight color. Interesting tonal color.</td>
</tr>
<tr>
<td>77 Green Blue</td>
<td>Useful for romantic moonlight.</td>
</tr>
<tr>
<td>2007 V5 Blue</td>
<td>Rich deep indigo blue. Slightly more red than 81.</td>
</tr>
<tr>
<td>80 Primary Blue</td>
<td>Primary blue. For use with three color light primary system in cyc lighting.</td>
</tr>
<tr>
<td>81 Urban Blue</td>
<td>Very cold brittle feeling.</td>
</tr>
<tr>
<td>381 Baldassari Blue</td>
<td>Dark steel or triple daylight without going to green or too red.</td>
</tr>
<tr>
<td>82 Surprise Blue</td>
<td>Deep rich blue with slight amount of red.</td>
</tr>
<tr>
<td>382 Cono Blue</td>
<td>The most saturated blue. Good for dark night skies or for a backlight color. A great color for rock and roll concert lighting.</td>
</tr>
<tr>
<td>84 Zephyr Blue</td>
<td>Lovely contrast to pale blues; adds coldness to shadows.</td>
</tr>
<tr>
<td>85 Deep Blue</td>
<td>Deeply saturated blue with a hint of red.</td>
</tr>
<tr>
<td>385 Royal Blue</td>
<td>A very saturated blue. Pronounced red content that will shift toward purple when dimmed. Low transmission but striking contrast when used as a background with lighter accents.</td>
</tr>
<tr>
<td>86 Pea Green</td>
<td>Good for dense foliage and woodland effects.</td>
</tr>
<tr>
<td>89 Moss Green</td>
<td>Useful for mood, mystery and toning.</td>
</tr>
<tr>
<td>399 Chroma Green</td>
<td>Suggests reflected light from dense foliage. A brilliant cyc lighting color which will work for chroma-keying effects in television production.</td>
</tr>
<tr>
<td>395 Teal Green</td>
<td>A medium green-blue which can be used as a mystical special effect color. Also an interesting side or backlight color in concert lighting.</td>
</tr>
</tbody>
</table>
“In this scene from Villa American, the cyc and the stage are washed by a very slow and beautiful sunset gradated from R58, R80, and R3220 at the top to R50, R22, and R317 on the bottom, some of which is direct, some of which is bounced. The scene light, from up right, is also R22 and R50. As the sunset progresses it gets more red (more R50). Also some Rosco cloud gobos with NC, R80, and R22.”

Tom Weaver
"I created a bright and beautiful sunny day in Antibes on the cyc with a combination of R60, R65, R3220, and R362 with Rosco Cloud gobos, very softly, scimming across the cyc to add both texture and breakup and give some depth of field. The main scene light was R4215 and NC."

Tom Weaver

**filters to re-create skylight**

<table>
<thead>
<tr>
<th>Filters to Re-create Skylight</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROSCOLUX 4730 CC 30 Magenta</td>
<td>Double 4715. Medium pink. Adds color to sunset skies.</td>
</tr>
<tr>
<td>4960 CC 60 Magenta</td>
<td>Double 4960. Excellent for use in nighttime settings. Mystical moonlight.</td>
</tr>
<tr>
<td>57 Lavender</td>
<td>Excellent backdrop. Gives good visibility without destroying night illusions.</td>
</tr>
<tr>
<td>58 Deep Lavender</td>
<td>Enhances dimensionality.</td>
</tr>
<tr>
<td>3220 Double Blue</td>
<td>Bright nighttime area light. Crisp moonlight.</td>
</tr>
<tr>
<td>4230 CC 30 Blue</td>
<td>Double 4215. Interesting industrial sky. Overcast, slightly grey daylight.</td>
</tr>
<tr>
<td>Hensley Blue</td>
<td>A sharp cold blue that stays clean when dimmed.</td>
</tr>
<tr>
<td>64 Light Steel Blue</td>
<td>Useful for beams of realistic moonlight.</td>
</tr>
<tr>
<td>65 Daylight Blue</td>
<td>Useful for achieving depressed mood and dull skies.</td>
</tr>
<tr>
<td>365 Tharan Deft Blue</td>
<td>Clean blue with more red than 364. A true color correction filter for film. Converts 3200° Kelvin to 5500° Kelvin. Good for area light.</td>
</tr>
<tr>
<td>366 Jordan Blue</td>
<td>A crisp light blue with hint of green. Flattering on skin tones.</td>
</tr>
<tr>
<td>67 Light Sky Blue</td>
<td>Excellent sky color. Useful for cyc and borders.</td>
</tr>
<tr>
<td>68 Sky Blue</td>
<td>Excellent for early morning sky tones. Popular among designers for cyc and borders.</td>
</tr>
<tr>
<td>69 Brilliant Blue</td>
<td>Used for dramatic moonlight effects.</td>
</tr>
<tr>
<td>70 Nite Blue</td>
<td>Used for very light midday skies. Occasionally used for general cool tint.</td>
</tr>
<tr>
<td>70 Italian Blue</td>
<td>Good to create eerie and mysterious effects. Good for nighttime water effects.</td>
</tr>
<tr>
<td>71 Sea Blue</td>
<td>Occasionally used for cool tints and non-realistic area lighting.</td>
</tr>
<tr>
<td>72 Azure Blue</td>
<td>A clean slightly green blue. Good moonlight fill.</td>
</tr>
<tr>
<td>4315 CC 15 Cyan</td>
<td>Very pale blue green. Interesting industrial daytime skies. Use with caution on skin tones.</td>
</tr>
<tr>
<td>4330 CC 30 Cyan</td>
<td>Double 4315. Slightly greener than “normal” daylight. Uncomfortable skylight.</td>
</tr>
<tr>
<td>4360 CC 60 Cyan</td>
<td>Double 4330. Strong eerie daylight. Simulates fluorescent and industrial light sources.</td>
</tr>
<tr>
<td>73 Peacock Blue</td>
<td>Fantasy moonlight. Crisp and beautiful.</td>
</tr>
<tr>
<td>74 Night Blue</td>
<td>Fantasy moonlight. Crisp and beautiful.</td>
</tr>
<tr>
<td>376 Bermuda Blue</td>
<td>A soothing green blue. More blue than 76. A good conventional moonlight color. Interesting tonal color.</td>
</tr>
<tr>
<td>78 Trudy Blue</td>
<td>A rich clean red blue that warms to lavender when dimmed.</td>
</tr>
<tr>
<td>378 Alice Blue</td>
<td>Moody, cloudy blue with lavender undertones. Urban night skies and ominous, mystical moonlight.</td>
</tr>
<tr>
<td>81 Urban Blue</td>
<td>Very cold brittle feeling.</td>
</tr>
<tr>
<td>82 Surprise Blue</td>
<td>Deep rich blue with slight amount of red.</td>
</tr>
<tr>
<td>363 Sapphire</td>
<td>A deep romantic blue on the red side.</td>
</tr>
<tr>
<td>84 Zephyr Blue</td>
<td>A true blue with excellent punch or bright skies.</td>
</tr>
<tr>
<td>385 Royal Blue</td>
<td>Excellent for non-realistic backgrounds.</td>
</tr>
</tbody>
</table>
**Filters for the cyc/sky**

<table>
<thead>
<tr>
<th>Filters</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Golden Amber</td>
<td>Useful as amber cyc light and late sunsets.</td>
</tr>
<tr>
<td>Deep Amber</td>
<td>Very useful as a backlight. Dramatic specials and firefight.</td>
</tr>
<tr>
<td>Light Red</td>
<td>Vibrant red. Good alternative primary.</td>
</tr>
<tr>
<td>Medium Red</td>
<td>Good red primary for use with three-color light primary systems in</td>
</tr>
<tr>
<td></td>
<td>cyclorama lighting, footlights, border lights.</td>
</tr>
<tr>
<td>Medium Violet</td>
<td>Midnight and moonlight illusions. Enforces mysterious mood. Useful for</td>
</tr>
<tr>
<td></td>
<td>evening cyc wash.</td>
</tr>
<tr>
<td>Royal Lavender</td>
<td>Excellent for nighttime scenes. Rich, vivid accents, good in backgrounds.</td>
</tr>
<tr>
<td>VS Indigo</td>
<td>Cold blue cyc color with strong lavender cast. Earle moonlight cyc.</td>
</tr>
<tr>
<td>4290 CC 90 Blue</td>
<td>4260 + 4230. Deep red blue. Enhances deep blues in costumes and scenery.</td>
</tr>
<tr>
<td></td>
<td>Vibrant backlight.</td>
</tr>
<tr>
<td>Light Steel Blue</td>
<td>Useful for beams of realistic moonlight.</td>
</tr>
<tr>
<td>Daylight Blue</td>
<td>Useful for achieving depressed moods and dull skies.</td>
</tr>
<tr>
<td>Light Sky Blue</td>
<td>Excellent sky color. Useful for cyc and border.</td>
</tr>
<tr>
<td>Slate Blue</td>
<td>Clean medium blue. Good of sky color or moonlight.</td>
</tr>
<tr>
<td>Sky Blue</td>
<td>Excellent for early morning sky tones. Popular among designers for cyc and</td>
</tr>
<tr>
<td></td>
<td>borders.</td>
</tr>
<tr>
<td>Brilliant Blue</td>
<td>Used for dramatic moonlight effects.</td>
</tr>
<tr>
<td>Tahitian Blue</td>
<td>Medium bright blue with some green. Nice water effects color.</td>
</tr>
<tr>
<td>Peacock Blue</td>
<td>Good for fantasy, moonlight and water effects.</td>
</tr>
<tr>
<td>Sea Green</td>
<td>Teal blue green. Great for enhancing water scenes or deep sea environments.</td>
</tr>
<tr>
<td></td>
<td>Greener than R73.</td>
</tr>
<tr>
<td>Twilight Blue</td>
<td>Rich blue with slight green accent. Dramatic, mystical nighttimes.</td>
</tr>
<tr>
<td>Cerulean Blue</td>
<td>A crisp, clean blue-green. Useful as a water effect or as a sidelight for</td>
</tr>
<tr>
<td></td>
<td>dance.</td>
</tr>
<tr>
<td>Light Green Blue</td>
<td>Distinctive greenish blues. Useful for romantic moonlight.</td>
</tr>
<tr>
<td>Bermuda Blue</td>
<td>A soothing green blue. More blue than 76. A good conventional moonlight</td>
</tr>
<tr>
<td></td>
<td>color interesting tonal color.</td>
</tr>
<tr>
<td>Green Blue</td>
<td>Deep rich blue moonlight. Won’t shift red when taken down on dimmer.</td>
</tr>
<tr>
<td></td>
<td>Nice for color mixing.</td>
</tr>
<tr>
<td>VS Blue</td>
<td>Deep blue, fantasy moonlight or cyc color.</td>
</tr>
<tr>
<td>Primary Blue</td>
<td>Primary blue. For use with three color light primary system in cyc lighting.</td>
</tr>
<tr>
<td>Urban Blue</td>
<td>Very cold, hard, brittle feeling.</td>
</tr>
<tr>
<td>Congo Blue</td>
<td>Deep blue more saturated than 385. Good for dark night skies or</td>
</tr>
<tr>
<td></td>
<td>for a backlight color. A great color for rock and roll concert lighting.</td>
</tr>
<tr>
<td>Midnight Blue</td>
<td>Clean intense red-blue. Deeper than R83 with a little more red.</td>
</tr>
<tr>
<td>Royal Blue</td>
<td>Excellent for non-realistic backgrounds.</td>
</tr>
</tbody>
</table>

“The important thing to remember about lighting a cyc as a sky is that it can’t just be one solid color, like a blue. That’s an abstract wall of color, not a sky. If you really look at the sky-in any state-you’ll notice a vast array of layers and color. Here I used R3220 and R80 and a low-focused ground row for a cold, but beautiful horizon. In addition, I had Rosco create a custom glass moon gobo which just looked beautiful. I used a R3220 diagonal back light as well to really give this a moonlight-drenched feeling.”

Tom Weaver
"This event wanted to celebrate the Alley school and honor its colorful nature. The use of rich color with the mirror ball chandelier (29 in all) allowed all of these hues to layer in a very unconventional way. It was very exciting to experiment during this event as the chandelier of mirror balls created a refractive element for us to be creative with. I chose color combinations, such as R388 and R33 that would vibrate against each other, using ultra violets as a background tone."

Al Crawford

<table>
<thead>
<tr>
<th>Filters For Special Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROSCOLUX</td>
</tr>
<tr>
<td>10 Medium Yellow</td>
</tr>
<tr>
<td>11 Light Straw</td>
</tr>
<tr>
<td>Fire</td>
</tr>
<tr>
<td>21 Golden Amber</td>
</tr>
<tr>
<td>22 Deep Amber</td>
</tr>
<tr>
<td>324 Gypsy Red</td>
</tr>
<tr>
<td>Orange Red</td>
</tr>
<tr>
<td>26 Light Red</td>
</tr>
<tr>
<td>27 Medium Red</td>
</tr>
<tr>
<td>4790 CC 90 Magenta</td>
</tr>
<tr>
<td>39 Skelton Exotic Sangria</td>
</tr>
<tr>
<td>339 Broadway Pink</td>
</tr>
<tr>
<td>41 Salmon</td>
</tr>
<tr>
<td>342 Rose Pink</td>
</tr>
<tr>
<td>343 Neon Pink</td>
</tr>
<tr>
<td>344 Follies Pink</td>
</tr>
<tr>
<td>45 Rose</td>
</tr>
<tr>
<td>46 Magenta</td>
</tr>
<tr>
<td>346 Tropical Magenta</td>
</tr>
<tr>
<td>347 Belladonna Rose</td>
</tr>
<tr>
<td>48 Rose Purple</td>
</tr>
<tr>
<td>348 Purple Jazz</td>
</tr>
<tr>
<td>49 Medium Purple</td>
</tr>
<tr>
<td>349 Fisher Fuchsia</td>
</tr>
<tr>
<td>4990 CC 90 Lavender</td>
</tr>
<tr>
<td>358 Rose Indigo</td>
</tr>
<tr>
<td>59 Indigo</td>
</tr>
<tr>
<td>359 Medium Violet</td>
</tr>
<tr>
<td>370 Italian Blue</td>
</tr>
<tr>
<td>4330 CC 30 Cyan</td>
</tr>
<tr>
<td>FILTERS FOR SPECIAL EFFECTS (CONTINUED)</td>
</tr>
<tr>
<td>----------------------------------------</td>
</tr>
<tr>
<td>ROSEOLUX</td>
</tr>
<tr>
<td>4360 CC 60 Cyan</td>
</tr>
<tr>
<td>Double 4330. Greenish daylight. Good for simulating the glow of television screens.</td>
</tr>
<tr>
<td>4390 CC 90 Cyan</td>
</tr>
<tr>
<td>4360 + 4330. Strong cyan. Fantasy water scenes.</td>
</tr>
<tr>
<td>374 Sea Green</td>
</tr>
<tr>
<td>Teal blue green. Great for enhancing water scenes or deep sea environments. Greener than R73.</td>
</tr>
<tr>
<td>375 Carolean Blue</td>
</tr>
<tr>
<td>A crisp, clean blue-green. Useful as a water effect or as a sidelight for dance.</td>
</tr>
<tr>
<td>76 Light Green Blue</td>
</tr>
<tr>
<td>Distinctive greenish blue. Useful for romantic moonlight.</td>
</tr>
<tr>
<td>77 Green Blue</td>
</tr>
<tr>
<td>Rich blue, good for creating “fictional” night time lighting, film-noir moonlight.</td>
</tr>
<tr>
<td>79 Bright Blue</td>
</tr>
<tr>
<td>Cool clear bright blue.</td>
</tr>
<tr>
<td>80 Primary Blue</td>
</tr>
<tr>
<td>Primary blue. For use with three color light primary system in cyc lighting.</td>
</tr>
<tr>
<td>83 Medium Blue</td>
</tr>
<tr>
<td>Good for non-realistic night skies.</td>
</tr>
<tr>
<td>384 Midnight Blue</td>
</tr>
<tr>
<td>Clean intense red-blue. Deeper than R63 with a little more red.</td>
</tr>
<tr>
<td>86 Pea Green</td>
</tr>
<tr>
<td>Good for dense foliage and woodland effects.</td>
</tr>
<tr>
<td>386 Leaf Green</td>
</tr>
<tr>
<td>Bright, clean green. Less yellow than 86. Rich foliage and woodlands.</td>
</tr>
<tr>
<td>87 Pale Yellow Green</td>
</tr>
<tr>
<td>Sunny spring mornings.</td>
</tr>
<tr>
<td>4430 CC 30 Green</td>
</tr>
<tr>
<td>4490 CC 90 Green</td>
</tr>
<tr>
<td>4460 + 4430. Bright saturated clean green.</td>
</tr>
<tr>
<td>3317 1/8 Plus Green</td>
</tr>
<tr>
<td>Very pale green correction. Neutralizes magenta.</td>
</tr>
<tr>
<td>3316 1/4 Plus Green</td>
</tr>
<tr>
<td>Pale green correction. Helps incandescent sources simulate the green cast of fluorescent lamps.</td>
</tr>
<tr>
<td>3315 1/2 Plus Green</td>
</tr>
<tr>
<td>3304 Tough Plus Green</td>
</tr>
<tr>
<td>Correction to balance daylight sources with fluorescents. Slickly on skin tones.</td>
</tr>
<tr>
<td>88 Light Green (darker)</td>
</tr>
<tr>
<td>Light yellow green. Nice combined with 87 for leaf breakup.</td>
</tr>
<tr>
<td>388 Gaolight Green</td>
</tr>
<tr>
<td>A yellow-green similar to the color emitted by gas lighting fixtures. Appropriate for period pieces: La. La Boheme, and useful for creating reflections from fields and meadows.</td>
</tr>
<tr>
<td>89 Moss Green</td>
</tr>
<tr>
<td>Useful for mood, mystery and toning.</td>
</tr>
<tr>
<td>389 Chroma Green</td>
</tr>
<tr>
<td>Suggests reflected light from dense foliage. A brilliant cyc lighting color which will work for chroma-keying effects in television production.</td>
</tr>
<tr>
<td>2004 1/8 Green</td>
</tr>
<tr>
<td>Strong dominant green. Less yellow than 90. “Christmas tree” green.</td>
</tr>
<tr>
<td>90 Dark Yellow Green</td>
</tr>
<tr>
<td>Alternate primary where higher transmission is desired.</td>
</tr>
<tr>
<td>91 Primary Green</td>
</tr>
<tr>
<td>Primary green for three color primary system.</td>
</tr>
<tr>
<td>92 Turquoise</td>
</tr>
<tr>
<td>Useful for creating a mood of mystery and for toning scenery that has been spattered in blues.</td>
</tr>
<tr>
<td>392 Pacific Green</td>
</tr>
<tr>
<td>Nice medium blue green. Pretty aquamarine on HMI and discharge sources.</td>
</tr>
<tr>
<td>93 Blue Green (darker)</td>
</tr>
<tr>
<td>Cyan with stronger green tones, lighter than 95. Beautiful when contrasted with lavenders and purples. Good fantasy lighting.</td>
</tr>
<tr>
<td>393 Emerald Green</td>
</tr>
<tr>
<td>Perfect rich green without yellow or blue undertones. Flattering and pretty.</td>
</tr>
<tr>
<td>94 Kelly Green</td>
</tr>
<tr>
<td>Fantasy and unrealistic effects. Unflattering on skin tones.</td>
</tr>
<tr>
<td>95 Medium Blue Green</td>
</tr>
<tr>
<td>Used on foliage in moonlight areas or for creating a mood of mystery. Good for toning scenery painted in blues, blue-greens and greens.</td>
</tr>
<tr>
<td>395 Teal Green</td>
</tr>
<tr>
<td>A medium green-blue which can be used as a mystical special effect color.</td>
</tr>
<tr>
<td>97 Light Grey</td>
</tr>
<tr>
<td>Neutral greys to reduce intensity without affecting color temperature.</td>
</tr>
<tr>
<td>397 Pale Grey</td>
</tr>
<tr>
<td>A hafstop neutral density.</td>
</tr>
<tr>
<td>98 Medium Grey</td>
</tr>
<tr>
<td>Helpful in balancing brightness of lamps of different wattage.</td>
</tr>
<tr>
<td>398 Neutral Grey</td>
</tr>
<tr>
<td>40% transmission neutral grey filter. Cuts intensity of light without dimming so colors stay clean.</td>
</tr>
<tr>
<td>99 Chocolate</td>
</tr>
<tr>
<td>Warms light and reduces intensity.</td>
</tr>
</tbody>
</table>

“Green Violin was inspired by a Chagall painting. At the heart of his work is a gorgeous and unrestrained use of color. I mixed Resolux colors like a painter, using R26, R95 and R68 to light the interior of the white box, a palette that gave me almost any color I needed.”

Jane Cox
Permacolor Dichroics And How They Work

In a conventional color filter, white light is passed through the medium, which absorbs certain wavelengths of light, filtering them out of the composite white light. The rest of the spectrum passes through the filter, thus creating the desired color.

A dichroic color filter works differently. Instead of absorbing the unwanted portions of the spectrum, dichroic filters reflect them, acting as a very specialized mirror, but still passing the appropriate colored light.

The technology behind dichroic filters was developed well over a hundred years ago. Using vacuum deposition, thin layers of transparent dielectric materials (typically titanium dioxide and silicon dioxide) are deposited onto a low expansion glass substrate (typically borosilicate). As light crosses the boundary from one layer of one of these materials to another, a little bit of light is reflected. Dichroic filters are made of many layers—a green filter can have more than 50—so there is a lot of light reflected back and forth between the boundaries of the layers, which sets up patterns of constructive and destructive interference. That is, if light of a particular wavelength is reflected back over itself so that the peaks of the waves line up with the troughs, the waves cancel each other. On the other hand, if the peaks line up with the peaks, the waves reinforce each other. By carefully designing combinations of different thicknesses of layers and thus manipulating the path lengths that the internally reflected light must travel, it is possible to create a filter that lets certain portions of the spectrum pass through and that reflects other parts of the spectrum.

The effect of a dichroic filter is highly dependent on the angle at which the light strikes the filter. One result of this multi-layer filtering method is that the filtering action is dependent on the length of the path the light takes through the filter. If the light strikes the filter straight on, which is the way most dichroic filters are designed to be used, the light that passes through is the intended color. However, if the light strikes the filter at an angle, the path length is changed, and the color of the light transmitted is different. Light passing through the filter greater than 20° off normal incidence will be shifted away from the desired color noticeably. This produces a colored fringe or halo at the edge of the beam when used on lights with a beam spread greater than 40°. The wider the spread, the more obvious this color shift. While not possible in all instruments, the solution is to filter the light while the rays are essentially parallel, before they pass through any type of spread lenses. In the case of an ellipsoidal reflection spotlight, this can be accomplished by placing the filter in the gate of the instrument. In a PAR with interchangeable lenses, the filter should be located inside of the spread lens. Instruments using reflectors to create a wide spread are not appropriate for use with dichroic filters unless a rainbow effect is desired.

In Figure 1, a conventional glass or plastic filter absorbs the green light, allowing the red and blue (magenta) light to pass through. Figure 2 shows how a dichroic filter reflects the green light rather than absorbing it while transmitting the red and blue light.
Permacolor Dichroics And Roscolux

Dichroic filters offer several benefits over plastic filters. Most obviously, a dichroic filter can withstand continuous exposure to high temperature lighting instruments without fading or degrading. Borosilicate glass is rated for peak temperatures as high as 450°C. The coating itself can withstand continuous temperatures as high as 225°C.

An additional benefit of filters that use selective reflection of specific wavelengths of light is very pure and saturated colors. A dichroic filter in a deep saturated blue may transmit as much as 40% more blue light than an absorptive filter of a comparable color. This increased output may mean fewer luminaires are required in certain situations.

Dichroic filters offer lighting designers an excellent solution to many design problems. They offer higher color transmission, can withstand extremely high temperatures and can preserve the integrity of a design over a long run with little maintenance. However, they require more planning during the specification process. Using the resources of both the luminaire manufacturer and the filter suppliers, these minor hurdles can be overcome and the full benefits of this filter technology can be realized.

**USING DICHROIC FILTERS**

Given these unique characteristics, the specification and installation of dichroic filters requires some special care and attention.

- Insure that the lighting instrument in question does not have a beam spread wider than 40° or color fringing may result.
- Determine whether the maximum temperature of the lighting instrument exceeds the rating on the coating or the glass. Does the instrument create hot spots? Borosilicate glass has excellent thermal properties, but is rated for maximum hot spotting of 90°C / sq. cm.

---

### Permacolor Gel Color Reference

<table>
<thead>
<tr>
<th>Permacolor</th>
<th>Gel Color Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>#31002 Bastard Amber</td>
<td>E154</td>
</tr>
<tr>
<td>#31018 Amber Blush</td>
<td>R4630</td>
</tr>
<tr>
<td>#43409 1/4 CTO</td>
<td>R3409</td>
</tr>
<tr>
<td>#43408 1/2 CTO</td>
<td>R3408</td>
</tr>
<tr>
<td>#43407 CTO</td>
<td>R3102</td>
</tr>
<tr>
<td>#31012 Bright Straw</td>
<td>R2003</td>
</tr>
<tr>
<td>#31013 Goldenrod</td>
<td>E441</td>
</tr>
<tr>
<td>#35200 Yellow</td>
<td>E104</td>
</tr>
<tr>
<td>#35400 Amber</td>
<td>E015</td>
</tr>
<tr>
<td>#35600 Med Orange</td>
<td>E158</td>
</tr>
<tr>
<td>#35900 Orange</td>
<td>E135</td>
</tr>
<tr>
<td>#36100 Flame Red</td>
<td>E26</td>
</tr>
<tr>
<td>#36500 Primary Red</td>
<td>R27</td>
</tr>
<tr>
<td>#31033 Light Pink</td>
<td>R3318</td>
</tr>
<tr>
<td>#31337 Pale Pink</td>
<td>R336</td>
</tr>
<tr>
<td>#34758 Medium Pink</td>
<td>R64</td>
</tr>
<tr>
<td>#34630 Hot Pink</td>
<td>R39</td>
</tr>
<tr>
<td>#34763 Deep Magenta</td>
<td>R346</td>
</tr>
<tr>
<td>#34640 Vivid Magenta</td>
<td>R349</td>
</tr>
<tr>
<td>#34965 Lavender</td>
<td>R2009</td>
</tr>
<tr>
<td>#31048 Purple Fusion</td>
<td>R58</td>
</tr>
<tr>
<td>#31054 Lavender Accent</td>
<td>R55</td>
</tr>
</tbody>
</table>

---

### Reference Chart

<table>
<thead>
<tr>
<th>Permacolor</th>
<th>Gel Color Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>#31055 Lilac</td>
<td>E202</td>
</tr>
<tr>
<td>#31062 Booster Blue</td>
<td>R363</td>
</tr>
<tr>
<td>#31065 Mediterranean Blue</td>
<td>R69</td>
</tr>
<tr>
<td>#43208 1/4 CTB</td>
<td>E218</td>
</tr>
<tr>
<td>#43204 1/2 CTB</td>
<td>E203</td>
</tr>
<tr>
<td>#43202 CTB</td>
<td>E201</td>
</tr>
<tr>
<td>#35700 Sea Blue</td>
<td>E354</td>
</tr>
<tr>
<td>#35590 Cyan</td>
<td>E118</td>
</tr>
<tr>
<td>#35400 Sky Blue</td>
<td>E141</td>
</tr>
<tr>
<td>#35100 Lt Blue Green</td>
<td>R79</td>
</tr>
<tr>
<td>#31080 Primary Blue</td>
<td>R80</td>
</tr>
<tr>
<td>#34600 Med Red Blue</td>
<td>R385</td>
</tr>
<tr>
<td>#34200 Deep Purple</td>
<td>E181</td>
</tr>
<tr>
<td>#31073 Peacock Blue</td>
<td>R390</td>
</tr>
<tr>
<td>#34853 Turquoise</td>
<td>R94</td>
</tr>
<tr>
<td>#31066 Industrial Green</td>
<td>E121</td>
</tr>
<tr>
<td>#34959 Lt Yellow Green</td>
<td>E89</td>
</tr>
<tr>
<td>#35156 Fern Green</td>
<td>R389</td>
</tr>
<tr>
<td>#35055 Primary Green</td>
<td>E124</td>
</tr>
<tr>
<td>#43026 White Diffusion</td>
<td>R3027</td>
</tr>
<tr>
<td>#38000 IR/UV Filter</td>
<td>No Reference</td>
</tr>
<tr>
<td>#34000 UV Blocker</td>
<td>No Reference</td>
</tr>
</tbody>
</table>
Other Rosco Products

STANDARD STEEL GOBOS

After color filters, steel gobos are probably the lighting designers’ most widely used tools. When positioned in the optical path of theatrical spotlights, gobos will create shapes, shadows or texture and even project images or symbols.

Rosco offers hundreds of different designs and styles of standard gobos. These are generally available at theatrical supply houses throughout the world and can be purchased in sizes to fit theatrical spotlights or moving lights. The Rosco Gobo Catalog displays several hundred of the most popular designs. Alternatively the entire collection is available on the Rosco web site at www.rosco.com/us/gobos/

CUSTOM GOBOS, STEEL AND GLASS

Virtually any black and white image or logo can be made into an inexpensive steel gobo at Rosco’s laboratory in Texas. Steel gobos are etched from 5 mil, hard rolled stainless steel.

Rosco produces five different types of custom glass gobos, from high resolution black and white for photographic images, to one, two three or more color gobos. For three or more colors, another option are high definition photogobos.

For fast service and more information on custom gobos, contact Rosco by phone at 1-866-228-2256 or on the Rosco web site at http://www.rosco.com/us/gobos/placeorder.cfm

EXAMPLES OF CUSTOM SPECTRUM GOBOS:

- HIGH RESOLUTION
- ONE COLOR
- TWO COLOR
- MULTI-COLOR
- HIGH DEFINITION PHOTO GBO

GLASS GOBOS

Rosco offers five different types of standard glass gobos, many available off the shelf at theatrical supply dealers.

When used in Rosco Gobo Rotators, these gobos offer designers the opportunity to create such effects as rain, fire, snow, etc. They are often used without rotators to create brilliant background textures or colors. All Rosco glass gobos are available in sizes to fit theatrical spotlights, and many are available in moving light sizes as well.

See the Rosco Gobo Catalog for a complete selection of these gobos.
"... the Art of the Theatre is neither acting nor the play, it is not the scene nor dance, but it consists of all the elements of which these things are composed: action, which is the very spirit of acting; words, which are the body of the play; line and colour, which are the very heart of the scene ...

One is no more important than the other, no more than one colour is more important to a painter than another, or one note more important than another to a musician."

— Edward Gordon Craig
1911
278 CM - 4-1/2" Dia, 7-1/4" H
Incandescent lamping: Accepts one 75W Maximum Par30 lamp.
Fluorescent lamping: (-13Q/O) includes one 13W CF lamp with
120 Volt/NPF magnetic ballast or one 16W (-18QE/O) CF lamp with electronic
120 thru 277 Volt ballast, housed in secondary (6" dia) canopy (adds 1-3/4" to H).
Please ADD desired Finish and Light Source codes to catalog number when ordering.
Example: 278 CM DB (Incandescent - no Light Source code required)
Available Options: T

279 CM - 6" Dia, 9" H
Incandescent lamping: Accepts one 150W Maximum Par38 lamp.
Fluorescent lamping: (-13Q/O) includes one 13W or 22W (-22Q/O) CF lamp with
120 Volt/NPF magnetic ballast or one 28W (-28E/O) CF lamp with electronic
120 thru 277 Volt ballast, housed in secondary canopy (adds 1-3/4" to H).
Also available with one 32W or 42W CF lamp (-32TE/O, -42TE/O).
Please ADD desired Finish and Light Source codes to catalog number when ordering.
Example: 279 CM BL-13Q/O
Available Options: B, R, RT, T

290 CM - 8" Dia, 14" H
Incandescent lamping: Accepts one 250W Maximum Par38 lamp.
Fluorescent lamping: (-13Q) includes one 13W or 28W (-28Q) CF lamp with
120 Volt/NPF magnetic ballast or one 26W (-26TE) CF lamp with electronic
120 thru 277 Volt ballast. Also available with one 32W, 42W or 57W lamp
(-32TE, -42TE, -57TE).
Please ADD desired Finish and Light Source codes to catalog number when ordering.
Example: 290 CM WH-28TE
Available Options: B, R, RT, T

290T CM - 8" Dia, 14" H
H.I.D. lamping: Supplied with Tempered Glass Lens. Includes one 50W, 70W or
100W medium-base lamp with magnetic ballast. (+H50, -H70, -H100) High
Pressure Sodium (120 Volt/NPF only) or (-M50, -M70, -M100) Metal Halide
(120 Volt HPF). For 277 Volt/HPF, add suffix (277 (-M50/277, -M70/277,
-M100/277)).
Please ADD desired Finish and Light Source codes to catalog number when ordering.
Example: 290T CM R DB-M50 (R suffix indicates optional reflector)
Available Options: QRS, R

Options & Accessories:
(add "suffix" to catalog number)
B - Black Milli-Groove
Baffle: 279 CM B, 290 CM B
R - Specular
Aluminum Reflector: 279 CM R, 290 CM R, 290T CM R
RT - Specular
Aluminum Reflector and Tempered Glass Lens: 279 CM RT, 290 CM RT
T - Tempered Glass Lens
278 CM T, 279 CM T, 290 CM T
QRS - Quartz Re-Strike:
(mini-cand lamp by others)
290T CM QRS, 290T CM R QRS

PLEASE NOTE: Baffle not available in combination with Reflector or Tempered Glass Lens.
# Table of Contents

Introduction ............................................. 1
- Using this Manual ......................................... 2
- Register Your Ion ........................................... 3
- Help from ETC Technical Services ......................... 3

Important Concepts ........................................ 4
- Channel = Fixture ....................................... 4
- Output .................................................... 4
- Record Target ........................................... 4
- Move Instruction ........................................ 4
- Manual Data ............................................. 4
- Syntax Structure ......................................... 4
- Parameters and Parameter Categories ...................... 5
- Tracking vs. Cue Only .................................... 5
- Move Fade ................................................ 6
- Block vs. Assert .......................................... 6
- Live and Blind ........................................... 7
- HTP vs. LTP ............................................. 7

Other Reference Materials ................................. 8
- Help System ............................................. 8
- Online Eos Family (Eos Ti, Eos, Gio and Ion) User Forums ........ 8

Chapter 1 System Overview ............................... 9
- System Components ..................................... 10
- Console .................................................. 10
- Remote Processor Unit (RPU) ............................ 10
- Remote Video Interface (RVI) ........................... 10
- Radio Focus Remote (RFR) .............................. 10
- iRFR and aRFR .......................................... 10
- Gateways ............................................... 11

- Console Geography ..................................... 12
- Terminology ............................................. 13
- Littlites .................................................. 14
- Cleaning Ion ............................................. 14
- Outputting DMX ......................................... 14

- Console Capacities ..................................... 15
- Output Parameters ....................................... 15
- Channel Counts ......................................... 15
- Cues and Cue Lists ..................................... 15
- Record Targets ......................................... 15
- Faders .................................................... 15
# Chapter 2: System Basics

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting Up the Hardware</td>
<td>18</td>
</tr>
<tr>
<td>Power</td>
<td>19</td>
</tr>
<tr>
<td>Power Up the Console</td>
<td>19</td>
</tr>
<tr>
<td>Power Down the Console</td>
<td>19</td>
</tr>
<tr>
<td>Your First Interaction</td>
<td>20</td>
</tr>
<tr>
<td>Single Monitor Configuration</td>
<td>20</td>
</tr>
<tr>
<td>Dual Monitor Configuration</td>
<td>21</td>
</tr>
<tr>
<td>The Central Information Area (CIA)</td>
<td>22</td>
</tr>
<tr>
<td>Parameter Display</td>
<td>22</td>
</tr>
<tr>
<td>Browser</td>
<td>22</td>
</tr>
<tr>
<td>Collapse/Expand the CIA</td>
<td>22</td>
</tr>
<tr>
<td>Lock the CIA</td>
<td>23</td>
</tr>
<tr>
<td>Favorite CIA Display</td>
<td>23</td>
</tr>
<tr>
<td>Locking the Facepanel</td>
<td>23</td>
</tr>
<tr>
<td>Using the Browser</td>
<td>24</td>
</tr>
<tr>
<td>Virtual Keyboard</td>
<td>24</td>
</tr>
<tr>
<td>Fader Module</td>
<td>25</td>
</tr>
<tr>
<td>Using Direct Selects</td>
<td>25</td>
</tr>
<tr>
<td>Direct Selects in Flexi Mode</td>
<td>26</td>
</tr>
<tr>
<td>Clear Functions</td>
<td>27</td>
</tr>
<tr>
<td>Display Control and Navigation</td>
<td>28</td>
</tr>
<tr>
<td>Opening and Closing Displays</td>
<td>28</td>
</tr>
<tr>
<td>Selecting Displays</td>
<td>29</td>
</tr>
<tr>
<td>Moving Displays</td>
<td>29</td>
</tr>
<tr>
<td>Scrolling within a Display</td>
<td>29</td>
</tr>
<tr>
<td>Expanding Displays</td>
<td>30</td>
</tr>
<tr>
<td>Zooming Displays</td>
<td>30</td>
</tr>
<tr>
<td>Graphical User Interface (GUI) Display Conventions</td>
<td>31</td>
</tr>
<tr>
<td>Indicators in the Live/Blind Display</td>
<td>31</td>
</tr>
<tr>
<td>[Data] Key</td>
<td>35</td>
</tr>
<tr>
<td>[Time] Key</td>
<td>35</td>
</tr>
<tr>
<td>[Label] Key</td>
<td>35</td>
</tr>
<tr>
<td>Using Flexichannel</td>
<td>36</td>
</tr>
<tr>
<td>Indicators in the Playback Status Display</td>
<td>37</td>
</tr>
<tr>
<td>Using [Format]</td>
<td>39</td>
</tr>
<tr>
<td>Encoders</td>
<td>45</td>
</tr>
<tr>
<td>Encoder Navigation</td>
<td>45</td>
</tr>
<tr>
<td>Locking the Encoders</td>
<td>45</td>
</tr>
<tr>
<td>Encoders in Blind</td>
<td>45</td>
</tr>
<tr>
<td>Flexi Encoders</td>
<td>45</td>
</tr>
<tr>
<td>Moving Light Controls</td>
<td>46</td>
</tr>
<tr>
<td>ML Controls</td>
<td>46</td>
</tr>
<tr>
<td>Using Softkeys</td>
<td>47</td>
</tr>
<tr>
<td>Context Sensitive Softkeys</td>
<td>47</td>
</tr>
<tr>
<td>Changing Softkey Pages</td>
<td>47</td>
</tr>
</tbody>
</table>
Chapter 3
Managing Show Files

Create a New Show File
Open an Existing Show File
Selective Partial Show Opening
Merging Show Files
Printing a Show File
Saving the Current Show File
Using Quick Save
Using Save As
Importing Show Files
Exporting a Show File
Deleting a File
File Manager

Chapter 4
Patch

About Patch
Displays
Flexichannel Views in Patch
Labeling
Patching Conventional Fixtures
Patching By Channel
Range Patching
Patching By Address
Using Output Address vs Port/Offset
Replace
Helpful Hints
(Address) [i]/[j]
Dimmer Doubling
Moving and Copying Channels
Swapping Channels
Unpatch a Channel
Deleting Channels
Using (Offset) in Patch
Creating multi-part and compound channels

Using the Scroller/Wheel Picker and Editor
Using the Picker
Using the Editor
Calibrating a Scroller Using the Encoders
Calibrating a Scroller Using the ML Display
Patching Moving Lights, LEDs, and Accessories
Display Pages in Patch
{Patch} Display and Settings
{Attribute} Display and Settings
(Database) Display and Settings ........................................... 80
Using Device List ................................................................... 82
Dimmer List for CEM+, CEM3, and FDX 2000 ......................... 82
RDM Device List ................................................................. 84
Patching Discovered Dimmers and RDM Devices ..................... 86
Errors and Warnings ............................................................. 86
Detaching Devices .................................................................. 87
Clearing the Patch .................................................................. 87
Reset Patch ........................................................................... 87
Fixture Creator ....................................................................... 88
Creating a New Fixture ............................................................ 88
Copying a Fixture ..................................................................... 92
Merging Custom Fixtures into a New Show File ....................... 92
Importing a Custom Fixture .................................................... 92
Update Library ....................................................................... 92
Snap Parameters .................................................................... 93

Chapter 5 Setup ................................................................. 95
Opening Setup ....................................................................... 96
Show .................................................................................. 96
Desk ................................................................................... 103

Chapter 6 Basic Manual Control ................................. 111
Selecting Channels ................................................................. 112
Select Channels From the Keypad .......................................... 112
Selecting Channels from Faders ............................................ 112
Using Groups as a Channel Collector ................................... 112
Offset ................................................................................. 113
Setting Intensity .................................................................... 114
Level Wheel .......................................................................... 114
Manual Control of Non-intensity Parameters (NPs) ................ 115
Parameter Display ................................................................. 115
Setting Parameters with the Keypad ...................................... 116
Adjusting Parameters Using + and - ..................................... 116
Setting Non-intensity Parameters with the Encoders .............. 116
Using the Color Picker .......................................................... 121
Home ................................................................................. 123
Select Last ............................................................................ 123
Multiple Intensity Channels .................................................... 124
Lamp Controls ....................................................................... 125
Using +% and -% .................................................................. 126
Channel Intensity ................................................................... 126
Non-intensity Parameters ...................................................... 126
Remainder Dim ..................................................................... 127
Highlight and Lowlight ......................................................... 128
Chapter 7

Using Groups ............... 133

Recording Groups Live ................ 134
Ordered Channels .................. 134
Offset .......................... 135
Editing and Updating Groups in Live ................ 135
Selecting Groups ................ 135
Deleting Groups ................ 135
Group List ....................... 136
Open the Group List ................ 136
Ordered View and Numeric View ................ 136
Editing Groups from the Group List ................ 136
Using Groups as a Channel Collector ................ 137

Chapter 8

Storing and Using Palettes ............. 139

About Palettes ................. 140
Palette Types .................. 140
Intensity Palettes ............. 140
Focus Palettes ................ 140
Color Palettes ................ 140
Beam Palettes ................ 140
Palette Options ................. 140
(By Type) ..................... 140
(Absolute) ................... 140
(Locked) .................... 141
Storing Palettes Live ............... 142
Storing Palettes with [Record] ................ 142
Storing Palettes with [Record Only] ................ 143
Using Filters with Palettes ................ 144
Recalling Palettes ................. 145
Editing Palettes Live ............... 146
Rerecord ..................... 146
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using [Cue Only / Track]</td>
<td>168</td>
</tr>
<tr>
<td>Timing</td>
<td>169</td>
</tr>
<tr>
<td>Setting Cue Level Timing</td>
<td>169</td>
</tr>
<tr>
<td>Non-intensity Parameter Category Timing</td>
<td>170</td>
</tr>
<tr>
<td>Delay Time</td>
<td>171</td>
</tr>
<tr>
<td>[Time][]</td>
<td>171</td>
</tr>
<tr>
<td>Discrete Channel or Parameter Timing</td>
<td>172</td>
</tr>
<tr>
<td>Assigning Cue Attributes</td>
<td>173</td>
</tr>
<tr>
<td>Clearing Cue Attributes</td>
<td>175</td>
</tr>
<tr>
<td>Flags</td>
<td>176</td>
</tr>
<tr>
<td>Block</td>
<td>176</td>
</tr>
<tr>
<td>Assert</td>
<td>177</td>
</tr>
<tr>
<td>AllFade</td>
<td>177</td>
</tr>
<tr>
<td>Mark</td>
<td>177</td>
</tr>
<tr>
<td>Preheat</td>
<td>177</td>
</tr>
<tr>
<td>Using External Links</td>
<td>178</td>
</tr>
<tr>
<td>Modifying Cues Live</td>
<td>179</td>
</tr>
<tr>
<td>Using [Alt] [Enter]</td>
<td>179</td>
</tr>
<tr>
<td>Using Record</td>
<td>179</td>
</tr>
<tr>
<td>Using Record Only</td>
<td>180</td>
</tr>
<tr>
<td>Record and Record Only [+]</td>
<td>180</td>
</tr>
<tr>
<td>Move To</td>
<td>180</td>
</tr>
<tr>
<td>[Update]</td>
<td>181</td>
</tr>
<tr>
<td>Recording and Editing Cues from Blind</td>
<td>186</td>
</tr>
<tr>
<td>From Summary or Table Views</td>
<td>187</td>
</tr>
<tr>
<td>From the Cue Spreadsheet</td>
<td>187</td>
</tr>
<tr>
<td>Using Encoders in Blind</td>
<td>188</td>
</tr>
<tr>
<td>Deleting Cues</td>
<td>189</td>
</tr>
<tr>
<td>In Track Mode</td>
<td>189</td>
</tr>
<tr>
<td>In Cue Only Mode</td>
<td>189</td>
</tr>
<tr>
<td>Chapter 12 Using Mark</td>
<td>191</td>
</tr>
<tr>
<td>AutoMark</td>
<td>192</td>
</tr>
<tr>
<td>Conditions Triggering an AutoMark</td>
<td>192</td>
</tr>
<tr>
<td>Allowing a Live Move</td>
<td>192</td>
</tr>
<tr>
<td>AutoMark and Timing</td>
<td>192</td>
</tr>
<tr>
<td>Referenced Marks</td>
<td>193</td>
</tr>
<tr>
<td>Setting Referenced Mark Flags</td>
<td>193</td>
</tr>
<tr>
<td>Applying Flags as Channels are Marked</td>
<td>194</td>
</tr>
<tr>
<td>Reference Marks and Timing</td>
<td>197</td>
</tr>
<tr>
<td>Mark Time</td>
<td>197</td>
</tr>
<tr>
<td>Chapter 13 Using Filters</td>
<td>199</td>
</tr>
<tr>
<td>Record Filters</td>
<td>200</td>
</tr>
<tr>
<td>Partial Filters</td>
<td>201</td>
</tr>
<tr>
<td>Removing Filters</td>
<td>201</td>
</tr>
<tr>
<td>Storing Data with Record Filters</td>
<td>201</td>
</tr>
<tr>
<td>Chapter 17</td>
<td>Advanced Manual Control</td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td></td>
<td>Using [Copy To]</td>
</tr>
<tr>
<td></td>
<td>Using [Recall From]</td>
</tr>
<tr>
<td></td>
<td>Using (Make Null)</td>
</tr>
<tr>
<td></td>
<td>In Live</td>
</tr>
<tr>
<td></td>
<td>In Blind</td>
</tr>
<tr>
<td></td>
<td>Using (Make Manual)</td>
</tr>
<tr>
<td></td>
<td>Using (Make Absolute)</td>
</tr>
<tr>
<td></td>
<td>Using (Query)</td>
</tr>
<tr>
<td></td>
<td>Using [Capture]</td>
</tr>
<tr>
<td></td>
<td>Using [Undo]</td>
</tr>
<tr>
<td></td>
<td>Command History</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 18</th>
<th>Using Park</th>
<th>235</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Using Park</td>
<td>236</td>
</tr>
<tr>
<td></td>
<td>Park Display</td>
<td>236</td>
</tr>
<tr>
<td></td>
<td>Parked Values in Live</td>
<td>236</td>
</tr>
<tr>
<td></td>
<td>Scaled Parked Values in Live</td>
<td>237</td>
</tr>
<tr>
<td></td>
<td>Parked Addresses in Live</td>
<td>237</td>
</tr>
<tr>
<td></td>
<td>Park Values from the Park Display</td>
<td>238</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 19</th>
<th>Creating and Using Effects</th>
<th>239</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>About Effects</td>
<td>240</td>
</tr>
<tr>
<td></td>
<td>The Effect List</td>
<td>240</td>
</tr>
<tr>
<td></td>
<td>Effects Editor</td>
<td>241</td>
</tr>
<tr>
<td></td>
<td>Effect Status Display</td>
<td>244</td>
</tr>
<tr>
<td></td>
<td>Step Effects</td>
<td>245</td>
</tr>
<tr>
<td></td>
<td>Program a Step Effect</td>
<td>246</td>
</tr>
<tr>
<td></td>
<td>Absolute Effects</td>
<td>248</td>
</tr>
<tr>
<td></td>
<td>Program an Absolute Effect</td>
<td>249</td>
</tr>
<tr>
<td></td>
<td>Multiple Intensity HTP Effects</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>Relative Effects</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>Focus Effects</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>Color Effects</td>
<td>251</td>
</tr>
<tr>
<td></td>
<td>Linear Effects</td>
<td>251</td>
</tr>
<tr>
<td></td>
<td>Define a Pattern Shape</td>
<td>252</td>
</tr>
<tr>
<td></td>
<td>Program a New Relative Effect</td>
<td>252</td>
</tr>
<tr>
<td></td>
<td>Apply an Existing Effect</td>
<td>253</td>
</tr>
<tr>
<td></td>
<td>Recording an Effect in a Cue</td>
<td>253</td>
</tr>
<tr>
<td></td>
<td>Editing Effects Live</td>
<td>253</td>
</tr>
<tr>
<td></td>
<td>Stop an Effect</td>
<td>253</td>
</tr>
<tr>
<td></td>
<td>Deleting an Effect</td>
<td>253</td>
</tr>
<tr>
<td></td>
<td>Effects on Submasters</td>
<td>254</td>
</tr>
</tbody>
</table>
Appendix C  Multi-console and Synchronized Backup . 357
  Overview.................................................. 357
  Multi-console setup .................................... 358
  Synchronized Backup. ................................. 361
  Mirror Mode ............................................. 365

Appendix D  Using the RPU and RVI ................. 367
  RPU Overview ........................................... 367
  Remote Processor Unit (RPU) ......................... 368
  Start Up .................................................. 369
  Software Configuration ................................. 370
  Basic Use Guidelines ................................. 371
    Net3 Services .......................................... 371
  RVI3 and RVI Overview ................................. 372
  Remote Video Interface 3 (RVI3) ..................... 372
  Remote Video Interface (RVI) ....................... 373
  Basic Use Guidelines for RVI3 and RVI ............. 375

Appendix E  Remote Control ......................... 377
  Remotes Overview ..................................... 377
    Phone Remote .......................................... 377
    Radio Focus Remote (RFR) ............................ 378
  Console Section Mode .................................. 379
  Basic Use Guidelines ................................. 381
  RFR Operation Modes .................................... 383
  Technical Specifications ............................. 387
    iRFR ...................................................... 388
    aRFR ...................................................... 388

Appendix F  Universal Fader Wings ................. 389
  Overview .................................................. 389
  1 x 20 Setup ............................................. 389
  2 x 10 and 2 x 20 Setup .............................. 389
  User Guidelines for Fader Wings ...................... 392
Welcome to the Ion Operations Manual. This manual is a comprehensive resource for users of the Ion control system.

This chapter contains the following sections:

- Using this Manual........................................2
- Register Your Ion........................................3
- Help from ETC Technical Services.........................3
- Important Concepts....................................4
- Other Reference Materials.................................8
- Online Eos Family (Eos Ti, Eos, Gio and Ion) User Forums .8

Note: For information on using show control with your system, see the Eos Family Show Control User Guide, which is available for download at www.etcconnect.com.
Using this Manual

In order to be specific about where features and commands are found, the following naming and text conventions will be used:

- Facepanel buttons are indicated in bold [brackets]. For example, [LIVE] or [Enter]. Optional keys are indicated in <angle brackets>, for example, <Cue> or <Sub>.
- Browser menus, menu items, and commands you must perform are indicated in bold text. For example: In the File menu, click Open. Or: Press [Record] [Preset] [Enter].
- Alphanumeric keyboard buttons are indicated in all CAPS. For example, [Load] or [Timing Disable].
- Keys which are intended to be pressed or held simultaneously are indicated with the “and” symbol. For example, [Load] & [Timing Disable].
- Softkeys and clickable buttons in the Central Information Area (CIA) are indicated in bold (braces). A note about <More SK> (more softkeys): this command is always indicated as optional, and is only indicated once in an instruction regardless of how many pages of softkeys exist. This is because there is no way to predict what softkey page you are on at any given time. Press <More Softkeys> until you find the required command.
- References to other parts of the manual are indicated in italics. When viewing this manual electronically, click on the reference to jump to that section of the manual.

Note: Notes are helpful hints and information that is supplemental to the main text.

CAUTION: A Caution statement indicates situations where there may be undefined or unwanted consequences of an action, potential for data loss or an equipment problem.

WARNING: A Warning statement indicates situations where damage may occur, people may be harmed, or there are serious or dangerous consequences of an action.

Please email comments about this manual to: TechComm@etcconnect.com
Register Your Ion

Registering your Ion system with ETC ensures that you will be notified of software and library updates, as well as any product advisories.

To register your console, you will need to enroll in “My ETC,” a personalized ETC Web site that provides a more direct path of communication between you and ETC.

Register now at http://www.etcconnect.com/product.registration.asp.

Help from ETC Technical Services

If you are having difficulties, your most convenient resources are the references given in this user manual. To search more widely, try the ETC Web site at www.etcconnect.com. If none of these resources is sufficient, contact ETC Technical Services directly at one of the offices identified below. Emergency service is available from all ETC offices outside of normal business hours.

When calling for assistance, please have the following information handy:

- Console model and serial number (located on back panel)
- Dimmer manufacturer and installation type
- Other components in your system (Unison®, other control devices, etc.)

**Americas**

Electronic Theatre Controls Inc.
Technical Services Department
3031 Pleasant View Road
Middleton, WI 53562
800-775-4382 (USA, toll-free)
+1-608 831-4116
service@etcconnect.com

**United Kingdom**

Electronic Theatre Controls Ltd.
Technical Services Department
26-28 Victoria Industrial Estate
Victoria Road,
London W3 6UU England
+44 (0)20 8896 1000
service@etceurope.com

**Asia**

Electronic Theatre Controls Asia, Ltd.
Technical Services Department
Room 1801, 18/F
Tower 1, Phase 1 Enterprise Square
9 Sheung Yuet Road
Kowloon Bay, Kowloon, Hong Kong
+852 2799 1220
service@etcasia.com

**Germany**

Electronic Theatre Controls GmbH
Technical Services Department
Ohmstrasse 3
83607 Holzkirchen, Germany
+49 (80 24) 47 00-0
techserv-hoki@etcconnect.com
Important Concepts

Before using Ion, you should read and familiarize yourself with the concepts defined below. You will find that understanding these terms and concepts will improve your efficiency with Ion.

Channel = Fixture

A fixture is defined as a group of related addresses that together control a device. An example of a fixture would be an ETC Revolution. This moving light contains 31 parameters that together allow you to perform various functions such as pan and tilt. Each of these attributes is addressed by a different output.

Ion treats fixtures and channels as one and the same. Unlike former ETC consoles where a fixture occupied one channel for each parameter, Ion assigns each fixture a single channel number. Individual parameters are then associated with that channel as additional lines of channel information.

Output

Outputs are the method by which level changes to channels are conveyed to attached devices. These outputs are patched to channels. In its simplest form, an output is the data signal sent from the console to turn on a light or modify a fixture parameter.

Record Target

A record target is any data location that you can store data using a [Record] or [Record Only] command. Examples of record targets are cues, palettes, presets, and macros.

Move Instruction

A move instruction is any change to a parameter from its previous stored value. Any change to a channel’s intensity is a move instruction. Any change to a channel’s pan or tilt is a move instruction. Any change to a channel’s color mixing is a move instruction, and so on.

Manual Data

Manual data is any value set for a channel via the command line. Manual data will remain at its value until a move instruction is provided for it.

Syntax Structure

Most instructions can be entered into Ion through the command line. The Ion command line expects instructions to be entered in a specific structure, or syntax.

Generally speaking, the order of syntax can be described as:

- What are you trying to affect? (Channel, group)
- What do you want it to do? (Change intensity, focus, pan and tilt)
- What value do you want? (Intensity at full, iris at 50)

Naturally other commands will be used in the course of programming your show, but most other functions are modifiers of these three basic steps: modifying the channel(s) you are working with, determining what parameters of those channels you are impacting, and what value you want them to assume. When working with record targets, the syntax is similar.

Note: Not all actions on Ion must be entered from the command line, although many will result in a command line instruction. Other actions bypass the command line entirely.
Enter

Since the command line can receive multiple edits and instructions at once, it is necessary to let Ion know when you have completed your instruction in the command line. This is done with the [Enter] key.

There are some commands which are self-terminating, and therefore do not require [Enter] to be pressed. Some (but not all) of these commands are:

- [Out]
- [Shift] & [+]
- [Shift] & [-]
- [Full] [Full]
- Actions from the direct selects

Parameters and Parameter Categories

Ion divides fixture parameters into four major parameter categories: Intensity, Focus, Color, and Beam. These are the parameters in each category:

- Intensity . . . . . . . Intensity
- Focus . . . . . . . Pan and Tilt
- Color . . . . . . . . All color parameters (such as color wheel, CMY, scrollers, and so on).
- Beam . . . . . . . . Any parameter not covered in the other categories.

Tracking vs. Cue Only

Ion is, by default, a tracking console. This means two things. First, tracking relates to how cue lists are created. Once data is in a cue list, it will remain a part of that cue list, at its original setting, and track forward through subsequent cues, until a new instruction is provided or until it is removed from the cue list using filters or null commands.

Secondly, tracking relates to how changes to cue data are handled. Unless otherwise instructed by a Cue Only command, changes to a parameter in a cue will track forward through the cue list until a move instruction (or block command) is encountered.

It is possible to change the default setting of Ion to “Cue Only”. This prevents changes from tracking forward into subsequent cues, unless overridden with a track instruction.

Ion also has a [Cue Only/Track] button that allows you to record or update a cue as an exception to the default setting. Therefore, if the console is set to Tracking, the button acts as Cue Only. If console is set to Cue Only, it behaves as a Track button.
Move Fade

Move Fade is a lighting control philosophy which determines how cues are played back. Ion adheres to this philosophy.

In a Move Fade system, parameters do not change from their current setting until they are provided a move instruction in a cue or are given a new instruction manually.

For example, in cue 1, channel 1 has been given an intensity value of 50%. This value does not change until cue 20, where channel 1 is moved to 100%. Therefore, channel 1 has a tracked intensity value of 50% in cues 2-19. If the user applies a manual intensity value of 25% while sitting in cue 5 (for example), that channel will stay at 25% until Cue 20 is recalled - because 20 is the next cue in which channel 1 has a move instruction. The original intensity of 50% will not be reapplied in subsequent cues unless specifically called out by the cue or manually performed.

Cue List Ownership

Ion is capable of running multiple cue lists. In a multiple-cue-list console, cue list ownership is an important concept. Cue list ownership is determined by the cue from which a channel is currently receiving its value. In Live, a parameter is considered to be "owned" by a cue list when it is receiving its current value from that cue list.

When alternating between cue lists in sequential playback, an active cue list does not necessarily own a channel unless that list has provided the last move instruction for that channel. For example, assume a channel is owned by cue list 1 and is at a tracked value. If a cue from another cue list is executed and provides a move instruction for the channel in the new cue, the channel is now owned by the second cue list. It will not return to cue list 1 until that cue list provides a move instruction for the channel.

Assert may be used to override this default behavior, allowing a cue list’s control over a channel to resume, even when the channel’s data is tracked.

This rule is not followed when executing an out-of-sequence cue. An out-of-sequence cue is any cue that is recalled via "Go To Cue", a Link instruction, or manually changing the pending cue. In general applications, the entire contents of the cue (both moves and tracks) will be asserted on an out-of-sequence cue.

Block vs. Assert

In previous ETC consoles, placing a block instruction on a channel was a way to treat a tracked value as a move instruction, both in editing and playback. In Ion, this behavior is now split up. Blocked channel data is an editing convention only, and it prohibits tracked instructions from modifying the associated data. Blocked data has no impact on playback; the channels will continue to play back as though they were tracks. Assert is used to force playback of a tracked/block ed value.
Live and Blind
Live and Blind are methods to view and edit data in your show files. When you press the [Live] key, the screen will show you the live display. When you press [Blind], you will see the blind display. In either case, you may use the [Format] key to alter how the data is displayed (see Using [Format], page 39).

When in Live, the data displayed represents the data being sent from the console at that moment. In other words, the parameter data that is “live” on stage. When you edit data in live, those changes will become active and visible on stage as soon as the command line is terminated.

When in Blind, the data displayed represents data from the record target you choose to view (cues, presets, palettes, and so on). When you edit data in Blind, changes will not automatically appear on stage, since the data you are modifying is not live. This is true even if the record target you are modifying is active on stage. It is possible to play a cue in Live, then switch to Blind and edit that cue in blind without affecting levels on stage. Edits in Blind do not require a [Record] command to be stored. They are considered stored when the command line is terminated. Any display that is not the Live display is considered Blind, and the Blind LED will be illuminated. For example, if you open patch, the blue LED on [Blind] will be lit to show that you are in a Blind display.

HTP vs. LTP
HTP (Highest-Takes-Precedence) and LTP (Latest-Takes-Precedence) are terms used to define the output of a channel parameter that is receiving data from multiple sources. In HTP, the highest level of all sources will be executed. In LTP, the most recent level received will be executed. Cue lists and submasters can operate as HTP or LTP for intensity parameters only. Non-intensity parameters (NPs) are always LTP. Submasters can operate as HTP or LTP for intensity. The default is HTP. Ion’s default cue list setting for intensity is HTP (see HTP/LTP, page 209). Ion’s default submaster setting for intensity is HTP.

HTP
HTP is only applicable to the intensity of a channel. HTP channels will output the level that is the highest of all inputs. HTP channels are also referred to as “pile-on”, because as control inputs are added (for example - you may bring up cues and multiple submasters that all have the same channel recorded at various levels), the system calculates which input has the highest level for that channel and outputs that level for the channel. As control inputs are removed (you pull some of the submasters down to zero), the console will adjust the channel level, if required, to the highest remaining level.

LTP
LTP is applicable to any parameter of any channel. LTP output is based on the most recent move instruction issued to the channel parameter. Any new values sent to the channel will supersede any previous values, regardless of the level supplied. Ion determines the LTP value for a channel, which is overridden by any HTP input values that are higher than the LTP instruction. This is then finally modified by manual control.
Other Reference Materials

Help System
A keyhelp system is also contained within your system. To access help, press and hold [Help] and press any key to see:

- the name of the key
- a description of what the key enables you to do
- syntax examples for using the key (if applicable)

Note: Keyhelp is included on most tangible action buttons on your Ion console. This includes most softkeys and clickable buttons as well as the traditional keys on the keypad.
As with hard keys, the "press and hold [Help]" action can be also used with softkeys and clickable buttons.

Online Eos Family (Eos Ti, Eos, Gio and Ion) User Forums
You are encouraged to visit and participate in the ETC Eos Family (Eos Ti, Eos, Gio and Ion) User Forum, accessible from the ETC web site (www.etcconnect.com). This gives you access to an online community of Eos, Eos Ti, Gio, and Ion users where you can read about other users’ experiences, suggestions, and questions regarding the product as well as submit your own.

To register for the ETC Family (Eos Ti, Eos, Gio and Ion) User Forum:

Step 1: Go to ETC’s community web site (www.etcconnect.com/community). An introduction page to the online community will open.
Step 2: You may register for the forum using the “register” link in the introduction or by clicking the “join” link in the upper right corner of the page.
Step 3: Follow the registration instructions provided by the community page.
Chapter 1
System Overview

Inside this chapter you will find general descriptions of your Ion control console, how it fits into a network control system, and the various areas of user interface.

This chapter contains the following sections:

• System Components ..................................10
• Console Geography ..................................12
• Cleaning Ion ...........................................14
• Outputting DMX ......................................14
• Console Capacities ..................................15
System Components

Console
Ion is designed from conception as a fully integrated controller for conventional lights and multi-parameter devices (for example: moving lights, LEDs, color scrollers, gobo wheels). Attention to detail across all areas of the system design and architecture allows you the utmost flexibility and customization of use.

Ion allows designers and programmers to develop a mutual vocabulary for control. This implementation of simple and uniform syntax for control provides a solid foundation for both experienced and inexperienced users.

Remote Processor Unit (RPU)
The RPU can be used as the primary, backup processor for the system, a client, or for primary playback in installations that do not require a facepanel after initial programming is completed.

For more information, see the appendix Remote Processor Unit (RPU), page 383.

Remote Video Interface (RVI)
The remote video interface allows remote interaction with the lighting control system. This can be for display purposes only. Additionally, with a mouse and alphanumeric keyboard attached, the RVI can be used as a remote programming station. The RVI provides supports for a maximum of two DVI or SVGA monitors, 1280x1024 minimum resolution.

For more information, see the appendix Remote Video Interface (RVI), page 379.

Radio Focus Remote (RFR)
The RFR provides wireless control of key front panel functions. The base station for the RFR can be networked into the system, or can connect to a console or remote device using the USB interface.

For more information, see the appendix Remote Control, page 377.

iRFR and aRFR
The iRFR and aRFR provide wireless control of key front panel functions. See “iRFR” on page 388. See “aRFR” on page 388.
Gateways

Ion is part of a fully networked system capable of direct output of both ETCNet2 and Net3. Gateways can be configured to listen to either ETCNet2 or Net3 and provide interface to devices in the lighting system that do not accept network communication directly. Gateways are provided for DMX/RDM output, show control input and output and analog input and output.

- Net3 to DMX/RDM gateways are provided with a maximum of four outputs, which can be male, female, or terminal strip.

**Note:** Net3 Gateways only support RDM when in Net3 mode.

- Show Control Gateway supports MIDI In/Thru and Out and SMPTE In.
- I/O Gateway supports 24 analog inputs, 16 SPDT contact closure outputs, and RS-232 serial protocol.
Console Geography

Below is a diagram of the Ion console with references made to specific areas of use. The terms and names for each area and interface are used throughout this manual.

Parameter category/encoder page buttons

Softkeys

Navigation keys

Level wheel

Playback controls

Control keypad

Paged encoders

Power button

USB port

LCD screen

Blackout and Grandmaster

Parameter category/encoder page buttons

Softkeys

Navigation keys

Level wheel

Playback controls

Control keypad

Paged encoders

Power button

USB port

LCD screen

Blackout and Grandmaster

Current Ion Rear panel

IEC receptacle

Audio Ports (not currently supported)

MIDI Out and In

Remote trigger port

Phone Remote Port

DMX ports 1 and 2

Hard power switch

VGA port

DVI video ports

USB ports

Ethernet port

Original Ion Rear panel

IEC receptacle

Ethernet port

MIDI Out and In

Remote trigger port

Phone Remote Port

DMX ports 1 and 2

Hard power switch

VGA port (blue)

Audio Ports (not currently supported)

USB ports

Dual DVI video port (white)
Terminology

Power Button
The power button on the front of the console is used to power up or power down. A separate power switch, located in the rear panel, can be used to disconnect power from the console's internal components.

**WARNING:** Before servicing Ion, you must switch off the power on the rear panel and disconnect the power cord completely.

USB Ports
One USB port is provided on the front of the console to connect any USB storage device. An additional USB port on the rear panel can be used to connect peripherals such as an alphanumeric keyboard, pointing device, or touchscreen control for external monitors.

**CAUTION:** The USB ports cannot be used for charging devices such as cell phones.

Encoders
Encoders and the LCD (see below) for control of non-intensity parameters are provided at the top center of the console. The four encoders are pageable controls, which are populated on the LCD with the parameters used in your show.

LCD
This display accompanies the CIA as an additional user interface. This LCD offers you softkeys, encoder information, and an additional view of the command line.

Load
The load button is located above the fader pair at the bottom of the LCD and is used to load the specified cue.

Control Keypad
The control keypad area is divided into three general sections including record targets, numeric keypad and modifiers, and special function controls.

Level Wheel
Adjusts intensity for selected channels. It also provides scrolling and zoom functions in various modes.

Navigation Keypad
Used for quick access to the live and blind displays, format, paging, and navigation within displays.

Parameter Category/ Encoder Page Buttons
Parameter buttons are used to select parameter categories and change encoder pages. To post a parameter category to the command line, use [Shift] & [Encoder Page Button].

IEEE Ethernet 802.3 Ethernet Port
Ethernet port for connection to a network switch, network gateways, and accessory devices.
Littlites®

You may connect a Littlite to the side of your Ion console.

Dimming Littlites
Attached desk lamps can be dimmed either with the desk lamp control knob on the side of the console, or from the software.

Desk lamp controls are found in Setup>Desk>Brightness Settings. The [Desk Lamp] slider has a range of 0% (dimmest) to 100% (brightest). The default setting is 0%. The console will set the desk lamp to this setting on startup of the application. See "Brightness Settings" on page 108. The desk lamps can also be controlled by holding down [Displays] and rolling the level wheel.

Cleaning Ion
Should the exterior or LCD of your Ion require cleaning, you may gently wipe them with a dampened (not dripping), non-abrasive paper towel or soft cloth.

If this does not clean the console sufficiently, you may apply some window cleaner (containing ammonia is fine) to the cloth and repeat the process until clean.

Outputting DMX
In order to output levels from Ion, you can either use the DMX ports on the back of the console, or to output over a network, you may connect a Net3 gateway or Net2 node. If your devices receive Net3 or ETCNet2 directly, no gateway or node is required.

Ion has two DMX ports. To output, connect one 5 pin XLR cable per port. The first port will default to outputting the first universe of DMX, addresses 1-512, and the second port to the second universe, outputting addresses 513-1024. See Local DMX Outputs, page 351 for information on reconfiguring the DMX ports.

Nodes and gateways will function with Ion out of the box without previous configuration. However if custom configuration is required, you will need to use either NCE (Network Configuration Editor) or GCE (Gateway Configuration Editor). GCE is installed on Ion by default and can be accessed in ECU>Settings>Maintenance>Gateway Configuration Editor (GCE). NCE can be installed on the console or a Windows® PC for configuration.

For more information on Net3 gateways or Net2 nodes, see the product literature that accompanied the hardware or download it from our website at www.etcconnect.com.
Console Capacities

Output Parameters
- 1,024 outputs (DMX channels)
- or-
- 1,536 outputs (DMX channels)
- or-
- 2,048 outputs (DMX channels)
- or-
- 3,072 outputs (DMX channels)

Channel Counts
- 10,000 channels (any number from 1 to 99,999)

Cues and Cue Lists
- Up to 999 cue lists
- Up to 10,000 cues

Record Targets
- 1,000 Groups
- 1,000 x 4 Palettes (Intensity, Focus, Color and Beam)
- 1,000 Presets
- 1,000 Effects
- 1,000 Macros

Faders
- 1 dedicated Master Playback, with Go and Stop/Back
  - a maximum of 200 configurable playbacks, with Go and Stop/Back
  - a maximum of 300 configurable submasters, with Bump and Assert/Select
Chapter 2

System Basics

This chapter explains the base level procedures for setting up, navigating, and understanding how to operate Ion.

This chapter contains the following sections:

- Setting Up the Hardware ........................................ 18
- Power ................................................................. 19
- Your First Interaction ............................................... 20
- The Central Information Area (CIA) .......................... 22
- Using the Browser ................................................ 24
- Display Control and Navigation ............................... 28
- Graphical User Interface (GUI) Display Conventions .... 31
- Using [Format] ...................................................... 39
- Using Flexichannel ............................................... 36
- Encoders .............................................................. 45
- Moving Light Controls .......................................... 46
- Using Softkeys ..................................................... 47
Setting Up the Hardware

Follow these steps to prepare your Ion for use.

Step 1: Place your console on a firm, level surface. Be sure to leave space for access to the rear of the console. You will need to connect several items to the ports on the back.

Step 2: Connect any monitors to the proper ports on the back of the console.

**Note:** Ion supports up to 2 monitors, either 2 DVI-D monitors or 1 DVI-D and 1 VGA.

Step 3: Connect the keyboard and mouse. Attach to the appropriate connector on the back of the console.

Step 4: If you will be connecting to an Eos Family network, connect the appropriate Ethernet (CAT 5 or better) cable to the Ethernet port on the back of the console.

Step 5: If you plan on using the DMX ports on the back of Ion to control your lighting system, attach the appropriate DMX connector and cable to the desired port. These ports default to output DMX universes one and two. Configuration is required to use any other universe. For more information, see Local DMX Outputs, page 351 in the ECU appendix.

Step 6: Attach the appropriate IEC power cable for your location to the IEC connector on the back of the console, just above the power switch.

Your console hardware is now ready to be powered up.
Power

Power Up the Console

Step 1: Attach the appropriate power cable to the IEC connector on the rear of the console.
Step 2: Press the I/O switch (I is “on”) next to the IEC connector on the rear of the console to turn power on. This will provide power to all internal electronics.

Note: You need to wait about 30 seconds between steps 2 and 3.

Step 3: Press the power button, located in the top left corner of the console, above the USB port. The button LED will illuminate blue to indicate the console is running. The console will boot up into the Ion environment. The Ion system is now ready for use.

Note: In the future, you may go straight to the welcome screen by adjusting a setting in the ECU. See Open in Shell, page 337 in the ECU appendix.

Power Down the Console

Step 1: After saving your show (see below), in the browser menu select Power Off Device. A dialogue box opens asking you to confirm.
Step 2: Confirm this command by clicking {OK} in the dialog box. The console will power down.

-Or-
Step 1: Press the power button, located on the face panel. A dialogue box opens asking you to confirm.
Step 2: Confirm this command by pressing {OK} in the dialog box or by pressing the power button again. The console will power down.

Note: Ion is a persistent storage console. Therefore if you shut down your system without saving the show file, you will return to the same place in your show when you reboot.

Note: The console will display an improper shutdown message on the next power up if the console was not powered down from the browser menu or welcome screen.
**Your First Interaction**

When you first start up Ion, you will immediately enter the Ion software environment. Since Ion can be set up with one or two monitors, what you will first see depends partly upon the number of monitors you are using.

**Single Monitor Configuration**

When using a single monitor, the top half of the initial display screen becomes the primary viewing area for displayed information. Ion will first open with the live table display on the top (primary) half of the screen and the CIA on the bottom half of the screen.

When the CIA is open, one line of the playback status display is visible above the double arrows. You can view more of the playback status display by collapsing the CIA (see Collapse/Expand the CIA, page 22).
**Dual Monitor Configuration**

When two monitors are used, one monitor will default to showing the CIA, and the other will default to having the live display and the playback status display open on tabs.

For additional information on displays, see *Display Control and Navigation, page 28.*

Please see *Monitor Arrangement, page 338* for more information on configuring Ion for a dual monitor configuration.
The Central Information Area (CIA)

The Central Information Area (CIA) is displayed on the lower portion of the screen. By default, the CIA consists of two primary areas: the parameter display and the browser.

Parameter Display
This display shows the parameters available for patched channels. It is also where you can select which parameters to view in live or blind, or select parameters for command line control. The parameter display will dynamically change depending on the channel (fixture) selected and its applicable parameters.

Browser
The browser is the interface for numerous functions including saving a show, opening a show, changing settings, viewing record target lists, opening displays and many other functions.

Collapse/Expand the CIA
It is possible to collapse the CIA from view. To do this, you can click the double arrow icon centered above the CIA. The CIA will collapse from view, exposing a larger viewing area of whatever display is visible above the CIA. The double arrows will move to the bottom of the screen.

To expand the CIA into view again, click the double arrow at the bottom of the screen. The CIA will reopen.
**Lock the CIA**

You can lock the CIA in place to prevent it from being collapsed.

To lock the CIA, click on the lock above the browser. The double arrow above the CIA will disappear and the lock will “lock”.

To unlock the CIA, click the sunken lock again and the double arrows will reappear.

**Favorite CIA Display**

You can select a favorite default display for the CIA that will show when [Displays] is pressed. The standard default display for the CIA is the Browser.

The favorite display will show a gold star icon at the top of the CIA by the double arrows & lock. Displays that can be selected as a favorite, but are currently not, will show a grey star at the top of the CIA. Click on the grey star to make that display your favorite. That display will now be the new default display for the CIA. Displays that show up in the CIA but can not be the default display will not show the star icon.

The following displays can be set as the favorite CIA default:

- About
- Browser (default)
- Color Picker
- Direct Selects
- Virtual Sliders
- Virtual Keypad
- ML Controls
- Encoder Information Screen
- Effects Status

**Locking the Facepanel**

It is possible to lock out the facepanel, which prevents any actions from the command line or CIA.


---

**Note:**

This will also lock any fader wings or USB connected peripherals.
Using the Browser

To use the browser, you must first draw focus to it by clicking anywhere in the browser area of the CIA or by pressing the [Displays] key. If the browser is not visible, double pressing [Displays]>Browser will always bring up the browser.

When focus is on the browser, the window border highlights in gold. The scroll lock LED illuminates red and the paging keys will now control selection in the browser.

- Use the page arrow keys to move the selection bar up and down the list. You can also use the level wheel to scroll through the list.
- When the bar highlights the desired menu, press [Page ▼] to open the menu.
- Continue pressing [Page ▼] to open submenus.
- Scroll to the item you wish to open using [Page ▲] or [Page ▼] and then press [Select]. You may also click the item you wish to open and then press [Select]. You can also use the level wheel to scroll in the browser.
- If you wish to close a submenu scroll to that item and press [Page ◄].
- To draw focus to the CIA press the [Displays] key.
- Additional presses of [Displays] will minimize or restore the CIA.

**Note:**

The [Select] key can be used to confirm a choice in the browser.

Virtual Keyboard

It is possible to open a virtual keyboard in the CIA which mimics the hard keys found on the actual Eos keypad. The keypad will not match the facepanel on Ion. This virtual keyboard is accessible from the browser.

**To open the Virtual Keyboard on a monitor:**

1. Go to Browser>Virtual Controls>Virtual Keyboard. A window will open in the CIA displaying your monitor placement options for the keyboard.
2. Click the placement option in which you want the keyboard to appear.

**To close the Virtual Keyboard on a monitor:**

1. Go to Browser>Virtual Controls>Close Module. The placement screen will appear again in the CIA.
2. Click the placement of the module you wish to close. The module will be removed.
Fader Module

If you prefer to have faders available to you, the monitors can be populated with virtual faders, called fader modules.

To open the fader module on a monitor:

Step 1: Go to Browser>Virtual Controls>Fader Module. A window will open in the CIA displaying your monitor placement options for the module.
Step 2: Click the placement option in the CIA in which you want the module to appear.

To close the fader module on a monitor:

Step 1: Go to Browser>Virtual Controls>Close Module. The placement screen will appear again in the CIA.
Step 2: Click the placement of the module you wish to close. The module will be removed.

Using Direct Selects

Direct selects allow access to a number of controls, including a channel select display. If there are more items than can be viewed at once, you may view subsequent pages by using the page buttons ((Page ▲), (Page ▼)) by the direct selects.

Selecting Channels with Direct Selects

Channel direct selects are highlighted when selected. Channel selection is generally an additive process, if channels 1-5 are selected, pressing (Channel 6) adds channel 6 to the selection, leaving channels 1-5 also selected. Pressing (Channel 6) again will deselect the channel.

If you have labeled channels in patch, those labels will be displayed above the channel number when viewing channels in the direct selects.

It is possible to double hit a channel button. This selects that channel and deselects any previously selected channels.

• (Channel 1) - adds channel 1 to currently selected channels, if not currently selected.
• (Channel 1) (Channel 10) - adds channels 1 and 10 to currently selected channels.
• (Channel 1) (Channel 1) - selects channel 1, deselects all other channels.
• (Page ▼) - pages direct selects down by one page.
• (Page ▲) - pages direct selects up by one page.

Direct Selects

Ion gives you the option of opening direct select modules on the monitors.

To open the direct selects on a monitor:

Step 1: Go to Browser>Virtual Controls>5 x 10 Direct Select Module. A window will open in the CIA displaying your monitor placement options for the module.
Step 2: Click the placement option in which you want the module to appear.

To close the direct selects on a monitor:

Step 1: Go to Browser>Virtual Controls>Close Module. The placement screen will appear again in the CIA.
Step 2: Click the placement of the module you wish to close. The module will be removed.

For information on populating direct selects see Organizing the Direct Selects.
Organizing the Direct Selects
You have considerable flexibility in how you organize the direct selects. They may be arranged to display one of several different types of data.

To choose which information to view:

Step 1: Click the {Select} button for any block of direct selects. You will be offered the following choices to view: Channels, Groups, Intensity Palettes, Focus Palettes, Color Palettes, Beam Palettes, Presets, Macros, Effects, and Snapshot.

Step 2: Click the button for the data you wish to view and the associated direct selects will populate with any recorded information of that type. If there is no recorded information of that type the block of buttons will remain empty but will populate with data of that type as associated record targets are stored.

Step 3: You may also click {Select} again, without choosing any option, to return to the previous state.

You can increase/decrease the size of any set of direct selects by pressing the {20/50} button, which will change the display between one set of 50 buttons and two sets of 20 buttons. Or you may press the {100} button to expand to a full set of 100 buttons. Press {100} again to switch back to the previous view.

You may also press the {Expand} button (located beneath the {Select} button) to expand a set of direct selects to full screen. Press {Expand} again to return the set to its previous size and mapping. Century and Millennium buttons will display when direct selects are in expand mode.

When the direct selects are opened on a tab, two sets of direct selects will be displayed.

Direct Selects in Flexi Mode
Direct selects can be placed into a flexi mode, which will remove empty tiles. When {Select} is pressed, the {Show Flexi} button will display.

Note: A single empty direct select tile may remain if the adjacent direct select tiles are not sequential. This is to allow an easy way to insert a new direct select between the existing ones.
Clear Functions

You can access the various clear options from the browser by selecting {Clear} from the main browser menu. The clear functions window will open in the CIA.

From this menu you can select one of the available clear options by clicking on the desired button in the CIA. Ion will ask you for a confirmation before performing the selected clear. For {Clear Targets}, Ion will allow you to choose which record targets you want to clear.

From the {Clear Targets} screen you can select which record targets you wish to clear. The buttons at the center of the CIA represent all of the record targets that you can choose to clear. By default all components are selected (gray) and will be cleared. To withhold any targets from being cleared, simply deselect them in the CIA by clicking the respective button.

To reselect all targets, click the {Reset} button and all buttons will return to gray (selected). To stop the process, click the {Cancel} button.

When you have selected or deselected all of the record targets you require, click {OK}.

After clearing, the CIA will return to the browser. If you want to perform additional clear functions, you must select {Clear} from the browser again.

To exit the clear functions screen without clearing, press the [Displays] key at any time or select a clear button and then select {Cancel} from the confirmation screen.

Reset System vs Clear Show

Using {Reset System} will open a new show file and reset the Setup options to their defaults. Using {Clear Show} will only open a new show file.

Reset Patch vs Clear Patch

Using {Reset Patch} will clear your patch and set it to a 1-to-1 patch. Using {Clear Patch} will only clear out the patch.
Display Control and Navigation

Opening and Closing Displays

The live/blind display will always open as tab 1. The playback status display will always open as tab 2. Neither of these displays can be closed.

Other displays are numbered as they are opened. Tab numbering is useful for navigating to views.

Displays can be opened and closed in different ways, depending on the display. Many displays are accessible from the browser, while other displays are accessible from the LCD softkeys. The blind displays of record targets (also called "lists") can be quickly accessed by double pressing the record target button (for example, [Preset] [Preset] opens the preset list).

From the browser

Open and navigate the browser as described in Using the Browser, page 24. When you open a new display (such as the cue list index, group list, or patch) and it is posted in a tab view, it will open on monitor 2. If the display does not open as a tab view (such as "setup" or the browser) it will open in the CIA.

Again, any time you wish to return to the browser, simply press [Displays] and then (Browser) and it will be made available.

From the hardkeys

You can open list views of any record target by double-pressing the key for the desired record target.

From the LCD softkeys

To open any displays accessible from the softkeys, press [Displays]. The softkeys will repaint to display:

- Effect Status
- Color Picker
- Patch
- Setup
- Browser
- Magic Sheet
- Command History
- Curves
- Pixel Maps
- Show Control
- Mirror

Any of these softkeys will open the associated display with a single press.

Closing Displays

To close any tab display, select the display by using the [Tab] key or other means of navigation. When the desired display is active, press [Escape] to close it.

To close a display in the CIA, press the [Display] key and the browser will reappear.

To close all displays except for the live/blind display and the playback status display (tabs 1 and 2), press [Shift] & [Tab].
Selecting Displays
When a display is selected, the screen is highlighted in a gold border and the display name (such as “1. Live Channel”) will be in gold as well. When a display is not selected, there is no border and the tab name is gray.

If a display is already open, it can be selected in the following ways:
• Press [Tab] to change focus from the currently selected tab to the tab immediately to the right.
  If no tabs are to the right, the selection moves to the first tab on the left of all available monitors.
• Press [Tab] & [n], where “n” represents the tab number of the desired tab.
• Press [Live] or [Blind] to automatically bring live/blind into focus. If there are multiple instances of live/blind, pressing [Shift] + [Live] / [Blind] brings the next live/blind tab into focus.
• Double press a record target button (such as [Preset] or [Submaster]) to either open the associated display or select it if it is already open.

Moving Displays
To move the active display from one monitor to another, press and hold the [Tab] key and use the page arrow keys to move the display in the direction of the desired screen. One press of the left or right page keys will move the display to the next screen in that direction. To move it back, press the opposite arrow key.

Scrolling within a Display
By default the page keys will advance/retreat a display by one page per press. However, to scroll through displays you may press the [Scroll Lock] key on the keypad. The LED on the button illuminates red when in scroll lock mode.

Scroll lock is a toggle state. When scroll lock is first pressed:
• [Page ▼] - scrolls table, spreadsheet and channel views down,
• [Page ▲] - scrolls table, spreadsheet and channel views up,
• [Page ►] - scrolls table and spreadsheet views right,
• [Page ◄] - scrolls table and spreadsheet views left.
Expanding Displays

[Expand] allows a tab to be viewed across multiple external monitors.


Note: Please note that you must have two monitors attached to Ion to use the [Expand] feature.
If the display you are expanding is at the right most position, the display will expand onto the first (or left most) monitor.

Zooming Displays

You may zoom in and out on displays. To do this, press and hold the [Format] button and scroll the Level Wheel to alter the display. Scrolling the wheel up zooms in. Scrolling the wheel down zooms out. Zooming the channel summary display when it is in 100 channel mode is not supported. You can also zoom by holding down the left mouse button and rolling the scroll wheel on a mouse.
Graphical User Interface (GUI) Display Conventions

Ion relies on many traditional ETC indicators which you may be familiar with, as well as some new ones. This section identifies the graphical and colorful conventions used in Ion to indicate conditions to you.

Indicators in the Live/Blind Display

This is the live/blind summary view.

Note: The color and text conventions described below apply regardless of the format of live/blind being used (see Using [Format], page 39).

<table>
<thead>
<tr>
<th>Channel Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight line under channel heading</td>
</tr>
<tr>
<td>Intensity data (I)</td>
</tr>
<tr>
<td>Effect data</td>
</tr>
<tr>
<td>No other parameter categories</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conventionals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most of the channels in the above image are conventional channels (intensity is the only available parameter).</td>
</tr>
<tr>
<td>Conventionals have a straight line beneath the channel number. They also display only the top field, intensity, as no other parameters are available on a conventional channel.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Moving Lights or Multi-parameter Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Several channels in the image are moving lights (possessing more parameters than just intensity).</td>
</tr>
<tr>
<td>Moving light channels have a wavy line beneath the channel number as well as parameter category indicators at the bottom of the channel.</td>
</tr>
<tr>
<td>This view also has additional data fields beneath intensity (F, C, B). This information can be suppressed by pressing and holding [Data] and any of the encoder paging keys (Focus, Color, Image, Shutter, or Form). Doing so will leave only the intensity field and FCB indicators at the bottom of the channel.</td>
</tr>
</tbody>
</table>
Color indicators
Ion uses color to indicate the selection state and information about channel or parameter levels.

**Channel numbers/channel headers**

- **Gray number** . . . . . Unpatched channel number.
- **White number** . . . . . Selected channel number.
- **Bright White number** . . Channel is parked.
- **Gold number** . . . . . Channel is captured.
- **Gold outline** . . . . . . Selected channel.
- **Number with no graphic** . Deleted channel.

**Channel or parameter levels**

- **Bright Red** . . . . . Manual Data (any data that has been set but not yet stored to an active cue or submaster) on all consoles using the same user ID.
- **Dark Red** . . . . . Manual Data (any data that has been set but not yet stored to an active cue or submaster) from other consoles that are using different user IDs.
- **Blue** . . . . . The intensity value is higher than in the previous cue. Non-intensity parameters (NPs) are in blue when any move instruction has occurred. Unmarked.
- **Green** . . . . . The intensity value is lower than in the previous cue. Also used in reference marking to indicate a channel is marked.
- **Magenta** . . . . . Value is unchanged from the previous cue (tracked).
- **White** . . . . . The value is blocked.
- **White with an underscore** Value is auto-blocked.
- **Gray** . . . . . Default or the value is a null value (from either {Make Null} or a filter). When nulled, a gray "n" appears next to the value.
- **Yellow** . . . . . Data set from a submaster.

---

**Note:**
When data is in transition (moving), it will appear in a lighter version of its color. This includes up/down fades for intensity, non-intensity moves from cues, submaster, and timed manual changes.
Text Indicators in live/blind

Please note examples of text indicators in the following graphic:

Color conventions listed above apply to text indicators as well. Therefore red indicates a manual value that must be stored.

• _ . . . . . . . . . . . . . . Underlined value (white) indicates a system-applied block (also called an auto-block).
• A . . . . . . . . . . . . . . Indicates the channel or parameter is asserted.
• B . . . . . . . . . . . . . . Indicates the channel or parameter is manually blocked. This block must be stored.
• C . . . . . . . . . . . . . . Captured Channel
• I . . . . . . . . . . . . . . Channel is controlled by an inhibitive submaster or grandmaster. When displayed in the Block flag, "I" indicates a cue level intensity block.
• IP, CP, FP, BP . . . . . Indicates that the value is referenced to a palette (Intensity, Color, Focus, or Beam). This text is followed by a number, indicating which palette is being referenced. This can be substituted with the palette label if the "Show Reference Label" setting is activated (see Show Reference Labels, page 107). Holding down [Shift] & [Label] will toggle between the palette label and palette number.
- **MK** ................. Indicates the channel is marked for a later cue. The cue number is indicated in the other categories (see "Q" below).
- **N** .................. Indicates the value is null (from either [Make Null] or a filter).
- **P** .................. Indicates the channel is parked.
- **Ph** ................. Indicates the channel is at a preheat level.
- **Pr** .................. Indicates that the value is referenced to a preset. This text is followed by a number, indicating which preset is being referenced. The preset label may also be shown if this setting is enabled (see Show Reference Labels, page 107). Holding down [Shift] & [Label] will toggle between the preset label and preset number.
- **Q** .................. Found in the non-intensity categories of a marked channel. The “Q” is followed by a number indicating which cue the mark is in preparation for.
- **t** ................... The channel has discrete (parameter/category-specific) timing.
- **+** .................. Found in place of parameter data in summary view. Indicates that not all parameters in that category are at the same value. This indicator is found only in the summary view or in table views when the parameters are collapsed into a category view.
- **!** .................. Indicates an ACN, RDM, or dimmer error.
- **ND** ................. Indicates that a channel has been patched as a non-dim fixture type.
- **S** .................. Indicates that a channel is stored to a shielded submaster.
- **R** .................. Indicates a manual reference override. Manual changes have been made that override a previously stored reference (such as to a palette or preset). Once recorded, the reference will be broken. If updated, the referenced target will be updated as well, unless otherwise instructed.
- **M** .................. Indicates a mark is placed, but manual, and must be stored. Is blue when stored."m" indicates cue is not marking.
[Data] Key
Pressing and holding [Data] allows you to view the values behind any referenced or marked data. [Data] exposes the next lower reference level. So if you view a palette reference and press [Data], the absolute data will be displayed instead. If you are viewing a preset, absolute or palette data will be displayed, depending on what is contained in the preset.

The [Data] key is also used in combination with the encoder paging keys to change the level of detail in summary and views, and to select parameters to view in spreadsheet modes.

[Time] Key
Pressing [Shift] & [Time] allows you to view discrete timing data behind any channel parameter. Keep [Time] held down to page. [Time] exposes channel or parameter specific timing for any channels in the current cue. The first value is the delay time. If “--” is displayed, there is no delay. The value to the right of the / is the transition time.

When the [Time] button is pressed on a terminated command line, the selected cue is always displayed for time modification. To add discrete timing to channels on a terminated command line, those channels must be reselected. The [Select Last] command can be helpful. See “Select Last” on page 123.

[Label] Key
Pressing and holding [Shift] & [Label] toggles the view to show reference labels or numbers depending on what display setting is being used. See “Show Reference Labels” on page 107.
Using Flexichannel

Flexichannel (use of the [Flexi] key) allows you to view only channels meeting a certain criteria in the live/blind display, therefore removing unwanted data from view. Flexichannel has several available states which include allowing you to view:

- All channels
- All patched channels
- Manual channels
- All show channels (any channels that have data stored in a cue or submaster)
- Active channels (channels with intensity above zero or a move instruction)
- Selected channels

In flexi mode, any selected channels (including the last channel selection) are always included in the view. Gaps in channel numbers are indicated by a vertical line between the channels where a gap in numbering occurs.

To change flexi modes in the live/blind display, press [Flexi] to cycle through the views listed above. When [Flexi] is held down, the softkeys change to represent all of the available flexi states. You can select the desired flexi view from those keys.

[Next/Last] can be used to select the next or last channel in the current flexi mode.

[Thru] can be used to view only channels in the current flexi mode (except for selected channels mode) as long as either the first or last channel in the [Thru] range is included in the current flexi mode. To include channels not in the current flexi mode, [Thru] [Thru] can be used.

Flexichannel with Timing

You may also engage a “Channels with Timing” flexichannel state by pressing [Flexi] & [Time]. This will display all channels that have discrete timing in the current cue and will remove channels without discrete timing from view.

You may still press [Shift] & [Time] to view the discrete time behind any parameter or category. The display will remain in this state until you disengage it by pressing [Flexi] & [Time] again.

View Channels

You may select specific channels to appear in another flexichannel state called “View Channels”. This state does not exist until you select channels to view. After view channels is activated, it will appear in the rotation of flexichannel states when [Flexi] is pressed.

To select channels to view:

Step 1: Select channels on the command line (do not press [Enter]).
Step 2: Press and hold [Flexi].
Step 3: Press [View Chans]. The “View Channels” flexi state will be created and the channels you selected will be visible in it.

The channels you selected will be visible in this flexi state until you select other channels and press [View Chans] again. At any time, you can access the last channels you defined for this state by pressing [Flexi] until this state is visible.

To redefine the selected channels in the state, simply follow the steps above again.
Indicators in the Playback Status Display

**Color indicators**
- Gold .................. Any item (cue, list, page) highlighted in gold indicates “current”. Outlined in gold indicates “selected”.
- Red .................. Cue fade is in progress (cue list area)

**Text indicators**
- + (see cue 6) ........ Indicates that there is discrete timing within the associated cue. Found in the cue display “Timing” area.
- * (see cue 4) .......... Indicates the cue has an all fade command. Found in the cue display “Flags” area.
- - .................. Indicates a dark move, a cue that has any non-intensity parameters moving on channels whose intensity is at 0.
- x .................. Indicates that a mark has been placed, but the mark is broken.
- A or a (see cues 3&4) .. Indicates an asserted cue. “A” indicates the entire cue is asserted. “a” indicates a channel or parameter assert only. Found in the cue display “Flags” area.
- B or b (see cue 2&5) .. Indicates a blocked cue. “B” indicates the entire cue is blocked. “b” indicates a channel/parameter block only. Found in the cue display “Flags” area.
- D .................. AutoMark is disabled.

Indicates the timing for a category.
If blank, default time is used and there is no move instruction.
Indicates that timing has been applied but there is no move instruction.
• **F9** (see in cue 8) . . . . . Indicates a follow time associated with the cue (in this case, 9 seconds). Found in the cue display.

• **H4** (see in cue 6) . . . . . Indicates a hang time associated with the cue (in this case 4 seconds). Found in the cue display.

• **I** . . . . . . . . . . . . Indicates an intensity blocked cue. Found in the cue display “Flags” area.

• **M or m** . . . . . . . Indicates a marked cue. “M” indicates an AutoMark or a reference mark that is used by a subsequent cue. “m” indicates a reference mark that is currently unused by any subsequent cue (see *Using Mark*, page 191). Found in the “Flags” area.

• **P** (see in cue 3) . . . . . Indicates the cue will preheat. Found in the cue display “Flags” area.

• **R** (see in cue 8) . . . . . Indicates the source cue which refers back to an earlier mark (see *Referenced Marks*, page 193).

• **E 1*(see in cue 2.5) . . . . Indicates a cue level effects override.

• **M1** (see in cue 3) . . . . . Indicates a linked macro.

• **Q2/1** (see in cue 6) . . . . Indicates a linked cue.

• **S1** (see in cue 1) . . . . . Indicates a linked string.

---

**Note:** For more details on information contained in the playback status display, see *Playback Status Display*, page 42.
Using [Format]

Some displays have multiple formats. When the display is first opened, it opens in its default view. The default view for Live/Blind is table view, with all parameter categories displayed. When the default format has been changed, those new settings will be used whenever the display is changed back to that format.

Live and Blind share formatting. When you change from one format to another format, you are always working with the same format until you change it. The exception to this is spreadsheet, which is only available in blind. If you are working in blind spreadsheet, when you return to live you will be working with the table or summary view, based on which one you were last using.

Summary View

The summary view displays the largest number of channels of any of the formats. Below you can see channels 1-60 are shown. This format is best used to see large numbers of channels' intensity data and/or parameter category data. Individual parameters are not visible in this view.

FCB icons will appear at the bottom of the channel area for channels that have those parameters patched to them.

To collapse the summary view, hold down the [Data] key and press any encoder paging key (located to the right of the LCD).

When the summary view has been collapsed to show only intensity data, you may include focus, color, or beam data in the summary view by holding down the [Data] key and pressing any encoder paging key (located to the right of the LCD). This displays all categories.
Table View

Table view is available in live or blind. Unlike summary view, table view displays the fixture type associated with channels and details about each channel’s category or parameter levels.

In live, table view displays all active channel data being output from Ion. In blind, it will display all data for a single record target (cue, preset, palette) depending on what is viewed. In table view, focus, color, and beam information can be viewed in either a summary of these three categories.

To expand a category to show detail, press the [Data] key and the associated parameter key. For example, [Data] & [Color] will change the color category from a summary view to a detailed one.

To collapse a category, press the [Data] key and the associated parameter key. You cannot hide a category from view.

When a category has been expanded, to hide or reveal only certain parameters, press and hold [Data] and then select the parameter buttons of the appropriate parameters in the CIA. The parameters will be displayed or suppressed depending on the current view.

Notice that when you hold down the [Data] button, the buttons of parameters that are currently selected for viewing will be highlighted in the CIA.

In the table view, a slight space is provided between fixture types, giving a clear delineation between them. The name of the fixture type is displayed at the top of the section for that fixture.

Channels with only intensity parameters will display the same as in summary view.
Spreadsheet (Blind Only)

Spreadsheet format is available only in blind mode. It is useful for viewing channel data and trends for multiple cues, submasters, palettes, or presets at one time. Cues and other record targets are displayed on the vertical axis and channel data is visible on the horizontal axis.

Since this is a blind-only view, changes made in this view are immediate and do not require a record or update.

As with table view, spreadsheet format allows you to choose exactly which parameters you want to view. Parameters can be expanded/suppressed by holding [Data] and pressing the desired parameter buttons in the CIA. Category data is not available in spreadsheet, but you may hide all parameters of a specific category by holding [Data] and pressing the desired parameter category button (also called “encoder paging keys”). By default, the spreadsheet view displays just intensity.
Playback Status Display

The playback status display allows you to view a range of cues in the current cue list, all cue attributes for those cues, and a view of the fader configurations for 10 pages of 10 faders each (for a total of 100 visible faders).

Holding down [Time], while a cue is fading, will display the cue category times counting down in the cue list display area. The default action is to show the total time not the countdown. To always show the countdown, a {PSD Time Countdown} option is available in Setup, see [Displays], page 107. When the {PSD Time Countdown} is enabled, the cue category times will countdown as a cue is fading. To see the total time, hold down the [Time] key. {PSD Time Countdown} is “disabled” by default.

When focus is on the playback status display, you can use the paging keys to navigate in the display. An optional command line for the playback status display is available. The optional command line must be enabled to use. See “[Displays]” on page 107.

There are three formats for the playback status display. By default, it will be an expanded cue list format. With the playback status display selected, press [Format] to toggle between the formats.

**Expanded Cue List Format**

Pressing [Format] with the playback status display active will access this format. In expanded cue list, the view of the active cue list increases to the full size of the display. The current fader page is still visible at the bottom of the screen.
Split Playback Status Display
Pressing [Format] with the playback status display active will access this format. With the playback status display split, two different cue lists can be displayed at the same time by locking. If both cue lists are unlocked, they will display the same list.

**Note:** The first time you access the split playback status display, you may need to adjust the splitter bar between the two lists to see the second list.
**Fader Display Format**
Pressing [Format] with the playback status display active will access this format.

- **Current cue list**
- **Cues**
- **Timing data**
- **Cue flags**
- **Cue attributes**

**Fader Pages 1-10**

- **Submasters**
- **Master cue list timeline**

- **Other cue list**
- **Faders 7-10**
Encoders

The encoders are one of two ways to control the non-intensity parameters (NPs) of multiple-parameter devices. The four encoders are identified by the encoder LCD, just beneath the encoders.

Encoder Navigation

Use the encoder page buttons (located to the upper right of the encoder LCD) to choose which parameters are currently available on the encoders. There are six readily usable buttons: [Focus], [Color], [Custom], [Form], [Image], and [Shutter]. Pressing any of these will change the parameters controlled by the encoders.

Some fixtures have more parameters than can be displayed on one encoder page. The number of pages for each category is displayed at the right side of the encoder screen. To view the other pages, simply press the [Color], [Custom], [Shutter], [Image], or [Form] button to advance the pages, or press an encoder button with a number key to go directly to the page you want to access. The number of pages is indicated in the LCD.

Encoders can be switched from course mode into fine by holding down [Shift] while using an encoder will put it in fine mode for as long as [Shift] is held down. Once [Shift] is released, the encoder will return to course mode.

Locking the Encoders

It is possible to lock out the encoders. To lock out the encoders, press [Escape] & [Encoder Page Keys]. To unlock, press any of the [Encoder Page Keys].

Encoders in Blind

The encoders and level wheel are disabled by default when in the blind display. Pressing an [Encoder Page Keys], for example [Color], will enable the encoders and level wheel. When the encoders are disabled, trackball functionality for pan and tilt will also be disabled.

Flexi Encoders

Holding down [Flexi] and an [Encoder Page Keys], for example [Image], will put the encoders into Flexi mode. In Flexi mode, any empty locations for parameters not applicable for selected channels will be suppressed.
Moving Light Controls

An additional tool for controlling the non-intensity parameters (NPs) of multiple parameter devices is the ML Controls. The ML Controls is found with the other virtual controls in the browser. Navigate to Browser>Virtual Controls>ML Controls.

You will need to have a multi-parameter device selected to properly view this display. The display will change based on the device selected. If you have a device that only has intensity and color parameters, the ML Control display will only show intensity and color parameters.

ML Controls

Controls available in this display will change based on the fixture selected.

- Category button (Clicking this button will show or collapse the encoder wheel, see #12)
- Parameter button (Clicking the button will put the parameter on the command line.)
- Home button allows you to home a specific parameter or attribute of a parameter.
- Parameter attributes
- Arrow to scroll through a fixture’s available categories.
- Palette button (Clicking the button will put the palette on the command line.)
- Palette Select buttons. Will display number or label.
- Gives pan and tilt functionality to a mouse or trackball.
- Opens the gel picker.
- Collapses or expands categories.
- Toggles the color format from Hue/Saturation to absolute parameter data and back.
- Virtual encoder (Click and hold close to the center line for slow movement, further away for faster movement.)
Using Softkeys

Some of the features and displays in Ion are accessible from the softkeys, which are located in the bottom right area of the LCD.

Pressing the [Displays] button accesses the following softkeys:

- Effect Status
- Color Picker
- Patch
- Setup
- Browser
- Magic Sheets
- Command History
- Curves
- Pixel Maps
- Show Control
- Mirror

Context Sensitive Softkeys

Softkeys are context sensitive and will change depending on the active display, the current command in the command line, the active record target and so on.

Changing Softkey Pages

When there are more relative softkeys than the six available softkey buttons, the LED in the [More SK] button will light. Press [More SK] to view the additional softkeys.
Chapter 3  
Managing Show Files

This chapter explains how to create, open, and save your show files. Each of these operations are accomplished through the browser area in the CIA.

This chapter contains the following sections:

• Create a New Show File. ........................................50
• Open an Existing Show File .................................50
• Merging Show Files ...........................................54
• Printing a Show File ...........................................55
• Saving the Current Show File ..............................57
• Using Quick Save ..............................................57
• Using Save As ................................................57
• Importing Show Files ........................................57
• Exporting a Show File .......................................58
• Deleting a File ................................................58
• File Manager ..................................................58
Create a New Show File

To create a new show file, navigate within the browser to: File > New> and press [Select].

You will be prompted for confirmation that you want to create a new show. Press [OK] to confirm or [Cancel] to discontinue the operation. (Patch 1to1) will be selected by default. If you wish to not have a 1 to 1 patch, deselect the (Patch 1to1) button and click [Ok].

A new show created with (Patch 1to1) selected will have a 1 to 1 patch and 1 to 1 channel to sub assignment.

Open an Existing Show File

Names of show files may appear in the browser list in normal text or in bold text. Files in normal text indicate that there is only one show file stored by that name.

Bold show names indicate that there are several versions of the show file stored under that name, the bold one being the most recent. To access the most recent show file, simply select the bold name. You may right arrow [1] from the bold name to expand a list of previous versions beneath it in the browser. Select the desired show from the expanded list.

To open an existing Ion show file, navigate within the browser to: File > Open> and press [Select].

Ion provides you with multiple locations to retrieve an Ion show file (.esf) including:

- Show File Archive - This is the default storage location for show files when a show file is created and saved. Older versions of the show file will be listed under the most current version. This allows you the ability to open the latest version or an earlier version of a show file if desired.
- File server - if one is connected. When there is no file server connected, it will not display in the browser.
- USB device - When a USB device is connected and an Ion show file (.esf) is available on the device, you will notice the USB is displayed in white text and is expandable.

Open the desired location:

- To open a show file from the Show File Archive, navigate within the browser to: File > Open> Show File Archive and press [Select].
- To open a show file from the file server, navigate within the browser to: File > Open> File Server> and press [Select].
- To open a show file from a USB device, navigate within the browser to: File > Open> Name of Drive and press [Select].
Select the specific show file

- Navigate within the specified storage location and select the show file you wish to open, press [Select].
- If the selected show has multiple time stamps and you wish to load an older version, navigate to the desired revision and press [Select].

This will open the partial show loading screen in the CIA.

![Do you really want to open file?](image)

From this screen you can select which components of the show file you wish to load. The buttons at the center of the CIA represent all of the show components that you can choose to load. By default all components are selected (gray) and will be loaded. To withhold any show components from loading, simply deselect them in the CIA by clicking the respective button.

To reselect all show components, click the (Reset) button and all buttons will return to gray (selected). To stop the show load process, click the (Cancel) button.

When you have selected or deselected all of the show components you require, click (OK). Ion loads the selected show to the console.

**CAUTION:** On a partial show open, if any record targets are not opened, any existing data of that type will be cleared from the console. To merge show data, merge should be used. See "Merging Show Files" on page 54.
**Selective Partial Show Opening**

If you select the **Advanced** button in the partial show opening screen, you will have the opportunity to load partial components from the show file and be able to specify the desired location of those partial components in the new show file.

---

**CAUTION:** On a partial show open, if any record targets are not opened, any existing data of that type will be cleared from the console. To merge show data, merge should be used. See "Merging Show Files" on page 54.

For example, you could specify only cues 5-10 from cue list 2 and load them as cues 20-25 in cue list 7 in the new show. You could also specify only specific palettes, presets, effects, and so on. To see the complete list of show components, press the **Advanced** key in the partial show loading screen.

As you specify components, they are added to a table in the CIA. In the table, fields with a dark background may be edited, fields with a light gray background do not apply to that component. For each component in the list, you can specify the desired range by clicking in the proper area in the table and entering numbers from the keypad. The columns in the table are:

- **List** - The list you are taking data from (such as a cue list).
- **List Target** - The list you are adding the data to.
- **Start** - The first in a range of components (such as a range of cues).
- **End** - The last in a range of components.
- **Target** - The desired location of the components in the new show file (for ranges, this will be the location in the new show of the first component in the range, the others will follow in order).
To open only partial components from a show file:

Step 1: From the browser, navigate to the desired show file (see Open the desired location:, page 50).

Step 2: When the partial show load screen appears, click the {Advanced} button. The partial components selection screen will appear in the CIA.

Step 3: Select the show components that you wish to load by clicking on their respective buttons on the left side of the CIA. The components will appear in the list to the right as you select them.

Step 4: Click any fields for which you want to enter specific numbers. The field (if editable) will highlight in gold.

Step 5: Enter the numbers using the keypad to specify the desired cues/groups/effects and so on.

Step 6: Click {OK} to load the components to the new show.

You may exit the partial show load screen at any time by clicking the {Cancel} button. This will return you to the browser.

You may clear all selected components from the table at any time by clicking the {Reset} button.

You may exit the advanced loading screen at any time by clicking the {Advanced} button. This will return you to the general partial show load screen.

Partial Patch Opening

You have the option to selectively open partial patch information or fixtures into a show file by selecting the {Advanced} button in the partial show opening screen.

Note: It is important to remember that on a partial patch open, if any record targets are not opened, any existing data of that type will be cleared from the console. To keep that data, merge should be used.

You can specify the desired range by selecting the proper area in the table and entering numbers from the keypad. The columns in the table that relate to patch are:

- Start - The first in a range of components.
- End - The last in a range of components.
- Target - The desired location of the components in the new show file (for ranges, this will be the location in the new show of the first component in the range, the others will follow in order).
Merging Show Files
Ion supports the merging of .esf show files.

**Note:** Merging show files is different from opening show files. When you do a partial open of show components, untouched record targets are cleared. When you do a merge, those record targets remain.

You have the option of merging .esf show files from the Show File Archive, a File Server (if connected), or a USB device.

To merge a show file, navigate within the Browser to: **File > Merge**. Navigate to the desired storage location and press [Select]. When using merge, Ion displays only the available files. Navigate to the specific file and press [Select].

This will open the merge screen in the CIA. From this screen you can choose which aspects of the show file you want to merge. By default all aspects are unselected (black). Selected show aspects will appear in gray.

If you select the (Advanced) button in the merge show loading screen, you will have the opportunity to load partial components from the show file and be able to specify the desired location of those partial components in the current show file.

For example, you could specify only cues 5-10 from cue list 8 and load them as cues 20-25 in cue list 7 in the current show. You could also specify only specific palettes, presets, effects, and so on.

To see the complete list of show components, press the (Advanced) key in the merge show loading screen.

As you specify components, they are added to a table in the CIA. In the table, fields with a dark background may be edited, fields with a light gray background do not apply to that component. For each component in the list, you can specify the desired range by pressing the proper area in the table and entering numbers from the keypad. The columns in the table are:

- **List** - The list you are taking data from (such as a cue list).
- **List Target** - The list you are adding the data to.
- **Start** - The first in a range of components (such as a range of cues).
- **End** - The last in a range of components.
- **Target** - The desired location of the components in the new show file (for ranges, this will be the location in the new show of the first component in the range, the others will follow in order).
To merge only partial components:

Step 1: From the browser, navigate to the desired show file (see Open the desired location:, page 50).

Step 2: When the merge show load screen appears, press the {Advanced} button. The partial components selection screen will appear in the CIA.

Step 3: Select the show components that you wish to merge by pressing on their respective buttons on the left side of the CIA. The components will appear in the list to the right as you select them.

Step 4: Press any fields for which you want to enter specific numbers. The field (if editable) will highlight in gold.

Step 5: Enter the numbers using the keypad to specify the desired cues/groups/effects and so on.

Step 6: Press {OK} to load the components to the current show.

Partial Patch Merging

You have the option to selectively merge partial patch information into a show file by selecting the {Advanced} button in the partial show merge screen.

You can specify the desired range by selecting the proper area in the table and entering numbers from the keypad. The columns in the table that relate to patch are:

- **Start** - The first in a range of components.
- **End** - The last in a range of components.
- **Target** - The desired location of the components in the new show file (for ranges, this will be the location in the new show of the first component in the range, the others will follow in order).

Printing a Show File

Ion provides you with the ability to save a show file or aspects from a show file to a PDF file for printing. Ion has three locations to save the PDF files including the Show File Archive, the File Server (if connected), or a USB device (if connected). Saving the PDF file to a USB (F:) device, allows you to then print the PDF from a personal computer. Printing directly from Ion is not supported. To save a PDF of an Ion show file, navigate within the browser to: File> Print> and press [Select].

This will open the printing screen in the CIA. From this screen you can choose which aspects of the show file you want to save to PDF. By default all aspects are selected (gray) and will be saved. To
withhold any show aspects from printing, simply deselect them in the CIA by touching the respective button. Deselected show aspects will appear in black.

To reselect all show aspects, press the (Reset) touchbutton and all buttons will return to gray (selected). To stop the show file from being saved to a PDF and return to the browser, press the (Cancel) button. When you have selected/deselected all of the show aspects you require, press the (Ok) touchbutton to create the PDF file.

You can also choose to print specific portions of show aspects. To select this information, press the (Advanced) button. The touchbuttons at the center of the CIA will again represent all of the show aspects that you can choose. By default all aspects will be deselected (black).

As you select aspects, they will be added to the table in the CIA. For each component in the list, you can specify the desired range by pressing the proper area in the table and entering numbers from the keypad. The columns in the table are:

- List - The list you are taking data from (such as a cue list).
- Start - The first in a range of components (such as a range of cues).
- End - The last in a range of components.

To deselect all show aspects, press the (Reset) touchbutton and all buttons will return to black (deselected).

To return to the main print screen, press the (Advanced) button. To stop the show file from being saved to a PDF file and return to the browser, press the (Cancel) button. If you are ready to save the file, press the (Ok) button. You will be prompted to name the file.

The PDF will have the show name, date and time it was created, and date and times for when the show file was last saved. It also gives the Ion software version information. If multiple aspects were selected to save to the file, there will be hyperlinks at the top of the PDF so you can quickly jump to a section.
Saving the Current Show File
To save the current show data, navigate within the browser to: File> Save> and press [Select].
The Show File Archive is the default storage location for show files when they are saved. The new
time stamp located beneath the show file name on the CIA indicates that the show file has been
saved.
All previous saves are stored in the Show File Archive with the time stamp following the file name.

Using Quick Save
To save the current show data to the hard drive without having to navigate to the browser, hold
down [Shift] & [Update].

Using Save As
To save an existing Ion show file to a different location or with a different name, navigate within the
browser to: File> Save As> and press [Select].

Ion provides you with three locations to save an Ion show file (.esf) including the Show File Archive,
the File Server (if connected) or a USB device (if connected).
Navigate to the desired storage location and press [Select]. When using “Save As” to save the
show file to a specific location, the alphanumeric keypad will display on the CIA. Name the show file
and press [Enter]. The show file will be saved in the specified location with the show file name you
entered with a time stamp suffix.
By default, the current show file name will be used. Pressing [Label] or [Delete] on the console, or
DELETE on an alphanumeric keyboard will remove the default show label when doing a Save As.

Importing Show Files
Ion supports the import of standard USITT ASCII and Lightwright® text files.

Note: Ion supports ASCII show file import from a number of other control consoles,
including the Congo, Obsession, Expression and Emphasis product lines, as well
as the Strand 300 Series. Please note that all show files must be saved in an
ASCII format prior to importing them into Ion.

Caution: The way data is stored and used is often different between different desks.
Imported data may not playback exactly the same between desks. Not all data
(such as effects and macros) may be imported. This varies by product.
You have the option of importing standard USITT ASCII (.asc) or Lightwright (.txt or .asc) from the Show File Archive, a File Server (if connected), or a USB device.

To import a show file, navigate within the Browser to: File > Import > (Type of file to import) and press [Select]. If you are importing an USITT ASCII file, you will have two options, Import as Library Fixtures or Import As Custom Fixtures. Import as Library Fixtures will allow Ion to try to match the fixtures in the file with fixtures in the Ion library. Import as Custom Fixtures will bring the fixtures in as they are in the file. It is recommended to use Import as Custom Fixtures.

Navigate to the desired storage location and press [Select]. When using import, Ion displays only the available files. Navigate to the specific file and press [Select].

**Exporting a Show File**

Export your Ion show file to a standard USITT ASCII, .csv, Focus Track, or Fast Focus Pro show file using the export feature.

To export your Ion show file in ASCII format, navigate within the browser to: File > Export > and press [Select]

You have the option of exporting your show file in ASCII format to the Show File Archive, to a File Server (if connected), or to a USB device.

Navigate to the desired storage location and press [Select]. The alphanumeric keypad will display on the CIA. Name the show file and press [Enter]. The file will be saved in the specified location with the file name you entered with a “.asc” file extension.

You can export Ion show files as a .csv format by navigating within the browser to: File > Export > CSV and select the location for the export, the Show File Archive, a File Server (if connected), or to a USB device.

Files can also be exported as in a Focus Track or Fast Focus Pro format by going to File > Export > Fast Focus Pro or Focus Track and select the location for the export, the Show File Archive, a File Server (if connected), or to a USB device.

**Deleting a File**

Ion provides you with the ability to delete show files from the Show File Archive and the File Server from within the browser.

**To Delete a Show File**

Navigate within the browser to: File > Open and press [Select]. Navigate to the desired show file and press [Delete]. Press [Enter] to confirm or any other key to abort the deletion process.

**To Delete a Folder**

The folder must first be empty.

Navigate within the Browser to: File > Open and press [Select]. Navigate to the desired folder and press [Delete]. Press [Enter] to confirm or any other key to abort the deletion process.

**File Manager**

Ion has a file manager, which provides a way to manage show files. See "File Manager" on page 347.
Chapter 4

Patch

Patch is where fixture assignments and properties are stored and can be viewed. Once a channel is patched to an output, and the output is connected to a device (for example a dimmer, moving light, or accessory), the channel will then control that device.

This chapter contains the following sections:

- About Patch ..........................................................60
- Displays .................................................................61
- Patching Conventional Fixtures ..............................63
- Using the Scroller/Wheel Picker and Editor ...............68
- Patching Moving Lights, LEDs, and Accessories .......75
- Display Pages in Patch ..............................................76
- Using Device List .....................................................82
- Clearing the Patch ...................................................87
- Fixture Creator .........................................................88
About Patch

Ion treats fixtures and channels as one and the same, meaning each fixture is assigned a single control channel number. Individual parameters of that fixture, such as intensity, focus, color, and beam are also associated with that same channel number but as additional lines of channel information.

Patching can be done via two different methods: manually entering a patch and by patching devices using RDM via the Device List in patch. RDM allows bi-directional communication between the desk and any RDM devices over RDM or Ethernet. See "Using Device List" on page 82.

For manual patching, you are required to enter only the simplest data to patch a device and begin programming your show, such as the channel number, the device type (if needed), and address. When you provide more information in the patch, you will have more detailed control and improved function during operation.

One or more devices may be patched to a single channel. For example, you may want to patch a group of dimmers to the same channel. In addition you may patch multiple devices to the same channel for building a compound or accessorized fixtures. For example a Source Four® with a color scroller and a gobo changer may be patched to a single channel. This is referred to as a compound channel. See "Creating multi-part and compound channels" on page 67.
Displays

To begin patching your show, you must first open the patch display. To open the patch display, press [Displays] and then [Patch].

The patch display will open on an available external monitor and the CIA will display patch controls. If there are no monitors attached, patch will open on one of the on-board monitors.

From within the patch display, you can open the Device List to use RDM to patch any RDM compatible devices. For more information about Device List, see Using Device List, page 82.

The patch screen will display the following information if available:

- **Channel** - the patched channel number. In patch by address mode, channel will appear blank if not currently patched.
- **Address** - the patched output address. In patch by channel mode, address will appear blank if not currently patched. Pressing [Data] toggles the display from showing address as patched by the user, output address, and the port/offset. See “Using Output Address vs Port/Offset” on page 64.
- **Type** - device or dimmer type that is patched.
- **Label** - displays the assigned label of the channel or address. See Labeling, page 62.
- **Interface** - displays which interfaces will be used for the device. See (Interface) in (Patch) Display and Settings, page 76.
- **Output** - displays the current live intensity level. Value is displayed as 0-255, with 255 being full.

Status in the Patch Display

Status flags will display on the far left of the patch display to advise you when a channel or address requires your attention.

A red “!” or yellow “?” will display when there is a warning or error from an RDM, CEM+, CEM3, or ACN device. See “Errors and Warnings” on page 86.
**Flexichannel Views in Patch**

In patch by channel mode, [Flexi] can be used to view only those channels that are currently patched. In patch by address mode, [Flexi] can be used to view only those addresses that are currently patched. By pressing [Flexi], you can toggle the view between patched channels/addresses, selected channels, and all channels/addresses.

Holding down [Flexi] will display the following softkeys:

- **{Flexi All}** - displays all the channels or addresses depending on which view is used.
- **{Patch}** - displays only the patched channels or addresses.
- **{Selected}** - displays any selected channels or addresses.
- **{View Channels}** - displays those channels selected for the View Channels flexichannel state.
- **{Partitioned}** - only available when partitioning is enabled. Displays the following options:
  - Partitioned Channels
  - Partitioned Patched Channels
  - Partitioned Selected Channels
  - Partitioned View Channels

**Labeling**

To label a channel or address, press the [Label] key with the channel or address selected on the command line. You can use the virtual alphanumeric keyboard or an external keyboard to enter the desired label text.
Patching Conventional Fixtures

For patching fixtures, there are two different patch modes: patch by channel and patch by address. Ion defaults to patch by channel mode. Pressing [Format] while in the patch display will toggle the mode between patch by channel and patch by address.

**Note:** When working with conventional devices, you can patch in either mode easily. When working with compound channels or multiple parameter devices, such as moving lights, it is recommended to work in patch by channel.

**Patching By Channel**

In patch by channel mode, [2] [0] [At] [1] [Enter] patches channel 20 to address 1. Pressing [At] will post address to the command line while patching by channel.

Additional examples of patch by address:

- [5] [At] [1][0][0] [Enter] - patches channel 5 to address 100.
- [2][0][3] [At] [1][2] [Enter] - patches channel 203 to address 12.

**Range Patching**

Range patching using the [Thru] key allows you to quickly patch a group of channels. [1][Thru][2][0] [At] [1] [0] [Enter] patches channels 1 through 20 to addresses 10 through 29.

You can also use the [+] and [-] keys. [1] [+] [4] [+] [8] [At] [1] [Enter] patches channel 1 to address 1, channel 4 to 2, and channel 8 to 3. The [Group] key can also be used if groups have been created.

**Note:** Range patching only works with channels. If you try to range patch addresses, parts for the channel will be created. See "Creating multi-part and compound channels" on page 67.

**Note:** If you try to patch a channel or address that exceeds the desk's capacity, an error message saying number out of range will display on the command line.

**Patching By Address**

Pressing [Format] while in the patch display will toggle the mode between patch by channel and patch by address. [2] [0] [At] [1] [Enter] patches address 20 to channel 1. Pressing [At] will post channel to the command line while patching by address.

Additional examples of patch by address:

- [5] [At] [1][0][0] [Enter] - patches address 5 to channel 100.
- [2][0][3] [At] [1][2] [Enter] - patches address 203 to channel 12.

**Note:** If, at any point, you try to patch an address that is already in use, Ion will post an advisory to indicate this, preventing you from duplicating addresses in your patch.
Using Output Address vs Port/Offset

The output address is the DMX or network DMX (often called EDMX) address. Examples of output addresses are 510, 1, and 1024.

Port/offset refers to the DMX universe or port and the offset of the address. For example, since a single DMX port can transmit 512 addresses (known as a “universe”), the port/offset for address 515 would look like 2/3 because address 515 is the 3rd address of universe 2.

An example of patching by port/offset in patch by address mode is `[2]/[1]/[0] [At] [2][0] [Enter]`, which patches universe 2 address 10, or 522, to channel 20.

**Note:** As it is possible to patch by either address or port/offset, pressing the [Data] key will move between showing the patch as it was originally entered, then the output address values, and last the port/offset.

**Note:** An address can not be assigned to multiple channels, but a channel can have multiple addresses assigned to it.

Replace

By default, if you patch an address to a channel that is already patched, Ion will create a new part for the new address. If you want to replace the current address with the new, use {Replace}:

- `[n] {Replace} [n] [Enter]` - replaces the address in part 1 of the selected channel.

Helpful Hints

[At] [Next] [Enter] finds the next available address range large enough to accommodate the selected device.

Examples of [At] [Next]:

- `[At] [2] [/] [Next] [Enter]` - finds the next available address range on universe 2.
- `[At] [7] [7] [7] [Next] [Enter]` - finds the next available address after 777.

[At] [/] [n] [Enter] can be used to patch an address on the same universe that was last used.

**Note:** You can open or merge patch data from other show files, see Partial Patch Opening, page 53 and Partial Patch Merging, page 55 for more information.

 `{Address} [n] [/]`  
The syntax `{Address} [n] [/]` can be used to select a full universe in patch.

- `[channel list] {Address} [n] [/] [Enter]` - changes the addresses of all the selected channels to a new universe while using the same offset.
- `{Address}[2] [/] [Copy To] [Copy To] <Address> [3] [/] [Enter]` - moves all channels with addresses in universe 2 to the same offsets in universe 3.
- `{Address} [n] [/] (Unpatch)` - unpatches all patched addresses in the selected universe.
Dimmer Doubling

You can patch channels in Ion to accommodate for dimmer doubling with Sensor dimmer racks. This is done using the softkeys available in patch (\{No Dim Dbl\}, \{A\}, and \{B\}).

For Example:

Let’s assume you patch 96 channels of dimmers to addresses 1-96.

\begin{itemize}
  \item \textbf{[1] [Thru] [9] [6] [At] [1] [Enter]}
\end{itemize}

Now you wish to dimmer double 1-12 of your Sensor+ rack and you want these to be channels 97-108. To patch this, press:

\begin{itemize}
  \item \textbf{[9] [7] [Thru] [1] [0] [8] [At] [1] (B) [Enter]}
\end{itemize}

Channels 97-108 are patched to address 1-12 B, while channels 1-12 are now patched to address 1-12 A.

To remove the dimmer doubling from these addresses, you must first press [Format] to enter Address mode and then press:

\begin{itemize}
  \item \textbf{[1] [Thru] [1] [2] (NoDimDbl) [Enter]}
\end{itemize}

Addresses 1-12 have been returned to single dimmer modes and channels 97-108 are now unpatched.

By default, doubled dimmers start with an offset network DMX address value of 20000. Therefore, in the above example, address 1B (channel 97) is actually controlled by network DMX address 20001. Address 2B is actually controlled by network DMX address 20002 and so on. This offset matches the default offset in CEM+ / CEM3 when configuring your Sensor dimmer rack for dimmer doubling. To change the default offset value, see Show Settings, page 96.

Note: For Ion, dimmer doubling needs to be turned on per DMX port in the ECU. See “Local DMX Outputs” on page 351.

Note: There is also a Dimmer Doubling setting for Net3 Gateways with DMX outputs. This is used with Sensor racks that are connected via DMX. The Gateway must be properly configured.

Moving and Copying Channels

Channels and their data can be moved from one location to another within patch. Channel data can be copied between different channels. You can also move the channel data from one channel to a different one.

\begin{itemize}
  \item \textbf{[1] [Copy To] [Copy To] [7] [Enter]}
\end{itemize}

The second press of the [Copy To] key changes the command from copy to into move to.

This syntax will move the patch information for channel 1 to the patch for channel 3. All data in the show file that was stored at channel 1 is also move to channel 3.

To copy a channel to another location within patch:

\begin{itemize}
  \item \textbf{[1] [Copy To] [2] [Enter]}
\end{itemize}

To copy a channel to another location within patch and all record targets in the show:

\begin{itemize}
  \item \textbf{[1] [Copy To] [2] (Plus Show) [Enter]}
\end{itemize}

To copy a channel to another location with all record targets in the show but not the patch data:
[Copy To] [2] (Only Show) [Enter]

To copy on the notes and keyword fields from one channel to another:

[Copy To] [2] (Only Text) [Enter]

**Swapping Channels**

Channels can be swapped for each other in patch:

[Swap] [Enter]

This syntax will replace channel 1's data with channel 2's and vice versa in patch and throughout the entire show.

---

**Note:**

Move To and Swap always impact the entire show.

---

**Unpatch a Channel**

To unpatch a channel while in patch you can press:

[n] (Unpatch) [Enter]

The (Unpatch) softkey, will reset all the properties of the channel to the default. This includes removing the device type if specified.

To retain all the elements of the channel, besides the address, you would instead use:

[n] [Alt] [0] [Enter]

Unpatched channels may also have data stored.

**Deleting Channels**

It is possible to delete channels in patch. Deleting channels is different from unpatching in that deleted channels cannot be manipulated or have data stored for them. When deleted, the channel numbers will still be visible in the live/blind display, but the channel graphic will be removed from the display.

*For Example:*

To delete channels in the patch display, press:

[6] [Thru] [1] [0] [Delete] [Enter] [Enter]

-or-

[Delete] [1] [Thru] [1] [0] [Enter] [Enter]
Using {Offset} in Patch

Using the {Offset} feature in patch allows you to force a numerical offset between the starting address of channels in patch or for offsetting your channel selection. This feature is useful when you want to start your addresses at some known multiplier.

- [1] [Thru] [5] [At] [1] {Offset} [3] [1] [Enter] - fixtures will be patched with a patch address offset of 31 channels, allowing you to have additional space within the patch for a given fixture type regardless of configuration or personality.

- [1] [Thru] [2] [0] {Offset} [2] [At] [1] {Offset} [2] [0] [Enter] - selects every other channel in the list and patches them with an offset of 20 addresses.

**Note:** For multiple parameter devices, Ion will automatically offset the addresses based on the fixture type.

Creating multi-part and compound channels

A multi-part channel is any channel that has more than one dimmer patched to it. A compound channel has multiple profiles patched to it that make up one channel, an example would be a dimmer with a scroller and auto-yoke. By default, Ion will add a part if you are trying to patch to a channel that has already been assigned an address.

To patch a multi-part channel in address format:

- [5] [1] [3] [At] [8] [Enter]

  Assuming channel 8 was previously patched to an address, this will create a part 2 and address it at 513.

To patch a multi-part channel in channel format:

- [9] [At] [5] [4] [0] [Enter]

  Assuming that channel 9 is already patched to an address, this will create a part 2 and address it at 540.

  - [8] [Part] [2] [At] [5] [1] [3] [Enter]

    This will create a part 2 for channel 8 and address it at 513. If you wish to patch by address while in the channel view, press:

    - {Address} [5] [1] [3] [At] [8] [Enter]

    This will perform the same action as the previous example, assuming channel 8 was previously patched to an address.

To select multiple parts for editing:

- [1] [Part] [1] [Thru] [5]

  This is useful for deleting or assigning new addresses to existing parts.

To patch a compound channel in channel format:

- [1] [Part] [2] [At] [5] [Type] <scroller profile>

  Creates a part 2 for channel 1 and assigns it the selected scroller profile. See (Patch) Display and Settings, page 76 for more information on using {Type}.
Using the Scroller/Wheel Picker and Editor

The scroller and wheel picker allows you to choose a specific scroll, color wheel, gobo wheel, or effect wheel from standard manufacturers and associate them with fixtures. You may also create customized rolls/wheels using the editor to match custom devices installed in your fixture.

**Note:** Scrollers, color wheels, gobo wheels, and effect wheels can be created without first selecting or patching a fixture.

Using the Picker

Default color and pattern media for the selected fixture, as determined in the fixture library, is displayed in the (Attributes) page. Only the media attributes that are available for the selected fixture will display.

In the image below, the selected channel is a Source Four Revolution® with a color scroller and two gobo wheels. If the selected channel included other wheels, each device would be represented in the display with a button.

Select the desired attribute to open the picker

The picker displays on the left half of the CIA when you select the specific attribute ((Scroller), (Color Wheel), (Gobo Wheel), or (Effect Wheels)). The picker displayed is specific to the selected attribute (the scroller picker will display when (Scroller) is pressed, the color wheel picker will display when (Color Wheel) is pressed, and so on).
The picker displays buttons for the standard scroll or wheel type of the selected channel. The default selection is the wheel as shipped from the manufacturer (derived from the fixture library). Displayed to the left of the standard scroll/wheel selection is a list of each color/gobo as they are installed in the selected device (frame by frame). When the color or pattern image is available, it will display next to the frame name.

In the above image, **{ETC Scroll}** is the default scroll for the selected ETC Source Four Revolution. The list of gel colors as they are installed in the scroll are displayed to the left with a color chip for easy reference. Selecting any other type, such as **{Martin Scroll}**, updates the frame list.

The softkeys displayed beneath the picker are **{Clear Calib}**, **{Copy Scroller}**, **{Clear}**, **{New}**, **{Copy}**, **{Edit}**, and **{Delete}**.

- **{Clear Calib}** - clears out the calibration data for the whole scroller wheel and returns to the wheel’s default data.
- **{Copy Scroller}** - used to copy a scroller wheel and its calibration to another channel. See “Scroller Calibration Column” on page 73.
- **{Clear}** - clears the selection type from the selected channel in the picker.
- **{New}** - creates a new scroll or wheel and provides additional softkeys to enable the Editor. See Using the Editor below.
- **{Copy}** - makes a copy of the currently selected scroll/wheel type, which can then be edited using the editor. See Using the Editor below.
- **{Edit}** - used to edit an existing scroll or wheel.
- **{Delete}** - used to remove the selected frame only from a scroll or wheel that you have created.

**Using the Editor**

The editor is used to create new or edit copied scrolls and wheels. While in the picker display, you can create a new scroll or wheel by pressing the **{New}** softkey or make a copy of an existing scroll or wheel by selecting the source, then pressing the **{Copy}** softkey.

The editor does not limit how many frames you can add to the scroll or wheel for the selected fixtures. Keep in mind that any fixture has its own limitations. For example, a Source Four Revolution color scroller is limited to 24 frames. If you have created a custom color scroller with 30 frames, the Source Four Revolution will only provide you access to the first 24 frames that you created. This applies to wheels as well.

When using the editor, the following softkeys are available for use:

- **{Insert}** - inserts a new frame above the selected frame.
- **{Delete}** - removes the selected frame.
- **{Edit}** - changes the selected frame.
- **{Invert}** - reverses the order of the frames.
- **{Done}** - completes the editing process.
Creating a new scroll or wheel

When you create a new scroll or wheel, \textit{(New Wheel)} appears in the wheel list as the selected button. The frame list will be empty with only “New” displayed in frame 1.

To modify a color, gobo, or effect selection with a mouse, you need to click on the gray box in the C/G column of the frame you wish to change.

You can label the new wheel by pressing the \texttt{[Label]} and typing the desired label on the virtual keyboard and pressing \texttt{[Enter]}.

To select a color or pattern for the specific frame in the scroll/wheel, select the “NEW” text. The available gel, color, gobo and effect media selections will be displayed.

The media selection includes the following softkeys:

- \texttt{(Gel)}, \texttt{(Color)}, \texttt{(Gobo)}, and \texttt{(Effect)} - each will display available media selections as they are cataloged by the associated scroll or wheel manufacturers.
- \texttt{(Open Frame)} - places the frame in Open White. Generally, the first media frame is open.
- \texttt{(Cancel)} - cancels the media selection and returns to the frame editor.

When a manufacturer is selected from the list, the catalog selection changes to display only the selected manufacturer’s offerings. When a specific catalog is selected, the media will display in the last three columns of the editor.

When you make a media selection, the display returns to the new wheel frame list where additional frames can be added to the scroll or wheel (using the \texttt{(New)} frame button) or you can touch/click in the next frame area to add more frames.

\textbf{Note:} An \texttt{(Invert)} softkey will display when creating or copying a wheel or scroller. \texttt{(Invert)} is used to reverse the order of frames.
Editing a copy of a scroll or wheel

If a copy has been made of an existing scroll or wheel, the copied scroll or wheel will display as \textit{(New Wheel \text{n})} before the standard manufacturer offerings. The frame list will include an exact duplicate of the copied selection.

To make a change to a frame, first select the frame then press \textit{(Edit)} to display the media selection. Or you can insert a new frame above a selected frame using the \textit{(Insert)} softkey.

For example, to insert a new frame in between existing frames 2 and 3, select frame 3 and press the \textit{(Insert)} key. The media selection will display.

The media selection includes the following softkeys:

- \textit{(Gel)}, \textit{(Color)}, \textit{(Gobo)}, and \textit{(Effect)} - each will display available media selections as they are cataloged by the associated scroll or wheel manufacturers.
- \textit{(Open Frame)} - places the frame in Open White.
- \textit{(Cancel)} - cancels the media selection and returns to the frame editor.

When a manufacturer is selected from the list, the catalog selection changes to display only the selected manufacturer’s offerings. When a specific catalog is selected, the media will display in the last three columns of the editor.

When you make a media selection, the display returns to the new wheel frame list where additional frames can be edited in the scroll or wheel.

Scroller Fan Curves

Curves can be applied to the scroller fan parameter allowing for the output of the fan to be controlled by the intensity of the channel. The curves available for this are the same used for intensity parameters and cues. See “Storing and Using Curves” on page 277.

To set a curve to a scroller fan, go to \textbf{Displays}\textgreater\textbf{Patch}\textgreater\textbf{Attributes}\textgreater\textbf{Fan Curve} for each scroller.
Calibrating a Scroller Using the Encoders

You can calibrate the center point of any frame in a scroller using the calibrate feature. Calibrating a scroller is normally done from the live display. You can also calibrate using the ML display. See "Calibrating a Scroller Using the ML Display" on page 74.

**Note:** It is recommended that you calibrate your scroller frames starting with the last frame and working backward to the first frame. This will help ensure a complete and accurate calibration. Calibration may need to be performed when you initially patch a scroller and may need to be adjusted through the course of operation as spring tension changes in a color scroller.

To calibrate a scroller:

1. Select the channel of the scroller you wish to calibrate.
2. Press the [Color] encoder button. Multiple presses may be required before the scroller encoder is visible in the encoder LCD.
3. Use the encoder to move all the way to the last frame of the scroller.
4. If you are in course mode, press the encoder to switch to "Fine" mode. The \{Calibrate\} touchbutton will appear as one of the scroller buttons in the LCD.
5. Continue adjusting the frame in fine mode until the frame is centered in the desired position.
6. Press \{Calibrate\} in the encoder LCD. The new center position is now stored for the selected channel.
7. Press \{Last\} in the encoder LCD to move to the center point of the previous frame.
8. Visually verify if the center point of the new frame is accurate. If it is, press \{Last\} again to move to the previous frame in the scroll. If not, follow the calibration procedure again.
9. Repeat steps 4-8 until you have calibrated all of the frames.
Scroller Calibration Column
Calibration information will be displayed in the scroller calibration column.

The displayed calibration information is the DMX address that puts the frame into its center position. Information in the calibration column can be manually edited by clicking on it and typing in a new DMX address.

**Note:** Calibration data will only be applied to scroller wheels that are assigned to a channel. Data will not be displayed when viewing a wheel with an empty command line.

**Note:** Calibration data can be returned to its default by clicking on the data and pressing [Clear]. If you are entering in new data and hit [Clear], the data will return to the default and not any previously calibrated data.

Pressing the softkey (Clear Calib) will clear out the calibration data for the whole scroller wheel, returning it to the default data.

Scrollers that have calibrated data will display a “~” after their name.

The (Calibrate) button will now only appear on scroller parameters that are currently not at the center of a frame.
Calibrating a Scroller Using the ML Display

You can calibrate the center point of any frame in a scroller using the calibrate feature. This will ensure that color scroll frames will be centered over the aperture of the fixture when you advance a color scroll frame-by-frame. You can do this using the ML Controls display.

To calibrate a scroller:

Step 1: In the Live display, select the scroller channel.
Step 2: Use the [ML Controls] key to open the ML Controls display.
  • The color category will display automatically with the Hue and Saturation encoders and a frame picker.
Step 3: To begin calibrating, click on the {Scroller ::} button. The scroller encoder will be displayed.
Step 4: Use the scroller encoder to adjust the centerpoint of a frame. It is recommended that you start with the last frame in the scroll.
Step 5: When the frame is centered, click {Calibrate}.
Step 6: Repeat for any remaining frames that need to be calibrated.

Note: It is recommended that you calibrate your scroller frames starting with the last frame and working backward to the first frame. This will help ensure a complete and accurate calibration.

Calibration may need to be performed when you initially patch a scroller and may need to be adjusted through the course of operation as spring tension changes in a color scroller.
Patching Moving Lights, LEDs, and Accessories

The process of patching moving lights requires more detail than patching a dimmer. Specific information is required for more advanced control of the features offered by moving lights.

It is recommended that when patching moving lights, LEDs, and accessories that you work in patch by channel mode.

After you have entered the channel number, click (Type). You will then select a device type from the fixture library.

Press (Manafct) from the CIA to display the fixture library. The two columns on the left are pageable and show manufacturer names. Use the arrow buttons to scroll the list of manufacturers. Selecting a manufacturer repaints the device columns with all devices from that manufacturer that are available for patching.

Scroll through the device list and make your selection. If a fixture has multiple modes, clicking on its name will open a list of available modes. After the selection is made, the fixture or device type will be placed on the command line after the channel number and displayed in the box beneath the (Type) button.

Notice the three softkeys (Favorites), (Manafct), and (Add Favorite) located beneath the CIA.

(Favorites) provides you with the option of showing only the library of fixtures or devices that are already patched in the show, your favorites, and Ion’s default devices. (Manafct) shows all fixtures or devices available in the library sorted by manufacturer.

(Add Favorite) will add a fixture or device to your favorites list. If you want to delete a fixture or device from the favorites list, click (Edit) while in the favorites display. Select the device you wish to remove and click (Delete).

Press [At] and then enter a starting address for the selected channel or group of channels. The desk will automatically offset addresses based on the fixture type selected.

To select a device interface (optional), click (Interface). See “Protocols” on page 221.

Click the (Attributes) softkey to set detailed moving light attributes. The following buttons may be available on this page depending on the device selected: {Preheat}, {Proportion}, {Curve}, {Fan Curve}, {LD Flags}, {GM Exempt}, {Invert Pan}, {Invert Tilt}, {Swap P/T}, {Scrollers}, {Gobo Wheels}, {Color Wheels}, and {Effect Wheels}. See “{Attribute} Display and Settings” on page 78.

If your moving light includes parameters such as a color scroller or gobo wheel and you have custom gels or non-standard patterns installed, use the Scroller/Wheel Picker and Editor to modify the device patched. The more specific your patch data (including accurate colors and patterns), the more detailed programming and operating will be. See “Using the Scroller/Wheel Picker and Editor” on page 68.
Display Pages in Patch

Softkeys available for use while in patch include {Patch}, {Attributes}, and {Database}. Pressing any of these softkeys opens a paged view of the patch display and redraws the CIA to an expanded view of fields related to the selected page.

When creating and editing your patch, page through each of these softkeys individually to enter more specific data about your selected device.

{Patch} Display and Settings

When patch is opened, Ion defaults to this display. It provides access to data input fields that you may use to define devices in your lighting system.

- **{Channel}** - In the patch display, all channels are displayed in numerical order. When multiple devices are patched to the same channel, the channel number is only displayed in the first row, additional devices are indicated with part extensions (example P2) on the next row of the table.
  - Select the channel number using the control keypad or the direct selects.

- **{Type}** - Ion defaults to patching dimmers. To specify a specific device type for the selected channel, press the {Type} button from the CIA.
  - The two columns on the left side of the CIA are pageable and show manufacturer names. The four columns to the right of the manufacturer’s list are pageable devices that are available from the selected manufacturer for patching.
    - Selecting a specific manufacturer repaints the display with all devices that are available from that manufacturer. After you select a device, the fixture/device type appears in the command line, in the {Type} box in the CIA, and in the “Type” field for that channel in the patch display.

- **{Label}** - An optional user-defined label. You can use the [Label] key to display the virtual PC keyboard on the CIA. Pressing (Label) or [Label], after a label has already been assigned, will display the label on the command line for editing purposes. Pressing [Label] will delete the text.
  - [1] [At] [5] [Label] <S4 house right> [Enter] - patches channel 1 to output 5 and labels channel it “S4 house right”.

![Patch Display](image-url)
• **{Address}** - A required entry field for any device. You may use [Alt] instead of the **{Address}** button.
  - Use the keypad to define the starting address for the device (from 1 to 65536) or a port and offset value.
  - You may enter a start address without defining an end address. Ion will draw this information from the library data. If you wish to leave a larger output gap than required by the library, use [Offset]. See Using [Offset] in Patch, page 67.
  - If you specify a start address that conflicts with other channels already patched, the conflicting channels will be unpatched after a confirmation is provided by the user.

• **{Interface}** - An optional field used to specify what network interfaces should be used for the output. When the field is left blank, the default data output is used as selected in the **{Network}** and **{Local I/O}** sections of the ECU. For more information about setting defaults see Output Protocols, page 342 and Local DMX Outputs, page 351. The interface options available are sACN, Net2-EDMX, ArtNet, Avab UDP, and Local DMX, depending on what has been enabled in the **{Network}** and **{Local I/O}** sections of the ECU for the desk. If an output option is not enabled, it will not appear in the **{Interface}** list.

• **{Flash}** - will bring a channel or address to full, and then every other second the level will move to 15%. That will hold for 1 second, and then the level will return to full. The channel or address will keep flashing until either the command line is cleared or **{Flash}** is selected again.
**Attributes** Display and Settings

The **Attributes** page provides you with optional fields for additional information and details about the configuration of your rig. Attribute settings include **(Preheat)**, **(Proportion)**, **(Curve)**, **(Fan Curve)**, **(LD Flags)**, **(GM Exempt)**, **(Invert Pan)**, **(Invert Tilt)**, and **(Swap P/T)**.

When the selected device includes a color scroller, a **(Scroller)** button will be displayed in the CIA, when the selected device includes a color wheel, a gobo wheel, and/or effect wheel, **(Color Wheel)**, **(Gobo Wheel)**, and/or **(Effect Wheel)** buttons will appear.

Press the desired attribute button and use the keypad to set the attribute value.

- **(Preheat)** - This field allows you to specify an intensity value to preheat incandescent filaments. When a preheat flag is applied to a cue, any channels that are fading from zero to an active intensity and have been assigned a preheat value in patch will preheat in the immediately preceding cue.
  - [1] **(Preheat)** [0] [3] [Enter] - channel 1 is assigned a patched preheat value of 3%.
  - The preheat flag is applied to a cue as an attribute when the cue is recorded.

- **(Proportion)** - An attribute to set a modifier for the intensity of the device. If the patch limit is set at 90% (for example), the actual output will always be 10% lower than the specified intensity parameter, as impacted by the various playbacks or submasters. This value is set numerically in a range of 0% to 200%.

- **(Curve)** - Used to assign a curve to an address in patch. In patch, curve is applied to intensity parameters only.
  
  - From channel view:
  
  - From address view:

- **(Fan Curve)** - Used to assign a curve to the scroller fan parameter, which allows for the output of the fan to be controlled by the intensity of the channel. Curves available for this are the same used for intensity parameters and cues.

---

**Note:** When **(Curve)** or **(Fan Curve)** is pressed, a list of the available curves will be displayed. Clicking on an available curve will assign it.
• **{LD Flags}** - This field allows channels to contribute to live and dark move flags in the playback status display. Disabling will prohibit those channel moves from contributing to the live and dark move flags. This is enabled by default.

• **{GM Exempt}** - Used to exempt channels from grandmaster, blackout, rem dim, and go to cue 0 operations.

• **{Invert Pan}** (Invert Tilt) - A moving light attribute used to invert the output of pan, tilt, or both. Select either the **{Invert Tilt}** or the **{Invert Pan}** button on the CIA.
  • **[2] {Attributes} {Invert Pan}** - inverts the output of the pan parameter on channel 2.

• **{Swap P/T}** - A moving light attribute used to exchange pan and tilt levels. Select the **{Swap}** button on the CIA.
  • **[2] {Attributes} {Swap}** - swaps the pan and tilt parameters for channel 2.

• **{Scrollers}** - An attribute used to change the scroll loaded in a scroller or moving light. Select the **{Scrollers}** button on the CIA to display the scroller picker and the scrolls available for your device. See "Using the Picker" on page 68.
  • **[2] {Attributes} {Scrollers}** - opens the Scroller Picker in the CIA for scroll selection for channel 2.

• **{Color Wheels}** - An attribute used to change the color wheel loaded in a moving light. Select the **{Color Wheels}** button on the CIA to display the wheel picker with the options available for your device. See "Using the Picker" on page 68. "More" as shown in the patch display, indicates additional parameter properties are available for the selected device, such as the color and gobo wheels.
  • **[4] {Attributes} {Color Wheels}** - selects channel 4 and opens the wheel picker in the CIA for color wheel selection.

• **{Gobo Wheels}** - An attribute used to change the gobo wheel loaded in a moving light. Select the **{Gobo Wheels}** button on the CIA to display the wheel picker with gobo options available for your device. See "Using the Picker" on page 68.
  • **[3] {Attributes} {Gobo Wheels}** - selects channel 3 and opens the Wheel Picker in the CIA for gobo wheel selection.

• **{Effect Wheels}** - An attribute used to change the effect wheel loaded in a moving light. Select the **{Effect Wheels}** button on the CIA to display the wheel picker with the options available for your device. See "Using the Picker" on page 68. "More" as shown in the patch display, indicates additional parameter properties are available for the selected device, such as the color and gobo wheels.
  • **[5] {Attributes} {Effect Wheels}** - selects channel 5 and opens the wheel picker in the CIA for effect wheel selection.
{Database} Display and Settings

The {Database} page provides you with additional fields for entering information that can be used by the "Query" function. These fields include {Notes} and {Text 1} through {Text 4}. Clicking on {Text 1} through {Text 4} will open up a display for selection of keywords. It will display keywords that were already created as well as showing an option for creating new keywords. Clicking on {New Keyword} will display an alphanumeric keyboard for entering in a new keyword.

- **{Text}** - Text fields are used to provide up to four keywords about any channel or group of channels. These fields can be anything that you think is important about a channel, such as its location (FOH), an attribute of it (wash, spot) or other characteristics of the channel (such as gel R80). You may use the virtual keyboard in the CIA, or an external keyboard, to provide up to 30 characters of key words about the device.
  - [5] {Database} {Text 1} < FOH right > [Enter] - adds text to channel 5.
- **{Notes}** - Provides you the ability to attach a text note to a channel or group of channels. Select the {Notes} button on the CIA to display the virtual keyboard. You may type a label or any length of note regarding your channel in this space.
  - [5] {Database} {Notes} < this fixture is a backup to channel 15 for front of house right / new lamp installed on 10/4/06 > [Enter] - adds a note to channel 5.

Adding Keywords in Patch

If you plan on being able to query channels based on a keyword association, the keyword must be defined in patch.

**To enter a keyword for a channel:**

1. Step 1: Press [Displays], to the right of the CIA.
2. Step 2: Press {Patch} at the bottom of the CIA.
3. Step 3: Press {Database}.
4. Step 4: Select a channel or range of channels in the command line.
5. Step 5: Touch one of the {Text (1-4)} touchbuttons in the CIA to specify which keyword you are entering. A list of previously defined keywords will be posted. Select from these or press {New Keyword}. A virtual alphanumeric keyboard will appear.
6. Step 6: Type the keyword or words you wish to use.
7. Step 7: When finished, press [Enter].

Once keywords have been created, they will appear in the keyword section of the CIA when a query is performed. For more information on keyword queries see *Using {Query}, page 232.*
Deleting Keywords from the Database

Keywords can be deleted from any of the four text fields in the database. To delete a keyword from the entire database, you would use the following syntax:

•  [Delete]  {Text1}  <orange>  [Enter]  [Enter]

This will delete orange anywhere it was used in any text field of any channel.

To just delete a keyword from a specific channel, you would use the following syntax:

•  [1]  {Text1}  [Enter]

That would delete the text from channel 1's first text field only. If you wanted to delete the second text field, you would select {Text2} and so on.
Using Device List

The Device List is used to discover, configure, and monitor compatible Remote Device Management (RDM) and network devices. RDM allows for bi-directional communication between a RDM compatible device, such as a lighting fixture, and your desk.

Two lists, dimmer and RDM, make up the device list.

The dimmer list is the area of patch that handles setting up dimmer feedback from CEM+, CEM3, and FDX 2000. You can also do some configuration of dimmers from this list. The RDM List is the area of patch that handles RDM feedback with devices. You can also do some configuration of devices from this list. Once RDM compatible devices have been patched, they keep communicating with the desk to allow you to know when things like blown lamps happen or if a device goes offline for some reason. See "RDM Device List" on page 84.

The Device List displays all discovered devices during the current session and all devices that have been stored in the show file.

**Note:**

Desks only support RDM devices that are connected through an external ACN gateway. Supported gateways are the ETC Net3 4 or 2 port Gateways. Gateways need to be running version 5.1 or newer.

**Dimmer List for CEM+, CEM3, and FDX 2000**

**Note:**

For Dimmer Feedback, these software versions are required: CEM+ v3.0 and newer, CEM3 v1.3.1 and newer, and FDX v3.4.0 and newer.

To use the Dimmer Feedback area of the Device List, you must first enable feedback. In the network tab of the ECU, when using CEM+ or CEM3, make sure (Sensor Feedback) is enabled, or when using FDX 2000, make sure that (FDX) is enabled. The default setting is disabled for both. See "Interface Protocols" on page 343.

Open the Dimmer Feedback display while in the patch display by pressing (Device List)>(Dimmers). When the dimmer list is opened, the dimmers will be displayed in Patch by Address mode.
Ion will display the following information that it receives from the dimmers:

- Address
- Channel
- Label
- System
- Rack
- Lug
- Properties
  - Module Type
  - Firing Mode
  - Control Mode
  - Curve
- Loads
- Recorded Loads

**Note:** The System ID number from CEM3 is not currently supported.

**Note:** Rack numbers and dimmer numbers need to be unique for Ion to properly recognize them. For CEM+, dimmers also need to be patched to different sACN addresses.

With a dimmer or dimmers selected, you can edit various dimmer settings in the property view, which will display in the CIA. Items with a caret (>) are editable. When multiple dimmers are selected together for editing, an "*" will show for data that is different between the selected dimmers.

FDX dimmers will not display data for the following:

- Recorded Load
- Actual Load
- Rack Dimmer Source
- Threshold
- Scale Minimum
- Preheat Enable
- Preheat Timing
- AF Enable

**Note:** When dimmers are discovered, they are not automatically attached to patched channels in Ion; you must attach a dimmer to a channel. See "Patching Discovered Dimmers and RDM Devices" on page 86.
RDM Device List

Before you can start using the RDM Device List, you must first enable (RDM) in the network tab of the ECU. By default RDM is disabled. See “Interface Protocols” on page 343. RDM must also be enabled on the DMX ports of the Gateway. The Gateway needs to be running version 5.1 or newer.

Open the RDM Device List while in the patch display by pressing (Device List)> (RDM).

You will need to make sure that (Device Discovery) is enabled. (Device Discovery) is disabled by default. The (Device Discovery) option will not display if (RDM) is disabled in the ECU.

**Note:** (Device Discovery) will automatically disable when you leave the patch display.

When the RDM device list is opened, the devices will be displayed in Patch by Address mode. At the top of the list is a RDM indicator. This indicator shows incoming and outgoing RDM traffic.

Ion will display the following information that it receives from the RDM devices:

- Address (a part will be added if multiple devices are discovered with the same address)
- Channel
- Label
- Manufacturer
- Model
- Footprint

Ion will also display what personality from the Ion library the device matches in the Ion Type column. This information will not display until you first select the device. Once the device has been selected for the first time, Ion will extract the type information from the device and display it.

The following messages may display in the Ion Type column:

- No RDM Data Available - no model specific RDM data has been extracted from the device.
- Extracting RDM Commands - currently getting the command data from the device.
- Extracting RDM Fixture - currently getting the data required to create a fixture definition for the device.
- Extracting RDM Sensors - currently getting the sensor definitions from the device.
- Offline - no model specific RDM data has been extracted from the device and it is now offline.
With a device or devices selected, you can edit various device settings in the property view, which will display in the CIA. Items with a caret (>) are editable. When multiple devices are selected together for editing, an "*" will show for data that is different between the selected devices.

The following buttons will also display in the property view:

- **(Device Properties)** - opens the properties list for the selected RDM device.
- **(Sensors)** - displays if the selected device has sensors. Pressing **(Sensors)** will open the sensors list.
- **(Lamp Controls)** - displays if the selected device has lamp controls. Pressing **(Lamp Controls)** will open the lamp controls list.
- **(Ignore Errors)** - when enabled, errors messages will not display in the live/blind displays. They will still display in about and the properties display in patch.
- **(Reload RDM Data)** - deletes the fixture data from the desk and reloads it from the device.
- **(Flash)** - triggers the identity function of the RDM device. The identity function may defer between different manufacturers' devices. For example, Wybron scrollers identify by wiggling their gel back and forth.
- **(!) or (?)** - displays if selected device has errors. Pressing **(!)/**(?)** will open the error list.
Patching Discovered Dimmers and RDM Devices

When dimmers/devices are discovered, they are not automatically attached to any patched channels in Ion. If you want the benefits of dimmer or RDM feedback, you must attach a dimmer or device to a channel.

If you patch a dimmer/device's address to a channel, while in the device list display, the dimmer/device will be automatically attached to that channel. However, if you patch outside of the device list, you will need to (Attach) the device to the channel.

Note: If the dimmer/device’s address is not yet used in the patch, it is easiest to patch the address to a channel in the dimmer list or device list screen.

<Chan> [X] (Attach) or <Address> [X] (Attach) will link that channel/address in patch and the dimmers/devices at that address.

When a channel number is attached to a dimmer/device, by patching it or using (Attach), the channel’s fixture type is changed to the dimmer or device fixture type.

The advantages of attaching a dimmer to a channel are:

• The desk warns you when a channel’s attached dimmer has an error or is offline.
• Items that are attached between patch and the device list will display a caret (>) beside their channel/address in patch.

The advantages of attaching a device to a channel are:

• Its fixture type is copied to the channel.
• The desk warns you when a channel’s attached device is offline or has an error.
• The device will always appear in the device list display, even if the device is offline.
• Items that are attached between patch and the device list will display a caret (>) beside their channel/address in patch.

Errors and Warnings

One of the advantages of using dimmer and RDM feedback is error and warning reporting. If something happens with a patched and attached dimmer/device, you will be notified in live, patch, and about.

The notifications you can see are:

• A red “!” means that the dimmer/device has errors, such as overtemp, breaker trip, and lamp out.

Note: If the dimmer/device’s address is not yet used in the patch, it is easiest to patch the address to a channel in the dimmer list or device list screen.
• Yellow “?” means that the dimmer/device has a warning message. Warning messages can include:
  • Multiple devices’ addresses overlap
  • Multiple devices of different devices at this address
  • Patched fixture type mismatch
  • Patched fixture address mismatch
  • Offline

**Detaching Devices**
Pressing **(Attach)** twice will post the **(Detach)** command.

```plaintext
<Chan> [X] (Attach) (Attach) or <Address> [X] (Attach) (Attach)
```
will remove the link between that channel/address and the device at that address.

**Clearing the Patch**
You can clear the patch entirely by accessing the clear functions from the browser. Select **(Clear)** from the main browser menu. The clear functions window will open in the CIA.

To clear the patch, click **(Clear Patch)**. A confirmation is required before the patch will be cleared.

To exit the clear functions screen without clearing, press the **[Displays]** key at any time or select a clear button and then select **(Cancel)** from the confirmation screen.

**Reset Patch**
You can use **(Reset Patch)** to clear out your patch, and set it to a 1-to-1 patch.
Fixture Creator

Ion provides you with the ability to create your own fixture type within patch and store it with your show file. You can name the fixture, assign all necessary parameters, define the address and operational range of those parameters, and set lamp controls.

The fixture creator is accessible from patch. Once a fixture has been created, it is stored in the show file. It is not added to the fixture library. If you want to use the created fixture in another show file, you will need to use merge. See "Merging Custom Fixtures into a New Show File" on page 92.

To open the fixture creator:

1. Press [Displays] > {Patch} to open the patch display.
2. Press the {Fixtures} softkey. This will open a list displaying those same fixtures that are currently patched. This is the fixture creator.

Creating a New Fixture

New fixtures are created from the fixture creator list in the CIA (see above). You can either create a new fixture, or copy an existing fixture to edit. See "Copying a Fixture" on page 92.

To create a new fixture, press {New}. A new fixture will be added to the fixture list.

Name New Fixture

Once the new fixture appears in the list, it is recommended that you name the fixture you are about to create.

To name a fixture in the creator list:

1. Use the [Page] keys, mouse, or touchscreen to select the new fixture.
2. Press [Label] or [Type]. You can press [Label] twice to clear the name. The virtual keyboard will open in the CIA.
3. Enter the desired name for the new fixture on the virtual (or attached alphanumeric) keyboard.
4. Press [Enter]. The name will appear in the “Type” column for the new fixture.

Add parameters

After naming the fixture, you can specify which parameters the new fixture contains.

To add parameters to a new fixture:

1. Use the [Page] keys, mouse, or touchscreen to select the new fixture.
Step 2: Press {Edit}. That fixture will open in a new display in the CIA.

Step 3: Determine the total number of parameters that your fixture has. Do not count 16-bit channels as two channels, this will be done in a later step.

Step 4: Press {New} to add parameter slots. Repeat this step until you have as many slots as are required by the number determined in step 3.

Note: When {New} is pressed, the parameter slot will appear in the list with a default name in the “Parameter” column. You may disregard these default parameters as you will redefine the designations in a later step.

Step 5: Use the [Page] keys, mouse, or touchscreen to navigate to any parameter slots that you wish to alter the default parameter designations for.

Step 6: Click on the slot or press {Parameters} to open a list of touchbuttons that represent all of the available parameters.

a: Use the {>>} and {<<} buttons to scroll through the available parameters (in alphabetical order).

The touchbuttons on the left side of the CIA can be used to speed your search. You may press them to see only parameters that fall into the specific categories of {Intensity}, {Focus}, {Color}, {Image}, {Form}, {Shutter}, or {Control}. {All} returns you to the complete list of parameters.

b: Use the parameter category buttons on the left of the CIA to expedite searching for a particular parameter.

Step 7: Press the touchbutton for the desired parameter in the CIA.

Step 8: Repeat steps 5-6 until you have entered all of the required parameters for the new fixture.

If you are missing a parameter slot: At any point you can use the [Page] keys and {Insert}, to insert a parameter slot above the selected one.

If you want to remove a parameter: you can use the [Page] keys and {Delete}, to remove a parameter from the list.
Define Parameters

Once you have added and specified all of the parameters for the new fixture, you can now define the address requirements, size, and ranges for each of them.

To define the size (8-bit or 16-bit) of any parameter:

Step 1: Use the [Page] keys to navigate to any parameter that you wish to alter the size of. The system defaults to 8-bit for any new parameter.

Step 2: When selected, press {Size}. This will toggle the parameter from 8-bit to 16-bit. If 16-bit is selected, the system automatically applies a value in the “LDMX” column. This value can be altered (see below).

To define the DMX address of any parameter:

You can alter the default DMX address assigned to any parameter in the list. This is not the actual address that will be used when patched, but rather it is the order of address for the parameter relative to the other parameters in the fixture.

Step 1: Use the [Page] keys to navigate to the “DMX” column of the desired parameter.

Step 2: Enter the desired address using the keypad.

CAUTION: Be careful not to duplicate any address in the DMX order of parameters in the new fixture. Ion does not prevent you from duplicating addresses.

To define the LDMX address of any 16-bit channel:

LDMX or “low-DMX” is the DMX address for the second half of any 16-bit channel. If used in Coarse/Fine determination. The DMX channel defines the “Coarse” adjustment and the LDMX defines the “Fine” adjustment.

Step 1: Use the [Page] keys to navigate to the “LDMX” column of the desired parameter.

Step 2: Enter the desired address using the keypad.

To alter the Home settings for any parameter:

You can define the value for any parameter’s “home” value.

Step 1: Use the [Page] keys to navigate to the “Home” column of the desired parameter.

Step 2: Enter the desired home value (0-255 for 8-bit, and 0-65535 for 16-bit) using the keypad.

To enable the Snap setting for parameters:

You can enable snap for parameters to exempt them from cue timing, so they snap to their new value. For more information about snap, see Snap Parameters, page 93.

Step 1: Use the [Page] keys to navigate to the “Snap” column of the desired parameter.

Step 2: Press (Snap) or click in the ‘Snap” column for the selected parameter to enable.
Range editing a parameter

You can enter the operational ranges for specific slots within any specific parameter (such as color scroller, color wheel, gobo wheel, and so on).

For example, if the parameter were “Gobo Wheel”, and the fixture included a four-slot gobo wheel, you can use ranges to determine the minimum/maximum values for each of those slots. You can also label the slots and define the minimum/maximum values that will appear in the channel display for that parameter.

To define the range values for any parameter:

Step 1: Use the [Page] keys to navigate to the parameter that you want to add ranges to.
Step 2: Press (Ranges). The range list will open.
Step 3: Determine the total number of slots required by the parameter. Be sure to include “open” slots when needed.
Step 4: Press (New) to add ranges. Repeat this step until you have as many slots as are required by the number determined in step 3.
Step 5: Use the [Page] keys to select the range and field you wish to edit. Fields are:
   • Min - enter the minimum value (0-255) for the range slot you are defining.
   • Max - enter the maximum value (0-255) for the range slot.
   • User Min - enter the value that will be displayed to users (for example, what will be displayed in the live summary view) when the slot is at its minimum value. Value can range from -9999 to 65535.
   • User Max - enter the value that will be displayed to users when the slot is at its maximum value. Value can range from -9999 to 65535.
Step 6: Press (Label) to add a label to any range slots. These will appear in the encoder LCD when the related parameter is displayed for the new fixture.
Step 7: Press (Done) when you have finished editing the ranges.

Lamp Controls

For many devices, their lamp and motor control functions can be controlled remotely using DMX. These will often require use of a timed sequence of DMX levels to control various functions such as striking the lamp, resetting the fixture, and other specific actions.

To define the lamp controls for a device:

Step 1: With the fixture selected, press (Lamp Ctrls). The lamp control display will open.
Step 2: Press (New) to add a lamp control.
Step 3: Press [Label] or (Ctrl Label) to label the new lamp control.
Step 4: Press (Steps) to open the lamp control editor.
Step 5: Press (New) to add any additional steps needed for the lamp control.
Step 6: Select the time column or press (Time) to change the timing for each step. Timing is in seconds. The standard time in the Eos Family library is 12 seconds.

Note: It is not recommended that you set the time to (Hold) unless the DMX value should permanently remain at that level. In order to alter a level set with a time of (Hold), another lamp control to change that DMX value would need to be created.

Step 7: For each step created, press (Levels) to set the DMX addresses and levels. You may setup as many levels as needed for each step. Softkeys available for the fields are:
   • (DMX Number) - sets the DMX address.
   • (DMX Level) - sets the DMX level (0-255).
   • (All Offsets) - sets all parameters of the device to the defined level.
Copying a Fixture
It is possible to copy an existing fixture and then edit its parameters. In the fixture editor, there is a {Copy} button. Pressing {Copy} when a library fixture is selected will create a copy of that fixture and will assign it a new name. This new fixture can then be edited.

Merging Custom Fixtures into a New Show File
Custom fixtures are saved with your show file and not in the fixture library. If you want to use custom fixtures in a different show file, you will need to use the advanced merge function while in the new show file.

For more information, see Partial Patch Merging, page 55

Importing a Custom Fixture
You can import custom fixtures from an ASCII show file, see Importing Show Files, page 57.

Update Library
When a new library is installed on Ion either from a software update or a separate fixture library file from the ETC website, changes in library data will not automatically update your show files. This is to prevent library changes from affecting a functional show file.

Using the {Fixtures} softkey in patch will open up the list of fixtures used in the current show file. In this view, you will be able to tell which fixtures in the currently loaded show file differ from the desk’s fixture library. For fixtures that have a library update, the {Update Lib} softkey will display in white, and for fixtures that don’t have an update, the {Update Lib} softkey will be grayed out.
Snap Parameters

Certain parameters may not want to be subjected to cue timing. Those parameters can be set to snap. By default, Ion will snap the parameters listed in the following table:

<table>
<thead>
<tr>
<th>Parameter Type</th>
<th>Effect Library</th>
<th>MSpeed</th>
<th>Shutter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beam FX Index/Speed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Camera IR Image</td>
<td>Enable</td>
<td>Negative</td>
<td>Shutter Strobe</td>
</tr>
<tr>
<td>Clip Directory</td>
<td>File</td>
<td>Object Directory</td>
<td>Strobe Mechanism</td>
</tr>
<tr>
<td>Color Effect</td>
<td>File Type</td>
<td>Object File</td>
<td>Sync Source</td>
</tr>
<tr>
<td>Color Index</td>
<td>Front/Rear Projection</td>
<td>Object File</td>
<td>Text</td>
</tr>
<tr>
<td>Control</td>
<td>Generator</td>
<td>Page</td>
<td>Texture</td>
</tr>
<tr>
<td>Copy Mod</td>
<td>Image Movement Speed</td>
<td>Projector Input</td>
<td>Timeline Position</td>
</tr>
<tr>
<td>Cue</td>
<td>Internal Media Frame</td>
<td>Relay</td>
<td>Tracking Object</td>
</tr>
<tr>
<td>Dimmer Curve</td>
<td>Library</td>
<td>Select</td>
<td>Transition Speed</td>
</tr>
<tr>
<td>Edge Blend Profile</td>
<td>Macro</td>
<td>Shape</td>
<td>Transition Time</td>
</tr>
<tr>
<td>Effect File</td>
<td>Mode</td>
<td>Shape Library</td>
<td>Transition Type</td>
</tr>
</tbody>
</table>

In the [About] channel patch screen, the snap column shows which parameters for that channel are currently set to snap.

If you wish to disable any of the default snap parameters or enable snap for parameters that are not by default enabled, you will need to first create a copy of the fixture profile. In the fixture editor for the copied profile, change the parameter settings via the Snap Enable/Disable column.

**Note:**
You will need to patch your fixtures to their new fixture type if you change which parameters are to snap or not.
This chapter describes the processes involved in changing your system settings to meet your preferences.

This chapter contains the following sections:

- **Opening Setup** ...........................................96
- **Show** .....................................................96
- **Desk** .....................................................103
Opening Setup

To enter the setup screen, press [Displays]>{Setup} or go to the Browser>Setup.

The CIA will repaint to display the setup screen and the softkeys will change to display the various subcategories of setup. Ion defaults to display show settings, however if you have changed the view to another subcategory, Ion will remember the view you were in when you return to setup.

The setup subcategory softkeys are:

- Show
- Desk

Show

When you select the (Show) softkey, the CIA repaints to display the following screen:

The buttons on the left are the setting categories within show setup. The show setup categories are:

- Show Settings
- Cue Settings
- Show Control
- Partitions

Show Settings

Click (Show Settings) to enter this category.

Nine fields will be available to you: (Num of Channels), (Dim. Dbl. Offset), (Partitioned Control), (Home Preset), (Allow HS Fades), (Auto-Mark), (Startup Macro), and (Disconnect Macro). To change the setting for any of these fields, click the field in the CIA to activate it. If the field requires data, enter it from the keypad. If the field is a toggle state, one click of the button will switch the field to its other state.

Changes from this screen are system wide and will impact all Ion consoles and clients connected to the system.

(Num of Channels)

You may use this field to set the number of channels in your Ion to the number of channels in your system. Ion supports a maximum of 99,999 channels. The default is 5,000. Only 10,000 channels can exist in the patch, but they can be distributed throughout the entire 99,999 channel count. Enter the number of channels for your system using the keypad. This entry must be confirmed with the [Enter] key.

Note: Every part in a multipart channel will count as an additional channel for the channel count total.
**{Dim. Dbl. Offset}**
This allows you to set the address offset for dimmer doubling. The default for this is 20000, to match the Net2 standard offset, including Sensor dimming software. For dimmer doubling over Local DMX, this value should be set to 256.

**{Partitioned Control}**
Enables or disables the assigning of partitions. Default is “Disabled” (see Using Partitioned Control, page 329 for more information).

**{Home Preset}**
Allows you to specify a preset that will be used as the home level for all non-intensity parameters stored in the preset, instead of the fixture library defaults. This preset will be applied for all “Go to Cue Out” and home commands. Intensity values in the preset will be ignored. Channels not included in the assigned home preset will continue to home to their library defaults.

**{Allow HS Fades}**
Hue and saturation (HS) color data normally fades in native space. Enabling {Allow HS Fades} will make HS data fade in HS space.

**{Auto-Mark}**
This toggles the AutoMark settings between enabled and disabled (see Using Mark, page 191 for more information). AutoMark is disabled by default.

**{Mark Time}**
This field allows you to set the time that non-intensity mark instructions will use. When {Mark Time} is disabled, which is the default, mark instructions will use cue timing.

**{Startup Macro}**
This field allows you to set up a startup macro that will trigger after the console initialization has completed.

**{Disconnect Macro}**
This field can be use for disconnect macros or shutdown macros.

- Disconnect Macro - allows you to set up a disconnect macro that will trigger when the primary disconnects from its backup, or when a backup disconnects from the primary.
- Shutdown Macro - allows you to set up a disconnect macro that will trigger at power off, not when exiting the application.
Fader Configuration

This screen allows you to specify what your faders are assigned as: playbacks, submasters, or grandmasters. These faders can be used by opening the virtual faders (see Fader Module, page 25) or by using the Universal Fader Wings (see Universal Fader Wings, page 389).

Note: Unless you need a grandmaster or a cue list loaded to more than one fader, it is generally not necessary to use the fader configuration screen. Assigning cue lists and submasters can all be done from live.

To change the configuration of any fader, use the (Page) buttons to access the fader page you wish to alter. For the desired fader, click the appropriate button (playback, submaster, or grandmaster) for the configuration you desire. Then click the (Mapped to) button and enter the number you want to map the fader to (see Mapped to... below). When you are done making changes, click (Close).

To leave this screen at any time without saving changes, you must click (Close).

Mapped to...

This button is used to specify the action target of any fader. It allows you to define the fader target that a slider is assigned to. Mapping is specific to the type of fader configuration (playback, submaster, or grandmaster).

Submaster - A maximum of 300 submasters can be recorded. (Mapped to) defines the submaster number that will be controlled by the specified slider. If a submaster slider is mapped to 10, when submaster 10 is recorded it will appear on that slider.

Grandmaster - 1 grandmaster may be assigned, but multiple instances of that GM may be mapped. A grandmaster inhibits all live intensity values. If the grandmaster is set at 50%, all live intensities will be at 50% of their actual values. Inhibited levels from the grandmaster do not impact data storage.

Playback - A maximum of 200 playbacks can be assigned. (Mapped to) allows you to have the same playback appear on multiple pages as it represents a playback number, not a specific fader or cue list number. To change the mapped location of any playback, click the (Mapped to) button for that slider and enter the number you wish to assign to it.

Unmapped - Selecting unmapped for any fader leaves that fader open and unoccupied.
Grandmasters, submasters, and playbacks may appear on more than one fader page.

In a partitioned control environment, the mapping of the faders (with the exception of the master fader) is global.

**Note:** Specifying a *(Mapped to)* location does not specify the cue list that will be loaded to that playback. Cue lists can be assigned to any playback. *(Mapped to)* establishes the order in which faders will be loaded.

---

**Master fader pair**

It is possible to map the master fader pair as well. This will allow separate users to have different lists loaded to the master fader pair. The default mapping for the pair is 0.

**Cue Settings**

This screen allows you to set the default cue times for the parameter categories of your Ion system. To change a time, click the parameter category button in the CIA and enter the desired time on the keypad. To set a time for all categories at once, press *(Selection Button) [Thru].* Pressing *[At]* selects manual times.

The categories for which you may set default times are:

- Intensity Up
- Intensity Down
- Color
- Focus
- Beam
Show Control
This section allows you to adjust settings for MIDI show control, time code (MIDI or SMPTE), analog, and serial functions. For more information on using show control with your system, see the Eos Family Show Control User Guide, which is available for download at www.etcconnect.com.

(SMPTE Time Code Rx)
This touchbutton is used to control whether your console can receive SMPTE time code. Choosing “Disabled” will disable all time code lists that have a SMPTE source. The default for this setting is “Enabled”.

(MIDI Time Code Rx)
As above, but for MIDI Time Code instead of SMPTE. The default for this setting is “Enabled”.

(Resync Frames)
This touchbutton allows you to configure how many frames need to be synced before timecode starts running. Frames can be from 1-30. Default is 2 frames.

(MSC Receive)
This touchbutton toggles the setting for receiving MIDI Show Control from an external source between “Enabled” and “Disabled”. The default setting is “Disabled”.

(MSC Receive Channel)
Also known as a “Device ID” this setting configures the MIDI channel for the console to receive MIDI Show Control information. Only MSC data with the same device ID will be received. A device ID can be from 0-126, or if set to 127, Eos Ti, Gio, Ion, or Element will receive MSC data from all IDs (All Call). Eos cannot be set as an All Call receiver. For example:

• {MSC Receive Channel} [5] [0] [Enter]

(ACN - MIDI Rx ID(s))
This setting allows you to specify the MIDI Show Control data that your console will receive when transmitted over the Architecture for Control Network (ACN). When set, the console will respond to MSC data from any gateway that has its ‘ACN MIDI Rx ID’ set to the same number. ACN MIDI Rx ID can be from 1-32. ID ranges may be used. When using the local MIDI ports on Eos Ti, Gio, Ion, or Element, this setting needs to match the MIDI Rx Group ID in the ECU>{Settings}>{Local I/O}>Show Control Gateway>Group IDs. For example:

• {ACN MIDI Rx ID} [2] [5] [Enter]

• {ACN MIDI Rx ID} [1] [Thru] [1][0] [Enter]
Setup

**{MSC Transmit}**
This setting, when enabled, allows the console to send MSC messages for actions taken on the console, such as cue actions, macros firing, and submaster bumps. The default setting is “Disabled”.

**{MSC Transmit Channel}**
Also known as “Device ID” this setting allows you to establish the device ID with which your console will transmit MIDI Show Control information. A device ID can be from 0-126, or if set to 127, Eos, Eos Ti, Gio, Ion, or Element will transmit MSC data to all IDs (All Call). For example:
- `{MSC Transmit Channel} [5] [0] [Enter]`

**{ACN - MIDI Tx ID}**
This setting allows you to specify the ID number of MIDI Show Control data that the console transmits over an Architecture for Control Network (ACN). When set, the console will transmit MSC data to any gateway that has its “ACN MIDI Tx ID” set to the same number. ACN MIDI Tx ID can be from 1-32. When using the local MIDI ports on Gio, Ion, or Element, this setting needs to match the MIDI Tx Group ID in the **ECU>{Settings}>{Local I/O}>Show Control Gateway>Group IDs**. For example:
- `{ACN MIDI Tx ID} [2][5] [Enter]`

**{String MIDI TX}**
When enabled, this setting will cause the console to send serial strings instead of a MIDI Show Control message when certain actions happen at the console.

**{MIDI Cue List}**
MIDI Cue List specifies the cue list that the console will use to send MSC data. If left blank and MSC Tx is enabled, all cue lists will generate MSC events. Otherwise, only the particular list (or lists) selected will fire MSC events.

**{Analog Inputs}**
This is a master setting for receiving analog inputs from a Net3 I/O Gateway or the local analog ports on a Gio, Ion, or Element. When disabled it will turn off all analog input for all event lists. Default is “Enabled”.

**{Relay Outputs}**
This is a master setting for triggering external relays from a Net3 I/O Gateway or the local ports on a Gio, Ion, or Element. When disabled it will turn off all external relays for all event lists. The default is “Enabled”.

**{String RX}**
This setting will enable receiving strings on all Serial RX formats.

**{String RX Group IDs}**
This button is for setting up which Serial Port Group ID (from I/O Gateway settings in GCE) the console will listen to. This only affects serial traffic from I/O gateways, not network UDP messages or ACN strings. Group IDs are from 1-32. Remember group IDs relate to the number set in the gateway. It can be set to listen to multiple group IDs by using [Thru] and [+].

**{String RX Port}**
This setting specifies the UDP port that the console will listen to for receiving strings.

**{String TX}**
This settings will enable sending strings on all Serial TX formats.

**{String TX Group IDs}**
This button is for setting up which Serial Port Group ID (from I/O Gateway settings in GCE) the console will send to. This only affects serial traffic to I/O gateways, not network UDP messages or
ACN strings. Group IDs are from 1-32. Remember group IDs relate to the number set in the gateway. It can be set to send to multiple group IDs by using [Thru] and [+].

[String TX Port]
Setting for the UDP destination port that the console will send strings.

[String TX IP Address]
Sets the destination IP address that the console will send strings.

Partitions
Pressing the [Partitions] button in Show setup opens the partition display in the CIA. This display shows any recorded partitions, including the four pre-existing partitions. For more information, see Using Partitioned Control, page 329.
Desk
This setup softkey accesses settings for the user identified on the associated Ion device. Changing these settings does not impact other Ion controllers on the network assigned a different user ID.

{Record Defaults}
This screen enables you to change general record defaults.

To change the setting for any of these fields, click the field in the CIA to activate it. If the field requires data, enter it from the keypad. If the field is a toggle state, one click of the button will switch the field to its other state.

Auto Playback
When enabled, this feature automatically plays back cues and submasters as they are stored and releases manual control. For submasters to automatically play back, the slider must be at full. This field is a toggle state between “Enabled” and “Disabled”. When auto playback is “Disabled”, all manual levels are maintained and cues must be loaded and executed on playbacks. The default is “Enabled”.

Track
This field allows you to switch between tracking and cue only modes (see Tracking vs. Cue Only, page 5). The default is “Tracking”.

Record Confirm
This setting allows you to enable or disable the confirm action when storing over a previously recorded target. The default is “Enabled”.

Delete Confirm
This field allows you to enable or disable a required confirmation before any delete command is executed. The default is “Enabled”.

Update Mode
This field allows you to select a default update mode (see Update Styles, page 181). The default is “All”.

Break Nested
This setting allows you to enable/disable the update modifier break nested. The default is “Disabled”.

Update Last Ref
This setting allows you to enable/disable the update modifier update last ref. The default is “Disabled”.

246 of 1217
(Manual Control)
This desk setting button gives you access to Ion manual control settings.

**Manual Time**
In this section you may change the default times for manual changes to occur in live. Times can be set for each parameter category (Intensity Up, Intensity Down, Focus, Color, and Beam). You may use the [Thru] key to enter a value for all categories.

- *(Int Up) [Thru] [9] [Enter]*

The default for each of these is 0 seconds.

**Manual Control**
This section allows you to specify the values for certain buttons and settings used in manual control. To change any value, click the appropriate button in the CIA and use the keypad to enter a new value.

- **Preserve Blind Cue** - This enables the console to display the last selected cue in blind when you return to blind. The default is disabled.
- **Level** - This sets the default for Level (which is accessed in Ion by double pressing [Full]). Any value between 0-100 may be entered. The default is 100.
- **Plus%** - This sets the level for the +/- (which is accessed in Ion by pressing [Shift] & [+]), which will increase the selected channel by the set percentage. Any value between 0-100 may be entered. The default is 10%.
- **Minus%** - This sets the level for -% (which is accessed in Ion by pressing [Shift] & [-]), which will decrease the selected channel by the set percentage. Any value between 0-100 may be entered. The default is 10%.
- **Highlight Preset** - This field is used to specify the preset that will be used for highlight commands.
- **Lowlight Preset** - This field is used to specify the preset that will be used for lowlight commands.
- **Highlight Rem Dim** - This enables a Remainder Dim when any highlight or lowlight commands are given, thereby temporarily dimming any channel not participating in the High/Low. An intensity level or a preset can be assigned in this field. Channels not in highlight or lowlight that are not included in the RemDim IP or preset are not affected.
- **Live RemDim Level** - This allows you to set the level for all remainder dim commands in live. The default is 0. An intensity level or a preset can be assigned in this field.

**Default Times**
In this section you may change the default times for sneak commands and the respective feature response times based upon parameter category. The default for these is 5 seconds, except for back time, which uses a default of 1 second.
**Sounds**
You can adjust the frequency and length of the audible sounds that Ion delivers. Signals are qualified as being either an error, advisory, or click sound. All types of sounds can be adjusted from this setup screen in the CIA.

To adjust a sound, move the virtual slider with the mouse on the CIA. To hear the result of your adjustment, click the (Test) button respective to the sound type, located beneath the sliders.

To turn off all sounds completely, click the (Turn Sounds Off) button. The sound area will then be replaced with a (Turn Sounds On) button, which can be pressed to reactivate audible signals in Ion.

**Level Wheel**
You can adjust the increment and acceleration effect of the level wheel from this screen as well.

To alter the number of ticks in a full turn of the level wheel, adjust the slider labeled “LW ticks”. This will increase or decrease the amount of change effected when you use the level wheel. A higher tick setting will increase the amount of change resulting from one turn while lower settings will decrease the amount, making smaller adjustments easier to perform. The options range from 50 - 255 ticks. The default is 150.

Ion also provides an adjustable acceleration feature for the Level wheel. This feature allows you to adjust the wheel’s sensitivity to fast adjustments, thereby temporarily overriding the number of ticks setting. To adjust the level wheel acceleration, use the virtual slider labeled “LW Acc. Factor”. The higher the slider setting, the less sensitive the level wheel will be to acceleration. The lower the setting, the more sensitive it is. When set low, the faster you move the wheel, the greater the increment covered by a revolution. When movement stops, the normal LW ticks will be reinstated.

**Encoder**
Similar to “LW Acc. factor” (see above), the encoder acceleration factor is used to adjust the acceleration of all encoders.

To adjust the encoder acceleration, use the virtual slider labeled “Encoder Acc. Factor”. The higher the slider setting, the less sensitive the level wheel will be to acceleration. The lower the setting, the more sensitive it is.

“Encoder Tic Freq.” can be used to increase or decrease the number of ticks in a full turn of the encoder.

Press (Disable Accel) to disable encoder acceleration. With acceleration disabled, two new options will be available: (Encoder Degrees Per Revolution), which is for the pan & tilt encoders, and (Encoder Percent Per Revolution), which is for the other encoders. When a pan or tilt encoder is moved one revolution, the parameter will change by as many degrees as defined in
Setup. The default is 30. When any other encoder is moved one revolution, the parameter will change by the set percentage of its entire range. The default is 35.

The settings for (Encoder Degrees Per Revolution) and (Encoder Percent Per Revolution) are stored with the showfile. Starting a new file will reset the two settings. Whether or not acceleration is disabled or enabled is not stored with the showfile.

**Note:** If you turn acceleration off and move the encoder quickly, and you see movement of the associated parameter slightly greater than indicated by your encoder settings, a firmware update may be required for your Ion’s encoders. See “Firmware Update” on page 349.

---

**{Face Panel Keypad}**

**Auto Repeat**
This setting allows you to adjust the auto repeat settings (delay and speed) for the facepanel keypad.

**Blackout**
You can disable the [Blackout] hardkey here. By default, blackout is “Enabled”.

**Grandmaster**
You can disable the Grandmaster. By default the Grandmaster is “Enabled”.

**Spacebar [Go]**
You can enable the spacebar on an external keyboard as the hotkey for [Go]. By default, it is “Disabled”.

**Hide Mouse**
With hide mouse enabled, if the mouse is left idle for 10 seconds, the cursor will go away. Once the mouse is used again, the cursor will return. By default, this is “Disabled”.

---

---
[Displays]
This desk setting button gives you access to the Ion display settings.

High Contrast Display
This button toggles the setting between “Enabled” and “Disabled”. When enabled, high-contrast brightens the magenta used to show tracked values.

The default setting for this is “Disabled”.

Show Reference Labels
This button toggles the setting between “Enabled” and “Disabled”. When enabled, referenced record targets (such as presets or palettes) with labels will have their labels displayed in the live/blind display rather than their target type and number. [Shift] & [Label] can be used to temporarily toggle between views.

The default setting for this is “Disabled”.

Group Chans By 5
You can turn off/on the grouping of channels in groups of 5 in the live summary view from this field.

The default for this setting is “Enabled.”

DirSel.Dbl Clk
When enabled, double clicking a direct select button will act as [Recall From] [Record Target] to place the entire contents of that preset, palette, or step-based effect on stage. The default for this setting is “Disabled”. 100 Channel Display

This setting can be used to display 100 channels at a time in the live summary view. The default for this setting is “Disabled.”

Cmd Line on PSD
This setting can be used to display an optional command line on the Playback Status Display. The default for this setting is “Disabled”.

PSD Time Countdown
When enabled, the cue category times will countdown in the PSD as a cue is fading. The default for this setting is “Disabled”.

User Id
You can change the User ID for the console by selecting this button and entering a number from the keypad. For more information on User ID see About User ID, page 328.
PDF File Settings
This screen allows you to select the orientation and paper type for PDF files.

Brightness Settings
This screen allows you to adjust the brightness and contrast settings for the Ion LCD, the fader wing LCDs, and desk lamps.

Fader Wing Config
This screen allows you to manually configure the positions of fader wings connected to the Ion. The console will default to configuring the wings on its own. To manually configure, you must click on the *Manual Config. Off* softkey.

Clicking on the *Manual Config. Off* button turns manual configuration on and displays the Fader Wing Configuration screen.

Clicking *Identify* will display numbers on each wing’s display to aid in configuration. The numbers do not identify the wings as to their actual order. Order is determined from left to right. The left most wing will contain the first faders, unless a 1x20 wing is attached. A 1x20 will always contain the first faders regardless of other wings to the left of it.

Click and drag the wings to match your physical layout. Click *Apply* to save the changes. Clicking *Reset* will restore to the last saved configuration. Clicking *Manual Config. On* will turn off manual configuration and will require a restart of the application before the console will automatically configure the wings. For more information on using fader wings, see *Universal Fader Wings, page 389*. 

Ion Operations Manual
{RFR Settings}
This screen is for allowing Net3 RFR, iRFR, and aRFR connections. The default setting is “Enabled”. For more information see RFR, page 352 and Radio Focus Remote (RFR), page 378.

{Trackball Settings}
This screen allows you to select various trackball options and adjust settings.

Trackball Tick Freq.
This fader adjusts the trackball tick frequency. The default is 200 ticks.

Trackball Acc. Fctr
This fader adjusts the trackball acceleration factor. The default is 800 zip.

Swap Pan/Tilt
This touchbutton swaps the directions for Pan and Tilt on a trackball. The default for Pan and Tilt is X and Y, respectively. When this button is enabled, Pan and Tilt will be Y and X.

Reverse Pan
This touchbutton reverses the direction of Pan.

Reverse Tilt
This touchbutton reverses the direction of Tilt.

Reset
This button resets all five trackball settings back to their default.
Chapter 6
Basic Manual Control

Ion provides a variety of ways to select and command control channels. This chapter identifies the many basic ways you can select channels and manipulate show data within Ion.

This chapter contains the following sections:

- Selecting Channels ...........................................112
- Setting Intensity ..............................................114
- Manual Control of Non-intensity Parameters (NPs) ........115
- Home ..............................................................123
- Select Last ....................................................123
- Multiple Intensity Channels ...............................124
- Lamp Controls .................................................125
- Using +% and -% ..............................................126
- Remainder Dim. ................................................127
- Highlight and Lowlight ......................................128
- Sneak ..............................................................130
- Flip .................................................................131
- Channel Check ...............................................131
- Address at Level .............................................131
- Address Check ...............................................131
- Flash ..............................................................132
- Using {Move To} ..............................................132
Selecting Channels

Ion provides interactive ways to select channels including the control keypad, faders, and direct selects. For information on using the direct selects for channel selection, see Selecting Channels with Direct Selects, page 25.

Channels are deselected when any action is taken on the keypad that is unrelated to manual control, such as recording groups and cues, or updating a record target, etc. You can also press [Clear] after a terminated command line to clear the channel selection.

Select Channels From the Keypad

The keypad defaults to selecting channels. Channels may be selected on the control keypad using the [+], [-], and [Thru] keys for consecutive or non-consecutive channel selection. The following examples illustrate various methods of selecting channels from the control keypad:

• [5] [Enter] - selects channel 5.
• [5] [+] [7] [Enter] - selects non-consecutive channels 5 and 7.
• [5] [Thru] [9] [Enter] - selects channels 5 through 9.
• [2] [Thru] [8] [-] [5] [Enter] - selects a range of channels 2 through 8, except channel 5.
• [-] [6] [Enter] - removes channel 6 from the current selection list.
• [+][1] [Enter] - adds channel 1 to the current list of channels.

Note: You may use [+]/[+] multiple times to add or remove multiple channels from the selection. [Thru] lists may be entered in ascending or descending order.

Selecting Channels from Faders

Holding down the [Fader Control] button while a fader wing is attached will cause the last button on the wing to toggle between channel and fader modes.

In channel mode, each fader will control a separate channel for the number of faders available. Channels above the number of available faders will need to be controlled from the keypad.

Holding down [Sneak] while moving a channel fader will allow it to be moved without asserting control.

Using Groups as a Channel Collector

[Group] can be used as a quick way to collect channels from submasters, cues, palettes, or presets.

The following actions are possible:

• [Group] [Cue] [1] - selects all the channels in cue 1.
• [Group] [Sub] [3] - selects all the channels in submaster 3.
• [Group] [Int Palette] [5] - selects all the channels in intensity palette 5.

Note: The [Thru] command uses the current flexichannel state. Channels not included in the flexichannel mode (except selected channels mode) are not collected in a thru range. [Thru] [Thru] can be used to collect all channels in the range, even if they are not in the current flexi mode. See "Using Flexichannel" on page 36.
[Next] and [Last]

The [Next] and [Last] buttons increment and decrement channel selection. If only one channel is selected, [Next] increments the channel selection to the next sequential channel, while [Last] decrements the channel selection by one.

Select channel 10 then change the selection to channel 11 using the [Next] key:

- [1] [0] [Enter]

Channel 10 is selected with a gold outline around the entire channel and the channel number is indicated in white.

- [Next]

Channel 11 is now selected with a gold outline and white channel number while channel 10 is no longer selected.

If there is no specific channel selected when [Next] or [Last] is pressed, channel 1 is selected.

When a group of channels is selected, pressing [Next] or [Last] selects the first or last channel in the channel list.

For Example:

Channels 11 through 20 are selected:

- [Next]

Channels 11 through 20 are still the specified channel list but only channel 11 is selected for control. You can now sequentially press [Next] or [Last] to cycle through the list. Press [Select Last] to reselect the entire range.

Note: [Next] and [Last] work with the current flexichannel state. See “Using Flexichannel” on page 36.

Offset

[Offset] is a feature used to select a range of channels from a broader channel selection. For the offset feature to function, you must first select a group of channels, then press [Offset]. When [Offset] is pressed, the softkeys change to the following: (Even), (Odd), (Reverse), (Random), and (Reorder). These keys, along with the numeric keys from the keypad are used to create channel offsets. These channel commands can be combined with group record functions.

The following examples illustrate how offset works:

- [1] [Thru] [10] (Offset) (Even) [Enter] - selects channels 2, 4, 6, 8, 10.
- [1] [Thru] [2] [0] (Offset) [3] [Enter] - from the selected group, this syntax would select channels 1, 4, 7, 10, 13, 16, 19 which is an offset of every third channel from the selection.
- (Group 5) (Offset) (Random) [Enter] - selects all channels in Group 5 and places them in random order. This selection may be used only temporarily or it may be recorded to a new Group.
- [1] [Thru] [2] [0] (Offset) (Even) (Random) [Enter] - selects all even channels within the range and puts them in random order.
- (Group 3) (Offset) (Reorder) [Enter] - reorders the channels in group 3 so they are in numeric order.
- [Offset] [4] [Enter] - selects every fourth channel in the current channel selection.
Setting Intensity

Channel intensity may be manually entered from the keypad, set with an intensity palette (if programmed) or set with the level wheel. Pressing [At] after channel selection assumes an intensity value will be added to the selected channels. You may also use the [Full] button to bring the selected channels to their full intensity or you may use the [Out] button to fade the intensity out.

Use the Level ([Full] [Full]), +% ([Shift] & [+]) and -% ([Shift] & [-]) keys to affect the intensity value of selected channels. Each of these keys are set at a specific value established in the Setup ((Manual Control), page 104).

- Level is set by default to full (100% intensity).
- +% and -% are each set by default value of 10 points.

The following examples illustrate the various methods of setting intensity:

- **1 [+] [3] [At] [5] <0> [Enter]** - selects channels 1 and 3, and sets an intensity level of 50%.
- **1 [Thru] [5] [-] [4] [Full] [Enter]** - selects a range of channels 1 through 5, except channel 4, and sets the intensity to full.
- **1 [Thru] [8] [At] [+] [3] <0> [Enter]** - adds 30% to all intensities in the channel selection. If they were at 50, they will now be at 80. If channels 1, 3, and 5, were at 30 and 4 was at 50, they would be 60% and 80% intensity, respectively.
- **5 [Thru] [8] [At] [-] [3] <0> [Enter]** - scales the intensities of the selected channels in the list down 30% of their current values.
- **1 [Thru] [4] [At] [1] [3] [0] [Enter]** - scales the intensities of the selected channels in the list up 30% of their current values. If channels 1 through 4 were at 40% intensity, this would scale them up by 30% to a value of 52.
- **2 [+] [5]** - roll the wheel up for greater intensity or down for less intensity.
- **1 [Full] [Full]** - selects channel 1 and sets it to full and self terminates the command line.
- **Group [9] [Out]** - selects all channels in Group 9 and sets the intensity values for those channels to zero. As long as channels are on the command line you can continue to address them with commands without having to reselect them.
- **1 [0] [At] [At]** - selects channel 10 and sets an intensity level as established in Setup.

For Example:

- **1 [Thru] [5] [Full] [Enter]**
  The selected channels are highlighted in gold, with white channel text and red intensity values (indicating manual data). You may continue to modify channels 1 through 5 since they are still selected and displayed on the command line.
  - **[Shift] & [-] [Shift] & [-]**
    This command would reduce the intensity of channels 1 through 5 by 20%.
  - **[At] [7] [5] [Enter]**
    You can continue manipulating the selected channels so long as the channels are selected and displayed on the command line.

Level Wheel

You may set intensity for selected channels or addresses using the level wheel. Rolling the level wheel upwards increases intensity. Rolling it downwards (towards you) decreases it.
**Manual Control of Non-intensity Parameters (NPs)**

Non-intensity parameters can be set with a variety of controls including the control keypad, buttons on the central information area (CIA) and the encoders.

**Parameter Display**

The parameter display in the CIA is populated with only those parameters that are found in the patched devices. As channels are selected, the parameter display will change to show only parameters relevant to the selected channels.

The parameters are divided into the following categories: Intensity, Focus, Color and Beam. Each parameter category is represented with buttons in the parameter tiles. These buttons allow you to select the entire collection of all parameters within that category. You can also select a single parameter from a category using that parameter’s button in the parameter display.

Beam has three subcategories which correspond to the way the encoders are mapped. They are {Shutter}, {Image}, and {Form}. These subcategories are represented with buttons in the CIA. Pressing these buttons allows you to select all parameters within those subcategories.

Within the CIA, in the upper left corner, notice the {All NPs} button. When pressed, this collects all non-intensity parameters for further editing.

Some examples of using parameter buttons are:

- ![Diagram showing parameter buttons]

- **[1] [Iris] [5] [Enter]** - Places the iris parameter of channel 1 at 50%.

- **[Group] [4] [Zoom] [Edge] [Out] [Enter]** - Sends any zoom and edge values for all fixtures in group 4 to 0%.

- **[1] [Thru] [3] [All Speed] [At] [2] [5] [Enter]** - Sets all the available speed parameters for channels 1 through 3 to 25.
Setting Parameters with the Keypad

When the CIA is placed in parameter mode, all parameters of selected channels may be given numeric values through the keypad.

When no channels are selected, the CIA shows all of the parameters that are available in the lighting system. When channels are selected, the CIA condenses to show only the parameters that are appropriate to the selection set. If channels are selected that have different device types, such as spot and wash lights, the CIA will show all of the available parameters. Parameters that are not available to all channels are grayed out.

Using [At] [/] [/] will place the direct DMX value on the command line. For example, [1] [At] [/] [/] [2][3][9] [Enter] would put channel 1 at DMX value 239.

The following examples illustrate how to set parameter values with the keypad:

• [5] [Iris] [5] [Zoom] [6] [5] [Edge] [5] [Enter] - sets channel 5 to an iris value of 50%, a zoom value of 65%, and an edge value of 50%.

Note: Pressing [Shift] + [Encoder Paging Key] will place the associated parameter onto the command line for numeric entry.

Adjusting Parameters Using + and -

[+] and [-] can be used to adjust parameters from the command line. When using [-], you will need to preface the command with [+] if you want to remove from the current value.

For Example:

• [Channel List] {Pan} [1][0] - sets to 10 degrees.
• [Channel List] {Pan} [+] [1][0] - adds 10 degrees.
• [Channel List] {Pan} [-] [1][0] - sets to -10 degrees.
• [Channel List] {Pan} [+] [-] [1][0] - removes 10 degrees.

Setting Non-intensity Parameters with the Encoders

Encoders provide a quick method to adjust current values for non-intensity parameters. The four encoders are pageable using the six encoder page hardkeys to the upper right of the encoder LCD. The encoder page keys consist of: [Focus], [Custom], [Color], [Form], [Image], and [Shutter]. Form, Image and Shutter are subcategories within the broader parameter category of Beam.

• Focus - includes pan and tilt control.
• Custom - includes intensity and intensity MSpeed.
• Color - includes all color mixing controls (CMY, RGB, HS), as well as scrollers, color wheels and color effects.
• Form- includes parameters that affect the quality or size of the light output, such as edge, zoom, iris, IMF, frost, etc.
• Image - includes anything that drops into the gate, such as gobos, effects wheels, etc.
• Shutter - includes all of the framing devices for the luminaire.

The LCD beneath the encoders indicates the parameters they control and provides additional information about the current status of those parameters. Encoder pages populate with parameters relevant to fixtures in the show patch. When you access a parameter page, controls that are not available for selected channels are suppressed.
Encoder LCD screen

The encoder LCD displays the active parameter category loaded on the encoders, as selected by the page buttons. Each encoder has an associated control section in the LCD that provides visual indication of:

- The parameter it controls.
- The current setting (value) of the parameter.

For Example:

- Encoder 1 is controlling pan.
- Encoder 2 is controlling tilt.
- Encoder 3 is controlling position MSpeed.
- Encoder 4 is not assigned.

Pressing a different encoder page key loads the encoders with other parameters of that type (if available).
Encoder paging

The number of pages for each category is displayed at the right of the LCD. You can go directly to the page required by pressing the encoder page button and a page number. For example:

- **(Form) & [3]** - this will take you to the third page of the form category.

Information in the encoder LCD is only as accurate as the patch information for that channel. For example, when you are working with color scrollers, the standard manufacturer color frames will be displayed for scroller controls unless you have created a custom scroll for the selected channel in patch using the Scroll Editor.

When you have created a new scroll or wheel in patch for any channel and that channel is selected, the custom information is displayed in the associated encoder LCD. See "Creating a new scroll or wheel" on page 78.

The encoder pages change depending on the channels selected. Below are scenarios to explain some of the possible operating conditions:

- Parameters that are in the show patch but do not apply to the selected channels are suppressed. The parameter name will be displayed in grey, but controls will be withheld as they are not applicable to the selected channel.

- When a group of channels is selected with some parameters that are similar but others that are not, the following will occur:
  - Parameters that are shared by all selected channels are displayed in white, with control provided for all channels.
  - Parameters that are available to some, but not all, of the selected channels are displayed in grey, with all available controls indicated. You may use these controls but the channels that do not support the relative parameters will not respond to the actions.
  - Parameters that none of the selected channels support are displayed grey, with only the parameter name shown.

- When you access a parameter page, the encoder wheels will automatically load and display the first page that has a valid parameter for the selected channels.

Encoder softkeys

If you press the encoder for any parameter, the softkeys change to display options relevant to that parameter. These may include **(Home)**, **(Last)** and **(Next)**, or **(Min)** and **(Max)**, and depending on the type of parameter, a **(Mode)** or **(Calibrate)** button.

Home

Each parameter has an associated **(Home)** softkey. This accesses any parameter and returns it to its default position. Additionally, the control keypad has a **[Home]** key. The **[Home]** key on the control keypad is a channel level instruction, meaning the entire luminaire will return to its home position unless you modify the instruction by selecting specific parameters or parameter categories.

The following examples illustrate use of these two keys, both from the control keypad and the softkeys:

- **(Home)** - when pressed from the encoder LCD, only the associated parameter of the selected channels will return to its home position.

- **[1] (Home) [Enter]** - homes all non-intensity parameters of channel 1. When this command overrides playback data, it results in a manual value for the associated parameters. When this command is an override of only manual data, it returns the parameters to their home position and removes the manual setting.

- **[1] (Color) (Home) [Enter]** - homes all of the color data for channel 1. You may also use the **[Color]** encoder page button for this command.
**Min and Max**

{Min} and {Max} are displayed when the parameter is linear, such as a shutter. Use these keys to set a minimum and a maximum setting for a parameter.

**Next and Last**

{Next} and {Last} are displayed when the parameter is segmented such as a fixed gobo or color wheel or a color scroller. Use these keys to increment or decrement in full frames.

**Mode**

The {Mode} key is provided to select different modes for the encoder wheel such as rotate, index, or special effects.

- When more than two modes are available, the {Mode} key can be pressed repeatedly, advancing through the various modes. Each mode will display beneath the current parameter setting.
- When only two modes are available, the alternate mode is indicated instead of a {Mode} key. Toggling that button switches the encoder wheel to the alternate mode.

**Flip**

The {Flip} button, available in the Pan/Tilt section of the encoder LCD, is used to flip the unit into its exact same position, but from the other direction. Depending on the current values of pan and tilt, there may be multiple flips.

**Trackball On/Off**

The {TrckbllOn/Off}, as displayed in the Pan/Tilt section of the encoder LCD when either the pan or tilt encoder is held down, is used to give pan and tilt functionality to a mouse or trackball device. When this function is turned on, above the CIA will be a message saying “Cursor as Pan/Tilt”.

**Multiple Encoder Control**

When parameters require more than one encoder for full control, the encoder LCD provides indication that the encoders are related to each other by name. Typically, additional modes will load on other pages but will reference the master parameter unique name. If there are multiple instances of a device in a single channel (such as two fixed gobo wheels or two color wheels, etc.), each device will load onto separate encoders.

**Form Control**

Form (a subcategory of Beam) collects the parameters that affect the quality of the beam, including the iris, edge, frost, etc. ‘Shutter’ and ‘Image’ are the other two subcategories of Beam.

When the [Form] encoder page button is selected, the LED will illuminate and the encoders automatically populate with the “Form” parameters as specified in the show patch. If there are more parameters in the show patch than will fit on the first page of the encoders, press the [Form] button again to page through the remaining parameters in the category or press [Form] and a page number to jump to a specific page.

The form parameters may include:

- **Edge** - controls the hard and soft qualities of a spot luminaire. While some fixtures may call this parameter “focus”, it is always represented as “edge” in Ion, to avoid confusion with “Focus” which refers to pan and tilt data. These values are set to the system default value for the selected luminaire, but may be modified as required on a per fixture basis.

- **Iris, Zoom, Strobe and IMF** - each parameter has in/out, narrow/wide, or fast/slow settings. Iris and Zoom also have programmable limits, called in/out and narrow/wide respectively. The strobe mode setting varies based on the fixture type.
Image Control
Image is the collection of parameters that affect the contents of the beam (gobo, prism, effects wheel, etc.).

Shutter Control
Pressing the [Shutter] button displays shutter controls, if there are any fixtures with framing devices patched.
Press the [Shutter] button again to access the additional shutter controls, available to the specific channel.

Color Control
Depending upon the specific device, color can be established manually with the encoders using:
• CMY color-mixing
• Hue and saturation color mixing
• RGB color-mixing
• Selection from a color wheel or scroller
You may also specify color by using the hue and saturation (HS) color picker and gel picker.
It is also possible to set non-intensity parameter data with direct entry using the control keypad and using the parameters on the CIA.

[1] [A] [4] <0> (Cyan) [5] [5] [Enter]
The first page of the color encoder will provide some scroller control, such as frame selection, on the top encoder. The next three encoders will control HS, CYM, or RGB color mixing. There will be buttons on the first page for switching between HS, CYM, and RGB. The HS controls will include buttons for {Brightness to Full}, {Home}, {Min}, and {Max}. The CMY and RGB controls include buttons for {Home} and {Max} for each of the parameters. No {Min} button will be displayed.

**Note:**
Color scroller data will display on the encoders and displays as frame numbers, F1, which would be frame 1, F2 for frame 2, etc. F1.5 is halfway between 1 and 2. F2+ will display if the frame is less than 2.5 and F2- if the frame is greater than 1.5. After the frame number, the gel number will also be displayed.
Frame numbers can be used from the command line. [2][Scroll][5][Enter] will send channel 2's scroller to frame 5. Frames can also be selected by using the DMX value for that frame. Pressing [1] twice will post DMX to the command line. [3][Scroll][10][1][2][5][5][Enter] will send channel 3's scroller to the frame with the DMX value of 255.

**Note:**
Dual scroller fixtures are addressed as 0-100% instead of by frame numbers. You may need to update your fixture before this feature will work. See “Update Library” on page 88.

Custom Control
Pressing the [Custom] button displays intensity controls.
Using the Color Picker
Press the [Displays] button and select the {Color Picker} from the softkeys to display the color picker in the CIA.

Within the color picker, you will see columns of buttons to the right. The first button (Color Format) is for toggling between native (RGB, CMY, color scroller, or color select) and hue and saturation. The other buttons are manufacturer catalogs of gels. To display a specific manufacturer’s catalog, press the specific manufacturer or catalog and select the desired gel. The {Bright to Full} button will only appear if selected channels have a brightness parameter.

When channels are selected and a specific gel is chosen, the color picker will show a dot which represents the selected fixture(s). The dot is a visual indication of the color each fixture can accommodate, closest to the gel selected. This tool is most useful when color matching between different fixture types to maintain an even field of color. You can click in the picker to go to the hue and saturation values or you can match a specific gel color from the manufacturers’ list on the right. Selecting a specific gel will also produce the hue and saturation value.

**Note:** When using the color and gel pickers for ‘non-standard’ LED fixtures, such as those that use RGBA, RGBW, and RGBAW, the Amber output will live halfway between red and green. White output will not be driven by hue/saturation directly.

**What is Hue and Saturation?**
- Hue is the actual color. It is measured in angular degrees around the cone starting and ending at red = 0 or 360 (so yellow = 60, green = 120, etc.).
- Saturation is the purity of the color, measured in percent from the center of the cone (0) to the surface (100). At 0% saturation, hue is meaningless.
- Brightness is measured in percent from black (0) to white (100). At 0% brightness, both hue and saturation are meaningless.

Gel colors can also be manually entered into the command line. [6] [Color] [1] [/] [1050] [Enter] assigns Apollo gel number 1050 to channel 6. Each of the manufacturers have been assigned a number, which can be seen beside their name in the Color Picker display.

When channels are selected, a black line may appear in the color picker. This line indicates what colors can be mixed by the fixture. If a color lies outside of the line, that color is out of the range of that device. If no black line is visible, the fixture has not yet been calibrated and the color matching will be approximated.

The gel picker is normalized to 3200 degrees. Therefore, if you are setting Rosco 80 (R80) on a arc source device, it will appear to be the same color as R80 on an incandescent source.
**Encoders**

When both CMY and RGB mixing systems are present in the lighting system, they take priority in the encoder mapping, followed by fixed wheels, then scrollers. A CMY color mixing fixture may not be placed in RGB mode, nor can an RGB fixture be placed in CMY mode.

- When the device is a fixed color wheel or a color scroller, you can use the encoder to select the desired frame. Pressing the (E) expands the display to include a button for each frame indicated with both a location number (example: "#5") and a label (example: "Rosco R80"). The specific colors within the scroller or wheel are specified in patch. See "Creating a new scroll or wheel" on page 78.
**Home**

Ion is equipped with a [Home] hardkey. This hardkey allows you to home a specific parameter. Additionally, you may home all of a channel’s non-intensity parameters or home only a specific category (I, F, C, B).

Homing a channel, category, parameter, or submasters will return it to the default value.

- **[1] [Home] [Enter]** - homes all parameters for channel 1, except intensity.
- **[1] [Color] [Home] [Enter]** - homes all color parameters for channel 1.
- **[Group] [1] [Color] [Focus] [Home] [Enter]** - homes the color and focus parameters of all channels in group 1. You can use the category keys in the CIA or the encoder paging keys.
- **[Sub] [1] [Home] [Enter]** - homes submaster 1.
- **[Sub] [1] [Thru] [Home] [Enter]** - homes all submasters.

You can select a preset to provide home values for non-intensity parameters (instead of fixture library default values) when home commands are used. Store a preset with modified home values for only the channel parameters you would like at a different value than default. And then assign that preset to Home in Setup (see Show Settings, page 96). Since home does not impact intensity, any intensity values stored in the home preset will be disregarded. Any channels that are not included in the preset assigned to Home in Setup will use their library defaults.

**Select Last**

The [Select Last] key allows you to reselect the previous channel selection. This includes multiple channel selections, groups, and so on. Using [Select Last] [Select Last] you can recall the last completed command line. However [Select Last] [Select Last] will not terminate the command line, [Enter] is required.

Pressing [Shift] & [Select Last], the softkeys on Ion change to display the following additional options:

- *(Select Active)* - selects all active channels. Pressing *(Select Active)* once will capture all active levels. Pressing *(Select Active)* twice will capture all active manual levels and those from playbacks except for submasters. Select NonSub Active will post to the command line.
- *(Select Manual)* - selects all channels with manual data.
- *(Select All)* - selects all channels.

On a completed command line, using [At] or [Select Last] after *(Select Active)* or *(Select Manual)* will post the numeric channel list to the command line.

For example, cue 1 is active, and has channels 1 through 5 at full. Using the syntax, *(Select Active)* [Enter] [At] will post channels 1 through 5 onto the command line.

Another example, Channels 10 through 20 have a manual level of 75. Using *(Select Manual)* [Enter] [Select Last] will put channels 10 through 20 onto the command line.
**Multiple Intensity Channels**

When a fixture with multiple intensity parameters is patched, Ion assigns it a master intensity. The master intensity can be used to control the multiple intensities together. The master intensity is handled in the same way as the intensity of a single intensity channel. Levels can be set via the level wheel, from the keypad, and the encoders. Master intensity can also be set via the parameter buttons in the CIA. [Intens] controls the master intensity. The other intensities will default to 100%.

Control of the individual intensities of a multiple intensity channel is handled using keypad with the parameter buttons in the CIA (see Manual Control of Non-intensity Parameters (NPs), page 115) or the encoders. Pressing the [Custom] button will map the intensity parameters to the encoders. You can either use the encoder itself to adjust the level or you can press down the encoder of the parameter you wish to put on the command line.

Levels assigned to the individual intensities will act independent of each other and the master intensity.

- [1][0][0] {Intens 3} [At] [5][0] - sets intensity 3 of channel 100 to 50% intensity.
- [1][0][0] [At] [7][5] - sets the master intensity of channel 100 to 75% intensity. All intensities for channel 100 will be mastered to 75% unless they have a separate intensity set.

In Table view, Ion will default to showing all intensity parameters associated with the channels.

In summary view, the master intensity is shown. If one of the multiple intensities has a value, an ‘+’ will display beside the master intensity.

---

*indicates that there is a level set from an individual intensity*
Lamp Controls

Lamp controls allow you to execute control functions of selected fixtures such as calibrate, douse lamp, strike lamp, and reset. Each fixture type has its own set of lamp control options which are available to you when you select the fixture from live and press the (Lamp Cntrls) softkey. This information is also available using [About] (see Using About, page 267).

For Example:

- [1] [1] [Enter] (Lamp Cntrls)

- or-

- [1] [1] [Enter] [About] (Lamp Cntrls)

This screen displays any lamp controls associated with the selected channel (this is also the "Lamp Control" subscreen of About). If the channel is a conventional (intensity-only) fixture, no parameters will be displayed. When the selected channel is an automated luminaire, options specific to the fixture type will display for use. Available RDM functions will also display here.

[Diagram of lamp controls]

Pressing any of these parameter control buttons will affect the selected channel after a confirmation.

Exit the lamp controls display by pressing [Displays].
Using +% and -%

Use +% and -% to incrementally change parameter values. To access this function on ION, press [Shift] & [+*] or [Shift] & [-]. By default, +% and -% are assigned a value of 10. This can be changed in Setup. This can be used with any parameter.

Channel Intensity

When channels are selected, pressing [Shift] & [+*] increments the intensity level by 10 (or by the value established in setup, see Manual Control, page 104). Alternatively, you may press [Shift] & [-] to decrement the intensity level by 10. You may use these keys consecutively to “add to” or “subtract from” the intensity level.

For Example:

Select channels 1 through 10 and set them to an intensity level of 45% from the keypad.

• [1] [Thru] [1] [0] [At] [4] [5] [Enter]

Change the intensity level to 65% using +% which is set to its default value of 10% in the setup menu.

• [Shift] & [+*] [Shift] & [+*]

Non-intensity Parameters

+% and -% may be used to incrementally adjust non-intensity parameters as well.

For Example:

• [1] (Iris) [Shift] & [+*] [Shift] & [+*]
• (Zoom) [Shift] & [-] [Shift] & [-]
### Remainder Dim

**Note:** By default, [Rem Dim] will set to zero. In Setup, you can assign a remainder dim value of something other than zero. See "Manual Control" on page 104. For the purposes of this discussion, the default value of zero will be used in examples.

[Rem Dim] temporarily provides a zero intensity to all channels except those that are currently selected, those that are parked, or those with intensity contributions from submasters. If the remainder dim command is reversed, the stage returns to its previous state. You may use the following commands for remainder dim:

- **[Next]** and **[Last]**: moves through the channel list.
- **[select channels] [Rem Dim] [Enter]**: sets all non-selected channels to zero
- **[Rem Dim]**: clears the rem dim function and returns the stage to its previous state

Pressing [Rem Dim] again releases all channels from rem dim mode and restores the stage to its previous state. Using the **[Next]** and **[Last]** buttons releases the current selected channel from Remainder Dim mode and sets its intensity to zero, while selecting the next or last channel and continuing Rem Dim operation.

**For Example:**

Assume channels 5 through 9 are selected and set at an intensity level of 50% and channels 10 through 15 are selected and set at an intensity level of 70%. Select channel 9 and dim the remaining channels.

- **[9] [Rem Dim] [Enter]**
  
  Channel 9 is set at an intensity level of 50% and all remaining channels are dimmed to zero.

- **[Next]**

  Selecting [Next] changes the channel selection to channel 10 which is set at an intensity level of 70%, the level set in the previous state, and all remaining channels including channel 9, are dimmed to zero.

[Rem Dim] can be used in groups including the use of **[Next]** and **[Last]** buttons to progress through the channels within the selected group.

**For Example:**

Assume you have group 1 selected (includes channels 1 through 10) with an intensity value of 50%, group 5 selected (includes channels 11 through 20) with an intensity value of 70%, and group 7 selected (includes channels 21 through 30) with an intensity value of 100%

- **[Group] [1] [At] [5] [Enter]**
- **[Group] [5] [At] [7] [Enter]**
- **[Group] [7] [At] [Full] [Enter]**

Select only Group 1 and dim the remaining Groups using the [Rem Dim] feature.

- **[Group] [1] [Rem Dim] [Enter]**

Channels 1 through 10 are selected with an intensity value of 50%, and all remaining channels are at a 0% intensity. You may progress channel by channel through the selected group (Group 1, channels 1 through 10) using the **[Next]** or **[Last]** key. Each press of the **[Next]** or **[Last]** key cycles you through only the channels of the selected group.

Pressing any other key terminates the [Rem Dim] mode and leaves channels at their remainder dim value.
You can set the dim level for all remainder dim commands in Setup (see Manual Control, page 104). When set to a value other than zero, all rem dim commands will bring intensity to this level instead. However it won’t bring an intensity up. For example, if the rem dim level in setup is set to 50%, [Rem Dim] will drop any value above 50% to 50%, but not add intensity to any channels below 50%.

It is possible to override the dim level temporarily by specifying a level after the [Rem Dim] command.

[Rem Dim] can also be used to exclude channels from a submaster or cues during a [Record].

For Example:

Using [Rem Dim] You can modify which channels are recorded in the submaster. For this example, assume that channels 1 through 10 are at full. You’ve recorded that to submaster one. Using [Rem Dim], you can modify the record so only channels 1 through 5 are recorded to the submaster.

- [1] [Thru] [1] [0] [At] [Full] [Enter]
- [Record] [Sub] [1] [Enter]
- [1] [Thru] [5] [Record] [Sub] [1] [Rem Dim] [Enter]

A [Rem Dim] command can also be used on a selectiv cue record. It will force any channels not included in the record, but that are tracking forward from a previous cue, to zero.

Highlight and Lowlight

Ion can be placed in Highlight mode. Channels selected while in these modes will either go to a default setting, or to a value provided by a highlight preset (established in setup). Modifications can then be made to those channels. Any changes will be maintained when the highlight mode is removed.

To place Ion in highlight mode, press [Highlight] [Enter]. The command line will show that highlight is currently in use.

If no highlight preset is established, or for channels that have no value stored in the highlight preset, the following values will be applied to channels as they are selected:

- Intensity - full
- Focus parameters - no change from present state
- Color parameters - home value
- Shutter parameters - no change from present state
- Image parameters - home value
- Form parameters - no change from present state

For Example:

Step 1:  [Group] [1] [Highlight] [Enter] - places channels 1 through 5 in highlight.
Step 2:  [Next] - specifies channel 1.
- 1 is in the highlight value.
- 2 - 5 are in the lowlight value.
- All other channels go to the defined rem dim level.

You may assign both a highlight and a lowlight preset in setup (see Manual Control, page 104). Any preset may be used. Channels/parameters that are not included in the presets assigned to Highlight and Lowlight will continue to use their default highlight values (see above).

Lowlight Preset

The [Lowlight Preset], which is set in Setup> Desk> Manual Control> Lowlight Preset, is used to define the behavior of specified but not selected channels while using [Next]/[Last] in highlight mode.
mode. When in highlight mode, [channel list] or [Group] [n] [Enter] [Next] will select the channel list or group and isolate the first channel.

For example, (Highlight) [Enter] [6] [Thru] [1][5] [Enter] [Next] specifies channels 6 through 15 but channel 6 is the only channel selected. 6 is at the highlight level and 7 through 15 are at their lowlight levels. Pressing [Next] again will put channel 7 at the highlight level and 6 plus 8 through 15 at their lowlight levels. If there is no lowlight preset, these channels are not affected.

Temporary Highlight Level
The highlight preset can be overridden by setting a temporary highlight level. Using (Highlight) [At] [5][0] [Enter] overrides the highlight preset and sets the highlight level to 50. Non-intensity parameters are not affected and will use the default highlight setting or the highlight preset.

The temporary highlight level will remain until (Highlight) is pressed again or the channel is no longer selected.

Highlight/Lowlight Rem Dim
In addition to the highlight and lowlight presets, there is also a setting for (Highlight Rem Dim) in setup. See "(Manual Control)" on page 104. When enabled and highlight mode is active, the intensity for all non-selected channels are automatically set to the Rem Dim value established in setup, if that Rem Dim value is lower than the channel's current intensity. This can be used to help further isolate the channels you are working with in Highlight Mode.

If you do not wish to enable Rem Dim globally in setup, you can specify a rem dim on the command line for temporary use. Rem Dim will use the (Live Rem Dim), as specified in setup. See "(Manual Control)" on page 104.

• [High_Low] [Rem Dim] [Enter]
Sneak

The [Sneak] command (when a destination is not provided) removes manual changes from selected channels and allows the channels to sneak back to their background states (cue or submaster instruction, if any). For Expression users, this is similar to Release.

If there is no background state from the playbacks, the channel parameters will be set to their home position. The sneak command follows the sneak timing default established in Setup (see Setup - {Manual Control}, page 104), unless a timing value is provided as part of the sneak command.

The playback status display will show a red counter for sneak time. If multiple sneak times are being used, the most recently fired sneak time will be displayed. For an example of the sneak counter, see Indicators in the Playback Status Display, page 37.

The sneak command can also be used to send a channel parameter to a specific destination, either with or without timing. The following examples illustrate the various methods of using the sneak command:

- [channel list] [Sneak] [Enter] - releases manual control, setting parameters to their background state. If there are current values for those parameters from a playback, those are the values that will be restored. If there are no values from a playback, the parameters are set to home (or default) position.
- [channel list] [Color] [Sneak] [Enter] - sneaks color of the selected channels to the default or background state.
- [Sneak] [Enter] - when no channels are selected, restores all channels with manual values to their background state.
- [Sneak] [Sneak] - puts {AllNPs} [Sneak] on the command line, which sneaks out all non-intensity parameters. [Sneak] [Sneak] is a self-terminating command.
- [Sneak] <Time> [3] [Enter] - restores all channels with manual values to their background state in 3 seconds.
- [Group] [5] <Color Palette> [9] [Sneak] [Enter] - selects group 5 and sneaks it to color palette 9 using default sneak time.
- [Sub] [4] [At] [5] <0> [Sneak] [2] [Enter] - selects submaster 4 and sneaks it to 50% in 2 seconds.
- [Chan][1] [Sneak] {Preset 1} - selects channel 1 and sneaks it to preset 1 using default sneak time.
- [Chan][2] [Sneak]<Time>[2][Intensity Palette 3] - selects channel 2 and sneaks it to intensity palette 3 in 2 seconds.
- [Shift] & [Sneak] - makes any manual data unmanual. The values will remain but they will no longer be available for [Update] or [Record Only] operations. When used with an empty command line, this will affect any and all manual data. When used with a channel selection, only those channels will be affected.

Note: When recalling a reference from the direct selects to use with the sneak command, the sneak command has to be entered before the reference.
Flip
The {Flip} feature is used to invert the pan and tilt values of selected channels to achieve the same focus position from the opposite yoke position. This allows you to correctly focus a fixture that may be at the end of its pan or tilt range or to correct a fade that may be moving in an undesired direction. {Flip} is a softkey in the encoder LCD. To access it, press and hold either the “Pan” or “Tilt” encoder, then press the corresponding softkey.

The following example illustrates the use of {Flip}:

- [channel list] {Flip}

Channel Check
Channel check allows you to quickly step through all of your patched channels. This is useful for checking lamps or checking focus.

Note: Parked dimmers will not be affected by the channel check feature.

The following examples illustrates the how to use the channel check feature:

- [1] [At] [7] <0> {Channel Check} [Enter] - brings channel 1 to 70% intensity
- [Next] - channel 1 returns to its background state and channel 2 is set to 70% intensity.
- [Next] - channel 2 returns to its background state and channel 3 is set to 70% intensity.

Use [Next] or [Last] to progress through the channel list to complete the channel check. Any other key press other than [Next] or [Last] will terminate channel check mode. Channel check follows the current flexichannel state.

Address at Level
The {Address} softkey in Live is used to send level information directly to an output address.

- {Address} [5] [Full] [Enter] - sets output address 5 to full. It will return to its previous level once the command line changes.
- {Address} [2] [/] [1] [At] [/] [2][3][0] [Enter] - sets universe 2, address 1 at DMX value 230.

With {Address} on the command line, you can use the level wheel to adjust the level. After using the {Address} command, [Next] and [Last] may be used to increment the address number and set it to the same level. Addresses return to their previous level once the command line is cleared or [Next] or [Last] is used to increment to the next address.

This feature is useful when you want to perform an address or dimmer check.

Address Check
Address check allows you to quickly step through all of your patched addresses.

Note: Address check differs from Address at Level because it skips non-intensity parameters of patched addresses. Since address check follows the current flexichannel state, it can be used with all channels to identify unpatched channels, or with flexi-patched to only show the intensity addresses of patched channels.

- {Address}[1] [At] [Full] {Check} [Enter] - brings address 1 to full intensity.

Use [Next] or [Last] to progress through the address list to complete the address check. Any key press other than [Next] or [Last] will terminate address check mode.
**Flash**

Using the (Flash) softkey in Live will bring a channel or address to full, and then every other second the level will move to 15%. That will hold for 1 second, and then the level will return to full. The channel or address will keep flashing until either the command line is cleared, or [Next]/[Last] is used to increment to the next channel or address.

1[Flash] - will bring channel 1 to full, then to 15%.

<Address>1][0][Flash] - will bring address 10 to full, then to 15%.

**Flash On & Flash Off**

Pressing [Shift] & [Full] together will put all the selected channels at full and “Flash On” will be posted to the command line.

Pressing [Shift] & [Out] together will put all the selected channels to out and “Flash Off” will be posted to the command line.

Releasing the keys will return the channels to their previous state.

**Using {Move To}**

While technically not a manual control instruction, {Move To} will be very useful when managing record target data stored from manual control. [Copy To] is also a useful function. See “Using [Copy To]” on page 228.

{Move To} allows you to take recorded data from one location and move it to another location. For example:

-   [Color Palette] 1 {Move To} <Color Palette> 5 [Enter]
-   [Preset] 3 {Move To} <Preset> 8 [Enter]
-   [Cue] 9 {Move To} <Cue> 2 [Enter]
-   [Preset] 1 {Move To} [Color Palette] 3 [Enter]
-   [Int Palette] 5 {Move To} [Preset] 1 [0] [Enter]

When a {Move To} command is given, data is removed from its current location and moved to its new location. If the new location already contains data, a confirmation is required by Ion (unless disabled in Setup). Existing data in the new location will be completely overwritten if a {Move To} command is confirmed.

The {Move To} softkey appears when a record target type preset, palette) is indicated on the command line. Some targets (macros, groups, effects, snapshots) only have the {Move To} option when viewing in the blind list view. You can also hit [Copy To] [Copy To] to access {Move To}.

When using {Move To} to convert a preset into a palette, all information not relevant for that palette will be removed.
Chapter 7
Using Groups

Groups are channel selection devices used for fast recall of specific channels. A maximum of 1000 groups can be recorded. Once recorded, they are accessible from the keypad, direct selects, and through the displays.

This chapter contains the following sections:

• Recording Groups Live ........................................... 134
• Selecting Groups .................................................... 135
• Group List ............................................................. 136
Recording Groups Live

Record groups of channels that you want to have available for fast recall later. Groups can be stored as whole numbers (such as Group 5) or as decimals of tenths or hundredths (such as Group 2.5 or Group 7.65). Only whole number groups can be stored using the direct selects, any decimal designations for groups must be stored using the keypad.

All groups may be labeled. These labels are then displayed on the direct selects as well as in the group list. Group numbers will not display in either until the groups have been created.

The following syntax examples illustrate the various methods and features available when recording groups:

- \([1] \text{[Thru]} [5] \text{[Record]} \text{[Group]} [7] \text{[Enter]}\) - records only channels 1 - 5 to group 7.
- \([\text{Record}] \text{[Group]} [7] \text{[Enter]}\) - records all channels with non-default values to group 7.
- \([5] \text{[Thru]} [9] \text{[Record]} \text{[Group]} [7]\) - records channels 5-9 to group 7 using the direct selects.
- \([3] \text{[Thru]} [8] \text{[Record]} \text{[Group]} [8][][5][2][Enter]\) - records channels 3-8 to group 8.52.
- \([\text{-}] [3] \text{[Record]} \text{[Group]} [7] \text{[Enter]}\) - records all channels, except channel “3,” to group 7.
- \([\text{Group}} [7][+] [5] \text{[Record]} \text{[Group]} [9] \text{[Enter]}\) - records groups 7 and 5 into group 9.
- \([\text{Group}} [8][\text{[Group]} [9] \text{[Record]} \text{[Group]} [1][0][Enter]\) - records groups 8 and 9 into group 10.
- \([\text{Record}} \text{[Group]} [7][\text{Label}] \text{[name]} [\text{Enter}]\) - records as above and adds a label to the group.
- \([\text{Record Only}} \text{[Group]} [7] \text{[Enter]}\) - records channels with manual data to group 7.
- \([\text{Record Only}} \text{[Group]} [7] \text{[Enter]}\) - records channels with manual data to group 7 using the direct select.

Ordered Channels

When recording groups, channels are ordered in the group based on their selection order when the group is stored. This ordering is useful combined with [Next] and [Last] functions and when applying effects to groups.

For Example:

If you record a group by selecting channels in the following order:

- \([1]+[3]+[5] \text{[Thru]} [9] \text{[Record]} \text{[Group]} [1] \text{[Enter]}\)

and later you select Group 1 and press [Next], the channels will be accessed, one at a time, in the same order in which they were initially selected.

If new channels are added to an ordered group using an update command, those channels are added to the end of the channel list from an ordering perspective.

When a group is previewed using the group list, the display defaults to showing the ordered view. Channels can be reordered as needed from this list. Use the [Format] key to change to a numeric listing of channels. For another example:

- \([1][0] \text{[Thru]} [2] \text{[Record]} \text{[Group]} [1] \text{[Enter]}\)

This will record channels 10 through 2 to Group 1, and then if you select the group you can cycle through the channels using [Next] starting with 10, then 9, then 8, and so on.

[Reorder] is an available softkey in the Group List display. Use [Reorder] to reorder the channels to numeric order in a group.
Offset
You can use the {Offset} softkey to aid in channel selection prior to storing groups. The offset options are {Odd}, {Even}, {Reverse}, and {Random}. For example:

- `[1] [Thru] [9] {Offset} {Odd} [Record] [Group] [5] - records all odd numbered channels between 1 and 9 to Group 5.
- `[1] [Thru] [2] [0] {Offset} {Reverse} [Record] [Group] [3] - records channels 1-20, in reverse order, to Group 3 using the direct selects.

Editing and Updating Groups in Live
Existing groups can be updated or rerecorded in Live. If you rerecord an existing group, a confirmation is required (unless disabled in “Setup”). By rerecording a group, you replace the contents of the group, you do not add to it. Updating a group does not require a confirmation and adds channels to the group, rather than replacing them.

Other editing or updating examples are:

- `[Group] [x] [Label] [Label] [Enter] - clears the label.
- `[Group] [x] [Label] [name] [Enter] - stores a new label.
- `[1] [Thru] [5] [Update] [Group] [n] [Enter] - adds channel 1-5 to existing Group n.

For record examples, please see Recording Groups Live, page 134.

Selecting Groups
Groups may be selected from the control keypad or the direct selects.

To select a group:

- `[Group] [1] [Enter] - selects all channels in Group 1
- `[Group] [1] [At] [5] <0> [Enter] - selects Group 1 and places all channels within at 50%
- `{Group 1} - Selects all channels in Group 1

If [Next] is used after a group selection, it accesses the first ordered channel in that group. Pressing it again accesses the second ordered channel in that group, and so on. [Next] - used after the last channel in the group - accesses the first channel in the group again.

[Last] may be used with group selects similar to [Next]. Press [Select Last] to reselect the entire group.

Deleting Groups
When you delete a group, the group number and all contents from the Group List Index and direct selects are deleted. Delete commands require a confirmation by default. This can be altered in the default settings. If you disable confirmations, the second enter is not required in the following examples:

Group deletion features include:

- `[Delete] [Group] [5] [Enter] [Enter] - deletes group 5.
- `[Delete] [Group] [3] [+] [Group] [5] [Enter] [Enter] - deletes groups 3 and 5.
- `[Delete] [Group] [3] [Thru] [9] [Enter] [Enter] - deletes groups 3 through 9.
- `[2] [Delete] [Group] [7] [Enter] - deletes channel 2 from group 7.
Group List

The group list allows viewing and editing of groups.

Open the Group List

To open the group list you can:

- Press [Group] [Group]
- In the browser, select “Group List” from the Record Target Lists

You can navigate within the group list using [Next] and [Last] or by selecting the group you want to work with.

Ordered View and Numeric View

By default, grouped channels will be displayed in ordered view. Therefore, grouped channels will appear in the order they were added to the group (see Ordered Channels above). If you wish to view the channels in numeric view, press the [Format] key and the view will be switched (channels will appear in numeric order from lowest to highest).

This setting is important in defining next and last functionality within groups in live/blind. If left in numeric format, when using [Next] or [Last] group selection channels will be selected in numeric order. If left in ordered view, they will be selected based on their order of being stored to the group.

Editing Groups from the Group List

An existing group can be modified without the need for recording or updating, as follows:

- Select the required group by pressing [Group] [n] [Enter], or using [Next] and [Last] to navigate through the list.

The selected group is highlighted in gold and above the CIA command line, “BLIND: Group x” is displayed.

The following actions are possible:

- [Label] [name] [Enter] - adds or modifies a group label.
- [Copy To] [Group] [7] [Enter] - copies the contents of the selected group to group 7.
- [2] [Insert Before] [9] [Enter] - inserts channel 2 into the group, placing it before channel 9 in the ordered view.
- [2] [Insert After] [5] [Enter] - inserts channel 2 into the group, placing it after channel 5 in the ordered view.
- [2] [Delete] [Enter] - removes channel 2 from the group.
- [+] <Chan> [1][0] [Enter] - adds channel 10 to the selected group.
- [-] <Chan> [5] [Enter] - removes channel 5 from the selected group.
- [+] [Group] [1][0] [Enter] - adds group 10 to the selected group.
- [-] [Group] [5] [Enter] - removes group 5 from the selected group.
- {Random} [Enter] - rearranges the channels in the group randomly.
- {Reverse} [Enter] - reverses the order of the channels within the group.
- {Reorder} [Enter] - reorders the channels to numeric order in the group selected.
Using Groups as a Channel Collector

[Group] can be used as a quick way to collect channels from submasters, cues, palettes, or presets.

The following actions are possible:

- [Group] [Cue] [1] - selects all the channels in cue 1.
- [Group] [Sub] [3] - selects all the channels in submaster 3.
- [Group] [Int Palette] [5] - selects all the channels in intensity palette 5.
Chapter 8
Storing and Using Palettes

Palettes are building blocks that can be used to create presets, cues and effects. Palettes are a critical component when using moving lights and can save considerable programming time when editing show data.

This chapter contains the following sections:

- About Palettes ..............................................140
- Palette Types ..............................................140
- Palette Options ..............................................140
- Storing Palettes Live .......................................142
- Recalling Palettes .........................................145
- Editing Palettes Live .......................................146
- Editing Palettes in Blind .................................147
- Using By Type Palettes ..................................150
About Palettes

Palettes are referenced data. This means that when included in presets, cues, or effects, changes to the contents of the palette are propagated into all of the places the palette is stored. Four types of palettes are available; Intensity, Focus, Color, and Beam. When recording palettes, three softkey options are available.

Ion supports up to 1,000 palettes of each of the four types. Palettes can be recorded as decimal or whole numbers and are automatically filtered into IFCB categories. Color data cannot be placed in beam palettes, intensity cannot be included in focus palettes, and so forth. This makes the process of creating palettes easier, faster and less work. If you need to create a reference that will include a mix of IFCB information, presets can be used. See "Storing and Using Presets" on page 151.

Palette Types

Intensity Palettes
Intensity palettes can easily be created for use with all channels that have intensity parameter data.

Focus Palettes
Focus palettes can be created for all channels that have pan and tilt functions.

Color Palettes
Color palettes can be created for all channels that have any color parameter data. Color palettes store any combination of color data, including CMY, RGB, and HS settings, color scrollers and color wheels.

You will find that [Record Only], filter settings, and selective store commands will be very useful when storing color palettes.

Beam Palettes
Beam palettes can be created for all channels that have any beam parameter data. It is rare when storing beam palettes that you will wish to include all of the beam parameters for channels. Therefore, [Record Only], filters, and selective store commands will be very useful when storing beam palettes.

Palette Options

{By Type}
By Type palettes are created with ‘default’ channels which contain values that can be assigned to any other channel within the same fixture type. By Type palettes can also contain discrete channel values.

By Type palettes will display a ‘T’ in the lower corner of the direct selects. A ‘+’ will display after the ‘T’ if there are channels stored with discrete data. For more information on by type palettes, see Using By Type Palettes, page 150.

{Absolute}
Absolute palettes are palettes that when recalled the data is displayed and treated like absolute data applied to a channel. The data is never referenced.

An absolute palette will display with an ‘A’ in the lower corner of the direct selects.
Locked palettes are palettes that are protected from being accidentally changed in Live.

A locked palette will display a "L" in the lower corner of the direct selects.

Locked palettes can be updated by specifically calling the channels and the record target, [channel list] [Update] [record target] [Enter]. Using [Update] [Color Palette] [1] [Enter] would not work in Live for a locked palette. However locked palettes are not protected in Blind.
Storing Palettes Live

Palettes may be stored in live or blind. There are a variety of methods for determining what data is stored into a palette but [Record], [Record Only], and using filters are the most common ways.

When [Record] is used, Ion will store the relevant parameter category data (intensity, focus, color or beam) for all channels that are not currently at their default value.

[Record Only] is a type of selective store that can be used to store only the relevant parameters that have manual data. Filters and selective storing provide additional methods to control what is stored into a palette.

Storing Palettes with [Record]
The most common method to create palettes is to store them from Live. Palettes can be numbered from 0.01 through 1000 and each can be given a label. [Record] will store the relevant current parameter data for all channels with non-default data for the appropriate palette type, as modified by the filter settings on the front panel.

For Example:
Assume you want to create a custom color using the color picker (for hue and saturation data) or the encoders (for CMY data) and store that data to a custom color palette. First you must select channels.

• [1] [Thru] [1] [1] [Enter]
Using the color picker, adjust the hue and saturation levels to the desired look. Or you can use the encoders to set the desired color using CMY color mixing or the gel picker. When the color is selected, store the palette.

• [Record] [Color Palette] [4] [Label] <FOH Blue> [Enter]
Notice that when you recorded the color palette, all of the color data for channels 1 through 11 is displayed in live with the reference “CP 4”. Because [Record] was used, it stored all of the color parameters for those channels.

Note: [Record] will store the entire parameter category into a palette. [Record Only] stores just the values you have adjusted manually to the target palette. See “Storing Palettes with [Record Only]” on page 143.

When a palette is created, the channels and the parameters involved in the record action are automatically set to the palette reference (“CP 4” in this instance). To view the absolute data for those channels, press and hold the [Data] key.

The following methods can be used to store palettes using [Record]:

• [Record] [Color Palette 1] - stores all color parameter data to color palette “1” and deposits it to the first color palette direct select.

• [Record] [Focus Palette] [2] [Label] <name> [Enter] - records focus parameter data for all channels not at their default state and adds a label to focus palette “2”.

• [Record] [Color Palette] [Next] [Enter] - records data to the next sequential color palette number.

• [:][5][Record] [Beam Palette] [Next] [Label] <name> [Enter] - stores to the next sequential beam palette, withholding the group or channels specified and adds a label.
Selective Storing Palettes with [Record]

Palettes can also be created using selective storing, which allows you to specify only the channels and parameters that you want to store.

The following examples illustrate various methods of selectively storing palettes using [Record]:

- `[1] [Thru] [3] [Record] [Intensity Palette] [2] [Label] <name> [Enter] - records the intensity data for selected channels 1 through 3 and adds a label to intensity palette 2.
- `[Group] [2] [Record] [Beam Palette] [Next] [Enter] - records the beam parameter data for Group 2 to the next sequential beam palette number.
- `[-] [9] [Record] [Focus Palette] [5] [Enter] - stores the focus data to focus palette 5, excluding the group or channels specified.
- `[1] [Thru] [9] {Iris} {Zoom} [Record] [Beam Palette] [5] [Enter] - stores all zoom and iris data for channels 1-9 to beam palette 5.

**Note:** When using a selective store, you must specify the channel list to be included or excluded, identified by the `[+] [-]` modifier, as part of the [Record] command. Otherwise all channels with appropriate non-default data will be stored in the new palette.

Also, selective storing is useful when you are doing a “one-time” selective store action. If you are recording a series of palettes with only specific parameters, it will save you time to set a record filter (see Using Filters with Palettes, page 144).

Storing Palettes with [Record Only]

[Record Only] is a selective record process that stores only manual parameter data. When used to record palettes, only the manual parameter data for channels will be stored in the palette. As with record, filters can further restrict stored data if they are enabled when using [Record Only]. See “Storing Palettes Live” on page 142.

**Note:** If you use [Record Only] to record to an existing palette, the data will be added to that palette. The original palette will not be completely overwritten. Only manual changes will be stored to the palette.

It is also possible to [Update] to add specific changes to the record target. See “Editing Palettes Live” on page 146.

The following methods can be used to selectively store manual parameter data to palettes using [Record Only]:

- `[Record Only] [Color Palette] [2] [Enter] - records only the manual color parameter data to color palette 2.
- `[Record Only] [Beam Palette] [5] [Label] <name> [Enter] - records manual beam parameter data for all channels and adds a label to beam palette 5.
- `[-] [9] [Record Only] [Color Palette] [Next] [Label] <name> [Enter] - stores to the next sequential color palette, withholding the group or channels specified and adds a label.
- `[select channels] [Record Only] [Focus Palette] [2] [Enter] - stores focus palette 2, but only includes the manual data for the specified channels and parameters.
- `[1] [Thru] [9] {Iris} {Zoom} [Record Only] [Beam Palette] [5] [Enter] - stores only manual zoom and iris data for channels 1-9 to beam palette 5.
Using Filters with Palettes

Filters can be used to modify what data is stored to a palette by a record action. The parameters that are active or filtered allow those parameters to be stored to record targets.

To filter a parameter:
- Step 1: Click the {Filter} button in the top-right corner of the parameter grid in the CIA.
- Step 2: In the CIA, click the button for the parameter you wish to store.
- Step 3: Click the {Filter} button again to stop filter selection. “Filter On” appears next to the parameter category label in the CIA.

To determine which parameter is filtered in the category:
- Step 1: Click the {Filter} button in the top-right corner of the parameter grid in the CIA. All actively filtered parameters are highlighted in gray. You may need to click the arrow button in the grid for that parameter category to page to additional parameters in the category.

Filters are a toggle state. To remove filters, click {Filter} and then click the highlighted parameter buttons in the CIA to deactivate the filters, or use {Clear Filters}.

For more information on filters, see Using Filters, page 199.
Recalling Palettes

Palettes may be recalled from the control keypad or from direct selects. When palettes are recalled, all data is manual and will display in red. Recalled palettes are applied only to selected channels, therefore you must select channels before recalling a palette. If a selected channel or parameter has no stored value in the recalled palette, it remains in its current state. Palettes on direct selects will gray out if they are not applicable for the current channel selection.

You can select all the channels included in a palette by pressing [Group] [Palette] [x] [Enter]. You can also recall an entire palette by pressing [Recall From] [Palette] [x] [Enter].

Recalled palettes will appear as manual data for the specified channels. That data will appear as abbreviations of the palette type (IP3 = Intensity Palette 3, FP8 = Focus Palette 8, and so on), or as the palette label if defined/enabled in the displays settings (see Setup, page 95). To see the numeric values behind any palette (or other referenced value), press and hold the [Data] key. To see the palette number behind the label, press [Shift] + [Label].

When palettes are recalled, channels with stored data in the palette will follow that data according to manual time settings. Palettes may also be recalled using a time specified using [Sneak] [Time].

You may also use groups to recall palettes. For example:

- [Group] [1] [1] [Beam Palette] [5] [Enter]
- [Group] [5] [Color Palette 6]

Palettes may also be recalled from the direct selects which automatically terminates the command line. To recall only specific parameters of a palette, select channels and the required parameters (or those not required, using the [-] key) in the command line.

The following are methods that can be used to recall palettes.

- [selected channels] {direct select} - recalls the associated (IFCB) palette data for the selected channels.
- [selected channels] [Palette] [n] [Enter] - recalls the associated IFCB palette for selected channels.
- [Channel List] {edge} [Beam Palette] [n] [Enter] - recalls only the edge data from the specified beam palette for the selected channels.
- [Group] [n] [Palette] [z] [Enter] - recalls all of the data in the palette and applies it to the selected group.
- [Intensity Palette] [y] [At] [/] [z] [Enter] - recalls the intensity palette for selected channels and sets all recalled intensity values to a proportioned level of their recorded states.

Note: The above example breaks the referenced link to the intensity palette. To maintain the link, the palette must be recalled without a modified intensity value. Calling back the intensity palette at full will also break this link.

When recalling palettes, only channels that are selected at the point of recall will be affected by the palette recall. The data recalled from a palette is referenced. To break the reference you may use (Make Absolute).
Editing Palettes Live

**Note:** If a palette is already recorded, [Record] replaces all existing data. [Record Only] is a selective store, therefore it adds data. Recording over a previously existing palette requires a confirmation, if confirmations are enabled in the setup menu.

It is also possible to [Update] to add manual changes to the record target.

**Rerecord**

Rerecording follows the conventions illustrated in the [Record] and [Record Only] sections detailed earlier in this chapter. The only exception is that a confirmation is required to record over an existing palette.

There are two different methods for rerecording:

- [Record] [Palette] [5] [Enter] [Enter] - overwrites the content completely.
- [Channel List] [Record] [Palette] [5] [Enter] [Enter] - merges the data.

**Update**

Live changes can be updated to both active and inactive palettes. When updating a parameter in an active palette, that parameter will no longer be absolute data, but will now be in the updated palette on stage.

The following illustrates how to update color palette 2 when no cues are active and you have recalled channels within that palette.

- `<channel list>` [Update] [Color Palette] [2] [Enter] - any manual changes for channels originally in the palette are updated in color palette 2.
- `[1] [Update] [Color Palette] [2] [Enter]` - adds channel 1’s manual data to color palette 2.
- `[.] [3] [Update] [Color Palette 2]` - withholds manual changes for channel 3 from the update to Color Palette 2 using the direct selects.

If a channel or parameter does not have data in the palette being updated, it will not be added to that palette unless the user specifically requests it by specifying the channel.
**Editing Palettes in Blind**

**CAUTION:** When editing palettes in blind, changes to palettes are automatic, therefore no update or record command is required.

Palettes can be viewed and edited in blind in the table and spreadsheet views.

### Entering Blind Palette from Live

- `[Blind]` then press `[Palette]` - pressing this will display the first recorded palette of the selected type (Intensity, Focus, Color or Beam) in blind or return to the last palette of this type viewed in blind.
- `[Blind] [Palette Select 1]` or `[Blind] [Palette] [1] [Enter]` - pressing this will display the specified palette “1” in blind.
- `[Palette] [Palette] (Edit)` - opens the list view of the palette type and then opens blind palette.

### View palettes from blind

While in any blind mode, when no channels are selected, you can enter a palette from the command line or direct selects. This will take you into blind channel mode for that palette.

- `[Color Palette] [n] [Enter]`

You may also cycle through the available palettes using `[Next]` and `[Last]`.

### Editing in Blind

The following are representative methods used for editing palettes in blind:

- `[2]` [Iris] [At] [Enter] - removes the current parameter category setting from channel 2.
- `[1]` [Iris] [5] [0] [Enter] - selects channel 1 and sets iris value to 50.
- `[2]` [Copy To] [5] [Enter] - copies the information from channel 2 to channel 5.
- `[6]` [Recall From] [Focus Palette] [1] [Enter] - recalls the values for channel 6 from Focus Palette 1 but not the reference.

You may use the encoders to set blind levels as well.

When editing in blind, it is possible to remove an instruction from any palette by selecting the channel and parameter and pressing [At] [Enter] or `{Make Null} [Enter].

[Recall From], [Copy To], [Replace With], and [Move To] may be used to create and edit palette data. See Advanced Manual Control, page 227.

**Note:** While editing palettes in blind, hitting [Recall From] [Recall From] will put [Recall From] [Palette] on the command line.
Editing Palettes in Spreadsheet View

Spreadsheet view shows a range of palettes along the Y axis and channels and channel parameters along the X axis. Viewing palettes in spreadsheet view is useful when you want to compare data between palettes.

You may select a palette from the spreadsheet using the [Next] or [Last] keys to move through the list or you may select the exact palette from the keypad. You may also select a range of palettes to edit at once. You can make changes to the palette(s) by selecting channels and altering parameter values. In addition to normal editing functions, you may also use the following commands in this view: [Copy To], (Make Absolute), (Make Null), (Move To), and (Replace With).

The following are representative methods used for editing palettes in blind spreadsheet:

- **[Color Palette] [1] [Thru] [9] [Enter]** - selects color palettes 1 through 9.
- **[1] (Scroller) (Make Null) [Enter]** - sets channel 1 scroller value null in the selected color palette.
- **[1] (Scroller) [4] [Enter]** - sets channel 1 scroller value to 40 in the selected color palette.

In addition to the examples given above, here are some examples of the additional palette editing features you have while editing in spreadsheet view:

- **[palette type] [1] [Thru] [5] (Move To) <palette type> [9] <Thru> [Enter]** - this will move palettes 1-5 to palettes 9-14 respectively. You do not have to supply the end value for Ion to perform the move.
- **[Beam Palette] [1] [Thru] [5] [Enter] (Iris) [5] [0] (Replace With) <Iris> [2] [5] [Enter]** - for palettes 1-5, this command will replace any iris parameter values of 50 with values of 25. This range editing using [Replace With] can only be done in spreadsheet view.

Editing Palettes in List View

When you press the specific Intensity, Focus, Color or Beam palette button twice, a list view for the associated palette type is opened on a new tab (or brings the list view into focus if already open). You can also open the list view from the browser. See “Using the Browser” on page 24.

From the list view, you can select a palette for editing, which changes focus to blind channel view, with the specified palette ready for editing. In addition, you can add palettes to your listing and edit the labels for each palette in the list.

**For Example:**

In the list view, you can select palettes and relabel or move them.

- **[1] [5] [Label] <name> [Enter]**

While in the specific palette category list view, the (Move To) and (Edit) softkeys are available for use.

To move a specific palette to a different location:

- **[1] (Move To) [3] [Enter]** - moves the contents and label of the specific palette 1 to palette 3. If palette 3 is already used, you will be asked to confirm that you want to overwrite the existing recorded palette. You can also hit [Copy To] [Copy To] to access (Move To).

You can also move data from a preset to a palette and vice versa. It is important to remember that when using the (Move To) command that data is removed from its current location and moved to its new location.
To copy a specific palette to a new palette:
• [2] [Copy To] [5] [Enter] - copies the contents of palette 2 to the new palette 5.
You can also use [Copy To] from presets to palettes.

To edit any palette data from the List View:
• [1] [5] (Edit) [Enter] - selects palette number 15 and brings the blind display into focus, with palette 15 selected for editing. You can use the [Next] and [Last] buttons to access the other palettes, or select a new palette for editing from the keypad.

Deleting Palettes
To delete color palette 1, press [Delete] [Color Palette] [1] [Enter] [Enter]. When palettes are deleted, any references in cues will be converted to absolute data.

Removing Channels from a Palette
You can remove specific channels from a palette. This can only be done from blind.

For Example:
Open the palette in blind:
• [Blind] & [Color Palette]
Select the palette you wish to edit:
• [Color Palette] [5] [Enter]
Remove channels by pressing:
• [2] [+] [4] [+] [6] [Thru] [9] [At] [Enter]
You may also remove a channel or parameter from a range of presets by pressing:
• [Beam Palette] [1] [Thru] [5] [Enter] [6] [At] [Enter]
You can remove channels from live by pressing:
• [channel list] [Delete] [Color Palette] [2] [Enter]
Using By Type Palettes

Storing a By Type Palette
If (By Type) is used when recording, the lowest number channel of each fixture type will be the default channel. Generally, when storing by type palettes, you will want only one channel of each fixture type in use. Any additional channels in that fixture type will be recorded with discrete data.

- [1] [Thru] [5] [Record] [Int Palette] [1] (By Type) [Enter] - Channels 1 through 5 are saved to Intensity Palette 1. Channels 1 through 5 are of the same fixture type. Channel 1 will be the default channel and channels 2 through 5 will be saved with discrete data.
- [1] [Thru] [5] [Record] (Intensity Palette 1) [Enter] - If a by type palette is recorded without using the (By Type) softkey and the default channel is included in the record, the default channel’s level will change and all other changes will be discrete.
- [1] [Thru] [5] [Record] (Intensity Palette 1) (Discrete) [Enter] - If a default channel is included in a record where (Discrete) is used and another channel is tracking it, the default channel will be changed to having discrete data and the lowest numbered tracking channel will become the new default channel. All other channels in the record will also have discrete data.

Editing By Type Palettes in Blind
In Blind, the default channel’s levels will display in blue, discrete data for the other channels will display in white, and any channels that are using the default channel value will display in magenta.

New softkeys available for editing palettes in blind are (By Type), (Discrete), and (Cleanup).

- [3] (By Type) [Enter] - makes channel 3 the new default channel for that device type. If another channel for that type was the default channel, its data will now be discrete.
- [1] [0] [Thru] [2] [0] (Discrete) [Enter] - changes the levels for channels 10 through 20 to discrete. If any of those channels are default, the lowest numbered tracking channel will become the new default channel.
- [5] [Thru] [8] [At] [Enter] - removes the discrete data for channels 5 through 8. They will now use the default channel’s values.
- [Color Palette] [2] (Discrete) [Enter] - changes all tracking and default channels to discrete.
- [Intensity Palette] [5] (By Type) [Enter] - makes the first channel of each device type a default channel.
- [Beam Palette] [3] (Cleanup) [Enter] - converts palettes created in earlier versions of Eos Family software to by type palettes. This command will use the first channel of each type as the default, and allow other channels of the same type to use that value upon recall.

(Make Null) can be used with by type palette when you wish to withhold a channel from responding to a by type palette recall. The data will still display but will be in gray with a ‘N’.

Updating By Type Palettes
Pressing (By Type) after an [Update] command, with a channel tracking but no default channel included in the update, will cause the lowest numbered tracking channel’s level to be updated into the default channel. The tracking channel will remain tracking. This means that when updating a default value in a by type palette, you don’t need to know the default channel number.

When a default channel is included in an [Update] command without using (By Type) and another channel is tracking it, the default channel’s data will be changed to discrete. The lowest numbered tracking channel will then become the new default channel. Any other updated channels will be made discrete.
Presets are very similar to palettes in that they are collections of data for specific channels to facilitate cue creation. Presets, however, can collect all data for a given channel (intensity, focus, color, beam) rather than just one parameter type.

Up to 1000 presets may be stored in Ion using decimals or whole numbers and they can contain absolute data or a mix of IFCB palettes. Presets can not refer to other presets.

This chapter contains the following sections:

- Storing Presets Live ........................................ 152
- Recalling Presets ......................................... 154
- Editing Presets Live ....................................... 155
- Using the Preset List ..................................... 156
- Editing Presets in Blind ................................. 157
Storing Presets Live

Presets can be recorded live using the keypad or the direct selects. Both [Record] and [Record Only] can be used to record presets, with or without filters. See “Storing Data with Record Filters” on page 201.

[Record] will store all channels that are not at their default values, and it will record all information about those channels, including parameters that are still at default. Therefore presets can contain all of the same information as a cue, but they have no timing information or cue attributes (such as follow, delay, or cue overrides). When recorded or rerecorded, presets are automatically recalled on stage. Presets may be individually labeled and each has an optional notes field.

Storing Presets Using [Record]

The [Record] key will store all parameter data for channels that are not at their default values, as modified by the filter settings in the CIA. This will store all parameter data that is not default even if it is not manual data. If filters are used, only the parameters enabled by the filters are stored.

When you record data to a preset live, the channels involved in that preset will then actually be in that preset.

The following methods can be used to store presets using [Record]:

- **[Record] [Preset] [5] [Label] [name] [Enter]** - Records all parameter data for all channels not at default and adds a label to preset 5.
- **[Record] [Preset] [Next] [Enter]** - Records data to the next sequential preset number.
- **[-] [2] [Record] [Preset] [n] [Enter]** - stores the preset, withholding the group or channels specified.
- **[channel list] [Record] [Preset] [6] [Enter]** - stores the preset, but only the data for the channel list supplied.
- **[Record] & {Preset 8}** - stores the preset to the specified direct select.
- **[channel list] [AllINPs] [Record] [Preset] [8] [Enter]** - records all non-intensity parameters for the selected channels to the preset.

**Note:** When using selective record, you must specify the channel list to be included (or excluded as the case may be) as part of the [Record] command. Otherwise, all parameters of channels with non-default values will be stored in the preset.

You may also use the filters and (Make Null) as additional tools to decide what data will be stored. For more information on these features see Using Filters.

When you rerecord an existing Preset, a confirmation will be required, unless confirmations have been disabled in Setup.
Storing Presets using [Record Only]

[Record Only] is a selective record process that stores only manual parameter data. Therefore, when used to record presets, only manual data for channels will be stored in the preset. As with [Record], filters and (Make Null) can be used to further modify what information is stored. See “Storing Data with Record Filters” on page 201.

The following methods can be used to store presets using [Record Only]:

- [Record Only] [Preset] [5] [Label] [name] [Enter] - records manual parameter data for all channels and adds a label to preset 5.
- [Record Only] [Preset] [Next] [Enter] - records manual data to the next sequential preset number.
- [-] [3] [Record Only] [Preset] [n] [Enter] - stores the preset, withholding the group or channels specified.
- [Channel list] [Record Only] [Preset] [6] [Enter] - stores the preset, but only the manual data for the channel list supplied.
- [Channel list] {Color} [Record Only] [Preset] [7] [Enter] - stores only manual color data for the specified channels to the preset.

Preset Options

When recording presets, two softkey options are available.

{Absolute}

Absolute presets are presets that when recalled the data is displayed and treated like absolute data applied to a channel. The data is never referenced. An absolute preset will display with an ‘A’ in the lower corner of the direct selects.

{Locked}

Locked presets are presets that are protected from being accidentally changed in Live. A locked preset will display a “L” in the lower corner of the direct selects.

Locked presets can be updated by specifically calling the channels and the record target, [channel list] [Update] [record target] [Enter]. Using [Update] [Preset] [1] [Enter] would not work in Live for a locked preset. However locked presets are not protected in Blind.
Recalling Presets

Channels must be selected when recalling a preset. If a selected channel or parameter has no value in the preset, it will stay in its current position. If you want to recall all channels in a preset, you can press [Recall From] [Preset] [x]. Presets on direct selects will grey out if they are not applicable for the current channel selection.

If you only want to recall certain parameters of the preset, select channels and enter the required parameters (or those not required, using the [-] key) in the command line (see command examples below).

When a preset is recalled, parameter changes will follow the manual timing defaults, if enabled. Any preset which is contributing to live output from Ion is considered to be “active.”

You may recall presets using any of the following methods:

- **(Preset 8)** - recalls the associated preset data for selected channels.
- **[Preset] [2] [Enter]** - recalls preset 2 for selected channels.
- **[Channel List] [Preset] [2] [Enter]** - recalls the preset data for the channels in the selection list.
- **[Channel List] [Color] [Preset] [5] [Enter]** - recalls only the color data from the specified preset for the specified channels.
- **[Color] & (Preset 7)** - recalls just the color data from the specified preset for selected channels.
- **[Recall From] [Preset] [3] [At] [5] <0> [Enter]** - recalls all channels in preset 3, and sets all intensity values at 50%. The original intensity data is still linked to the preset. If the intensity change is desired you must update the preset to maintain the change and the link, or make the data absolute before storing to another record target.
- **[Channel List] [Preset] [7] [Enter] [At] [/] [5] [Enter]** - recalls preset 7 for selected channels. Intensity values will be recalled at 50% of their recorded state. The intensity link is maintained. If the intensity change is desired the user either needs to update the preset to maintain the change and the link, or make the data absolute before storing to another record target.
- **[Recall From] [Preset] [9] [Enter]** - selects all channels with data stored in preset 9.
- **[1] [Recall From] [Preset] [1] [At] [5] [0] [Enter]** - recalls the intensity of channel 1 from preset 1 at 50% of the stored value. If channel 1 was set to 50 in preset 1, its recalled value would be 25.
Editing Presets Live

There are two ways to edit a preset in Live. You may rerecord the preset or you may use [Update].

Rerecord

Rerecording follows the conventions of [Record] and [Record Only]. The only exception is that a confirmation is required to actually rerecord the preset.

Two different mode for rerecording:

• [Record] [Preset] [5] [Enter] [Enter] - overwrites the content completely.
• [Channel List] [Record] [Preset] [5] [Enter] [Enter] - merges the data.

Update

[Update] is used to record parameter modifications back to a preset. When updating, you must specify the preset to be updated. You may do this using the keypad or the direct selects.

For the purposes of the following descriptions, assume that there are no active cues on stage. Updating referenced values while cues are active is covered in Modifying Cues Live, page 179.

For Example:

To update a preset, first recall the preset for any channels you wish to edit.

• [1] [Thru] [5] [Preset] [1] [Enter]
  or
• [Recall From] [Preset] [1] [Enter]

Make required changes to the desired parameters using the keypad or encoders. Once you have achieved the desired look, update the preset.

• [Update] [Preset] [1] [Enter]
  or
• [Update] & [Preset 1]

When updating a preset, only channels that are already in the preset will be updated. You need to select channels or parameters to force new data into a preset when using [Update].
**Using the Preset List**

The preset list displays all recorded presets. List views only allow you to change attributes; no editing can be done directly in list view. Pressing the **Edit** softkey takes you to the blind view of the selected preset, in the last format you used in blind. This will allow you to edit the preset.

You can navigate the preset list using **[Next]** and **[Last]**.

**Opening the Preset List**

Blind presets can also be viewed in the preset list and can be accessed in a number of ways.

To view the preset list in blind you may:

- Press **[Preset]** [Preset]
- Click on **Preset List** in the Browser>Record Target Lists

**Move To**

You can move presets within the preset list using the **Move To** softkey. You can also hit **Copy To** [Copy To] to access **Move To**.

- `<Preset>` [3] **Move To** [8] [Enter] [Enter] - moves preset 3 to preset 8. Preset 3 will be removed from the list. The second [Enter] is not required if you have disabled confirmations in setup.
- `<Preset>` [1] [Thru] [5] **Move To** [6] [Enter] [Enter] - moves presets 1 through 5 to presets 6 through 10.

You can also move data from a palette to a preset and vice versa. It is important to remember that when using the **Move To** command that data is removed from its current location and moved to its new location.

**Copy To**

You can copy presets within the list to another location in the list using **Copy To**.

- `<Preset>` [2] **Copy To** [9] [Enter] [Enter] - copies the contents of preset 2 to preset 9. Preset 2 will remain in the list. The second [Enter] is not required if you have disabled confirmations in setup.

You can also use **Copy To** from palettes to presets.
Editing Presets in Blind

All presets can be viewed and edited in blind. To open a preset in blind, you can do any of the following:

- Press [Blind] & (Preset x) - opens to the specific preset
- Press [Preset] [Preset] and then (Edit) when a preset is selected in the list

CAUTION: When editing presets in Blind, changes to presets are automatically stored. Therefore no update or record command is required.

You may change the way you view information in the preset list by pressing the [Format] button. This will cycle the preset list through two different views; spreadsheet and table.

Editing in Table View

Table view shows the data for one preset at a time in a table. Channels are displayed on the Y axis and parameters are shown along the X axis. Viewing presets in the table is useful if you want to see data for numerous channels in one specific preset.

To change which preset you are viewing you may use the [Next] or [Last] keys or you may select the exact preset from the keypad or direct selects. You can make changes to the preset by selecting channels and altering parameter values. In addition to normal editing functions, you may also use the following commands in this view: [Copy To], [Make Absolute], [Make Null], [Move To], and [Replace With].

Here are some examples of the additional preset editing features you have while editing in table view:

- [select channels or parameters] [Make Abs] - changes the data for any palette references within the preset into absolute data that no longer references another record target.
- [select channels or parameters] [Make Null] - removes the data for the specified channel or parameter from the preset.
- [select channels or parameters] [At] [Enter] - removes the data for the specified channel or parameter from the preset.
- [Preset] [5] [Move To] [Preset] [9] [Enter] - this will move the contents of preset 5 to preset 9. Preset 9 will be created and preset 5 will be deleted.
- [Preset] [1] [Copy To] <Preset> [5] [Enter] - this will copy the contents of preset 1 to preset 5. You may also copy ranges of presets to new locations.
- [1][Recall From][Preset][1][Enter] - will recall the contents for channel 1 in preset 1.

Note: While editing presets in blind, hitting [Recall From] [Recall From] will put [Recall From] [Preset] on the command line.
Editing in Spreadsheet View

Spreadsheet view shows a range of presets along the Y axis and channels and channel parameters along the X axis. Viewing presets in spreadsheet view is useful when you want to compare data between presets.

You may select a preset from the spreadsheet using the [Next] or [Last] keys to move through the list or you may select the exact preset from the keypad. You may also select a range of presets to edit at once. You can make changes to the preset(s) by selecting channels and altering parameter values. In addition to normal editing functions, you may also use the following commands in this view: [Copy To], (Make Absolute), (Make Null), (Move To), and (Replace With).

In addition to the examples given above in table view, here are some examples of the additional preset editing features you have while editing in spreadsheet view:

- [Preset] [1] [Thru] [5] (Move To) <Preset> [9] [Thru] [Enter] - this will move presets 1-5 to presets 9-14 respectively. You do not have to supply the end value for Ion to perform the move. If presets 9-14 already exist you will be asked to confirm this move.

- [Preset] [1] [Thru] [5] [Enter] (Iris) [5] [0] (Replace With) <Iris> [2] [5] [Enter] - for presets 1-5, this command will replace any iris parameter values of 50 with values of 25. This range editing using [Replace With] can only be done in spreadsheet view.

Deleting Presets

You may delete presets in the following ways:

- [Delete] [Preset] [1] [Enter]
- [Delete] [Preset] [1] [Thru] [5] [Enter]

Presets can be deleted from any screen, at any time. A confirmation is required to delete, unless confirmations have been disabled in Setup.

Removing Channels from a Preset

You can remove specific channels from a preset. This can only be done from blind.

For Example:

Open the preset in blind:

- [Blind] & [Preset]

Select the preset you wish to edit:

- [Preset] [5] [Enter]

Remove channels by pressing:

- [2] [+][4] [+][6] [Thru] [9] [At] [Enter]

Or you can remove a specific channel parameter from the preset by pressing:

- [5] [+][7] [Color] [At] [Enter]

You may also remove a channel or parameter from a range of presets by pressing:

- [Preset] [1] [Thru] [5] [Enter] [1] (Color) [At] [Enter]

You can remove channels from live by pressing:

- [channel list] [Delete] [Preset] [2] [Enter]
Chapter 10
Using Fan

This chapter describes using fan functions.

This chapter contains the following sections:

• Fanning Parameter Data .........................160
• Fan From the Command Line ..................160
• Fanning References ...............................161
• Fanning Timing and Delays ....................161
About Fan

Fan provides the ability to spread parameter and timing values in a range across a channel selection set and have those values be evenly spaced. Fan is applied by channel selection or group order. By default, fan operation is from the start channel.

On Ion, {Fan} is a softkey. When {Fan} is used after a channel selection, the softkeys will repaint to the following fan styles:

- **{Center}** - The middle channel in the order is set as the start and will remain unchanged, and the first and last channels will change in different directions. The level wheel will decrease the lower number channels and increase the higher number channels. {Center} only affects the level wheel.
- **{Reverse}** - The selected channel order is reversed before applying the fan.
- **{Mirror}** - The middle channel in the selected order is used as the starting channel and the first and last channels in the order are the end channels.
  - `{Center}` only affects the level wheel.
- **{Random}** - The selected channels are put in a random order before fan is applied.
- **{Repeat}** - The number of channels that are fanned before the pattern is repeated.
- **{Cluster}** - The channels are put into collections, which contains channels with all of the same value.

Fanning Parameter Data

Fan values can be adjusted with either an encoder or via the keypad. To adjust the fan values with an encoder, select the required channels and provide a baseline, if necessary, followed by {Fan}. If no value is entered, the current values will be used. When using encoders to adjust fan, it is not necessary to specify the parameter to be fanned. This is determined by the encoder used.

- `{Center}` - The middle channel in the order is set as the start and will remain unchanged, and the first and last channels will change in different directions. The level wheel will decrease the lower number channels and increase the higher number channels. {Center} only affects the level wheel.
- `{Reverse} - The selected channel order is reversed before applying the fan.
- `{Mirror} - The middle channel in the selected order is used as the starting channel and the first and last channels in the order are the end channels.
  - `{Center}` only affects the level wheel.
- `{Random} - The selected channels are put in a random order before fan is applied.
- `{Repeat} - The number of channels that are fanned before the pattern is repeated.
- `{Cluster} - The channels are put into collections, which contains channels with all of the same value.

Fan From the Command Line

A level or time command that uses [Thru] or a list of references is a command line fan command.

**Note:**

{Fan} is not necessary unless a fan style other than the default is needed.

To adjust the fan values from the command line:

- `{[1] [Thru] [5] [Fan] [Enter]` - selects the channels 1 through 5 and puts encoders and level wheel into fan mode.
- `{[1] [Thru] [5] [At] [5] <0> [Thru] [5] <0> [Enter]` - sets channel 1 to 10%, 2 to 20%, 3 to 30%, 4 to 40%, and 5 to 50%. This is the default fan adjustment and the {Fan} command is not necessary.
- `{[1] [Thru] [5] [Fan] [Mirror] [Enter]` - selects the channels 1 through 5 and puts encoders and level wheel into fan mode with mirror style.
**Fanning References**

When fanning references, such as palettes, if there are more than 2 reference lists are used then the data will be referenced data. The fan will be repeated if there are more channels than references.

- \([1] \text{[Thru]} \ [5] \text{[Int Palette]} \ [1] \text{[Thru]} \ [3] \text{[Enter]}\) - sets channel 1 to IP1, 2 to IP2, 3 to IP3, 4 to IP1, and 5 to IP2.

If the list contains 2 or less references, fan will be set to the levels between the references as absolute data.

- \([1] \text{[Thru]} \ [5] \text{[Int Palette]} \ [1] \text{[Thru]} \ [2] \text{[Enter]}\) - (Intensity palette 1 is all channels at 0% and intensity palette 2 is all channels set to 100%.) sets channel 1 to 0%, 2 to 25%, 3 to 50%, 4 to 75%, and 5 to 100% as absolute data.

**Fanning Timing and Delays**

Fanning timing and delays work exactly like fanning parameters.

- \([1] \text{[Thru]} \ [5] \text{[Time]} \ [6] \text{[Thru]} \ [1] \text{[0]} \text{[Enter]}\) - sets the discrete times for channel 1 to 6 seconds, 2 to 7 seconds, 3 to 8 seconds, 4 to 9 seconds, and 5 to 10 seconds.

- \([1] \text{[Thru]} \ [5] \text{[Delay]} \ [6] \text{[Thru]} \ [8] \text{[Fan]} \text{[Mirror]} \text{[Enter]}\) - sets the discrete delays of channel 1 to 8 seconds, 2 to 7 seconds, 3 to 6 seconds, 4 to 7 seconds, and 5 to 8 seconds.
Chapter 11
Working with a Single Cue List

When cues are created they are stored in a cue list. By default, recording cues will result in a single cue list, identified as cue list 1. While other cue lists can be recorded in Ion, this chapter deals primarily with working in a single cue list. For more information on multiple cue lists, see Working with Multiple Cue Lists, page 203.

This chapter contains the following sections:

- Basic Cueing ........................................164
- Recording Cues in Live .........................165
- Timing .................................................169
- Flags ................................................176
- Modifying Cues Live .............................179
- Recording and Editing Cues from Blind ....186
- Deleting Cues ......................................189
Basic Cueing

A cue is a record target comprised of channels with associated parameter data, discrete (channel or parameter level) timing, cue timing, and cue attributes (such as preheat, follow or hang instructions, and so on).

In Setup, you have determined if Ion will operate in a Cue Only or Tracking mode. By default, the system is set to tracking, therefore this section of the manual primarily addresses working in tracking mode. The current mode is displayed in the upper left corner of the live/blind display. It is important to know which mode you are working in, as it impacts how cues are edited. See "Tracking vs. Cue Only" on page 5.

- If your console is set in Track mode (default), changes move forward through the cue list until a block or a move instruction is encountered.
- If your console is set in Cue Only mode, changes to cues have no impact on subsequent cue data.

Cue Numbering

Cues can be numbered from .01 - 9999.99. Ion provides you with multiple ways to number your cues. The most common methods are listed below:

- After pressing record, enter a cue number which can be a whole number (1) or a decimal number (1.1).
- After pressing record, rather than entering a cue number you may press [Next], which will automatically number the cue with the next sequential number in the cue list. For example, the current cue is numbered cue 1.1, pressing [Record] [Next] will automatically number the new cue 1.2.
- When recording decimal cues, it is not necessary to specify the leading cue number if a decimal cue has already been recorded. For example, if the current cue is numbered 5.2, when you enter the next record command, you can just enter [.] [5] to record cue 5.5.
  - Whole numbered cue - [Next] increments the next whole numbered cue.
  - Tenths numbered cue (.1) - [Next] increments in tenths.
  - Hundredths (.01) numbered cue - [Next] increments in hundredths.
Recording Cues in Live

When using [Record], all parameters of any lights that have non-default values, either from manual control, other cues, or submaster playback are stored in the target cue.

Channels that have all default values, meaning they have never been changed, are not included in the record action, unless you specifically select the channel and press (Make Manual). Other possible exclusions are parameters withheld by use of filters, or if the channel parameters have been filtered (see Using Filters, page 199). You can also select individual parameters of individual channels (such as Cyan and Iris) and place them in a null state using the (Make Null) button if the values are not needed in the cue you are recording.

Ion is a tracking console, meaning once something is recorded into the cue list, the cue list will always contain information about that channel or parameter unless it is nulled, using the (Make Null) command, or filtered using the parameter filters.

When cues are recorded they are automatically played back and manual values are released, unless auto playback on record has been disabled in setup. Upon playback, displayed parameter levels will be color coded for clarification of the record action:

- Blue - intensity has increased from the previous cue or a non-intensity parameter has changed.
- Green - intensity level has decreased from the previous cue or a non-intensity parameter has marked.
- Magenta - level has tracked from a previous cue.
- White - level has been blocked (see Block, page 176).

Using Record

When the [Record] button is pressed the keypad defaults to cue mode; use of the [Cue] button is optional. The following are representative examples of recording cues in Live. Once the cue record has been specified, cue attributes such as timing can be combined and entered in any order you wish.

- [Record] <Cue> [5] [Enter] - records all parameters of any channels with non-default data into the specified cue number 5.
- [Record] <Cue> [5] [Label] [name] [Enter] - records the specified cue and provides an alphanumeric label.

Note: [+] can be used with [Record] to specify a range of cues for recording. See "Record and Record Only [+]" on page 180.
Using Record Only

[Record Only] is similar to [Record] except that it selectively stores only manually set values, preventing unwanted levels (such as from a submaster or another cue list), from being recorded into the cue. Therefore, when used to record a cue, only the manual data for channels will be stored in the cue. Any values in the previous cue that were unchanged will track into the new cue.

Double pressing [Record] will post Record Only to the command line.

All of the same commands used for [Record] may also be used for [Record Only].

- [Record Only] <Cue> [Next] [Enter] - stores only the manually set values into the next cue in the list.
- [Record Only] [Cue] [3] [Enter] - stores only the manually set data into cue 3.
- [2] [Thru] [8] [Record Only] <Cue> [9] [Enter] - stores only the manually set data for channels 2 through 8 into the target cue 9.
- [Group] [2] [Record Only] [Cue] [5] [Enter] - stores only the manual data from group 2 into cue 5.
- [selected channels] [Color] [Record Only] <Cue> [4] [Enter] - stores only the color data for the selected channels into cue 4.

As with [Record], filters can further restrict stored data if deployed when using [Record Only]. See “Using Filters” on page 199.
Using Selective Store

You may use the [-] button to withhold information from a cue or use the [+] button to specify a particular channel or parameter to be included in the record action. These actions are both selective stores.

For information on a selective store using filters see Partial Filters, page 201.

Using a Positive Selective Store

You may record only specified parameters into cues. If the cue has already been stored, this action adds the specified channel parameters to the existing cue data.

To record only specific channels into a new target cue:

- [1] [Thru] [5] [Record] <Cue> [4] [Enter] - this records only channels 1 through 5 into cue 4.
- [channel list] [Record] <Cue> [5] [Rem Dim] [Enter] - this will store the selected channels into the target cue. Any channels active in the previous cue that are not in the selected channel list will be set to zero in cue 5.

To record only specific parameters into a target cue:

- [1] [Thru] [5] [Focus] [Color] [Record] <Cue> [4] [Enter] - records the focus and color data for channels 1 through 5 into cue 4. Any other data on stage would not be stored in the target cue.

Using a selective store for a new record target will track in values from the previous cue that are not included in the record action.

Using a Negative Selective Store

It is possible to withhold data from a cue by using the [-] key as follows:

- [-] [3] [Thru] [6] [Record] <Cue> [9] [Enter] - records the specified cue, with the exception of channels 3 through 6.
- [-] [Sub] [7] [Record] [Enter] - records the selected cue, without the input from submaster 7.
- [-] [Sub] [Record] [Enter] - as above, except withholds the contents of all submasters.
- [-] [Color] [Record] <Cue> [8] [Enter] - records cue 9 without any color data.
Using [Cue Only / Track]

In Track Mode

When you create a new cue, any unchanged channel parameter data from the previous cue is tracked into the new specified cue. Any changes in this new cue will also track forward into subsequent cues until a move instruction is encountered. The [Cue Only/Track] key is an exception to this behavior. When you record a cue in the middle of an existing cue list, using the [Cue Only] button will prohibit new information from tracking into the subsequent cue. When you rerecord or update a cue, the modifications will not track forward.

Note: In the following examples, the command [Cue Only] indicates the same key hit of [Cue Only/Track] which is a single button on the keypad. The system setting determines the actual context of the button depending on the mode in which the system is operating.

For clarity, only the contextual function of the button is used in the examples.

With system set to “Track”

- [Record] <Cue> [5] [Cue Only] [Enter] - records cue 5. New values or changes will not track into the subsequent cue.
- [-] [Color] [Record] <Cue> [5] [Cue Only] [Enter] - as above the recorded data will not track forward and all color data is excluded from the record operation.
- [Record Only] <Cue> [5] [Cue Only] [Enter] - records all manual data, but doesn’t allow it to track into subsequent cues.
- [-] [5] [Record] <Cue> [6] [Cue Only] [Enter] - records the specified cue, except the contributions from channel 5. The stored data will not track forward in the list.

In Cue Only Mode

When you create a new cue, any channel parameter data from the previous cue is tracked into the new cue. The [Cue Only/Track] key can be used as an applied exception to the cue only/track system setting.

Note: In the following examples, the commands [Track] indicate the same key hit of [Cue Only/Track] which is a single button on the keypad. The system setting determines the actual context of the button depending on the mode the system is operating.

For clarity, only the contextual function of the button is used in the examples.

With system set to “Cue Only”

- [Record] <Cue> [5] [Track] [Enter] - records cue 5. This data will track forward in the list until the next move instruction or block.
- [-] [5] [Color] [Record] <Cue> [6] [Track] [Enter] - records the specified cue, except the color data from channel 5. The data will track forward in the list until the next move instruction or block.
- [Record Only] <Cue> [2] [Thru] [7] [Track] [Enter] - stores all manual data. The stored data will track from cue 2 and stop at cue 7.
Timing

Cue timing can be applied in a variety of ways. At a cue level, timing categories are provided for intensity up, intensity down, focus, color and beam transitions. Each of these times can have an associated delay. Timing can also be applied directly to a channel or a specific parameter. This is called discrete timing.

Time can be entered in minutes and seconds (example 10:15) with valid fade times from zero to 99.59, or seconds and tenths of seconds (example 1.3), or 100ths of seconds (example 1.35) with valid fade times from zero to 99.99. When no time is applied at a cue level, the defaults established in System Setup are used. See “Setup” on page 95.

For Example:

You want the time for cue 1 to be 10 minutes and 15 seconds.

• [Cue] [1] [Time] [1][0][1][5] [Enter].

The command line will show the time as:

LIVE: Cue 1 : Cue 1 Time 10:15

If you want the time for cue 1 to be in seconds and tenths of a second, like 1.3 seconds, you will type using a decimal.

• [Cue] [1] [Time] [1][.] [3] [Enter]

The command line will show the time as:

LIVE: Cue 1 : Cue 1 Time 1.3

Setting Cue Level Timing

Unless you specify otherwise, Ion assigns default fade times to any cue you record. Default timing is designated in Setup. Cue level timing can be applied when a cue is recorded or can be added or modified later.

Following are some examples of record commands with cue level timing:

• [Record] <Cue> [5] [Time] [9] [Enter] - puts a time of 9 seconds on all parameter timing categories.

• [Record] <Cue> [6] [Time] [3] [Time] [9] [Enter] - specifies the intensity up, focus, color, and beam times at 3 seconds and the down time at 9 seconds. The first instance of [Time] is used for intensity up fade (meaning intensity value is fading to a higher level than is previously set) and the second instance of [Time] is used for intensity down fade time (intensity values fading to a lower level than is previously set).

• [Record] <Cue> [2] [Time] [Enter] - resets time to default value. If the cue is recorded with split time, this command only resets the up fade time.

• [Record] <Cue> [2] [Time] [Time] [Enter] - un_splits the time and makes it the same as up.

Note: Unless FCB timing is specifically set, it always defaults to the up fade time value.

Note: If a cue is provided split fade times with no delay on either side, and those times are later the same values, the split time is cleared.
Manual Timing at a Cue Level

It is possible to assign a time of “manual”, for manual parameter transition through the associated fader. See “Cue Playback” on page 215. Manual times are assigned by using the {Manual} softkey that is displayed when recording a cue.

• [Record] <Cue> [4] [Time] (Manual) [Enter] - applies a manual time. If the cue had previously been given split times, would apply a manual to the upfade, focus, color, and beam times. If the cue had a single time, all of the timing would be “manual” and controlled by the fader.

• [Record] <Cue> [4] [Time] [Time] [Manual] [Enter] - applies a manual intensity time to the downfade.


Non-intensity Parameter Category Timing

Timing can also be applied for focus, color, and beam parameter categories at a cue level. By default, FCB timing is the same as intensity upfade time. Once FCB timing is different than intensity upfade time, those times are no longer affected by intensity upfade changes.

When you apply a time to an individual parameter category and that category has no movement, the time is displayed in gray. The specified timing will remain in gray until that category is provided with a move instruction, at which point it the timing will display in white.


• [Record] <Cue> [2] (Color) [Time] [Enter] - resets the color time of cue 2 back to the default value.

• [Record] <Cue> [2] [Time] [Time] [Time] [7] [Enter] - records cue 2 with a cue level focus time of 7. In this example, each press of the [Time] key steps through each timing value (up time, down time, focus time, color time and beam time.

• [Record] <Cue> [2] [Time] [7] [Enter] - records cue 2 and puts a time of 7 on all parameter categories (if FCB all had the same times to begin with).

---

Note: It is not necessary to rerecord a cue to alter stored timing data. You can simply redefine the time by specifying the cue and re-entering the time value(s).

• [Cue] [5] [Time] [8] [Enter] - Redefines the all category times to 8 seconds (if FCB all had the same timing).

• [Cue] [2] (Color) [Time] [5] [Enter] - Redefines color time to 5 seconds.

• [Cue] [3] (Focus) [Time] [+] [2] [Enter] - Removes 2 seconds from the current time.

• [Cue] [7] (Beam) [Time] [+] [3] [Enter] - Adds 3 seconds to the current time.
Delay Time

Delay can be useful when you do not want a parameter to change (for example - intensity down) until other changes have begun or completed their transition.

Delay times can be added to any cue or to any specific parameter category within the cue, which will postpone the parameter transition until the delay time has elapsed.

Following are some examples of recording with a delay:

- [Record] <Cue> [2] [Delay] [5] [Enter] - stores cue 2 with a 5 second delay on intensity.
- [Record] <Cue> [2] [Time] [9] [Delay] [3] [Enter] - records cue 2 with a 9 second upfade, delayed from Go by 3 seconds.
- [Record] <Cue> [2] [Time] [7] [Delay] [Enter] - records cue 2 with a 7 second upfade, and removes a delay time on the upfade.

Delay can be used to affect only the parameters in the specified category.

- [Record] <Cue> [2] [Color] [Delay] [8] [Enter] - records cue 2 with a delay time of 8 seconds for the color category.

For information on delaying effects, see Delaying Effects, page 255.

[Time][/]

The [/] key can be used with [Time] to control the intensity upfade and downfade times, and delays.

- [Cue] [1] [Time] [/] [5] [Enter] - places a downfade time of 5 on the cue, while splitting the upfade, which preserves its current value.
- [Cue] [2] [Time] [/] [Enter] - removes the downfade time and makes the downfade match the upfade.
- [Cue] [3] [Time] [4] [/] [Enter] - sets the upfade time, and splits the downfade without splitting the FCB times.
- [Cue] [5] [Time] [4] [/][3] [Enter] - sets the upfade and the downfade times.
- [Cue] [4] [Time] [2] [/] [/] [Enter] - changes only the intensity upfade time and splits the downfade and FCB times preserving their current value.
Discrete Channel or Parameter Timing

Rather than using cue times, timing can be applied directly at a parameter or channel level. This is referred to as discrete time.

Discrete timing can be applied to a specific channel or parameter. You must select the channels that you want to apply the time to, otherwise the system assumes you are addressing the selected cue.

Following are some examples of use:

- [channel list] [Color] [Time] [3] [Enter] - adds a time of 3 seconds to all of the color parameters of the channel list that have a move instruction.
- [Frost] [Time] [7] [Enter] - assigns a time of 7 seconds for the frost attribute of all selected channels.
- [Select last] [Frost] [Time] [7] [Enter] - selects the last channel selection and applies a time of 7 to any manual frost values.

Discrete delay times can also be placed on a channel parameter.

- [1] {Color} [Time] [4] [Delay] [3] [Enter] - places a time of 4 seconds and a delay of 3 seconds on all color parameters of channel 1.

The [+] and [-] hardkeys can be used to increase or decrease discrete timing values.

- [channel list] [Time] [+] [3] [Enter] - increases the discrete timing values by 3 seconds.
- [channel list] [Delay] [-] [1] [Enter] - decreases the discrete delay value by 1 second.

When timing has been applied to a channel parameter in live, a small red “t” will be displayed with the channel. This indicates the timing must be stored or updated to the required cue. When this is done, the “t” is displayed in blue. In the Playback Status Display, a “+” is displayed in the associated parameter category time field, indicating that not all of the parameters in the cue will use the cue timing. The [Shift] & [Time] keys can be held down to see the discrete delay or time information for channels in Live/Blind. Delay is displayed first, followed by the timing value.

Note: Reminder that any conditions places on channel/parameter in live (such as discrete timing, asserts, blocks, etc) must be stored or updated to the cue.
Assigning Cue Attributes
You can record cues with specific attributes to affect how cues behave when executed. Cue attributes include follow time, hang time, link, loop, curve, rate and label. Cue attributes can be entered when the cue is initially recorded, or they can be added or modified at a later date.

Follow/Hang
A follow time creates an auto-follow which automatically activates the next cue in the sequence when the follow time of the associated cue has elapsed. The follow time begins counting from the moment the cue is executed.

The hang time is also an auto-follow, but rather than counting from the moment the cue is executed, it is calculated from the completion of the cue. You can assign a negative value to a hang time, allowing a subsequent cue to overlap an active cue.

You can assign either a follow time or a hang time, but not both. Both features are accessed using the [Shift] & [Delay] keys on the console or the softkey (Fw/Hg). [Shift] & [Delay] or (Fw/Hg) will put Follow on the command line, and [Shift] & [Delay] [Delay] or double pressing (Fw/Hg) will put Hang.

Following are some examples of use:

•  [Record] <Cue> [5] [Shift] & [Delay] [8] [Enter] - records cue 5 and provides a “follow” time of 8 seconds which impacts the start of the next cue in the list. The following cue will automatically initiate on the same fader when the follow time has elapsed. The follow time will begin counting down when the associated cue (Cue 5) is executed.

•  [Record] <Cue> [5] [Shift] & [Delay] [Delay] [8] [Enter] - records cue 5 and provides a “hang” time of 8 seconds which impacts the start of the next cue in the cue list. The following cue will automatically initiate on the same fader when the hang time has elapsed. The hang time will begin counting down when the associated cue (Cue 5) is complete.


To remove a Follow/Hang time:

•  [Cue] [x] [Shift] & [Delay] [Enter]
Link/Loop

Link allows cues to be run out-of-sequence, by causing a different cue number to be loaded into the pending file of the playback fader when the cue that carries the link instruction is activated. If a follow or hang time is included with the cue attributes, the activation of the linked cue will occur when the follow or hang time has elapsed. The link can be within the cue list or to a cue in another cue list.

Following is an example of using link:

- [Record] <Cue> [2] {Link/Loop} <Cue> [8] [Enter] - records the specified cue 2 and provides a link to cue 8 in the cue list. When cue 2 is played back, the linked cue is loaded into the pending file of the associated fader.

Loop is provided as a method to link a series of cues and loop them a number of times in a sequence. Once the sequence of cues has played back the first time, the system recognizes the loop command and plays the sequence again.

If the first cue in the sequence is a cue with an assert attribute or has move instructions for channels, values from the last cue are not allowed to track through into the first cue when it is looped back. But without a move or assert in the first cue, values from the last cue will track into the first cue when it loops back. A loop specified with “0”, loops the sequence indefinitely.

Following is an example of using loop:

- [Cue] [2] {Link/Loop} <Cue> [1] {Link/Loop} [3] {Follow} [4] [Enter] - records a link from cue 2 back to cue 1. Because there is a follow time, cue 1 will automatically trigger 4 seconds after cue 2. If cue 1 also has follow time, it will automatically trigger cue 2. This sequence will run 4 times (once plus 3 loops) and then stop in cue 2. The loop value specifies the number of times the loop instruction will be performed. Since the sequence has run once prior to the loop command, the total number of passes will be the specified number of loops +1.
Rate

The **Rate** softkey can be used to apply a rate adjustment to all timing in the cue. The default rate is 100%, which is real time. To slow a cue down, set the rate below 100%, to speed the cue up, set the rate above 100%. The range rate for a cue is 0 - 2000%. A timing value of 5, with a rate of 50% will replay in 10 seconds. A timing value of 5, with a rate of 200% will replay in 2.5 seconds.

Following is an example of using rate:

```
```

- records the specified cue, and places a rate override instruction on all timing values. The cue would now be played back at 125% of recorded time values.

**Note:** You can use the playback rate override function to determine the rate at which you want to play the cue back, and then apply that rate to the cue. This eliminates the need to adjust all of the timing in the cue if you only need to speed it up or slow it down. See “Using Rate Override” on page 225.

Curve

**Curve** is used to affect the percent completion of a cue or part by applying the curve’s output level as the percent completion for all fade calculations.

Following is an example of how to assign a curve to a cue:


When a curve is applied to cue, it impacts only the intensity transitions in that cue. When applied to a cue part, it impacts any parameters moving in that part. For more information on creating and using curves see **Storing and Using Curves, page 277**.

Label

**Label** is used to attach an alphanumeric label to a cue or cue part.

Following is an example of how to apply a label to a cue:

- **[Record] <Cue> [7] {Label} <name> [Enter]** - records cue 7 and applies the label as entered on the alphanumeric keyboard.
- **[Record] <Cue> [8] {Label} [Block] [Enter]** - records cue 7 and applies the name of the hardkey as the label.

Pressing **[Label]**, when a label has already been applied to a cue, will display the label on the command line for editing. Pressing **[Label]** a second time will clear the label, or you can press **[Clear]** to remove the label one character at a time.

Clearing Cue Attributes

To clear attributes from a cue:

- **[Cue] [n] [Shift] & [Delay] [Enter]** - removes the follow or hang time from the specified cue “n”.
- **[Cue] [n] [Label] [Enter]** - removes the label from the specified cue “n”.
- **[Cue] [n] {Link/Loop} [Enter]** - removes the link instruction from the specified cue “n”.
- **[Cue] [n] {Thru} [v] {Rate} [Enter]** - removes the rate instruction in cues “n” through “v”.

You may combine these to remove multiple attributes at once:

- **[Cue] [n] [Shift] & [Delay] {Link/Loop} [Enter]** - removes the follow time and link instruction.
Flags

Flags can be applied to cues to change specific behaviors. Flags can be set for “Block”, “Assert”, “AllFade”, “Mark”, and “Preheat”.

Block

You can apply a block to a cue, a cue part, to any channel (or group of channels), or parameter (or group of parameters) within a cue. Block is an editing function, it has no impact on how the data is played back.

At a cue level

A cue level block causes all tracked values in the cue to be treated as move instructions for editing purposes, which prohibits any data changes from tracking into the cue. Parameters that are not included in the cue are not impacted by the block instruction.

Blocks do not protect a cue, channel or parameter from being modified by a range edit, nor are they protected from a trace instruction (see Using Trace, page 184). It is assumed that if you use the trace instruction, then you really want the initial value to change. A block will stop the trace from moving any further backwards through the cue list.

Ion also supports an “auto-block” function. Auto-block can protect your cue data from unwanted changes. For example, in cue 5 you set channel 1 to 50%. It is stored as a move instruction. Then, you later go back to an earlier cue and set channel 1 to 50% and it tracks forward to cue 5.

Channel 1 will be “auto-blocked” in cue 5. Even though it is now at the same value as the previous cue, the original concept of a move instruction is maintained.

Blocks that you have applied will display parameter data in white. Auto-blocks are displayed in white, with a white underscore.

• [Cue] [5] [Block] [Enter] - “B” is displayed in the flags field, indicating a cue level block. When this cue is recalled, all data that would otherwise appear as a tracked value, will be displayed in white. Any changes upstream in the cue list will not impact this “blocked” cue data.

At a Channel or Parameter Level

Blocks can also be applied to a channel or a channel parameter. This can be done in live or blind. When applied in live, the block instruction must be stored or updated to the appropriate cue.

• [9] [Block] [Enter] - applies a block to channel 9. A red “B” appears near the channel in the live display, indicating a block has been applied but is not yet stored.

• [Group] [5] [Color] [Block] [Enter] - applies a block to all of the color parameters for group 5.

When the block instruction has been stored or updated, any tracked values the block was applied to will be displayed in white.

Channel level blocks and auto-blocks are indicated in the cue list by a “b”, representing a partial block.
**Assert**

Assert is a way to make a tracked or blocked value act as a move instruction on playback. It is often used in a multiple cue list environments, or to assure that a transition happens in the desired time. See Using Assert, page 204 for more information on asserts in multiple cue lists.

Assert can be useful in a single cue list.

*For Example:*

Cue 10 is a blackout with a zero count. It is common practice to block blackout cues. Let’s say though that some of the lights were fading to zero in cue 9. You hit [Go] for cue 10 before cue 9 is finished. The lights that were fading to zero in cue 9 will continue their downfade in the timing for cue 9 since cue 10 doesn’t provide them with a new move instruction. If you assert cue 10, the lights will bump to black as expected.

**AllFade**

Any cue can have an allfade flag applied. An allfade sends the intensity for all channels not included in the cue to zero. Submasters, any captured channels and the contribution from any faders that are set to independent are unaffected, unless the cue executing the allfade is also set to independent. An allfade flag "*" is identified in the playback status display for the specified cue.

- `<Cue> [5] [Allfade] [Enter]` - sends intensity for all channels not included in the allfade cue to zero.

The allfade instruction is useful as a quick cleanup, to get back to a known state on stage, without having to worry about what channels need to be set to zero.

**Mark**

The Mark flag is used to relay information about either automarks or reference marks. When using automarks, an "M" will display in the flags field for the specific cue that will execute an automark. A "D" is displayed when automark has been disabled for a cue or a cue part.

When using reference marks, an "M" will display in the flags field for any cue that will execute a referenced mark. An "R" displays when a cue is the source of a mark. See “Using Mark” on page 191.

**Preheat**

Preheat can be used to warm filaments in the cue immediately preceding an intensity upfade from 0. Preheat values can be assigned channels individually in patch (see Attribute Display and Settings, page 73).

Preheat is assigned on a cue (or cue part) basis and, if assigned, any channel in that cue with a preheat value assigned in patch will fade to that intensity in the cue immediately preceding the cue with the preheat flag. Cues with a preheat flag will display an "P" in the preheat flag column (indicated by a "P" at the top of the column).

When a channel is in a preheat state, a "Ph" is displayed in the intensity field of that channel. When a preheat is executed, the preheat value is established using the upfade time of the associated cue. It is possible to hold the [Data] key to see the actual preheat values.
Using External Links

External links can be used to trigger actions such as macros, show control, or snapshots. Additionally, you can enter instructions that sync the “Go” of other cue lists.

When you press (Execute), the softkeys will change to (Time Code), (Macro), (Relay), (On), (Off), (Snapshot), (OOS Sync), (MIDI Raw), and (String).

To trigger a macro:

• [Cue] [1] {Execute} [Macro] [5] [Enter] - triggers Macro 5 when cue 1 is executed.

To trigger a snapshot:

• [Cue] [3] {Execute} {Snapshot} [3] [Enter] - loads snapshot 3 when cue 3 is played back.

To trigger a relay either on or off:

• [Cue][5] {Execute} (Relay)[1] [1] [1] [On] [Enter] - triggers relay 1/1 on (ACN Group ID / Relay Number).

To trigger cue lists press:


To trigger a specific cue on another fader:

• [Cue] [4] {Execute} [Cue] [4] [/] [5] [Enter]

When cue list triggers are set, the system will automatically execute same numbered cues on the associated cue list. For example, assume that the last instruction above was applied to cue list 1, cue 1. When cue 1/1 is executed, any cues numbered “1” in cue list 2 thru 5 will be executed accordingly. If there is not a cue 1 in those lists, no action is taken on them. If there are cue numbers on secondary cue lists that are not in cue list 1, those cues are skipped and the subsequent cue taken as an “out-of-sequence” cue when triggered.

When cues are taken on the primary list out of sequence, only like-numbered cues on the secondary lists will be replayed. For example, if you go to cue 12 on the primary list, and there is a cue 12 on the secondary list, cue 12 on all lists is executed. However, if cue 12 does not exist in the secondary list, that list will be unaffected by the go to cue command. Out of sequence sync can be enabled to make sure secondary lists assume the same position in the show as they would on linear playback.

(OOS Sync) can be used to change that behavior per cue list. (OOS Sync) is disabled by default. When enabled, OOS Sync will display in the cue list index’s external links column. (OOS Sync) should be enabled in the secondary lists, not on the list that contains the execute command.

When OOS Sync is enabled, any out of sequence cue fired from a cue list that is synced with another cue list will trigger the closest earliest cue that exists if the correct cue does not.

For Example:

Cue list 1 is synced with cue list 2. Cue 1/3 is fired. Since cue 2/3 does not exist, cue 2/2 will fire instead. If OOS Sync was disabled, a cue in cue list 2 would only fire if it has the same cue number as cue list 1.

Removing a trigger:

To remove a trigger, access the cue number and press (Execute), the record target type and press [Enter].

• [Cue] [5] {Execute} [Cue/Macro/Snapshot] [Enter]
Modifying Cues Live

Recorded cues can be modified live. Cue attributes (such as link, loop, label and so on) may be edited as well. The cue does not need to be active (played back) to change cue attributes. You may also change cue attributes for a range of cues if you wish.

Using [At] [Enter]

A useful feature when editing cues is [At] [Enter]. This is a simple feature which allows you to select any channel or parameter, or several of them, and remove their move instructions, allowing the value from the previous cue to be manually recalled.

[At] [Enter] is essentially a "recall from the previous cue" command; it completely removes a move instruction and any manual data, and replaces it with the value from the previous cue.

For Example:

Cue 5 is active in Live.

• [Group] [1] [Focus] [At] [Enter]

This command lifts the current move instructions for Group 1 focus, and recalls the focus data for those lights from the immediately preceding cue. It is now manual, and can be stored or updated as required.

You may also use [At] [Enter] to affect only certain channels or parameters by selecting them specifically:

• [2] [At] [Enter] - this will remove the changes for channel 2 only.
• [2] [Color] [At] [Enter] - this will remove only the color data changes for channel 2.
• [2] [Thru] [5] [+] [9] [+] [1] [Thru] [1] [5] [-] [1] [2] [-] [Zoom] [At] [Enter] - removes the changes for only the selected channels for all parameters except zoom.

Using Record

You may modify a cue by rerecording it entirely. After making changes to channels or parameters:

• [Record] [Enter] [Enter] - will replace any data in the active cue with the current stage settings.
• [Record] [Cue] [x] [Enter] [Enter] - will replace the any data in cue "x" with the current stage values.
• [1] [Record] [Cue] [2] [Enter] [Enter] - will only record the changes to channel 1.

Note:

Using [Record] will record all parameters of all non-default channels onstage. This means that all other cue data and submaster data will be included in the record action.

This is a common method when working with a single cue list. When working with multiple cue lists or submasters, [Record Only] is a useful tool.
Using Record Only

Modifying existing cues using [Record Only] is considered a “selective store” function. As such, it adds or modifies only manual data to the target cue, but leaves any other data that was already in the cue intact and does not include playback values from other cue lists or submasters. [Record Only] is a good way to modify existing cues without including contributions from other playbacks in the cue. In that way, it is very similar to update.

- [Record Only] [Enter] [Enter]- adds the current manual data to the selected cue.
- [Record Only] [Cue] [x] [Enter] [Enter]- adds the current manual data to cue “x”.

Record and Record Only [+]

[+] can be used to specify a range of cues when using [Record] and [Record Only].

Note: If no cue number is entered before the [+], the current active cue will be used.

For Example:

To record only cues 5, 10, and 15:

- [Record] <Cue> [5] [+] <Cue> [1|]0 [+] <Cue> [1|]5 <CueOnly/Track> [Enter]

To update the current cue and cue 7:

- [Record Only] [+] <Cue> [7] <CueOnly/Track> [Enter]

Move To

You can use the command (Move To) to move a cue from one location in the cue list to another.

- [Cue] [4] <More SK> (Move To) <Cue> [8] [Enter] - moves the contents of cue 4 to cue 8. Cue 4 is removed entirely. If cue 8 already existed, a confirmation will be required before replacing cue 8 (unless confirmations have been disabled in setup). Any contents of cue 8 will be replaced entirely.
[Update]

Update is a powerful feature, and also very versatile. Using a combination of [Cue Only], [Track], [Trace], and [Make Absolute], the number of ways you can update specific information and manual data is virtually endless. Below you will find some examples of how data can be updated to various record targets either at once, or individually. This list is by no means exhaustive, so you are encouraged to try methods of updating on your own.

Update Dialogue Box

When you press [Update], a dialogue box will open in the CIA. Update styles and modifiers for those styles will be divided in the Update Dialogue Box.

Update Styles

- **(All)** - this button will update the target cue and all references stored to that cue (nested and otherwise).
- **(Make Absolute)** - this button will update the target cue and convert all levels to absolute values, thereby removing any references.
- **(Ref Only)** - this button will only update the palettes or presets used in the cue, but will not update the cue itself. If a manual reference was used before using [Ref Only], the last manual reference will be updated.

Update Modifiers

- **(Last Ref)** - this button will update using the last reference that was applied.
- **(Break Nested)** - this button will update the target cue and any presets used, but breaks the reference to any palettes nested in a preset. For example, if cue 1 channel 1 references preset 3, and preset 3 was built using color palette 5. When updated with this option, preset 3 would be updated, color palette 5 would not, and the reference to CP5 would be broken in preset 3.
- **(Reset)** - this button will clear any commands after the [Update] command to quickly undo pending changes before [Enter] is pressed.

The dialogue box also provides you with a listing (by record target) of what channels/parameters will be impacted by the update instruction. If the channel contains a reference in the cue, it is indicated. If not, a “+” is displayed. Channels that have been manually added to the stage output, but are not overrides of an active cue will update to the selected cue list.

Once you have made a selection from the available options, press [Enter] and the target will be updated.

Targets may be deselected from the dialogue box, excluding them from the update without specifying the target number, for example, [Update] [Color Palette] [Enter].
Default Update Modes

You can define the default update modes in setup. The Update Setup options are under Browser>Setup>Desk Settings>Record Defaults. Ion defaults to Update All for the {Update Mode}, with {Break Nested} and {Update Last Reference} disabled.

Updating to References

When a cue is active, it is possible that various record targets (palettes or presets) will be played back within that cue. As changes are made to the data in that cue, as well as to the individual palettes or presets, updating both the cue and references within that cue is simple. When you have overridden a reference in a cue, the data is displayed in red with a red “R” in superscript next to the channel’s intensity.

By default, Ion updates any referenced data that was included in the cue.

For Example:

Cue 5 is recalled Live. It contains references to color palette 1 and preset 2. You make changes to channels included in these record targets. To update both the cue and the palettes or presets, press:

• [Update] [Enter]

This will automatically take the manual changes and update them to color palette 1 and preset 2. Therefore cue 5 now references these new values, and the modifications to CP1 and PR2 have propagated through all of the show data.

If you had made changes to other channels that were not included in the palettes or presets used in cue 5, those values would also be updated to the cue as absolute data.

Updating Without References (Make Absolute)

If you want to record your changes to the cue without updating the references, you may use {Make Absolute} break the associated to the reference. The {Make Absolute} command can be applied to the required channels or parameters before the update instruction, or they can be applied during the update.

• [Update] {Make Absolute} [Enter] - breaks the references for any parameters which have been changed and update the cue with the changes. The referenced target will no longer be displayed in the channels which were made absolute. All of the data updated in cue 5 will now be shown as absolute data.

• [5] [Thru] [9] [Update] {Make Absolute} [Enter] - breaks only the references for channels 5-9 and record their manual values to the cue. Other manual values will not be included in this update.

You may also use {Record Only} to break references.
For Example:

Cue 5 is active and onstage. Channels 5-20 are currently referencing preset 1. You make changes to channels 5-9. The data for these changes is now manual. Press:

- [Record Only] [Enter] [Enter]

If there were other changes on stage, you could have commanded:

- [5] [thru] [9] [Record Only] [Enter] [Enter]

Only the manual data will be recorded as an update to cue 5. The reference to preset 1 for channels 5-9 is broken and now the cue will display the absolute data rather than the reference indicator.

Update Break Nested

This is used only when presets that have embedded palette data are modified in a cue. If you wish to maintain the link to the preset, but not impact the palette that was the source of the preset, [Update] [Break Nested] can be used.

Using Cue Only/Track

The [Cue Only/Track] key can be used as an applied exception to the cue only/track system setting. Therefore if the system is set to Cue Only, the key behaves as a [Track] command. Alternatively, if the system is set to Track, the key behaves as a [Cue Only] button.

For more information on Tracking vs. Cue Only see Tracking vs. Cue Only, page 5 in Setup.

[Cue Only/Track] can be used in conjunction with record or update functions. Following are some examples of use:

**With system set to “Track”**

- [Record] <Cue> [5] [Cue Only] [Enter] [Enter] - rerecords cue 5. This will make the changes to cue 5 only. The changes will not track forward through the list.

- [-] [Color] [Record] <Cue> [5] [Cue Only] [Enter] [Enter] - as above, but changes to color parameters will not be included in the record and all data that was included will not track forward. Color data in the cue remains unchanged.

- [Update] <Cue> [5] [Cue Only] [Enter] - updates cue 5 with only those manual parameters that were receiving their instructions from that cue. The changes will not track forward in the list. Note that if the data being updated were referenced, this action updates the referenced target as well.

- [-] [5] [Record] <Cue> [7] [Cue Only] [Enter] [Enter] - rerecords the specified cue, except the contributions from channel 5. The changes will not track forward in the list.

**With system set to “Cue Only”**

- [Record] <Cue> [5] [Track] [Enter] [Enter] - rerecords cue 5. This will force the changes to track forward in the list until the next move instruction or block.

- [-] [5] [Color] [Record] <Cue> [7] [Track] [Enter] [Enter] - rerecords the specified cue, except the color data from channel 5. The recorded changes will track forward in the list.

- [Update] <Cue> [3] [Thru] [7] [Track] [Enter] - updates cues 3 thru 7. Range updates are subject to the normal rules of track/cue only in determining impact on subsequent cues.

**Note:**

In the following examples, the commands [Cue Only] and [Track] indicate the same key hit of [Cue Only/Track] - a single button on the keypad. The system setting determines the actual context of the button. For clarity, only the contextual function of the button is used in the examples.
Using Trace

**{Trace}** works just as Track does, except it allows changes to be tracked backwards through the cue list, until it sees a move instruction. A trace will track into, but not beyond, a blocked instruction.

Following are some examples:

- **[Update] <Cue> [5] {Trace} [Enter]** - updates cue 5, and tracks changes backward until a move instruction is encountered. If the system is in track mode, the change will track forward in the cue list until the next move instruction or block. If in cue only mode, this has no impact on subsequent cues.

- **[Update] {Trace} [Cue Only/Track] [Enter]** - updates the selected cue and tracks changes backward until a move instruction is encountered. If the system is in track mode, the change is prohibited from tracking forward in the list. If in cue only mode, the change is allowed to track forward.

When a channel that is inactive (at zero or null) in the cue list receives an active level, if update trace is used, that channel will not trace the current setting into previous cues. To force that channel’s new value to go backward in the cue list, **{Trace} {Trace}** can be entered.

**Updating the Current Cue**

The current cue is updated by simply pressing **[Update] [Enter]**. When only one cue list is active, this update will include any changes to all channels.

**Updating a Source Cue**

To update the source of a level in the current cue (therefore, a move instruction in a prior cue) you must specify a trace for the desired channel(s).

- **[5] [Update] [Trace] [Enter]** - updates any manual changes for channel 5 in the current cue. Any tracked values for channel 5 are traced back to the source of the value (the original move instruction) and changed to the new value. The value for traced changes in the current cue will be magenta indicating it is a tracked value.

- **[Trace] [Trace]** - If a channel was inactive in the cue (either because it had not previously been used in the cue list, or it was a tracked zero) and is set to a new level, by default the new level will not track back. You can force it by pressing **[Trace]** twice.

**Updating a Non-Active Cue**

It is possible to use the same update commands illustrated above to update inactive cues (cues not live onstage). In these situations, if the updated cue is not the source of a channel’s live value, manual data will remain manual. If the updated cue is the source of the current value, the values will change to magenta (indicating tracked) when the update is completed.

**Update [Thru]**

Using **[Update] [Thru]** allows you to update from a current cue to a destination cue without first entering the current cue’s number.

*For Example:*

If you are currently in cue 5 and you want to update through cue 10, you would use the following syntax:

- **[Update] [Thru] <Cue> [10] <CueOnly/Track> [Enter]**
Update [*]

[*] can be used to specify a range of cues for updating. [*] can also be used with [Record] and [Record Only].

**Note:** If no cue number is entered before the [*], the current active cue will be used.

*For Example:*

To update only cues 5, 10, and 15:

- `[Update] <Cue> [5] [*] <Cue> [1] [0] [*] <Cue> [1][5] <CueOnly/Track> [Enter]`

To update the current cue and cue 7:

- `[Update] [*] <Cue> [7] <CueOnly/Track> [Enter]`
Recording and Editing Cues from Blind

Press [Blind] and the selected cue will be displayed. You can make changes to cues in the blind display using either the summary, table, or spreadsheet views.

**Note:** Edits in blind take effect immediately. [Record] or [Update] commands are not required in blind.

If changes are made in the blind display to an active cue, these changes will not impact the current stage state. To make blind changes active you can press [Assert] & [Load] button for the fader associated with the cue.

Move instructions can be removed from a cue by selecting the channel and pressing [At] [Enter]. This allows all values from the previous cue to track into the current cue. You can also use this command for specific parameters as well.

**For Example:**

Suppose you are in blind cue 5 and you make changes to channels 1-5:

- [1] [Thru] [5] [At] [5] <0> [Iris] [3] [5] [Enter]
  
  Intensity goes to 50% and Iris to 35%. You decide to remove the Iris instruction:

- [Iris] [At] [Enter]
  
  The Iris value from the previous cue tracks in. Then you remove the intensity change as well:

- (Intensity) [At] [Enter]
  
  All values from the previous cue track in.

  Instead of using multiple commands, you can, in one command, return the channels to their values from the previous cue:

- [1] [Thru] [5] [At] [Enter]

  The impact of blind edits on subsequent cues is determined by the default setting of Track/Cue Only mode. Obviously in track mode any changes will track forward until the next move instruction, unless [Cue only] is pressed. In cue only mode any changes will apply only to the selected cue. If you want values to track forward, the [Track] button will allow it. The track/cue only instruction must be applied when a value is entered. [Trace] can also be used to have changes trace back to the initial move instruction. Such as:

- [1] [Thru] [5] [At] [5] <0> [Cue Only/Track] [Enter]

- (Intensity) [Cue Only/Track] [At] [Enter]

- [1] [Thru] [5] [At] [5] <0> [Cue Only/Track] [Trace] [Enter]

To Live From Blind

From blind, a softkey {Live} is posted when you press [Recall From] or [Copy To] to allow you to copy to or recall information from live. The following examples only work with the {Live} softkey, not the [Live] hard key.

- [1] [Recall From] {Live} [Enter]

- [2] [Copy To] {Live} [Enter]
From Summary or Table Views

Use the [Format] key to cycle through the available views (see Using [Format], page 39).

Summary view allows you to see the greatest number of channels at once, though parameter data is somewhat truncated. Channels with focus, color, or beam data are indicated with a respective F, C, or B beneath the level data. This view is useful for viewing lots of channel data at once or for editing primarily intensity values.

Table view grants you greater visibility of parameter data and a reduced number of visible channels. This view displays channels along the y axis and parameters along the x axis. Parameter categories are always visible (I, F, C, and B). You can also view specific parameters by pressing and holding the [Data] button and then pressing the category softkey(s) for the parameters you wish to view. This will expand the category to show any parameters used in the show. You can also deselect the parameters you do not wish to see. This is remembered the next time you go to table view.

The table view is useful for viewing and editing all parameters for a smaller number of channels.

Both summary and table views allow you to make changes to channels or parameters.

From the Cue Spreadsheet

The cue spreadsheet is another useful blind view of cue data. In spreadsheet view, cues are listed on the y axis and channels and parameters are displayed on the x axis. This view is useful for viewing a limited number of channels over a span of numerous cues. This makes spreadsheet view useful for viewing overall trends in channel and parameter data. Pressing [Data] + {parameter tiles} will expand or collapse information shown.

Editing cue ranges is possible in spreadsheet view. {Move To} is only available from this view. To select an entire cue range, you can press [Cue] [enter the first cue] [Thru] [Enter].
Replace With

(Replace With) is used to select channels that have certain specified values and then provide new instructions for those values.

**For Example:**

Select a range of cues:

- \([\text{Cue} \ [1] \ [\text{Thru} \ [9] \ [\text{Enter}]\]

Select a range of channels that are used throughout these cues and enter a change instruction:

- \([\text{[1] \ [Thru] \ [7] \ <A> \ [Color \ Palette] \ [5] \ (Replace \ With) \ <Color \ Palette> \ [3] \ [Enter]}\]

This instruction finds all instances of channels 1-7 in cues 1-9 that are in color palette 5 and replace CP5 with CP3. Be aware of the track/cue only settings when using this command.

The range of possibilities of potential **(Replace With)** commands is virtually endless and can be applied to single cues or channels, ranges of cues or channels, parameters of any type, or timing data.

**Move To**

(Move To) is used to move cues from one location in a cue list to another location in the same or a different cue list. When cues are moved, values that were tracks or move instructions and now match the previous cue will be auto-blocked by the system. The impact on subsequent cues is based on track/cue only settings as described above. Below is an example of **(Move To)**:

- \([\text{[Cue} \ [2] \ (Move \ To) \ <\text{Cue}> \ [9] \ [\text{Enter}]\]

In the above example, any tracked values in cue 2 become blocks (see **Block**, page 176) or moves in cue 9, as well as any move instructions which now match the previous cue. Cues after cue 9 are affected based on the default setting of track/cue only. Any values in the cue after cue 2 that tracked from moves in cue 2 are changed to move instructions.

Ranges of cues can be moved as well. You can also move cues to other cue lists. In either of these situations if any cue is to be overwritten, a confirmation is required.

**Using Encoders in Blind**

The encoders are disabled by default in blind. Press an [encoder paging key] prior to moving the encoders, and they will function while you remain in blind.

When a cue is specified, you can select channels and alter parameters using the encoders. **[Cue Only/Track]** can be placed on the command line to determine how these changes will impact subsequent cues.
Deleting Cues

Cues, lists of cues, or ranges of cues can be deleted. When deleting cues, the track/cue only setting of the console will determine how subsequent cues are affected. The [Cue Only/Track] button can be used to modify the default behavior as needed.

In Track Mode

When the console is in track mode, deleting a cue also removes any move instructions provided by the cue. For example, assume you have stored cues 1-10 and cue 5 contains move instructions for channels 1-5. If cue 5 is deleted, the move instructions are deleted as well and the values from cue 4 will track directly into cue 6 and beyond.

In this instance, if you used the [Cue Only] button in the delete instruction, cue 5 would be deleted, but the tracked values in cue 6 that originated in cue 5 would remain and be converted to move instructions.

In Cue Only Mode

When the console is in cue only mode, any subsequent tracked values are not eliminated, but are converted to move instructions instead.

In the example above, deleting cue 5 (in cue only mode) would result in any tracked values in cue 6, that originated in cue 5, being converted to move instructions.

If you apply the [Track] button to the delete instruction, the move instructions from cue 5 are deleted and the values from cue 4 would then track into cue 6 and beyond.

Some examples of cue deletion are:

- [Delete] <Cue> [5] [Enter] [Enter] - deletes cue 5. Subsequent cues in the list are affected depending on the console default setting as described above.
- [Delete] <Cue> [6] [Cue Only/Track] [Enter] [Enter] - deletes cue 6, making exception to the default setting, as described above.
- [Delete] <Cue> [7] [Part] [1] [Enter] [Enter] - deletes part 1 of cue 7.
- [Delete] <Cue> [8] [Part] [1] [Thru] [3] [Cue Only/Track] [Enter] [Enter] - deletes parts 1-3 of cue 8, making exception to the default setting, as described above.
- [Group] [1] [Delete] <Cue> [2] [Enter] - deletes any channels in group 1 from cue 2. Cue 2 remains in the cue list and any channels not in group 1 are unaffected.
- [Delete] <Cue> [2] [Thru] [8] [Cue Only/Track] [Enter] [Enter] - deletes cues 2-8, making exception to the default setting, as described above.
Chapter 12
Using Mark

Mark is an instruction that automates the process of presetting moving lights to their required state in a cue, prior to fading intensity up. This allows your moving lights to unobtrusively perform non-intensity parameter transitions in an inactive (darkened) state.

Ion provides two different methods to mark lights: AutoMark and Referenced Marks.

This chapter contains the following sections:

- AutoMark ........................................... 192
- Referenced Marks .............................. 193
AutoMark

The AutoMark feature is a system default setting and can be turned on or off at a global level. The system default for this setting is off. To change the default settings see Show Settings, page 96.

When AutoMark is enabled, non-intensity parameter transitions will occur in the cue immediately preceding the cue in which the changes are stored, if intensity in that cue is moved from zero to any active level. Therefore, the preceding cue “executes” the AutoMark.

AutoMark information is displayed for cues or cue parts. It is not a channel instruction. AutoMarked cues are indicated by an “M” in the M column of the playback status display.

AutoMarks will execute using the time of the cue in which the moves occur (the cue indicated by “M”). The exceptions to this are the mark time in setup, or if discrete timing is stored with the move instruction, in which case the discrete time will be used.

AutoMarks will display the same way in live and in blind.

Conditions Triggering an AutoMark

The following rules determine which channels AutoMark is applied to and how it is deployed:

- The marked cue must have a move instruction for intensity of moving lights above zero or null.
- The marked cue must have a move instruction for non-intensity parameters of those channels.
- AutoMark will not occur if the channel is receiving an intensity instruction from another source (such as a submaster or HTP fader).
- AutoMark must be enabled for an AutoMark to occur. AutoMark is based on the current setting of the default during playback. It does not matter what the setting is at the point of record.
- On a “per channel” basis, an AutoMark does not occur until:
  - Any parameter delay time has elapsed and
  - The intensity has reached zero and the parameter has completed any previous movement.

Allowing a Live Move

When AutoMark is “On” it is possible to override it on a per cue (or cue part) basis. The override will be available through a softkey, “AutoMark Off”. This softkey is not visible when AutoMark is disabled in default settings.

AutoMark can be disabled on cues or cue parts.

When enabled, the cue that executes the mark will have an “M” in the flags field. If AutoMark is disabled, allowing a live move, a “D” is displayed in the flags field of the cue or cue part where the data is stored.

By using AutoMark with multipart cues, it is possible to have some parameters mark and others move live.

AutoMark and Timing

An AutoMark will happen in the time of the cue in which is moving (the “M” cue), unless the channel has discrete timing or the mark time has been changed in setup. Discrete timing would override the mark time option in setup. See “Mark Time” on page 197. In which case, the discrete timing will apply to the moves. Discrete timing is applied in the cue where the move instruction is stored.
Referenced Marks

Referenced marks are user-specified marks that are manually applied to specific channels or parameters. When AutoMarks are disabled, referenced marks may be used. AutoMark and Referenced Marks cannot be used simultaneously.

There are essentially two parts to a successful referenced mark. The first part is the cue with the mark flag (set by the user). This is the cue in which any non-intensity parameters will change. This cue is referred to as the marked cue.

The second part is the cue with intensity value for the channels in question. This is referred to as the source cue. This is also the cue where the non-intensity moves are stored.

In order to use mark properly, you must specify channels to be marked in the source cue. Ion will not assume all moving lights apply to any given mark.

There are two ways to apply a referenced mark. You can apply a mark flag at a cue level and then subsequently reference that flag in a later cue, or you can apply a mark in a cue and reference back to an earlier cue.

Referenced marks are useful because the non-intensity parameter data is stored in the cue that actually fades the lights up. Therefore, any changes to the non-intensity parameter data is modified in the source cue. You do not need to worry about changing it in the marked cue.

Setting Referenced Mark Flags

You can apply a mark flag by pressing:

- [Cue] [n] [Mark] [Enter]

This sets a flag (M) on a cue for later marking activity. In subsequent cues, when channels are marked, they will preset for movement in this cue (unless told to mark elsewhere).

When you are building a cue containing channels that you want to mark, do the following:

- [select channels] [Mark] [Enter]
- Store the cue, following normal procedures. Ion will automatically look backwards in the cue list for the first mark flag it encounters.

For Example:

Assume you had placed a mark flag on Cue 10 (this is becomes the Marked Cue).

- [Cue] [10] [Mark] [Enter]

Later you store Cue 12 with a mark instruction on channels 1-10 (this becomes the Source Cue).

- [1] [Thru] [10] [Mark] [Enter] - Note that channels 1-10 are displayed with a red "M" in the upper right corner.
- [Record] <Cue> [1] [2] [Enter]

Since no specific mark instruction was given to the channels in cue 12, the channels will

Note: If you begin programming with AutoMark enabled, and then disable the feature, all of the AutoMarks in the show are converted to referenced marks.

Note: When bringing up the intensity of a fixture that is in a marked state, all the parameters of that fixture will be made manual and the current NPs settings will display. This is done so you won’t need to use [Make Manual] when storing to a cue.
mark back to the first “M” encountered in the preceding cues of the cue list, provided that the intensity for those channels is “out” throughout the duration of the mark.

When Cue 10 is played back, the non-intensity parameters of channels 1-10 will fade to the values stored in Cue 12. Then in Cue 12, the intensity will fade up on those channels.

Mark Display Indicators
In the previous example, indications that a mark had been placed are as follows. Cue 10 would be shown with a mark flag (M) in the cue list. In addition, when cue 10 is played back, channels 1-10 will show a green “MK” in the intensity field, while the non-intensity parameters would show the source cue number in green “Q12” (the MK in the intensity field is green if, in cue 10, the lights are fading to zero and then the NPs are marking. If, in cue 10, channels 1-10 were already at zero, a magenta “MK” will be displayed).

The source cue (cue 12) would include a green “M” next to the intensity level and any non-intensity parameter values would be displayed in green. Also, in the cue list, cue 12 would have an “R” in the mark flags field. If a mark has been placed on a cue, but that cue is not yet marking any lights, the “M” will be represented as “m”. You will also see an “m” if the mark is no longer in tact.

Applying Flags as Channels are Marked
You may also apply a mark flag to a previous cue by doing the following:

- [select channels] {Mark} [Cue] [5] [Enter]
- [Record] [Cue] [8] [Enter]

This would mark cue 5 to perform any non-intensity moves stored in cue 8. The display indicators for this mark would be the same as shown in the previous example. As long as intensity is at zero within the cue range, if there are any non-intensity move instructions for these channels between these two cues, they will be removed.

It is also possible to mark only certain parameters for marked moves, while allowing live moves for other parameters.

For Example:
If you wanted to mark only focus, and allow all other parameters to transition while the light is fading up, you can press:

- [1] [Thru] [10] [Focus] {Mark} [Enter]

Removing Referenced Marks
Mark is a toggle state. Therefore, the first mark command sets a mark. The second removes it.

To remove a mark flag from a cue, press:

- [Cue] [n] {Mark} [Enter]

To remove a mark from a channel:

- [select channel] {Mark} [Enter]

Note: If a mark is removed from a channel in live, the corresponding cue must be updated.
It is also possible to mark to a cue that doesn't exist, and when the mark is stored, Ion will automatically create the cue to mark to.

For Example:

If cue 2 does not exist yet:

- [select channels] (Mark) [2] [Enter]
  The command line will display, “Create Mark Cue?”
- [Enter]

When the cue is stored, the system will automatically create a cue 2 and mark the lights to it.

If a light is marked and that mark is later broken (for example being used by a move instruction stored in the mark range), Ion will attempt to repair the mark. This is done by automarking in the cue previous to intensity fading up, if possible. This will be indicated in the cue list by a “*” in the cue immediately proceeding the “R” cue.

Mark Earliest

The {Earliest} command can be used with {Mark} to mark the channel into the cue after the last intensity moved from a nonzero level to 0. The mark is stored and behaves exactly as if you had typed the cue number instead of {Earliest}. This works in blind, or in live if you record afterwards.

For Example:

Cue 2 moves the intensity for channel 1 to 0, Cue 3 thru 4 have no intensity for channel 1, and Cue 5 has the intensity move to full. From Cue 5:

- [1] (Mark) {Earliest} [Enter]
  This will work the same as [1] (Mark) [Cue] [3] [Enter], and will mark from cue 3 to cue 5.

Note:

[Mark] {Earliest} will mark through block cues or blocked intensity moves of 0, until it finds the earliest intensity move to 0. If the cue immediately before the cue being marked is the earliest intensity move to 0, it will mark in that cue.

{Earliest M} will mark to the earliest cue that already has a mark flag. If a mark cue doesn't exist, {Earliest M} will behave like {Earliest} and will mark to the earliest possible cue.
Mark Symbols
The symbols that appear in the Mark flag include:

Live

• MK ................ Indicates the channel is marked for a later cue. The cue number is indicated in the other categories (see “Q” below).

• Q .................. Found in the non-intensity categories of a marked channel. The “Q” is followed by a number indicating which cue the mark is in preparation for.

• M .................. Indicates a mark is placed, but manual, and must be stored. Is blue when stored. “m” indicates cue is not marking.

Playback Status Display

• D .................. AutoMark is disabled.

• M or m ............ Indicates a marked cue. “M” indicates an AutoMark or a reference mark that is used by a subsequent cue. “m” indicates a reference mark that is currently unused by any subsequent cue. Found in the “Flags” area.

• R .................. Indicates the source cue which refers back to an earlier mark. Found in the cue display “Flags” area.

• + .................. Indicates a cue is both a marking and reference cue when displayed in the mark flag.

• - .................. Indicates a dark move, a cue that has any non-intensity parameters moving on channels whose intensity is at 0.

• x .................. Indicates that a mark has been placed, but the mark has been broken. If possible, Ion will AutoMark the lights.
Reference Marks and Timing

Movement of non-intensity parameters in conjunction with a mark will adhere to the following timing rules.

If discrete timing is used for non-intensity parameters:

When channels execute a mark, the moves will use the discrete time(s) assigned to them in the source cue.

For Example:

A mark is applied to Cue 5, making it the marked cue.

- [Cue] [5] [Mark] [Enter]

Later, channels 1-10 are assigned discrete timing and a mark instruction:

- [1] [Thru] [1] [0] [Focus] [Time] [8] [Mark] [Enter]

Then, those channels are recorded into Cue 10:

- [Record] <Cue> [1] [0] [Enter]

In this instance, when Cue 5 is executed, channels 1-10 will perform their focus parameter moves in 8 seconds, as specified in Cue 10 (the source cue, which is the source of their move instruction).

If no discrete timing is used for non-intensity parameters or mark time is disabled:

When channels execute a mark, the moves will use the time recorded in the marked cue.

For Example:

Cue 5 is recorded with a time of 10 seconds.

- [Record] <Cue> [5] [Time] [1] [0] [Enter]

A mark is applied to Cue 5 as above.

- [Cue] [5] [Mark] [Enter]

Later, channels 1-10 are assigned a mark instruction and then recorded into Cue 10 with no discrete timing:

- [1] [Thru] [1] [0] [Mark] [Enter]
- [Record] <Cue> [1] [0] [Enter]

When Cue 5 is executed, channels 1-10 will perform their non-intensity parameter changes in 10 seconds, as specified in Cue 5 (the marked cue).

Marked cues that are played out of sequence will fade to their marks immediately. When firing a cue that has a linked cue, the cue will mark like the linked cue is the next cue. The marks will fade using the active cue’s timing.

Mark Time

Mark time is a setup option (Setup > Show > Show Settings > Mark Time) which allows you to set the time that mark instructions will use. When (Mark Time) is disabled, which is the default, mark instructions will use cue timing unless overridden with discrete timing. When you enter a mark time in setup, all NPs that mark (either through referenced marking or AutoMark) will use this time. The only way to override setup mark time is to use discrete timing. Clearing the (Mark Time) field sets it back to disabled. Select (Mark Time) and hit [Enter] to disable the default mark time.
Chapter 13
Using Filters

Filters are used to determine which parameters can be stored to cues, palettes, and presets. The filter selection tool in the CIA affects record operations as long as the filters are set.

This chapter contains the following sections:

- Record Filters .................................................. 200
- Storing Data with Record Filters ......................... 201
Record Filters

Record filters are used to select specific parameter data to store to record targets. When no filters are selected, all parameters can be stored, as appropriate to the [Record], [Record Only] and selective record action used.

**Note:**
When storing show data, applied filters are highlighted and allow the associated parameters to be stored in record targets.
When filters are deselected (not highlighted), they prohibit storing the associated parameters.
There is no difference between having all filters selected and having no filters selected (default). In either state, all parameters are available for recording.

Record filters are applied from the CIA using the following buttons:

![](image)

The parameter category buttons can be used to select filters, as follows:

- Intensity (enables recording intensity data)
- Focus (enables recording pan and tilt)
- Color (enables recording color data)
- Beam (enables recording all beam data)

**To apply record filters by category:**

Step 1: Click *(Filters)* in the top-right corner of the parameter grid in the CIA. The parameter buttons change to display filter selection.

Step 2: Click the parameter category button *(Intensity/Focus/Color/Beam)* for the category you want to include in the record target. All parameters in that category will be highlighted and "Filter On" will appear above the softkey.

Step 3: Click *(Filters)*. The buttons return to their normal appearance.

In subsequent record functions, only the filtered categories will be recorded. You may apply multiple category filters at once. Remember that applying all filters and no filters yields the same effect.
Partial Filters

If you do not want an entire category to be recorded, you may apply parameter specific filters (partial filters) instead.

To apply partial filters:

Step 1: Click [Filters] in the top-right corner of the parameter grid in the CIA. The parameter buttons change to display filter selection.

Step 2: Click the parameter button (for example [Zoom]) for the parameter you want to include in the record target. That parameter will be highlighted and "Filter On" will appear above the softkey.

Step 3: Click [Filters]. The buttons return to their normal appearance.

In subsequent record functions, only the filtered parameters will be recorded. You may apply as many partial filters at once, as you wish. Any unfiltered parameters will not be included in record actions. In live, unfiltered parameter data is displayed in its proper color, but a grey "n" (indicating null data) will appear in the upper right corner of the parameter’s field.

Removing Filters

Applying filters is a toggle state. To remove any filter, simply repeat the application process described above. When pressed again, any applied filter will be removed.

To remove all filters at once:

Step 1: Press and hold [Filters]. The parameter buttons change to display filter selection. [Clear Filters] appears in the upper left corner of the parameter buttons.

Step 2: Press [Clear Filters]. Any applied filters will be removed and the highlights will turn off.

Step 3: Release [Filters]. The buttons return to their normal appearance. All parameters are now available to record functions.

Storing Data with Record Filters

If a record target is stored with filters in place, the filters allow only associated parameter data to be recorded in the target. Non-filtered data is not included when you record.

The various record targets are affected by filters in the following ways:

- **Palettes** - Palettes by definition are already filtered. The color and beam filters can be used to further modify what is stored in the color and beam palettes, however.

- **Presets** - Active filter settings impact what is stored in presets.

- **Cues** - Active filter settings impact what is stored in cues, even when using "record only" commands.

- **[Recall From]** - Recall from instructions are not affected by the filters.
# Chapter 14

## Working with Multiple Cue Lists

Ion provides many useful tools to allow you work efficiently and simultaneously with multiple cue lists. This chapter focuses on the features and methods used when working with more than one cue list.

This chapter contains the following sections:

- **Recording to a New Cue List** .......................... 204
- **Using Assert** ............................................. 204
- **Changing the Active Cue List** .......................... 206
- **Using [Go To Cue] with Multiple Cue Lists** .......... 207
- **Using the Cue List Index** ............................... 208
Recording to a New Cue List

When recording cues, cue list 1 is initially used as the default cue list. Cue list 1 is displayed with only the cue number. It does not have a lead cue list number or a "/". To record to another cue list, that list must be specified. Cues will then be recorded to that cue list until another list is specified, or until the selected cue is changed in live.

You may record up to 999 cue lists in an Ion show file.

The cue list that you are storing to is always determined by the selected cue, unless you specify a different cue list. The selected cue is displayed just above the command line on the CIA, and at the bottom of the live/blind screen.

The selected cue is the last cue that you affected in live. This includes a record, an update or a playback action such as [Go], [Back], or a [Go To Cue] instruction, or simply changing the timing on a cue. It is very useful to keep an eye on the selected cue. Pressing [Live] will resync to the active cue.

Using Record

[Record] will record all parameters of any channels that have non-default values to a specified cue.

To record to a new cue list, press:

- \[Record\] <Cue> [2] [/] [5] [Enter] - this will create cue list 2 and will record the data to cue 5 in that cue list.

Any cues recorded after this will automatically record to cue list 2 until another cue list is specified or the selected cue changes the cue list number.

Using Record Only

[Record Only] can be used to create a new cue list instead of [Record]. [Record Only] stores only manual data to the specified cue.

To record to a new cue list press:

- \[Record Only\] <Cue> [2] [/] [5] [Enter] - this will create cue list 2 and will record all manual data to cue 5 in that cue list.

The cue list display will change to show only data from cue list 2. Any cues recorded after this will automatically record to cue list 2 until another cue list is specified or the selected cue changes the cue list.

Make Manual

This softkey can be used to convert live cue or submaster data into manual values, allowing them to be included in the [Record Only] operation. Therefore data from other cues or lists can be selectively converted to manual data and then stored to another cue/list using [Record Only].

For more information on [Make Manual], see Using [Make Manual], page 231.

Using Assert

By default, channel parameters only respond to move instructions during playback (see Cue List Ownership, page 6). The [Assert] function allows tracked or blocked data from a cue to be replayed, even when another cue list has taken control of that channel or parameter.

Assert can be applied to cues, cue parts, channels, channel parameters, or to entire cue lists.

Asserted channels will play back their tracked and blocked values, regardless of cue list ownership, when the associated cue is replayed.
At a Cue Level

When applied at a cue level, [Assert] ensures that all data in the cue - both moves and tracks - will be played back at their stored values.

To place an assert on a cue press:

- [Cue] [x] [/] [y] [Assert] [Enter] - the cue will assert all of its channels upon playback. An “A” will be displayed in the “A” column of the cue attributes (cue index, playback status, and so on); indicating the cue has been asserted.

Assert can also be used from the command line to manually replay portions of a cue without having to replay the entire cue. Assert in this mode can only be used with cues that are currently active.

To place an assert on a portion of a cue:

- [Group] [6] [Assert] [Cue] [4] [Enter] - asserts the instructions for the channels in group 6 in cue 4.

This would then need to be stored using either [Record] or [Update].

At a Cue List Level

When applied at the cue list level, [Assert] ensures that all values in all cues in that list are asserted on playback. When a cue list has been asserted, the playback status display will show an ‘A’ in the assert column for every cue in that list.

To place an assert on a cue list:

- [Cue] [x] [/] {Assert} [Enter]

At a Channel Level

When applied at a channel or parameter level, assert ensures that the entire channel or the specified parameter will be played back at its stored value.

To place an assert on a channel or group of channels:

1. [select channels] [Assert] [Enter] - a red “A” will appear next to all of the channels’ parameters in the live/blind display. This indicates the assert is placed, but not yet recorded to a cue.

2. [Record] <Cue> [x] [Enter] - the red “A” turns to blue in the live/blind display, indicating the assert has been recorded. In the cue x row of the playback status display or the cue list index, a lower case ‘a’ appears in the “A” column, indicating that a partial assert is included in cue x.

You may also store this assert using [Update] or you can apply it in blind.

To place an assert on specific parameters:

1. [select channels] [Intensity/Color/Focus/Beam or parameter buttons] [Assert] [Enter] - places an assert on the specific parameters of the selected channels.

2. [Record] <Cue> [x] [Enter] - the assert is recorded to cue x. In the cue x row of the playback status display or cue list index, a lower case “a” appears in the “A” column, indicating that a partial assert is included in cue x.

Assert is a very useful tool allowing channels that have been seized by other cue lists to be repossessed by the associated cue list, while still allowing the asserted channel data to be treated as tracked instructions.
Using AllFade

Allfade is a cue attribute that commands any intensity values on stage that are not provided by the associated cue to fade to zero intensity when the cue is played. The allfade will adhere to the downfade time of the associated cue.

This is useful in conjunction with assert, so you can regain control of channels from other cue lists and fade other channels from that cue list out.

To assign an allfade to a cue:

- \[\text{Record} \ <\text{Cue}> \ [n/m] \ [Allfade] \ [Enter]\] - records cue n/m as an allfade cue, thereby forcing any channels not in the cue to fade to zero on playback.

Like many other cue attributes, allfade is a toggle state. To remove the allfade flag, specify the cue and press \[\text{Allfade} \ [Enter]\].

Changing the Active Cue List

The active cue list will be displayed in detail on the playback status display. This view is changed by the following actions:

- Recalling another cue list in the command line - \[\text{Cue} \ [3] \ [Enter]\]
- Recording a cue to another cue list - \[\text{Record} \ <\text{Cue}> \ [3] \ [8] \ [Enter]\]
- Playing back a cue from the fader of another cue list - press \[\text{Go}\] for the associated fader.

Note: Channels with tracked values in the associated cue will not fade out in response to an allfade. These tracked values are part of the associated cue and therefore will be played back.

Note: The split Playback Status Display allows detail for two cue lists. Both or either of these can be locked. See “Split Playback Status Display” on page 43.

Note: For information on using out of sequence sync, see Using External Links, page 178.
Using [Go To Cue] with Multiple Cue Lists

[Go To Cue] defaults to the currently selected cue list. [Go to Cue] is a live function. It can not be used to change cues in blind. [Go to Cue] instructions can be executed from any operating mode, without returning to live.

By default, a Go to Cue instruction is an out-of-sequence cue and will follow the rules of such (see Out-of-Sequence Cues, page 218).

For examples of how to use [Go To Cue] in playback, please see Go To Cue, page 218.

Using Go To Cue 0

[Go To Cue] [0] is a command line instruction that resets all intensity values not owned by another fader to default, including any manual values that are not an override to another active fader value.

[Go To Cue] [0] [Enter] also resets the selected cue list to the top of the list, with the first cue pending.

To [Go To Cue] [0] on another cue list, press:

• [Go To Cue] [2] [/] [0] [Enter]

Note: Ion has an added intensity parameter for LED fixtures, that by manufacturer default, have only RGB parameters but no intensity parameter. With this added control, the LED fixture will respond to the [Go To Cue] [0] command.

Captured channels, independent values and values from other faders running a different cue list are not affected by a [Go To Cue] [0] command.

When [Go To Cue] [0] is executed, any intensity values owned by the associated cue will fade out, while all non-intensity parameters remain in the current state. A [Go To Cue] [0] instruction does not impact the input from other programmers using partitioned control, unless the channels or parameters are shared.

[Go To Cue] [0] & [Load]

You can use [Go To Cue] [0] in conjunction with a fader load button to send a specific cue list to cue 0. This action does not use the command line. On the desired fader, simply press:

• [Go To Cue] [0] & [Load]

Using Go To Cue Out

To reset all parameters to their default state (unless they are controlled by a submaster) and reset all cue lists that are loaded to faders so that the first cue of each list is pending, press:

• [Go To Cue] [Out] [Enter]
Using the Cue List Index

The cue list index is a blind display list which shows the cue list you are working with, the cue status, any other stored cue lists and what (if any) faders the lists are loaded onto. All cue attributes can be edited from the list including whether the cue list is set to independent or not, and if the intensity values in the cue list will play back as HTP or LTP. Cue attributes can be changed in live or blind, but independent, background, and HTP/LTP settings can only be set in the cue list index.

Open the Cue List Index

You can access the cue list index by pressing [Cue] [Cue], or you can navigate within the browser to Record Target Lists > Cue List Index and press [Select].

The top half of the cue list index displays all stored cues, including cue attributes, for the selected cue list. The bottom half of the cue list index displays all stored cue lists. The selected cue list is highlighted.

Using the mouse, you can move the barrier between the stored cue display (top) and the stored list display (bottom) to increase or decrease the viewing area of either section. Hover the mouse arrow over the list boundary until it changes to the familiar “move boundary” icon. Then click and drag the boundary up or down to the desired height.
Cue List Attributes

Cue list attributes determine how the cue list will interact with other playbacks. Cue list attributes include:

- The cue list number
- The cue list label
- Fader type (Proportional, Manual Master, or Intensity Master)
- Independent (default is not enabled)
- Intensity HTP or LTP setting (default is LTP)
- Assert
- Background
- External Links

When a cue list is loaded to a fader, all attributes of that cue list are in effect. When a new cue list is loaded, the attributes of that cue list are in effect, and any manually set behavior of the fader (such as filter states, timing disable, etc.) are maintained.

When the cue list index is in focus, the following softkeys are available for editing the cue list: {HTP/LTP}, (Independent), (Solo Mode), (Fader), (Edit), (Background), and (Execute).

HTP/LTP

The {HTP/LTP} softkey is a toggle state between LTP (latest takes precedence) and HTP (highest takes precedence). For more information on HTP/LTP see HTP vs. LTP, page 7.

All parameters other than intensity are LTP.

Intensity, by default, is also LTP. Cue lists can be set with an HTP intensity override. When a cue list is set to HTP, intensity values provided by that cue list will override the LTP value (of which there can be only one), provided the HTP instruction is higher than the LTP value. When a cue from an HTP cue list is executed, Ion determines if the intensity value when the cue is complete will be higher than the current setting. If so, the intensity will begin to fade from its current value to the required value in the incoming cue using the cue’s upfade time.

Note that this behavior is relevant only to cues. If a submaster is going to provide a higher level, Ion will wait until the value is matched before assuming control of the intensity.

The following example illustrates the use of the {HTP/LTP} softkey in the cue list index:

- `<Cue> [1] [/] {LTP/HTP} [Enter]` - toggles the selected cue list between HTP/LTP behavior.

Independent

The {Independent} softkey sets a cue list to independent. Any channel parameters currently under the control of an independent playback cannot be changed by other non-independent playbacks or submasters. Independent status is equally shared between other independent cue lists and submasters.

The following example illustrates the use of the {Independent} softkey in the cue list index:

- `<Cue> [2] [/] {Independent} [Enter]` - toggles the selected cue list between non-independent and independent mode.
Solo Mode

The **Solo Mode** softkey is useful in multiple programmer situations. **Solo Mode** is used to pull a cue list out after it has been synced with other lists for editing purposes.

**For Example:**

Cue List 1 is being used by one programmer and Cue List 2 was programmed by a second programmer. For the run of the show, the lists are synced so they run together. But if changes need to be made to Cue List 2 and not be affected by the playback of Cue List 1, **Solo Mode** can be used.

- **[Cue] [2] [I] {Solo Mode} [Enter]** - places Cue List 2 into solo mode.

**Solo Mode** is a toggle state. So if Cue List 2 is already in solo mode, and **[Cue] [2] [I] {Solo Mode} [Enter]** is used again, that list will no longer be in solo mode.

Fader type

Faders can be set as Proportional, Manual Master, or Intensity Master (I-Master). This affects how cues are recalled and modified. See "Proportional vs. Intensity Master" on page 259. See "Manual Master Cue Lists" on page 226.

Proportional faders, when the slider is set to zero prior to the execution of a cue, will withhold playback of intensity data until the slider is raised. Intensity data will then be played back proportionally according to the level of the fader. Once the slider reaches full, the cue is considered complete and the cue is released from the manual fader. If the slider is at any value other than zero when the cue is executed, intensity values will play back normally. If the slider is returned toward zero, intensity in the cue will face to the previous level.

Faders set as Intensity Masters will master the intensity level for cues during playback. Therefore, intensity masters set below 100% will proportionally limit playback of intensity data relative to the level that the slider is set. All non-intensity parameters are unaffected by the slider. Once the slider has reached full, control of intensity is retained. If the slider is moved toward zero, intensity will proportionally fade toward zero (not the previous state as per proportional faders).

**For Example:**

The playback fader for cue list 1 is an intensity master and the slider is set at 50%.

When a cue is played back on this fader, intensity values will raise to 50% of their final values and then stop. As the intensity master is raised/lowered, intensities will increase/decrease accordingly. Once the slider has reached full, control of intensity is retained.

Background

The **Background** softkey is a toggle state for enabling/disabling the background state of a cue list. Background states are enabled by default. When enabled, the content of the cue list will act as a background or previous state for other cues and submasters. When a cue list has its background state disabled, a “D” will display in the Cue List Index background column.

Edit

The **Edit** softkey opens a blind channel view of the selected cue and changes focus from the cue list index. You can change the blind display to spreadsheet or table view by pressing the **Format** key. You can edit any of the cue attributes for the cue selected in the index, but the cue contents must be edited in the blind display. See "Recording and Editing Cues from Blind" on page 186.
Chapter 15
Multipart Cues

Cues can be divided into up to 20 parts. This chapter describes the methods used to create and edit multipart cues.

This chapter contains the following sections:

- About Multipart Cues .................................................. 212
- Record a Multipart Cue in Live .............................. 212
- Storing a Multipart Cue in Blind .............................. 214
About Multipart Cues

Cues can be divided into up to 20 parts. Each part can have its own channels or parameters, levels and timing information. Multipart cues can be stored in live or blind using the same conventions to record a standard cue.

There are three basic ways to create a multipart cue. You can build a multipart cue part-by-part in live, you can break an existing cue into multipart cues in live, or you can break an existing cue apart in blind.

A channel or parameter can only be provided an instruction once in a multipart cue. For example, it isn't possible to adjust color for channel 1 in Cue 1 Part 1 and then also provide a different instruction for channel 1 color in Cue 1 Part 8.

Default part timing is drawn from the cue level timing defaults established in Setup; you may also assign discrete timing to channels in each part as you would for a single part cue.

Record a Multipart Cue in Live

Storing a multipart cue in live is accomplished in similar fashion to storing a single part cue. However, rather than storing the entire cue, you select and store just the channels that you want in each part.

Please note that there are a variety of different ways and different orders to go about creating a multipart cue. The following examples represent some, but not all, of those ways.

Creating a New Multipart Cue in Live

Build part-by-part

Make desired changes to the stage state. If all of the changes that you have made are to go into a part, press:

- [Record Only] [Cue] [2] [Part] [1] [Enter]

Continue making changes and storing parts as you go.

Build parts from cue end state

In most instances, you will create the end state of the cue and then break it into parts. To do this, you use selective storing commands, as follows:

- [channel or parameter selection] [Record] (or [Record Only]) [n] [Part] [a] [Enter]
- [channel or parameter selection] [Record] (or [Record Only]) [Part] [b] [Enter]

Each part can contain its own cue level timing and other attributes. Follow/Hang, Link and Loop, and Allfade commands can be placed at the cue level only—they cannot be placed on a part. Also, through the channel selection, you can put channel parameters into different parts.

Part 1 of any multipart cue is where all unassigned move instructions will reside. Therefore, if the body of the cue (which is the normal behavior) is to be in part 1, you can simply select the channel or parameter list that you wish to place in parts 2 and higher.
Setting Multipart Cue Attributes

Cue attributes, such as [Time], [Delay], [Block], [Assert], [Label], [Rate], [Mark], and (AutoMark Off) can be assigned in part cues. They are stored and function exactly as they do in single part cues.

Cue part attributes can be defined as the parts are recorded, or they can be added after the part has been created. For example:

• [Record] [Cue] [2] [Part] [1] [Delay] [8] [Enter]
• [Cue] [4] [Part] [3] [Color] [Time] [6] [Enter]
• [Cue] [8] [Part] [9] [AutoMark Off] [Enter]
• [Record Only] [Cue] [5] [Part] [2] [Assert] [Enter]

For more on cue attributes, see Assigning Cue Attributes, page 173.

Using Update in Live

Updating a multipart cue is generally the same process as updating a single part cue, except you will provide a specific part cue number in the update command.

Various referenced data, such as palettes or presets, can be assigned to build a multipart cue. If you have made changes to referenced data within a multipart cue, thereby creating manual data, pressing [Update] [Enter] updates both the multipart cue and any referenced data with the new levels, as it does with single part cues.

You can update a part of a multipart cue with only selected parameters as well.

For Example:

Assume you have written cue 1, which is a multipart cue and is active. Part 2 includes channels 1 through 5 referencing intensity palette 2 which is set at 25%. Select channels 1 through 5 and change the intensity value to 21%. The data in live will indicate the new levels in red, and an “R” is displayed to indicate the reference has been broken.

To update cue 1 part 2, including the new intensity levels, breaking the reference to the intensity palette, press:

• [1] [Thru] [5] [Make Absolute] [Enter]
• [Update] <Cue> <1> <Part> [2] [Enter]

To update cue 1 part 2 and the referenced palette with the new levels:

• [1] [Thru] [5] [Intensity] [Update] <Cue> <1> <Part> [2] [Enter]

For Example:

When cue 2 is active, select channels 1 through 5 and set new levels for the color scrollers. Update only part 4 of the multipart cue 2 with the new scroller levels.

• [1] [Thru] [5] [Scroller] [Update] <Part> [4] [Enter]
Storing a Multipart Cue in Blind

**Note:** Edits in blind take effect immediately, they do not require a [Record] or [Update] command.

### Changing a Single Part Cue to a Multipart Cue

When working in blind, more often than not you will be breaking a single part cue into a multipart cue. It is quite possible to create a new cue in blind and follow the exact same process, except in addition to pulling channel parameters into parts, you will also be providing them with move instructions or block commands. It is worth noting that tracked instructions do not belong to any specific part of a multipart cue.

Select the cue you wish to break apart and specify the first part you wish to create. Part 1 is generally where the body of the cue resides. Therefore, if you specify any part other than part 1, all of the move instructions in the cue are placed in part 1.

Begin by selecting any channels that you wish to move into some part other than part 1.

- [1] [Thru] [5] [Part] [2] [Enter]
- [6] [Thru] [1] [0] (Intensity) [Part] [3] [Enter]
- [6] [Thru] [1] [0] (Color) [Part] [4] [Enter] - and so on.

As you create each part, that part is now selected. It is possible to select the channel parameter you want and press [Part] [Enter] to pull that data into the selected part.

**Note:** When breaking a cue into a multipart cue in blind, the [Part] button is a required instruction. Channel selection will not automatically assign a channel into a part. Use of the [Part] key allows you to add only specific channel parameters to the part. For example:

- [5] [Thru] [9] (Color) [Part] [Enter]

### Changing a Multipart Cue to a Standard Cue

To change a multipart cue to a standard cue, delete all of the parts of the cue.

*For Example:*

Cue 4 is a 3 part cue that include channels 1 through 20. To change cue 4 back to a standard single cue:

- [Delete] [Part] [1] [Thru] [3] [Enter]

### Deleting a Part from a Multipart Cue

When you delete parts of a multipart cue, any move instructions in the deleted part are moved to the first available part. If you want to delete move instructions out of a cue part, you have to select the channels and [At] [Enter] or null them.

- [Delete] <Cue> [1] [Part] [1] [Enter] [Enter]
- [Delete] <Cue> [6] [Part] [1] [Cue Only/Track] [Enter] [Enter]
- [Delete] [Part] [1] [+] [2] [Enter] [Enter]
- [Delete] [Part] [1] [Thru] [3] [Enter] [Enter]
Ion has many features that aid in cue playback. The playback section is located on the left side of
the console and includes the master fader pair, grandmaster, load button, and the fader control
button. Virtual faders (see Fader Module, page 25) and the fader wings can also be used in
playback.

This chapter contains the following sections:

- *Introduction to Playback* .......................... 216
- *Selected Cue* ........................................ 217
- *Out-of-Sequence Cues* ............................... 218
- *Assigning Faders* ..................................... 220
- *Changing Fader Pages* ............................... 220
- *Playback Fader Controls* ......................... 221
- *Manual Master Cue Lists* .......................... 226
**Introduction to Playback**

Cues may be played back using the master playback fader pair. While any cue list can be loaded to these faders, the first cue list you record to will automatically load to the master fader pair.

The master playback fader pair is located to the left of the control keypad. The master is a split cross-fader pair. The two buttons beneath the master fader pair are [Go] and [Stop/Back]. The [Load] button is located directly above the fader pair and the area of the LCD above it corresponds as well, displaying the current cue and list active on the master fader.

For information about using the Universal Fader Wings, see *Universal Fader Wings, page 389.*

**Playback Controls**

![Diagram showing master fader pair and buttons](image-url)
Selected Cue
The selected cue is always indicated just above the CIA. The selected cue and all of its attributes are displayed near the bottom of the live/blind display and on the playback status display.

Live / Blind
When working in live, the selected cue is always the last cue you recorded, edited, updated or played back. When entering blind for cues, the selected cue will be selected and displayed. Changing the selected cue in blind will cause the playback status display to change as well, unless preserve blind cue has been enabled in Setup, allowing you to see all the attributes of the cues surrounding the selected cue. When you return to live, the selected cue is synchronized to the currently active cue.

When in Live or Blind, if you press [Live] or [Blind] respectively, the selected cue will set to the last executed cue. This cue will appear on the command line.

The attributes of the selected cue (such as timing, attributes, label and external links) are shown at the bottom of the live/blind display, below the command line.

In Live
To load a new cue to the faders, select the cue on the command line and then press [Load]. When the [Go] button is pressed, the activated cue will be the selected cue.

For Example:
Assume cue list 1 is currently loaded to the master fader pair. To load cue 2/1:

• [Cue] [2] [/] [1] [Load]

Cue 2/1 will load to the pending file of the master fader pair.

In this example, the last cue executed from cue list 1 is still the active cue, while cue 2/1 is pending. When [Go] is pressed, 2/1 will be executed.

You can also load cue list 2 by pressing [2] [/] [Load]. This will load the first cue of list 2 into pending.

The selected cue is changed by go, record, or update instructions as well as cue modification or selecting a cue on the command line. When you execute a cue that has a follow or hang time, the next cue will become the selected cue when activated.

In Blind
While in blind, changing the selected cue will change the playback status display to show information surrounding that cue.

CAUTION: When editing in blind, changes to cues are automatic, therefore no update or record command is required.

While working in blind mode, cues can be executed in live using [Go], [Back], and [Go to Cue], but this does not change the cue you are working with in blind.
Out-of-Sequence Cues

An out-of-sequence cue is any cue that is played back in one of the following ways:

- Cue is executed using a [Go To Cue] command.
- Cue is executed by a link instruction.
- Cue is loaded into a fader’s pending file.
- Cue is re-executed using [Assert] & [Load] or is asserted from the command line.

Generally, when an out-of-sequence cue is executed, the entire contents of the cue will be played back (move instructions and tracked values).

**For Example:**

Cue 1 sets channel 1 to full. That value is tracked forward until cue 10. The programmer plays back cue 1 on fader 1. Then the programmer sets channel 1’s intensity to 50% manually. If she executes cue 2, channel 1 remains at 50%, as it is a channel parameter that is not receiving a move instruction from the incoming cue.

However, if she presses [Go to Cue] [5] [Enter] (an out-of-sequence execution), even though the value for channel 1 in Cue 5 is a tracked value, channel 1 will fade from the manual value of 50%, to full in the Go-to-cue time.

**Go To Cue**

[Go to Cue] instructions can be executed from any operating mode. By default, a [Go to Cue] instruction is an out-of-sequence cue and will follow the rules of such (see Out-of-Sequence Cues above).

Following are examples of [Go To Cue]:

- [Go To Cue] [5] [Enter] - all parameters with values in cue 5 are faded to those values, even if they are tracked.
- [Go to Cue] [6] [At] [5] [Enter] - takes you to cue 6 at 50% of its fade completion. Hitting [Go] would finish the cue.
- [Go To Cue] [Next] [Enter] - takes you to the next cue in the active list.
- [Go To Cue] [Last] [Enter] - takes you to the previous cue in the active list.

When a [Go To Cue] instruction is executed, any null states applied with [Make Null] are removed. To maintain the make null setting, you should use [Capture] for the required channels.

**Go To Cue Timing**

[Go To Cue] uses go-to-cue timing established in Setup, page 95. You can use a [Go To Cue] instruction with different timing options as follows:

- [Go To Cue] [2] [Time] [1] [Enter] - this command would take you to cue 2 in 1 second.
- [Go To Cue] [3] [Time] [4] [Enter] - this command would take you to cue 3 and all upfades and NP moves would have a time of 4 seconds and downfades of 3.
- [Go To Cue] [Next] [Time] [3] [Enter] - this command would take you to the next cue in the selected list in three seconds.
- [Go To Cue] [Last] [Time] [2] [Enter] - this command would take you to the previous cue in the selected list in two seconds.
- [Go To Cue] [8] [Time] [Enter] - this command would take you to cue 8 using all timing values stored in cue 8.
Other Go To Cue options

When [Go to Cue] is pressed, the softkeys in the CIA are changed to provide Go to Cue modifiers to enhance your playback ability.

From these softkeys, you can specify that when going to a cue, only some elements of that cue will be played back. Specifically you can choose to play back:

- single parameter channels only (conventionals),
  - [GoTo Cue] [1] {SingleParam} [Enter]
- multiple parameter channels only (moving lights),
  - [GoTo Cue] [2] {MultiParam} [Enter]
- move instructions only,
  - [GoTo Cue] [3] {MovesOnly} [Enter]
- use marks,
  - [GoTo Cue] [5] {Use Marks} [Enter]
- or you can choose play back a cue and withhold any link (follow, hang, execute instructions) it may contain.
  - [GoTo Cue] [4] {MinusLinks} [Enter]
- sets up the selected cue for manual control using a fader
  - [Go to Cue] [6] [Time] {Manual} [Enter]

These can be combined within the command line as well:

- [Go To Cue] [1] {MultiParam} {MovesOnly} [Enter]
  - [Go To Cue] [4] {Complete} [Enter] will go to cue 4 and if that cue has a follow/hang, any following cues in the sequence will also fire. This may look like you are going straight to the last cue in the sequence, but each cue will fire to make sure that any external links are fired.
  - [Go To Cue] [2] [At] [5][0] {Complete} [Enter] will go to cue 2 at 50% of its completion.
  - Cue lists other than the currently selected one can be homed as well by using the syntax, [Go to Cue] [x] [/] [Home] [Enter]. For example, [Go to Cue] [2] [/] [Home] [Enter] would execute the first cue of list 2.
  - [Go to Cue] [x] [/] [Out] [Enter] allows you to use the [Go to Cue] [Out] command on a list specific basis. [Go to Cue] [Out] continues to affect all active cue lists.

**Note:** [Go to Cue] [x] [/] [Out] is similar to [Go to Cue] [x] [/] [0] [Out] except that any NPs on the fader will fade to their home level.

[Go to Cue] [5] [Time] [Enter] will go to cue 5 using cue times, and also uses any associated follow/hang times to automatically trigger the subsequent cue. To go to a cue in cue time, but not trigger the follow/hang, you would use [Go to Cue] [5] {Minus Links} [Time] [Enter].

**Note:** If you want to specify a time or use the cue time, the [Time] command must always be entered after any other commands, such as {Minus Links} or {SingleParam}. The exception to this rule is {Manual}. ---
Slider Module

You can have access to multiple cue lists at once by using the virtual faders (see Fader Module, page 25) or fader wings. This will give you the ability to run multiple cue lists or submasters from multiple faders at the same time.

Assigning Faders

Playbacks and submasters can be defined on the fader pages in setup (see Setup, Fader Configuration, page 96). The location of playbacks and submasters can also be mapped live as the contents of those targets are stored. Grandmasters must be defined in setup.

If a fader is an empty playback, an empty submaster, or is unmapped, a cue can be loaded to that location by selecting the cue from the command line and clicking the associated [Load] key. On the fader wings, the load function is accessed by pressing both buttons associated with the fader. The fader will then be automatically assigned as a playback, using the lowest unused playback number.

Once a cue list is loaded to a fader, storing to that cue list automatically plays the cue back on the appropriate fader, when auto playback on record is enabled in Setup.

When a cue list is loaded to a playback, all cue attributes of that cue list are in effect. When a new cue list is loaded, any fader attributes that can be set as direct action from the facepanel (such as filters, timing disable, etc.) are maintained. Loading a new cue does not change the manual fader attributes.

With Auto Playback Enabled

“Auto Playback” is a record function enabled in setup (Setup, page 96), that automatically executes cues recorded in live on playback faders. When the cue is executed on the playback fader, any manual parameters involved in the record operation are automatically released to the cue and all other values stored in the cue are owned by that cue.

When the first cue is stored on Ion, that cue automatically loads on the master fader.

Assigning Playback Faders Manually

To load a new cue into the pending file of a playback fader, when “Auto Playback” is disabled in setup or when you want to move a cue list to a different fader, first place that cue or list number on the command line, press [Enter], then click or press the associated [Load] button for the destination playback fader.

- [Cue] [4] [Load] - changes the selected cue and loads it to the associated fader. This action assumes cue 4 is from the same cue list as is currently selected.
- [Cue] [3] [] [Load] - changes the selected cue list and loads cue list 3 to the associated fader.

Changing Fader Pages

Ion has 30 pages of ten faders each. When using virtual faders, you can page through the 30 available pages of faders by clicking the desired page in the virtual fader display. Click the arrow buttons to advance through the page number buttons until you find the desired page. When using fader wings, holding down [Fader Page] and bump buttons 1-30 (if available) will change to the appropriate page.
Playback Fader Controls

In Ion, many of the buttons mentioned below exist as softkeys. In order to have access to some of these keys, press [Fader Control]. The softkeys will change to display the fader control keys. You may press [More SK] if the green LED is illuminated, to view additional fader control buttons.

Go and Stop/Back

Using [Go]

The [Go] button is used to execute the cue currently in the pending file of the associated fader. When [Go] is pressed, all parameters assume their required positions in the recorded times, unless they have been recorded with manual timing.

Using [Stop/Back]

All fader activity can be instantly stopped mid-transition by pressing the [Stop/Back] button for the required fader. To resume the cue, press the [Go] button. To fade to the previous cue on that fader, using default “back” timing, press the [Stop/Back] button again from this state.

When a cue on the playback fader is complete, pressing [Stop/Back] will step backwards sequentially through the cue list from that point. [Stop/Back] uses default back time as established in Setup. See “Cue Settings” on page 99. Or you can back into the previous cue using specific timing by pressing:

• [Go to Cue] [Last] [Time] [n] [Enter].

Using Blackout

It is possible to blackout a physical fader that is assigned as a grandmaster by pressing the fader’s [Go] & [Stop/Back] buttons at the same time. Pressing [Go] & [Stop/Back] again will exit blackout.

[Go To Cue] [0]

You can use the [Go To Cue] [0] button, located with the playback controls, in conjunction with a fader load button, to send a specific cue list to cue 0. This action does not use the command line. To do this:

Step 1: Press [Fader Controls]
Step 2: If necessary, press [More SK] until (Go ToQ 0) is visible in the LCD.
Step 3: Press and release {Go To Cue 0}.
Step 4: Press or click [Load] for the desired fader. The cue list will go to cue 0.

For more information on this action, see Using Go To Cue 0, page 207.
Using Manual Control

There are three types of manual control for playbacks:

- Cues can be stored with manual timing. When cues have stored manual timing, the default behavior of the fader is to control those manual values.
- Cues can be captured for manual intensity control only. This is possible only when the associated cue has no manual timing values.
- Cues can be manually overridden using the [Man Override] & [Load] feature which captures all parameter transitions.

In each of these cases, follow time counts down from [Go]. The hang time will be started when the potentiometer reaches full or when the last parameter reaches its end state from timing, whichever comes last.

Manual Timing Control

Manual timing can be set for any parameter or group of parameters. The potentiometer is then used to control the progress of a transition.

For Example:

Assume the active cue contains an instruction to set color at 5 for channel 1.

The pending cue contains an instruction to set channel 1 to color 12 and the color parameter has a manual time. Press [Go] to activate the cue. Channel 1 color does not change.

As you move the fader up manually, channel 1 color moves proportionally from color 5 to color 12. Any parameters with timing will start their moves at the press of [Go] and be unaffected by the manual control.

To program a channel manual time:

- [1] [Color] [Time] (Manual) [Enter] - assigns a manual time to channel 1. This must be recorded or updated to a cue.

Manual timing can also be set at a cue level:

- [Record] [Cue] [5] [Time] (Manual) [Enter]

Manual timing can also be set at a cue category level:

- [Record] [Cue] [6] [Color] [Time] (Manual) [Enter]
Manual Intensity Override

An intensity transition may be taken over manually and the transition captured by dropping the fader down until it reaches the percentage of cue completion (i.e. if the cue is 50% complete, when the fader is manually dropped to 50%, the intensity transitions will be captured and the intensity portion of the cue completed by moving the fader manually between 50% and full or anywhere in between). If the fader is dropped below 50%, the fader will fade all intensity values proportionally from their captured values to their previous values.

If a fade is captured and the faders are not reset to 100% prior to the next press of the [Go] button, the fader will automatically reset to 100% upon cue execution. Alternatively, you can set the fader to 0% before executing the next cue to capture the cue for manual intensity control when the [Go] button is pressed if the fader is set to proportional control. Intensity control is released from the fader when the cue is considered complete (when the fader is brought back to 100%). If the fader is set as an Intensity Master, the intensity control is maintained, even when the cue has completed.

If a pending cue has any manual control properties, you may either preset the fader to zero or, if it is a virtual fader, the console will automatically set the fader to zero when the [Go] button is pressed. The master fader pair must be manually set.

Manual intensity override is not possible if there is any manual timing in the cue, as the potentiometer is already occupied with that control.

Manual Override

Manual override allows the potentiometer of the associated fader to control all parameters in a transition state on that fader. When [Fader Controls] [Man Override] & [Load] are pressed, all activity on that fader is frozen.

The potentiometer is used to manually complete the cue transition for all parameters. If the fader is operating in a paired mode, the left fader controls the intensity upfade and all non-intensity parameters, while the right fader controls all intensity downfade actions. Manual control override automatically releases when the cue is complete.

A group of faders can be collected for manual override by pressing or clicking [Man Override] & [Load] (continue adding faders by clicking the associated [Load] buttons).
Using Assert (Playback Button)

Use {Assert} & [Load] for the associated fader to re-run the active cue in that fader, following the same rules as [Go To Cue]. Assert can be used to regain control of all cue contents, apply a newly set independent state to the associated fader, or make any changes in blind to an active cue on stage.

When [Fader Controls] (Assert) & [Load] are used together, the entire contents of the cue are replayed. You can assert just certain elements of a cue by using the command line.

Following are some examples of asserting elements of a cue from the command line:

- [channel list] [Assert] [Enter] - asserts the selected channels with values from cue 5. Note that cue 5 must be active for this command to execute.
- [channel list] [Color] [Assign] [Enter] - asserts the color values from cue 1 for the selected channels. Note that cue 1 must be active for this command to execute.
- This would then need to be stored using [Record] or [Update].

Using Timing Disable

The {Time Disable} softkey, used with [Fader Controls] and [Load], causes timing data to be ignored for any cues that are activated on the associated playback fader. When a playback fader is in timing disable mode, you will notice “TD” in the associated fader display.

To release the playback fader from time disable mode, press [Fader Controls] {Time Disable} & [Load] again. You can also cut the next cue in by pressing [Timing Disable] & [Go] or the last cue by pressing [Timing Disable] & [Back].

They will snap from move instruction to the next move instruction in a time of zero.

Using Freeze

{Freeze} can be used to halt all effect activity on any active faders. To activate a freeze for only a specific fader, press [Fader Controls] {Freeze} & [Load].

There are two ways to remove the freeze command:

- Press {Freeze} & [Load] again for the specific faders to unfreeze the activity.
- Press {Assert} & [Load] or [Go] or [Stop/Back] for the specific faders to resume the activity.

You may freeze and unfreeze effects from the command line.

- [Effect] [2] [Fader Controls] {Freeze} [Enter] - to freeze effect 2. Freezing a specific effect is different from stopping an effect. Freeze will stop the effect exactly where it is.
- [Effect] [6] [Thru] [9] [Fader Controls] {Freeze} [Enter] - to freeze a specified range of effects.

When an effect is in freeze mode, you can use the same command to unfreeze:

- [Effect] [2] [Fader Controls] {Freeze} [Enter]
- [Effect] [6] [Thru] [9] [Fader Controls] {Freeze} [Enter]
Using Stop Effect

The **Stop Effect** softkey can be used to stop all effects from operating on any or all faders, or it may be used with the control keypad to stop a specific effect.

- To stop all effects on a fader, press **[Fader Controls]** Stop Effect & **[Load]** of the associated fader.
- To stop a specific effect regardless of the fader it is operating on, press **[Effect]** [2] **[Fader Controls]** Stop Effect **[Enter].**

When an effect is stopped, all impact of the effect is removed and the stage output is as though the effect has never been activated.

Releasing Content From a Fader

There are a few ways to release content from a playback fader:

- **[Fader Control]** Off + **[Load]** - returns control to the background fader, either a cue or a submaster, and stops any effects that are running on that fader. If there is no background value, the intensities will just fade out.

  **Warning:**

  **[Off]** + **[Load]** can only edit off the cue, and is not recommended when using [Go to Cue] [Out] command to clear out all background LTP fader values.

- **[Fader Control]** Release + **[Load]** - behaves like **Off** + **[Load]** except that it sets the pending cue to the first cue in the list and removes the active cue.

- **[Shift]** + **[Load]** - behaves like **Release** + **[Load]** except that it removes the content entirely from the fader. Pressing **[Shift]** + **[Load]** on an empty playback fader will unmap the fader.

Using Rate Override

To collect a playback fader for rate control, press **[Fader Controls]** Rate & **[Load]** for the required fader. When **[Rate]** is pressed without **[Load]**, it always collects the master fader for rate control. A subset of faders can be collected by pressing and holding **[Rate]** while clicking the **[Load]** button for the associated faders you would like to add. When no faders are under rate control, pressing **[Rate]** collects the master fader for rate override.

Use the rate encoder to adjust the rate dynamically. The default is 100%, which is real time (example: 5 seconds = 5 seconds). Decrease the percentage to slow the cue down. Setting the rate to 0% will stop the cue. Increase the percentage to speed up the event.

Following are some examples of rate:

- A 50% decrease rate applied to a 5 second event will play the cue in 10 seconds.
- A 200% increase rate applied to a 5 second event will play the cue in 2.5 seconds.

The top rate adjustment is 2000%. All timing values associated with a cue (including any follow or hang times) are affected by the rate modification proportionally.

If a cue is complete, any rate adjustment applied affects the cue in the pending file. When that cue is subsequently activated, the adjusted rate is used to direct timing. Pressing **[Rate]** again will turn rate control off and reset to 100%.
Manual Master Cue Lists

Manual master is an additional condition for cue playback. In this mode, cues are triggered manually by faders without using the [Go] button. With a cue list on a fader set to manual master, a cue will fire in manual time when the fader is moved from 0% or from Full. This is all done without hitting [Go]. Any cues in a manual master list not fired by moving a fader, but triggered via [Go] instead, will fade according to cue’s timings.

Note: Follow and hang times will be ignored when firing a cue with a manual master fader.

To set a cue list to manual master, use the {Fader} softkey in the Cue List Index. To access the cue list index, press [Cue] [Cue]. {Fader} will toggle between Proportional Master, Intensity Master, and Manual Master. The default is Proportional Master.

When manual master has been selected as the fader mode for a cue list, the initials ‘MM’ will appear above the cue list label field. Initials ‘IM’ will display when set to intensity master mode.

Timing is scaled. So, if color has a 5 count delay, and the duration of the cue is 10, the color transition will not begin until the faders manually reach 50%.

For more information about the other modes available, see Fader type, page 210.
Chapter 17
Advanced Manual Control

This chapter describes some more advanced features for manual control functions. These features can save you valuable programming time.

This chapter contains the following sections:

- Using [Copy To] ......................................................... 228
- Using [Recall From] ................................................... 229
- Using [Make Null] ..................................................... 230
- Using [Make Manual] .................................................. 231
- Using [Make Absolute] ............................................... 231
- Using [Query] ............................................................ 232
- Using [Capture] .......................................................... 233
- Using [Undo] .............................................................. 234
Using [Copy To]

[Copy To] allows you to copy all data from one channel to another, either within the current working mode or to a different record target. [Copy To] works much like [Recall From], but in the opposite direction, [Copy To] forces data to a channel from the selected channel, whereas [Recall From] pulls it from a channel to the selected channel.

By using the IFCB category buttons or parameter buttons, you may copy subsets of channel data. Entire cues, cue ranges and cue lists can be copied to other locations. To only copy over intensity and parameter levels, use the {Only Levels} softkey. This will exclude discrete timing information.

To copy over data from only active channels, use the {Only Active} softkey.

When referenced data is copied, if the copy target also has data in the reference that is being copied, the target will be placed in that reference (such as, CP 1), at its stored values. If the copy target is not included in the reference, absolute data will be copied to the target, and not the reference.

Below are some examples of copy commands from record targets. This command is very versatile and the following list is far from exhaustive:

- [2] [Copy To] [Cue] [5] [Enter] - copies all information for channel 2 to cue 5.
- [2] [-] [Focus] [Copy To] [Cue] [5] [Enter] - Copies all parameter data for channel 2, other than focus, to cue 5.
- [Group] [3] [Copy To] [Preset] [6] [Enter] - copies current information for group 3 to preset 6.
- [3] [Copy to] [6] [Cue] [8] [Enter] - copies the data from channel 3 to channel 6 in cue 8.
- [3] [Copy to] [4] [Thru] [9] [Enter] - copies the data from channel 3 to channels 4 thru 9.
- [3] [Copy to] [8] [Cue] [2] [1] [Cue Only/Track] [Enter] - copies the data from channel 3 to channel 8 in cue 2/1 and takes exception to the track/cue only settings in regard to subsequent cues in cue list 2.
- [Cue] [2] [1] [Copy to] [Cue] [7] [1] [Enter] - copies all of the contents of cue list 2 to cue list 7.
- [Cue] [1] [1] [Thru] [1] [0] [Copy To] [Cue] [5] [1] [5] [Thru] [Enter] - copies cues 1 thru 10 from cue list 1 to cue list 5, starting with cue 5.
- [1] [Copy To] [2] [0] [Only Levels] [Enter] - copies only the intensity and parameter information from channel 1 to channel 20.

In live, you can use [Sneak] with [Copy To] to fade in the change.

For example, [1][2] [Copy To] [2] [Sneak] <Time> 7 [Enter] would copy the recorded data from channel 12 to channel 2 and sneak it in 7 seconds.

Using the {HTP} softkey with [Copy To] will cause any intensity levels to be ignored if they are less than or equal to the copied value.

For example, channels 1 and 2 are at 50% in cue 10, and in cue 11 channel 1 is at 10% and channel 2 is at full. If you are in cue 11, and use the syntax [1] [Thru] [2] [Copy To] [Cue] [1][0] [HTP] [Enter], channel 1 will remain at 50% and channel 2 will go to full.
Using [Recall From]

[Recall From] is similar to [Copy To], except that it retrieves data from other locations, and can be used only for a channel list recalling from the same channel list but in a different location (for example, a cue). [Recall From] is essentially a “copy from” command.

All parameter data for selected channels will be recalled, or by using the IFCB category buttons or parameter buttons, you may recall subsets of channel data. To only recall only intensity levels, use the {Only Levels} softkey.

To recall data from only the active channels, use the {Only Active} softkey.

Using the {HTP} softkey with [Recall From] will cause any intensity levels to be ignored if they are less than or equal to the recalled value.

For Example:

Channels 1 and 2 are at 50% in cue 10, and in cue 11 channel 1 is at 10% and channel 2 is at full. If you are in cue 10, and use the syntax:

- **[Recall From] [Cue] [1][1] [HTP] [Enter]**

Channel 1 will remain at 50% and channel 2 will go to full.
Using {Make Null}

The {Make Null} softkey can be used to withhold parameter data from record or update actions in live, and remove parameter data from record targets in blind. {Make Null} is applied using channel selection and can impact entire channels, individual parameters, or parameter categories.

In Live

When you apply a {Make Null} instruction to channels or parameters in live, channel data is still visible onstage, but that data is essentially rendered invisible to record commands. Similar to filters (see Record Filters, page 200), {Make Null} acts as an “ignore” instruction in live, not a remove instruction. When channel data is nulled, the values for that data in the live display turn grey and an “N” appears next to the data field.

{Make Null} differs from park in that you can still manipulate data onstage (through manual control or through playback) but that data will be unavailable for record actions.

Some examples of using {Make Null} in live are:

• [1] [Thru] [5] {Make Null} [Enter] - converts all parameters of channels 1-5 into null data.
• [2] {Color} {Make Null} [Enter] - changes only color data for channel 2 to null data.
• [9] [Thru] [5] {Pan} {Make Null} [Enter] - changes only the pan data for channels 5-9 to null.

Null instructions are lifted in two different ways. First, as {Make Null} is a toggle state, it is possible to reselect the channel and parameter followed by {Make Null} [Enter]. This lifts the null state.

Additionally, a Go To Cue instruction will remove the null state.

In Blind

When applied in blind, {Make Null} can be used to mask instructions in a cue after it has already been stored. A {Make Null} instruction can also be applied to channels or parameters in palettes, presets, and submasters, thereby removing the data from the target entirely, in the same way that [Alt] [Enter] does.

When applied to channels or parameters in cues, {Make Null} doesn’t remove the data from the cue, it simply makes it unavailable for playback. It has the same effect on move instructions that it has on tracked values.

Some examples of using {Make Null} in blind are:

• [Color Palette] [1] [Enter] [3] {Magenta} {Make Null} [Enter] - removes all magenta parameter data for channel 3 from color palette 1.
• [Preset] [5] [Thru] [9] [Enter] {Intensity} {Make Null} [Enter] - removes all intensity data for all channels in presets 5-9.
• [Cue] [8] [Enter] [2] [Thru] [7] {Make Null} [Enter] - nulls all data for channels 2-7 in cue 8.
• [Cue] [9] [Enter] {Intensity} {Make Null} [Enter] - nulls all intensity data for all channels in cue 9.

In the cue scenarios above, {Make Null} differs from using [Alt] [Enter] in that instead of allowing values established in previous cues to track in, {Make Null} both restricts the recorded data from playing back and prevents other values from tracking in. Therefore, if the cue were executed as an out-of-sequence cue or asserted, no data would play back or track in for any nulled values.
Using {Make Manual}

The {Make Manual} softkey can be used to convert cue or submaster data into manual values, allowing it to be included in [Record], [Record Only], and [Update] operations.

- [8] {Focus} {Make Manual} [Enter] - selects channel 5 and makes all of its focus data manual.
- [9] [Thru] [3] {Color} {Intensity} {Make Manual} [Enter] - selects channels 3-9 and makes their color and intensity values manual.

Using {Make Absolute}

Referenced data can be transformed into absolute data using the {Make Absolute} softkey. This softkey is available in live or blind. Referenced data is channel or parameter data that is derived from a palette or preset. {Make Absolute} can be used to leave a parameter unchanged, but break its palette or preset reference.

The following examples illustrate how to change referenced data into absolute data.

- [4] {Make Absolute} [Enter] - selects channel 4 and makes any referenced data for that channel absolute data.
- [7] {Color} {Make Absolute} [Enter] - selects channel 7 and makes its color data absolute.
- [3] [Thru] [9] {Color} {Intensity} {Make Absolute} [Enter] - selects channels 3-9 and makes their color and intensity data absolute.

In each of these examples, the channel display will change to show the result of the command. Wherever the reference was previously indicated (IP, FP, CP, BP, Pr), an absolute value (numerical) will be seen.

In live, data that is changed to absolute is also made manual, thereby requiring a record or update instruction if the results are to be maintained.

{Make Absolute} can also be used in conjunction with an update command, allowing a cue to be updated while also breaking the reference to palettes or presets that were manually modified.

For example, [Update] {Make Absolute} [Enter] will update the active record target. Any manual values that were modifications to a palette or preset stored in the cue will be updated as absolute data in the cue. The reference will be discarded.
Using \{Query\}

\{Query\} is used to select channels that meet criteria specified by you. These selections are conditional, based on what type of luminaire a channel is or what that channel is doing, isn’t doing, can do or cannot do. These criteria are established in the command line using the softkeys, the keypad, and the direct selects.

When \{Query\} is used, the softkeys change to:

- Is In
- Isn’t In
- Can Be
- Can’t Be
- Or
- Moves Only

The CIA also repaints to display the available keywords and fixture types by which you can search. These can be used in defining your query criteria.

As a query is defined in the command line, channels will be specified in the Live/Blind display. When an [Enter] command is used to end the query, the remaining channels of the query will be selected.

**For Example:**

You wish to find channels which are in color palette 2 and have an intensity of 50%:

- \{Query\} <Is In> [Color Palette] [2] [At] [5] [0] [Enter]

In the Live/Blind display, any channels meeting this criteria will be selected.

You may use [Next] and [Last] to cycle through the query selection, one channel at a time to control only a specific channel.

Other examples of using a query are:

- \{Query\} <Isn’t In> [Beam Palette] [2] [5] [Enter]
- \{Query\} <Luminaire> <Can Be> [Focus Palette] [8] [Enter]
- \{Query\} <Fixture Type> <Revolution> <Can Be> [Focus Palette] [6] <Isn’t In> [Cue] [4] [Thru] [9] [Enter]
- [Next] [Next] [Enter] - selects one channel from the query result.

Additionally, in patch you can define up to four “query” keywords for each channel. These keywords can be used to create a query condition as well (See Keywords, page 83).

Keywords defined in patch will appear in the CIA when \{Query\} is pressed. They can then be used in a query like this:

- \{Query\} <Your keyword> <Can’t Be> [Beam Palette 5] [Enter]

Buttons on the facepanel, such as [Time] can also be used to construct a query.
Using [Capture]

Capture is a manual independent state. Any captured channel parameter data will be unaffected by playback, but will respond to manual control operations.

When channels are selected, [Capture] [Enter] captures all parameters of those channels. They will remain unavailable for playback or submaster override until they are released from the captured state. Capture is a toggle state, so to release parameters from a captured state, press [Capture] [Enter] again.

For Example:

- [1] [Thru] [9] [At] [Full] [Capture] [Enter]

A “C” is displayed next to the captured parameters (intensity) in the channel display. The selected channels are now captured and are unavailable for playback or submaster instructions until they are released from capture.

You may also capture specific parameters of a channel using the parameter buttons in the CIA.

For Example:

- [7] [Focus] [Capture] [Enter]

If a group of channels are selected, and some of those channels are captured and some are not, the first press of [Capture] releases all channels from the captured state and the second press captures all manual settings for the selected channels.

Uncaptured channels remain at their current values until restored to previous values or a new instruction is provided. You may restore channels to their background or default state using the [Sneak] [Enter] feature (see Sneak, page 130). Or you may leave them in a manual state until a new instruction is received.

It is also possible to “latch” capture on. This will automatically capture all manual changes as they are made. Pressing [Capture] [Capture] [Enter] automatically captures subsequent manual changes. The command line will read “Capture Enable” and the Capture LED will illuminate. To remove the capture latch, press [Capture] [Capture] [Enter] again.
Using [Undo]

Undo is a method to reverse or “undo” certain operations performed in the software. You can use [Undo] to reverse any command that results in a change to data that would be saved to the show file or any command that changes manual levels in live.

If there are any commands in the command line, pressing [Undo] once clears the command line. Once the command line is empty, pressing [Undo] will start the undo process. [Shift] + [Clear] can be used to clear the command line.

When [Undo] is pressed from an empty command line, the command history display will open in the CIA and the most recent completed command is highlighted in gold. If you press [Enter], you will undo your last command. This will exclude discrete timing information.

You may use the page arrow keys to select multiple commands. When [Enter] is pressed an advisory is posted. When [Undo] is pressed again, all highlighted commands will be undone and subsequently removed from the command history. When removing more than one command, a confirmation is required.

After an Undo has been performed, a {Redo} button will appear in the command history. You may press this button followed by [Enter] and the last undo will be “redone” to reinstate the removed commands.

In a multiple user environment, each user is only able to undo the changes that they made. In the undo command history, the user will only see the commands that they used.

Note: Not all commands can be undone including playback actions and manual attributes placed on channels or encoder actions.

Command History

Command histories are kept for each editing session, which begins when:

- a desk logs on to the network
- a new show file is loaded
- a show file is opened, merged, or imported

Each user builds an individual command history, specific to the commands they have entered.

You can open the command history at any time by pressing <More Sk> (Cmd History).

Commands that do not affect manual input or record targets (loading a cue, running a cue, or moving a submaster) are not included in the command history.
Chapter 18
Using Park

This chapter describes using park functions from both the live and park display.

This chapter contains the following sections:

• Park Display ........................................... 236
• Parked Values in Live ................................. 236
• Scaled Parked Values in Live ....................... 237
• Parked Addresses in Live .......................... 237
• Park Values from the Park Display ............... 238
Using Park

The park instruction allows you to set a channel or parameter to a specific value and have it remain at that level on stage (live mode), prohibiting manual control override, cue or submaster playback modification. Park may also be used to place a scaling instruction on the intensity output of a channel.

**Note:** A parked channel intensity is not impacted by grandmaster or blackout operations.

Parked values are withheld from all record targets, but you can manually set levels for parked channels and parameters and store those values into record targets. Keep in mind that the values set and stored in live do not actually output to the system if the parameter is parked.

When channels or parameters are parked, the LED on the [Park] button illuminates and the live display will indicate “Parked Channels” or “Parked Dimmers” in the top right corner. In addition, any parked channel or parameter will be indicated with a white channel number and a “P” will be visible in the channel. When the parked channel or parameter is unparked, it reverts to the level the console is currently providing, or its default value if there is no current instruction.

Park instructions are not subject to partitioned control. Any programmer or operator may park and unpark channels or parameters as needed. Parked parameters set by radio focus remotes (RFR) will automatically unpark when the associated device goes offline.

Channels, parameters and outputs can be parked and unparked from live and from the park display.

**Park Display**

You can access the park display by pressing [Park] [Park] or [Blind] & [Park]. The park display shows all parked channels and parameter values on the top half of the screen and all parked addresses (dimmers) on the bottom half of the screen. Parked channels displayed on the top of the screen can be displayed in the summary, table, and packed table views seen in the live/blind display by using the [Format] key.

When a channel intensity is parked, the parked value will be indicated in white text. When a channel has a non-intensity parameter that is parked, that parameter will also be indicated with white text. The display also provides detail of which user parked the channel or parameter (when multiple users are on the system).

When an address is parked, it will appear in the bottom half of the park display. The address, parked value, affected channels and parameters are indicated.

**Parked Values in Live**

Channels and parameters may be parked and unparked from the live display. Following are some examples:

**Note:** Parked values will only be displayed in the park display.

To park a channel, parameter, or group from live:

- [2] [At] [5] [0] [Park] [Enter] - parks channel 2 intensity at 50%
- [2] [Intensity] [Park] [Enter] - parks the intensity of channel 2 at its current value
- [2] [Park] [Enter] - parks all parameters of channel 2 at their current settings

**Note:** If a channel list is constructed in which some channels are parked and some are unparked, [Park] [Enter] will unpark them all. A confirmation will be required.
• [2] [Alt] [Park] [Enter] - if channel 2 is unparked, this command parks intensity at the current value. If the intensity for channel 2 is parked, this command unparks intensity.

• [2] [Color Palette] [8] [Park] [Enter] - parks the color for channel 2 in color palette 8.

• [2] [Color] [Park] [Enter] - parks channel 2 color at its current value.

• [Group] [Cue] [6] [Park] [Enter] - parks all the channels stored in cue 6 at their levels provided in the cue.

• [Park] [Enter] - clears all parked channels and scaled park instructions (see Scaled Parked Values in Live, page 237). A confirm is required. When a channel is unparked, it reverts to the level the console is currently providing, or its default value if there is no current instruction. A confirmation will be required.

Scaled Parked Values in Live
A scaled parked value allows the intensity output (only) to be modified proportionally in live. Scaled park values are ignored when storing a record target. The setting on the display indicates what should be stored, not the actual scaled value. An example of how to set a scaled parked value in live includes:

• [3] [Alt] [/] [1] [2] [5] [Park] [Enter] - sets a scaled value of 125% on channel 3 intensity. In other words, whenever channel 3 is active, it will be active 25% higher than its current setting.

• [3] [Alt] [/] [8] [5] [Park] [Enter] - sets a scaled value for channel 3. Whenever channel 3 is active, it will playback 15% lower than its current setting.

Remove the scaled parked value:

• [3] [Alt] [/] [Park] [Enter] - unparks a scaled intensity for channel 3.

• [Park] [Enter] - unparks all parked channels.

A channel can have both a scaled parked value and a parked intensity value. Keep in mind that the parked intensity has priority over (and overrides) scaled park values. A channel can have a parked value or a scaled park value, but not both.

Parked Addresses in Live
DMX addresses can be parked in Live. When in live, an {Address} softkey exists beneath the CIA. Below are some examples of parking an address in live:

• {Address} [5] [Alt] [5] [0] [Park] [Enter] - parks output 5 at 50% intensity.

• {Address} [5] [Park] [Enter] - unparks output 5. A confirmation will be required.

• {Address} [Park] [Enter] - unparks all parked outputs. A confirmation will be required.
Park Values from the Park Display

You can park and unpark channel parameters or addresses from the park display. Open the display by pressing [Park] [Park] or [Blind] & [Park]. While in this display, it is assumed that you want to park channels or parameters, therefore the use of the [Park] key is not necessary when parking, but is used for unparking. You can also use [At] [Enter] to unpark.

Following are examples for parking channel parameters from the park display:

- [3] [At] [4] [5] [Enter] - parks channel 3 at 45%.
- [3] [Color Palette] [4] [Enter] - parks color for channel 3 at color palette 4.

Following are examples for clearing parked values while in the park display:

- [channel list] [Park] [Enter] - unparks channels in the list.
- [channel list] [At] [Enter] - unparks channels in the list.

Below are examples for parking addresses in the park display:

- {Address} [5] [At] [5] [0] [Enter] - parks address 5 at 50% intensity.
- {Address} [5] [At] [Enter] - unparks address 5.
Effects are a method within Ion to provide dynamic, repetitive action to channels. This chapter explains the different types of effects, and how to use them.

This chapter contains the following sections:

- **About Effects** .................................................. 240
- **The Effect List** .................................................. 240
- **Effect Status Display** .......................................... 244
- **Step Effects** ...................................................... 245
- **Absolute Effects** ................................................. 248
- **Multiple Intensity HTP Effects** ......................... 250
- **Relative Effects** .................................................. 250
- **Program a New Relative Effect** ......................... 252
- **Apply an Existing Effect** .................................... 253
- **Effects on Submasters** ....................................... 254
- **Delaying Effects** ............................................... 255
About Effects

Effects are manual control functions that can be applied to a channel parameter and then included in cues or submasters. Cues can contain both standard transitions for some channels and parameters and effects for the same or other channels and parameters.

Intensities can have different effects running at the same time but they must be from different sources. You can have an intensity effect running on a cue and those same channels can be impacted by an intensity effect on a submaster. See "Multiple Intensity HTP Effects" on page 250.

Effects have user defined properties and attributes which are applied to the effects whenever they are used in cues. Effects also have cue level overrides, which allow you to use an effect in multiple locations, and modify its size, shape or rate in individual cues.

Within Ion, effects are broken up into three fundamental behavior types; Step, Absolute, and Relative effects.

The Effect List

At any time you may press [Effect] [Effect] to view the effect list. Any recorded effects will be displayed here. The effect list is a blind view and any changes made in this view are automatically stored; a record command is not required.

Notice that there are effects existing in this list prior to any being recorded. Effects 901-916 are preprogrammed relative effects that are automatically available to you (see Relative Effects, page 250).

To navigate this list use the navigation keys as described in Display Control and Navigation, page 28 or select the effect number you wish to work with. Notice that when you select the effect list, the CIA changes to display the information for the currently selected effect.
Effects Editor
When viewing the effect list, the selected effect is displayed in the CIA. The effect properties and attributes are shown in categorized buttons in the CIA. To change any property or attribute, press the corresponding button and enter data as required.

The properties display of the effects editor is shown below and definitions of properties follow.

Type
Defines the effect type: step-based, absolute, or relative (linear, focus, or color). To change the type, press \texttt{(Type)} and then press the desired effect type in the buttons to the left.

\begin{itemize}
  \item \texttt{<Effect> [1] (Type) [Step based] [Enter]}
\end{itemize}

Scale
Applies only to relative effects. This modifies the amount the pattern is offset from the current parameter values. The scale is expressed as a percentage increase or decrease (25 = 25\% of the programmed value).

\begin{itemize}
  \item \texttt{(Scale) [3] [0] [Enter]} or you may adjust this using the “Scale” encoder.
\end{itemize}

Cycle Time
Provides a cumulative time to complete one full iteration of an effect. In relative effects, the cycle time determines the length of time required for one channel to complete the cycle.

In absolute and step-based effects, the cycle time determines the time required to complete one full iteration of the effect. In these effect types, modifying the cycle time changes the timing values proportionally within the effect itself.

To change the cycle time, press \texttt{(Cycle Time)} and then enter the desired time (in minutes and seconds) from the keypad, followed by \texttt{[Enter]}. This can also be adjusted from the encoder.

Duration/Cycle
This determines the length of time an effect will run. To specify, press \texttt{(Duration/Cycle)} and then choose the desired method from the buttons that appear to the left. The options are:

\begin{itemize}
  \item \texttt{(Infinite)} - for step and absolute effects, the effect will run until the channel is provided a new instruction or the effect is stopped. Relative effects with an infinite duration will run until a stop flag is applied.
  \item \texttt{(Duration)} - the effect will run for a set amount of time given in minutes and seconds. Enter the time from the keypad.
  \item \texttt{(Num cycles)} - the effect will run for a set number of iterations. Enter the number using the keypad.
  \item \texttt{(Duration/Cycles) [Num Cycles] [1] [0] [Enter]}
\end{itemize}
**Parameters**
This allows you to select which parameters will be involved in the selected effect, by default. By entering a value here, you do not need to specify the required parameter when placing an effect on a channel group.

To add or remove parameters to the effect, press **Parameters** and then select the desired parameters from the buttons that appear to the left.

- **Parameters** {Iris} [Enter]

**Attributes**
These determine the basic behavior of the effect. Attributes include behaviors such as forward, reverse, bounce, positive, negative, and random grouping or random rate. The attributes are slightly different between step, absolute and relative effects.

- **Forward** - the effect will run in the programmed direction (the arrow on the pattern editor indicates “forward” for pattern effects, step and absolute effects will follow numerical order).
- **Reverse** - effect will run in the opposite direction of forward or reverse numerical direction. Forward and Reverse are mutually exclusive settings.
- **Bounce** - effect will run first in forward, then in reverse. Subsequent passes alternate between forward and reverse.
- **Positive** - effect will run the steps (on state and off state) as programmed. This is applicable to step effects only.
- **Negative** - inverts the on state and off state for the effect. This is applicable to step effects only.
- **Random Grouping** - channel distribution or step order (depending on the type of effect) are applied in a continuously random fashion.
- **Random Rate** - this overrides the cycle time of the effect. Random Rate is applied in a range (for example 5- thru 150).

Play with these behaviors to see how they alter your effect.

**Entry**
Establishes at what time and how channels will enter the effect. To change the entry method press **Entry** and then choose a method from the buttons to the left. Entry modes vary by effect type. The options are:

- **(Cascade)** - channels enter the effect according to the trail and cycle time values (if applicable).
- **(Immediate)** - all channels enter the effect instantaneously.
- **( Fade by Size)** - the effect will achieve its full value as allowed by the pattern or step or absolute values using the In Time.
- **( Fade by Rate)** - increases the rate of the effect as it enters. If an effect submaster has an entry mode of **(Fade by Rate)**, the submaster will control the rate between 0 to 100.
- **( Fade by Size and Rate)** - the effect will achieve its full value as allowed by the pattern or step or absolute values and ramp up to full speed using the In Time.

**Exit**
Establishes at what time and how channels will exit the effect. To change the exit method press **Exit** and then choose a method from the buttons to the left. Exit modes vary by effect type and how the effect is stopped. The options are:

- **(Cascade)** - channels leave the effect when they have completed their last pass (number of cycles) or when they do not have enough time to make a final complete pass (duration).
- **(Immediate)** - all channels exit the effect instantaneously.
- **(Fade by Size)** - when the effect is exited, values will return to their background state while
...still running using the exit time.

- **{Fade by Rate}** - decreases the rate of the effect as it exits.

- **{Fade by Size and Rate}** - when the effected is exited, channels will stop running the effect and return to their background state using the exit time.

- **{Stop and Fade}** - when the effected is exited, channels will stop running the effect and return to their background state using the exit time.

- **{Stop and Hold}** - when the effect is existed, channels will halt exactly where the effect left them.

**Time (Entry or Exit)**

These fields establish the length of time for channels to enter or exit the effect. It can be entered in minutes and seconds from the keypad. These timing values are applied to the entry and exit modes. Cue level timing is the default for these. Press **{Entry Time} [Enter]** or **{Exit Time} [Enter]**. To reset to defaults, press **{Time} [Enter]**.

**Grouping**

Grouping is used only in relative and absolute effects. This determines how channels currently running the effect will be grouped throughout the pattern. To change this press **{Grouping}** and then enter the number of lights you want grouped together.

Grouping defaults to **{Spread}**. This means that every light the effect is applied to will act as an individual element, moving through the effect sequentially based on the channel selection order, cycle time, and trail times. You can enter any number you require. A grouping of 2 means that every other light in the selection list when the effect is applied will move together through the effect. Grouping of three means every third light, and so on.

Your options are 1-29 or **{Spread}** which will distribute each channel in the effect evenly and treat it as a separate group.

- **{Grouping} [2]** - every other channel (in a range of channels) will be grouped when running the effect.

When an effect is applied to a group in live, that group is distributed by order, using this grouping function. If a group list is created and an effect applied, each group is considered an individual element within the effect.

**Trail**

Trail is applicable to relative and absolute effects. Trail determines how channels are to follow each other through the effect; it is a percentage of the cycle time. Trail can be any value from 0-100%, even, or solo. The default is even. For example:

- **{Even}** - the groups will be distributed evenly throughout the pattern. This is calculated by dividing the cycle time of the effect by the number of groups of channels.

- **{10%}-{90%}** - when the first group is 10% through the effect, the second group will start the effect, and so on through the remaining groups. Therefore, the groups will trail n% behind each other, as a percentage of the cycle time.

- **{Solo}** - the first group will execute the entire pattern. When done, the second group will execute the entire pattern, and so on.
Using Encoders with the Effect Editor

When any effect is specified in the command line, the encoder LCD automatically repaints to display the following properties:

- Cycle Time (Default is 5 seconds for relative effects)
- Scale
- Shape (Vertical or Horizontal as defined by the (Mode) button)
- Axis

At any time, you may use the encoders to adjust these properties within the effects editor for the specified effect.

Effect Status Display

To view the effects currently running, you may press [Displays]-(Effect Status) to reveal the effect status display in the CIA.

This display shows you any currently running effects and gives you the ability to edit the effect while running. When an effect is selected, the encoders and encoder screen change to allow you to manipulate the effect according to rate, size, horizontal form, vertical form, and axis.

For Example:

To edit an effect, select the effect using the command line or by clicking on the effect in the status display.

- [Effect] [9] [0] [2] [Enter]

The encoder screen repaints so that the encoders now control the five attributes in the columns of the effect status display:

- Rate - modifies cycle time. Default is 100% and can be modified from 0%-2000%.
- Size - modifies scale. Default is 100% and can be modified from 0%-2000%.
- Shape (Vertical or Horizontal as defined by the (Mode) button) - default is 100% and can be modified from 0%-2000%.
- Axis - default is 0° and can be modified by +/- 180°.

Use the encoders or softkeys to adjust the effects while watching the effect on stage.

The effect itself can be accessed for editing from this display by pressing (Edit). Any changes made directly in the effect status display are made to the effect itself and must be stored. Cue level overrides also must be stored or updated to the required cue, but do not impact the basic effect itself.

Effect attributes modified in the effect status display can be reset to their previous values using the softkeys:

- [Rate] [Enter] - resets the rate to the previous value.
Step Effects

In step effects, each step contains an on-state and an off-state. The on-state is the action the channels in the step should take when the step is active. The off-state is the action the channels in the step should take when the step is not active. Step effects are a quick and easy way to build simple chases.

When building step effects, channels must be defined for each step. This is different from absolute and relative effects.

Once complete, you may play back the effect on all channels embedded in it by pressing [Recall From] [Effect] [x] [Enter]. Or you may specify only certain channels to play back from the embedded channel list.

A step effect is displayed in a chart with the following columns:

- **Step** - indicates the step numbers.
- **Channels** - displays the channel(s) in the step.
- **Param** - displays the parameter (if other than intensity) controlled by the step.
- **Step Time** - time from triggering the associated step to triggering the next step.
- **In Time** - the length of time for the channels to fade to the “on-state”.
- **Dwell Time** - the length of time the step remains in an “on-state”.
- **Decay Time** - the length of time it takes for the channels to fade to the “off-state”.
- **On State** - the parameter level (in%), or referenced data to be used for the “on-state”.
- **Off State** - the parameter level (in%) or referenced data to be used for the steps off-state. If you want the “off-state” to be the background state from playback, select the column and press [Alt] [Enter].

All times are entered from the keypad in minutes and seconds, tenths and hundredths.

Here is an example of a step effect when viewed in the CIA:
Program a Step Effect

Below is the process used to program the effect illustrated in the image above.

For Example:

To open the effects list press:

- [Effect] [Effect]

Establish the number of the effect by pressing:

- <Effect> [1] [Enter]

The CIA will repaint with unpopulated fields for the new effect. Assign the effect as "step" by pressing:

- <Type> {StepBased}

The effect will appear in the list and the CIA will repaint with the default entries for the effect and a step chart for the effect. Define the number of steps by pressing:

- (Step) [1] [Thru] [6]

The steps will populate the chart and will remain selected. To make identical changes to all steps at once, you may now use the page arrow keys to navigate the chart. To make changes to only a single step, specify only one step in the command line, default values are drawn from the previous step.

After paging to the “Channels” column, specify the channels for the effect.

- [1] [Thru] [1] [2] [Enter]

Channels 1-12 will be broken up and distributed through the steps in the chart. Choose the parameter you would like in the effect by pressing:

- (Parameters) <Intensity> (Intensity is assumed unless another parameter is specified)

All steps are now intensity based. Use the page arrows to access the “Step time” column. Enter the desired step time:

- [1]

Page arrow to the Dwell Time (In time is left at 0) column and enter a dwell time:

- [1]

Page arrow to the Decay Time column and enter a decay time:

- [.25]

Page arrow to the On State column and enter the on state percentage:

- [100]

Page arrow to the Off State column, or use the softkeys to go to the desired field, and enter the off state percentage:

- [5]

Adjust any of the effect details on the right side of the CIA by pressing the appropriate detail button and making changes (see Effects Editor, page 241).

Note: The cycle time is an aggregate of all of the timing in the effect and indicates how long it will take to make one full pass through the effect. If the cycle time is modified by the keypad or the encoder, it proportionally adjusts all of the timing within the effect.
Delete a step
To delete a step from a step-based effect, specify the effect in the command line and press delete:

- `[Effect] [1] {Step} [4] {Delete} [Enter] [Enter]`

Insert a step
To insert a step anywhere in the effect, specify the step you wish the new step to be inserted before.

- `[Effect] [1] {Step} [4] {Insert} [Enter]` - Inserts a new step before step 4. If step four does not exist, it also creates the steps necessary to have “step 4” and then places a step ahead of it as well.

Inserted steps result in all succeeding steps to be bumped one place lower in the effect. In the above example, by inserting before step 4, step 4 would become step 5, step 5 would become 6 and so on. The inserted step would become the new step 4.
Absolute Effects

Absolute effects are a listing of sequential actions that channels are to take. They differ from step effects in that there is no on/off state, rather they define progressive behavior from one action, to the next, to the next, and so on. The best example of this is that palettes and presets can be used as actions in absolute effects.

Absolute effects differ from relative effects (which are also progressive) in that you are specifying exactly what actions you want the lights to take, rather than mathematical offsets from the current state (relative effects).

Absolute effects also do not contain an embedded channel list. Therefore, the effect must be applied to channels in order to be played back.

Absolute effects are displayed in a chart with the following columns:

- Action - displays the action number.
- Time - the time for the action to fade in.
- Dwell - the duration of the action before moving to the next action.
- Level - indicates either the level of the parameter specified in the effect, or the referenced value for the channel(s) to perform (Palette or preset as defined in the command line).

In the above image, actions 1-8 indicate referenced values in the "Level" column (palettes or presets), though these values can be absolute data as well.
Program an Absolute Effect

Below is the process used to program the effect illustrated in the image above.

For Example:

To open the effects list press:

- [Effect] [Effect]

Establish the number of the effect by pressing:

- [Effect] [8] [Enter]

The CIA will repaint with unpopulated fields for the new effect. Assign the effect as absolute by pressing:

- <Type> {Absolute}

The effect will appear in the list and the CIA will repaint with the default entries for the effect and an action chart for the effect. Define the first action by pressing:

- {Action} [1] [Enter]

The step will populate the chart and will remain selected. You can also create a range of actions at once, using the [Thru] button, if desired. Use the page keys to navigate to the different columns.

After arrowing to the “Time” column (or using the softkeys), specify the fade in time for the actions.

- [5] [Enter]

Page arrow to the Dwell column and enter a dwell time:

- [5] [Enter]

Page arrow to the Level column and enter the desired referenced target:

- [Color Palette] [5]

Page arrow down and a new action will be created. All fields default to the values in the previous action. Page to the next action in the Level column and enter the referenced target:

- {Color Palette 8}

Page arrow down to the next action in the Level column and enter the referenced target:

- [Color Palette] [2]

Page arrow down to the next action in the Level column and enter the referenced target:

- {Color Palette 4}

Adjust any of the effect details on the right side of the CIA by pressing the appropriate detail button and making changes (see Effects Editor, page 241).
**Multiple Intensity HTP Effects**

Multiple intensity HTP effects are either step or absolute effects running on HTP submasters or cue lists. For multiple intensity HTP effects to run correctly, they must be recorded and played back from different sources.

For example, you create three separate step effects. Each effect impacts the same channels. For the three separate effects to run correctly you need to record them to three separate effect submasters or cues in separate cue lists. Either method will allow for each effect to run together according to the rules of HTP. But, for example, if you were to have three separate effects running on three separate effects submasters and you try to record that into one cue, the cue will only run the effects that were currently at the highest level at the moment of the record.

**Relative Effects**

A relative effect is an offset from the current state of a channel parameter. There are three different types of relative effects: focus, color, and linear. Each of the these effect types have a graphic editor designed specifically for the parameters involved.

Relative effects have many of the same properties and attributes as step-based and absolute effects.

Ion is preprogrammed with 16 relative effects which represent some of the most commonly used patterns and parameters. These are automatically visible in the effects list and can be manipulated using the encoders to conform to your needs. You may also custom build relative effects.

---

**Note:** As you learn to use the effects editor with relative effects, it is recommended that you experiment with the preprogrammed effects until you understand the fundamentals and how effects can be altered.

---

**Focus Effects**

Focus effects are designed to impact a channel’s pan and tilt parameters. These are represented in the horizontal and vertical axes of the graph in the effects editor. They can be created from live or blind and the properties can be set in the effects editor as any other effect (see Effects Editor, page 241).

New focus effects default to a circle. You can clear this and draw your own shape by pressing (Edit)>[Clear] and drawing on the graph with your finger or the mouse. Press {Apply} when you are done. Canned focus effects can be modified in the same manner. The green arrow indicates default direction of motion, which can be modified in attributes.

**Focus Effect**
Color Effects

Color effects impact only color parameters. Hue and saturation offsets can be used which are represented in the horizontal and vertical axes of the graph in the effects editor. The (Parameters) key within a color effect displays the various color mechanisms used in any patched channels.

New color effects default to a circle. You can clear this and draw your own shape by pressing (Edit)>(Clear) and drawing on the graph with your finger or the mouse. Press (Apply) when you are done. Canned color effects can be modified in the same manner. The green arrow indicates default direction of color shift, which can be modified in attributes.

Linear Effects

A linear effect does not have to be parameter specific. Rather it can simply be a reference to a linear diagram which can be applied to any parameter. You can redraw the linear diagram for an existing linear effect by pressing (Edit)>(Clear) and then tracing the diagram on the graph with the mouse or your finger. Press (Apply) when you are done.
Define a Pattern Shape
Shapes can be defined for any relative effect (focus, color, or linear).

To define a shape, press the (Edit) softkey beneath the pattern editor. The softkeys will change to (Apply), (Restore), (Clear).
- Press (Clear) to clear the pattern.
- Draw a new pattern using your finger (or the mouse). If you want to return to the original pattern, press (Restore) before pressing apply.
- When you have the proper pattern drawn, press (Apply). The pattern will be applied to the effect.

Note: If you delete a preprogrammed effect (for example, after making changes to it) the effect will return to its default value. You can also copy effects to another effect location and modify them from there. This will leave the original effect untouched.
- [Effect] [904] [Copy To] [8] [Enter]

Program a New Relative Effect
To open the effects list press:
- [Effect] [Effect]

Establish the number of the effect by pressing:
- [Effect] [4] (Type) (Linear/Focus/Color) [Enter]

The effect will appear in the effect list and the CIA will repaint with the effect details visible. Manipulate the effect using the encoders, effect graph, or property fields so that the effect meets your needs (see Effects Editor, page 241 for details on effect properties and encoders).
Apply an Existing Effect

Once an effect has been created, it will appear in the effects list. To apply an existing effect, press:

- [Select Channels] [Effect] [x] [Enter]
  or using the direct selects
- [Select Channels] {Effect x}

The selected channels will begin their changes as programmed in the effect.

Since step based effects have an embedded channel list, those effects can be recalled by [Group] [Effect] [n] [Enter] or [Recall From] [Effect] [n] [Enter] without selecting channels.

Recording an Effect in a Cue

To apply an existing effect, press:

- [Select Channels] [Effect] [x] [Enter]

Recording to a cue, press:

- [Record] [ Cue] [x] [Enter]

Editing Effects Live

To edit an effect while it is running, press:

- [Displays] {Effect Status}

The effect status display will open in the CIA and any currently running effects will be visible in the display. Selecting the effect number in the status display will select the effect for editing. Select the effect you want to edit live by pressing:

- [Effect] [x] [Enter]

Use the encoders to adjust the attributes as described in Effect Status Display, page 244. Adjustments are cue overrides and don’t impact the core effect.

To edit other properties of the effect in live, press {Edit} and the effects editor will open (See Effects Editor, page 241). Changes made in the editor will impact the effect itself and all instances in which the effect is used. Changes made to effects in the effect status display impact only that instance of the effect. Changes made directly in the effect editor impact all instances of that effect. The changes will then need to be recorded or updated.

Stop an Effect

Pressing [Fader Control] {Stop Effect} [Enter] will stop all running effects.

To stop a specific effect, press: [Effect] [n] [At] [Enter]

You may also stop effects on specific channels by [selecting channels] [Effect] [Enter].

You may also remove an effect instruction by [selecting channels] [Effect] [At] [Enter]. This command will work in live or blind. You can also stop the whole effect by pressing [Effect] [x] [At] [Enter].

Deleting an Effect

To delete an effect, press [Delete] [Effect] [n] [Enter] [Enter]. If you delete one of the default effects (901 through 916) that effect will return to its default values.
Effects on Submasters

Channels running effects can be loaded onto a submaster. Pressing the bump button of the submaster starts or stops the effect.

For the submaster to control the rate and/or size of the effect, it must be configured as an effects submaster. When a submaster is defined as effect, only the effect information is stored. The slider will then have control of the in and out behavior of the effect.

If the submaster is set to additive, the slider will control non-effect values only.

Configuring an Effect Submaster

To configure an effect submaster, press:

• [Sub] [x] (Mode) [Enter]

Note: The (Mode) softkey toggles between inhibitive, effectsub, and additive. Press (Mode) until effectsub is on the command line.

Recording an Effect to a Submaster

To apply an existing effect, press:

• [Select Channels] [Effect] [x] [Enter]

Recording to a submaster, press:

• [Record] [Sub] [x] [Enter]

Running an Effect from a Submaster

The way effects are played back from a submaster depends on its mode, and whether the submaster is set to be a proportional fader or an intensity master.

Below is an example of four different submasters, in different modes, with the same effect stored to them.

Effect on an Additive/Proportional Submaster

The submaster contains the intensity, pan/tilt data, along with the effect. Pressing the bump button starts the effect. The fader controls values not affected by the effect. Pressing the bump button again stops the effect.

Effect on an Additive/Intensity Master Submaster

Pressing the bump button marks the lights, and starts the effect. The fader brings up any intensities stored in the submaster. Pressing the bump button again stops the effect.

Effect on an Effect/Proportional Submaster

Pressing the bump button starts the effect. The fader controls the rate and/or size based on the effect’s entry behavior. Pressing the bump button again stops the effect.

Effect on an Effect/Intensity Master Submaster

Pressing the bump button starts the effect. The fader controls the rate and/or size based on the effect’s entry behavior. Pressing the bump button again stops the effect.

In other words, there is no difference between a proportional fader and an intensity master when the submaster is configured to be an effect submaster.
Delaying Effects

A delay can be placed on an effect in a cue or submaster by using the syntax [Effect] [n] [Delay] [n] [Enter]. [Effect] [n] [Delay] [Enter] removes the delay.

**Note:** If an effect delay is set in live, the cue or submaster must be recorded to include the delay.

The Effect Status display has a delay column to show when a delay has been applied to an effect. When an effect is in delay mode, the column will display the countdown for the delay.

<table>
<thead>
<tr>
<th>Effect</th>
<th>Source</th>
<th>Channels</th>
<th>Delay</th>
<th>Rate</th>
<th>Size</th>
<th>H. Form</th>
<th>V. Form</th>
<th>Aids</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plan</td>
<td>26-36, 44</td>
<td>100</td>
<td>220</td>
<td>960</td>
<td>2</td>
<td>3</td>
<td>235</td>
</tr>
<tr>
<td>2</td>
<td>Plan</td>
<td>51-54</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3*</td>
<td>Plan</td>
<td>99-104</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When an effect is delayed, a **"** will display by the effect number in the playback status display external links column.
Chapter 20
Storing and Using Submasters

Faders, both virtual and physical, can be assigned as submasters. This chapter explains how to assign and use submasters on your Ion console. You may also use submasters with Universal Fader Wings. For more information on these, see Universal Fader Wings, page 389.

This chapter contains the following sections:

- About Submasters ........................................... 258
- Changing Fader Pages ...................................... 262
- Loading Submasters ......................................... 263
- Using Bump Button Timing With Submasters ........ 265
- Submaster List .................................................. 266
About Submasters

Submasters can store any parameter data for channels. When storing from Live, Record Only and Record can both be used to determine what contents are stored. You can copy cues, presets, or palettes to a submaster as well. Channels running effects can be loaded onto a submaster. See “Effects on Submasters” on page 254. Submasters can be accessed using the slider module (see Slider Module, page 220) or the Universal Fader Wings (see Universal Fader Wings, page 389).

Faders can be configured as submasters in setup (see Fader Configuration, page 98) or they can be defined while programming.

In blind, submasters can be created by using the [Thru] [Thru] syntax.

- [Sub] [1] [Thru] [Thru] [1] [0] [Enter] - will create subs 1 through 10.

To automatically set the submasters to 1-to-1, in blind, press [Sub] [1] [Thru] [Thru] [3][0][0] [Enter] to create all 300 submasters. Now in Live, press [Sub] [1] [Thru] [Enter], which selects all submasters created. Then you can hit the load button for the first submaster and it will load all submasters sequentially.

When set as a submaster, the bottom button beneath the potentiometer acts as a bump button or a mark button depending on the submaster type (Proportional or Intensity Master). The button above the bump can be used to select all of the channels associated with the submaster, if the submaster is inactive. This is equivalent to the syntax [Group] [Sub] [x] [Enter]. When the submaster is active, this button will assert the contents of the submaster when pressed.

It is possible to program upfade, dwell, and downfade times in association with the submaster bumps.

On fader wings, when a submaster bump LED is blinking, it means that the submaster must be homed due to either changes to its content or to its mode. In either case, reset the submaster by dropping it to zero and the moving it back to the desired position. Inhibitive submasters (see below) that are blinking must be homed to 100% rather than zero. The LED will also blink when the submaster is in a “Held” state via bump button timing.

Recording a Submaster

You can record current stage contents directly to a submaster. To do this, set levels in live as needed then record them to the submaster. See the following examples:

- [Record] [Sub] [5] [Enter] - records all current values to sub 5.
- [Record Only] [Sub] [5] [Enter] - records the manual values of the current stage state to sub 5.
- [Record Only] [Sub] [5] [Label] [xxxx] [Enter] - as above, with a label.
- [Record] [Sub][5] [Mode] [Enter] - as above, and alters mode between inhibitive or additive. Other submaster properties (HTP/LTP, Exclusive, and so on) can be assigned in this way as well.

You can also record selected channel data to submasters as well. See below:

- [Channel List] [Record] [Sub] [5] [Enter] - records all data for the channel list to sub 5.
- [Channel List] [Record Only] [Sub] [5] [Enter] - records manual data for the channel list to sub 5.
Submasters can also be recorded using selective storing, which allows you to specify only the channels that you want stored.

- [6] [Thru] [1][0] [Record] [Sub] [3] [Enter] - records only channels 6 through 10 to submaster 3.

If a submaster already has data stored to it, selective store will act as a merge function. Using the above example of channels 6 through 10 stored to submaster 3, if you were to then store channel 5 to submaster 3, that would be added to the current content so that channels 5 through 10 are now stored.

If you don’t want the data to merge, you can either first delete the submaster to remove the original content. See “Deleting a Submaster” on page 264. Or you can selective store while using [Rem Dim].

- [5] Record [Sub] [3] [Rem Dim] [Enter] - records channel 5 to submaster 3 and removes any previous data from the submaster.

Submaster Displays
In the display window of any programmed submaster, you will see the following:

- Submaster number
- Submaster label (if any)
- Independent flag (if any)
- I-Master flag (I.M. - if any)
- Current submaster value

Additive, Inhibitive, or Effectsub
You may define your submaster as additive (contributes to the live output) or inhibitive (limits live output). Ion defaults to submasters being additive.

To toggle a submaster between additive, inhibitive, or effectsub:
- [Sub] [7] {Mode} [Enter]

Additive submasters are indicated by a green LED or a green outlined fader icon in the fader window.

Inhibitive submasters display these indicators in red. Channels mastered by an inhibitive submaster are indicated with an “I” next to the intensity value in the channel display in live. Inhibitive submasters do not provide levels to the stage picture, they limit them (similar to a grandmaster). It is possible to put non-intensity parameters onto an inhibitive submaster, but it must be done from blind.

For more information about effectsub, See "Effects on Submasters" on page 254.

Proportional vs. Intensity Master
A submaster can be set to be either a proportional fader or an intensity master. This is done using the {Fader} softkey. Ion defaults to submasters as proportional.

Proportional submasters
When a submaster is proportional, the slider will control all contents of the submaster (intensity and non-intensity parameters) when moved from zero. When a proportional sub is return toward zero, channel will be returned to their previous level.

The bump button can be used to bump all values to their recorded levels in the submaster, or, by assigning timing values, fade the contents of the submaster up or out.
Intensity master
When set to this fader type, the slider will control intensity only. The bump button can be used to preset (mark) non-intensity parameters stored to the submaster. If the bump is not pressed before the slider is moved, the slider will also fade the non-intensity-parameters to their recorded values. Once the non-intensity-parameters are at their end state, the slider only controls intensity. When dropped toward zero, controlled intensities will be faded toward zero.

When non-intensity parameters on a intensity master submaster have been marked using the bump button, the LED on its bump button will pulse to tell you that the non-intensity parameters have been marked.

Pressing the bump button for an intensity master submaster that is currently bumped will release the non-intensity parameters using the bump button timing. Its bump button LED will also be turned off.

To toggle a submaster between a “Proportional” or “I-Master” fader:
- [Sub] [8] [Fader] [Enter]

HTP vs. LTP
Submasters can be set to be either Highest-Takes-Precedence (HTP) or Latest-Takes-Precedence (LTP). This setting is applied to intensity only. Non-intensity parameters are always LTP. Ion defaults all submasters to HTP. For more information on HTP and LTP see HTP vs. LTP, page 7.

To toggle a submaster between HTP and LTP:
- [Sub] [6] [HTP/LTP] [Enter]

Exclusive Submasters
Submasters can be placed in exclusive mode. This prohibits storing the contribution of the submaster into any record targets. In essence, this acts as a fixed [-] [Sub] [Record] command.

To place a submaster in exclusive mode:
- [Sub] [5] [Exclusive] [Enter]

Priority
A submaster can be set to be independent, shielded, or no priority. This is done using the {Priority} softkey. Ion defaults to submasters as no priority.

Independent
You can also set a submaster to “independent”, allowing submaster values to remain unaffected by other submasters or playback fader instructions. They will, however, still be impacted by manual control, grandmaster, blackout, park instructions, or other play faders and submasters on independent.

Note: Inhibitive submasters cannot be set as independent.
Storing and Using Submasters

**Shield**

The content of a shielded submaster is automatically made exclusive and can't be controlled by anything other than that submaster and park, including by manual control.

Channels stored to shielded submasters will display in yellow with a superscript ‘s’ beside it.

If channel parameters stored to shielded submasters were previously stored to cues or other submasters, those instructions will be ignored on playback.

If the same channels are assigned to more than one shielded submaster, control of those channels will be shared on either a LTP or HTP basis depending on the settings for the submasters.

**Note:** *Inhibitive submasters cannot be shielded.*

**To toggle a submaster between priority options:**

- `[Sub] [7] (Priority) [Enter]`

**Restore**

Submasters can be placed into restore modes of minimum or previous, which is the default. When a submaster is in the restore to previous mode, the restore column of the submaster list display will be blank. When in minimum mode, 'Min' will display in the restore column.

The restore mode of previous means that when the submaster is returned to zero, control will be restored to the background value, such as another submaster or a cue.

The restore mode of minimum means that when the submaster is faded down, control does not go to the previous background state but to the parameters’ minimum value.

**To toggle the restore mode between “Previous” and “Min”:**

- `[Sub] [8] (Restore) [Enter]`

**Submaster Background State**

Submasters can have their background states disabled. Background states are enabled by default. When enabled, the content of the submaster will act as a background or previous state for other cues and submasters. When a submaster has its background state disabled, a “D” will be displayed in the Submaster List background column.

For example, cue 1 has channel 10 at 25%. Submaster 1 is raised and has channel 10 at 50%. Submaster 2 is then brought up and has channel 10 at Full. When submaster 2 is lowered to zero, control will be returned to submaster 1. If submaster 1 is lowered to zero, control will return to cue 1.

Using the above example, if submaster 1 has its background state disabled, which makes its content unavailable as a background state, then when submaster 2 is lowered to zero, control would return to cue 1 and not to submaster 1.

**To disable a submaster’s background state:**

- `[Sub] [9] (Background) [Enter]`
Changing Fader Pages

On Fader Wings
The fader wing is paged using the [Fader Controls] button on the Ion console. Fader pages are delineated in 10 fader increments. If you advance to the next fader page, your entire fader wing array will advance by a total of 10 faders.

To change the fader page of a fader wing:
Step 1: Press and hold the [Fader Controls] button on the Ion console. The LCD on the fader wing will display the available pages beneath the fader bump buttons.
Step 2: Press the bump button corresponding to the page you wish to display on the fader wing. The fader wing will display those faders after your selection is made.

On the Slider Module
The slider module is paged on Ion using the page buttons that are displayed to the right of the module. There are 30 available pages of sliders. Pages are delineated in 10 fader increments. Click on the appropriate page button to access that row of sliders. You can scroll through the available pages by clicking the arrow button(s) next to the page buttons.

Note: On a 2x10 fader wing, you can only access the first 19 pages of faders.
Loading Submasters

Submasters can be loaded with cues, presets, or palettes. You can convert an empty fader to a submaster without configuring it in setup. Any fader can be configured and loaded with a submaster if:

- the fader is not configured
- or-
- the fader is configured as a playback but has no cue list loaded to it
- or-
- the fader is configured as a submaster, but that submaster is empty.

Regardless of the fader configuration in setup, if the above conditions are met, the fader can be loaded with the submaster specified on the command line.

If a submaster with data (or a playback fader) already occupies the fader, that fader must be unloaded before another submaster can be loaded.

To release a fader that contains a submaster:

Step 1: Press and hold [Fader Controls].
Step 2: If necessary, select the fader page that contains the desired fader. Pressing the appropriate page bump button on the fader wing or use the page controls with the slider module.
Step 3: Press [Release].
Step 4: Press both buttons ([Load]) of the desired fader. The fader will be released but will remain configured as a submaster.

On Fader Wings

Faders on fader wings can be configured as submasters by pressing both buttons of the desired fader. In this instance, this acts as a [Load] button.

To load a fader with a submaster:

Step 1: Specify the submaster on the command line.
- [Sub] [5] [Enter]
Step 2: Press both buttons ([Load]) for the desired fader. The submaster will load to the fader.

On the Slider Module

- [Sub] [5] (Load) - loads submaster 5 to the fader associated with the load button.
- [Cue] [5] [Sub] [4] [Enter] - loads the contents of cue 5 to submaster 4 (a [CopyTo] command will appear within the syntax on the command line).
- [Cue] [5] (Load) - loads cue 5 to the submaster associated with the chosen load button.
- [+] [5] [Cue] [5] [Sub] [6] [Enter] - loads the contents of cue 5, minus channel 5, to submaster 6.
- [Cue] [1] [Thru] [5] [Sub] [1] [Thru] [4] [+] [7] - sequentially loads cues 1 thru 5 to subs 1, 2, 3, 4 and 7.
- [Cue] [1] [Thru] [5] [Sub] [1] [Thru] [Enter] - sequentially loads cues 1 thru 5 to subs 1 thru 5 (a [CopyTo] command will appear within the syntax on the command line).
Updating a Submaster

It is possible to make changes to a submaster in live mode. [Update] is used to store changes to a submaster.

- [Update] [Sub] [5] [Enter] - updates sub 5 to include changes in live output only for channels already in submaster 5. You can also press the bump button for submaster 5 to select it.

- [Channel list] [Update] [Sub] [5] [Enter] - adds only the specified channels to submaster 5.

Labels can be changed without restoring the contents as well:

- [Sub] [6] [Label] [xxxx] [Enter]
- [Sub] [6] [Label] [Label] [Enter] - removes the label.

Releasing Content From a Submaster

To release content from a submaster, use one of the following methods:

- [Fader Control] (Off) & [Load] - stops any running effects and fades out according to the (Restore) mode of the submaster.

- [Fader Control] (Release) & [Load] - behaves in the same way as (Off). (Release) does not unmap the fader.

- [Shift] & [Load] - behaves like (Off) and (Release) except that it will also unmap the fader.

Deleting a Submaster

You can delete a submaster using the [Delete] key. When a submaster is deleted, the slider remains configured as a submaster, but it will be empty.

- [Delete] [Sub] [5] [Enter] [Enter] - deletes the contents of sub 5.
Using Bump Button Timing With Submasters

Each submaster bump can have three different timing values: Upfade, Dwell, and Downfade (see below). The default timing is set so that the bump functions as an “on” flash key for additive submasters and an “off” flash key for inhibitive submasters. Effects on submasters will follow submaster timing, unless timing has been placed in the effect itself.

The three timing values are:

- **Upfade time** - this is the time for the submaster to fade from its home position to its target position (0 to Full if additive, Full to 0 if inhibitive). The default time is 0.
- **Dwell time** - this is the time the submaster look will hold before starting the downfade. This can be set to a specified time, or to “Hold” or “Manual”. “Hold” time maintains the submaster values until the bump is pressed a second time. “Manual” time applies the submaster values only as long as the bump is held. The default is “Manual”.
- **Downfade time** - this is the time for the submaster to fade from its target position to its home position. The default time is 0.

At any time, the potentiometer can be used to manually override fade progression or a submaster triggered with time.

To add bump button timing live:

- `[Sub] [8] [Time] [3] [Time] [4] [Time] [3] [Enter]` - adds a 3 second upfade, 4 second dwell and 3 second downfade to submaster 8.
- `[Sub] [2] [Time] [Time] [Manual] [Time] [3] [Enter]` - adds a manual dwell time and a 3 second downfade time to submaster 2. When the bump is pressed and held, it will flash on and stay on until the button is released, at which time it will begin the downfade.
- `[Sub] [4] [Time] [3] [Time] [Hold] [Enter]` - adds a 3 second upfade time, and a ‘hold’ dwell time. When the bump is pressed, the upfade starts. Once at the target value it will remain there until the button is pressed again. The downfade will “bump” to zero.
- `[Sub] [3] [Time] [Enter]` - resets all time for submaster 3 to default (Up = 0, Dwell = Manual, Down = 0).

Controlling Subfades Manually

It is possible to take control of submasters even if they have recorded time. To capture the fade you must push the potentiometer past the current fade level. Once this is done, control is transferred to the potentiometer for full manual control.

You may then use the potentiometer to increase or decrease the submaster level as needed.
Submaster List

You can access the submaster list by pressing [Sub] [Sub] or through the browser (Record Target Lists>Submaster List>[Select]).

The list view includes a list of all stored submasters including their label and all recordable properties. You can navigate within the list by using the [Next] and [Last] buttons or by selecting the desired submaster from the command line.

When this tab is active, the softkeys will repaint to supply you with options to affect the submaster type, or if the submaster is set to independent. You can also move a submaster using [Move To]. For example:

- [Sub] [1] {Mode} [Enter] - toggles the submaster 1 between “additive”, “effectsub”, and “inhibitive”. This can be done in live as well.
- [Sub] [2] {Independent} [Enter] - toggles submaster 2’s independent setting on and off. Independent can only be activated on an additive submaster.
- [Sub] [2] {Move To} [Sub] [9] [Enter] [Enter] - moves the contents, label, and timing data from submaster 2 and places it in submaster 9. Submaster 2 is removed.

You may copy the contents of a submaster by using the [Copy To] button.

Editing Submasters

If you want to actually edit the contents of the submaster, you can select the submaster and press {Edit}. This changes focus to the live/blind display and places you into the blind edit mode for the specified submaster. You may also press [Blind] and select the required submaster from the command line.

Any changes made in this screen are automatically stored. A [Record] or [Update] command is not required.
Chapter 21
Using About

[About] provides detailed information regarding selected elements. When opened, it appears in the CIA and remains open until closed or until another action forces it to close.

This chapter contains the following sections:

- [About] ......................................................... 269
- About System .............................................. 269
- About Channel ............................................ 270
- About Address ............................................. 272
- About Cue .................................................... 275
- About IFCB Palettes ................................. 275
- About Presets ............................................. 275
- About Groups .............................................. 275
- About Curves .............................................. 276
- About Effects .............................................. 276
About [About]

Pressing [About] puts the console in “about” mode, which allows you to examine “about” information indefinitely, simply by selecting the element you are interested in.

When in about mode, selecting a channel will reveal information about that channel. Below are examples of the “Current Values” view (see below) of information that is presented when selecting conventional or moving lights.

The buttons on the right side of the about screen alter the information that is displayed for the selected channel. The selected button is highlighted in gray. The buttons are:

- **(Current Values)** - this shows any current information that the channel is receiving and following.

- **(Background)** - this displays any information that is being sent to the channel, but not adhered to since another source has ownership of the channel.

- **(Moves)** - this shows the previous move, value of the previous move, the next move, and its value.

- **(Usage)** - this shows where and how a channel is used.

- **(Patch)** - this displays patch information about the channel.

- **(Lamp Controls)** - this displays any parameters and available RDM commands associated with the channel. If the channel is a conventional (intensity-only) fixture, no parameters will be displayed. If it is a moving light, this key will access lamp controls.
[About]
When [About] is pressed, the CIA presents the following information:

- Channel count for the console
- Software version
- Copyright notifications
- Device name
- Assigned as (Primary/Backup/Client/Offline)
- User ID
- Number of patched and unpatched addresses
- Priority (ACN and Net2)
- IP Address

About System
When {About System} is pressed, the CIA displays a list of all network devices that are connected to Ion. These network devices include:

- Consoles
- RPU and RPU3
- Net3 RV1 and RV/3
- PC & Mac Clients
- Net3 Show Control Gateways
- Net3 I/O Gateways
- Legacy Unison CMEi processors
- Unison Paradigm processors
- CEM+ and CEM3
- Net3 Gateways
- ETCNet2 Nodes

Each network device will display the following information:

- Device Type
- Name/Component
- Status
- Connected
- IP Address

**Note:** Devices may appear more than once in this list if they have multiple roles on the network.

**Note:** If any errors or warnings are present at the rack, the CEM+ / CEM3 will display in red.
Clicking on a CEM+ / CEM3 in the **About System** list will open the About Rack display, which shows the following information about the rack:

- Rack Name (displays as the title)
- Type
- Ambient Temperature
- Phase A, B, C Voltages
- Frequency
- System Number
- IP Address
- Software Version
- Rack Errors

Buttons available in the About Rack screen are **(Activ. Preset)**, **(Deactiv. Preset)**, and **(Clear Errors)**.

---

**Note:** Clearing CEM+ / CEM3 errors from Ion will be temporary unless the errors have been fixed at the CEM+ / CEM3. Errors displayed on Ion will clear on their own once they have been cleared from the CEM+ / CEM3. Some CEM+ / CEM3 errors can only be cleared at the CEM+ / CEM3.

---

**About Channel**

Press **[About]** to put the CIA into “About” mode. When a channel is selected, the information below is displayed. You can select the information you wish to view from the buttons located on the right side of the CIA. The buttons are:

**{Current Value}** displays information that indicates:

- Channel number
- Device Type
- Most recent intensity move (cue number)
- Next intensity move
- What the channel is inhibited by (if anything)
- Keywords
- Notes
- A list of all parameters on the channel showing the current value and its source, the DMX value, the absolute value, delay and timing information, marking information, and any parked values.

**{Background}** displays similar information:

- Channel number
- Device Type
- Keywords
- Notes
- A list of all parameters on the channel showing the background value and its source, which shows what the parameters will go to if the current control source is removed. The background data will be represented by the standard color coding scheme.
**Moves** displays information that shows:

- Parameters
- Previous move in the cue list that currently has ownership
- Value of the previous move (preset, palette, or absolute data)
- Next move
- Value of the next move (preset, palette, or absolute data)

**Usage** displays information on how the channel is used, such as:

- Maximum Intensity
- Cue lists it is used in
- Total number of cues it appears in (based on intensity)
- Total number of intensity moves
- List of submasters that include the channel
- List of cues that have move instructions for the channel
- List of cues with dark moves for the channel
- List of cues that the channel is active in
- List of groups that include the channel

**Note:** While in the **Usage** screen for About Channel, if another channel is selected, you will need to hit the **Refresh Usage** button to see the information for the new channel.

**Patch** displays the following information:

- Address range
- Proportional patch level
- Curve (if any)
- Preheat information (if any)
- Swap/invert pan/tilt status
- Keywords
- Notes
- List of all parameter values with their address, home value, snap parameter, DMX value, and parked value (if any)

**Lamp Controls** displays controls for the lamp, available RDM commands, or other parameters of the device (if it is a moving light).
About Address

Press [About] to put the CIA into "About" mode. When an address is selected, the information below is displayed. You can select the information you wish to view from the buttons located on the right side of the CIA. Additional buttons may display based on RDM and Sensor Feedback if enabled. The buttons are:

(Address) displays the following information:
- Address number (displayed as straight address and port/offset)
- Dimmer label (if any)
- Associated channel number, which is a hyperlink to the [About] channel display.
- Part number (if any)
- Notes
- Output value (ACN, Net2, ArtNet, Avab UDP, or DMX)
- Current output value and source of output
- Parameter controlled by the address
- Home Value
- Basic patch information
- Extended patch information (if available)
- If it is a scroller, color/gobo wheel, the assigned scroll or wheel is indicated

(Next Part) & (Last Part) will advance to the next part or go back to the previous part. These buttons only display for addresses with parts.

(Go To Patch) is a shortcut to edit the patch for the address selected. This will open up the patch display.

(Library Data) displays the following information:
- Revision number
- Release date
- Open issues list (if available)
- Usage notes including switch settings and configuration (if available)
- Alternate fixture names (if any)

(Lamp Controls) displays controls for the lamp or other parameters of the device (if it is a moving light).

(Address Check) will bring current address to full.

(Next/Last Unpatched) will allow you to see what addresses closest to the current address are currently unpatched.
(Dimmer Feedback) - appears when the current address is patched to a dimmer in an ETC Sensor rack with a CEM+ or CEM3. Sensor feedback must be enabled. See Sensor Feedback, page 343 and Errors and Warnings, page 86 for more information.

**Note:** For Sensor feedback, the CEM+ must be running software version 3.0 or later.

(Dimmer Feedback) displays the following information:

- Name (dimmer name)
- Module type
- Rack/Position
- Rack dimmer level (displayed as a percentage)
- Rack dimmer source
- Recorded load
- Actual load

(Dimmer Feedback) displays the following information, which can be modified from Ion by clicking on the value and entering in a new value:

- Firing Mode
- Control Mode
- Curve
- Threshold
- Scale Minimum
- Scale Maximum
- Preheat Enable
- Preheat Timing
- Advanced Features (AF) Enable

Ion supports the following softkey commands from this display:

- (Ignore Errors)
- (Clear Errors)

**Note:** Clearing CEM+ / CEM3 errors from Ion will be temporary unless the errors have been fixed at the CEM+ / CEM3. Errors displayed on Ion will clear on their own once they have been cleared from the CEM+ / CEM3. Some CEM+ / CEM3 errors can only be cleared at the CEM+ / CEM3.
**Device Details** - appears when the current address is patched to a RDM device. RDM devices must be enabled through the ECU and discovered through the patch. See [RDM, page 343, (Patch) Display and Settings, page 76, and Errors and Warnings, page 86.]

**Device Details** displays the information that it receives from the device and allows some changes to be made to:

- Device Label (displayed at the top by the address number)
- DMX Address (can be changed in this display by clicking on the property or value)
- DMX Label (same as the device label, but the label can be changed here by clicking on the property or value)
- Type
- Manufacturer
- Device ID
- Footprint
- Version
- Lamp State
- Lamp Hours
- Head DC Voltage
- Lamp On/Off
- Gel Distance Traveled
- Gel2 Distance Traveled
- Fan RPM
- Ambient Temperature
- Gel Temperature
- Device Errors (will only display if there are current errors)
- Clear Errors

Device Errors are displayed in four different colors depending on severity.

**Note:** Color severity is determined by the device manufacturer.

- Gray - unknown or not an error
- White - Advisory
- Yellow - Warning
- Red - Error

**Note:** Changing the address can not cause any part of the fixture to move to a different universe or communication with the device may be lost. The universe is set into the gateways port configuration.

**Note:** Details displayed will vary based on the device.

**Note:** Changes may take a few seconds to take effect. They will propagate to the RDM device and then back to the console’s patch and about displays.

**Note:** Details displayed will vary based on the device.
**About Cue**

The following information will be displayed when a cue is selected:

- the cue number
- timing data for the cue (including discrete timing)
- flags
- attributes
- number of moves per IFCB provided by the cue
- current status of the cue
- what channels move in the cue
- any effects running
- external links

**About IFCB Palettes**

The following information will be displayed when an intensity, focus, color, or beam palette is selected:

- the number of cues the palette is used in
- the number of presets the palette is used in
- the number of channels
- the first cue the palette is used in
- the last cue the palette is used in
- the number of cue lists that use the palette

**About Presets**

When a preset is selected, the following information will be displayed:

- the number of channels
- the first cue the preset is used in
- the last cue the preset is used in
- the number of cue lists that use the preset

**About Groups**

When a group is selected, the following information will be displayed:

- the group label (if any)
- the channels in the group

The **(Ordered)** and **(Numerical)** softkeys can be used to change the display view in About Groups.
About Curves
When a curve is selected, the following information will be displayed:
- curve number
- the curve label (if any)
- the channels that use the curve in patch
- the channels that use the curve as a fan curve
- the cues/cue parts that use the curve

About Effects
When an effect is selected, the following information will be displayed:

Note: To view About Effect in live, the effect must be running.

- effect number
- effect label (if any)
- list of submasters that use the effect
- list of cues that use the effect

Note: Any cues or submasters that have overrides, such as rate, for the effect will display an *.
A curve is a relationship between the timing of a fade and the output level of a cue, cue part or dimmer at each point of time during that fade. By using a non-linear curve, you can create a variety of effects, accommodate variations and deficiencies in your lighting equipment, alter the transition ramp, and protect equipment from stress.

This chapter contains the following sections:

- **About Curves** ........................................ 278
- **Creating a Curve** ................................... 279
- **Editing Curves** ................................. 280
- **Applying a Curve** ............................... 281
- **Delete a Curve** ................................. 281
About Curves

You may apply curves to dimmers in patch. Curves may also be applied to cues, to cue parts, and to scroller fans. When applied to a cue, the curve impacts only the intensity moves in that cue. When applied to a cue part, the curve impacts all parameter moves stored in that cue part.

When applied in patch, the intensity transition will follow the ramp defined by the curve during its fade. This value is determined by referencing the output value of the curve at that percentage and outputting the curved level rather than the percent level. Up to 100 points of delineation can be established in a curve, each with its own intensity value if desired.

When applied to a cue, the “percent completion” of the cue is determined by applying the curve’s output level as the percent completion for all fade calculations. For single-part cues, the calculation applies only to intensity. For multipart cues, however, the curve applies to all parameters in the part.

When applied to a scroller fan, the output of the fan will be controlled by the intensity of the channel.

Ion provides ten pre-programmed, commonly used curves. They can be edited or copied to a new curve location. When a pre-established curve is deleted, it will return to its original state.

The curve editor can be accessed by pressing [Displays] (Curve) or from the browser, Browser>Record Target Lists>Curves. When selected, the curves list will open as a separate tab and the CIA will show the graphical output of the first curve in the list.

You can scroll through the list using the [Next] and [Last] keys, or you can specify a curve in the command line.

- {Curve} [9] [0] [4] [Enter] - selects curve 904 from the list and displays its shape in the CIA.
Creating and Editing Curves

Creating a Curve

When you have opened the curves display (see About Curves, page 278), you can select a curve or create a new curve by pressing:

• (Curve) [x] [Enter]

If the curve is already stored, the contents are displayed in the CIA. If this is a new curve, a linear curve is displayed.

Pre-established Curve

New Default (linear) Curve
**Editing Curves**

**Using the Keypad**

Once selected and displayed in the CIA, you can edit a curve from the keypad. Points are established in increments of five. You can add more points from the keypad.

- `3 [At] 1 [Enter]` - adds control input point “3” and sets its curve level at 10%.
- `7 [7] [At] [Full] [Enter]` - adds control input point “77” and sets its curve level at full.

You can specify points and adjust their levels in the command line or you may use the keys below to alter the curve:

- `[Page ↗]` - selects the next fade completion point.
- `[Page ↘]` - selects the previous fade completion point.
- `[Level Wheel]` - adjusts the output level of the selected point.
- `[Page ▲]` - raises the selected point’s output by 1%.
- `[Page ▼]` - lowers the selected point’s output by 1%.
- `[Full]` - sets the selected point’s output to full.
- `[Out]` - sets the selected point’s output to zero.
- `[Shift] & [+]-` raises the selected point by the amount for +% established in setup.
- `[Shift] & [-]` lowers the selected point by the amount for -% established in setup.

**Using the curve display**

Once a curve is displayed in the CIA, you can press {Edit} to edit the curve in the editor display. In the curve editor you can trace the desired shape of the curve using the mouse on the screen. As you progress through drawing the curve, intensity values will be added for existing points on the curve. If you add points to the curve (from the keypad) those points will be adjusted as well.

You can also toggle between an “interpolated” or “stepped” curve shape. Ion defaults to “interpolated”. To switch to “stepped”, press the {Stepped} softkey. Once pressed, this softkey changes to {Interpolated}, which allows you to switch back.

Below are two examples of the same curve. The first is interpolated and the second is stepped.

![Interpolated Curve](image)

![Stepped Curve](image)

**Clearing the curve**

At any time, you can clear a curve from the curve editor display by pressing the {Clear} softkey. This will return the curve to its original linear shape or to its default shape if it is a pre-established curve.
Applying a Curve

To Channels In Patch

Curves can be applied to any intensity parameter in patch. Once added, the curve number appears in the channel’s “Curve” column of the patch display. Pressing (Curve) in Patch>Attributes will display a list of available curves.

- [Displays] (Patch) (Attributes) [1] (Curve) [9] [0] [1] [Enter] - applies curve 901 to channel 1 intensity.
- [Displays] (Patch) (Attributes) [2] [Thru] [8] (Curve) [2] [Enter] - applies curve 2 to intensity for channels 2 thru 8.
- [Displays] (Patch) (Attributes) [1] (Curve) [At] [Enter] - removes the curve from channel 1.

To Cues

Curves can also be applied to cues or cue parts in Live/Blind. This affects the percent completion of the cue or part by applying the curve’s output level as the percent completion for all fade calculations. Once added to a cue, the curve number appears in the cue’s “Curve” column of the cue list in the playback status display.

- [Cue] [5] <More SK> (Curve) [At] [Enter] - removes any curve from cue 5.
- [Cue] [8] [Part] [3] (Curve) [6] [Enter] - applies curve 6 to part 3 of cue 8.

To Scroller Fans

Curves can also be applied to a scroller fan. When applied to a scroller fan, the output of the fan will be controlled by the intensity of the channel. To apply a curve to a scroller fan, go to Patch>Attributes> (Fan Curve). See “Scroller Fan Curves” on page 71.

Delete a Curve

While in the curve display, you can delete a curve in the following ways:

- [Delete] (Curve) [3] [Enter] [Enter] - deletes curve 3 from the list.
- [Delete] (Curve) [9] [0] [1] [Enter] [Enter] - since curve 901 is a pre-established curve, this command will return curve 901 to its default state, thereby removing any edits to it.
- [Delete] [Enter] - deletes the currently selected curve.
Chapter 23
Storing and Using Snapshots

Snapshots are record targets that store the current state of the Ion console and monitor configuration. These can then be recalled to instantly reset the console and displays to the state stored in the snapshot. You can choose which parts of the console and displays you wish to store as a part of the snapshot.

This chapter contains the following sections:

- **About Snapshots** ........................................... 284
- **Recording Snapshots** ................................. 284
- **Recalling Snapshots** ................................. 285
- **Editing Snapshots** ................................. 285
About Snapshots

When you record a snapshot, aspects of the Ion user-interface, based on user-preference, are stored so that you can recall them in the future. This allows you to bring the console back to a desired state quickly.

Snapshots can be used on Ion RPU or Net3 RVI to change what is currently displayed on the external monitors and how that information is displayed.

Snapshots contents are global. They can be stored and recalled on any control interface, other than Net3 RFRs. When recorded, they store the relevant settings of the device initiating the record. When recalled, they recall only the controls that are appropriate on the device the snapshot is recalled.

Control areas that may be stored in a snapshot are:

- Direct Selects - records the configuration, mapping, and current page of any direct selects in use.
- Encoders - records the current page of the encoders.
- Faders - captures the current state of all the faders including: current page, current fader configuration, position of all submasters and playbacks, any fader attributes, and pending cues.
- Monitors - records the current display and configuration of the external monitors.
- Filters - records the current setting of the record filters.

Note: Snapshots that store the faders do **not** include the active cue in a fader. They only include pending cues and fader attributes.

When snapshots are recorded, you can view them in the snapshot list. To view the list, navigate to Browser>Record Target Lists>Snapshots.

Recording Snapshots

To store the current state of the console, record a snapshot.

For Example:

- **[Record] (Snapshots) [1]**

  The CIA will display buttons representing the following areas of console:

  - Monitors
  - Faders
  - Encoders
  - Direct Selects
  - Filters

  By default, all of these elements are selected for storing. If you wish to store only some of these elements, select those desired by touching the button in the CIA. Selected elements will be highlighted in gray.

  - **(Monitors) (Encoders) (Direct Selects) [Enter]**

  You can label snapshots or attach notes as desired.

  - **(Snapshots) [1] [Label/Note] [text] [Enter]**
Recalling Snapshots

Snapshots can be recalled in the following ways:

- from the keypad/command line - \{Snapshots\} [5] [Enter]
- from cues using the execute list
- from a recorded macro instruction
- from the direct selects - \{Snapshot 4\}

Since snapshots can be recalled from any device (except RFRs) on the Ion network, snapshots may be affected by the type of device they are recalled on. If the recalling device does not have the same physical layout or has other limitations that differ from the recording device, Ion will map the snapshot to the best of its ability.

---

Note: In a system with multiple users, it is recommended that you allot discrete snapshot numbers for each user. Since snapshots are global and can be recorded/recalled from most devices, assigning numbers for each user will ensure their snapshots are stored and edited properly for their device.

---

Editing Snapshots

To edit or preview the contents of a snapshot, navigate to Browser>Record Target Lists>Snapshots.

You can use [Next] and [Last] to navigate the list or you may specify a snapshot in the command line.

Once a snapshot is specified, the list displays five columns, one for each element. You may change the enabled elements by pressing the CIA buttons or the softkeys found beneath the CIA. If an element is added to the command line using the softkeys, it will be enabled when [Enter] is pressed. All other elements will be disabled.

For Example:

- `<Snapshots> [3] (Monitors) [Enter]`

This command will enable the monitors for snapshot 3 and disable any other elements.

Deleting Snapshots

You may delete snapshots using the following syntax:

- `[Delete] [Snapshots] [2] [Enter]`
- `[Delete] [Snapshot 5]`
Chapter 24
Storing and Using Macros

Ion provides you with the ability to record macros, which allow you to compose a series of programming actions and be able to execute them later by recalling the macro.

This chapter contains the following sections:

• About Macros ................................................. 288
• Store a Macro from Live ................................. 288
• Macro Editor Display ................................. 290
• Play a Macro ................................................. 294
• Delete a Macro ................................................. 294
About Macros

Macros are comprised of any series of button presses (both hard and softkeys), screen commands and events. Ion provides you with the macro feature to simplify complex or repetitive console programming and operating tasks that you perform often.

When you record the series of button presses to a new macro, you can later play it back by simply pressing the macro direct select button, running it from a linked cue, accessing it from a connected show control system, remotely triggering the macro, or running it from another recorded macro.

You may create up to 1,000 macros either from live, using the macro [Learn] mode to record a sequence of keystrokes as you perform the operation, or you can create a macro from within the macro editor display, entering and editing keystrokes into the macro content editor without actually executing the instructions.

The macro editor display contains a listing of all recorded macros including labels and the contents of the macros stored. All macro editing is accomplished from the macro editor display.

Store a Macro from Live

The most effective way to store a macro is from live mode using the macro [Learn] mode to record a sequence of button presses as you enter them. You can include any button press on the console (hard key or soft key), except [Macro], the arrow keys, [Escape], [Select], and [Learn].

Using the [Learn] key

Pressing the [Learn] key while in live mode places the console in macro learn mode. The [Learn] key flashes and the CIA displays “Learning” above the command line. Assign a number identifier (from 1 to 1000) to the Macro using the control keypad and press [Enter]. The CIA flashes “Learning Macro ####” above the command line. This indicates that the console is ready to record the macro.

Note: It is helpful if you plan your macro content in advance of the macro record process. While in learn mode, each button press is recorded as content, even the [Clear] button if you have mistaken a keystroke. There is no way to fix a content error in live mode, but you can rerecord the macro as needed or you can edit the recorded macro in the macro editor, removing any unneeded commands. See “Edit an Existing Macro” on page 293.
Begin writing the sequence of button presses and events for the macro record. When you have finished with the series of events and button presses, press the [Learn] key again to exit macro learn mode.

Examples of a macro record function include:

- **[Learn] [1] [Enter] [Go To Cue] [Out] [Time] [0] [Enter] [Learn]** - records macro 1 with the go to cue out command.

- **[Learn] [5] [Enter] [1] [Full] [Chan Check] [Enter] [Learn]** - records macro 5 with channel 1 at full in channel check mode. To check the next channel in the list, press [Next].

- **[Learn] [4] [Enter] [-] [Sub] [Record] [Learn]** - records macro 4 with instructions to record a target excluding all submaster data.

- **[Learn] [2] [Enter] [-] [Group] [6] [Color] [Record] [Learn]** - records macro 2 with instructions to record a target excluding the color data from group 6.

You can also create a macro in live that bumps submasters across fader pages but first you must have content assigned to the submasters.

**For Example:**

Write submasters 1 through 5 and 15 through 17, each with its own channel selections at 100%. Then press:

- **[Learn] [1] [Enter] [Bump1] [Bump2] [Bump3] [Bump4] [Bump5]**

- **[Fader Page]**

- **[Bump15] [Bump16] [Bump17] [Learn]**

Once you have created the macro from Live in [Learn] mode, you can easily edit the sequence from the macro editor display. See "Macro Editor Display" on page 290.
Macro Editor Display

Macro editing is accomplished from the macro editor display. As an alternative to recording your macro in live, you may create it from this display instead. Open the macro editor display from the browser by navigating to Record Target Lists > Macro Editor, then press [Select]. The editor will display on an external monitor.

The display is divided horizontally, the top portion displays the macro contents in detail while the bottom portion lists all macros, including the label and contents.

While in the macro editor display, any numeric entry on the command line is assumed to be a macro number. If the macro number entered already exists and [Enter] is pressed, the macro list will page to the selected macro and the macro content detail section will display all of the contents of the selected macro. If the macro number entered does not exist in the list and [Enter] is pressed, an empty macro will be created with the specified macro number.
While in the macro editor display, the following functions may be performed using the control keypad and softkeys:

- **[Label]** - when a macro is selected and [Label] is pressed, the alphanumeric keypad will display on the CIA. Label the macro and press [Enter].
  - ![1][Label] <name> [Enter] - labels macro 1

- **[Delete]** - when a macro is selected and [Delete] [Enter] is pressed, you will be prompted to confirm the deletion of the selected macro. To confirm press [Enter], to abort press [Clear].
  - ![1][Delete] [Enter] - deletes macro 1 from the list.

- **[Copy To]** - when a macro is selected and [Copy To] is pressed, you will be prompted to enter the macro number that you want to copy the contents of the selected macro to. You will be prompted to confirm the copy process, press [Enter] to confirm or [Clear] to abort the copy to process.
  - ![1][Copy To] [6] [Enter] [Enter] - copies the entire contents of macro 1 to macro 6.

- **(Edit)** - when a macro is selected and (Edit) is pressed, you will have entered edit mode for the selected macro. Three notable changes to your macro editor display include:
  - A blinking cursor in the macro content detail portion (top) of the display.
  - “Press [Select] to save or [Escape] to cancel changes” flashes above the command line.
  - The available softkeys change to (Loop Begin), (Loop Num), (Wait), (Delete), (Cancel), and (Done).

- **(Move To)** - allows you to move and reorganize your macros anywhere in the macro list numerically.
  - For instance, if you have macros 1 through 5 in the list, and you want to move or change macro 1 to macro 6 so that your most commonly used macros are first in the list, you would press ![1](Move To) [6] [Enter]. This leaves only macros 2 through 6 in the list.

- **(Macro Mode)** - allows you to assign different modes for the macro to run in. There are three modes: background, foreground, and default.
  - **(Default)**
    - When a macro in default mode is run manually, it runs in the foreground (i.e., the command line) on the device that fired it. When a macro in default mode is executed by a cue or via show control, it runs in the background on the master device.
    - Running a macro on a master device only matters when the macro changes the displays of the device it runs on such as snapshot and flexichannel macros.
  - **(Background)**
    - When a macro in background mode is run manually, it runs on the device that fired it but will not affect its command line.
    - A macro in background mode that is run from a cue or via show control will run on the master device but will not affect the master’s command line.
    - When a background macro is running and includes a link to another macro, or is currently waiting, pressing the [Macro] button will stop it.
  - **(Foreground)**
    - When a macro in foreground mode is run manually, it runs on the device that fired it and affects its command line.
    - If a foreground mode macro is fired via show control, it runs on the master device and will affect its command line.
    - If a cue fires the macro, it will run on the device whose user last pressed [Go] on that playback. If a foreground macro is fired from a cue that is executed from another cue list, the macro will run on the device that last pressed [Go] on the cue’s playback but not the playback that triggered the executed cue.
Create a New Macro from the Display

From the macro editor display, enter any unrecorded macro number from 1 to 1000 and press [Enter]. Your new macro number will display in the macro list in numerical order but will not have a label or any contents.

To store the macro contents, select the macro and press (Edit). A cursor appears flashing in the macro content detail portion of the display, ready for you to add the macro content.

For Example:
Create macro 3. Write the instruction to set all active channels to 50%, then sneak them to their original levels over 10 seconds and last, link to macro 5.

- <Macro> [3] [Enter]
- (Edit)
- [Group] [5] [At] [5] [Enter]
- [Sneak] [Time] [1] [0] [Enter]
- [Macro] [5] [Enter]
- [Select]

While in macro edit mode, all keys are entered as content except the macro editor softkeys, arrow keys, [Escape], [Select] and [Learn] keys.
Edit an Existing Macro

When you have created a macro using macro learn mode from live or otherwise, you can edit the content of your macro by removing or adding commands and special macro softkey functions (such as wait, loop, and so on).

From the macro editor display, select an existing macro number and press [Enter]. The selected macro contents will display the detail section. Press [Edit] to make changes to the content.

When in edit mode, the browser changes to display all softkeys available for the system that would otherwise be difficult to find when recording a macro.

Next to the softkeys display are paging buttons to page through the available softkeys. When used, these paging buttons will not be stored as content in your macro.

In addition, a new set of macro editor softkeys are displayed while in edit mode including:

- **{Loop Begin}** - inserts a loop start command.
- **{Loop End}** - inserts an end command for a loop with a limited number of iterations. An infinite loop is assigned when you use “0” for the iterations.
- **{Wait}** - inserts a pause for a period of time. This needs to be followed with a whole number of seconds.
- **{Delete}** - removes commands from the macro.
- **{Wait for Input}** - Inserts a pause in the macro to allow you to enter data. The pause lasts until you press the [Macro] key again. Then the remainder of the macro will be completed.
- **{Done}** - exits macro edit mode. You may also use the [Learn] key to enter and exit edit mode.

In edit mode, the cursor in the macro content detail section of the display provides use of the arrow keys to navigate through the existing content list. Use of the arrow keys will not be stored to the macro content.

To add content, place the cursor in the section that you want to insert, then add the command. To delete a command, place the cursor ahead of the content to be deleted, then press the [Delete] softkey.

Press [Select] when you have completed all editing. Press [Escape] to abort.

**Note:** Macros for options with a toggle action between enable and disable, such as AutoMark in setup, can use the [Enable] and [Disable] softkeys for creating absolute actions instead of toggles.
**Play a Macro**

You can play a macro from the command line, from the direct selects, run it from a linked cue, or from another macro.

To play macro 5 from the command line press `[Macro] [5] [Enter]`. “Running Macro 5” displays above the command line in live while the macro is running.

To run macro 5 from the macro direct selects simply press `(Macro 5)`. “Running Macro 5” displays above the command line in live while the macro is running.

To run macro 5 from cue 1 press:

- `[Cue] [1] (Execute) [Macro] [5] [Enter]

If you would like to run multiple macros from cue 1, press:

- `[Cue] [1] (Execute) [Macro] [6] [Enter]
- `[Cue] [1] (Execute) [Macro] [7] [Enter]

Each macro has to be entered individually. The previous example would result in macros 5 through 7 being executed from cue 1.

To run a macro from another macro, see the example under Create a New Macro from the Display.

**Stop a Macro**

If you need to stop a macro while running (for example, during an infinite loop) you may press [Escape] and the macro will stop.

**Delete a Macro**

You can delete a macro from the macro editor display by selecting the macro and pressing `[Delete] [Enter]`. You will be prompted to confirm the deletion. Confirm by pressing [Enter] again, or abort by pressing [Clear].

*For Example:*

Delete macro 5 from the macro list.

- `[5] [Enter]
- `[Delete] [Enter] [Enter]

Or from any display:

- `[Delete] [Macro] [5] [Enter]
Chapter 25
Using Magic Sheets

Magic Sheets are user created custom interactive displays.

This chapter contains the following sections:

- About Magic Sheets ........................................ 296
- Magic Sheet Display ......................................... 297
- Navigating a Magic Sheet ................................. 299
- Creating and Editing Magic Sheets ...................... 300
- Examples of Magic Sheets ................................. 309
About Magic Sheets

Magic Sheets are user created interactive displays that offer customizable views for displaying data and programming. Magic Sheets are comprised of objects that are tied to show data, such as channels and palettes.

The following are two examples of magic sheets. For additional examples, see Examples of Magic Sheets, page 309.
Magic Sheet Display

You can first open the magic sheet display by pressing [Displays] {Magic Sheet} [Enter], or you can navigate within the browser to Displays> Magic Sheet Display> new and press [Select].

After you have created a magic sheet, you can recall a specific magic sheet, by pressing [Displays] (Magic Sheet) [#] [Enter] or you can navigate within the browser to Displays> Magic Sheet Display and press [Select].

All available magic sheets will be displayed in the magic sheet browser.
**Magic Sheet List**

Double pressing *(Magic Sheet)* or CTRL+S on an external keyboard will open the magic sheet list. The magic sheet list displays a list of all created magic sheets, their labels, and how many views have been saved for each magic sheet. See *Display Tools* for more information about views.

To label a magic sheet, use the syntax *(Magic Sheet) [#] [Label] <name> [Enter].*

Pressing *[Label]*, when a label has already been applied to a magic sheet, will display the label on the command line for editing. Pressing *[Label]* a second time will clear the label, or you can press *[Clear]* to remove the label one character at a time.

**Display Tools**

Clicking on the triangle in the bottom left corner of the magic sheet display will open a list of the display tools.

These tools include:

- **Add View** - different views of the same magic sheet can be saved and recalled. Zoom and pan the display to change the view, and then click *(Add View)* to save. To change views, you can use the arrows in the display tools or multi-touch gestures. You can also press *(Magic Sheet) [1] [/] [2] [Enter]* to view Magic Sheet 1, View 2. See "Multi-Touch Gestures" on page 299.

- **Save Screenshot** - saves a .png screenshot of the magic sheet to an attached USB drive.

- **Magic Sheet Browser** - opens the magic sheet browser, which displays thumbnail images and labels for the created magic sheets. The browser can also be opened using multi-touch gestures. See "Multi-Touch Gestures" on page 299.

- **Lock** - locks the magic sheet so it cannot be zoomed or panned. This is useful for a customized direct select layout, where you want the buttons to always be in the same spot.

- **Zoom to All** - zooms to show all objects.

- **Zoom to Selection** - zooms to show all selected objects.

- **Center on Selection** - centers the display on the selected objects without changing the zoom level.
Navigating a Magic Sheet

Magic sheets can be navigated using a mouse, a keyboard, a touchscreen, or a multi-touch touchscreen. The drag and drop function for placing objects is a single touch action or done using a mouse.

Additional mouse commands include:

- **Left Click** - selects an object.
- **Right Click** - pans the display.
- **Wheel** - zooms the magic sheet.
- **[Shift]+ Wheel** - provides a fine zoom of the magic sheet.

![Selecting from left to right will open the blue window selection box. This selects any object that is completely inside of the box. This can be done with a single touch or using a mouse.](image1)

![Selecting from right to left will open the green crossing selection box. This selects any object that either crosses the boundary line of the box or is completely inside of it. This can be done with a single touch or using a mouse.](image2)

Multi-Touch Gestures

The following multi-touch gestures can be used with an external multi-touch touchscreen.

- **Scroll** - touch with two fingers to move around the page.
- **Zoom Out** - touch with two fingers and then move your fingers toward each other.
- **Zoom In** - touch with two fingers and then move your fingers away from each other.
- **Zoom to All** - double tap with two fingers.

The following multi-touch gestures can be used with monitors that support 3 or more simultaneous touches:

- **Jump to Previous View** - use three fingers to swipe upwards or to the right.
- **Jump to Next View** - use three fingers to swipe downwards or to the left.
- **Magic Sheet Browser** - tap with three fingers to open the browser.

Keyboard Shortcuts

With an external alphanumeric keyboard attached, the following keyboard shortcuts can be used:

- ARROW KEYS - move selected item or navigate when nothing is selected.
- SHIFT - move/rotate item without snapping to grid.
- SHIFT + mouse wheel - provides a fine zoom of the magic sheet.
- CTRL+S - double tap to open the magic sheet list.
- CTRL+A - select all
- CTRL+C - copy
- CTRL+V - paste
- CTRL+X - cut
- CTRL+G - group
- CTRL+SHIFT+G - ungroup
- DELETE - delete
- ESC - finish line/polygon creator or close tab.
Creating and Editing Magic Sheets

Pressing the edit button on the right hand side of the magic sheet display will open the editing tools.

The main area of the magic sheet will display a grid to aid with layout. The editing tools will be displayed on the right side of the magic sheet. The editing tool window is divided up into three areas: layout tools, the MS Object Library, which is made up of four tabs that contain the MS Objects, and the MS Object Properties.

You can drag and drop objects onto the magic sheet, or you can use the layout tools to create arrays of objects.

**Note:** To see a description of a tool or object, hover your cursor over it. Its title will display after a second or two.

**Note:** Holding down [Shift] while placing an object will bypass the snap to grid behavior.

**Quick Save**

Clicking on the *(Quick Save)* button allows you to save an undo restore point for the magic sheet you are working on. Once saved, a green check mark will temporarily appear next to the *(Quick Save)* button.

It is recommended that you click *(Quick Save)* before making any major changes to the magic sheet that you think you might want to undo. *(Undo) Enter* will take the magic sheet back to the last undo restore point. An undo restore point is also set whenever you exit the editor.

Quick saving a magic sheet will also send any changes made to the magic sheet to all the devices in a multiconsole system.
Layout Tools
The layout tools are divided into four areas: edit mode, zoom, alignment, and ordering.

Edit Mode
Clicking on the arrow will open the edit mode options, which include:

- **Grid Enabled** - toggles between a grid being displayed and no grid. With the grid enabled, the magic sheet will also have a snap to grid behavior when placing objects.
- **Normal** - allows for dragging and dropping of objects from the object list.
- **Quick Layout** - allows you to place more instances of a selected object. When finished, click the **Done** button or change the layout mode to normal.
- **Quick Number** - used to quickly assign target numbers to objects. While in quick number mode, clicking on an object will assign the selected target and increment the numbers as specified in the target section of edit mode.
- **Target** - used to specify object, starting target number, and incrementation for use in quick number mode.
  - **Object** assigns the object from the list.
  - **Start** assigns the starting target number.
  - **Increment** assigns what incrementation the target numbers will use after the start number.

Zoom
Clicking on the magnifying glass will open the zoom mode options, which include:

- **Reset Zoom** - sets the zoom level to 1:1 and centers the magic sheet.
- **Zoom to All** - zooms to show all objects.
- **Zoom to Selection** - zooms to show all selected objects.
- **Center on Selection** - centers the display on the selected objects without changing the zoom level.
Alignment
Clicking on the alignment icon will open the alignment options, which include:

- **Create Array** - allows you to create arrays of objects. After placing one object of your choice, click on *(Create Array)* to open an additional window for choosing what array type you want to use.

- **Align Settings** - allows you to align objects either to the left, right, center, or top, middle, bottom.

- **Align Rotation** - allows you to select multiple objects and align their rotation to the first object selected.

- **Rectangle** - will layout a rectangle array of objects. You can define how many rows, columns, and the spacing.

- **Circle** - will layout a circle array of the objects. You can define the number of objects and the size of the circle.

- **Distribute Horizontally** - allows you to distribute objects horizontally at an equal distance apart between two objects. Set the distance you would like by placing the first and last objects. Then with all objects selected that you wish to distribute (including the first and last ones you positioned), click the *(Distribute Horizontally)* button.
• **Distribute Vertically** - allows you to distribute objects vertically at an equal distance apart between two objects. Set the distance you would like by placing the first and last objects. Then with all objects selected that you wish to distribute (including the first and last ones you positioned), click the *(Distribute Vertically)* button.

• **Distribute Rotation** - allows you to distribute objects at an equal rotation between two objects. Set the level of rotation you would like by placing the first and last objects at a rotation. Then with all objects selected that you wish to rotate (including the first and last ones you positioned), click the *(Distribute Rotation)* button.

**Ordering**

The objects can either be placed on their own or stacked on top or beneath each other.

Clicking on the order icon will open the ordering options, which include:

• **Group** - allows you to group objects together so they can be moved and rotated like a single object.
• **Ungroup** - removes grouping.
• **Send Backward** - will send an object back.
• **Bring Forward** - will send an object up.
• **Send to Bottom** - will send an object beneath all other objects.
• **Bring to Top** - will stack an object on top of all other objects.

**Magic Sheet Object Library**

The objects section of the editing tools has four tabs: objects, fixture symbols, backgrounds, and background settings.

**MS Objects**

The following table contains the various magic sheet objects located in the first tab, and a brief
description of what they do. Settings for objects can be adjusted in the *MS Object Properties* area.

<table>
<thead>
<tr>
<th>Object</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel</td>
<td>acts as a direct select for a channel.</td>
</tr>
<tr>
<td>Group</td>
<td>acts as a direct select for a group.</td>
</tr>
<tr>
<td>Preset</td>
<td>acts as a direct select for a preset.</td>
</tr>
<tr>
<td>Palettes</td>
<td>acts as a direct select for a palette.</td>
</tr>
<tr>
<td>Macro</td>
<td>acts as a direct select for a macro.</td>
</tr>
<tr>
<td>Blank</td>
<td>can be assigned a target.</td>
</tr>
<tr>
<td>Tombstone</td>
<td>mirrors the channel indicators from the live/blind summary view.</td>
</tr>
<tr>
<td>Command Line</td>
<td>mirrors the command line. Can be assigned to mirror the command line for any user. Multiple command lines for different users can be used.</td>
</tr>
<tr>
<td>Text</td>
<td>places descriptive text on the sheet. The text can also be assigned a target.</td>
</tr>
<tr>
<td>Line</td>
<td>draws a line. Examples of use could be as a pipe for fixtures or a divider between buttons.</td>
</tr>
<tr>
<td>Truss</td>
<td>places truss.</td>
</tr>
<tr>
<td>Shapes</td>
<td>draws shapes that can have a target assigned to them or could be used to represent set pieces.</td>
</tr>
<tr>
<td>Points</td>
<td>allows for free form creation of objects.</td>
</tr>
</tbody>
</table>
Fixture Symbols

From the second tab, fixture symbols can be placed on a magic sheet. The symbols can be tied to a channel number. Information about that channel can be displayed with the symbol, such as intensity, FCB data, and error indicators. See *MS Object Properties, page 307* for more information on the customizing options available.

Importing Fixture Symbols

Additional fixture symbols can be imported. The symbol must be saved as a .svg image file, and it needs to be tagged properly.

The outline section needs to be tagged as `etc_symbol_outline` and the base section needs to be tagged as `etc_symbol_base`.

The edits to the tags in the .svg file can be made in any text editor program, such as Notepad, or in a .SVG editor program, such as Inkscape.

See *Images* for steps on importing.

Images

Images from the third tab can be imported into magic sheets for two different purposes. They can be used as background images or as icons.

You can use a graphics image file as a background or icon. The following is a list of accepted image formats: .bmp, .gif, .ico, .jpg, .pbm, .pgm, .png, .ppm, .svg, .svgz, .tga, .tiff, .xbm, and .xpm. The maximum image size allowed is 1920 x 1920. Larger images will be scaled to this size.

You will need to have the images on a USB drive to import them into the desk.

Once an image has been imported, it is saved with the show file.

To import an image:

1. Step 1: Click on the import image icon. A separate window will open displaying any found USB drives.
2. Step 2: Select the appropriate drive.
3. Step 3: Navigate to the file you use to upload.
4. Step 4: Click on the file and then press {Ok}. It will now appear in the images tab.

Click on an image to select it. To use as an icon, drag and drop the image onto the magic sheet. You will be able to resize it. See “Editing Objects on the Magic Sheet” on page 308.

Background images need to be set in the background settings tab. You can also adjust the background settings there. See “Background Settings” on page 306.
Background Settings

In the fourth tab, you can adjust the settings for the background. Three options are available for background types; you can either use a solid color, a gradient of two colors, or an image.

**Solid**

When solid is selected, you will have the chance to select a color for the magic sheet background. You can either click on the color square in the tab, which opens a color selection window, or you can manually enter the RGB values.

**Gradient**

When gradient is selected, you will have the chance to select a two color gradient for the magic sheet background. You can either click on the color squares in the tab, which open a color selection window, or you can manually enter the RGB values.

**Image**

With image selected, you can adjust the size, opacity, and invert the colors of the selected background image.

You can select or import an image directly from this tab by pressing the choose a background image icon, if no previous image had been chosen, or by pressing the thumbnail icon of the selected image to change it.

Exporting and Importing Magic Sheets

Magic Sheets can be exported and imported in .xml format. The export and import icons are located at the bottom of the background settings tab.
MS Object Properties

You can customize MS objects and fixture symbols in numerous ways found in the MS Object Properties area. With an object selected, you can select options.

The customizable options include:

- **Color** - the object’s outline width, outline and fill colors can be adjusted here. The object’s colors can either be set or tied to a channel’s color.

- **Font** - the font used for a text object can be changed and adjusted as needed here. You can select font type, size, color, bold, italic, underline, and justification.

- **Target** - selects the target of the object. Most objects default to a target type, but that can be changed. The targets available are:
  - Beam Palette
  - Channel
  - Color Palette
  - Cue
  - Effect
  - Focus Palette
  - Group
  - Intensity Palette
  - Macro
  - Magic Sheet
  - Pixel Map
  - Preset
  - Snapshot
  - Submaster
  - User
  - Console Button

- **Zoom** - when clicked, the view will zoom in to show all object within that object’s group.

- **Selection** - when clicked, all other objects within that object’s group will be selected.

- **Text** - changes the text for a text object.

- **Fields** - up to six different fields of custom information can be displayed per objects. The justification of each field around the object can be adjusted. The text and color used for each field can also be adjusted. A scroller indicator bar can be added. Fields can display the following data:
  - Target ID
  - Fixture Type
  - Target Name
  - Label
  - Text 1-4
  - Intensity
  - Intensity Bar
  - Color Swatch
  - Summary
  - Focus
  - Color
  - Beam
  - Status
  - Prev Move
  - Next Move
The orientation of fields around the object can be adjusted by pressing the field orientation icon. You can also choose to keep text upright by pressing the icon to the right of the orientation icon.

There are three options for orientation.

- **Position** - shows the position of the object on the magic sheet. Position can be manually entered here.
- **Size** - shows the size of the object. Size can be manually entered here.
- **Rotation** - shows the rotation of the object. Rotation can be manually entered here.
- **Items** - refers to the number of objects selected for editing. Multiple objects can be edited at the same time.

**Editing Objects on the Magic Sheet**

In addition to using the editing tools, objects can be manipulated on the magic sheet using a touchscreen or a mouse. For selection methods for multiple objects, see *Navigating a Magic Sheet*, page 299.

The blue handles are used to resize objects without keeping the object’s aspect ratio.

The green handles are used to resize the object preserving the object’s aspect ratio.

The white handles are used to rotate the object.
Examples of Magic Sheets

The following are examples of magic sheets created using the magic sheets feature. These examples use a variety of objects provided in the software along with user-generated images.
Chapter 26
Virtual Media Server

This chapter contains the following sections:

- About Virtual Media Server .................................. 312
- Pixel Mapping in a Multi-Console System ............... 324
About Virtual Media Server

The virtual media server feature of Ion is comprised of two areas, the virtual media server and its virtual layers, and pixel maps. These areas are completely dependent on each other.

The virtual media server is a feature used to create layouts of fixtures, known as pixel maps, which then applies media content (images, movies, text, and procedurally generated effects) by way of virtual media layers to the pixel map.

A pixel map is a layout of fixtures onto a grid, which determines order of playback and how the data will be interpreted and outputted to create the desired image or effect. A pixel map creates relationships among the channels in an X-Y grid so that the channels and their parameters can be associated with pixels in an image.

A virtual media layer contains one piece of media content. A pixel map can contain up to 12 virtual media layers, which can be stacked on top of each other or used separately.

Media Content

Images, movies, text, and .html files can be applied to a pixel map. A stock library of media is provided when the Eos Family Pixel Mapping Installer is installed. Please see the Eos Family Pixel Mapping Installer v1.0.0 Release Note for installation instructions.

Additional media content can be installed. Supported media file formats are:

- Images - .png, .jpg, .gif, .tiff, and .svg
- Movies - any format that QuickTime® supports (.3gp, .3gpp, .3gpp2, .3gp2, .3gp, .flc, .h264, .hdmov, .m4a, .m4b, .m4p, .moov, .movie, .mp4, .mpg4, .mqv, .mv4, .pic, .pict, .qif, .qt, .qti, .qtif, .tvod, .vid)
- Text - .txt
- HTML - .htm, .html

Importing Media Content

There are three ways to import media. Those methods are:

- Import All Pixel Map Media - An automatic method for importing media.
- File Manager - A manual method for importing media.
- Import Show Pixel Map Media - An automatic method of importing all media needed for the current show file. Used by backup and clients. For more information on synchronizing media content, See "Synchronizing Media Archives" on page 325.

File names for media content need to follow the naming convention of file number_filename. For example, 002_Volcano.mov is a file name that would be recognized. When importing by using the file manager, you need to number the files prior to importing. However using Import All Pixel Map Media allows you to specify the library and file numbers, and the console will autonumber the file names as needed during the import process.

Using Import All Pixel Map Media

To import go to Browser>Import>Import Pixel Map Media>Import All Pixel Map Media and select the device with the media on it.
Options in this display include:

- **{Library(1-255)}** - selects the library to import media.
- **{File(0-255)}** - selects the file number.
- **{Reorder Libraries}** - specify whether or not the library on the source device will be renumbered. If the source device’s library is not numbered, it will be assigned the specified library number.
- **{Reorder Files}** - specify whether or not the file(s) on the source device will be renumbered. If the source device’s file(s) is not numbered, it will be assigned the specified file number.
- **{Overwrite}** - overwrite the existing media files.
- **{Start Import}** - begins the import process. A progress bar will appear to indicate the status of the import process. When finished, click **{Done}**.
- **{Cancel}** - stops the import, and exits the display.

**Importing with the File Manager**

To import go to ECU>Settings>Maintenance>File Manager.

**Note:** Make sure your files follow the naming convention of file number_filename. If the files do not, they will not be recognized as media files. You can always import using Import All Pixel Map Media instead.

Select the device with the media on it in one window and in the other window select the MediaArchive folder. Inside the MediaArchive folder, you will see numbered folders. Those folders correspond to libraries. You can copy or move files.
Exporting Media Content

There are two ways to export media. Those methods are:

- **Export Pixel Map Media** - An automatic method for exporting media.
- **File Manager** - A manual method for exporting media.

**Using Export Pixel Map Media**

This is an automatic method of exporting all the media used in the current show file. This includes any pixel map media stored in cues, presets, submasters, etc.

To export, go to **Browser>Export>Export Pixel Map Media**. Select the device you want to export the media content to.

There are only two options available in this display:

- **{Start Export}** - begins the export process. A progress bar will appear to indicate the status of the import process. When finished, click **{Done}**.
- **{Cancel}** - stops the export and exits the display.

**Using File Manager**

Exporting with the file manager is very similar to importing with it. You select the files in the MediaArchive folder that you wish to export, and you can either copy or move them to your device.

**Patching the Virtual Media Server and Layers**

To get started using this feature, you must first patch a channel as the Virtual Media Server and additional channels as layers.

You will need to be in the patch by channel display.

In the patch display, enter the channel number that will be your virtual media server. Press **{Type}** then **{Manufctr}** to display the fixture library. Select **{ETC}, {Virtual}, {Server_Ver_1.0}**.

Enter the channel numbers that will be your virtual media layers. Press **{Type}** then **{Manufctr}** to display the fixture library. Select **{ETC}, {Virtual}, {Layer_Ver_1.0}**.

For information about **{Virtual Effect Layer}**, see "Effect Layers" on page 322.

---

**Note:** No addresses need to be assigned in patch for the virtual media server and layers.
Creating a Pixel Map

A pixel map is a layout of fixtures onto a grid, which determines order of playback and how the media content will be interpreted and outputted to create the desired image or effect.

A pixel map creates relationships among the fixtures in an X-Y grid so that the channels and their parameters can be associated with pixels in an image.

Limitations of pixel maps include:

- 10 pixel maps per show file
- 12 layers per pixel map
- 16,384 pixels per pixel map grid

Open up the Pixel Map display, Displays > More SK > Pixel Maps

Note: Hovering your cursor above the pixel map will display the column and row location for the pixel.
In the Pixel Map display, any numeric entry is assumed to be a Pixel Map. Each pixel map must have a unique number.

To create a pixel map, type in the number you want to assign to it and hit [Enter].

The virtual media server and layer(s) need to be assigned to the pixel map. Using the softkeys, select {Server Channel} and the channel you patched as the Virtual Media Server.

Then select {Layer Channels} and the channels you patched as Virtual Media Layers.

In this display you can also label the pixel map, assign the interfaces it will use, and adjust the width and height.

Column and row guides can be created numerically in either the Pixel Map or in the Edit displays. The guides can aid in viewing a pixel map.

When that basic information has been assigned to the pixel map, press the {Edit} softkey to select the fixtures.

In the edit screen, you will be able to define the array and types of fixtures. To do this, you can select pixels from the map by using a touchscreen or by holding down the left button on a mouse and dragging across the pixels you wish to select.

Once the pixels have been selected, you need to select their fixture type and then assign the starting address. By default, the addresses will be organized in rows starting from the left to the right and top to bottom. The edit screen shows a representation of the current mapping.

Options available for changing the mapping:

- {Horizontal Order} - toggle state from left to right to right to left
- {Vertical Order} - toggle state from top to bottom to bottom to top
- {Direction} - toggle state from rows to columns
- Click the {Apply} button to see the changes made while still in the edit display.

In the edit display, the softkeys will repaint to the following mapping options:

Options available for changing the mapping:

- {Rotate 90}
- {Flip V}
- {Flip H}
- {Invert}

The {Flash} button can be used to check the address output while still in the edit display.

When editing is finished, press the {Done} softkey to exit the edit display.

Note: Any pixel can have its size adjusted for better representation of the actual fixtures. This is done by selecting the pixel and then dragging the vertical and/or horizontal borders.

Note: A pixel map can be moved within the edit display by holding down the right mouse button. The map can be zoomed either by using a touchscreen or by holding down [Format] and moving the level wheel.

Note: To see the changes made by using the softkey mapping options, you don’t need to press {Apply}.

Note: A pixel map can be moved within the edit display by holding down the right mouse button. The map can be zoomed either by using a touchscreen or by holding down [Format] and moving the level wheel.
Working with the Virtual Media Server

Before you begin working with the Virtual Media Server, you will want to open the Pixel Map Preview display. Displays>Virtual Controls>Pixel Map Preview. For manipulating the pixel maps, you can use either the encoders or the ML Controls (Displays>Virtual Controls>ML Controls).

Note: For any output, the Server Channel must be set to a level along with any layers you are using.

Server Channel Controls

When working with the Server Channel, the following controls will be available:

- **(Intensity)**
- **(Pan) and (Tilt)** - used to adjust layers within the frame.
- **(Color)** - filters color for all layers.
- **(FoView)** - field of view, or perspective.
- **(Crossfade)** - used to adjust the priority when devices in the pixel map are also used as desk channels. -100 gives the pixel map priority, and +100 give the desk channel priority. At 0 (the default) the output is calculated HTP for intensity and LTP for NPs.
- **(Scale)** - adjusts Scale of all layers.
- **(Aspect Ratio)** - adjusts aspect ratio of all layers.
- **(XYZ Rotation Controls)** - rotation control for all layers

Layer Channel Controls

When working with the Layer Channels, the following controls will be available:

- **(Intensity)**
- **(Pan) and (Tilt)** - used to adjust the image of the individual layer within the frame.
- **(Color)** - filters the color of the content. For example, if all the colors are set to full, the content will play all colors normally. However if blue is at 0, then only the red and green pixels of the content will play. The color and gel pickers can be used to select color filtering quickly.
- **(Negative On/Off)** - with negative on, the output is the negative of the content. With it off, the content plays back normally.
- **(Image Brightness)** - this varies from intensity. The following images illustrates the differences between image brightness and intensity.

Note: All Virtual Media Layers operate in 16-bit color mode.
• **Playback Mode 1:**
  - {Display Centered}
  - {Display In Frame}
  - {Display Out Frame}
  - {Play Loop Forward}
  - {Play Loop Reverse}
  - {Play Once Forward}
  - {Play Once Reverse}
  - {Stop}

• **Playback Speed**

• **{In Point}** - determines where in the clip (frame number) you want to enter in.

• **{Out Point}** - determines where in the clip (frame number) you want to exit.

• **{Mix Modes}** - sets how the layers will interact. The following table shows the various mixer modes available. To illustrate the modes, the following layers were used:

<table>
<thead>
<tr>
<th>ETC</th>
<th>Bottom Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>0% Brightness, Full Intensity</td>
<td>50% Brightness, Full Intensity</td>
</tr>
</tbody>
</table>

*Top Layer*
<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>{Over}  (Default)</td>
<td>Top layer blended with bottom layer</td>
<td>![Example Image]</td>
</tr>
<tr>
<td>{In}</td>
<td>Top layer with opacity reduced by opacity of bottom layer</td>
<td>![Example Image]</td>
</tr>
<tr>
<td>{Out}</td>
<td>Top layer with opacity reduced by inverse opacity of bottom layer</td>
<td>![Example Image]</td>
</tr>
<tr>
<td>{Atop}</td>
<td>Top layer with opacity reduced by opacity of bottom layer and then blended with bottom layer</td>
<td>![Example Image]</td>
</tr>
<tr>
<td>{Add}</td>
<td>Top and bottom layers color and opacity added together</td>
<td>![Example Image]</td>
</tr>
<tr>
<td>Mode</td>
<td>Description</td>
<td>Result</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>{Subtract}</td>
<td>Top and bottom layers color and opacity subtracted from each other</td>
<td></td>
</tr>
<tr>
<td>{Multiply}</td>
<td>Top and bottom layers color and opacity multiplied together</td>
<td></td>
</tr>
<tr>
<td>{Screen}</td>
<td>Top and bottom layers colors inverted and then multiplied together</td>
<td></td>
</tr>
<tr>
<td>{Overlay}</td>
<td>Does a multiply or screen effect based on the lightness or darkness of the bottom layer</td>
<td></td>
</tr>
<tr>
<td>{Lighten}</td>
<td>Top layer’s color merges with bottom layer’s color, with the lighter color winning</td>
<td></td>
</tr>
<tr>
<td>Mode</td>
<td>Description</td>
<td>Result</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>(Darken)</td>
<td>Top layer’s color merges with the bottom layer’s color, with the darker color winning</td>
<td><img src="image1.jpg" alt="Image" /></td>
</tr>
<tr>
<td>(Dodge)</td>
<td>Bottom layer’s color brightened to reflect top layer’s color</td>
<td><img src="image2.jpg" alt="Image" /></td>
</tr>
<tr>
<td>(Burn)</td>
<td>Bottom layer’s color darkened to reflect the top layer’s color</td>
<td><img src="image3.jpg" alt="Image" /></td>
</tr>
<tr>
<td>(Hard Light)</td>
<td>Does a multiply or screen effect on the lightness or darkness of the top layer</td>
<td><img src="image4.jpg" alt="Image" /></td>
</tr>
<tr>
<td>(Soft Light)</td>
<td>Darkens or lightens colors depending on the top layer</td>
<td><img src="image5.jpg" alt="Image" /></td>
</tr>
</tbody>
</table>
• {Library} - selects the image library.
• {File} - selects the media file within the selected library.
• {Mask On/Off} - masks takes a lower layer and a higher layer, finds only the non-transparent pixels they have in common, and then displays the common pixels of the higher layer.
• {FoView} - perspective
• {Scale} - changes the scale of the content to either be larger or smaller than the standard content playback.
• {Aspect Ratio} - stretches or shrinks the content only along the X axis, making it wide or squished looking. Z Rotate can be used to modify the aspect ratio along the Y axis.
• {XYZ Rotation Controls}

**Effect Layers**

The Virtual Media Server allows you to use procedurally generated content. This is content that is created algorithmically in real time, instead of rendering file based media.

In order to use procedurally generated content, you must patch the pixel map layer as a virtual effect layer instead of a virtual media layer. Setting up the pixel map is the same as for using virtual media layers. There are two versions of the effect layer, {Effect Layer Ver 1.0} and {Effect Layer Ver 1.1}.

**Types of Effects**

There are three main effect types:

- Two color gradients - adjustable gradients with start and end colors
- Rainbow gradients - fixed gradient, full hue spectrum
- Perlin noise - good for animating random color effects, adjustable gradients

The effects are stored in file 1. File 1:0 is a home position of no effect, 1 - 3 are perlin noise effects, 4 is a perlin noise/rainbow gradient, 5-9 are rainbow gradients, and 10-19 are two color gradients.

Effects have various options of additional control.
Using Two Color Gradients
For the effects that use two color gradients (two color and perlin noise), there are several options for control of the gradients. The two colors are known as the start and end colors. Those options include:

- **(Intensity)** and **(Intensity 2)** - specifies the opacity of the start and end colors respectively for Virtual Effect Layer 1.0. If you want to fade a two color effect using this layer, you will need to fade both **(Intensity)** and **(Intensity 2)**.
- **(Intensity 2)** and **(Intensity 3)** - specifies the opacity of the start and end colors respectively. **(Intensity)** is a master opacity control for the entire layer. This is for Virtual Effect Layer 1.1. If you want to fade a two color effect using this layer, you can just fade the **(Intensity)**.
- **(Red) (Green) (Blue) or (Hue) and (Saturation)** - specifies the start color.
- **(Red 2) (Blue 2) and (Green 2)** - specifies the end color.
- **(In Point 1) and (Out Point 1)** - changes the distribution of the two colors in the gradient. In Point 1 moves the start color position closer to the end color. Out Point 1 moves the end color position closer to the start color.
- **(Playback Mode 1)** - basic animation, forward or reverse.
- **(Playback Speed 1)** - speed of animation.
- **(Layer Effect)** - adjusts the number of repeats in the gradient. Layer Effect has a range of -100% to 100%. At the home value of 0%, one full gradient is shown. Moving toward 0%, you will see less of the gradient and moving toward 100%, you will see up to four repetitions of the gradient.

**Note:** The button **(Layer Effect 2)** is for use with perlin noise effects.

Using Rainbow Gradients
For Rainbow Gradients, the colors cannot be adjusted. But the number of repeats can be adjusted by using **(Layer Effect)**. **(Playback Mode 1)** and **(Playback Speed 1)** work in the same way as for two color gradients.

Using Perlin Noise
For perlin noise effects, there are different options for control:

- **(Playback Mode 1)** - basic animation of noise, forward or reverse.
- **(Playback Speed 1)** - speed of animation.
- **(Layer Effect)** - adjusts the amount of noise. -100% equals very little noise, and 100% equals a lot of noise.
- **(Layer Effect 2)** - adjusts the horizontal scrolling speed. -100% equals a fast left scroll, 0% equals no scrolling, and 100% equals a fast right scroll.
Pixel Mapping in a Multi-Console System

When using file based media in a multi-console environment, the primary console should be used as the "base" media archive.

Media can be imported to the primary, and the backup console and/or any other clients can then synchronize their own, local media archives with the primary. The backup must synchronize media with the primary in the event that the backup must take control as the master. For clients, synchronizing the media is optional but useful if you wish to see the media playing back in the Pixel Map Preview display.

Steps for Configuring a Multi-Console System

Once the Eos Family Pixel Mapping Installer has been installed on all consoles, follow these steps to configure your multi-console system:

Setting up the Primary

Step 1: On the primary console, exit to the Eos Configuration Utility (ECU).
Step 2: Press the {Settings} button.
Step 3: Press {General} if needed.
Step 4: Make sure that the {Share Media Archive} box is checked. This will allow for sharing of the primary’s media archive. Copy the path name, you will need it to setup the backup and/or client.

Setting up the Backup and Clients

Step 5: On the backup or client, exit to the Eos Configuration Utility (ECU).
Step 6: Press the {Settings} button.
Step 7: Press {Maintenance}.
Step 8: Press {Network Drives}.
Step 9: In the Network Drives display, click the {Add} button.

Step 10: In the Add Network Drive display, choose a drive letter for {Local Drive}.

Step 11: Enter in the {Network Path}. The path name is listed next to the primary's {Share Media Archive} checkbox.

Step 12: Select the appropriate console type for the {Network Path Type}.

Step 13: Click {Ok}. You will now be able to access the primary's media archive from the backup or client. This new drive will appear in the browser like a USB drive.

Step 14: Click {Done} and launch the Ion application.

Synchronizing Media Archives

To view media playback in the Pixel Map Preview display, you will need to first import the required media into your backup and/or client's local media archive. This is done from the browser. There are two options for importing media:

- Import Show Pixel Map Media - This import function should be used by the backups and clients. It is the easiest way to ensure that your console will have all of the media required by
the current show file.

• Import All Pixel Map Media - This import function should be used by the primary to load the base media content and later to load media on the fly as required. This import function provides more complex options, like targeting which Library and File the media data will be imported into. See "Importing Media Content" on page 312.

Steps for Synchronizing Show Pixel Map Media

Step 1: On the backup or client, navigate to the browser.
Step 2: Expand File>Import>Import Pixel Map Media>Import Show Pixel Map Media.

Step 3: Select the appropriate network drive.
Step 4: The Import Show Media display will open. Press the (Start Import) button.
Step 5: A progress bar will appear to indicate the status of the import process. When finished, click (Done). You will now be able to see the media playing in the Pixel Map Preview display on the backup and/or clients.
Multiple Users

Ion can be set to act as a separate user from other consoles on the Ion system, or it can be set to act as the same user as another console. This is done by changing the user ID.

This chapter contains the following sections:

- About User ID .............................................. 328
- Assigning User ID ......................................... 328
About User ID

When multiple users are on the Eos Family network, they can all act as one combined user, as all separate users, or any of the varying degrees between.

Any Ion console, RPU, Eos console, RVI or client PC can be a separate user on the Eos Family network. Certain Eos Family devices work well as independent users while others are intended to share a user ID with another device. For example, consoles and RPUs are likely candidates for working with a unique user ID while RVIs and client PCs can be useful sharing an ID with another device to track programming information from a second location.

Eos Family devices sharing User IDs will share certain data, while those with different IDs will not. Below are the differences in multi-console data depending on User ID.

Data shared between Eos Family devices with the same User ID
- command line
- null channels in live
- selected channels
- filters
- selected cue
- live/blind mode
- setup>desk settings

Data specific to the Eos Family device, regardless of User ID
- current slider page
- current encoder page
- focus on displays without command line
- display configuration (layout, format, visible parameters, flexichannel)
- paging without changing selected target or channels

Data identical between all Eos Family devices, regardless of User ID
- all stage levels and edits
- all data stored in the show file
- playback, sub and grandmaster contents and progress

The default User ID for any Eos Family device is 1. You may change this based on your preference to allow/restrict the functionality described above.

Assigning User ID

User ID can be defined in setup (see Displays, page 107).

When multiple programmers are working on an Ion system, partitioned control can be used to restrict a specific user’s access to certain channels. This can help avoid overlapping control of channels by multiple programmers at once.

For more information on partitioned control, see Using Partitioned Control, page 329.
Chapter 28

Using Partitioned Control

Partitioned control allows discrete control and programming of channels between multiple programmers. Partitions can restrict access to specific channels by a particular user.

This chapter contains the following sections:

- About Partitioned Control ........................................ 330
- Setting Up Partitioned Control ................................. 330
- Partition List .......................................................... 330
- Creating New Partitions .......................................... 331
- Using Partitions ....................................................... 332
About Partitioned Control

When multiple programmers are working on an Ion system, partitioned control can be used to restrict a specific user’s access to certain channels. This can help avoid overlapping control of channels by multiple programmers at once.

Channels can be included in more than one partition.

Partitions only affect which channels a user has access to. They do not affect playback. As cue attributes are shared, in most instances programmers using different partitions will choose to store into different cue lists.

How to Use Partitions

The primary use of partitioned control is to allow more than one programmer to work on a show file at the same time without the risk of one user storing data for another user’s partitioned channels.

The most common example of this situation is when one user is programming moving lights while another user programs conventional fixtures. Partitioned control allows these users to divide the channels between them so they may work simultaneously. If one user stores data using [Record] or [Record Only], partitioned control will guarantee that only data for their partitioned channels will be stored. Data for channels not in the partition will be ignored when any store commands are performed.

Setting Up Partitioned Control

Partitioned control is enabled or disabled in show settings (see Show Settings, page 96). Partition defaults to “Disabled”. Enabling or disabling partitioned control is a systemwide setting, so all consoles on the network will adhere to the setting.

Partition List

To view the partition list, click the {Partitions} button in Show Settings. This display lists all existing partitions. There are four pre-programmed partitions in Ion, they are:

- **Partition 0** - No channels and no fader control. This is the default for all users when partitioned control is enabled for the first time on a show. To gain control, you must select a different partition.

- **Partition 1** - All channels. Allows the user access to all channels.

- **Partition 2** - Single Parameter Channels. Allows the user access to only channels with a single parameter.

- **Partition 3** - Multiple Parameter Channels. Allows the user access to only channels with multiple parameters.

To select a partition in the list, enter it in the command line.

- **[Partition] [2] [Enter]**

If partitioned control is enabled, this will now be your assigned partition.
Creating New Partitions

To create a new partition, press:

- \textbf{(Partition) \{x\} [Enter]} - where “x” is a number that does not yet exist in the partition list.

This will create a new partition, highlight it in the list, and (if partition is enabled) assign it as your partition.

To assign channels to that partition, enter them in the command line:

- \[1\] [Thru] \[9\] \[6\] [Enter]

You can also use [+] and [-] to further modify the channels in the partition. When adding/subtracting channels to a partition, if you do not use [+] or [-] before channel numbers, the numbers will replace the channels in the partition, rather than adding to or subtracting from them. This overwriting does require a confirmation (if enabled in setup).

When you are finished, you can press (Done) to return to the setup screen.

Deleting Partitions

To delete any partition, simply type the syntax in the command line:

- [Delete] (Partition) [5] [Enter] [Enter] - deletes partition 5 from the list.

Preprogrammed partitions cannot be deleted.
Using Partitions

When partitions are enabled and a partition is selected, you may only record data for the channels included in the partition, with the exception of parking and unparking channel parameters or playing back cues. If you try to control a channel that is not in your partition, you must confirm that you want to control that channel. You will not, however, be able to store information for that channel.

If you select a range of channels and set them to a level and some of those channels are not included in the partition, you must confirm the command. After which, the command will be allowed on the channels not in the partition.

When you record a target (cue, preset, palette), only those channels that are partitioned to you are recorded. Other programmers’ record actions to the same target can add to it (they do not replace it) unless channels are shared. When shared, the last value provided at the point of the record action will be stored.

Partitions in Playback

In general, partitions do not affect playback. In Ion, how faders are configured and what is loaded to those faders is shared across all control devices.

When cues are played back from any console, regardless of partitions, that cue will be played back in its entirety. This ensures that while partitions are used, any user can activate a cue and all users will see that cue played back on the system.

To facilitate partitioned programming, Ion allows you to change the fader number of the master fader pair on any console. This allows you to have different cue lists on the master fader pair of any consoles on the network. Using this feature, programmers can work within their partitions, using the master fader pair for their specific cue list, without affecting the cue list that is loaded to the master fader of another console.

Flexichannel in Partitioned Control

When partitioning is enabled, a new flexi state, “Partitioned” is available as a softkey. When this is enabled, the flexi state is limited to only those channels defined in the current partition. This view may be further modified by use of the remaining flexi states.
Appendix A

Eos Configuration Utility

Overview

This appendix covers the Eos Configuration Utility (ECU) and its use. This is a component of the Eos Lighting Control System and is used for both system configuration and performing basic level test functions of your Ion desk. These instructions illustrate how to use the utility, but do not specify what changes to make as these are based on your preferences and can be changed to suit your control needs.

Ion uses the ECU for the same purposes as Eos. There is a section of the ECU dedicated solely to the Ion desk. It grants you the ability to configure the DMX, MIDI, contact closure, and relay ports on the back of the desk. For more information see Local I/O, page 351.

What the Utility Does

Here is a brief list of some of the actions that can be performed from the ECU.

- Choose to boot the desk in Primary, Client, Backup or Offline mode
- Set the date, time and time zone
- Change the language the system uses
- Change the alphanumeric keyboard layout
- Configure external monitors
- Update software
- Configure Ethernet network settings and services
- Deep clear the system
- Save log files
- Perform a simple button and encoder response test
- Using the file manager
Eos Configuration Utility Reference

You can force the desk to boot into the utility instead of the main desk application. During the boot process, a countdown timer will appear. You will have 5 seconds to click the timer or to hold down “e”, “o” and “s” at the same time on the connected alphanumeric keyboard.

Otherwise, you can always enter the ECU from the Ion application by choosing Browser>Exit. If you want the desk to always boot into the utility, make sure (Open in Shell) is checked. See “Open in Shell” on page 337.

Starting Screen

This is the starting screen of the utility. From here you can choose to boot the desk in one of several different modes, change various settings, or shutdown the desk.

Primary

This is the mode for using a single desk in non-networked or networked applications. On a system with multiple desks, the primary is the desk that client and backup desks synchronize with, making it the source of all information a client or backup desk sees on the network.

Primary mode can be run on Eos Ti, Eos, Gio, Ion and RPUs (Remote Processor Unit).

Backup

Backup mode requires a primary desk be online to synchronize. Once this is done, a backup desk intakes all show data for use in the event that it needs to assume control of the lighting system.

The main difference between backup and client modes is what happens in the event of primary processor failure. If the primary fails, a backup will ask if you want it to take control as the master of the system or if you want to troubleshoot the problem. You can set the backup to automatically take control. See “Backup Automatically Takes Control” on page 343. When the primary remains in control, the backup will behave as a client would.

Backup mode can be run on Eos Ti, Eos, Gio, Ion, and RPUs. For more information on Ion backup systems, see Multi-console and Synchronized Backup, page 357.
**Client**

A device set to client mode can act as a remote controller or remote video station for a system. A client device cannot output to the lighting system. Only a primary or backup processor can do this.

User ID determines some interaction between the client and the primary desk. If the client and the primary desk have the same User ID, they will act as one. If they have different User IDs, they will have separate command lines.

Client mode can run on Eos Ti, Eos, Gio, Ion, RPUs, RVIs, and personal computers with the client dongle. Without a dongle, a client can connect in mirror mode. See “Mirror Mode” on page 365.

---

**Offline**

Offline mode puts the software in a state where there is no network activity, no control, no connections with other desks or any other network devices.

This mode is primarily intended for offline editing of a show file.

Offline mode can be run on Eos Ti, Eos, Gio, Ion, Element, RPUs, RVIs, and personal desktop or portable computers.

---

**CAUTION:** ETC does not recommend the use of wireless for show critical functions.
**General Settings**

**Device Name**
This specifies the name the Ion desk will use to identify itself on the network to other devices. Examples might be Booth Desk and Tech Table.

**Time**
The time the desk is using. This can be set manually (direct data-entry) or via SNTP (Simple Network Time Protocol) time service. Please see Network Settings, page 340 for more information.

The time is displayed in a 24-hour format as HH : MM : SS.

**Date**
The date the desk is using. This can be set manually (direct data-entry) or via SNTP (Simple Network Time Protocol) time service. Please see Network Settings, page 340 for more information.

The time is displayed as MM / DD / YYYY.

**Time Zone**
The time zone the desk is using. This is an offset from Greenwich Mean Time (GMT). Each setting in the pull-down list displays the offset, the name of the time zone and a couple of cities in that time zone.

**Language**
Allows you to select the display language of Ion. Choices are English, Bulgarian, German, Spanish, French, Italian, Japanese, Korean, Russian, Chinese - simplified, and Chinese - traditional.
**Keyboard**
Allows you to select the language for the alphanumeric keyboard within Ion. A wide variety of keyboards are supported. The keyboard can also be changed in the application when the virtual keyboard is open.

**Open in Shell**
When this is checked, the Ion desk will boot into the Configuration Utility every time instead of booting directly into the main Ion application.

**Automatically Update Software**
When this is checked, the desk will receive software updates from the Primary if used in a multi-console system.

**Show Archive Path**
This is the default location to save show files. The full path must be typed in and specified in a legal Windows format. The default location is a folder on the D: drive.
If you decide to change this setting, it is recommended that you keep this location on the D: drive. This will keep show files safe during software updates that may include re-imaging the C: drive.

**Share Show Archive**
Checking this box will enable you to share the show archive folder on the desk with another desk or computer.

**Share Media Archive**
Checking this box will enable you to share the media archive folder on the desk with another desk.

**Latitude**
Allows you to select the latitude the desk is using.

**Longitude**
Allows you to select the longitude the desk is using.

**Calibrate Elo External Touchscreens**

**Note:** Before you calibrate your external touchscreens, you may need to first use the External Monitor Arrangement display. See "Monitor Arrangement" on page 338.

Allows you to calibrate an Elo touchscreen. With the touchscreen connected, press the **Calibrate Elo External Touchscreen**.

The first display will have you touch some targets, and the second will have you touch various parts of the display to make sure the cursor follows your finger. If that works fine, press the green checkbox. If you need to return to the previous display, press the blue arrow button. If your monitor requires additional calibration, see *Elo Touchscreen Settings, page 347*.
Calibrate ETC External Touchscreens

**Note:** Before you calibrate your external touchscreens, you may need to first use the External Monitor Arrangement display. See “Monitor Arrangement” on page 338.

Allows you to calibrate an ETC touchscreen. With the touchscreen connected, press the (Calibrate ETC External Touchscreen).

The first display will have you touch various parts of the display to make sure the cursor follows your finger and the second will have you touch some targets.

**Monitor Arrangement**

Ion allows for up to two monitors. The first time Ion boots with two monitors, it may not display output to both. You will need to configure the monitors in (External Monitor Arrangement) under (General) in the ECU.

The number on the monitors matches the number of the video port on the rear of the desk. If monitor is displayed in gray, it is not currently enabled.

Selected monitor is not enabled.

**Note:** The selected monitor will display in yellow. Monitors can be dragged to any of the surrounding black boxes to mimic actual monitor layout.

The Monitor Arrangement Tool will dictate how and where the pointer moves from one screen/monitor to another. Generally speaking, you will want the logical placement on this screen to match your physical placement.

Buttons available in the External Monitor Arrangement display are:

- **(Identify)** - displays the video port numbers that your monitors are connected to on the physical monitors to confirm where you have placed them.
- **(Enabled)** - When checked, the monitor is available for use. The desk will display the (Enabled) box checked for any monitors it recognizes.
- **(Elo Monitor Settings)** - See “Elo Touchscreen Settings” on page 347.
- **(Primary)** - selects which monitor will display the ECU and Central Information Area (CIA).
- **(Resolution)** - sets how many pixels the monitor will display.
- **Color Depth** - sets how many colors will be displayed.
- **Refresh Rate** - sets the number of times in a second the monitor refreshes.
- **Orientation** - sets the monitor layout.
- **Apply** - will save and use your settings. A window will open asking if you want to **Keep Changes** or **Revert** back to the defaults. **Revert** will be selected within 15 seconds if nothing else has been selected first.
- **Close** - will close the display. **Close** will not save any settings if **Apply** has not been used.

**Note:** Only supported options will display. Monitor options may vary. While it is possible to assign a resolution lower than the minimum (1280x1024), it is recommended to be at 1280x1024 or higher.

**Software Update**

Software Update allows the installation of Eos Family Software and other ETC-approved software (GCE and NCE). Updating Eos Family Software does not affect or update the software in any other networked device such as a Net3 Gateway.

When you click on **Software Update**, the Ion desk looks at the root directory of any connected USB drive for an Ion desk software update file. You will be shown the names of any updater files found on the drive. Select the file you would like to install and click the **Install** button, or click **Cancel**. The software will first save to the hard drive before opening the installer.

You will also receive a message if no software update file can be found.
Network Settings

Local Area Connection

These are the settings that determine the method to get an IP address and/or the actual IP address information that Ion uses for network communication.

Status

This reports if the port is “Online” (configured, connected to a network and operational). It reports as “Offline” if any one of the above conditions is not true.

Obtain an IP Automatically

Clicking in the enable box will set Ion to get its IP address dynamically from a DHCP server. While the desk is starting, it will ask for an IP address from a DHCP server. If one responds, it will use the assigned IP address.

If no DHCP server is available, Ion will default to a self-generated link-local IP address in the range of 169.254.x.y. The IP address used by Ion in this configuration may change dynamically as needed. A change should typically only occur when there are changes to the network configuration or to resolve an IP address conflict.

Enabling or disabling the DHCP setting will require you to reboot Ion for the new setting to take effect.

Note: ETC recommends the use of a static IP address for compatibility with other ETC devices, though the needs of your particular installation may vary.

Note: You cannot set Ion to receive an IP address via DHCP and act as a DHCP server at the same time. It can either send dynamic addresses or receive them, but not both at the same time.

IP Address

If DHCP is disabled, you set the Ion IP address here. This is a static IP address and will remain set until changed by a user. Ion defaults to an IP address of 10.101.100.101.

If DHCP is enabled, this field will display the IP address that is being used by the desk (whether it is served via DHCP or a self-generated link-local IP address).
Subnet Mask
If DHCP is **disabled**, you set the Ion subnet mask here. This is a static setting and will remain set until changed by a user. Ion's default subnet mask is 255.255.0.0.
If DHCP is **enabled**, this field will display the subnet mask that is being used by the desk (whether it is served via DHCP or a self-generated link-local IP address).

Gateway
If DHCP is **disabled**, you set the gateway IP address here. This is a static gateway IP address and will remain set until changed by a user. Ion's default gateway is 10.101.100.101.
If DHCP is **enabled**, this field will display the gateway IP address that is being used by the desk (whether it is served via DHCP or a self-generated link-local IP address).

Physical Address
The physical address is the MAC address. This address is a unique identifier and cannot be modified.

Enable Remote Power On/ Off
From Ion it is possible to remotely power on and off some devices, such as RPU's, RVIs, and other desks.

(Remote Power On) and (Remote Power Off) must be enabled on each device before it can receive the power on and off commands. The default setting for both is Disabled.

The Remote Power commands are sent from the browser. The command for Power On is sent from **Browser>Network>Power On MultiConsole System**, and the command for Power Off is from **Browser>Network>Power Off MultiConsole System**.

**Note:** Only devices that synchronize with the Primary will be available for Remote Power On and Off.

Ping
Ping is used to test the network connection between two devices.
Output Protocols

This is for selecting which protocols the desk will output and which ones are included in the default.

sACN
This sets the control priority for sACN data from this desk. The valid range for this setting is 1 (lowest) to 200 (highest). This is the reverse of EDMX.

Ion and the Net3 Gateways support two versions of sACN, the draft version and the final ratified version. The ratified version is outputted by default unless this is selected.

Net2 - EDMX
This sets the control priority for EDMX data from this desk. The valid range for this setting is 20 (lowest) to 1 (highest). This is the reverse of sACN.

Avab UDP
This sets the subnet for Avab UDP data from this desk. The priority levels range from 0-200. The default is 0, which is no priority level. 1 is the lowest priority level and 200 is the highest. When set to no priority level (0), the data will merge according to HTP.

A backup desk will receive its Avab UDP priority level from the primary. The backup will then output at one priority higher than the primary, unless the primary was set to the highest priority of 200.

ArtNet
This sets the subnet for ArtNet data from this desk. The valid ArtNet Start range for this setting is 0-15.

Broadcast Type
• Directed Broadcast - Broadcast packets are directed to a subnet based on the IP address and subnet mask of the sender.
• Limited Broadcast - The limited broadcast address is 255.255.255.255. It is limited because routers will never forward datagrams with that destination address. This means that datagrams with the limited broadcast address are confined to the particular network segment on which they originate.

Output to Visualizer from Offline
Checking this box allows for output in offline mode for use with a visualization program.

Backup Takes Over At Higher Priority
This enables the backup device in a multi-console system to take over at a higher priority than the master if the master goes offline.
Backup Automatically Takes Control
Switches to the backup automatically if the primary should go offline.

Allowed Output Addresses
A range or ranges of addresses that can be assigned to limit the number of output addresses. The default setting is to allow addresses 1 through 65536.

Interface Protocols

MultiConsole
Clicking in the enable box will allow for multiconsole communication on the selected port. See “Multi-console and Synchronized Backup” on page 357.

Network Type
This setting adjusts the timeout period before a backup device will take control from the master.

- **Standard** - After five seconds of no response from the master, the backup will assume the master has disconnected and will then take control.
- **Engineered** - After 1.6 seconds of no response from the master, the backup will assume the master has disconnected and will then take control.

Sensor Feedback
Clicking in the enable box will allow Ion to receive feedback over the network from a Sensor rack. This option is “Enabled” by default. See About Address, page 272 for more information.

RDM
Clicking in the enable box will allow Ion to perform RDM functionality including device discovery. See {Patch) Display and Settings, page 76 and About Address, page 272

**Note:** RDM requires use of a Net3 Gateway using version 5.1 or higher.

FDX Feedback
Clicking in the enable box will allow Ion to receive FDX dimmer feedback over the network.

Broadcast Type

- **Directed Broadcast** - Broadcast packets are directed to a subnet based on the IP address and subnet mask of the sender.
- **Limited Broadcast** - The limited broadcast address is 255.255.255.255. It is limited because routers will never forward datagrams with that destination address. This means that datagrams with the limited broadcast address are confined to the particular network segment on which they originate.

WiFi Remote
Select to allow WiFi RFRs, like the iRFR or aRFR, to connect to Ion. For additional information, including setup, please visit the iRFR Documentation Wiki and aRFR Documentation Wiki, www.etcconnect.com/wiki.

UDP Strings
Clicking in the enable box will allow the selected port to send UDP strings.
DHCP Service

All settings in this section require a reboot of the desk before they will take effect. If this section is grayed out, or you are unable to change any settings, you don’t have Net3 Services installed on your desk. Net3 Services are installed by the installer for ETC’s Gateway Configuration Editor (GCE) software, which is available for download from the ETC website.

Ion can provide a DHCP (Dynamic Host Configuration Protocol) address server. DHCP is a TCP/IP protocol that dynamically assigns an IP address to a network device when it requests one. This is a small and simple DHCP server that is intended to be used on non-routed networks. It will not serve IP addresses across a router.

CAUTION: There should only be a single DHCP server active on a network. It is possible to start more than one DHCP server on a single network (nothing is built-in to DHCP servers to prevent this from happening). If this occurs, it will result in unstable conditions and possibly result in network communications failures.

Clicking in the enable box will start the DHCP server in the Ion desk. It will use the settings below to determine which IP addresses it gives out.

- **First Address** - This sets the starting IP address of the range of IP addresses the DHCP server will give out.
- **Number of Addresses** - This sets how many IP addresses the DHCP server will give out. A setting of 500 means it will give out IP addresses to the first 500 devices that ask for an IP address.
- **Subnet Mask** - This sets the logical network size vs. the device address. ETC’s default is 255.255.000.000 (class B). This is the subnet mask that the DHCP server will give to network devices.
- **Routed** - If checked, you can use the default gateway box, below, to specify the gateway you would like DHCP devices to use. If unchecked, the DHCP server will serve the same value for both the devices IP address and gateway, which is a suitable configuration for non-routed networks.
- **Default IP Gateway** - This specifies the IP address of a router if one is present on your network. This is the gateway IP address that the DHCP server will send to network devices to use.

If you are on a flat or non-routed network, the Gateway IP address should match the IP address of the device. In order to configure this DHCP server to send out matching gateway IP addresses, configure this gateway IP address to match the IP Address Pool field. Then the DHCP server will give out a gateway IP address that matches the IP address.

Learn Network Devices

Clicking this button will trigger the DHCP service to search the network for existing devices, and add them to its table of known addresses. If you have equipment with statically assigned IP addresses in your network, this will ensure the DHCP service does not serve out any IP addresses which conflict with those devices.

Update Service (TFTP)

Clicking in the enable box will start the TFTP (Trivial File Transfer Protocol) server.

- **Update File Path** - This sets the directory where files are to be served through TFTP. This must be the full path to the directory, including drive letter. For example: C:\etc\nodesbin
Time Service (SNTP)

Clicking in the enable box will start the SNTP (Simple Network Time Protocol) service. You determine if the service is running as a client (receiving time messages) or as a server (sending time messages) during the installation process.

- **Client/ Server** - When configured as a client, a desk will attempt to synchronize its time with the rest of the devices in the system, by listening for time information and altering its own clock. When configured as a server, a desk will serve out time to other devices on the network, acting as a time “master”

- **ETC Net2 time** - With ETC Net2 time enabled, the time server will periodically broadcast (as a server) or receive (as a client) the current time, which is required by devices running the ETCNet2 protocol, for example, Legacy Unison systems.

- **External Time Server** - The External Time Server option allows you to synchronize your desk to a third party time system at a specific IP address using the NTP or SNTP protocols. This allows use of a specific time clock for time sync. This requires a high accuracy time clock on your network.

- **External Server IP** - If External Time Server is enabled, you will need to specify the IP address of your external NTP or SNTP time server in this field.
Deep Clear

Deep Clear... functions in much the same way that New does from the File menu or Reset System does from the Clear menu (both are found within the browser). A deep clear is automatically performed when new software is installed. Sometimes it is useful to perform a deep clear between updates.

The advantage of deep clear is that you can clear all desk data before reloading the desk’s current state during boot. This is helpful if you are moving a new desk onto the network and don’t want it to suddenly take control of a system or if you somehow end up with a corrupt show file that is causing issues upon boot.

It’s worth noting that Deep Clear (like Reset System and File>New) does not reset any of the settings in the Eos Configuration Utility (ECU) like its operational mode or IP address settings. Everything in the ECU remains as it was last configured.
Save Logs...
Clicking on the {Save Logs...} button displays a dialog box prompting you to save the desk log files for troubleshooting purposes. By clicking on the {Advanced} button, you can select or deselect any of the various individual log files to be saved.

Clicking {Next} you will see a drop down menu to select the target export location from any available write-enabled removable media such as a USB drive.

If you experience software problems with your system that we are unable to reproduce, sending these log files to ETC Technical Services (see Help from ETC Technical Services, page 3) can help us isolate the issue.

Backup Show Archive
{Backup Show Archive...} allows you to either backup the most current version of each show file or every version of each file to a USB drive.

Restore Show Archive
{Restore Show Archive...} allows you to restore show files from a USB drive.

File Manager

{File Manager} provides a way to manage show files. You can create and delete new folders, move, and copy files between the desk and USB drives.

The file manager display will show the ShowArchive folder on your desk as well as any external USB drives that are detected. The display is split into two windows, so you can see two different folders at the same time for copying or moving data between them.

Elo Touchscreen Settings
For basic calibration of your Elo touchscreen, see Calibrate Elo External Touchscreens, page 337. For advanced calibration and settings, use the {Elo Touchscreen Settings} button.

Pressing {Elo Touchscreen Settings} will open the properties window for the monitor. This window has 5 tabs: general, mode, sound, properties 1, and about.

Upgrade Console
{Upgrade Console...} is used for upgrading the desk’s outputs.
Upgrade I/O Firmware

(Upgrade I/O Firmware) is used to upgrade the firmware in the desk’s I/O card. When you first open the I/O Downloader, it will look for the connected console. This may take a second or two. Once the console is found, the downloader will search for the needed files. If it finds the file, it will list it and you can click (Download). If it doesn’t find the file, you can use (Browse) to look for the needed file and selected it. Once finished, click (Exit).

Network Drives

(Network Drives...) allows you to select an alternative show file storage location on another desk or computer. After setting this location, it will appear as an option within the save and open dialogs in Ion.

In the (Network Drives...) dialog box, there is a (Add) button for mapping a network drive. In the Add Network Drive dialog box, select the drive letter that is appropriate, the network path, and the path type. The network path can use either the IP Address or the Device Name. (Example: \10.101.90.101\ShowArchive or \YourDeviceName\ShowArchive) The network path type can be Eos, Gio, Ion, Element, Eos Ti, or Other. If Other is selected, you will have additional fields to fill out for Username and Password.

Shared Folders

(Shared Folders...) allows you to see if any folders are currently being shared by the desk. You can select the folder and click (Don’t Share) if you no longer want to share the folder. By selecting (Don’t Share) here, you will also uncheck the box for Share Show Archive in the General tab.

Log Off

This will log off the current user. This should only be done under the direction of ETC Technical Services for administrative purposes.
Firmware Update

The firmware update window will display any detected devices that use firmware and may require an update. With the device selected, if an update is available, the {Update} button will be highlighted in yellow. If the button is grayed out, an update is not available.
Face Panel Test

Face Panel Test provides a way to verify the functional state of all of the keys, encoders and sliders on the Ion desk. The screens are very straightforward. For field diagnostics, you shouldn’t need more than the sections of Ion Keyboard.

Press/move every key and verify that those events register on the diagnostic test screen.
**Buttons**

**RPU Face Panel Buttons**

This area is for configuring the buttons on the front of a RPU or RVI. Clicking on a button will open a dialog window for selecting what type of button, macro, hardkey, or none, you wish to assign.

If hardkey is selected, a list of the various hardkeys on your desk will be available to select from. If macro is selected, a list of available macros will display. Selecting none will assign no action to the selected button.

**(Import)** allows you to import a RPU/RVI button configuration file. **(Export)** allows you to export a RPU/RVI button configuration file. **(Restore Defaults)** will restore the factory defaults for the RPU/RVI buttons.

For more information, see “Software Configuration” on page 370.

**Local I/O**

This screen allows you to configure the ports on the back of the Ion desk.

![Local I/O configuration](image)

**Local DMX Outputs**

The following settings are available:

- **Enable** - enables DMX output from the local ports.
- **Default Output Protocol** - enables DMX as a default output.
- **Ports** - the settings for the two DMX ports.
  - **Address** - sets the starting address for the port.
  - **Doubled** - enables dimmer doubling on the port.
  - **Speed** - sets the speed for the ports. Options are: maximum, fast, medium, and slow. The speed may need to be adjusted for certain devices. The default speed is maximum.
- **Dimmer Doubled Offset** - this offset matches the default offset in CEM+ / CEM3 when configuring your Sensor dimmer rack for dimmer doubling. The default offset is 20,000.
Show Control Gateway

**Note:** To input RS-232 into a Ion desk, you will need to use a Net3 I/O Gateway.

**Group IDs**
Allows you to set the group number for the MIDI In and MIDI Out ports. Group numbers can be from 1-32. Default for both ports is 1.

**Contact Closure (remote trigger connector)**
Allows you to set the Group and Address In values for the remote trigger input on the back of Ion.

**Relay Out (remote trigger connector)**
Allows you to set the Group and Address In values for the remote trigger port on the back of Ion.

---

**RFR**
This screen is used for setting up the Radio Focus Remote (RFR) to work with Ion. For more information on RFR, see Remote Control, page 377. For additional RFR settings, see (RFR Settings), page 109.

**USB RFR Settings**
These settings need to match between the desk and the RFR. For more information on changing the frequency and ID at the remote, see Change Frequency and ID Setting, page 380.

**High Frequency Channel**
The frequency that the RFR is using. There are 1-12 channels.

**Network ID**
The Network ID is a separate digital channel on a single high frequency (HF) setting. There are 1-99 IDs available.
Appendix B

Facepanel Shortcuts

Overview

The following is a list of button pushes: single, maintained, or combined. It is highly recommended that you read and familiarize yourself with this list. For keyboard shortcuts, see the Eos Family v2.0 Hot Keys Quick Guide.

Facepanel and Displays

- [Encoder Page Keys] & [Number] - pages to the desired encoder control page.
- [Shift] & [Tab] - closes all tabs except Live/Blind and the Playback Status display.
- [Shift] & [Live/Blind] - advances the displays to the next instance of live or blind.
- [Live] - when already in live, resyncs the selected cue to the most recently activated cue.
- [Blind] - when already in blind, resyncs to the active cue in live. (When blind cue has been changed, or when preserve blind cue has been enabled.)
- [Data] & [Encoder Paging Keys] - to expand/ suppress categories on displays.
- [Displays] & Level Wheel - dims the Littlites.
- [Displays] [Displays] - resets the CIA to the browser. (Unless another display is set to the favorite.)
- [Data] (maintained press) - toggles the display to show data living under referenced data. Keep [Data] depressed to page.
- [Format] & Level Wheel - zooms the display in focus.
Operations

- [At] [Enter] - removes move information from selected channel/parameters. If done in live, posts the value from the previous cue (numeric) manually. If done in blind, allows the value from the previous cue to track in.
- [Sneak] [Sneak] - releases NPs of selected channels and self terminates.
- [At] [At] - set to level as defined in setup.
- [Full] [Full] - sets selected channels intensity to full and self terminates.
- [Thru] [Thru] - The [Thru] command accesses only the channels displayed in the current flexistate (unless the channel range specified is NOT in the current display). [Thru] [Thru] selects the range regardless of the flexi mode.
- [Undo] - clears an unterminated command line. Otherwise opens the undo controls.
- [Shift] & [Clear] - clears the command line.
- [Copy To] [Copy To] - posts ‘move to’ to the command line.
- [Shift] & [Sneak] - makes manual data “unmanual”. It leaves the values as they are, but they are then no longer available for update or record only operations. When executed from an empty command line, this affects all manual data. When done with a channel selection, this affects only those channels.
- [Shift] & [*] - +%
- [Shift] & [+] - -%
- [Recall From] [Recall From] - posts recall from cue to the command line.
- [Select Last] [Select Last] - repeats last command line, unterminated.
- [Shift] & [Last] - repeats last command line, unterminated.
- [Shift] & [At] - recalls last channel(s) and parameters.
- [Select Active] [Select Active] - select active minus submaster contributions.
- [Shift] & [Select Active] - posts ‘select non-sub active’ on the command line.
- [Shift] & [Select Last] - posts additional channel selection options to the softkeys.
- [Label] [Label] - appended to a record target command, clears the current label, this includes show file labels.
- [Shift] & restore manual channel faders - resets faders to zero without asserting control.
- [Shift] & [Delay] [Delay] - posts hang.
- [Trace] [Trace] - forces a previously inactive light to track its new intensity setting backwards.
- [Shift] & [Encoder Page Key] - posts the category to the command line.
• [Record] [Record] - posts 'record only' to the command line.
• [Shift] & encoder toggle - posts the parameter to the command line.
• [Shift] & [Block] - posts Intensity Block to the command line
Appendix C
Multi-console and Synchronized Backup

Overview
This appendix outlines the procedures required to use multiple Eos Family control devices (such as an Ion console, Eos Ti console, Eos console, Gio console, Remote Processor Unit (RPU), Remote Video Interface (RVI), or PC or Mac with client dongle) simultaneously on a network. It outlines the setup, configuration, and behavior that is entailed in an Ion multi-console scenario.

Definition of terms
Familiarize yourself with these terms prior to setting up a multi-console system.

Note: Only Intel-based Macs can connect as a client. A Mac client will not support any external ETC USB devices, such as fader wings or the RFR. A Mac client will support use of the iRFR.

Ion multi-console functionality is also used to provide synchronized backup of your show while running multiple Ion devices on the network.

Note: Ion consoles, Eos consoles, Gio console, RVIs, RPUs, or a computer running Eos with a client dongle may all be considered active units on an Ion network. For the sake of brevity, the term "Ion" is used to represent any and all of these options in the following descriptions.

- **Primary** - When an Ion is configured as a primary, other Ion devices can connect and synchronize with it. If using a backup processor, the primary is the Ion that will be backed up. Only Ion/Eos/Eos Ti/Gio consoles and RPUs can be set to primary. By default, all Ion consoles will start up as a primary.

- **Backup** - This Ion is capable of taking control of the system if the primary fails. You may input data and run your show from a backup. There can only be one backup in an Ion network and you must specify which primary it is backing up. Only Ion/Eos/Eos Ti/Gio and RPUs can be set to backup.

- **Client** - Any online Ion that is not the primary or backup is a client. Client data is sent and received over the network, and clients will synchronize with a designated primary.

- **Offline** - Any Ion controller that is disconnected from the Ion network. Changes to show data performed on an offline Ion will not affect the rest of the Ion network or the lighting system.

- **Master** - The Ion that is currently sending control data to the lighting system is the master. In most circumstances this is also the primary. Should a primary fail and a backup takes control, then the backup will be acting as the master.

- **Tracking** - Any console that is synchronized with a master is tracking. Once a backup takes control it becomes a master and is no longer tracking.
• **User** - A user is an Ion defined by a user ID. If it has a unique user ID, the Ion will operate separate from other Ion devices on the network, but would still track show data. If it shares a user ID, Ion will synchronize with like IDs. See *User ID and multi-console features, page 360.*

• **System** - One primary Ion, one backup Ion, and (if available) multiple clients synchronized together.

• **Mirror Mode** - A mode for mirroring the displays of another device. See “Mirror Mode” on page 365.

### Multi-console setup

When using multiple Ion consoles on the network, you should adjust some of the settings of your devices to ensure optimal functionality.

Additional requirements for multi-console setup include:

- Software versions must match exactly between all devices.
- The language settings in the ECU must match. See “Language” on page 336.
- The keyboard language setting in the ECU must match. See “Keyboard” on page 337.

---

**Note:** It is recommended that you perform the following setting changes before connecting your Ion device(s) to the network. After the changes are complete, connect to the network and reboot the device.

### Designate Primary

By default, all Ion devices will boot as a primary. When using multiple devices on the network, only one should be designated as a primary. Other devices should be configured as the backup (only one per system) or clients. There can be a maximum of 12 Ion devices connected to a master.

To change this setting, you must exit the Ion software (*Browser>Exit Ion*) and then designate the device as primary, backup, or client as described in the ECU appendix (see *Starting Screen, page 334*).

### DHCP Server

DHCP server supplies IP addresses to network devices. Only one Ion device [typically the Primary] on the network is necessary to do this properly. Therefore you should disable the DHCP server on all devices except for the intended primary.

To disable the DHCP server on your device see *Local Area Connection, page 340.*

### Change Device Name

To easily identify your Ion on the network, change the device name to be representative of the device (such as “Booth Primary” or “Tech Backup”). This is done in *General Settings, page 336.*

### Backup Auto Switch

Switches to the backup automatically if the primary should go offline. This is enabled in *Backup Automatically Takes Control, page 343.*

### Backup at Higher Priority

This enables the backup device in a multi-console system to take over at one priority higher than the master if the master goes offline. This is enabled in *Backup Takes Over At Higher Priority, page 342.*
Network Type
This setting adjusts the timeout period before a backup device will take control from the master.

- **Standard** - After five seconds of no response from the master, the backup will assume the master has disconnected and will then take control.
- **Engineered** - After 1.6 seconds of no response from the master, the backup will assume the master has disconnected and will then take control.

Change IP Address
All Ion consoles by default have the same static IP address. All Ion RPUs also, by default, have the same static IP address. A full list of ETC network IP address is available at [www.etcconnect.com/wiki](http://www.etcconnect.com/wiki).

- Default Ion Console IP Address: 10.101.100.101
- Default Ion RPU IP Address: 10.101.95.101

Each Ion device on the network should be given a unique IP address. If running multiple devices of the same type (for example - two consoles, or two RPUs), you must alter the default static IP addresses to ensure proper functionality.

Changing the static IP address is done through the ECU (see *Network Settings, page 340*), on the "Network" page. Manually change the IP address of any non-primary Ion device by clicking in the IP Address field and entering the new number from the keyboard. When done, press [Enter].

![Network Settings Page](image)

**Note:** It is recommended that you alter the very last digit of the static IP address by an increment of one for each additional Ion device on the network. Therefore, if the master ends in "101", change the backup to end in "102", a client to end in "103" and so on.
User ID and multi-console features

Set in Setup (see [Displays], page 107), User ID is an Ion/Eos-specific identifier that can be set uniquely for each Ion device or can be shared between multiple devices allowing for shared data between consoles. The user ID can be set anywhere from 1 to 99.

Ion devices sharing User IDs will share certain data, while those with different IDs will not. Below are the differences in multi-console data depending on User ID.

Data shared between Ion devices with the same User ID
- Command line
- Null channels in live
- Selected channels
- Filters
- Selected cue
- Live/blind mode
- Setup>desk settings

Data specific to the Ion device, regardless of User ID
- Current slider page
- Current encoder page
- Focus on displays without command line
- Display configuration (layout, format, visible parameters, flexchannel)
- Paging without changing selected target or channels

Data identical between all Ion devices, regardless of User ID
- All stage levels and edits
- All data stored in the show file
- Playback, submaster, and grandmaster contents and progress

The default User ID for any Ion device is 1. You may change this based on your preference to allow or restrict the functionality described above.

Note: After you have completed the setting changes described above, connect your Ion device to the network and reboot the device.

Multi-console backup

Within an Ion system, you have the added bonus of show data backup. The backup on the system will receive all show data updates and stage levels so that, in the event of a primary failure, the backup will be capable of taking control of the system without a loss of show data or live output. Saving occurs across the whole network.
Synchronized Backup

Once you have changed settings to facilitate a multi-console system on the network, you may activate synchronized backup to ensure show data security.

Ion synchronized backup is designed so that during normal operation the primary console controls the lighting system and any console configured as backup or client synchronize with the primary. The following activities will synchronize between consoles when operating in a backup system:

- Playback
- Record operations
- Manually set data
- Show file and show data

Only Ion, EosTi, Eos, and Gio consoles, or RPUs can function as a primary or backup.

Setting up Synchronized Backup

Before backup is possible, you must have at least two Ion devices (consoles or RPUs only) connected to the network. One must be assigned as primary and one as a backup.

To assign a backup to a primary:

Step 1: Exit the Ion environment (Browser>Exit) on the console you wish to act as the backup. This will send you to the ECU welcome screen.

Step 2: Click on the {Backup} button in the welcome screen. The console will then startup the software, this time in backup mode. Ion will try to connect to a master console. The CIA will say "Waiting for Master. One moment please...".

Step 3: If the backup doesn’t connect after a few moments, click the {Troubleshoot} button in the CIA. This will open the network configure screen in the CIA.

Step 4: Select a master console from the list on the right. If no masters are available in the list, a master console is not connected to the network.

Step 5: Press {Change Master}. The backup Ion will synchronize with the master.

Note: If this is the first time that a backup is connecting to this master, you will need to press {Troubleshoot} and select the master.
In the CIA you will see the current status of the backup.

If the primary goes offline for any reason, the backup will automatically takeover as the master if backup auto switch has been enabled. See “Backup Automatically Takes Control” on page 343. Whenever master control changes between the primary and the backup, there will be a dialog window that will be displayed that much be dismissed by the user.

When master control moves between the primary and backup devices, any clients in the system will automatically connect to the current master. Clients will also display a message, but the message will be dismissed after a short period of time. The device status above the CIA will also change.

**Note:** A client may take up to 30 seconds to determine that connection with the master has been lost.

If you enter the Network>Configure screen, it will have changed to the following.

Your backup is now acting as the master and is controlling the lighting system.
Backup Scenarios

Console and console
Two consoles can be used to provide backup. Either can be configured as the primary or the backup. If the primary console fails, the second console will take control with full show data intact. This is a useful scenario for touring multi-user applications.

RPU and console
One RPU and one console can be used as a backup option. In this configuration, it is recommended that you set the RPU as the primary and the console as the backup. In this scenario, should the RPU go offline, you will still have the full functionality of the console user-interface at your disposal.

RPU and RPU
Two RPUs may serve as primary and backup also. A backup system of this type can support many client consoles at once, which you may turn on and off as needed without the need to reset to a different master each time.

This application is ideal for permanent installations requiring synchronized backup.

Note: If the primary comes back online, it will **not** retake control of the lighting system. The primary will wait until it is redesignated as the master and the backup is reassigned to it.

You can force the backup to release control back to the primary by going to **Browser>Network>Configuration** and pressing the **[Release Control]** button.

You can also force the primary to take control away from a backup by going to **Browser>Network>Configuration** and pressing the **[Take Control]** button.
Remote Software Installation

Within a multi-console system, you can now remotely install software to all devices.

**Note:** All devices must be upgraded to version 1.9 before remote software installation is available.

In the ECU, go to Setting> General> Automatically Update Software to enable. Once enabled, the devices can be remotely updated with the next version of software. Devices will receive the software update from the Primary. When you install software on the Primary, the software will first be copied to its hard drive.

With the devices synchronized with the Primary, install the new version of software onto the Primary. All devices will lose their connection with the Primary at that time. When the Primary comes back online after installing the software, all the connected devices will be forced to update their software before they can reconnect with the Primary.

Remote Power On/Off

In a multi-console system, it is possible to power on and off devices remotely. Remote Power On and Remote Power Off must be enabled on each device before it can receive the power on and off commands. In the ECU go to Settings> Network> Enable Remote Power Off and Enable Remote Power On. The default setting for both is “Disabled”.

**Note:** Eos desks cannot be remotely powered on.

The Remote Power commands are sent from the browser. The command for Power On is sent from Browser> Network> Power On MultiConsole System, and the command for Power Off is from Browser> Network> Power Off MultiConsole System.

**Note:** Only devices that synchronize with the Primary will be available for Remote Power On and Off.
Mirror Mode

Mirror Mode is used to mirror the displays of another device. When a device is in mirror mode, the only action allowed from that device is paging via the page keys and shut down/start up. When a device in mirror mode pages, it also pages the host.

Mirror mode is intended primarily to allow a designer or assistant to see the exact same displays as a programmer on the system. It can be used on any device on the network, including the primary processor. Any device being mirrored is referred to as the Host.

The is no limit to the number of mirrored devices a host can have. But a console currently in mirror mode cannot be mirrored.

Using Mirror Mode on a Client without a Dongle

A client without a dongle can connect to the network. When this is done, the client can only operate in mirror mode, and it will always connect to the primary processor. No other options will be available.

Configuring Mirror Mode

Configuring a device to connect in Mirror mode is done from the Displays menu in the Browser. When [Displays] is pressed, a {Mirror} softkey will be displayed. Pressing {Mirror} will open up a list of potential hosts in the CIA.

The mirror display can be navigated using the arrow keys or a mouse. When the required host is highlighted, press [Enter] or double click with a mouse to confirm the selection. This display can also be opened with the keyboard shortcut of ALT + M.

Note: While in Mirror mode, the display will also have options for exiting and powering off the device.

Displays

When a device is placed in mirror mode, monitor 1 on the mirroring device matches external monitor 1 on the host, and monitor 2 matches external monitor 2 on the host. A client will mirror as many monitors as it has available.

All formats used on the host device are shown on the mirroring device including flexichannel states, column widths, chosen parameters, and pages.
The CIA will open on monitor 1. The CIA on the device in mirror mode can be locked open or closed. When left unlocked, the CIA will expand and close as normal. Not all CIA displays shown on the device in mirror mode. The following CIA displays are synchronized:

- About
- Effects
- Effects Status
- Color Picker
- Curves
- Undo

The CIA can be completely hidden when locked by pressing the [Displays] key. Pressing [Displays] again will display and unlock the CIA.

Exiting Mirror Mode

Exiting mirror mode can be done by selecting (Stop Mirroring) in the mirror display or using the keyboard shortcut ALT + X. When exiting mirror mode, the device will return to its normal, working state.

Shutdown/Start Up in Mirror Mode

When a device is shut down in mirror mode, it will restart in mirror mode mirroring the same host as before. If the host has changed settings, mirror mode will need to be reselected on startup.

Macros

Macros can be created to configure a device for mirror mode and to exit the mode. The RPU/RVI face panel configuration utility allows the face panel buttons to be populated with these macros.

Note: An alphanumeric keyboard will be needed to create this macro.

To create a macro to place a device in mirror mode:

Step 1: Set the User ID of all devices to match the Primary.
Step 2: Press ALT + M to open the mirror mode display.
Step 3: Highlight the device to mirror.
Step 4: Press [Learn] [x] [Enter] to record the macro.

To create a macro to exit mirror mode:

Step 5: With the console in mirror mode, press [Learn] [x] [Enter]
Step 6: Press ALT + X
Step 7: Press [Learn] to finish recording the macro.

Once the macros are created, you should save the show and set all User IDs back.

Note: Desk settings are not mirrored.

Note: Clients without a dongle cannot exit mirror mode.
Appendix D

Using the RPU and RVI

This appendix outlines the setup and configuration of your Ion Remote Processor Unit (RPU), Remote Video Interface 3 (RV3), and Remote Video Interface (RVI).

RPU Overview

The Ion RPU can be used as a primary, backup, or client processor in an Eos Family system. It can also be used for independent playback applications. For more information on multi-console terms such as “Primary” or “Backup”, please see Multi-console and Synchronized Backup, page 357.

Ion RPU ships with the following:

- Remote Processor Unit
- USB Keyboard
- USB Mouse
- Rack Mount Hardware Kit
- IEC Power cords with varying connectors
- Label Sets
Remote Processor Unit (RPU)

Hardware Setup

Rear Panel

Step 1: Attach the appropriate IEC power cord to the power connector.
Step 2: Connect any monitors to the proper ports on the back of the RPU.
Step 3: Connect the USB mouse and keyboard to the USB connectors.
Step 4: Attach a network ethernet cable to the ethernet port.
Step 5: Once all accessories and optional cables have been connected, switch the hard power switch on.

Note: The Ion RPU can support up to two monitors, either two DVI monitors or one VGA and one DVI. The minimum screen resolution must be at least 1280x1024 by 32bit color.
Using the RPU and RVI

Front Panel

Step 1: Press the soft power switch to activate the RPU (check rear panel to ensure power is connected and hard power switch is on).

Step 2: The backlit indicators will identify the operating status (master, backup, client, and so on) of the unit.

Step 3: USB port is provided for easy show loading to or from a USB storage device.

Step 4: 20 buttons are configurable from the Eos Configuration Utility (ECU). They are set to a default configuration. The label strips for these buttons are removable and reversible. Any changes to the button configuration can be written on the opposite side in pencil.

Start Up

After connecting power to the unit, press the soft power button on the front of the console.

By default, the RPU will boot into the Ion environment as a primary. If you wish to designate your RPU as something other than a primary, you must exit the Ion environment and choose a different designation from the Eos Configuration Utility welcome screen.

For more information on multi-console terms such as primary or backup, please see Multi-console and Synchronized Backup, page 357.
Software Configuration

The buttons section of the ECU has two different areas, the RPU face panel buttons and the Gio face panel buttons. You will want to make sure that you are in the RPU face panel buttons area.

To configure the RPU buttons:

Step 1: In the Ion browser, select File>Exit and confirm the selection. Ion will close and you will enter the Ion welcome screen.

Step 2: Click on the Settings button. This will open the ECU.

Step 3: On the right side of the screen, click on Buttons to enter the RPU button setup. A virtual display of the RPU buttons is displayed with the current button settings labeled on each button.

Step 4: Click on a button you wish to alter. A button popup window will open.

Step 5: Click on the type of button you want it to be (Macro or Hard Key).

  • If Macro - Click on the Macro # box and enter the desired macro number from the keyboard and press enter. Then click {Accept}.
  • If Hardkey - Click on the {HardKey} drop down menu and select the hard key you wish to use. Then click {Accept}.

Step 6: Repeat this process for any other buttons you wish to reconfigure.

Step 7: To restore the default buttons at any time, click the {Restore Defaults} button.

To import a button configuration:

You may import an RPU button configuration file from a USB device.

Step 1: Click the Import button in the RPU area of the buttons section of the ECU. The RPU will search for valid RPU button file.

Step 2: If a valid file is found, the ECU will ask you if you want to import the settings. Click {Yes}. The settings will be imported.

Step 3: Click {Ok}.

To export a button configuration:

You may export your RPU button configuration to a USB device.

Step 1: Click the {Export} button in the RPU area of the buttons section of the ECU.

Step 2: If a USB drive is available, the ECU will ask you to choose the desired drive from the drop down menu. Click on the desired USB drive.

Step 3: Click {Accept}. The button configuration will be saved to the USB drive.

Step 4: Click {Ok}.

For more information on settings in the ECU, please see Eos Configuration Utility, page 333, and RPU Face Panel Buttons, page 351.
Basic Use Guidelines

Displays
The RPU can be used with either one or two DVI monitors, or one VGA and one DVI. You can collapse or expand the CIA on the displays by engaging the scroll lock and pressing F5. If you are using one monitor, you may find this feature useful in increasing the efficiency of your available display area.

Net3 Services
By default, both Ion and the Ion RPU ship with all Net3 services enabled.
When used in a multi-console backup system, you must disable Net3 services for the intended backup device. If the RPU is the intended primary (recommended, see Backup Scenarios, page 363), some Net3 services must be disabled on the intended backup device (console or RPU).
You must disable the DHCP server and TFTP server. You must also change the SNTP server to “client” to enable time synchronization between Ion devices. All of this is done using the Eos Configuration Utility (See Network Settings, page 340 and Local Area Connection, page 340).
**RVI3 and RVI Overview**

The RVI functions as a remote user interface to access and modify the contents of an entire Ion show file. You may configure the RVI to run Ion software in “Client” or “Offline” mode.

This appendix outlines the setup and simple configuration of your Remote Video Interface (RVI) for use with an Ion Control System.

Net3 RVI 3 ships with the following:

- Remote Video Interface
- USB Keyboard
- USB Mouse
- Rack Mount Hardware Kit
- IEC Power cord
- Label Set

**Remote Video Interface 3 (RVI3)**

**Hardware Setup**

**Rear Panel**

- **Hard Power Switch**
- **Audio Ports** (Not Currently Enabled)
- **Ethernet Port 1**
- **Ethernet Port 2**
- **IEC Receptacle**
- **DVI-I Video Ports**
  - Ion only supports 2 outputs.
- **USB 2.0 x6**

**Step 1:** Attach the IEC power cord to the power connector, then to the IEC receptacle.

**Step 2:** Connect any monitors to the proper ports on the back of the RVI 3.

**Step 3:** Connect the mouse and keyboard to the USB connectors.

**Step 4:** Attach a network ethernet cable to the Ethernet port. All communications to the associated control console are made over this Ethernet connection.

- Connection to the console may be made either directly using a Cat5 or better null-modem cable or through an Ethernet hub or Ethernet switch using standard Cat5 or better patch cables.

**Step 5:** When all connections are made, switch on the hard power switch.

**Step 6:** Press the soft power switch, on the front of the unit, to power up the RVI 3.

---

**Note:** The RVI 3 with Ion support up to two monitors. Any of the monitors can be DVI or VGA. The connectors are DVI-I, DVI-I to VGA adapters are required for VGA monitors. The adapters are not included.

The minimum screen resolution is 1280x1024.
Note: If the unit does not power up, check the hard power switch, on the rear panel, to ensure it is switched on.

Front Panel

Step 1: Press the soft power switch to activate the RVI 3 (check rear panel to ensure power is connected and hard power switch is on).
Step 2: Backlit indicators identify the operating status (client, offline, in sync) of the unit.
Step 3: USB port is provided for easy show loading to or from a USB storage device.
Step 4: 20 buttons are configurable from the Eos Configuration Utility (ECU). They are set to a default configuration. The label strips for these buttons are removable and reversible. Any changes to the button configuration can be written on the opposite side in pencil.

RVI3 Start Up
At startup, the RVI will open in the Ion application or the ECU, based on the setup option. The default setting is to open in the ECU.

Remote Video Interface (RVI)

Electrical Specification
- Operating voltage 100-240 VAC, 50-60Hz (2 amps at 120 VAC).
- Ambient temperature and humidity 0 - 35 °C, 95% non-condensing humidity, maximum.
- Storage temperature and humidity 0 - 35 °C, 95% non-condensing humidity
- CE and ETL Compliant.
- Installation Category II, indoor use only.
- May operate up to 2000 meters altitude.
**Hardware Setup**

**Note:** Older versions of the RVI hardware will vary from the images shown here.

**Rear Panel**

- **Step 1:** Attach the appropriate IEC power cord to the power connector, then to the IEC receptacle.
- **Step 2:** Connect any monitors to the proper ports on the back of the RVI.

**Note:** The RVI supports up to two monitors, either two DVI monitors, or one DVI and one VGA. The minimum screen resolution must be at least 1280x1024 with 32bit color.

- **Step 3:** Connect the USB mouse and keyboard to the USB connectors.
- **Step 4:** Attach a network ethernet cable to the Ethernet port. All communications to the associated control console are made over this Ethernet connection.
- **Step 5:** When all connections are made, switch on the hard power switch.
- **Step 6:** Press the soft power switch, on the front of the unit, to power up the RVI.

**Note:** If the unit does not power up, check the hard power switch on the rear panel, to ensure it is switched on.
Front Panel

- Press the soft power switch to activate the RVI (check rear panel to ensure power is connected and hard power switch is on).
- Backlit indicators identify the operating status (master, backup, client, and so on) of the unit.
- USB port is provided for easy show loading to or from a USB storage device.
- 20 buttons are configurable from the Eos Configuration Utility (ECU). They are set to a default configuration. The label strips for these buttons are removable and reversible. Any changes to the button configuration can be written on the opposite side in pencil.

RVI Start Up

At initial startup, the RVI will display the Eos and the Congo logos. Use the mouse to select the Eos Family operating system. The RVI will initialize to the Eos environment each time the power is cycled, unless you choose to change the operating system in the related settings menu (see “Switch to Congo from Eos Operating Mode,” in the Net3 Remote Video Interface Setup Guide, page 3).

**CAUTION:**

If you **Exit** and enter the ECU, do not select the “Primary” or “Backup” buttons that are displayed in the ECU welcome screen. The Net3 RVI will only function as a “Client” on the Eos network or “Offline”.

Basic Use Guidelines for RVI3 and RVI

Displays

The RVI can be used with either one or two DVI monitors, or one DVI and one VGA. You can collapse/expand the CIA on the displays by engaging the scroll lock and pressing F5. If you are using one monitor, you may find this feature useful in increasing the efficiency of your available display area.

Button Configuration

Settings for the RVI can be altered in the Eos Configuration Utility (ECU). The 20 buttons on the front panel of the RVI are configurable from the Button section of the ECU.

**Note:**

The buttons section of the ECU has two different areas, the RPU/RVI face panel buttons and the Gio face panel buttons. You will want to make sure that you are in the RPU face panel buttons area.
To configure the RVI buttons:

Step 1: In the browser, select File>Exit and confirm the selection. Ion will close and you will enter the Ion welcome screen.

Step 2: Click on the {Settings} button. This will open the ECU.

Step 3: On the right side of the screen, click on {Buttons} to enter the RPU/RVI button setup. A virtual display of the RPU/RVI buttons is displayed with the current button settings labeled on each button.

Step 4: Click on a button you wish to alter. A button popup window will open.

Step 5: Click on the type of button you want it to be (Macro or Hard Key).
- If Macro - Click on the Macro # box and enter the desired macro number from the keyboard and press enter. Then click {Accept}.
- If Hard Key - Click on the {HardKey} drop down menu and select the hard key you wish to use. Then click {Accept}.

Step 6: Repeat this process for any other buttons you wish to reconfigure.

Step 7: To restore the default buttons at any time, click the {Restore Defaults} button.

Note: RVI and RPU button configurations are interchangeable. Therefore you can import button configurations from one to the other.

To import a button configuration:

You may import an RVI button configuration file from a USB device.

Step 1: Click the {Import} button in the RPU/RVI area of the Buttons section of the ECU. The RVI will search for valid RVI/RPU button files.

Step 2: If a valid file is found, the ECU will ask you if you want to import the settings. Click {Yes}. The settings will be imported.

Step 3: Click {Ok}.

For more information, see RPU Face Panel Buttons, page 351.

To export a button configuration:

You may export your RPI button configuration to a USB device.

Step 1: Click the {Export} button in the RPU/RVI area of the Buttons section of the ECU.

Step 2: If a USB drive is available, the ECU will ask you to choose the desired drive from the drop down menu. Click on the desired USB drive.

Step 3: Click {Accept}. The button configuration will be saved to the USB drive.

Step 4: Click {Ok}.

For more information on settings in the ECU, please see Eos Configuration Utility, page 333.
Appendix E

Remote Control

Remotes Overview
Three different remotes are available for controlling Ion; the phone remote, the radio focus remote (RFR), and the iRFR/aRFR.

Phone Remote
The phone remote allows for remote control of the Ion console by using a wireless phone. The base station for the phone connects directly to the phone remote jack on the rear of your console. See “Console Geography” on page 12. The numeric keypad of the phone is used to control channels and levels.

Phone Remote Functions
The numeric keypad of the phone is mapped as following:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Thru</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Last</td>
<td>Macro</td>
<td>@</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Next</td>
<td>Address</td>
<td>Full</td>
</tr>
<tr>
<td>*/Shift</td>
<td>0</td>
<td>#/Enter</td>
</tr>
<tr>
<td>Clear CL</td>
<td>Chan Check</td>
<td>Sneak</td>
</tr>
</tbody>
</table>

To use the commands in gray, first hit the [*] button followed by the number or symbol above the gray command. For example, to place a [+] on the command line, press [*] [1].

Pressing [*] [*] will clear the command. Commands entered from the phone remote will appear on the command line for the console.

Phone Remote Connector
The pin outs for the phone remote RJ11 connector are:
- Pin 4 - Data +
- Pin 5 - Data -
Radio Focus Remote (RFR)

The Net3 Radio Focus Remote (RFR) provides remote access to frequently used console features such as dimmer and channel checks as well as update and record functions.

The RFR handheld remote and receiver unit features a high frequency (HF) link for bi-directional communication with a connected console. During operation, the system status can be viewed on the LCD of the remote.

Note: This appendix covers only RFR operation with the Eos Family control system. For information on using the RFR with Congo or Congo Jr consoles, see the "Congo/ Congo Jr User Manual" or the "Net3 Radio Focus Remote Setup Guide" for more information.

Handheld Remote

The RFR handheld unit features 24 backlit buttons and two push-button thumb wheels, one on either side for scrolling to desired targets and selecting them for interaction. The top side of the remote has an on/off power switch, a high frequency antenna and a USB Mini-B port. The USB Mini-B connection is used to supply power for the internal rechargeable NiMH AA batteries.
Base Station Receiver

The receiver includes a USB type B connector and an Ethernet connector (IEEE 802.3af) on the front of the unit for connection to the console (USB) or to a switch in your Net3 network.

USB

When the base station is connected directly to a console by USB type B, the RFR is powered by and controls only the console the base station is connected to. ETC supplies a 1.8m (6 ft.) USB cable for base station connection to a console or USB hub. The maximum distance between products is 5m (16 ft.).

When the base station is connected to Eos/Ion using USB, the RFR remote will automatically connect to that console when powered.

Ethernet

For use with the Ion console, the base station will need to be plugged into an ethernet switch. If the switch is not power over ethernet, the base station can receive power via USB from the console.

Note: For single base station use, no configuration is needed if defaults are used. For multiple base stations, custom configurations, and connection issues, further configuration will be needed.

CAUTION: You may use either the ethernet connection or the USB connection for data to the console, but not both.

Console Section Mode

Holding down [.] while the remote is booting up will take you to the console selection list. This mode is used to select between Direct USB mode, Base USB mode, or available host consoles for networking.

Note: If multiple RFR units are to be used separately within a range of each other’s receiver units, change the frequency and/or ID settings to avoid conflicts. Reference Change Frequency and ID Setting below for more information.

For optimal operation, set the base stations apart by at least 5m (16 ft.) to ensure the two units do not interfere with each other’s operation.
Change Frequency and ID Setting

A network ID is a separate digital channel on a single high frequency (HF) setting. Changing an ID setting from the default "1" is useful when multiple systems are utilizing the same frequency.

**Note:** If you change the frequency and ID settings in the handheld remote you must also change the frequency and ID settings to match in the base station.

To change the radio settings on your remote:

**Step 1:** With the remote power off, press and hold the [C] button. Continue pressing it and power up the unit. The display window will show the HF Channel selection screen.

**Step 2:** Choose an HF Channel (1 - 12) by spinning either thumbwheel.

- While setting the HF Channel, the RFR scans each available channel for traffic which may interfere with the RFR. This feature is used to determine what frequency to use in your venue.
- In the "Available:" field the RFR will display ***, **, * or "used". The asterisks indicate the quality of the signal at that channel. *** is best. "Used" indicates that other traffic is detected on that channel, but the RFR may still function properly.

**Step 3:** Press {Next} ([S2]).

**Step 4:** Choose a network ID by moving either thumbwheel. Allowed range is from 1 to 99.

**Step 5:** Press {Next} ([S2]).

**Step 6:** Set the HF power level. This allows you to alter the strength of the transmission signal from the remote. Allowed range is from +10 dBm to +18 dBm.

- A higher value indicates a stronger signal, but shortened battery life. A lower value indicates a weaker signal and an extended battery life.

**Step 7:** Press {Save} ([S3]).

**Step 8:** You must cycle the power to apply the new settings.

**Note:** Default [S4] will reset remote settings to their default values. No confirmation is required.

**Note:** Configuration over the network must be done using the Gateway Configuration Editor (GCE).

To change the frequency and network ID in your base station receiver using USB:

**Step 1:** In the browser menu, select File<Exit. A dialog box opens asking you to confirm.

**Step 2:** Confirm this command by pressing {Yes}. The Ion application will close and the Eos Configuration Utility (ECU) will display.

**Step 3:** Press {Settings} button. A new settings dialog box will display.

**Step 4:** Press the {RFR} button. A RFR dialog box will display.

**Step 5:** Choose the appropriate High Frequency Channel setting from the drop down box (must be from 1-12, matched with the remote).

**Step 6:** Choose the appropriate Network ID setting from the drop down box (must be from 1-99).

**Step 7:** Accept the changes by pressing the {Accept} button. To cancel changes press {Cancel}. The next time you start the Ion application, Ion will automatically send the new settings to any base station that is connected to the console.

**Step 8:** If you have any difficulty, reset the base station by disconnecting the USB cable from the console and then reconnect it. This cycles power to the unit.
Basic Use Guidelines

Keypad Function

The keypad illuminates while the keys are in use and remains illuminated while the unit is transmitting data. After a key is released, the keypad will dim the backlight until the next button press or transmission.

Most of the buttons on the handheld remote function exactly as they work on the Ion console. A select few of the buttons require additional explanation.

- **[More SK / Mode]** - When this button is pressed and released, the soft keys will change to the next page of softkeys (if there is more than one page available). Press and hold the **[More SK / Mode]** button to display the available RFR modes.
- **[Enter / Chan]** - When the RFR is connected for use with an Ion console, this button functions as **[Enter]**, which terminates the command line.
- **[@]** - The first press of this button is "at". The second consecutive press is "at level". The third press is "at Out".
- **[S1 - S6]** - These six buttons are softkeys, defined by the operating mode and identified in the bottom portion of the LCD (see below).
- **[.]** - The first press of this button is ".". The second consecutive press is "f".

LCD General Layout

The handheld remote LCD is divided into four sections. The top section displays status for the selected target. The middle section displays the command line. This section scrolls to accommodate viewing long command syntax. The next section displays the console’s mode status and error status (if any). The bottom section displays the current function of the soft keys (it also displays the various modes when **[Mode/More SK]** is pressed and held).

Thumbwheels

The two thumbwheels on the RFR (one left, one right) have varying functionality depending on the selected mode (see RFR Operation Modes, page 383). Generally speaking, the left thumbwheel acts as a level wheel. It increases or decreases intensity for selected channels. The right thumbwheel behaves as next and last for scrolling through data lists.
Recharge the Handheld Battery

A battery level indicator is found in the upper right corner of the handheld LCD. When the battery is near to a complete drain, the indicator will flash. When charging, the indicator will depict increasing power to verify that it is charging.

When the remote is not in use, set the switch to the "Off" position to guard against accidental key presses and to conserve battery power.

Charge the battery using the USB Mini-B cable that shipped with your RFR. Connect the USB Mini-B connector to the handheld remote and the other end to the USB charger adapter supplied with your RFR. You may also attach the USB cable to a powered USB-hub, personal computer, or your console. A full recharge may take up to 12 hours.

Provided there is enough battery charge, you may use the remote while charging.

CAUTION: If you choose to charge the remote from the Ion console, you should unplug the base station before doing so.

The remote will be functional once it is connected directly to the console. If the base station is still connected and a command is entered on the remote, multiple iterations of the command may register and this may create errors in the Ion command line.

Remotes Enabled/Disable

Remotes must be enabled before using. For more information, see [RFR Settings], page 109 and [RFR], page 352.

Remotes Enabled/Disable Via a Macro

A macro can be used to enable or disable all remote control (RFR, WFR, iRFR, aRFR) connections. The macro can either be a toggle between enable or disable, or it can have an absolute action of either enabling or disabling remote connections using the (Enable) and (Disable) softkeys on the Macro Editor. See "Macro Editor Display" on page 290.
RFR Operation Modes

The Ion RFR defaults to opening in Channel Check mode the first time. The next time it is connected, the RFR will return to the last mode it was in. There are other modes available in the RFR, however. To switch modes, hold down the [Mode/More SK] button and then select the desired mode from those available by pressing the appropriate softkey. Mode options are: Channel Check, Park, Live, Playback, and Patch.

Channel Check Mode

This mode allows you to perform channel and address checks. The default is Channel Check. Check will automatically be placed at the end of every command while in this mode.

Softkeys

The following softkeys are available for Channel Check mode:

- Address
- Last
- Full
- Next

The right thumbwheel acts as next/last buttons. The left thumbwheel doesn’t have a function in this mode.

Park Mode

This mode is used for parking channels and also for “channel check” and “address check” functions.

Softkeys

The following softkeys are available in park mode:

- Address
- Channel
- Last
- Full
- Out
- Next

{Address} and {Channel} are used to select addresses or channels for parking.

- <Channel> [7] [@] [5] [Enter] - Parks channel 7 at 50%.
- {Address} [8] {Full} - Parks address 8 at full.

{Full} and {Out} are used to set those levels for channels or addresses. {Out} parks the channel or address at 0.

**Live Mode**

Live mode is used for modifying levels and recording or updating cues. This mode is intended to allow you to make basic adjustments to show data. Buttons and softkeys function as they do within Eos/Ion.

The command line is displayed in the LCD to verify the commands you enter. It also displays details for the currently selected channel or the current cue (if no channels are selected).

**Softkeys**

The following softkeys are available on page one of live mode:

- Group
- Rem Dim
- Sneak
- Full
- Out
- Macro

The following softkeys are available on page two of live mode:

- Rec
- Update
- Time
- Cue Only/Track (shown as “Qoly/Tk”)
- Address

(Macro) allows you to execute a macro.

- (Macro) [3] [Enter]

In live mode, the left thumbwheel controls the level of the selected channels. The right thumbwheel acts as next and last buttons, defaulting to next or last cue selection for the currently selected cue list.
Playback Mode

Softkeys

The following softkeys are available in playback mode:

- Sub
- Load Q
- Stop/Bk
- Out
- Goto Q
- Go

{Sub} is used to set the level of a submaster.

- {Sub} [5] [@] [7] [Enter] - sets submaster 5 to 70%.

{Load Q} allows you to load a cue into the pending file for the master playback fader pair only.

- {Load Q} [5] [Enter] - Loads cue 5 of the master playback fader to the pending file for that fader. Pressing {Go} will execute this cue.

{Go} and {Stop/Bk} are duplicates of the [Go] and [Stop/Back] buttons for the Eos/Ion master fader pair.

{Goto Q} allows you to jump to any cue in the show.

- {Goto Q} [6] [Enter] - plays back cue 6 for the master playback fader pair.
- {Goto Q} [4] [.] [.] [2] [Enter] - plays back cue 2 from cue list 4. To play back cues from any other list than the one loaded to the master playback fader pair requires you to specify the cue list in the command line.

The left thumbwheel controls intensity of a selected submaster. The right thumbwheel acts as next or last for the most recently selected cue list.
Patch Mode
In patch mode, the LCD displays the channel, address and type for the currently selected channel(s).

Softkeys
The following softkeys are available in patch mode:

- Address
- A
- B
- /
- Fixture Controls (shown as: FixCtrl)

(Address) allows you to change the address of the selected channel.

- [1] {Address} [1] [Enter] - addresses channel 1 to output 1.

(A) and (B) are used for patching dimmer doublers.

- [9] [7] [Th] [1] [0] [2] {Address} [1] (B) [Enter] - patches channels 97-102 to outputs 1B-6B (for dimmer doubling).

(\) is used to patch the port and offset.

- [2] {Address} [3] [7] [1] [Enter] - patches channel 2 to port 3 offset 1 or address 1025.

(FixCtrl) is used to display the fixture controls for a channel (if available).


The thumbwheel will scroll through the available fixture controls. Press the thumbwheel to activate the fixture control.
## Technical Specifications

### Handheld Transmitter

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Antenna</td>
<td>Helical, fixed.</td>
</tr>
<tr>
<td>Working range</td>
<td>90m (300 ft) indoor, 200m (656 ft) in free field.</td>
</tr>
<tr>
<td>Size</td>
<td>160mm(4.5&quot;) x 72mm (2.8&quot;) x 20mm (.8&quot;) excludes antenna.</td>
</tr>
<tr>
<td>Connections</td>
<td>Integral USB Mini-B connector for charging the unit.</td>
</tr>
<tr>
<td>Power</td>
<td>2x NiMH rechargeable battery. (Recharge using the USB connection.)</td>
</tr>
<tr>
<td>Weight</td>
<td>400g (14 oz.) includes antenna.</td>
</tr>
</tbody>
</table>

### Base Station Receiver

<table>
<thead>
<tr>
<th>Data</th>
<th>USB type B. Ethernet.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>USB or Power over Ethernet (PoE).</td>
</tr>
<tr>
<td>Size</td>
<td>112mm(4.4&quot;) x 71mm (2.7&quot;) x 45mm (.7&quot;) excludes antenna.</td>
</tr>
<tr>
<td>Connections</td>
<td>Integral USB connector to console or RPU. Ethernet 802.3af.</td>
</tr>
<tr>
<td>Maximum USB cable length</td>
<td>5m (16.5') from power source using USB.</td>
</tr>
<tr>
<td>Weight</td>
<td>380g (13 oz.) includes antenna.</td>
</tr>
</tbody>
</table>
iRFR
The iRFR is a software application that runs on an Apple iPhone® or iPod Touch. The application can be downloaded from the Apple Application Store, search for iRFR. The iRFR offers the same functionality of the RFR. A closed wireless network is needed.

For additional information on the iRFR, including setup, please visit the www.etcconnect.com/wiki.

aRFR
The aRFR is an application that runs on Android devices. The application can be downloaded from the Android Marketplace, search for aRFR. The aRFR offers the same functionality of the RFR. A closed wireless network is needed.

For additional information on the aRFR, including setup, please visit the www.etcconnect.com/wiki.
Appendix F

Universal Fader Wings

Overview

Universal fader wings can be used in conjunction with your Ion console to facilitate the use of submasters and playbacks. The wings are available in 2x10 or 2x20 or 1x20 configurations.

The fader wings are designed to physically attach to your Ion console, thereby receiving power from the console and eliminating the need for the external power supply. Or you may connect wings to Ion using a USB cable and provide power using an external power supply.

1 x 20 Setup

The 1 x 20 fader wing is specifically designed to be physically attached to your console. A USB cable connection is required.

To install the 1 x 20 on your Ion console, follow the instructions that were included with the 1 x 20 wing. Be sure to connect the wing to Ion using the USB cable that was included with the wing.

2 x 10 and 2 x 20 Setup

2x10 and 2x20 Universal Fader Wings may be attached together and then physically attached to Ion consoles.

Wings may also be connected to an Ion console, RPUs, or RVIs using a USB cable. When connecting fader wings with a USB cable, one external power supply must also be used.

Rules of Connection

Rule One

Your entire system is limited to a total of 300 faders per processor (Ion, RPU, RVI).

Rule Two

No more than three fader wings may be physically attached to each other. This means:

- A maximum of three fader wings may be directly attached to either side of a console (3 per side).
- A maximum of three fader wings may be connected using a USB cable to form an external array using an external power supply.

Note: Only one wing (2 x 10 or 2 x 20) may be used with Eos Family offline software running on a personal computer. The Mac OS is not supported.

Connecting Wings to Ion

Up to three Universal Fader Wings may be attached together and then connected to Ion using a USB cable only or by physically attaching them to the ion console. Both sides of Ion may have up to three wings attached.

The best way to attach wings together is to attach them in order from left to right.
Attach Universal Fader Wings

Step 1: Using a #1 Phillips head screwdriver, on the underside of the wing(s) remove the two screws securing the bumpers that will be removed from the appropriate side or sides of the wings. The bumpers will be removed in a later step.
   a: Carefully turn the wing over and place it faders-down on a clear, flat work surface.
   b: Remove and save the two screws securing the bumper to the side of the wing.

CAUTION: Do not set the wing on the connector side (rear panel). Instead, place it face down on the faders.

Step 2: Turn the wing over to return it to its upright position.

Step 3: Remove the bumper(s) from the wing.
   a: Right Side - Gently pull the bumper up until it is flush with the facepanel.
      Left Side - Gently push the bumper down until it loosens from the facepanel.
   b: Pull the bumper away from the facepanel until it is free from the wing.

Step 4: Repeat steps 2 and 3 for each side of each wing that needs to be exposed.

Step 5: Align the two wings. Lift the wing on the right and place it gently on the hooks provided on the wing on the left. Check that the two wings are aligned properly front and back.
then press down gently on the right wing until it is fully seated. This should be a smooth connection but may require a little force.

Step 6: Repeat above procedure to connect another wing to the right end of the pair, if desired.

Step 7: Re-insert screws to secure wings together and secure the bumpers to the sides of the wings.

Attach fader wing array to Ion

Once all of the desired wings are attached (within the limits above), you may use the same procedure above to attach the wings to Ion.

Connect Universal Fader Wing(s) to Console with USB Cable

Step 1: With the console power off, connect the USB A to B cable (provided) between the console and one wing as shown above. If multiple wings are joined, only one power and one USB connection is required for all joined wings.

Step 2: Using the power supply adaptor kit, connect the fader wing to a power source.

Step 3: It is recommended that you run the power and USB cables through the strain relief included on the back of the wings.

Step 4: Turn the console on.
User Guidelines for Fader Wings

Fader Wing Interaction With Ion

1x20
When connected with a USB cable, the 1 x 20 will automatically be populated with the faders 1-20. Any other fader wings will then be populated with successive fader pages.

2x10 or 2x20
Ion will automatically recognize the fader wings and their configuration (2 x 10 or 2 x 20) once they are connected to the console. The system will configure the faders according to the configuration in fader wing configuration screen, for more information see (Fader Wing Config), page 108. The left most fader will be fader 1 on page 1, next will be fader 2 on page 1, and so on.

Multiple wings connected
If multiple wings are used in conjunction with each other, configuration will automatically adhere to the following logic.

1x20
Anytime a 1x20 is attached to Ion, it will automatically load the first 20 faders. Other wings will then be populated, starting with the 21st fader.

2x10 and 2x20
When 2x fader wings are attached to each other, the faders will populate continuously across the attached array according to the configuration in fader wing configuration screen. The top row of all wings will be successive from one wing to the next. The bottom row will start where the entire top row left off and then will also be successive from one wing to the next.

Therefore, when fader wings are attached to each other:

| Top Row Faders | 1 - 10 | 11 thru 30 | 31 - 40 |
| Bottom Row Faders | 41 - 50 | 51 thru 70 | 71 - 80 |
| 2x10 | 2x20 | 2x10 |

LCD
The display at the center of the fader wing shows information about the faders.

For submasters the sub number, label, and current value (0-100%) of the fader are shown. When the page is changed, the current value will display the necessary percentage the fader must be set at to match the required level of the submaster.

For playbacks the cue list number will be shown preceded by an “L” (for example “L3” = cue list 3). Beneath this the current pending cue is displayed in an oval shape.

For Grandmasters, a “GM” is displayed and the current output percentage is shown (100% - blackout).
Using the Buttons

Each fader is equipped with two buttons beneath the potentiometer. When used with submasters, the bottom button is the bump key. The top button can be used in two ways. When pressed in conjunction with the bump button it will act as a "Load" button for that fader and can be used to load submasters. When pressed individually, it will act as a group select button for all channels in that submaster. Pressing it in this instance is the same as entering [Group] [Sub] [x] on the command line.

For playbacks, the bottom button acts as a [Go] button and the top button acts as a [Stop/Back] button, similar to the buttons beneath the master fader pair on Ion.

When pressed together, these buttons act as a [Load] button for that fader which can be used to load faders or to use any of the fader controls such as (Release) or (Stop Effect).

Loading Faders

To load a submaster or playback onto an unmapped fader, specify the desired submaster or cue list on the command line and press [Enter]. Then press both fader buttons (which equals [Load]).

To load contents to a fader that is already mapped, you may have to release the fader by pressing and holding [Fader Controls], pressing (Release), and then pressing both fader buttons ([Load]).

To assign a fader as a Grandmaster, you must do so in the fader configurator in setup.

Holding down the [Fader Control] button while a fader wing is attached will cause the last button on the wing to toggle between Channel and Fader modes.

Fader Wing Paging

The fader wing is paged using the [Fader Controls] button on the Ion console. Fader pages are delineated in 10 fader increments. If you advance to the next fader page, your entire fader wing array will advance by a total of 10 faders.

Note: On a 2x10 fader wing, you can only access the first 19 pages of faders.

To change the fader page of a fader wing:

Step 1: Press and hold the [Fader Controls] button on the Ion console. The LCD on the fader wing will display the available pages beneath the fader bump buttons.

Step 2: Press the bump button corresponding to the page you wish to display on the fader wing. The fader wing will display those faders after your selection is made.
Using the Faders

When the page is changed, the fader wing LCD will display information for any mapped submaster or loaded playback. Unmapped faders will display no information.

Submaster LEDs will illuminate in the color of the new submaster loaded on the page (green for additive and red for inhibitive). Fader wing submasters are not motorized, therefore when you change pages you may have to manually reset the fader to the proper location to reflect its current output level. If a submaster setting must be matched to gain control, the LED will flash quickly in the appropriate color. The LED will stop flashing and illuminate normally once the fader has been moved to the required location.

When loaded with a playback, you may use the fader to interrupt a fade in progress and switch the fade to manual timing. First press [Go] and while the fade is in progress, drop the fader to zero and the raise the fader at the desired rate. Once it is raised fully, the fade will complete and control will be returned to the buttons.
# Index

## Symbols

- % ........................................ 126
+ % ........................................ 126

## A

- about .................................... 268
  - about ................................ 268
  - channel ................................ 270, 272
  - cue .................................... 275
  - curves ................................ 276
  - effects ................................ 276
  - groups ................................ 275
  - palettes ................................ 275
  - presets ................................ 275
  - system ................................ 269
- absolute data
  - with palettes ......................... 147
- absolute effects ........................ 248
- absolute palette
  - description ............................ 140
- accessories
  - patching ............................... 75
- active cue list
  - changing ............................... 206

## Address

- in live ................................ 131

## address

- parking in live .......................... 237
- allfade ................................ 177, 206
- aRFR .................................... 343, 388

## assert

- and load ................................. 224
- at channel level ........................ 205
- at cue level ............................. 205
- cue list ................................ 224
- flags ................................... 177
- using with cue lists .................... 204

## assign

- virtual faders ........................... 220

## At // .................................... 116

## At Enter ................................ 179

## AutoMark ................................. 192

## allowing live moves .................... 192

## timing ................................. 192

## B

- back (key) .............................. 221
- background (softkey)
  - in cue list index ..................... 210
- backup .................................. 357–363
  - backup console ........................ 357
  - client .................................. 357
  - master .................................. 357
  - offline console ......................... 357
  - primary ................................. 357
- backup console
  - definition ............................. 357
- basic manual control .................. 111
- beam palette
  - description ........................... 140
- blackout ................................ 221
- blind
  - channel display ....................... 147
  - display indicators ..................... 31
  - editing cues in ........................ 186
  - editing palettes in .................... 147
  - editing presets in ..................... 157
  - recording cues in ...................... 186
  - spreadsheet view ....................... 41
    - edit palettes in ....................... 148
  - storing multipart cues in ............ 214
  - text indicators ....................... 33
  - using encoders in ..................... 188
- block .................................. 176
  - channels/parameters .................. 176
  - cues .................................. 176
- browser ................................ 22
  - clear ................................... 27
  - file
    - save as ................................ 57
    - Image ................................ 24
  - navigating within ..................... 24
  - virtual keyboard ....................... 24
- bump button
  - timing ................................ 265
- buttons
  - configuration ......................... 351
- by type palette
  - description ........................... 140
- by type palettes ....................... 150
C

calibrate scroller ........................................ 72
capture ..................................................... 233
Central Information Area (CIA) ..................... 22
  browser ................................................... 22
  favorite display ...................................... 23
  locking ..................................................... 23
  parameter display ................................... 22
  parameter display in .................................. 115
  unlocking .................................................. 23
  virtual keyboard ........................................ 24

channel
  delete ...................................................... 66
  faders ..................................................... 112
  swapping .................................................. 65
  unpatching ............................................... 66

channel check ............................................. 131

channels
  asserting ............................................... 205
  display conventions ................................... 31
  homing .................................................... 123
  moving ...................................................... 65
  multiple intensity ..................................... 124
  ordered with groups ................................... 134
  selecting ............................................... 112
  using about ............................................. 270, 272

CIA. See Central Information Area

cleaning Ion .............................................. 14

clear
  cue attributes ......................................... 175
  filters ..................................................... 201
  patch ....................................................... 87
  submaster ............................................... 264

clear functions ......................................... 27

clear patch ............................................... 27

clear show ................................................ 27

reset patch ............................................... 27

reset system ............................................. 27

client console
  definition ............................................... 357

close
  displays ................................................ 28

color control
  from encoders ......................................... 120

color effects ............................................ 251

color indicators
  in live/blind .......................................... 32

color palette
  description ............................................ 140

color picker
  description ............................................ 121

command history ........................................ 234

calculate line
  about .................................................... 22

syntax structure ........................................ 4

configuration utility ................................. 333–348

configure
  gateways ................................................. 14
  grandmaster ........................................... 98
  Ion DMX ports .......................................... 351
  Ion DMX nodes ......................................... 14
  show control ports ................................... 352

console
  capacities .............................................. 15
  cleaning ................................................ 14
  geography .............................................. 12
  playback controls .................................... 216

conventional fixtures
  display conventions ................................... 31

copy
  fixture ................................................ 92
  copy to ................................................ 228

create
  cue ....................................................... 165
  cue list ................................................. 204
  curve .................................................... 279
  fixture in patch ....................................... 88
  group ..................................................... 134
  macro
    using editor display ................................ 292
    new fixture ........................................... 88
    palette ............................................... 142
    preset ............................................... 152
    submaster ............................................ 258

cue
  recording an effect ................................... 253
  selected, the .......................................... 217
    in blind .............................................. 217
    in live ............................................... 217

cue level timing
  setting ................................................ 169

cue list
  out of sequence sync ................................ 178

cue list index .......................................... 208
  (Background) ........................................... 210

Ion Operations Manual
<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>208</td>
<td>opening</td>
</tr>
<tr>
<td>209</td>
<td>(HTP/LTP)</td>
</tr>
<tr>
<td>209</td>
<td>(independent)</td>
</tr>
<tr>
<td>210</td>
<td>(Solo Mode)</td>
</tr>
<tr>
<td>210</td>
<td>opening</td>
</tr>
<tr>
<td>224</td>
<td>cue lists</td>
</tr>
<tr>
<td>206</td>
<td>active list, changing the attributes</td>
</tr>
<tr>
<td>209</td>
<td>manual master</td>
</tr>
<tr>
<td>204</td>
<td>new, recording to</td>
</tr>
<tr>
<td>204</td>
<td>using (Record Only)</td>
</tr>
<tr>
<td>204</td>
<td>using (Record)</td>
</tr>
<tr>
<td>204</td>
<td>recording to new</td>
</tr>
<tr>
<td>204</td>
<td>using assert</td>
</tr>
<tr>
<td>189</td>
<td>Cue Only mode</td>
</tr>
<tr>
<td>215</td>
<td>cue playback</td>
</tr>
<tr>
<td>99</td>
<td>cue settings</td>
</tr>
<tr>
<td>179</td>
<td>(At) (Enter)</td>
</tr>
<tr>
<td>164</td>
<td>about</td>
</tr>
<tr>
<td>281</td>
<td>applying curves to</td>
</tr>
<tr>
<td>205</td>
<td>asserting</td>
</tr>
<tr>
<td>173</td>
<td>attributes</td>
</tr>
<tr>
<td>175</td>
<td>clearing</td>
</tr>
<tr>
<td>173</td>
<td>follow/hang</td>
</tr>
<tr>
<td>175</td>
<td>label</td>
</tr>
<tr>
<td>174</td>
<td>link/loop</td>
</tr>
<tr>
<td>175</td>
<td>rate</td>
</tr>
<tr>
<td>164</td>
<td>basic programming</td>
</tr>
<tr>
<td>176</td>
<td>block</td>
</tr>
<tr>
<td>208</td>
<td>cue list index</td>
</tr>
<tr>
<td>208</td>
<td>opening</td>
</tr>
<tr>
<td>189</td>
<td>deleting</td>
</tr>
<tr>
<td>189</td>
<td>in Cue Only mode</td>
</tr>
<tr>
<td>189</td>
<td>in Track mode</td>
</tr>
<tr>
<td>186</td>
<td>editing in blind</td>
</tr>
<tr>
<td>178</td>
<td>external links</td>
</tr>
<tr>
<td>176</td>
<td>flags</td>
</tr>
<tr>
<td>177</td>
<td>allfade</td>
</tr>
<tr>
<td>177</td>
<td>assert</td>
</tr>
<tr>
<td>176</td>
<td>block</td>
</tr>
<tr>
<td>177</td>
<td>mark</td>
</tr>
<tr>
<td>177</td>
<td>preheat</td>
</tr>
<tr>
<td>218</td>
<td>go to cue</td>
</tr>
<tr>
<td>222</td>
<td>modifying</td>
</tr>
<tr>
<td>281</td>
<td>curve delete</td>
</tr>
<tr>
<td>78</td>
<td>curve delete</td>
</tr>
<tr>
<td>187</td>
<td>from summary view</td>
</tr>
<tr>
<td>187</td>
<td>from table view</td>
</tr>
<tr>
<td>179</td>
<td>using (At) (Enter)</td>
</tr>
<tr>
<td>188</td>
<td>using (move to)</td>
</tr>
<tr>
<td>188</td>
<td>in blind</td>
</tr>
<tr>
<td>180</td>
<td>in live</td>
</tr>
<tr>
<td>180</td>
<td>using (Record Only)</td>
</tr>
<tr>
<td>179</td>
<td>using (Record)</td>
</tr>
<tr>
<td>188</td>
<td>using (Replace With)</td>
</tr>
<tr>
<td>181</td>
<td>using (Update)</td>
</tr>
<tr>
<td>179</td>
<td>modifying in live</td>
</tr>
<tr>
<td>211</td>
<td>multipart</td>
</tr>
<tr>
<td>214</td>
<td>changing to standard cue</td>
</tr>
<tr>
<td>214</td>
<td>deleting a part</td>
</tr>
<tr>
<td>213</td>
<td>setting part attributes</td>
</tr>
<tr>
<td>164</td>
<td>numbering</td>
</tr>
<tr>
<td>218</td>
<td>out of sequence</td>
</tr>
<tr>
<td>218</td>
<td>using go to cue</td>
</tr>
<tr>
<td>166</td>
<td>using (Record Only)</td>
</tr>
<tr>
<td>165</td>
<td>using (Record)</td>
</tr>
<tr>
<td>186</td>
<td>recording in blind</td>
</tr>
<tr>
<td>165</td>
<td>recording in live</td>
</tr>
<tr>
<td>212</td>
<td>recording multiparts in live</td>
</tr>
<tr>
<td>99</td>
<td>settings</td>
</tr>
<tr>
<td>167</td>
<td>storing</td>
</tr>
<tr>
<td>168</td>
<td>using (Cue Only/Track)</td>
</tr>
<tr>
<td>168</td>
<td>in Cue Only mode</td>
</tr>
<tr>
<td>168</td>
<td>in Track mode</td>
</tr>
<tr>
<td>214</td>
<td>storing multiparts in blind</td>
</tr>
<tr>
<td>169</td>
<td>timing</td>
</tr>
<tr>
<td>173</td>
<td>delay</td>
</tr>
<tr>
<td>172</td>
<td>discrete</td>
</tr>
<tr>
<td>170</td>
<td>manual</td>
</tr>
<tr>
<td>170</td>
<td>parameter category</td>
</tr>
<tr>
<td>169</td>
<td>setting</td>
</tr>
<tr>
<td>182</td>
<td>updating</td>
</tr>
<tr>
<td>182</td>
<td>to references</td>
</tr>
<tr>
<td>213</td>
<td>updating multiparts in live</td>
</tr>
<tr>
<td>275</td>
<td>using (About)</td>
</tr>
<tr>
<td>206</td>
<td>using (Allfade)</td>
</tr>
<tr>
<td>281</td>
<td>curve delete</td>
</tr>
<tr>
<td>78</td>
<td>in patch</td>
</tr>
<tr>
<td>278</td>
<td>curves</td>
</tr>
<tr>
<td>applying</td>
<td>281</td>
</tr>
<tr>
<td>to channels in patch</td>
<td>281</td>
</tr>
<tr>
<td>creating</td>
<td>279</td>
</tr>
<tr>
<td>editing</td>
<td>280</td>
</tr>
<tr>
<td>scroller fan</td>
<td>71</td>
</tr>
<tr>
<td>using about</td>
<td>276</td>
</tr>
<tr>
<td>custom fixture</td>
<td>92</td>
</tr>
</tbody>
</table>

| D                          |     |
| data (navigation key)      | 35  |
| database settings, in patch| 80  |
| delay                      |     |
| effects                   | 255 |
| delay timing               | 173 |
| delete                     |     |
| channel                    | 66  |
| cues                       | 189 |
| curves                     | 281 |
| groups                     | 135 |
| macros                     | 294 |
| palettes                   | 149 |
| parts from multipart cues  | 214 |
| presets                    | 158 |
| show file                  | 58  |
| snapshots                  | 285 |
| submasters                 | 264 |
| delete a channel           | 66  |
| desk lamps                 | 14  |
| desk setup                 | 103 |
| dimmer                     |     |
| See address.               |     |
| dimmer check               |     |
| See (Address)              |     |
| dimmer doubling            |     |
| in patch                   | 65  |
| direct selects             |     |
| flexi mode                 | 26  |
| opening                    | 25  |
| organizing                 | 26  |
| selecting channels with    | 25  |
| discrete timing            | 172 |
| display                    |     |
| indicators                 |     |
| mark                       | 194 |
| display indicators         | 31  |
| displays                   |     |
| attribute, in patch        | 78  |
| blind channel              | 147 |
| changing format            | 39  |
| close                      | 28  |
| color indicators           | 32  |
| controlling                | 28  |
| conventions                | 31  |
| database, in patch         | 80  |
| effect status              | 244 |
| expanding                  | 30, 31 |
| macro editor               | 290 |
| moving                     | 29  |
| navigating                 | 28  |
| open                       | 28  |
| from the browser           | 28  |
| from the hardkeys          | 28  |
| from the softkeys          | 28  |
| parameter                  | 22  |
| park                       |     |
| parking from               | 238 |
| patch                      |     |
| opening                    | 61  |
| settings                   | 76  |
| playback status            |     |
| color indicators           | 37  |
| "image"                    | 42  |
| indicators in              | 37  |
| text indicators            | 37  |
| scrolling within           | 29  |
| selecting                  | 29  |
| spreadsheet view           | 41  |
| summary data view          | 39  |
| table view                 | 40  |
| zooming                    | 30  |
| DMX                        |     |
| outputting                 | 14  |
| from Ion                   | 351 |

| E                          |     |
| edit (softkey)             |     |
| in cue list index          | 210 |
| editing                    |     |
| cues in blind              | 186 |
| curves                     | 280 |
| effect                     |     |
| live                       | 253 |
| from submaster list        | 266 |
| groups                     |     |
playing ........................................ 294
stopping ..................................... 294
storing in live ................................ 288
using {Learn} ................................ 288
magic sheets
  about ....................................... 296
  array ....................................... 302
  backgrounds ................................ 305
  creating .................................... 300
  display ...................................... 297
  display tools ................................ 298
  editing ...................................... 300
  editing objects ............................. 308
examples of .................................... 309
fixture symbols ................................ 305
importing fixture symbols .................. 305
importing icons ................................ 305
importing images ............................. 305
keyboard shortcuts ........................... 299
layout tools ................................... 301
list ............................................. 298
multi-touch gestures .......................... 299
navigating ..................................... 299
object library ................................ 303
object properties ............................. 307
objects ....................................... 303
quick save .................................... 300
targets ........................................ 307
make manual
  about ........................................ 231
  with multiple cue lists ..................... 204
make null
  about ........................................ 230
managing show files ......................... 49
manual control
  {last} ....................................... 113
  {next} ...................................... 113
  advanced .................................... 227
    capture ................................... 233
    copy to ................................... 228
    recall from ................................ 229
  channel check ................................ 131
  controlling non-intensity parameters  
    (NPs) ..................................... 115
during playback ................................ 222
encoder LCD ................................... 117
flash .......................................... 132
flip ........................................... 131
highlight ..................................... 128
home (hardkey) ................................ 123
lowlight ....................................... 128
make manual ................................... 231
make null ..................................... 230
offset ......................................... 113
remainder dim ................................ 127
selecting channels ........................... 112
setting intensity ............................. 114
setting lamp controls........................ 125
settings see setup ............................
  sneak ....................................... 130
submasters .................................... 265
timing
  manual, for cues ............................ 170
  manual master ............................... 226
  manual override (key) ........................ 223
    in playback ................................ 223
mark
  about ....................................... 191
  allowing live moves ........................ 192
  AutoMark ................................. 192
  AutoMark timing ............................ 192
  display indicators .......................... 194
  flag ......................................... 177
  referenced marks ............................ 193
  removing referenced marks ................ 194
  setting referenced mark flags ............ 193
  timing, referenced marks .................. 197
mark time ..................................... 97, 197
master console
  definition .................................. 357
merge
  .esf ........................................ 54
  show file .................................... 54
MIDI
  ports
    configuring ................................ 352
    setup ...................................... 100
  mirror mode ................................ 365
ML Controls .................................. 46
  virtual control ............................. 46
move to
  in patch .................................... 65
move to (softkey)
  about ....................................... 132
    with cues in blind ........................ 188
    with cues in live .......................... 180
moving displays ...................................... 29
Moving Light Control ................................. 46
moving lights
  display conventions ............................... 31
  patching ........................................ 75
multiconsole ...................................... 357–360
  features of ...................................... 360
multipart cues ....................................... 211
  about ............................................ 211
attributes
  setting ............................................ 213
  changing into standard cues .................. 214
  changing standard cues into .................. 214
  recording in live ................................ 212
  storing in blind ................................ 214
  updating in live ................................ 213
multiple intensity channels ....................... 124
multiple intensity HTP effects .................... 250
multiple users .................................... 311, 327

N
navigating
  encoders ........................................ 45
navigation keys
  (data) ............................................ 35
  (time) .......................................... 35
next (key) ......................................... 113
nodes ............................................... 14
non-intensity parameters (NPs)
  controlling ...................................... 115
  setting .......................................... 116
    -% ............................................ 126
    + .............................................. 116
    +% ............................................ 126
  setting with encoders ......................... 116
NPs. See non-intensity parameters
numbering
  cues ............................................. 164
numeric view
  groups .......................................... 136

O
offline console
  definition ...................................... 357
offset ............................................. 113
channels in groups ............................... 135
in patch .......................................... 67
online forums
  register for .................................... 8
OOS Sync ......................................... 178
open
  direct selects .................................. 25
  displays ........................................ 28
    from the browser ............................. 28
    from the hardkeys ........................... 28
    from the softkeys ........................... 28
  fixture creator ............................... 88
  partial show ................................... 51
  slider module .................................. 25
ordered channels ................................. 134
ordered view
  groups .......................................... 136
out
  go to cue ...................................... 207
  out of sequence cues ........................... 218
  using go to cue ................................ 218
out of sequence sync .............................. 178
output DMX ....................................... 14
  from Ion ....................................... 351

P
paging
  encoders ........................................ 45
  faders ......................................... 220
softkeys ......................................... 47
palettes
  about .......................................... 139
  absolute ....................................... 140
  as absolute data ............................... 147
  beam .......................................... 140
  by type ........................................ 140, 150
  color .......................................... 140
  deleting ........................................ 149
  editing in blind ............................... 147
    spreadsheet view ............................. 148
  editing in live ................................ 146
  filters ......................................... 146
  focus .......................................... 144
  intensity ....................................... 140
  list view ....................................... 148
  locked .......................................... 141
  options ........................................ 140
  recalling ...................................... 145
  rerecording ................................... 146
record filters
  storing data with .......................... 201
referenced marks .......................... 193
setting flags .......................... 193
timing ........................................ 197
register your Ion .......................... 3
relative effects .......................... 250
release ....................................... 225
Release. See Sneak
rem dim. See remainder dim
remainder dim .............................. 127
highlight ..................................... 129
Remote ...................................... 377
remote
  aRFR ....................................... 388
  iRFR ....................................... 388
phone ........................................ 377
  connector .................................. 377
  functions .................................. 377
radio focus (RFR) ........................ 388
Remote Device Management
  See RDM.
remote power off ................................ 364
remote power on ................................ 364
Remote Processor Unit (RPU)
  button configuration .......................... 351, 370
  hardware setup
    front panel ................................ 369
    rear panel ................................ 368
  in System Overview .......................... 10
  start up .................................... 369
remote software installation .............. 364
Remote Video Interface (RVI)
  button configuration .......................... 351, 375
  hardware setup
    front panel ................................ 375
    rear panel ................................ 374
  in System Overview .......................... 10
  start up .................................... 375
remove
  channels
    from presets .............................. 149, 158
    referenced mark .......................... 194
    replace .................................... 64
    replace with ................................ 188
rerecord palettes .......................... 146
reset
  patch ..................................... 87
RFR. See Radio Focus Remote.
S
save as ....................................... 57
saving
  existing show file .......................... 57
  quick ....................................... 57
scaled park .................................. 237
scroller
  calibrating ................................ 72
  calibration column ........................ 73
  editing in patch .......................... 71
  fan curves ................................ 71
scroller fans
  applying curves to ......................... 281
scroller picker ................................ 68
scrolling displays ........................ 29
select channels
  keypad ....................................... 112
select last .................................. 123
selecting
  displays .................................... 29
selective store
  negative .................................... 167
  positive .................................... 167
  with cues ................................... 167
Sensor feedback
  enable ....................................... 343
Services
  ETC Technical ................................ 3
settings
  attribute, in patch .......................... 78
  database, in patch .......................... 80
  patch ....................................... 76
setup ......................................... 95
desk settings .............................. 103
Displays ..................................... 107
Face Panel .................................. 105
  manual control
    record defaults .......................... 103
MIDI
  show control ................................ 100
  time code .................................. 100
opening ....................................... 96
show ......................................... 96
show control ................................ 100
show settings ................................ 96
cue settings ................................ 99
synchronized backup .......................... 361
setup ...................................... 361
syntax
structure ................................... 4
using enter .................................. 5
system
using about .................................. 269
System Components ....................... 10

T

table view ................................. 40
editing presets in ........................ 157
modifying cues from ....................... 187
technical services ......................... 3
text indicators
in live/blind ............................... 33
in playback status display ............. 37
time
bump buttons .............................. 265
cue
setting ..................................... 169
cues ......................................... 169
delay ....................................... 171, 173
disable in playback ....................... 224
discrete .................................... 172
go to cue .................................. 218
manual control of, in playback ........ 222
setting for parameter categories ...... 170
time / ...................................... 171
time (navigation key) ...................... 35
time code
MIDI .................................... 100
SMPTE .................................. 100
timing disable
in playback ............................... 224
touchscreens
Elo touchscreens
   calibrate ............................... 337
   settings ................................ 347
ETC touchscreens
   calibrate ............................... 338
trace
with update .............................. 184
Track mode
deleting cues in .......................... 189
trackball .................................. 119

U
undo
   command history ......................... 234
   using .................................. 234
unpatch a channel ......................... 66
break nested references
   with .................................. 181
update .................................. 181
cues
   using (Cue Only/Track) ............... 183
   without references .................... 182
current cue ................................ 184
default modes ............................ 182
dialogue box .............................. 181
fixture library in show file ............. 92
groups in live ............................. 135
inactive cues ............................ 184
modifiers ................................. 181
options .................................. 181
palette ................................... 146
presets .................................. 155
references
   in cues ................................ 182
source cue ................................ 184
styles .................................... 181
submasters ............................... 264
using trace .............................. 184
update dialogue box ...................... 181
user
data between different IDs ............ 328
   ID
      about ............................... 328
      assigning ........................... 328
      relation to data sharing .......... 328
multiple ................................ 311, 327
user ID
   relation to data sharing ............. 360
   with multiconsole ..................... 360

V
view
   spreadsheet, in blind .................. 41
table .................................... 40
virtual faders
   assigning ............................. 220
virtual faders See slider module ...... 25
virtual keyboard ........................ 24
END USER LICENSE AGREEMENT ("EULA")

PLEASE READ THE FOLLOWING CAREFULLY BEFORE OPERATING/INSTALLING THE SOFTWARE. BY OPERATING/INSTALLING THE SOFTWARE, YOU WILL BE DEEMED TO HAVE ACCEPTED AND AGREED TO THE TERMS OF THIS AGREEMENT. THE SOFTWARE IS LICENSED AND COPYRIGHTED (NOT SOLD).

Subject to the following terms and conditions, Electronic Theatre Controls, Inc. ("ETC") grants to you ("User"), a non-exclusive license to use the Software.

1. **Grant of License**
   This is a worldwide, royalty-free, non-exclusive license granted to User subject to and in accordance with the terms and conditions of this Agreement. ETC intends to provide, but does not guarantee, updates or upgrades of the Software. ETC will provide maintenance and support relating to the Software. The Software may not be transferred, sold, assigned, leased, rented, sublicensed, or otherwise conveyed, in whole or in part, by User to any third party without ETC’s prior written consent.

   You have acquired a device ("Device") which includes software licensed by ETC from one or more software licensors. The Software is licensed, not sold. You may use the Software only on the Device.

2. **ETC’s Software Rights**
   The Software is a proprietary product of ETC and is protected under all applicable copyright laws and international treaties. Except for the limited license granted herein, all right, title and interest to and in the Software remains forever with ETC.

3. **Additional Restrictions**
   User may not modify, distribute, rent, lease, or sell the Software, but User may transfer User’s rights under this License on a permanent basis provided User transfers this License, together with the accompanying Software, and all other relevant materials, retaining no copies and the recipient party agrees to the terms of this License. User agrees not to cause or permit the reverse engineering, disassembly, or decompilation of the Software. Removal, emulation, or reverse engineering of all or any part of the Software constitutes an unauthorized modification to the Software and is specifically prohibited. If the Software is licensed to a User for use in a member country of the European Union, User may reverse engineer and/or decompile the Software to the extent that sufficient information is not available for the purpose of creating an interoperable software program and cannot be obtained by observing, examining or testing the program (but only for such purposes and to the extent that sufficient information is not provided by ETC upon written request). User shall not remove any product
identification, copyright notices, or other notices or proprietary restrictions from the Software.

4. **Warranty Information**
Software is provided “AS IS” under this License, without warranty of any kind, either express or implied, including, without limitation, warranties that the Software is free of defects, merchantable, fit for a particular purpose or non-infringing. The entire risk as to the quality, operation, and performance of the Software is with User. Should any Software prove defective in any respect, User assumes the cost of any necessary servicing, repair or correction. This disclaimer of warranty constitutes an essential part of this license.

5. **Upgrades**
If this copy of the Software is an upgrade from a previous version of the Software, it is provided to you on a license exchange basis. You agree by your installation and use of such copy of the Software to voluntarily terminate your earlier Agreement and that you will not continue to use the earlier version of the Software or transfer it to another person or entity.

6. **Third-Party Software**
The Software may contain third-party software not owned by ETC which requires notices and/or additional terms and conditions. Such notices and/or terms and conditions may be obtained by contacting your ETC sales rep and are made a part of and incorporated by reference into this Agreement. In addition, certain copyrights notices for such third party software also are included in the documentation attached hereto. By accepting this Agreement, you are also accepting the additional notices and terms and conditions, if any, set forth elsewhere.

7. **U.S. Government Restricted Rights**
The Software and any documentation were developed at private expense, are commercial, and are published and copyrighted. The Software and any documentation may be transferred to the U.S. Government only with the prior written consent of an officer of ETC. The Software and documentation are provided with RESTRICTED RIGHTS. Use, duplication or disclosure by the U.S. Government or any person or entity acting on its behalf is subject to restrictions as set forth in subdivision (c)(1)(ii) of the Rights in Technical Data and Computer Software Clause at DFARS (48 CFR 252.227-7013) for DoD contracts, in paragraphs (c)(1) and (2) of the Commercial Computer Software-Restricted Rights Clause in the FAR (48 CFR 52.227-19) for civilian agencies, or in the case of NASA, in Clause 18-52.227-86(d) of the NASA Supplement to the FAR, or in other comparable agency clauses. The contractor or manufacturer is Electronic
8. **Limitation of Liability**

UNDER NO CIRCUMSTANCES AND UNDER NO LEGAL THEORY, WHETHER TORT (INCLUDING NEGLIGENCE), CONTRACT OR OTHERWISE, SHALL ETC BE LIABLE TO ANY PERSON OR ENTITY FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY KIND INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF GOODWILL, WORK STOPPAGE, COMPUTER FAILURE OR MALFUNCTION, OR ANY AND ALL OTHER COMMERCIAL DAMAGES OR LOSSES, EVEN IF SUCH PARTY SHALL HAVE BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. THIS LIMITATION OF LIABILITY SHALL NOT APPLY (I) TO DEATH OR PERSONAL INJURY RESULTING FROM SUCH PARTY’S NEGLIGENCE TO THE EXTENT APPLICABLE LAW PROHIBITS SUCH LIMITATION, (II) FOR CONSUMERS WITH RESIDENCE IN A MEMBER COUNTRY OF THE EUROPEAN UNION (A) TO DEATH OR PERSONAL INJURY RESULTING FROM ETC’S NEGLIGENCE, (B) TO THE VIOLATION OF ESSENTIAL CONTRACTUAL DUTIES BY ETC, AND (C) TO DAMAGES RESULTING FROM ETC’S GROSS NEGLIGENT OR WILLFUL BEHAVIOR. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THIS EXCLUSION AND LIMITATION MAY NOT APPLY TO YOU.

9. **Export Administration**

The Software, including technical data, are subject to U.S. export control laws, including without limitation, the U.S. Export Administration Act and its associated regulations, and may be subject to export or import regulations in other countries. User shall not directly or indirectly export or re-export the Software, or the direct product thereof, without first obtaining ETC’s written approval. User agrees to comply with all regulations and acknowledges that it has the responsibility to obtain licenses to export, re-export, or import the Software. The Software may not be downloaded or otherwise exported or re-exported (i) into, or to, any country to which the U.S. has embargoed goods, or to a national or resident thereof; or (ii) to anyone on the U.S. Treasury Department’s list of Specially Designated Nationals and Blocked Persons List; or (iii) to any country facing U.S. sanctions, as listed by the U.S. Treasury Department’s Office of Foreign Assets Control.

10. **Termination**

Notwithstanding the above, ETC may, without prejudice to any other rights or remedies, terminate this EULA, if any of the following events should occur: (i) if you fail to perform or comply with any provision or term herein; and (ii) if you become insolvent, go into liquidation, file or initiate an action for bankruptcy, or have a receiver, administrative receiver or liquidator appointed or suffer similar
measures in any relevant jurisdiction; or if you cease doing business in any form or are no longer able to meet your obligations within the meaning of this EULA.

11. **Confidentiality**
You shall keep secret and confidential and shall not disclose to any third party any and all confidential information owned or otherwise possessed by ETC including without limitation the Software, the related documents and the contents of this EULA without prior written approval from ETC.

12. **Ownership**
ETC and its licensors shall retain exclusive ownership of all world-wide intellectual property rights in and to the Software and any copies of the Software. All rights in and to the Software not expressly granted to User in this EULA are expressly reserved for ETC and its licensors.

13. **Warranty for Third Party’s Intellectual Property Rights**
You shall indemnify, defend and hold harmless ETC and the Supplier (or Suppliers, as applicable) from and against any and all losses, damages, claims, liability, costs and expenses (including reasonable attorney fees), suffered or incurred by ETC or the Supplier as a result of any claim by any third party that by reason of your use or application of any intellectual property right contained in the Software constitutes an infringement of any third party’s property rights, including but not limited to, patent and copyright.

14. **Destruction of the Software**
Upon termination of this EULA, you must destroy the Software, the related documents and any and all copies thereof within ten (10) days after the date of termination and submit documents evidencing such destruction to ETC.

15. **Miscellaneous**
A) Complete Agreement: This Agreement is the complete agreement between the parties with respect to the Software and supersedes any other communication, written or verbal, with respect to the Software.
B) Severability: The provisions of this EULA are severable; if any term or provision shall be deemed void or unenforceable by a court of competent jurisdiction, such declaration shall have no effect on the remaining terms and provisions hereof.
C) Governing Law: This Agreement shall be governed by the laws of the State of Wisconsin, USA.
The Artistic License

Preamble

The intent of this document is to state the conditions under which a Package may be copied, such that the Copyright Holder maintains some semblance of artistic control over the development of the package, while giving the users of the package the right to use and distribute the Package in a more-or-less customary fashion, plus the right to make reasonable modifications.

Definitions:

* "Package" refers to the collection of files distributed by the Copyright Holder, and derivatives of that collection of files created through textual modification.
* "Standard Version" refers to such a Package if it has not been modified, or has been modified in accordance with the wishes of the Copyright Holder.
* "Copyright Holder" is whoever is named in the copyright or copyrights for the package.
* "You" is you, if you're thinking about copying or distributing this Package.
* "Reasonable copying fee" is whatever you can justify on the basis of media cost, duplication charges, time of people involved, and so on. (You will not be required to justify it to the Copyright Holder, but only to the computing community at large as a market that must bear the fee.)
* "Freely Available" means that no fee is charged for the item itself, though there may be fees involved in handling the item. It also means that recipients of the item may redistribute it under the same conditions they received it.

1. You may make and give away verbatim copies of the source form of the Standard Version of this Package without restriction, provided that you duplicate all of the original copyright notices and associated disclaimers.

2. You may apply bug fixes, portability fixes and other modifications derived from the Public Domain or from the Copyright Holder. A Package modified in such a way shall still be considered the Standard Version.

3. You may otherwise modify your copy of this Package in any way, provided that you insert a prominent notice in each changed file stating how and when you changed that file, and provided that you do at least ONE of the following:

   a) place your modifications in the Public Domain or otherwise make them Freely Available, such as by posting said modifications to Usenet or an equivalent medium, or placing the modifications on a major archive site such as ftp.uu.net, or by allowing the Copyright Holder to include your modifications in the Standard Version of the Package.
b) use the modified Package only within your corporation or organization.

c) rename any non-standard executables so the names do not conflict with standard executables, which must also be provided, and provide a separate manual page for each non-standard executable that clearly documents how it differs from the Standard Version.

d) make other distribution arrangements with the Copyright Holder.

4. You may distribute the programs of this Package in object code or executable form, provided that you do at least ONE of the following:

a) distribute a Standard Version of the executables and library files, together with instructions (in the manual page or equivalent) on where to get the Standard Version.

b) accompany the distribution with the machine-readable source of the Package with your modifications.

c) accompany any non-standard executables with their corresponding Standard Version executables, giving the non-standard executables non-standard names, and clearly documenting the differences in manual pages (or equivalent), together with instructions on where to get the Standard Version.

d) make other distribution arrangements with the Copyright Holder.

5. You may charge a reasonable copying fee for any distribution of this Package. You may charge any fee you choose for support of this Package. You may not charge a fee for this Package itself. However, you may distribute this Package in aggregate with other (possibly commercial) programs as part of a larger (possibly commercial) software distribution provided that you do not advertise this Package as a product of your own.

6. The scripts and library files supplied as input to or produced as output from the programs of this Package do not automatically fall under the copyright of this Package, but belong to whomever generated them, and may be sold commercially, and may be aggregated with this Package.

7. C or perl subroutines supplied by you and linked into this Package shall not be considered part of this Package.

8. The name of the Copyright Holder may not be used to endorse or promote products derived from this software without specific prior written permission.

9. THIS PACKAGE IS PROVIDED "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED
WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

The End

Copyright (c) 1998, 1999, 2000 Thai Open Source Software Center Ltd and Clark Cooper
Copyright (c) 2001, 2002 Expat maintainers.

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.
NORTON LICENSE AGREEMENT
Norton Ghost

IMPORTANT: PLEASE READ THE TERMS AND CONDITIONS OF THIS LICENSE AGREEMENT ("LICENSE AGREEMENT") CAREFULLY BEFORE USING THE SOFTWARE (AS DEFINED BELOW). SYMANTEC CORPORATION, IF YOU ARE LOCATED IN THE AMERICAS; OR SYMANTEC ASIA PACIFIC PTE LTD, IF YOU ARE LOCATED IN THE ASIA PACIFIC RIM OR JAPAN; OR SYMANTEC LIMITED, IF YOU ARE LOCATED IN EUROPE, THE MIDDLE EAST OR AFRICA ("SYMANTEC") IS WILLING TO LICENSE THE SOFTWARE TO YOU AS THE INDIVIDUAL, THE COMPANY, OR THE LEGAL ENTITY THAT WILL BE UTILIZING THE SOFTWARE (REFERENCED BELOW AS "YOU" OR "YOUR") ONLY ON THE CONDITION THAT YOU ACCEPT ALL OF THE TERMS OF THIS LICENSE AGREEMENT. THIS IS A LEGAL AND ENFORCEABLE CONTRACT BETWEEN YOU AND SYMANTEC. BY OPENING THIS PACKAGE, BREAKING THE SEAL, CLICKING THE "I AGREE" OR "YES" BUTTON OR OTHERWISE INDICATING ASSENT ELECTRONICALLY, OR LOADING THE SOFTWARE, YOU AGREE TO THE TERMS AND CONDITIONS OF THIS LICENSE AGREEMENT. IF YOU DO NOT AGREE TO THESE TERMS AND CONDITIONS, CLICK THE "CANCEL" OR "NO" BUTTON OR OTHERWISE INDICATE REFUSAL, MAKE NO FURTHER USE OF THE SOFTWARE, AND CONTACT YOUR VENDOR OR SYMANTEC CUSTOMER SERVICE, USING THE CONTACT DETAILS IN SECTION 10 OF THIS LICENSE AGREEMENT. FOR INFORMATION ON HOW TO OBTAIN A REFUND OF THE MONEY YOU PAID FOR THE SOFTWARE (LESS SHIPPING, HANDLING, AND ANY APPLICABLE TAXES EXCEPT IN CERTAIN STATES AND COUNTRIES WHERE SHIPPING, HANDLING, AND TAXES ARE REFUNDABLE) AT ANY TIME DURING THE SIXTY (60) DAY PERIOD FOLLOWING THE DATE OF PURCHASE.

1. License:

The software (including any accompanying features and services) and documentation (including any product packaging) (the "Documentation"), that accompanies this License Agreement (collectively the "Software") is the property of Symantec or its licensors, and is protected by copyright law. Although Symantec continues to own the Software, You will have certain rights to use the Software after Your acceptance of this License Agreement. This License Agreement governs any releases, revisions, or enhancements to the Software, that Symantec may furnish to You. Subject to Symantec’s right to terminate for Your breach pursuant to Section 9, Your rights and obligations under this License Agreement with respect to the use of this Software (excluding the Content Updates described in Section 2) shall be perpetual and shall be as follows.

You may:
A. use one copy of the Software on a single computer. If a greater number of copies and/or number of computers is specified within the Documentation or the applicable transaction documentation from the authorized distributor or reseller from which You obtained the Software, You may use the Software in accordance with such specifications;
B. make one copy of the Software for back-up or archival purposes, or copy the Software onto the hard disk of Your computer and retain the original for back-up or archival purposes;
C. use the Software on a network, provided that You have a licensed copy of the Software for each computer that can access the Software over that network;
D. permanently transfer all of Your rights in the Software granted under this License Agreement to another person or entity, provided that You retain no copies of the Software and the transferee agrees to the terms of this License Agreement. Partial transfer of Your rights under this License Agreement shall not be permitted. For example, if the applicable documentation grants You the right to use multiple copies of the Software, only a transfer of the rights to use all such copies of the Software would be valid; and
E. use the Software in accordance with any additional permitted uses which may be set forth below.

You may not, nor may you permit any other person to:
A. sublicense, rent or lease any portion of the Software;
B. reverse engineer, decompile, disassemble, modify, translate, make any attempt to discover the source code of the Software or create derivative works from the Software;
C. use the Software as part of a facility management, timesharing, service provider or service bureau arrangement; or
D. use the Software in any manner that is not permitted pursuant to this License Agreement.
2. Content Updates:

Certain Software uses content that is updated from time to time, including but not limited to the following Software: antivirus and crimeware software use updated virus definitions; antispyware software uses updated spyware definitions; antispam software uses updated antispam rules; content filtering and antiphishing software use updated URL lists; some firewall software use updated firewall rules; vulnerability assessment products use updated vulnerability data and web site authentication software uses updated lists of authenticated web pages; these updates are collectively referred to as “Content Updates” (or alternatively referred to as “Protection Updates” or “Security Updates” at times). You shall have the right to obtain Content Updates for any period for which You have purchased a subscription for Content Updates for the Software (including any subscription included with Your original purchase of the Software), except for those Content Updates that Symantec elects to make available by separate paid subscription, or for any period for which You have otherwise separately acquired the right to obtain Content Updates. Symantec reserves the right to designate specified Content Updates as requiring purchase of a separate subscription at any time and without notice to You; provided, however, that if You purchase a subscription that includes particular Content Updates on the date of purchase, You will not have to pay an additional fee to continue receiving such Content Updates for the remaining period of Your existing subscription even if Symantec designates such Content Updates as requiring separate purchase. This License Agreement does not otherwise permit You to obtain and use Content Updates.

3. Product Installation; Required Activation:

A. During the installation process, the Software may uninstall or disable other security products, or features thereof, if such products or features are incompatible with the Software or for purposes of improving the overall functionality of the Software.

B. There may be technological measures in this Software that are designed to prevent unlicensed or illegal use of the Software. You agree that Symantec may use these measures to protect Symantec against software piracy. This Software may contain enforcement technology that limits the ability to install and uninstall the Software on a computer to not more than a finite number of times for a finite number of computers. This License Agreement and the Software containing enforcement technology may require activation as further set forth in the Documentation. If so, the Software will only operate for a finite period of time prior to Software activation by You. During activation, You may be required to provide Your unique product key accompanying the Software and computer configuration in the form of an alphanumeric code over the Internet to verify the authenticity of the Software. If You do not complete the activation within the finite period of time set forth in the Documentation, or as prompted by the Software, the Software will cease to function until activation is complete; at which time the Software functionality will be restored. In the event that You are not able to activate the Software over the Internet, or through any other method specified during the activation process, You may contact Symantec Customer Support using the information provided by Symantec during activation, or as set forth below.

4. Privacy; Data Protection:

From time to time, the Software may collect certain information from the computer on which it is installed, which may include:

- Information on potential security risks as well as URLs of websites visited that the Software deems potentially fraudulent. The URLs could contain personally identifiable information that a potentially fraudulent website is attempting to obtain without Your permission. This information is collected by Symantec for the purpose of evaluating and improving the ability of Symantec’s products to detect malicious behavior, potentially fraudulent websites and other Internet security risks. This information will not be correlated with any personally identifiable information.
- Portable executable files that are identified as potential malware, including information on the actions taken by such files at the time of installation. These files are submitted to Symantec using the Software’s automatic submission function. The collected files could contain personally identifiable information that has been obtained by the malware without Your permission. Files of this type are being collected by Symantec only for the purpose of improving the ability of Symantec’s products to detect malicious behavior. Symantec will not correlate these files with any personally identifiable information. Such automatic submission function may be deactivated after installation by following the instructions in the Documentation for applicable products.
The name given during initial setup to the computer on which the Software is being installed. If collected, the name will be used by Symantec as an account name for such computer under which You may elect to receive additional services and/or under which You may use certain features of the Software. You may change the account name at any time after installation of the Software (recommended).

Status information regarding installation and operation of the Software. This information indicates to Symantec whether installation of the Software was successfully completed as well as whether the Software has encountered an error. The status information could contain personally identifiable information only if such information is included in the name of the file or folder encountered by the Software at the time of installation or error. The status information is collected by Symantec for the purpose of evaluating and improving Symantec’s product performance and installation success rate. This information will not be correlated with any personally identifiable information.

Information contained in email messages that you send through the Software to Symantec to report as spam or as incorrectly identified as spam. These email messages may contain personally identifiable information and will be sent to Symantec only with your permission, and will not be sent automatically. If you send such messages to Symantec, Symantec will use them only for the purpose of improving the detection ability of Symantec’s antispam technology. Symantec will not correlate these files with any other personally identifiable information.

The IP address of the computer on which the Software is installed, as well as other general, statistical information used for license administration, product analysis, and for improving product functionality. This information will not be correlated with any personally identifiable information.

The collected information as set out above is necessary for the purpose of optimizing the functionality of Symantec’s products and may be transferred to the Symantec group in the United States or other countries that may have less protective data protection laws than the region in which You are situated (including the European Union), but Symantec has taken steps so that the collected information, if transferred, receives an adequate level of protection.

Symantec may disclose the collected information if asked to do so by a law enforcement official as required or permitted by law or in response to a subpoena or other legal process. In order to promote awareness, detection and prevention of Internet security risks, Symantec may share certain information with research organizations and other security software vendors. Symantec may also use statistics derived from the information to track and publish reports on security risk trends. By using the Software, You acknowledge and agree that Symantec may collect, transmit, store, disclose and analyze such information for these purposes.

5. Sixty (60) Day Money Back Guarantee:

If You are the original licensee of this copy of the Software and are not completely satisfied with it for any reason, please make no further use of the Software and contact Symantec Customer Service, using the contact details set out in Section 10 of this License Agreement, for a refund of the money You paid for the Software (less shipping, handling, and any applicable taxes except in certain states and countries where shipping, handling and taxes are refundable) at any time during the sixty (60) day period following the date of purchase.

6. Limited Warranty:

Symantec warrants that any media manufactured by Symantec on which the Software is distributed will be free from defects for a period of sixty (60) days from the date of delivery of the Software to You. Your sole remedy in the event of a breach of this warranty will be that Symantec will, at its option, replace any defective media returned to Symantec within the warranty period or refund the money You paid for the Software. Symantec does not warrant that the Software will meet Your requirements or that operation of the Software will be uninterrupted or that the Software will be error-free.

TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, THE ABOVE WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU MAY HAVE OTHER RIGHTS, WHICH VARY FROM STATE TO STATE AND COUNTRY TO COUNTRY.
7. Disclaimer of Damages:

SOME STATES AND COUNTRIES DO NOT ALLOW THE LIMITATION OR EXCLUSION OF LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE BELOW LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW AND REGARDLESS OF WHETHER ANY REMEDY SET FORTH HEREIN FAILS OF ITS ESSENTIAL PURPOSE, IN NO EVENT WILL SYMANTEC OR ITS LICENSORS BE LIABLE TO YOU FOR ANY SPECIAL, CONSEQUENTIAL, INDIRECT, OR SIMILAR DAMAGES, INCLUDING ANY LOST PROFITS OR LOST DATA ARISING OUT OF THE USE OR INABILITY TO USE THE SOFTWARE EVEN IF SYMANTEC HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

IN NO CASE SHALL SYMANTEC’S OR ITS LICENSORS’ LIABILITY EXCEED THE PURCHASE PRICE WHICH YOU PAID FOR THE SOFTWARE. The disclaimers and limitations set forth above will apply regardless of whether You accept the Software.

8. U.S. Government Restricted Rights:

The Software is deemed to be commercial computer software as defined in FAR 12.212 and subject to restricted rights as defined in FAR Section 52.227-19 "Commercial Computer Software - Restricted Rights" and DFARS 227.7202, "Rights in Commercial Computer Software or Commercial Computer Software Documentation", as applicable, and any successor regulations. Any use, modification, reproduction release, performance, display or disclosure of the Software by the U.S. Government shall be solely in accordance with the terms of this License Agreement.

9. Export Regulation:

You acknowledge that the Software and related technical data and services (collectively "Controlled Technology") may be subject to the import and export laws of the United States, specifically the U.S. Export Administration Regulations (EAR), and the laws of any country where Controlled Technology is imported or re-exported. You agree to comply with all relevant laws and will not export any Controlled Technology in contravention to U.S. law nor to any prohibited country, entity, or person for which an export license or other governmental approval is required. All Symantec product is prohibited for export or re-export to Cuba, North Korea, Iran, Syria and Sudan and to any country subject to relevant trade sanctions. USE OR FACILITATION OF SYMANTEC PRODUCT IN CONNECTION WITH ANY ACTIVITY INCLUDING, BUT NOT LIMITED TO, THE DESIGN, DEVELOPMENT, FABRICATION, TRAINING, OR TESTING OF CHEMICAL, BIOLOGICAL, OR NUCLEAR MATERIALS, OR MISSILES, DRONES, OR SPACE LAUNCH VEHICLES CAPABLE OF DELIVERING WEAPONS OF MASS DESTRUCTION IS PROHIBITED, IN ACCORDANCE WITH U.S. LAW.

10. General:

This License Agreement will be governed by the laws of the State of California, United States of America. This License Agreement is the entire agreement between You and Symantec relating to the Software and: (i) supersedes all prior or contemporaneous oral or written communications, proposals, and representations with respect to its subject matter; and (ii) prevails over any conflicting or additional terms of any quote, order, acknowledgment, or similar communications between the parties. Notwithstanding the foregoing, nothing in this License Agreement will diminish any rights You may have under existing consumer protection legislation or other applicable laws in Your jurisdiction that may not be waived by contract. This License Agreement shall terminate upon Your breach of any term contained in this License Agreement and You shall cease use of and destroy all copies of the Software and Documentation. The disclaimers of warranties and damages and limitations on liability shall survive termination. This License Agreement may only be modified by the Documentation or by a written document that has been signed by both You and Symantec. Should You have any questions concerning this License Agreement, or if You desire to contact Symantec for any reason, please write to Symantec Customer Service, 555 International Way, Springfield, OR 97477, U.S.A., or visit the Support page at www.symantec.com.

CPS / P 3.0 / USE
Additional Terms and Conditions:

In addition to the terms and conditions set forth above, the following terms and conditions will also apply to Your use of the Software:

A. You may use the Software on one Device to clone, or apply an image of a hard drive on that Device, or to another hard drive on the same Device, a replacement Device, secondary media, or network drive.

B. You may use the Software on a Device to create an image file of a hard drive on that Device and store the image file on fixed or removable media for disaster recovery purposes.

C. You may use the Software as a boot disk to re-apply the hard drive image that was created for disaster recovery purposes to the hard drive on the Device from which the disaster recovery image was made or on a replacement Device provided that the software has been removed from the original Device.

D. You may use the Software to clone a hard drive from a Device to a replacement Device, in the manner described in the Software documentation and to use the Software on the replacement Device provided that the Software has been removed from the original Device.

E. You may not use the Software commercially or non-commercially for the purpose of creating an image on multiple Devices or hard drives, except for multiple hard drives installed in or attached directly to the original Device.

F. For the purposes of this License Agreement, a virtual device is considered the same as a physical device.

G. If the Software You have licensed includes the Symantec Recovery Disk (“Component”) the following uses and restrictions apply to the Software:

   (i) The Component contains Windows® software licensed from Microsoft Corporation. Microsoft Corporation has no liability to You for the Component. Any support for the Component will be provided by Symantec in accordance with Symantec’s then-current support guidelines.

   (ii) THE COMPONENT CONTAINS A TIME-OUT FEATURE THAT WILL AUTOMATICALLY RE-BOOT THE DEVICE AFTER SEVENTY-TWO HOURS OF CONTINUOUS USE. THIS TIME-OUT FEATURE WILL RESET EACH TIME THE COMPONENT IS RE-LAUNCHED.

   (iii) The Component may be used as a boot, diagnostic, disaster recovery, setup, restoration, emergency service, installation, test, and configuration utility program. Use of the Component as a general purpose operating system or as a substitute for a fully functional version of any operating system product is strictly prohibited.

   Windows® is a registered trademark of Microsoft Corporation.

H. The Software may include access to the Google Desktop™ search engine (“Application”). Your use of the Application is governed by an agreement between you and Google. Symantec has no liability to You for your use of Application and does not warranty or provide technical support for Your use of the Application.

   Google™ and Google Desktop™ are trademarks of Google Inc.

I. The Software may contain third party device drivers. Such device drivers are provided solely for Your convenience. It is Your responsibility to confirm whether such device drivers are applicable to Your environment. The device drivers are provided by Symantec “AS IS” WITHOUT ANY TECHNICAL SUPPORT OR WARRANTY OF ANY KIND, INCLUDING BUT NOT LIMITED TO FITNESS FOR A PARTICULAR PURPOSE. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, IN NO EVENT AND UNDER NO LEGAL THEORY SHALL SYMANTEC OR ITS SUPPLIERS BE LIABLE TO YOU FOR ANY DIRECT, CONSEQUENTIAL, SPECIAL, INCIDENTAL, PUNITIVE OR INDIRECT DAMAGES OF ANY KIND ARISING OUT OF OR RELATED TO THE THIRD PARTY DEVICE DRIVER.

CPS / NGH 15.0 Add Terms / EN GLBL
A lightweight multi-purpose elliptical reflector floodlight, both scoops produce a very diffuse soft edged beam. The 154 scoop produces a beam diameter of 15 feet at a distance of 7.5 feet, and the 160 scoop produces a beam diameter that varies from 13.5 to 20.7 feet at the same distance. Both luminaires are designed to operate high color temperature Tungsten Halogen lamp as well as standard incandescent lamps. These fixtures are used in theatre and television as both a flood light and a cyclorama fixture. Other uses include photographic and television remote fill light. The scoop is an ideal fixture for color blending and for creating smooth even washes of light.

Specifications subject to change without notice.

**1000 Watt 14° Scoop 154/160**

**Features**
- Heavy spun aluminum construction
- Etched matte aluminum reflector
- Integrated rotatable color frame holder
- Plated steel color frame included
- Three 36” Teflon lead wires
- Up to 25 feet Hi-Temp rubber cable optional
- U.L. and c.U.L. listed for 1000 watts
- Made in the USA
1000 WATT 14" SCOOP

Specifications
Housing: Die-cast aluminum for 154, spun steel for 160.

Materials: Construction employs all corrosion-resistant materials and hardware.

Yoke: Rigid flat steel.

Reflector: Etched aluminum, matte finish, elliptical design.

Socket: Mogul screw base, tool free relamping for 154, Altman MPF medium prefocus, tool free relamping for 160.

Rating: 120/240 volts AC/DC operation 8.3/4.2 amps, 1000 watts maximum.

Cable: 36" Teflon leads encased in black fiberglass sleeving. Hi-Temp rubber cable optional, up to 25'.

Finish: Baked black enamel.

Weight: Approx; 9 lbs. (4.05 kg.) for 154. Approx; 8 lbs. (3.8 kg.) for 160.

Footcandles

<table>
<thead>
<tr>
<th>Distance Feet</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Footcandles</td>
<td>502</td>
<td>125</td>
<td>56</td>
<td>31</td>
<td>20</td>
</tr>
<tr>
<td>154 Spot Focus</td>
<td>12.5</td>
<td>18</td>
<td>22.5</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>160 Flood Focus</td>
<td>12.8</td>
<td>20.7</td>
<td>27.5</td>
<td>34.4</td>
<td></td>
</tr>
</tbody>
</table>

154 SCOOP PERFORMANCE CHART WITH 1000IF LAMP

<table>
<thead>
<tr>
<th>Candledome</th>
<th>Beam Angle</th>
<th>Field Angle</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>12,550</td>
<td>47°</td>
<td>90°</td>
<td>55</td>
</tr>
</tbody>
</table>

160 FOCUSING SCOOP PERFORMANCE CHART WITH EGK LAMP

<table>
<thead>
<tr>
<th>Focus</th>
<th>Candledome</th>
<th>Beam Angle</th>
<th>Field Angle</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spot</td>
<td>25,000</td>
<td>32°</td>
<td>84°</td>
<td>49</td>
</tr>
<tr>
<td>Flood</td>
<td>8,750</td>
<td>70°</td>
<td>108°</td>
<td>75</td>
</tr>
</tbody>
</table>

154 SCOOP DATA

<table>
<thead>
<tr>
<th>Watts</th>
<th>ANSI Code</th>
<th>Manufacturer</th>
<th>Color Temp (°K)</th>
<th>Rated Life (Hours)</th>
<th>Rated Lumens</th>
<th>Correction Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>300 or 300IF</td>
<td>300</td>
<td>1000</td>
<td>5,800</td>
<td>.25</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>500 or 500IF</td>
<td>300</td>
<td>1000</td>
<td>10,800</td>
<td>.45</td>
<td></td>
</tr>
<tr>
<td>750</td>
<td>750 or 750IF</td>
<td>300</td>
<td>1000</td>
<td>17,040</td>
<td>.72</td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>1000 or 1000IF</td>
<td>3100</td>
<td>1000</td>
<td>23,740</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>DSE</td>
<td>3200</td>
<td>750</td>
<td>27,000</td>
<td>1.14</td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>DKZ/DSE</td>
<td>3200</td>
<td>750</td>
<td>28,000</td>
<td>1.18</td>
<td></td>
</tr>
</tbody>
</table>

160 SCOOP LAMP DATA

<table>
<thead>
<tr>
<th>Watts</th>
<th>ANSI Code</th>
<th>Manufacturer</th>
<th>Color Temp (°K)</th>
<th>Rated Life (Hours)</th>
<th>Rated Lumens</th>
<th>Correction Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>120</td>
<td>EGE</td>
<td>Q500 CL/P</td>
<td>3000</td>
<td>2000</td>
<td>.40</td>
</tr>
<tr>
<td>500</td>
<td>120</td>
<td>EGC</td>
<td>Q500/5CL/P</td>
<td>3150</td>
<td>500</td>
<td>.48</td>
</tr>
<tr>
<td>750</td>
<td>120</td>
<td>DNT or DNT/750T12/9</td>
<td>3000</td>
<td>200</td>
<td>17,000</td>
<td>.64</td>
</tr>
<tr>
<td>750</td>
<td>120</td>
<td>EGQ or Q750 CL/P</td>
<td>3000</td>
<td>2000</td>
<td>15,750</td>
<td>.60</td>
</tr>
<tr>
<td>750</td>
<td>120</td>
<td>EGF or Q750CL/P</td>
<td>3200</td>
<td>500</td>
<td>20,400</td>
<td>.77</td>
</tr>
<tr>
<td>1000</td>
<td>120</td>
<td>EGJ or Q1000CL/P</td>
<td>3200</td>
<td>500</td>
<td>27,500</td>
<td>1.00</td>
</tr>
<tr>
<td>1000</td>
<td>120</td>
<td>EGK or Q1000/4CL/P</td>
<td>3200</td>
<td>500</td>
<td>26,500</td>
<td>1.00</td>
</tr>
<tr>
<td>1000</td>
<td>230</td>
<td>FKE or FKE/715</td>
<td>3050</td>
<td>75</td>
<td>569 of 1217</td>
<td></td>
</tr>
</tbody>
</table>

ACCESSORIES Supplied with Luminaire

<table>
<thead>
<tr>
<th>Catalog Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>154,160-154,160-16</td>
</tr>
</tbody>
</table>

ADDITIONAL ACCESSORIES

- 510 Malleable Iron Pipe Clamp
- 5C Safety Cable with Spring clip

Altman Lighting, Inc. is a subsidiary of Altman Stage Lighting Company, Inc.
Selador Series by ETC

Lustr – Paletta – Vivid

User Manual

June 2009

The Selador series of fixtures are intended for professional use only.
Read entire User Manual before using equipment.
ETC and Selador are registered trademarks of Electronic Theatre Controls, Inc. in the United States and other countries.

Other product and company names mentioned herein may be trademarks and/or service marks of their respective owners.

This product is protected by one or more of the following U.S. Patents: 6,016,038, 6,150,774, 6,788,011, 6,806,659, 6,683,423 and 7,023,543

Conforms to UL Std. 1573; Certified to CSA Std. C22.2 No. 166
# Table of Contents

Specifications .......................... 1
  Maximum Power Consumption at Full Intensity .......... 2
  Dimensions and LEDs ........................ 2
  Note About LED Fixtures ...................... 2

Overview ................................. 3
  Applications .................................. 4
  Document Conventions ......................... 5
  Safety ...................................... 5

Installation ............................... 6
  Power and Data Cabling Requirements ................. 6
    Power ..................................... 6
    Data ...................................... 6
  Installation Procedures ......................... 7
    Installing Mounting Hardware .................... 7
    Installation Clearances ....................... 7
    Safety Cable ................................ 9
    Fixture Weight ................................ 9
    Installing Secondary Lenses .................... 10
  Connections and Addressing ....................... 11
  Control .................................... 12

Routine Maintenance ..................... 14
  General Fixture Cleaning ..................... 14
  Cooling Fan Filter Cleaning .................. 15
  Fuse Capacities ........................... 15
# Specifications

## Physical
- Rugged extruded anodized aluminum construction
- Advanced thermal management systems for long LED life
- 1 to 43°C (35 to 110°F) ambient operating temperature
- Available in 11, 21, 42, and 63" lengths

## Electrical
- 100V to 240V 50/60 Hz internal power supply
- Neutrik® PowerCon® input connector
- Requires power from non-dim source

## LEDs
- Luxeon® Rebel™ 2.5W LED emitters (Lustr and Paletta)
- Luxeon K2 3.5W LED emitters (Vivid)
- 50,000 hr. LED life

## Optical
- Integral 12° optic
- Slots for secondary lenses
- Combine secondary lenses for desired beam spread

## Color
- Seven-color LED mix for superior color mixing
- Lustr – Optimized for highest output at white light
- Paletta – Optimized for strong, saturated colors
- Vivid – Optimized for strong, saturated colors at maximum brightness
- Color rendering as high as 90 CRI
- Interacts seamlessly with conventional sources
- Achieves excellent 3200° or any other Correlated Color Temperature white light from 800 to 20,000°K
- Beautifully illuminates skin tones and other objects
- Deeply saturated colors across an exceptionally wide gamut

## Control
- DMX512-A compliant
- DMX in and thru via 5-pin XLR connectors
- 8-channel (7 color plus intensity)
- Intensity channel minimizes color shift during dimming
- Digital LED display for address assignment
- Internal control electronics for smooth low-end dimming at 15-bit resolution
- 21" fixture provides 2 independently controllable cells
- 42" fixture provides 4 independently controllable cells
- 63" fixture provides 6 independently controllable cells

## Optional Secondary Lenses
- Beam-spreading lenses available in 10 degree increments from 20 to 80° in horizontal and vertical axis
- Easily interchangeable
Maximum Power Consumption at Full Intensity

Lustr and Paletta

<table>
<thead>
<tr>
<th>Model</th>
<th>Watts</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>120</td>
<td>1.25A@120 VAC</td>
</tr>
<tr>
<td>21</td>
<td>240</td>
<td>2.5A@120 VAC</td>
</tr>
<tr>
<td>42</td>
<td>480</td>
<td>5.0A@120 VAC</td>
</tr>
<tr>
<td>63</td>
<td>720</td>
<td>7.5A@120 VAC</td>
</tr>
</tbody>
</table>

Vivid

<table>
<thead>
<tr>
<th>Model</th>
<th>Watts</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>160</td>
<td>1.5A@120 VAC</td>
</tr>
<tr>
<td>21</td>
<td>320</td>
<td>3.0A@120 VAC</td>
</tr>
<tr>
<td>42</td>
<td>640</td>
<td>6.0A@120 VAC</td>
</tr>
<tr>
<td>63</td>
<td>960</td>
<td>9.0A@120 VAC</td>
</tr>
</tbody>
</table>

Dimensions and LEDs

Lustr and Vivid

<table>
<thead>
<tr>
<th>Model</th>
<th>Size in inches</th>
<th>Number of LEDs</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>11 x 7 x 7</td>
<td>40</td>
</tr>
<tr>
<td>21</td>
<td>21.5 x 7 x 7</td>
<td>80</td>
</tr>
<tr>
<td>42</td>
<td>42.5 x 7 x 7</td>
<td>160</td>
</tr>
<tr>
<td>63</td>
<td>63.5 x 7 x 7</td>
<td>240</td>
</tr>
</tbody>
</table>

Paletta

<table>
<thead>
<tr>
<th>Model</th>
<th>Size in inches</th>
<th>Number of LEDs</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>11 x 7 x 5</td>
<td>40</td>
</tr>
<tr>
<td>21</td>
<td>21.5 x 7 x 7</td>
<td>80</td>
</tr>
<tr>
<td>42</td>
<td>42.5 x 7 x 7</td>
<td>160</td>
</tr>
<tr>
<td>63</td>
<td>63.5 x 7 x 7</td>
<td>240</td>
</tr>
</tbody>
</table>

Note About LED Fixtures

All LED sources experience some lessening of light output and some color shift over time. Selador Series fixtures have complex thermal management systems to minimize these changes. With typical usage, a Selador fixture will still achieve 70% of its initial output after 50,000 hours of use. In individual situations, LEDs will be used for different durations and different levels. This can eventually lead to minor alterations in color performance, necessitating slight adjustment to presets, cues, or programs.

All LEDs exhibit a slight color shift as their temperature rises from ambient to operating temperature. This may or may not be visible to the eye. If this is a concern, a five to ten minute warm up cue (all color channels at 100%, intensity channels at 50%) prior to production can minimize this effect.
Overview

Congratulations on your purchase of a Selador Series by ETC product.

Selador's x7 Color System™ seven-hue technology produces a light and color quality that conventional LED systems cannot duplicate. This unique color system produces bright, broad-spectrum whites and intense colors equally well, rendering pigments, objects, and skin tones in a natural way.

Each member of the Selador Series product line is unique and optimized for a specific lighting task:

**Lustr**
- Luxeon Rebel 2.5W LED emitters
- Optimized for the best white light across the entire CCT range
- Beautifully illuminates skin tones and other objects

**Paletta**
- Luxeon Rebel 2.5W LED emitters
- Optimized for deep, pure pastels and saturated colors
- Interacts seamlessly with conventional sources

**Vivid**
- Luxeon K2 3.5W LED emitters
- Optimized for deep pastels and strong saturated colors
- High-power LEDs for the longest throws

Information in this manual is applicable to all three Selador Series by ETC products.
Applications

- Theaters
- Studios
- Churches
- Hotels
- Convention Centers
- Schools

<table>
<thead>
<tr>
<th>Application</th>
<th>11&quot;</th>
<th>21&quot;</th>
<th>42&quot;</th>
<th>63&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truss warmer</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front light</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side light</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Key light</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fill light</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Specials</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Downlight</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Backlight</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Stagewash</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Cyc light</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

If you have questions about your Selador series fixture that are not answered in this manual, please contact the supplier of your ETC equipment or ETC Technical Services.

**Americas**
Electronic Theatre Controls Inc.
Technical Services Department
3031 Pleasant View Road
Middleton, WI 53562
800-775-4382 (USA, toll-free)
+1-608 831-4116
service@etcconnect.com

**United Kingdom**
Electronic Theatre Controls Ltd.
Technical Services Department
26-28 Victoria Industrial Estate
Victoria Road,
London W3 6UU England
+44 (0)20 8896 1000
service@etceurope.com

**Asia**
Electronic Theatre Controls Asia, Ltd.
Technical Services Department
Room 1801, 18/F
Tower 1, Phase 1 Enterprise Square
9 Sheung Yuet Road
Kowloon Bay, Kowloon, Hong Kong
+852 2799 1220
service@etcasia.com

**Germany**
Electronic Theatre Controls GmbH
Technical Services Department
Ohmstrasse 3
83607 Holzkirchen, Germany
+49 (80 24) 47 00-0
techserv-hoki@etcconnect.com

Please email comments about this manual to: TechComm@etcconnect.com
Document Conventions

Throughout this manual, the following are used to alert you to notes and safety notices.

**Note:** Notes are helpful hints and information that is supplemental to the main text.

**CAUTION:** A Caution statement indicates situations where there may be undefined or unwanted consequences of an action, potential for data loss or an equipment problem.

**WARNING:** A Warning statement indicates situations where damage may occur, people may be harmed, or there are serious or dangerous consequences of an action.

**WARNING:** RISK OF ELECTRIC SHOCK! This warning statement indicates situations where there is a risk of electric shock.

Safety

The Selador series fixtures are intended for professional use only. Read entire User Manual before using equipment.

Please note the following safety notices before use:

**WARNING:** Note the following safety warnings before use:

- Do not mount the Selador series fixture on or near a flammable surface.
- Use the fixture in dry locations only, where humidity does not exceed 90 percent (non-condensing). Fixture is not intended for outdoor use.
- Mount and support the fixture only by the primary suspension holes in the enclosure.
- Suspend the fixture from a suitable structure using only the hardware rated for the weight of the fixture.
- In addition to primary suspension, attach a safety cable (ETC Model 400SC or other approved safety cable or device) to the fixture housing. Appropriate attachment points (holes) are provided in the protruding tabs on either end of the fixture housing.
- Disconnect the unit from power and from DMX before all cleaning and maintenance.
- Maximum ambient temperature: Ta=43°C (109°F)
- Maximum exterior surface temperature: Tmax=70°C (158°F)
- External Temperature after 5 minutes of full-brightness operation and 23°C (74°F) ambient: 38°C (100°F)
- External Temperature (steady state achieved) at 23°C (74°F): 70°C (158°F)
Installation

Power and Data Cabling Requirements

**Power**

The Selador series fixture operates on AC power, 100 to 240VAC/50-60Hz. You may use a circuit powered through an SCR dimmer, as long as the dimmer is set to unregulated non-dim (switched) operation.

Power is supplied through a standard five-foot power-input cable with Neutrik PowerCon locking pigtail with either an Edison, Twistlock™, or Stage-pin male connector.

**Data**

The Selador series fixtures operate on a DMX control signal. The unit is supplied with a 5-pin XLR DMX input connector and a 5-pin DMX Thru connector. DMX cables should be acceptable for DMX data transmission (not microphone cable) and should follow the standard pinout. The optional secondary data pair is not used by the Selador series fixtures. The maximum DMX data run from any DMX source to the last fixture in a chain is 1000 feet (300m). Termination is required in the data-out port of the last fixture in each data chain.

---

**DMX512 pinout for five-pin XLR female**

<table>
<thead>
<tr>
<th>Port</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Common (Shield)</td>
</tr>
<tr>
<td>2</td>
<td>Data –</td>
</tr>
<tr>
<td>3</td>
<td>Data +</td>
</tr>
<tr>
<td>4</td>
<td>not connected</td>
</tr>
<tr>
<td>5</td>
<td>not connected</td>
</tr>
</tbody>
</table>

---

See *Control, page 12* for additional information on DMX addressing of Selador Series fixtures.
Installation Procedures

Installing Mounting Hardware

Three different options are provided for mounting Selador fixtures.

- Yoke with C-clamp for 11’ and 21’ units
- Floor trunnions for all fixtures
- Pipe hanging brackets for all fixtures

**Note:** Trunnions should be installed with the feet inward so that fixtures can be lined up end to end if needed.

Installation Clearances

High-ambient Environments

In environments of higher ambient temperatures (35-40°C, 95-104°F) Selador Series fixtures should be operated at no more than 80% of maximum output. Note that the vast majority of color mixes involve more than one color channel at less than 100% intensity, so this may not be an issue during day-to-day use.

However, in high-ambient conditions avoid turning all channels to 100% for channel checks or focusing. Doing so may cause the power supply to shut down. Following a cool down period, the power supply will automatically reset and the fixture will return to operation.

**CAUTION:** Duty Cycle

Selador Series fixtures use ultra-quiet fans to cool the components and provide quiet predictable service for extended periods of time. When not in use, fixtures should be powered down (disconnected from power either at the breaker or by unplugging) to avoid unnecessary wear on the fan.
Floor trunnion dimensions

Hanging dimensions

Front view dimensions

Rear view to show power, data connections, and repeating addressing and fan locations
Safety Cable

The safety cable (or other approved safety device) should be attached to the fixture housing and wrapped around the hanging structure (pipe). Appropriate attachment points (holes) are provided in the protruding tabs on either end of the fixture housing. Take care to leave as little slack as possible in the safety cable to avoid the cable catching the yoke of the fixture.

![Safety cable attachment points](image)

Fixture Weight

Total weight depends on how the individual fixture is configured. Weights shown do not include secondary lenses.

**Lustr and Vivid**

<table>
<thead>
<tr>
<th>Model</th>
<th>Weight</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lbs.</td>
<td>Kg.</td>
</tr>
<tr>
<td>11</td>
<td>11.5</td>
<td>5.2</td>
</tr>
<tr>
<td>21</td>
<td>20</td>
<td>9.1</td>
</tr>
<tr>
<td>42</td>
<td>35</td>
<td>15.9</td>
</tr>
<tr>
<td>63</td>
<td>53</td>
<td>24.1</td>
</tr>
</tbody>
</table>

*a* Does not include mounting hardware.

**Paletta**

<table>
<thead>
<tr>
<th>Model</th>
<th>Weight</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lbs.</td>
<td>Kg.</td>
</tr>
<tr>
<td>11</td>
<td>10.5</td>
<td>4.7</td>
</tr>
<tr>
<td>21</td>
<td>18</td>
<td>8.2</td>
</tr>
<tr>
<td>42</td>
<td>32</td>
<td>14.6</td>
</tr>
<tr>
<td>63</td>
<td>48.6</td>
<td>22.1</td>
</tr>
</tbody>
</table>

*a* Does not include mounting hardware.
Installing Secondary Lenses

Up to two secondary lenses can be installed in the slots towards the front of the fixture. The stacking order and distance from the LED array are not important to the function of the lenses. To avoid lenses being too loose and potentially overlapping each other, use the narrower slots for thinner lenses.

To install secondary lenses:
Step 1: Loosen the screw on the end of the access panel that has the slot in it.

Step 2: Raise the panel out of the way, but leave it attached to the fixture.
Step 3: Slide the secondary lenses into the slots above the LEDs.
Step 4: Lower the panel and tighten the screw.
Connections and Addressing

Connect AC input power and DMX data cables to the appropriate ports as shown below.

Connect the incoming DMX data cable to the DMX Input connector. If you are daisy-chaining the data to other fixtures or DMX-controlled devices, connect the next DMX cable to the DMX Thru connector. The Selador Series fixtures require that the last fixture on a DMX line be terminated with a 100Ω resistor between pins 2 and 3.

Connect the AC Input cable:
Align and insert the power connector. Twist the connector clockwise until it locks into place.

Disconnect the AC Input cable:
Slide back the locking tab, twist the connector counterclockwise and pull to unlock and disconnect the power connector.

The quarter-turn fuse-holder requires a straight blade screwdriver to remove and reinstall a fuse. Refer to Fuse Capacities, page 15 for information about fuse types.
Control

Use the two push buttons on the bottom of the fixture to set the starting address for the fixture. View the LED display with the push buttons on the left. The top push button increases the number and the bottom push button decreases the number. Pressing and holding the push button increases the rate of change. When fixtures are powered up, they may temporarily respond to DMX address 001 for the first few seconds of operation. New address settings take effect after the LED display turns off.

**CAUTION:** Do not push the up and down address buttons simultaneously, or internal fixture software settings can be inadvertently compromised and performance affected.

Up and down address buttons are recessed to avoid inadvertent address changes. Use a Phillips screwdriver or other blunt device to lightly push the switches. To avoid damaging the switches, do not use sharp objects or excessive force when changing fixture address.

Addresses must be set between 1 and 505. Selador fixtures are manufactured based on an 11" LED array, or cell. Each cell can be addressed individually. Eleven inch fixtures have one cell, 21" fixtures have two cells, 42" fixtures have four cells, and 63" fixtures have six cells. A 42" fixture can be addressed as four individual cells, one cell, or any combination.

**Each Selador fixture must be considered a separate DMX device for the purpose of DMX line-loading calculations, with the exception of 63" fixtures. These 63" fixtures must each be considered 1.5 DMX devices for line loading.**

<table>
<thead>
<tr>
<th>Fixture</th>
<th>Number of Cells</th>
<th>Number of DMX Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>11&quot;</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>21&quot;</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>42&quot;</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>63&quot;</td>
<td>6</td>
<td>1.5</td>
</tr>
</tbody>
</table>

DMX line-loading practice dictates that no more than 31 devices can be daisy-chained together. Consequently, no combination of Selador fixtures totaling more than 31 DMX devices should be configured in one DMX line. For example, twenty 6-cell units (30 DMX devices) are okay. Twenty-one 6-cell units (31.5 DMX devices) are not acceptable. For runs of fixtures totaling more than 31 DMX devices, split the DMX runs by using a DMX splitter.

**Note:** A fixture with a starting address higher than 505 will not have control of all parameters. Therefore, 505 is the highest address shown on the address display.
Each cell of a Selador Series fixture occupies eight DMX channels. Seven are individual colors and the eighth is the master intensity. The table below describes the order and function of each address.

<table>
<thead>
<tr>
<th>Data Channel</th>
<th>Color</th>
<th>Value</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fixture address Red</td>
<td>0-255</td>
<td>Intensity 0-100%</td>
</tr>
<tr>
<td>2</td>
<td>Fixture address + 1 Red-orange</td>
<td>0-255</td>
<td>Intensity 0-100%</td>
</tr>
<tr>
<td>3</td>
<td>Fixture address + 2 Amber</td>
<td>0-255</td>
<td>Intensity 0-100%</td>
</tr>
<tr>
<td>4</td>
<td>Fixture address + 3 Green</td>
<td>0-255</td>
<td>Intensity 0-100%</td>
</tr>
<tr>
<td>5</td>
<td>Fixture address + 4 Cyan</td>
<td>0-255</td>
<td>Intensity 0-100%</td>
</tr>
<tr>
<td>6</td>
<td>Fixture address + 5 Blue</td>
<td>0-255</td>
<td>Intensity 0-100%</td>
</tr>
<tr>
<td>7</td>
<td>Fixture address + 6 Indigo</td>
<td>0-255</td>
<td>Intensity 0-100%</td>
</tr>
<tr>
<td>8</td>
<td>Fixture address + 7 Master intensity control</td>
<td>0-255</td>
<td>Overall intensity 0-100%</td>
</tr>
</tbody>
</table>

**Note:** Use individual color channels to create color mix. Use Master Intensity Control to set fixture intensity. Master Intensity Control (Channel 8) must be above 0% for the fixture to output.

**Color Matching**

This information will be provided in a future release of this manual.
Routine Maintenance

General Fixture Cleaning

To ensure optimum performance of your Selador series fixture, you should perform the following inspections and cleanings at least once a year. You may need to inspect or clean the fixture more often, depending on the type and amount of use your fixture experiences during the year.

**CAUTION:** Allow fixture to cool down completely prior to cleaning.

- Disconnect all power and DMX cables prior to cleaning.
- Check for excessive dust or debris in the heat-dissipating fins around the entire fixture enclosure. Clean using compressed air or a soft cloth. Keeping the heat sink components of the enclosure clean facilitates efficient cooling and extends LED longevity.
- NEVER spray liquids into the fixture.
- NEVER spray compressed air into a fixture that is powered-up.

- A can of compressed air or oil-free air from an air compressor set at a low setting can be used to blow through the vent holes and remove dust or other debris from the interior of the fixture. Dust build-up can cause overheating and premature shutdown.
- Remove the secondary lenses (if used) and clean out any dust and debris. All components, including the secondary lenses, can be cleaned using compressed, oil-free air as described above or a clean micro-fiber cloth. The use of any liquid cleaning solution is not recommended for Selador fixtures.
- Inspect all mounting hardware for wear and, if necessary, clean using compressed, oil-free air or a soft, lint-free cloth.
Cooling Fan Filter Cleaning

- Cooling fan filters should be inspected at a minimum every six months; more frequently if fixtures are powered on for more than four hours per day
- Use a vacuum cleaner to remove dust from each fan filter
- In dusty environments or conditions involving the use of smoke machines, clean the filters as follows:
  - Using fingernail or small flat-blade screwdriver, remove fan filter cover by prying under one of the two locking tabs
  - Carefully remove foam fan filter from fan assembly
  - Gently wash foam fan filter in a solution of mild dishwashing solution and water
  - Thoroughly rinse each foam fan filter in clear water
  - Pat dry or air-dry filters
  - After filters are completely dry, reinstall by inserting them into fan assembly
  - Reattach the filters to the fixture

Note: No user-serviceable parts are inside.

Fuse Capacities

All Selador Fixtures use 3AG 250V 1.25” X 0.25” fuses. Use the following capacity fuses for all Selador fixtures; Lustr, Paletta, and Vivid.

<table>
<thead>
<tr>
<th>Fixture Size</th>
<th>Fuse Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>11”</td>
<td>2 amp</td>
</tr>
<tr>
<td>21”</td>
<td>4 amp</td>
</tr>
<tr>
<td>42”</td>
<td>8 amp</td>
</tr>
<tr>
<td>63”</td>
<td>10 amp</td>
</tr>
</tbody>
</table>
# Contents

## Introduction
- How to use this manual .......................................................... 5
- System components ............................................................... 6
- Sensor dimming overview ....................................................... 7
  - How Sensor uses DMX512 signals ........................................ 7
  - Unique Dimmer Numbers (UD#) ........................................... 8
  - DMX addressing modes ..................................................... 9
  - Standard DMX addressing mode .......................................... 9
  - Advanced DMX addressing mode ........................................ 10
- Sensor dimming system features ............................................ 11
  - Smart Menus ........................................................................ 11
  - Set direct dimmer levels from the CEM .................................. 11
  - Backup looks ....................................................................... 11
  - Adding dimmers in a Panic circuit ....................................... 12
  - ETCLink ............................................................................... 12
  - Advanced Features ............................................................. 12
  - Dimmer Doubling .................................................................. 12

## Operation
- Using the Control Electronics Module ..................................... 13
- Setting direct dimmer levels from the CEM .............................. 14
  - Setting direct dimmer levels ................................................. 14
  - Clearing direct dimmer levels .............................................. 15
  - Using direct dimmer levels with Backup looks .................. 15
- Getting dimmer, rack and system information at the CEM .... 16
  - Getting dimmer information from the About menu ........... 17
  - Getting rack information from the About menu ............... 19
  - Getting system information from the About menu .......... 20
- Controlling Backup looks ....................................................... 21
  - Playing Backup looks ........................................................ 21
  - Unsetting (deactivating) Backup looks ............................. 21
  - Recording Backup looks .................................................... 22
  - Assigning dimmers to the Panic circuit ............................. 23
  - Deleting a Backup look ..................................................... 21
  - Clearing (erasing) all Backup looks ................................. 22
- Changing dimmer, rack and system settings in the Setup menu 24
  - Dimmer mode, curve and error reporting settings .......... 25
  - Setting up a rack in Standard mode .................................. 27
  - Setting up a rack in Advanced mode ................................. 30
- Viewing and changing system settings .................................. 34
### Maintenance
- Cleaning dimmer rack air filters................................. 37
- Vacuuming dimmer racks.............................................. 38

### Service
- Contacting ETC about equipment problems .................. 39
- Changing Installation Rack modules ............................ 39
- Dimmer module circuit breakers ................................... 41
- Changing CEM phase fuses ........................................... 41
- Resetting or Testing Ground Fault Interrupt (GFI) dimmer modules...... 42
- Troubleshooting .......................................................... 43

### Sensor specifications .................................................. 45

### Glossary .................................................................... 46

### Appendix 1: CEM error messages ................................. 48
### Appendix 2: Sensor 3.0 dimmer curves ......................... 49
### Appendix 3: Standard mode CEM menu flowchart .......... 52
### Appendix 4: Advanced mode CEM menu flowchart .......... 53
### Appendix 5: GFI Dimmer test sheet ............................. 55
Introduction

Welcome to the User Manual for the Sensor CEM dimming system. This manual contains operating instructions for Sensor CEM dimming systems. There are four Sensor CEM installation racks: the 6-slot SR6, the 12-slot SR12, the 24-slot SR24 and the 48-slot SR48.

How to use this manual

Manual organization

This manual has separate sections to tell you how to use, maintain and troubleshoot your Sensor CEM dimming system:

- **System components** on page 6 details the main parts of a Sensor system
- **Sensor dimming overview** on page 7 provides descriptions of Sensor dimming functions
- **Sensor dimming system features** on page 11 describes features in your Sensor system that enhance system usability
- **Operation** on page 13, gives step-by-step operating instructions
- **Maintenance** on page 37 describes routine maintenance tasks
- **Service** on page 39 tells you how to repair and troubleshoot your system and how to contact ETC to get technical assistance
- **Sensor specifications** on page 45 contain technical specifications
- **Glossary** on page 46 defines technical terms used in this document

Warnings and notice conventions

These symbols alert you to danger or important information:

⚠️ **Warning!** Warns you when electricity may cause injury

⚠️ **Warning!** Warns you when there is a possibility of other types of injury

⚠️ **Caution** Alerts you to important information relating to equipment performance or reliability

Contacting ETC

For questions about Sensor CEM systems, contact ETC Customer Service at 800/688-4116.
System components

Installation Racks

The dimmer rack contains your dimmer modules, Control Electronics Module (CEM) and their associated electrical connections. The rack enclosure protects your dimming components with a key locking door. The door contains the air filter and should not be left open during operation.

Caution Running your Sensor system with the door open exposes components to tampering and will allow dust contamination, causing overheating and system shutdown.

There are four models of Sensor Installation Racks.

- The SR 6 rack has 6 dimmer slots
- The SR 12 rack has 12 dimmer slots
- The SR 24 rack has 24 dimmer slots
- The SR 48 rack has 48 dimmer slots

The Sensor Control Electronics Module

The Control Electronics Module (CEM) is required for Sensor systems. The CEM sets dimmer levels, monitors system status and enters your changes to system configuration settings. A Sensor dimming system will not function without a properly installed CEM.

For control input, the CEM has two DMX512 input ports, port A and port B. You can use them individually or make them work together.

The CEM location varies by cabinet type.

- The SR6, SR12 and SR24 racks’ CEM slot is at the bottom
- The SR48’s CEM slot is in the middle of the rack, 24 slots from the top

Warning! Do not apply power to a Sensor dimming system without a properly installed CEM. A missing CEM exposes dangerous voltages and makes the system inoperable.

Sensor dimmer modules

Sensor dimmer modules are installed into rack slots. Modules may hold one or two dimmers (single or dual density), depending on current rating and rise time. All dimmer modules are protected by circuit breakers. Dimmer modules should only be removed by qualified personnel, and must be replaced by modules of the same type, or with airflow modules, before restoring system power.

Warning! Do not operate Sensor dimming systems with empty module slots. Open slots expose dangerous voltages and interfere with rack ventilation, causing rack overheating.
Sensor dimming overview

A Sensor dimming system controls lighting using DMX512 control levels from a lighting control system (usually a lighting console or architectural controller).

![Diagram of a typical CEM lighting system](image)

**Figure 2: A typical CEM lighting system**

**How Sensor uses DMX512 signals**

DMX512 is the standard digital signal used in lighting control. DMX signals are normally generated by a lighting console and transmitted to the dimmer rack by a DMX data network.

Each DMX512 signal contains up to 512 separate channels, each containing a single output level. The Control Electronics Module (CEM) matches DMX channel levels to the correct dimmer.

**Applying DMX channels to individual dimmers**

Each dimmer in a Sensor system is identified by a Unique Dimmer Number (UD#) between 1 and 8192. UD#s are assigned according to dimmer position and rack address. See *Unique Dimmer Numbers (UD#s)* on page 8 for details.

To apply DMX levels to dimmers, the CEM matches a DMX channel to each dimmer’s UD#, starting with the DMX Start address (the first DMX channel used in the rack). For example, if the DMX Start address is 101, and the first UD# in the rack is 49, the CEM sends the level from channel 101 to dimmer 49, channel 102 to dimmer 50, etc., until all dimmer levels are set.

**Note:** For specific information on setting DMX starting addresses and configuring DMX inputs, see DMX addressing modes on page 9.
Unique Dimmer Numbers (UD#s)

Unique Dimmer Numbers identify each dimmer in a Sensor system individually (up to 8192 dimmers per system). UD#s are assigned by the Control Electronics Module (CEM) according to rack address and dimmer position.

The lowest UD# for each rack is the First Unique Dimmer Number (shown on the CEM status display as 1st UD#). By default, the dimmer in a rack's top slot is assigned the 1st UD#.

In “balanced” racks, the numbers are distributed on each electrical phase. In “sequenced” racks, dimmers are numbered sequentially from top to bottom.

When dimmers are balanced, DMX channels are still applied in order of the UD#. This causes DMX channels assignments to skip down through the dimmers in the rack.

In systems with multiple dimmer racks, each rack is assigned an ETCLink address. This rack address determines the UD#s assigned to dimmers in each rack. For example, in a system with three 24-dimmer racks, rack number one would hold dimmers 1 through 24, rack two would have dimmers 25 through 48 and rack three would have dimmers 49 through 72.

Rack addresses and dimmer distribution are set at the factory before racks are shipped and dimmer slots are numbered with one or two UD# labels.
DMX addressing modes

The Control Electronics Module (CEM) DMX address settings select the desired range of DMX channels. DMX addressing also controls input from both of the CEM's DMX input ports, A and B. Sensor systems can use either Standard or Advanced DMX addressing mode.

**Standard Mode** uses a DMX Start address to set the first DMX512 channel number used. Beginning with the Start address, the CEM applies one DMX channel per Unique Dimmer Number (UD#) until all the dimmers in the rack have levels.

**Advanced Mode** has a Start and End address for each DMX port. Only DMX channel levels between the Start and End addresses are used. Each DMX port can control a separate dimmer set using the First Dimmer Affected setting.

Advanced mode also enables you to set priority levels for input ports and backup looks. See Advanced DMX addressing mode on page 10 for details.

**Standard DMX addressing mode**

Standard mode is the normal DMX512 addressing method. For systems that use one source of lighting signals at a time, or apply multiple control signals to the same set of dimmers, Standard mode is usually the best choice.

Standard mode allows you to enable both DMX512 port A and port B together, or to disable one or both as needed. Both ports share a single DMX Start address you set and apply their control channels by UD#, starting with the racks first Unique Dimmer number (1st UD#).

If both ports are sending levels at the same time, the system applies the highest level from each port on a channel-by-channel basis (Pile-on mode).

Channel levels from Backup looks have higher priority than input from either DMX port. However, Backup looks channels recorded with "unset" levels continue to respond to DMX input. See Backup looks for specific dimmers on page 11 for details.

**Note:** See Setting up a rack in Standard mode on page 27 for step by step programming instructions.
Advanced DMX addressing mode

Advanced mode enables complex lighting control systems to use multiple control sources with overlapping or split dimmer assignments.

DMX512 port start and end addresses and First Dimmer Affected numbers

In Advanced mode you can set separate DMX start and end addresses for port A and B. You also set separate First Dimmer Affected numbers for each input port. These settings allow you to apply a specific portion of each DMX port’s 512 channels to a specific set of dimmers in a rack. Each port can control a separate set of dimmers, or overlap dimmer control assignments.

![Figure 8: Advanced DMX port addressing modes](image)

Using input priorities

**Note:** Levels from Panic circuit activation or direct dimmer input from the CEM or other ETCLink devices override levels from DMX and Backup looks. DMX port and Backup look priority settings have no effect on the built-in override priority of Panic circuit or direct dimmer level input. When both ports are sending levels to the same dimmers, control is decided by port priorities set in the Setup Rack submenu. Input priorities can be applied to DMX input ports A and B, and to Backup looks. There are four levels of input priority:

**Note:** High and Low priority can only be assigned to a single input source. If one of these priorities is assigned to a second input, the first input will be reset to **Pile-on** priority:

- **High** priority channel levels are used first. High priority levels disable levels from **Low** or **Pile-on** priority inputs.
- **Pile-on** priority signals are used if there are no **High** priority control signals present. **Pile-on** priority disables **Low** priority signals. When signals from multiple **Pile-on** priority sources are present, the highest level takes control on a channel by channel basis.
- **Low** priority levels are used if no **High** or **Pile-on** priority control signals are present.
- **Off** shuts off input from DMX input ports. **Off** is not used for Backup looks.

**Note:** See Setting up a rack in Advanced mode on page 30 for step by step programming instructions for Advanced mode.
Sensor dimming system features

ETC’s Sensor dimming system features improve set up and operation

- Smart Menus only display settings used by your system
- Set direct dimmer levels at the Control Electronics Module (CEM)
- 32 Backup looks controlled by dimmer rack electronics
- Built-in Panic circuit configuration
- ETCLink feedback lets you remotely monitor and configure your system
- Advanced Features provides individual dimmer circuit data over ETCLink
- Built-in support for ETC’s Dimmer Doubling light fixtures

Smart Menus

Smart Menus simplify navigating all CEM menus by suppressing display of unneeded configuration windows. When a feature is disabled, Smart Menus will skip its setting window(s). If the feature is activated, its window(s) reappear. You only see the windows you need to use for your system.

Table 1: Smart Menus affected windows

<table>
<thead>
<tr>
<th>Feature</th>
<th>Menu location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced features</td>
<td>Setup Rack menu</td>
</tr>
<tr>
<td>Dimmer Doubling</td>
<td>Dimmer menu</td>
</tr>
<tr>
<td>ETCLink menus</td>
<td>Multi-rack systems only</td>
</tr>
<tr>
<td>DMX312 start address</td>
<td>Setup rack (Standard mode only)</td>
</tr>
</tbody>
</table>

Set direct dimmer levels from the CEM

You can set levels directly for any dimmer in the system with the CEM display and keypad. You can use direct levels to light an area as a temporary substitute for your main control system, to test new lighting loads or dimmer installations, or to set Backup looks or Panic circuits. See Setting direct dimmer levels on page 14 for details.

Caution Direct dimmer levels disable DMX312 and Backup control level inputs from your normal lighting control system. Only Panic circuit activation overrides direct levels.

Backup looks

You can record and activate up to 32 Backup looks using the CEM Backup menu. Backup looks can be used as a temporary substitute for your main control system, or for static lighting control during area setups or construction. Backup looks can also function as a cost-effective architectural control system, house lighting controller, or stage manager backup. See Controlling Backup looks on page 21 for details.

Backup looks for specific dimmers

You can record Backup looks that only affect selected dimmers. Setting levels directly at the CEM enables you to give dimmers an “unset” level. Unset dimmers are not affected by the Backup look and continue to respond to DMX control levels sent by your facility lighting control system. See Using direct dimmer levels with Backup looks on page 15 for details.
Adding dimmers in a Panic circuit

If your system includes an external Panic circuit, you can easily create a set of dimmers which will drive to full when the circuit is activated. See Assigning dimmers to the Panic circuit on page 23 for details.

Note: Panic activation only affects dimmers included in the panic set. Other dimmers not included in the set continue to dim normally.

Caution Panic activation automatically drives the output levels of the selected dimmer set to full, overriding all other level inputs to those dimmers.

ETCLink

ETCLink is a feedback and configuration network for your dimmer racks and ETCLink-capable peripherals. Sensor systems monitor their operation and provide operator feedback over the ETCLink network, allowing you to monitor system performance at the CEM, with optional ETCLink peripheral devices, or from the displays of an ETCLink-compatible lighting control console.

ETCLink peripherals can report information and edit configuration settings on any rack or dimmer in your system. Peripherals include dimmer rack CEM displays, ETCLink compatible consoles and ETCLink peripherals which duplicate many CEM functions.

Automatic Unique Dimmer Number (UD#) addressing

Your Sensor CEM dimming system assigns a Unique Dimmer Number (UD#) to each dimmer in your system. ETCLink uses UD#s to identify dimmers for error reporting and dimmer setup. Each dimmer slot in a Sensor rack has a UD# sticker on the left side showing its UD#(s).

Advanced Features

Using Sensor’s Advanced Features (AF) option, ETCLink can report output and signal data from individual dimmers. AF systems can report load changes in individual circuits that indicate problems like burned-out lamps or tripped dimmer circuit breakers.

Sensor’s Advance Features (AF) option allows recording and monitoring of individual dimmer output loads. Constant comparison of dimmers’ actual loads against the recorded value lets the system signal you when a load value changes. A change usually means a lamp has burned out or failed, allowing you to make an immediate replacement.

Dimmer Doubling

By splitting the AC power waveform into positive and negative halves using ETC’s Dimmer Doubler connector, a single dimmer can set two different lighting levels on one dimmer circuit. Sensor CEM systems can automatically configure dimmers to take advantage of the this feature. See Dimmer mode, curve and error reporting settings on page 25 for setup instructions.
Operation

Using the Control Electronics Module

Open the dimmer rack door to access the Control Electronics Module (CEM).

CEM front panel LCD display

The CEM has keypad control input and a two line by 20 character LCD display.

![CEM face panel components](image)

The normal status display shows the rack’s number and the first Unique Dimmer Number (1st UD#) on the first line, and a status message on the second line. The normal status message is System OK. See Appendix 1: CEM error messages on page 48 for a list of error messages and their causes.

CEM keypad controls

<table>
<thead>
<tr>
<th>Button label</th>
<th>Button function</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Dimmer]</td>
<td>Opens Dimmer menu</td>
</tr>
<tr>
<td>[About]</td>
<td>Opens About menu</td>
</tr>
<tr>
<td>[Backup]</td>
<td>Opens Backup menu</td>
</tr>
<tr>
<td>[Setup]</td>
<td>Opens Setup menu</td>
</tr>
<tr>
<td>[0] through [9]</td>
<td>Enter numbers</td>
</tr>
<tr>
<td>[AI]</td>
<td>Enables dimmer level input in the Dimmer menu</td>
</tr>
<tr>
<td>[Exit]</td>
<td>Returns to the current display’s first screen if pressed once</td>
</tr>
<tr>
<td></td>
<td>Returns to the Status display if pressed twice</td>
</tr>
<tr>
<td>[Next]</td>
<td>Selects the next dimmer or backup look in the Dimmer or Backup display</td>
</tr>
<tr>
<td>[Thru]</td>
<td>Permits selection of a range of Unique Dimmer Numbers</td>
</tr>
<tr>
<td>[Clear]</td>
<td>Clears the current entry</td>
</tr>
<tr>
<td>[A] or [V]</td>
<td>Increase or decrease levels or scroll up or down through lists</td>
</tr>
<tr>
<td>[&gt;]</td>
<td>Advances to the next screen in a sub-menu</td>
</tr>
<tr>
<td>[Enter]</td>
<td>Executes selected actions or records value changes</td>
</tr>
<tr>
<td>[A/B]</td>
<td>Switches between Dimmer Doubling channel A and B</td>
</tr>
<tr>
<td>[Reset]</td>
<td>Restarts system electronics</td>
</tr>
</tbody>
</table>
Setting direct dimmer levels from the CEM

The Dimmer menu sets and displays dimmer levels set directly by Sensor control electronics at the CEM keypad.

**Note:** Some other ETCl sink peripherals can also set direct dimmer levels. Levels set by these devices function like levels set at the CEM.

1. Press [Dimmer] to enter the dimmer menu. The CEM LCD displays a dimmer's Unique Dimmer Number (UD#) and level. **NOT SET** indicates dimmers without set levels.

2. Press [A] or [Y] to scroll to the desired dimmer, or enter UD#s with the number keys and press [Enter].

**Dimmer menu Shortcuts**

- ▼ To select a range of dimmers enter the first UD# with the number keys, press [Thru] and enter the last UD#. Press [Enter]. All the dimmers between the two numbers are selected.
- ▼ You can select one or more dimmers directly from the Status display by entering the numbers on the keypad.
- ▼ Press [A] after entering the UD#(s) to “pop” dimmer levels to 100.

**Setting direct dimmer levels**

**Caution** Direct dimmer levels override normal dimming. Only use direct levels when normal facility lighting is not needed. To restore normal dimming, clear direct dimmer levels.

**Setting dimmer levels (except Dimmer Doubled dimmers)**

1. After entering your UD#(s), press [A1]. An @ appears between the UD#(s) and the dimmer level.
2. Press [A] or [Y] to increase or decrease dimmer levels or use the number keys to enter a percentage between 0 and 100.
3. Press [Enter] to set the level.
Setting levels for Dimmer Doubled dimmers

1. Enter the UD#(s) you wish to set levels for. Dimmer Doubled UD#s will be split into A and B channels.

2. To enter levels, press [At]. An @ appears between dimmer channel A and its dimmer level.

3. Press [A/B] to switch between channel A and B.

4. Press [A] or [Y] to increase or decrease dimmer levels or use the number keys to enter a percentage between 1 and 100.

5. Press [Enter] to set the level.

Clearing direct dimmer levels

Clearing dimmer levels restores control to DMX port inputs from your DMX lighting control system.

Note: Dimmers with levels of 0 must be cleared before they will respond to DMX or Backup look control input.

1. After entering your UD(s), press [At]. An @ appears between the UD(s) and the dimmer level.

2. Press [Clear]. [Enter]. The dimmer level changes to NOT SET.

Using direct dimmer levels with Backup looks

Backup looks recorded from direct dimmer levels can set levels for designated dimmers while other dimmers continue to respond to DMX lighting control.

Note: In Standard mode, levels from Backup looks always take control from DMX input levels. In Advanced mode, Backup look priority must be set to “High” before Backup levels can override DMX input. See Using input priorities on page 10 for details.

Follow these steps to create a Backup look for specific dimmers.

1. Set levels for the dimmers you want the Backup look to control using instructions from Setting direct dimmer levels on the previous page. In the example, dimmer 1–6 are set to 25 and dimmer 7 is set to 0.

2. Clear levels from dimmers you wish to remain under DMX control so their levels are NOT SET. In the example, dimmers 8–512 are cleared.

Note: Until a level is set for them, dimmers default to "NOT SET" and do not need to be cleared.

3. Record the Backup look from these levels. See Backup looks on page 11 for details.

4. After recording the Backup look, clear all direct dimmer levels to restore control to your facility lighting control system.

When the Backup look from the example is activated, dimmers 1–6 will go to 25 percent and dimmer 7 will go to 0 percent (off), while dimmers 8–512 remain under normal DMX port control.

Exiting the Dimmer menu

To exit the Dimmer menu, press [Exit]. The LCD returns to the Status display.
Getting dimmer, rack and system information at the CEM

The About menu lets you view dimmer, rack and system information. Since you cannot make setting changes in the About menu, it is a safe way to monitor your system during operation.

The About menu is divided into three submenus:

- **Dimmer** — lets you view individual dimmer’s type, address, location, load, level, and error messages
- **Rack** — lets you view your installation rack’s line voltage and frequency, starting address, DMX port A status, DMX port B status, temperature, and rack type
- **System** — lets you check your system for active Panic states or backup looks, and displays your system’s configuration name
Getting dimmer information from the About menu

**Status display**

- **Rack**: 1
- **1st UD#: 1**
- **System OK**

- **About Dimmer** 12*
  - **D15AF**
- **Rec. Load**: 1725 W

The About Dimmer submenu lets you view dimmer types, addresses, levels, and dimmer errors.

1. Enter the submenu by pressing [About] [1].
2. The first line of the display shows the Unique Dimmer Number (UD#).
3. Move from display to display by pressing [►].
4. Scroll up or down to view the desired dimmers by pressing [A] or [V] or enter a UD# using the number keys and press [Enter].
5. Press [Exit] twice to return to the Status display.

**Dimmer module type**

The first display shows the dimmer type on the second line.

**Dimmer rack and slot number**

- **About Dimmer** 12*
- **Rack**: 1
- **Slot**: 1

**Note:** Dual density dimmer modules share slot numbers.

**Dimmer recorded load (AF systems only)**

The third display shows the last load recorded for the dimmer. Only systems with Advanced Features can record dimmer loads. If no load is recorded, -- -- W displays.

**Actual dimmer load (AF systems only)**

The fourth display shows the load the system is currently reading on the dimmer. Only systems with Advanced Features can display dimmer loads.

**Note:** Load information (display 3 and 4) is only shown for systems equipped with Advanced Features (AF). Non AF systems display two dashes instead of a number.

**Dimmer control level**

The fifth display identifies dimmer level by percentage. If the level is set at the keypad, by a Backup look or by a Panic circuit, the level will be followed by an S, B or P respectively. Levels set by DMX512 input port A are followed by PA, port B levels are followed by PB.

**Dimmer Doubled dimmer levels**

Since Dimmer Doubled dimmers set two levels per dimmer circuit, the level display shows two output levels A and B. Identifying suffixes are the same as for other dimmer levels.
Dimmer status and error messages

The sixth display shows dimmer status, including any error messages reported by the CEM for that dimmer. If there are no errors, the second line reads **Ok**.

### Table 2: Dimmer error messages

<table>
<thead>
<tr>
<th>Message</th>
<th>Error condition</th>
<th>Notes and causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>OVERTEMP</td>
<td>Dimmer module is too warm</td>
<td>Check airflow through dimmer (air filter may be dirty)</td>
</tr>
<tr>
<td>MOD- REMOVED</td>
<td>Dimmer is missing from slot</td>
<td>Dimmer may not be installed</td>
</tr>
</tbody>
</table>

The messages listed below are only displayed by systems with Advanced Features

<table>
<thead>
<tr>
<th>Message</th>
<th>Error condition</th>
<th>Notes and causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC OUTPUT</td>
<td>Dimming is not balanced between the positive and negative peaks of the AC waveform</td>
<td>An SCR power cube may have failed</td>
</tr>
<tr>
<td>DIM FAIL</td>
<td>Dimmer has control signal, but no output</td>
<td>Dimmer circuit breaker is off, or SCR cube has failed</td>
</tr>
<tr>
<td>LOAD CHANGE</td>
<td>Load is different than recorded load</td>
<td>Lamp may have burned out, or lamping has been changed since loads were recorded</td>
</tr>
<tr>
<td>NO DIM LOAD</td>
<td>No load detected</td>
<td>Lamps may be burned out or wiring is defective</td>
</tr>
<tr>
<td>SCR FAILED</td>
<td>Dimmer output does not match control level</td>
<td>The SCR power cube may need to be replaced</td>
</tr>
</tbody>
</table>
Getting rack information from the About menu

**Status display**

<table>
<thead>
<tr>
<th>System 1 OK</th>
<th>[About]</th>
<th>Rack 1 Dimmer 2 Rack 3-System</th>
</tr>
</thead>
</table>

The About Rack submenu lets you view rack information.

1. Enter the submenu by pressing [About] [2].
2. Move from display to display by pressing [→].
3. The first line shows the rack number. Scroll up or down to view different racks by pressing [A] or [Y] or enter a rack number using the number keys and press [Enter].
4. Press [Exit] twice to return to the Status display.

**Line frequency and phase voltages**

The first About Rack display shows the selected rack’s input power frequency on the first line. The second line displays line voltage.

**Rack starting address (Standard mode only)**

**Start Addr** displays the rack’s DMX Start address, the first DMX channel from the input ports applied to dimmers in the rack. Because Start Address is only used in Standard DMX addressing mode, this window does not appear when Advanced DMX addressing mode is selected.

**DMX512 input port A or B status**

The third and fourth displays show the status of the CEM’s two DMX512 input ports, port A and port B. The second line identifies the port, followed by one of four status messages:

- **OK** means the port is set for, and receiving, DMX512 levels
- **Disabled** means the port is not set to receive signals
- **No Input** means the port is set to receive, but no DMX512 signals are present
- **Data Err** means there are DMX512 data errors

**Dimmer room air temperature**

**Ambient Temp** displays the dimmer room air temperature while the rack’s cooling fan is running. If the fan is idle, the temperature display is “– –“.

**Dimmer rack type**

**Type** displays the rack’s type. For racks equipped with Advanced Features, an AF follows the rack type.
Getting system information from the About menu

Status display

The About System submenu lets you view Panic and Backup look status and the system configuration name.

1. Enter the submenu by pressing [About] [3].
2. Move from display to display by pressing [►].
3. Press [Exit] twice to return to the Status display.

Panic circuit status (Active or Inactive)

The Panic display shows if a Panic circuit is active or inactive. A Panic circuit is a set of dimmers that drive to full output when activated by an external switch.

Backup look status

The Backup display shows if a Backup look is active. Backup looks are lighting looks recorded by the CEM. They are activated at the CEM face panel or remotely by ETCl ink devices.

If a backup look is active, its number displays on the second line followed by Active.

If no backup looks are active, the backup look number is 0 followed by Inactive.

Configuration name

The System Name window shows the configuration name. If you need to make a service call, knowing your configuration name helps Technical Services identify your system.
Controlling Backup looks

The Backup menu lets you play, record and clear Backup looks. Backup looks are dimmer level settings recorded and played by the CEM. They typically set house and stage lights without a console, or work as a backup if DMX512 input fails. You can record up to 32 different backup looks.

Playing Backup looks

1. Press [Backup], [1]. Play Backup Look appears on the first line of the LCD. The second line displays Backup look numbers and their status: Recorded, Not Recorded or Activate.

   **Note:** You cannot play a Backup look until one has been recorded. See Recording Backup looks on page 22 for recording instructions.

2. Press [A] or [V] to scroll through the Backup looks or enter a number from 1 through 32 with the number keys.

3. When the desired Backup look appears on the LCD, press [Enter] to activate it. The second line of the LCD displays the number of the Backup look followed by Active. Dimmers fade to the Backup look’s levels.

   **Note:** Activating a Backup look when another is already playing causes a five second cross-fade from the old look to the new.

Unsetting (deactivating) Backup looks

1. Press [Backup] [1]. Play Backup Look appears on the first line of the LCD. The second line displays Backup look numbers and their status: Recorded, Not Recorded or Activated.

2. Press [0] or scroll with [A] or [V] to Unset Look.

3. Press [Enter] to unset the look. It fades out in five seconds.

Deleting a Backup look

1. Press [Backup] [2]. Record Backup Look appears on the first line of the LCD. The second line displays Backup look numbers and their status, either Recorded or Not Recorded.

2. Press [A] or [V] to scroll to the desired Backup look or enter its number with the number keys.

3. Press [Clear]. The second line will display Delete? followed by NO. Scroll from NO to YES with [A] or [V] and press [Enter] to erase the look.
Clearing (erasing) all Backup looks

1. Press [Backup] [3]. Backup Looks appears on the top line of the LCD and Clear All? NO appears on the bottom line.
2. Press [A] or [Y] to scroll from NO to YES and press [Enter]. All the Backup looks are erased. When erasing is finished, the LCD returns to the first Backup look display.

Caution  Clearing all Backup looks permanently erases all 32 system backup looks. Follow the procedure for Deleting a Backup look (previous page) to erase individual backup looks.

Recording Backup looks

1. Set the lighting look you want to record:
   ▼  Using a lighting console or other DMX512 device.
   ▼  Directly from the CEM Dimmer menu. See Using direct dimmer levels with Backup looks on page 15.
   ▼  By combining DMX512 and CEM levels
2. Press [Backup] [2]. Record Backup Look appears on the first line of the LCD. The second line displays backup look numbers and their status, either Recorded or Not Recorded.

Note:  You can replace previously recorded Backup looks by recording new dimmer levels to them. The new levels replace the old ones.
3. Press [A] or [Y] to scroll through the Backup looks or enter a number from 1 through 32 with the number keys.
4. When the desired Backup look appears on the LCD, press [Enter]. A window appears asking whether you want to record Set Levels or a Snapshot:
5. Select Set Levels or Snapshot with [A] or [Y] and press [Enter] to record the Backup look.
   ▼  Set Levels records only direct dimmer levels set at the CEM. Direct level Backup looks can interact with DMX512 inputs when activated. See Using direct dimmer levels with Backup looks on page 15 for details.
   ▼  Snapshot records the current lighting look as a standard Backup look. It will record both DMX512 and direct dimmer levels.
6. Recording appears momentarily on the second line of the LCD as current dimmer levels are recorded.
7. When recording is complete, the second line displays the number of the Backup look followed by Recorded. The Backup look is recorded and ready to be activated.
Assigning dimmers to the Panic circuit

The CEM Panic circuit is a system-wide set of dimmers that drive to full when activated by an external signal. Panic circuits consist of all dimmers set to levels higher than 98 percent when the Panic is recorded.

1. Set dimmer channels you want assigned to the Panic circuit higher than 98 percent.

   **Note:** If your console displays levels in DMX decimal mode (0-255), you need to set dimmers levels above 250 to include them in the Panic set.

2. Press [Backup], and then [2] to display the Record Backup Look window.


4. Press [v]. Panic_Recorded or Panic_Not_Recorded displays.

   ▼ If Panic_Not_Recorded is displayed, press [Enter] to add all dimmer circuits set higher than 98 percent to the Panic circuit.

   ▼ If Panic_Recorded is displayed, press [Enter] to display Overwrite Panic?: No. Change No to Yes with [a] or [v] and press [Enter] to replace the previous Panic circuit assignments.

   **Note:** Recording the Panic set will take approximately 30 seconds per dimmer rack in your system.
Changing dimmer, rack and system settings in the Setup menu

The Setup menu displays and edits dimmer, rack and system operating settings. It is divided into three submenus.

1. **Setup Dimmer** controls dimmer modes, curves and scale voltage. On Advanced Features (AF) equipped systems, Setup Dimmer also controls recording loads, and enables or disables load errors.

2. **Setup Rack** sets the ETCLink address, DMX addressing, configuration checking, and allows you to update backup looks from other CEMs.

   **Note:** You have the choice of running Setup Rack in either Standard or Advanced mode. See DMX addressing modes on page 9 for details about DMX addressing options.

3. **Setup System** permits users with AF systems to record dimmer loads and enable and disable load error reporting. On all systems, Setup system sets the data loss fade time and Panic circuit options.

   **Caution!** Changes made in the Setup menu take effect immediately, and can alter or even stop normal dimming functions. Use the Setup menu cautiously when the system is in use and keep a record of changes in case of problems.

Switching between Standard and Advanced addressing mode

1. Press [Setup] and [2] on the CEM keypad to enter the **Setup Rack** menu.
2. Press [>] until you reach the **DMX Mode** window.

   **Note:** It may be necessary to press [>] up to 12 times. The number will vary depending on the features used in your system.

4. Press [Enter] to make the change.
Dimmer mode, curve and error reporting settings

The Setup Dimmer submenu lets you view and edit dimmer firing modes, dimming curves and error reporting.

1. Enter the submenu by pressing [Setup] [1].
2. Move from display to display by pressing [►].
3. Press [Exit] twice to return to the Status display.

Editing dimmer modes

The first display selects dimmer modes. Dimmer modes determine how dimmers respond to DMX512 level changes.

1. Enter the Unique Dimmer Number with the number keys, or scroll through the dimmers with [A] or [Y]. Press [Enter].
2. Scroll through the dimmer modes with [A] or [Y]. There are four dimmer modes available:
   - **Off** turns the dimmer off.
   - **Normal** operates as a standard incandescent dimmer.
   - **Non-dim** dimmers output *regulated* AC voltage when the DMX512 level is higher than the threshold level.
   - **Switched** dimmers output *unregulated* AC voltage when the DMX512 level is higher than the threshold level.
   - **DD** (Dimmer Doubled) enables a single dimmer circuit to dim two ETC Source 4 loads at different levels. See Dimmer Doubling on page 12 for details.
3. Press [Enter] to select the desired dimmer mode.
Choosing dimmer curves

The second display lets you select the dimmer curve. Dimmer curves adjust the relationship of individual dimmers’ control signal input to their power output.

1. Enter the Unique Dimmer Number (UD#) with the number keys or scroll through the dimmers with [A] or [Y];
2. Press [Enter].
3. Scroll through the curve options with [A] or [Y]. There are five curves available (See page 49 for graphs of Sensor dimmer curves):
   - Sensor 2.0 – ETC’s previous Modified Square law curve for Sensor system using Sensor configuration software version 2.14 or earlier
   - Mod Square – ETC’s recommended curve for incandescent lighting using a Sensor dimming rack
   - Square – Standard square law curve
   - Mod Linear – ETC’s modified linear (straight) output curve (recommended for low-voltage or ballasted loads)
   - Linear – Linear (straight) output curve
4. Press [Enter] to select the desired curve.

Setting dimmer scale voltage (“boost” in software versions 2.x)

The third display lets you set the dimmer scale voltage. Scale voltage sets the maximum effective Root Mean Square (RMS) voltage the dimmer can output to the load. Voltage output regulation can compensate for line power fluctuations or differences in line resistance between loads.

1. Enter the UD# with the number keys or scroll through the dimmers with [A] or [Y];
2. Press [Enter].
3. Enter a scale voltage with the number keys or scroll to the desired voltage with [A] or [Y];
4. Press [Enter].

Setting dimmer threshold levels

The fourth display controls a dimmer’s threshold level. The threshold level sets a dimmer shut-off point, expressed as a percentage of (RMS) voltage. When control input sends a dimmer below its threshold level dimmer output goes to zero. You can set threshold to Normal, or from 0 to 90 percent by scrolling levels with [A] or [Y].

Note: Since threshold is expressed as a percentage of RMS voltage, the DMX or direct dimmer level where the threshold cutoff occurs will vary depending on your dimmer curve.

1. Enter the UD# with the number keys or scroll through the dimmers with [A] or [Y];
2. Press [Enter]. Use [A] or [Y] to scroll to the desired value between 0 and 90 percent.
3. Press [Enter].

Note: For dimmers set to Switched or Non-dim firing modes, the Normal setting is changed to Always On. Dimmers with Always On thresholds drive to full output when dimmer rack power is on.
Setting up a rack in Standard mode

Standard DMX mode is used in most single-console systems. It uses a single DMX512 Start address for both DMX input ports. The user selects either port A or B for control, or uses both ports in highest takes precedence mode.

Note: To streamline navigating menus, Smart Menus only display configuration windows for features used by your system. Therefore, your display may skip unneeded steps in the configuration process.

Entering the Setup Rack menu

The Setup Rack menu sets rack, dimmer and control input addresses, enables and disables ports and turns other rack features on and off.

1. Press [Setup], then [2] to enter the Setup Rack menu. The first window is ETCLink Addr:

ETCLink Address: (Multi-rack systems only)

The ETCLink address is a number between 1–32 that determines rack identity in the system configuration.

1. Use [A] or [Y] or the numeric keypad to enter an ETCLink address number and press [Enter].
2. Press [>] to go the next window.

Start Address

1. To set the number of the first DMX512 channel you want the DMX ports on your rack to use, scroll through DMX channels with [A] or [Y] or type in a channel number from 1-512 with the numeric keypad and press [Enter].
2. Press [>] to go the next window.

DMX Port A status

1. To set your system to use or ignore control input from DMX port A use [A] or [Y] to display either Enabled or Disabled and press [Enter].
2. Press [>] to go the next window.

DMX Port B status

1. To set your system to use or ignore control input from DMX port B use [A] or [Y] to display either Enabled or Disabled and press [Enter].
2. Press [>] to go the next window.
DMX addressing mode status

**DMX Mode** sets your system to use either DMX addressing mode; Standard, which makes setting up most standard systems easier, or Advanced, for the power to configure complex multi-console systems.

1. Use [A] or [V] to display either Standard or Advanced and press [Enter].
   *Note: Switching to Advanced mode will completely change your Setup Rack menu options. Use the instructions from Setting up a rack in Advanced mode on page 30 if you are using Advanced mode.*
2. Press [>] to go to the next window.

**Transfer (Multi-rack systems only)**

*Note: Do not use the Transfer function unless you are directed to by an ETC-authorized service representative as part of the process of replacing a Control Electronics Module (CEM).**

**Transfer** downloads a configuration from one rack to another.

1. If desired, you can change the rack’s ETCLink address number by scrolling screen numbers with [A] or [V] or typing in a number with the numeric keypad. Press [Enter] to select the number or press [>] to go to the next window.
2. The CEM will check to see if any other racks in your system have that address. (An ETCLink network rack must have its own ETCLink number.)
3. If the number is OK, the window displays **Download config from Rack:**
4. Scroll through ETCLink rack addresses with [A] or [V] or type in the rack number you want to download the configuration from and press [Enter].
5. Press [Enter] to download the configuration. After the configuration has downloaded, the **Port A:** window displays.

**Update Backup looks from another rack (Multi-rack systems only)**

*Note: Do not use the Update function unless you are directed to by an ETC-authorized service representative as part of the process of replacing a Control Electronics Module (CEM).**

Backup looks are lighting looks recorded and played by the CEM electronics. You can update Backup looks from other racks.

1. To update Backup looks from another rack, use [A] or [V] or the numeric keypad to enter the desired rack number and press [Enter] (You must select the number just above or below your rack address number).
2. Press [>] to go to the next window.

**Checking rack configurations (Multi-rack systems only)**

All racks in a system must have the same configuration to work properly. Your system can be set to automatically check for mismatched configurations.

1. To change Configuration checking status, use [A] or [V] to choose either Enabled or Disabled and press [Enter].
2. To bypass Config Checking: and go back to the beginning of the Setup Rack, menu press [>].
   *Note: Do not turn Config Checking off unless instructed to do so by an authorized ETC representative.*
Recording a single dimmer load

**Note**: Dimmer loads can only be recorded in racks equipped with ETC’s Advanced Features (AF) option.

Recording dimmer loads allows an AF system to monitor dimmer circuits for load changes that indicate a lamp failure.

1. To record a dimmer load, use [A] or [V] or the numeric keypad to enter the desired dimmer number and press [Enter].
2. Use [A] or [V] to switch NO to YES and press [Enter].

**Note**: The dimmer is cycled through its output range during recording. It will not respond to normal DMX512 control until recording is complete.

3. The CEM will record the dimmer load. During recording, the CEM will display **Recording Loads** and dimmer output level. The time needed will vary depending on rack size:
   - SR6 or SR12 racks records loads in approximately 30 seconds
   - SR24 racks record loads in approximately 1 minute
   - SR48 racks record loads in approximately 2 minutes and 45 seconds
4. When recording is finished, the CEM displays **Restoring Set Levels** momentarily, then returns to the normal display.

Turning a dimmer’s load error reporting on or off

**Note**: Load errors can only be reported in racks equipped with ETC’s Advanced Features (AF) option.

When AF racks detect a load error indicating a lamp failure or tripped dimmer circuit breaker, it sends an error message to other ETCLink devices in the system. You can turn this feature on or off.

1. To switch load error reporting, use [A] or [V] or the numeric keypad to enter the desired dimmer number and press [Enter].
2. Use [A] or [V] to switch between ENABLED and DISABLED and press [Enter].
Setting up a rack in Advanced mode

Advanced DMX mode is used in complex multi-console systems. Advanced mode enables individual port start and end addresses, input priorities and first dimmer affected for Port A and Port B. You can also assign a priority for Backup looks in Advanced mode.

**Note:** To streamline navigating menus, Smart Menus only displays configuration windows for features used by your system. Therefore, your display may skip unnecessary steps in the configuration process.

**Entering the Setup Rack menu**

The Setup Rack menu sets rack, dimmer and control input addresses, enables and disables ports and turns other rack features on and off.

1. Press [Setup], then [2] to enter the **Setup Rack** menu. The first window is **ETCLink Addr.**
ETCLink Address: (Multi-rack systems only)

The ETCLink address determines rack identity in the system configuration.

1. Use [A] or [Y] or the numeric keypad to enter an ETCLink address number and press [Enter].
2. Press [>] to go the next window.

DMX Port A Priority

1. To determine the priority of DMX port A control levels when other input data is present, use [A] or [Y] to display either High, Low, PileOn, or Off priority options and press [Enter] (See Using input priorities on page 10).
2. Press [>] to go the next window.

Port A Start

1. To set the number of the first DMX512 channel you want DMX port A to use, scroll through DMX channels with [A] or [Y] or type in the number you want from the numeric keypad and press [Enter].
2. Press [>] to go the next window.

Port A End

1. To set the number of the last DMX512 channel you want DMX port A to use, scroll through DMX channels with [A] or [Y] or type in the number you want from the numeric keypad and press [Enter].
2. Press [>] to go the next window.

Port A First Dimmer

1. To set the Unique Dimmer Number of first dimmer you want DMX port A to control, scroll through Unique Dimmer Numbers with [A] or [Y] or type in the number you want from the numeric keypad and press [Enter].
2. Press [>] to go the next window.

DMX Port B Priority

1. To determine the priority of DMX port B control levels when other input data is present, use [A] or [Y] to display either High, Low, PileOn, or Off Priority options and press [Enter] (See Using input priorities on page 10).
2. Press [>] to go the next window.

Port B Start

1. To set the number of the first DMX512 channel you want DMX port B to use, scroll through DMX channels with [A] or [Y] or type in the number you want from the numeric keypad and press [Enter].
2. Press [>] to go the next window.

Port B End

1. To set the number of the last DMX512 channel you want DMX port B to use, scroll through DMX channels with [A] or [Y] or type in the number you want from the numeric keypad and press [Enter].
2. Press [>] to go the next window.
Port B First dimmer
1. To set the Unique Dimmer Number of first dimmer you want DMX port B to control, scroll through the numbers with [A] or [Y] or type in the number you want from the numeric keypad and press [Enter].
2. Press [>] to go the next window.

Setting Backup look Priority
1. To change your Backup look Priority use [A] or [Y] to display either High, Low or PileOn and press [Enter] (See Using input priorities on page 10).
2. Press [>] to go the next window.

DMX Mode status
DMX Mode sets your system to use either DMX addressing mode; Standard, which makes setting up most standard systems easier, or Advanced, for the power to configure complex multi-console systems.
1. Use [A] or [Y] to display either Standard or Advanced and press [Enter].
2. Press [>] to go the next window.

Transfer (Multi-rack systems only)
Note: Do not use the Transfer function unless you are directed to by an ETC-authorized service representative as part of the process of replacing a Control Electronics Module (CEM).
Transfer downloads a configuration from one rack to another.
1. If desired, you can change the rack’s ETCLink address number by scrolling screen numbers with [A] or [Y] or typing in a number with the numeric keypad. Press [Enter] to select the number or press [>] to go to the Port A: window.
2. The CEM will check to see if any other racks in your system have that address. (An ETCLink network rack must have its own ETCLink number.)
3. If the number is OK, the window displays Download config from Rack:.
4. Scroll through ETCLink rack addresses with [A] or [Y] or type in the rack number you want to download the configuration from and press [Enter].
5. Press [Enter] to download the configuration. After the configuration has downloaded, the Port A: window displays.

Update Backup looks from another rack (Multi-rack systems only)
Note: Do not use the Update function unless you are directed to by an ETC-authorized service representative as part of the process of replacing a Control Electronics Module CEM.
Backup looks are lighting looks recorded and played by the CEM electronics. You can update Backup looks from other racks.
1. To update Backup looks from another rack, use [A] or [Y] or the numeric keypad to enter the desired rack number and press [Enter]. (You must select the number just above or below your rack address number.)
2. Press [>] to go the next window.
Checking rack configurations (Multi-rack systems only)

All racks in a system must have the same configuration to work properly. Your system can be set to automatically check for mismatched configurations.

1. To change Configuration checking status, use [▲] or [▼] to choose either Enabled or Disabled and press [Enter].
2. To bypass Config Checking: and go back to the beginning of the Setup Rack menu press [►].

Note: Do not turn Config Checking off unless instructed to do so by an authorized ETC representative.
Viewing and changing system settings

Status display

| Rack: 1st Unit: 1 | System Ok
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Setup</td>
<td>Setup 1-Dimmer</td>
</tr>
<tr>
<td></td>
<td>2-Rack 3-System</td>
</tr>
</tbody>
</table>

The Setup System submenu lets you change system settings.

1. Enter the submenu by pressing [Setup] [3].
2. Move from display to display by pressing [ ].
3. Press [Exit] twice to return to the Status display.

Recording multiple dimmer loads (AF systems only)

Note: Dimmer loads can only be recorded in racks equipped with ETC's Advanced Features (AF) option.

Recording dimmer loads allows an AF system to monitor dimmer circuits for load changes that indicate a lamp failure or dimmer circuit breaker trip.

When you record multiple loads, your system will automatically record all the dimmers you select. To prevent overloading the main circuit breaker, the system limits recording to no more than eight dimmers per phase (up to 24 dimmer per cycle on a 3 phase rack). After finishing the first recording, the system repeats the cycle with the next group of dimmers until all selected dimmers have been recorded.

Note: Dimmers are cycled through their output range while they are being recorded. They will not respond to normal DMX12 control input until recording is completed.

1. Set a level of at least 1 percent on all dimmers you want recorded. You can use your lighting console or direct levels from the CEM.
2. To record dimmer loads, use [A] or [Y] to switch NO to YES and press [Enter].
3. The CEM will record the dimmer load. During recording, the CEM will display Recording Loads and dimmer output level. The time per recording cycle will vary depending on rack size:
   - SR6 or SR12 racks records loads in approximately 30 seconds
   - SR24 racks record loads in approximately 1 minute
   - SR48 racks record loads in approximately 2 minutes and 45 seconds
4. When recording is finished, the CEM displays Restoring Set Levels momentarily, then returns to the normal display.
Turning load error reporting On or Off for all dimmers (AF systems only)
The second display lets you turn system load error reporting on and off. When
an AF system detects an error in dimmer output, it flashes the error beacon,
displays the message on the CEM LCD and transmits an ETCLink error
message.
1. Press [Enter] and scroll to ENABLED or DISABLED by pressing [A] or [Y].
2. Press [Enter] again to complete the change.

Setting data loss fade time
The third display edits your system’s data loss fade time. The data loss fade
time sets the number of seconds (from 1 to 999) the system will hold the last
valid look if DMX512 input is lost. After the set number of seconds pass,
dimmer levels begin a five second fade to zero.
Note: The 999 second maximum value holds levels for 16 minutes and 39
seconds.
1. Press [Enter] and enter a new data loss fade time number with the
number keys or scroll the number of seconds up or down by
pressing [A] or [Y].
2. Press [Enter] again to complete the change.
Note: To hold the last valid look indefinitely after losing DMX512 input, enter
0 as the data loss fade time.

Panic Activation (Panic-enabled systems only)
The Panic circuit drives selected dimmers to full brightness when activated.
You can set the CEM for the activation signal used by your system.

- Hold runs Panic as long as a steady Panic activation signal is present
- Momentary turns Panic on and off in response to a short signal
1. To change your Panic activation, use [A] or [Y] to display either Hold or
Momentary and press [Enter].
2. To bypass Panic: and go to the Config Checking: window, press [►].
Maintenance

Cleaning dimmer rack air filters

Clean the air filter on your dimmer cabinet every six months, more often if your system operates in a dusty environment.

1. Open the dimmer rack door. The air filter is mounted on the inside of the door, held in on the bottom by a metal lip.
2. Slide the filter up about 1/2 inch until the filter base clears the top edge of the lip. Pull the base out far enough to clear the retaining lip and slide the filter down and out.

3. Vacuum or blow dust out of the filter.

Note: You can wash the filter under clear tap water, but it must be completely dry before you reinstall it. Do not use soap or other chemicals to clean the filter.

4. Slide the top of the filter back up into the slot at the top of the door until the base clears the metal retaining lip on the bottom of the door.
5. Let the filter drop back into place and close the door.

Note: When you clean the air filter, you should also check the dimmer module air vents for dust. See Vacuuming dimmer racks on the next page for instructions.
Vacuuming dimmer racks

You should inspect your dimmer rack when you clean the air filter and vacuum the front of the dimmer modules if necessary.

**Caution** To avoid the possibility of electrical shock, turn off power at the main breaker before touching the rack with the vacuum nozzle.

1. Open the door and look at the modules’ air vents and SCR power cube air inlets. If a dust buildup is visible, vacuum the front of the modules.
2. Leave the modules inside the rack. Most dust collects on the dimmer choke vents and SCR power cube air inlets of the dimmer modules.

Phase voltages inside the rack can be deadly. Do not remove rack modules when vacuuming dimmer racks. Only qualified technicians should expose the inside of the dimmer cabinet.

![Diagram of dimmer module air vents, SCR power cube air inlets, and CEM air vent]

**Figure 12: Vacuuming CEM rack modules**

3. Use a narrow vacuum cleaner nozzle to vacuum dimmer module air vents, the SCR power cube air inlets and the CEM air vent. Do not push debris into the modules.

4. Close the door.
Service

Contacting ETC about equipment problems

If possible, please have this information available before contacting ETC about an equipment problem:
- Your location and job name
- Any error messages on the CEM status LCD display
- Related system problems or equipment failures

ETC Technical Services
3030 Laura Lane
Middleton, WI 53562
Phone: 1-800-775-4382

Note: For the best service results, always tell your service representative you are using the CEM version of Sensor dimming system.

Caution Servicing Sensor CEM dimming equipment exposes high amperage power connections inside the rack. If possible, always turn off power at the main circuit breaker before servicing your system.

Changing Installation Rack modules

All Sensor CEM rack modules can be easily replaced without tools. Modules slide in and out of their slots and are ready to start dimming immediately.

Although Sensor modules, including the CEM, can be replaced with power on, always turn rack power off at the main circuit breaker, if possible, before changing modules.

Note: Operating a dimmer rack with open module slots disrupts airflow inside the rack, which can lead to rack overheating.
Removing and replacing a dimmer module
1. Turn off rack power at the main breaker, if possible.
2. Open the rack door.
3. Grasp the dimmer module by the center of the main air vent.
4. Pull the dimmer straight out.
5. Firmly press the replacement dimmer or airflow module into the correct slot until you feel the connections seat (the module face will be flush with the other modules).
6. Close and lock the Sensor rack door before applying power.

![Image of removing a dimmer module](image.png)

Figure 13: Removing an CEM module

Removing and replacing a CEM module
1. Turn off rack power at the main breaker.
2. Open the rack door.
3. Grasp the pull tab centered on the bottom of the CEM.
4. Pull the CEM straight out.
5. Firmly press the new CEM module into the correct slot until you feel the connections seat (the module face will be flush with the other modules).
6. Close and lock the Sensor rack door before applying power.
7. **ONLY** if directed to do so by an ETC-authorized service representative, transfer configuration and Backup look information to your new CEM. See page 28 (Standard DMX addressing mode) or page 32 (Advanced DMX addressing mode) for details.
Dimmer module circuit breakers

Each dimmer is protected by a built-in circuit breaker on the left side of the module. Circuit breakers are turned On and Off or reset using the switch handles on the left side of the dimmer modules.

**Note:** Dual density dimmer modules have two circuit breaker switches.

1. Open the dimmer rack door.
2. Locate the dimmer module you want to control or reset.
3. Put the circuit breaker switch in the desired On or Off position.
   - Push the handle **left** to turn the dimmer on or reset a tripped breaker.
   - Push the handle **right** to turn the dimmer off.

![Figure 14: Dimmer module circuit breakers](image)

Changing CEM phase fuses

The CEM has three phase fuses:

- The phase A fuse, F1, is a 250V, 1.5 amp, slow-blow fuse. CEM operating power is drawn through this fuse. If F1 fails, the CEM will not operate and dimming will not work. The Sensor rack beacon will be dark.
- Phase B (F2) and Phase C (F3) fuses, are 250V, 0.125 amp, fuses. If F2 or F3 fail, the CEM will function, but dimmers on the affected phase will not operate and the phase status LED will be dark. The Sensor rack beacon will flash to signal a problem.

Replacing a phase fuse

1. Remove the CEM module (See Removing and replacing a CEM module on page 40).
2. Locate and replace the defective fuse.

![Figure 15: Replacing CEM phase fuses](image)

3. Replace the CEM module and close the door.
Resetting or Testing Ground Fault Interrupt (GFI) dimmer modules

GFI modules have circuitry that compares the current between the Phase and Neutral wires on the dimmer circuit. If the module detects more than a 5mA current drop (ground fault) between Phase and Neutral, it trips the breaker. GFI dimmer modules from ETC comply with UL 943 if they are properly installed and maintained.

Resetting a tripped GFI circuit breaker

Note: Dual density GFI dimmer modules have two circuit breaker switches.
1. Open the dimmer rack door.
2. Locate the dimmer module you want to control or reset.

Note: Handles on tripped circuit breakers will be to the right.
3. Put the circuit breaker switch in the desired On or Off position.
   ▼ Push the handle left to turn the dimmer on or reset a tripped breaker.
   ▼ Push the handle right to turn the dimmer off.

![Figure 16: GFI Dimmer module circuit breakers](image)

Testing GFI circuit breaker functions

GFI dimmer modules must be tested monthly for proper GFI operation in order to comply with UL943 for life safety applications. Test results should be recorded on a test sheet that is easily accessible from the dimmer rack.

Note: GFI tests must be performed with rack power on.
1. Open the dimmer rack door and locate the GFI modules you want to test.
2. Push the Test switch just right of the circuit breaker handles:
   ▼ If the GFI breaker is working, the breaker switches will trip to the right
   ▼ If the switches do not trip, the GFI circuit may need repair

![Figure 17: GFI Dimmer module circuit breakers](image)

3. Reset the breaker switches and log the test on the test sheet.
4. Close the dimmer rack door.

Warning! GFI testing must performed and logged monthly to conform to UL 943 GFCI Life Safety requirements.
Troubleshooting

Your Sensor CEM system helps you identify system problems with status reporting and diagnostic testing capabilities.

You will usually notice a system problem in one of two ways:

- The Sensor Beacon on the dimmer rack begins blinking, indicating the CEM has detected a problem. The system may still continue to dim normally.
- You notice a problem with system performance. The error beacon may be flashing, or the problem may be caused by another part of your lighting control system.

When either of these situations occur, you can follow these steps to isolate and correct the cause.

Make a preliminary examination of your system

1. Check for loose or damaged control cables coming into your dimmer rack.
2. Check for tripped breakers on your main circuit breaker panel.
3. Look for obstructions on top or in front of your installation rack that may be blocking rack ventilation.
4. Open the door and look for dust buildup on the air filter or rack modules.
5. Check for tripped dimmer module circuit breakers.
6. Check the CEM display for error messages. For an explanation of error message causes and possible corrections, see Appendix 1: CEM error messages on page 48.
7. Check for an activated Backup look at your CEM. (This can lock some or all of your dimmer circuits at one level.) See Controlling Backup looks on page 21 for details.
8. Make sure your Panic circuit is not activated. (This will drive some of your dimmer circuit to full and hold them there.) See Assigning dimmers to the Panic circuit on page 23 for details.
9. Make sure all direct dimmer levels at the CEM are cleared. (This can lock some or all of your dimmer circuits at one level.) See Setting direct dimmer levels on page 14 for details.
10. Correct any of these problems you find, press [Reset] on the front of the CEM module and observe the system to see if the problem still exists.

If you cannot locate or correct the problem

If you are unable to eliminate the problem, contact your authorized ETC representative.

See Contacting ETC about equipment problems on page 39 for procedures on contacting ETC for technical help.
Sensor specifications

Dimensions

SR6 – 16.4 inches high x 14.8 inches wide x 13.3 inches deep
SR12 – 25.8 inches high x 14.8 inches wide x 13.3 inches deep
SR24 – 45.8 inches high x 14.8 inches wide x 16.8 inches deep
SR48 – 83.1 inches high x 14.8 inches wide x 22.8 inches deep

Weight

SR6 – 36 pounds
SR12 – 50 pounds
SR24 – 132 pounds
SR48 – 249 pounds

Rack module weights

Control Electronics Module – 4.3 pounds
D15 and D20 module – 5.0 pounds
D50AF module – 5.5 pounds
D100AF module – 7.6 pounds
Airflow (AFM) module – 1.5 pounds

Electrical compliance

SR6 – 100 amps per phase (3 phase maximum)
SR12 – 200 amps per phase (3 phase maximum)
SR24 – 400 amps per phase (3 phase maximum)
SR48 – 800 amps per phase (3 phase maximum)

(These are maximum current ratings. Your rack may use less depending on the type and number of dimmer modules.)

Class I electrical device
Frequency: 50/60Hz
Operational Voltage (Ue): 120V ±10% (3p + N + △)
120V ±10% (2p + N + △)
Insulation Voltage: (Uj): 400V
Impulse withstand Voltage (Uimp): 4000V
Short-circuit current: 10kA
Degree of protection: IP20

Types of Electrical Connections: W.W.W

EMC Environment 1
Pollution Degree 2

Environment

Ambient temperature between 32°F and 104°F (0 – 40°C)
Humidity between 30 – 95% (non-condensing)
Altitude below 6500 feet (2000 meters)
Glossary

Backup looks: Backup looks are lighting looks recorded in the CEM. Up to 32 backup looks can be recorded. Backup looks can be played or recorded from the CEM or from ETClink consoles, PCs or peripheral devices.

CEM: The Control Electronic Module for a Sensor CEM dimming system. CEM systems enable multiple DMX512 inputs and addressing modes and support ETCLink.

Dimmer channel: An individual circuit used to set lighting levels.

Dimmer curve: Determines how control signal level maps to dimmer voltage output. Curve options available from the Setup dimmer menu are Square, Mod Square, Linear, and Sensor 2.0.

Dimmer Doubling: ETC's patented method of using one dimmer channel to control two separate Source Four lighting loads at two different levels. It can be selected as a Dimmer mode option.

Dimmer Mode: Determines the firing mode of a digital dimmer. Available firing modes are: Normal, Switched, Off, Non-dim, and Dimmer Doubled. Dimmer mode is selected in the Setup Dimmer menu.

Dimmer module: A slide-in cartridge containing one or two dimmer channels.

Dimmer rack: The cabinet, cooling and power distribution system for dimmer modules.

Dimmer regulation: Maintains steady dimmer output voltage by adjusting dimmer firing. It is used to compensate for line voltage fluctuations and or different load resistance.

Dimmer slot: The rails and circuit connections in a dimmer rack that individual dimmer modules slide into during installation. Larger dimmer modules (100 amp) use two dimmer slots per module.

Direct dimmer levels: Direct dimmer levels are dimmer output values set directly from the numeric keypad of the CEM. Set levels override input from all sources except Panic activation.

DMX mode: The DMX512 addressing scheme. It is set to either Standard or Advanced in the Setup rack menu.

- Standard DMX mode – used in the majority of single-console systems. Standard mode automatically assigns dimmers to DMX512 channels using the Start address set by the user. Both port A and B use the same start address. The user can select either port A or B for control, or use both ports in highest takes precedence mode.

- Advanced DMX mode – used in multi-console systems or where special addressing is required. The user sets individual Port start and Port end addresses for port A and/or B as desired. The user also enters the First dimmer that each port affects in the rack and assigns each port a priority.

DMX512: The established data protocol for digital control of dimming systems. A DMX512 signal carries up to 512 dimmer channels – each with an intensity level from 0-255.
ETLink: A digital Echelon® LonTalk® network that carries system status information, including console-specific and dimmer-specific data, between components of a Sensor system. ETLink components include CEMs and ETLink consoles, PCs or peripheral devices.

ETLink Address: A number assigned to a dimmer rack or connected device in a multi-rack ETLink network. Accessed through the Setup Rack menu.

**Note:** Dimmer racks are assigned a number between 1-32. These addresses cannot be duplicate or skip numbers (e.g. rack 1, 2, 3, 4, 5 – Not rack 1, 2, 2, 4, 5).

First Dimmer: The first Unique Dimmer Number (between 1 – 8192) affected by a port’s addressing scheme. Used with the port start and port end addresses. Accessed through the Setup rack menu in Advanced DMX mode only.

Highest takes precedence: Compares levels from two control sources on a channel-by-channel basis and assigns control to the higher channel level.

MPE: Multi-Protocol Electronics module used in Sensor MPE dimming systems. MPE systems use a single DMX512 input and/or AMX192 or Analog 0-10 volt control systems. ETLink is not available for MPE systems.

Panic: Panic is a group of dimmers driven to full intensity by a remote keyswitch station signal.

Port: DMX512 input ports. Each CEM in the rack has two DMX input ports labeled port A and port B.

Port End: The last channel number (between 1 – 512) used from a DMX512 input port. Accessed from the Setup Rack menu in Advanced mode only.

Port Start: The first channel number (between 1 – 512) used from a DMX512 input port. Accessed from the Setup rack menu in Advanced mode only.

Priorities: Priority determines how dimmer levels from Port A, B and backup looks interact to control dimmers. There are three levels of priority: High, Pipe-on and Low. Accessed from the Setup rack menu in Advanced mode only.

Rack Start: The lowest Unique Dimmer Number (between 1 – 8192) in a dimmer rack. Usually the first dimmer channel in the rack. This is the number that appears after Start: in the default CEM status display. (In the example the Rack start number is 256.)

Scale voltage: Scale voltage sets the maximum voltage the dimmer can output. Scale voltage is set in the Setup dimmer menu.

Start address: The DMX512 channel number (between 1 – 512) applied to the first dimmer in the rack. Succeeding channel levels are automatically applied to the remaining dimmers in order of their Unique Dimmer Number. Displayed after Start Addr: in the Setup rack menu in Standard mode only.

Threshold: Threshold sets the minimum voltage the dimmer can output. Threshold voltage is set in the Setup dimmer menu.

Unique Dimmer Number (UDN): The ETLink number between 1 and 8192 assigned to each dimmer channel in the system. This number is used for error reporting and dimmer setup by CEMs and ETLink consoles, PCs or peripheral devices.
Appendix 1: CEM error messages

If the CEM detects an error, it will flash the Sensor beacon and display the appropriate error message in the LED Status display. A CEM will only display error messages from its installed rack. ETCLink-capable lighting consoles and peripherals can select racks by ETCLink address and review error messages remotely.

**Note:** There may be more than one error message. You can use [A] or [Y] to scroll through multiple error messages.

### Table 3: CEM Error messages, causes and corrective action

<table>
<thead>
<tr>
<th>CEM Error Message</th>
<th>Probable cause</th>
<th>Possible corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMBIENT OVERTEMP</td>
<td>Ambient temperature higher than 115°F</td>
<td>Lower dimmer room temperature</td>
</tr>
<tr>
<td>AMBIENT TEMP HIGH</td>
<td>Ambient temperature higher than 104°F</td>
<td>Lower dimmer room temperature</td>
</tr>
<tr>
<td>AMBIENT TEMP LOW</td>
<td>Ambient temperature lower than 32°F</td>
<td>Raise dimmer room temperature</td>
</tr>
<tr>
<td>BACKUP MISMATCH</td>
<td>Backup took error</td>
<td>Transfer backup look data from another rack</td>
</tr>
<tr>
<td>CONFIG MISMATCH</td>
<td>Configuration error</td>
<td>Transfer configuration data from another rack</td>
</tr>
<tr>
<td>DIMMER ERROR</td>
<td>A dimmer in this rack has an error</td>
<td>Use About Dimmers to check the specific error</td>
</tr>
<tr>
<td>DATA ERROR PORT (A,B)</td>
<td>DMX512 data error</td>
<td>Check DMX512 port input cable and termination</td>
</tr>
<tr>
<td>DIMMER OVERTEMP</td>
<td>One or more dimmers are overheated</td>
<td>Check exhaust fan and air filter operation</td>
</tr>
<tr>
<td>ETCLINK FAILED</td>
<td>ETCLink enabled but not responding</td>
<td>Check all ETCLink cable and connectors</td>
</tr>
<tr>
<td>FREQUENCY ERR</td>
<td>Feed power is not 50 or 60Hz, (±2.5Hz)</td>
<td>Check input frequency</td>
</tr>
<tr>
<td>NO AIRFLOW</td>
<td>Insufficient airflow detected</td>
<td>Check fan and air filter for obstruction</td>
</tr>
<tr>
<td>NO DATA PORT (A,B)</td>
<td>No DMX512 data received by Port A or B</td>
<td>Check DMX512 source devices and input cables</td>
</tr>
<tr>
<td>OVERTEMP #</td>
<td>Dimmer has overheated and shut down</td>
<td>Check airflow, press [Clear] to reset dimmer</td>
</tr>
<tr>
<td>PHASE (A, B or C) ERROR</td>
<td>Voltage below 90V or above 140V</td>
<td>Check line feed</td>
</tr>
<tr>
<td>PHASE (A, B or C) OFF</td>
<td>L1, L2, or L3 dimmers turned off for voltage error</td>
<td>Check line feed</td>
</tr>
<tr>
<td>PHASE DETECT FAIL</td>
<td>CEM could not read line feed phasing</td>
<td>Reseat CEM and try again. If problem persists, replace the CEM</td>
</tr>
<tr>
<td>PROCESSOR FAIL</td>
<td>CEM processor not responding</td>
<td>Replace CEM</td>
</tr>
<tr>
<td>SYSTEM ERROR</td>
<td>System and CEM configurations different</td>
<td>Replace CEM or check setup configuration</td>
</tr>
<tr>
<td>TEMP SENSOR STUCK</td>
<td>Ambient temperature sensor is stuck</td>
<td>Replace CEM</td>
</tr>
<tr>
<td>ZERO CROSSING ERR</td>
<td>CEM hardware failure</td>
<td>Replace CEM</td>
</tr>
</tbody>
</table>
Appendix 2: Sensor 3.0 dimmer curves

Dimmer curves determine how dimmers set voltage output in response to control signal input. To accommodate designer preferences and load response variations, Sensor offers five dimmer curve choices, which can be applied to individual dimmers [See Choosing dimmer curves on page 26 for details].

Linear curve

The linear curve matches the control input percentage to Root Mean Squared (RMS) voltage output. Each percent increase in control level increases dimmer voltage output by the same amount.

![Linear Curve](image1)

Figure 18: Linear dimmer curve

Modified linear curve

A modified linear curve reduces the voltage change at low control levels for better performance in low-wattage fixtures.

![Modified linear Curve](image2)

Figure 19: Modified linear dimmer curve
**Square law curve**

At low control levels, much of traditional incandescent fixture’s light output is in the invisible infrared spectrum. This results in poor visible response to low control levels. A square law curve applies a multiple derived from the square root of the control level (with full output equal to 1.00) to increase voltage response at low control levels to compensate for the infrared loss.

![Square Law Curve](image)

*Figure 20: Square law dimmer curve*

**Modified Square law curve**

A standard square law curve may overcompensate for infrared loss, resulting in "steppy" response to incremental control changes at low levels. ETC’s modified square law curve applies a second multiple to the standard square law curve for more uniform response to control levels changes across the entire range of dimmer output.

![Modified square Law Curve](image)

*Figure 21: Modified square law dimmer curve*
**Sensor 2.0 curve**

The Sensor 2.0 curve is the previous version of ETC’s modified square law curve. It provides backwards compatibility for shows created using earlier versions of ETC equipment and familiar response for designers who prefer the earlier version.

*Figure 22: Sensor 2.0 dimmer curve*
Appendix 3: Standard mode CEM menu flowchart

Sensor CEM menu structure (Standard mode)
Version 3.0
Appendix 4: Advanced mode CEM menu flowchart
### Appendix 5: GFI Dimmer test sheet

**Test Reminder:** For maximum protection against electrical shock, operate the Test switch on each GFCI dimmer module at least once a month. Record the test date below using an indelible ink marker.

| Test | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  | 34  | 35  | 36  | 37  | 38  | 39  | 40  | 41  | 42  | 43  | 44  | 45  |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1    | 46  | 91  | 136 | 47  | 92  | 137 | 48  | 93  | 138 | 49  | 94  | 139 | 50  | 95  | 140 | 51  | 96  | 141 | 52  | 97  | 142 | 53  | 98  | 143 | 54  | 99  | 144 | 55  | 100 | 145 | 56  | 101 | 146 | 57  | 102 | 147 | 58  | 103 | 148 | 59  | 104 | 149 | 60  | 105 | 150 | 61  | 106 | 151 | 62  | 107 | 152 | 63  | 108 | 153 | 64  | 109 | 154 | 65  | 110 | 155 | 66  | 111 | 156 | 67  | 112 | 157 | 68  | 113 | 158 | 69  | 114 | 159 | 70  | 115 | 160 | 71  | 116 | 161 | 72  | 117 | 162 | 73  | 118 | 163 | 74  | 119 | 164 | 75  | 120 | 165 | 76  | 121 | 166 | 77  | 122 | 167 | 78  | 123 | 168 | 79  | 124 | 169 | 80  | 125 | 170 | 81  | 126 | 171 | 82  | 127 | 172 | 83  | 128 | 173 | 84  | 129 | 174 | 85  | 130 | 175 | 86  | 131 | 176 | 87  | 132 | 177 | 88  | 133 | 178 | 89  | 134 | 179 | 90  | 135 | 180 |   |

This Test log must be posted in a conspicuous place near the GFI dimmers.
ETC

G E N E R A L  I N F O R M A T I O N

Sensor+ dimming systems provide high density, professional features and exceptional reliability for lighting applications that require the best the entertainment industry can offer.

APPLICATIONS
- Professional and educational theatre
- Production studio
- Concert and performance halls
- Themed retail and dining
- Multi-use Convention Centers
- Houses of Worship

FEATURES
- High dimmer density
- Up to two 2.4kW dimmers per module
- 6, 12, 24, and 48 module racks available
- Rugged industrial construction
- Installable flexibility
- Adaptable modular design
- 100,000 AC Rating
- Advanced configuration editing built into rack
- Stores up to 128 Presets in memory
- Direct Ethernet control signal input
- Two DMX392 inputs
- Standard system and rack monitoring with diagnostic reporting
- Supports ETC Dimmer Doubling™
- All racks UL and CEI Listed

ACCESSORIES
- Sensor preset station
- Dimmer Doubling™
- Sound Suppression Hood
- Floor pedestal for 24-module rack
- Document holder

O R D E R I N G  I N F O R M A T I O N

Installation Racks

<table>
<thead>
<tr>
<th>Model#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR6+</td>
<td>Sensor+ 6 Module Rack</td>
</tr>
<tr>
<td>SR12+</td>
<td>Sensor+ 12 Module Rack</td>
</tr>
<tr>
<td>SR24+</td>
<td>Sensor+ 24 Module Rack</td>
</tr>
<tr>
<td>SR6+</td>
<td>Sensor+ 6 Module Single Phase Rack</td>
</tr>
<tr>
<td>SR12+</td>
<td>Sensor+ 12 Module Single Phase Rack</td>
</tr>
<tr>
<td>SR24+</td>
<td>Sensor+ 24 Module Single Phase Rack</td>
</tr>
</tbody>
</table>

Rack Options*

<table>
<thead>
<tr>
<th>Model#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT12</td>
<td>Amp-Trap® fuse option for 12-module rack</td>
</tr>
<tr>
<td>AT24</td>
<td>Amp-Trap® fuse option for 24-module rack</td>
</tr>
<tr>
<td>AT48</td>
<td>Amp-Trap® fuse option for 48-module rack</td>
</tr>
<tr>
<td>RK12</td>
<td>Raising kit for 2 - 12 module racks</td>
</tr>
<tr>
<td>RK24</td>
<td>Raising kit for 2 - 24 module racks</td>
</tr>
<tr>
<td>RK48</td>
<td>Raising kit for 2 - 48 module racks</td>
</tr>
<tr>
<td>AUX12-12</td>
<td>12'' Auxiliary Rack (for 12-module rack)</td>
</tr>
<tr>
<td>AUX12-24</td>
<td>12'' Auxiliary Rack (for 24-module rack)</td>
</tr>
<tr>
<td>AUX12-48</td>
<td>12'' Auxiliary Rack (for 48-module rack)</td>
</tr>
<tr>
<td>AUX19-12</td>
<td>19'' Auxiliary Rack (for 12-module rack)</td>
</tr>
<tr>
<td>AUX19-24</td>
<td>19'' Auxiliary Rack (for 24-module rack)</td>
</tr>
<tr>
<td>AUX19-48</td>
<td>19'' Auxiliary Rack (for 48-module rack)</td>
</tr>
</tbody>
</table>

*Vibration Reduction mounts available for all Sensor+ racks.
Contact ETC for details

Rack Accessories

<table>
<thead>
<tr>
<th>Model#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBD</td>
<td>Sensor+ preset station</td>
</tr>
<tr>
<td>DD</td>
<td>Dimmer Doubling without input connector</td>
</tr>
<tr>
<td>DD-L</td>
<td>Dimmer Doubling with Load-Lock input connector</td>
</tr>
<tr>
<td>SSD-C</td>
<td>Dimmer Doubling with Test (both input connectors)</td>
</tr>
<tr>
<td>SSSh-6-12</td>
<td>Sensor+ Sound Suppression Hood - small</td>
</tr>
<tr>
<td>SSSh-24-48</td>
<td>Sensor+ Sound Suppression Hood - large</td>
</tr>
<tr>
<td>Pedestal</td>
<td>Floor pedestal for 24-module rack</td>
</tr>
<tr>
<td>OTH</td>
<td>Document holder</td>
</tr>
</tbody>
</table>

646 of 1217
**SPECSIFICATIONS**

**GENERAL**
- Racks available in four sizes:
  - SR8+: 8 modules, 12 dimmer maximum
  - SR12+: 12 modules, 24 dimmer maximum
  - SR24+: 24 modules, 48 dimmer maximum
  - SR48+: 48 modules, 96 dimmer maximum
- Dual density (two dimmers per module), single density and half density dimmer modules available
- Operating temperatures: 0-40°C / 32-104°F
- Dimmer room HVAC systems must at all times maintain the specified ambient temperatures at the dimmer rack. Dimmer systems operating within 10 degrees F of the upper or lower temperature limits must utilize flowback installation and operating guidelines to operate reliably.
- Relative humidity: 30-90% non-condensing
- All racks UL and cUL Listed

**MECHANICAL**
- Rugged 16-gauge steel construction
- Fine-textured, scratch-resistant, epoxy paint
- SR8+ and SR12+ uses wall mount installation
- SR24+ can be wall or pedestal mounted
- SR48+ is floor mounted
- Top and bottom conduit access through removable panels (SR48+) or knockouts (SR8+, SR12+, and SR24+)
- No tools required for module removal or installation
- Keyed module slots prevent insertion of inappropriate module types
- Front access to all wiring and terminations
- Full height locking door
- Electrostatic air filter easily removed from door for periodic cleaning
- High efficiency cooling system with airflow sensor
- High visibility LED status beacon

**ELECTRICAL**
- SR8+, SR12+ and SR24+ accept:
  - Three phase 120/208 VAC, single phase 120/240 VAC
- SR48+ accepts:
  - Three phase 120/208 VAC
  - Line feed frequencies from 47-63Hz
  - Line feed voltage range is 90-140 VAC
  - Load terminals accept up to #4 AWG (16mm²) wire (see chart)
- 100,000 AIC races rating
- Auxiliary Equipment Racks and custom switchgear/distribution available (Call ETC for details)

**CONTROL ELECTRONICS**
- Sensor+ Control Electronics Module (CEMA)
  - Single Ethernet control signal input
  - Two DMX512 inputs
  - Standard diagnostic reporting
  - Supports Dimmer Doubling™

**OPTIONS**
- Advanced Features™ dimmer-specific load and diagnostic reporting
- Amp-Tap® fuses to allow feeding individual racks from over-size mains
- All-copper bus lits available
- Auxiliary Racks
- Vibration reduction kits available for all racks

**ORDERING INFORMATION**

**Dimmer Modules**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D15</td>
<td>Dual 15A Dimmer Module - 3100W</td>
</tr>
<tr>
<td>D15E</td>
<td>Dual 15A Dimmer Module - 4000W</td>
</tr>
<tr>
<td>D20</td>
<td>Dual 20A Dimmer Module - 4000W</td>
</tr>
<tr>
<td>G50A</td>
<td>Single 50A Dimmer Module - 6000W</td>
</tr>
<tr>
<td>D100A</td>
<td>Half 100A Dimmer Module - 10000W</td>
</tr>
</tbody>
</table>

**Special Purpose Sensor Modules**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L15</td>
<td>Dual 15A Low Wattage Dimmer Module</td>
</tr>
<tr>
<td>L10F</td>
<td>Single 10A Low Wattage Fluorescent Dimmer Module</td>
</tr>
<tr>
<td>D15F</td>
<td>Single 15A Fluorescent Dimmer Module</td>
</tr>
<tr>
<td>D20F</td>
<td>Single 20A Fluorescent Dimmer Module</td>
</tr>
<tr>
<td>R15A</td>
<td>Dual 15A Relay Module - Advanced Features</td>
</tr>
<tr>
<td>R20A</td>
<td>Dual 20A Relay Module - Advanced Features</td>
</tr>
<tr>
<td>C20</td>
<td>Dual 15A Constant Circuit Breaker Module</td>
</tr>
<tr>
<td>C20</td>
<td>Dual 20A Constant Circuit Breaker Module</td>
</tr>
<tr>
<td>AF24</td>
<td>Air Flow Module</td>
</tr>
</tbody>
</table>

**Control Modules**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEMA</td>
<td>Control Electronics Module</td>
</tr>
</tbody>
</table>

**WIRING CHARTS**

**Load Wiring Lug Capacity**

<table>
<thead>
<tr>
<th>Connection</th>
<th>Wire Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>10A, 15A, 20A, and 50A lugs</td>
<td>4 AWG Max. (16mm²)</td>
</tr>
<tr>
<td>100A lugs</td>
<td>2/0 AWG</td>
</tr>
</tbody>
</table>

**Primary Feed Lug Capacity**

<table>
<thead>
<tr>
<th>Connection</th>
<th>Wire Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR8+</td>
<td>Single 200 - 14 AWG</td>
</tr>
<tr>
<td>SR12+</td>
<td>Dual 200 - 14 AWG</td>
</tr>
<tr>
<td>SR24+</td>
<td>Dual 200 - 14 AWG</td>
</tr>
<tr>
<td>SR48+</td>
<td>Dual 200 - 14 AWG</td>
</tr>
</tbody>
</table>

**RACK DIMENSIONS**

**Installation Rack dimensions**

<table>
<thead>
<tr>
<th>Model</th>
<th>Height</th>
<th>Width</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>inches</td>
<td>inches</td>
<td>cm</td>
</tr>
<tr>
<td>SR8+</td>
<td>18.0</td>
<td>47</td>
<td>146.6</td>
</tr>
<tr>
<td>SR12+</td>
<td>25.8</td>
<td>60</td>
<td>146.6</td>
</tr>
<tr>
<td>SR24+</td>
<td>45.8</td>
<td>116</td>
<td>146.6</td>
</tr>
<tr>
<td>SR48+</td>
<td>83.1</td>
<td>211</td>
<td>214</td>
</tr>
</tbody>
</table>

647 of 1217
# Sensor+° Racks
## Sensor+ Standard Series

### Physical

#### Empty Dimmer Rack Weights

<table>
<thead>
<tr>
<th>Model</th>
<th>Weight</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR6+</td>
<td>35.0</td>
<td>16.0</td>
</tr>
<tr>
<td>SR12+</td>
<td>45.0</td>
<td>21.0</td>
</tr>
<tr>
<td>SR12+ Door*</td>
<td>11.0</td>
<td>5.0</td>
</tr>
<tr>
<td>SR24+</td>
<td>107.0</td>
<td>49.0</td>
</tr>
<tr>
<td>SR24+ Door*</td>
<td>17.0</td>
<td>8.0</td>
</tr>
<tr>
<td>SR48+</td>
<td>188.0</td>
<td>86.0</td>
</tr>
<tr>
<td>SR48+ Door*</td>
<td>31.0</td>
<td>14.0</td>
</tr>
</tbody>
</table>

*Rack doors ship separately

#### Installed Dimmer Rack Weights*

<table>
<thead>
<tr>
<th>Model</th>
<th>Maximum Weight</th>
<th>Typical Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR6+</td>
<td>71.0</td>
<td>33.0</td>
</tr>
<tr>
<td>SR12+</td>
<td>115.0</td>
<td>53.0</td>
</tr>
<tr>
<td>SR24+</td>
<td>263.0</td>
<td>129.0</td>
</tr>
<tr>
<td>SR48+</td>
<td>493.0</td>
<td>249.0</td>
</tr>
</tbody>
</table>

*Maximum — 020HV modules (5.7Lbs each)
Special — 020 modules (5.2Lbs each)
Refer to module datasheets to calculate rack weight for other module types

#### Clearance above fan

| SR6+  | 10.0" | 25cm |
| SR12+ | 10.0" | 25cm |
| SR24+ | 16.5" | 42cm |
| SR48+ | 18.8" | 48cm |

---

*Copyright © 2000 PC: All rights reserved. All product specifications and production are subject to change. 15500 Bexar St. A. Printed in USA 11/99*
sensor+
CEM+ Sensor Rack (SR Series)
Retrofit Manual

Revision A

Copyright © Electronic Theatre Controls, Inc.
All Rights reserved.
Product information and specifications subject to change.
Part Number: 7150M2300 Rev A
Released: June 2004
Introduction

This manual is intended to guide ETC Service Technicians through the process of upgrading existing Sensor rack installations to Sensor+ racks with an CEM+ control module. This manual covers SR6, SR12, SR24 and SR48 permanent installation dimming racks.

If you have questions about the retrofit process that are not answered in this manual, please contact ETC Technical Services.

Americas
ETC International
Technical Services Department
3031 Pleasant View Road
Middleton, WI 53562

+1 800 775 4382
+1 608 831 4116
service@etconnect.com

Please email comments about this manual to: TechComm@etconnect.com

Warnings and Notice Conventions

These symbols are used in Sensor documentation to alert you to danger or important information:

**Note:** Notes are helpful hints and information that is supplemental to the main text.

**CAUTION:** A Caution statement indicates situations where there may be undefined or unwanted consequences of an action, potential for data loss or an equipment problem.

**WARNING:** A Warning statement indicates situations where damage may occur, people may be harmed, or there are serious or dangerous consequences of an action.

**WARNING:** RISK OF ELECTRIC SHOCK! This warning statement indicates situations where there is a risk of electric shock.
Safety

Please note the following safety warnings before use:

• Disconnect power from the racks before all maintenance.

WARNING: Dimmer racks without an accessible power disconnect device cannot be serviced safely.

Overview of this Manual

Reference this manual throughout the retrofit procedure.

• Preparation, page 5 - before you open the rack.
• Remove the Old, page 5 - labeling and remove the existing equipment.
• Install the New Backplane, page 9 - transfer the wiring and install new components.
• Change out the AF Cards (if present), page 10 - remove the existing Advanced Feature cards and install the new ones.
• Change out the Beacon PCB, page 10 - replace the beacon pcb with the new one.
• Verify the Retrofit, page 11 - put the dimmers back in the rack and power up the rack.
• Configure the CEM+, page 11 - put a configuration in the CEM+.
• Finishing Touches, page 11 - replace rack stickers and the acrylic beacon in the door.
• Quick Reference Sheet, page 13 - is an illustrated overview of the retrofit procedure.

When viewing this document in electronic form (pdf file) with Adobe Acrobat Reader, blue italicized text followed by a page number such as "Overview of this Manual, page 2" is a link within the document. If you click on the link, it will jump to that section or topic.
# Section 1
## Unpack and Organize

The table below lists the parts and components needed to retrofit a Sensor+ rack up to a Sensor+ rack with a CEM+. Each part is listed to reflect the different quantities for the different kits and types of racks.

<table>
<thead>
<tr>
<th>Parts/Components</th>
<th>Ba 5000</th>
<th>SR12</th>
<th>SR24</th>
<th>SR50K</th>
<th>SR50K-504</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEM+ Backplane Bracket</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>CEM+ Backplane PCB Assy</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>CEM+ Backplane Label</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Stand-off (4-40x0.75, M-16.8-HX AL)</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>CEM+ Backplane Short Shroud</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Screw (4-40X14 SCMS Phillips)</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>CEM+ Sensor Rack Retrofit Manual (blue manual)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Backplane Screw (8-32X3/8 PhF-HMS)</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>CEM+ Backplane 1/8 #6 screw spacer</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Wire ties - 4</td>
<td>8</td>
<td>8</td>
<td>10</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Tie-mount (sticker-back)</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Ethernet Termination Kit</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>CAT5E Cable U/UTP 1F4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>CEM+ Beacon (Blue LED) PCB Assy</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Beacon PCB Screw (6-32X3/8 PhF-HMS)</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>CEM+ Door Acrylic</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Terminal Block 8F Plug Screw</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>CEM+ Upgrade 16-Pin Power Cable</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>PCB Upgrade 16-Pin Power</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>CEM+ Lower Ribbon Card Assy</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>CEM+ Upper Ribbon Card Assy</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Sensor+ Door Label</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Heat shrink - 4.5 x 1.5 dia.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Heat shrink - 6 x 3/16 dia.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

---

Unpack and Organize

---

654 of 1217
## Parts/Components

<table>
<thead>
<tr>
<th>ETC Part Number</th>
<th>7100K1001</th>
<th>7100K1002</th>
<th>7100K1003</th>
<th>7100K1004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor+ AF Cards (Optional)</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Terminal Block 8F Plug IDC (Optional)</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>CEM+ 7153A1001</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

### Required Tools

- #1 Phillips screwdriver
- #2 Phillips screwdriver
- 38. Socket
- Diagonal wire cutter
- Permanent marker
- Heat shrink gun
Section 2
The Retrofit

Preparation

Step 1: Use Sensor Configuration Editor and a SLTA to download and save the current sensor configuration out of racks for later reference.

Step 2: Turn off main power to the rack(s).

Step 3: Pull the modules out of the rack. Note and document the module's order/positioning in the rack for proper insertion and configuration later.

Step 4: Use a digital voltmeter and VERIFY that power is off by checking voltages for all combinations between the phase bars, neutral and ground.

Remove the Old

Step 1: Mark the edge connector of each dimmer output ribbon cable (1, 2, 3 & 4) as illustrated below in the hexagons. There may be stickers on the ribbon cables already, however these refer to cable length and not dimmer outputs. They should not be used as a reference to these instructions.

![Image of ribbon cable layout]

**Note:** The order/layout of the dimmer output edge connectors is different on the CEM+ backplane.

Step 2: Document and/or label each wire that is currently landed on the J2 edge connector.

Step 3: Unscrew the dimmer output edge connectors from the backplane metal.

Step 4: Carefully feed the dimmer output ribbon cables through the backplane.

Step 5: Examine each ribbon cable for any nicks or cuts due to backplane scrapes.

Step 6: Unscrew the power edge connector (J1). Remove it from the backplane by sliding it out of the notch in the rack and carefully pushing it through the backplane metal. This connector will be used in the upgrade.

Step 7: Unscrew the backplane metal from the rack. (One screw in each side upper corner - two screws total.) Discard these screws. Replacement screws with thread locker are provided (ETC Part# HW377).
Step 8: Push the backplane towards the back of the rack to free the backplane side tabs.

Step 9: Bend the sides into the center (out of the sides of the rack).

Step 10: Slide backplane metal forward in order to allow easier working space while removing data terminations.

Data and Power Terminations

**Note:** There are two different connectors available for CEM+ data terminations. One is for stranded wire as found in Belden 9729 and contains screw terminals (ETC Part# J3407 included with the kits). The other style is an IDC connector (ETC Part# J3409 - an additional line item) for solid-core wire such as Category 5 cabling.

Step 1: Transfer all wire groups (except those designated as ETCLink) to the new connectors one at a time. Clip tie-wraps as needed to free wires from the old backplane. See Quick Reference Sheet, page 13 for detailed data wiring instructions and pin-outs.

a: In most cases stranded wire has been used for the data terminations. If so, land the DMX wiring on the new connectors in the same manner as they were on the old backplane (physically landed on the same connector and no need to use the DMX Thru connector).

b: If Category 5 type cabling is used, use IDC connectors and land the rack-to-rack jumper connections on the separate DMX Thru connector on the backplane (J15).

**CAUTION:** If using the IDC connector for Cat5 solid-core wiring, you must start with clean wire ends (clip the old punched end). Re-punching the old ends could result with an intermittent or failed connection.

Step 2: If present, cap the ETCLink wiring.

a: Clip the bare ends.

b: Cap the ends of the wires with the provided UL recognized heat shrink and a heatgun.

c: Wire-tie the wires back to the cable.

d: Secure the cabling to the side or back of the rack with tie mounts and wire ties.

**Note:** Complete removal of the ETCLink wiring may not be possible, and isn't necessary if properly capped as described in Step 2.

Step 3: Finish removing the old backplane metalwork. Discard the old backplane.

Step 4: Clip the first wire-tie behind the existing J1 power connector to give the harness more room to move while you work.
Step 5: Install the power adapter harness to edge connector (straight thru PCB) to old power connector (match the wire colors).

Step 6: Secure the power connectors together with provided 4" wire-ties. Clip wire tie ends for neatness.

Step 7: Center the provided 4 1/2 x 1/2 dia. heat shrink tubing over the power harness connectors (leaving at least 1 1/4 past each connector) and heat shrink it with a heat shrink gun.

Step 8: Secure the power harness to the rack:

- SR6, SR12 & SR24 racks
  a: Use a pair of sticky-back tie mounts and wire ties to secure the power harness to the rear or left side of the rack. The new power connector should be facing out of the rack (near where the old harness used to be installed) and the power harness needs to be kept back from the phase bars.

- SR48 racks only.
  a: Remove the screw near the bottom of B phase bar that connects the red sense wire to the phase bar.
  b: Use a 3/8 socket to remove the five bolts holding the B phase bar in place and push the phase bar towards the center of the rack. You only need enough room to mount the power harness. Do not remove the power feeder.
  c: Using a couple sticky-back tie-mounts, mount the power harness to the left side of the rack (see detail below). The new power connector should be facing out of the rack (near where the old harness used to be installed) and the power harness needs to be kept back from the phase bars.
Step 9: Identify the different dimmer output ribbon cable transition cards. An SR6 and SR12 will only have a single "lower" card.

![Diagram showing transition boards](image)

**Note:** There are two different types. An "upper" card and a "lower" card. The PCB card is marked for both the type and which side is up when installed.

Step 10: Mate the transition cards with the ribbon cable edge connectors as indicated below. Secure the ribbon cable connectors to the transition cards with wire ties. The tie wrap binding needs to be on the top for an Upper board and on the bottom for a Lower board for clearance. Clip wire tie ends for neatness.

![Diagram showing tie wrap positions](image)

Step 11: Terminate the Ethernet cable with the provided Ethernet Termination Kit (ETC Part# 4101A2003). Follow the wire preparation and termination instructions included with the kit.
Install the New Backplane

Step 1: Set the DMX termination switches. Termination should be turned on for the last physical rack in the DMX daisy-chain (No DMX wiring goes back out for that port.) The switches and their location are shown here.

Step 2: Bend one arm of the backplane metal in towards the opposite arm (about 30 deg).

Step 3: Insert the backplane metal on an angle. Then straighten it once it is past the face of the rack. Push it into the rack far enough that it stays in place, but leave yourself some room to make the power and data connections.

Step 4: Make the power and data connections on the backplane.
   a: Dimmer output ribbon cables/transition cards. The order/layout is not the same as on the old backplane. See the illustration below. Make sure the proper side is facing up on each connector and that each connector is fully seated.
   b: Power harness (Look at the pin shapes for proper orientation. It will only fit one way.)
   c: DMX connections. (The wires come out the top on both styles of connectors.)
   d: Beacon connector (The wires come out the top.)
   e: Use the 1' Cat5 Ethernet cable to connect the biscuit box to the backplane. (Not shown on the drawing below for clarity.)
      • In an SR6, SR12 and SR24, use the double-stick tape (on the box) to secure the biscuit box to the bottom of the rack behind the backplane.
      • In an SR48, use the double-stick tape (on the box) to secure the biscuit box to the bottom of the backplane.

Step 5: Push the backplane the rest of the way into the rack. Be careful of the power and data connections you just made. Don’t let any of the wiring become stressed or get pinched.
Step 6: Insert tabs in the side of the rack.

Step 7: With the tabs fully inserted in the sides of the rack, pull the backplane towards the front of the rack to line up the screw holes in the upper side corners to line up.

Step 8: Install one screw with a sleeve in each side upper-corner of the backplane.

**Note:** You cannot use the old screws without the additional shoulder-sleeve as they will block the CEM+ from being fully inserted.

**Change out the AF Cards (if present)**

Step 1: Remove the old AF cards (pull the plastic tabs)

Step 2: Address the new AF cards (mini-switches) as shown below.

Step 3: Install the cards in the slots. Make sure they are completely and securely seated. Card #1 at the top, down to 4 at the bottom for SR48. (SR6, SR12 & SR24 have fewer cards. Always start with #1 at the top.)

**Change out the Beacon PCB**

Step 1: Remove the two screws that hold the beacon PCB in the face of the rack.

**Note:** Be sure to use a properly sized screwdriver (#2 Phillips) and a good amount of force as those screws are kept in place with a thread locker. Don’t worry about damaging the existing screws (replacements are provided) or shearing off the heads of the screws (the screw shanks are threaded into the PCB’s standoffs).

Step 2: Pull the PCB down and around the rack case. (The wire harness will only let it go so far.)

Step 3: Note the orientation of the connector, and unplug the wire harness from the old Beacon PCB.

Step 4: Attach the wire harness to the new beacon PCB with the connector in the same orientation.

Step 5: Install the new beacon PCB (ETC Part # 7060B5109) with two screws (ETC Part # HW222) (two new screws of the same type are provided in case the old ones get damaged during the removal process).
**Finishing Touches**

Step 1: Remove the old Sensor beacon acrylic in the door and discard.
Step 2: Install the Sensor+ beacon acrylic in the door.
Step 3: Remove old Sensor label from the front of the door and discard.
Step 4: Clean the door surface to remove any dirt or old adhesive.
Step 5: Apply the new Sensor+ label to the front of the door. Line up the label around the opening for the acrylic in the door and be sure the label is straight. Use a piece of cloth or paper towel to make sure the label is flat & smooth and properly adhered to the rack door.

Repeat the above steps for the remainder of connected racks.

**Verify the Retrofit**

Step 1: Put the dimmer modules back in the rack in the correct/original order.
Step 2: Put the CEM+ in the rack.
Step 3: Power up the rack.
Step 4: Check that the CEM+ powers up and the rack fan turns on. (The only rack errors should be a lack of DMX on the ports if the DMX source is not present.)

**Configure the CEM+**

Step 1: Configuration of the CEM+ is done via the front face panel interface or via a graphical HTML interface called Sensor+ Connect that is resident in the CEM+.
Step 2: Configure the rack to reflect the rack type and dimmer module types installed.
Step 3: Configure the data types that will be used (DMX and EDMX) including the rack patch.
Step 4: For detailed configuration information, please refer to the CEM+ Configuration Manual.
**Section 3 - Quick Reference Sheet**

1. Number the ribbon cables
   - CEM Ribbon Cable Layouts
   - J1
   - J2
   - J3

2. Label the data wiring (use the pin-out from #4)
   - CEM Ribbon Cable Layouts
   - J1
   - J2
   - J3

3. Start to remove the old backplane
   - Remove the backplane screws

4. Transfer wire groups one at a time to the new backplane data connectors.
   - CEM to CEM+
   - Transfer wire groups one at a time to the new backplane data connectors.

---

**Physical Overview**

- DMX Thru for Cat5 with IDC connector
- CEM
- CEM+

---

Clip ends, Heat shrink, and Tie back.
5. Assemble the power harness adapter & heat shrink it.

6. Identify the ribbon cable transition cards for correct use and placement.

7. Mate the transition card(s) with the correct ribbon cable connector. Note the markings for proper orientation to both the ribbon cable and the backplane.

8. Set the DMX termination.

9. Bend & insert the new backplane.

10. Make the power & data connections.

11. Install backplane screws (2).

12. Address AF cards.

13. Install new beacon PCB.


15. Apply new Sensor+ label.
ETC®, Emphasis™, Expression®, Insight™, Imagine™, Focus™, Express™, Unison®, Obsession® II, ETCNet2™, EDMX™, Source Four®, Revolution™, Sensor®, and WYSILink™ are either registered trademarks or trademarks of Electronic Theatre Controls, Inc. in the United States and other countries.

The name WYSIWYG™ is a trademark of CAST Lighting Limited.

Microsoft® and Windows® are registered trademarks of Microsoft Corporation in the United States and other countries.

All other trademarks, both marked and not marked, are the property of their respective owners.
# Table of Contents

## Introduction

- Congratulations... ........................................... 1
- Using this Manual ........................................... 1

## Chapter 1

**Overview** .................................................. 3

- System Components ........................................ 3
- Sensor+ Dimming System Features ........................ 6

## Chapter 2

**Basic Operation** ......................................... 7

- The CEM+ User Interface ................................... 7
- Sensor+ Connect Web Browser Interface ................. 8
- Default Network Settings for Your Computer .......... 9
- CEM+ Basic Operation ...................................... 10
- The Main Menu ............................................. 10
- About ....................................................... 11
- Login ....................................................... 13
- Presets ..................................................... 14
- Panic ....................................................... 16
- Dimmer ...................................................... 17
- Rack (User only - no Guest access) ..................... 20
- Group (User only - no Guest access) .................... 23

## Chapter 3

**Maintenance** .............................................. 25

## Chapter 4

**Service** .................................................... 27

- Contacting ETC about equipment problems .......... 27
- Changing Installation Rack Modules .................... 27
- Dimmer module circuit breakers ......................... 28
- CEM+ Fuses ............................................... 29
- Reset/Test Ground Fault Interrupt (GFI) dimmer modules 29

**Troubleshooting** .......................................... 31

- Make a preliminary examination of your system ..... 31
- If you cannot locate or correct the problem... ....... 31
<table>
<thead>
<tr>
<th>Appendix A</th>
<th>CEM+ Error Messages</th>
<th>33</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix B</td>
<td>Dimmer Curves</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Linear curve</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Modified linear curve</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Square law curve</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Modified Square law curve</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Sensor 2.0 curve</td>
<td>37</td>
</tr>
<tr>
<td>Appendix C</td>
<td>GFI Dimmer Test Sheet</td>
<td>39</td>
</tr>
</tbody>
</table>
Introduction

Congratulations...

on your purchase of the ETC Sensor®+ dimming system. Sensor+ continues ETC's tradition of providing the highest quality products for the entertainment lighting market. If you have questions regarding the operation or installation of your Sensor+ system, please contact ETC Technical Services at the office nearest you.

ETC Americas: Tel: +1 800 688 4116 (toll-free within USA)
Tel: +1 608 831 4116 (from outside USA)
Email: service@etcconnect.com

ETC Asia: Tel: +852 2799 1220
Email: service@etcasia.com

ETC Europe: Tel: +44 (0)20 8896 1000
Email: service@etceurope.com

Using this Manual

This manual contains information on using the basic features of the CEM+ control module, the Sensor+ Connect browser interface, and basic maintenance and service procedures for your Sensor+ rack(s).

The following symbols are used in this manual to alert you to danger or important information.

Note: Provides important information about your installation.

CAUTION: Alerts you to important information relating to equipment performance or reliability.

WARNING: RISK OF ELECTRIC SHOCK! Warns you when electricity may cause injury.

WARNING: Warns you when there is the possibility of other types of injury.
Chapter 1
Overview

A Sensor+ dimming system controls lighting using EDMX™ control levels from a lighting control system on the ETCNet2™ network and/or DMX512 control levels from a lighting control system on the DMX network. The CEM+ can accept levels from EDMX and up to two DMX inputs. The configuration of your dimming system determines which input or combination of inputs will generate the output levels of your dimmers.

System Components

The Sensor+ system consists of Sensor+ installation racks, CEM+ control modules and various power control modules, generally referred to as “dimmers”, however a module may contain only a circuit breaker or a relay, or may contain no electronics at all.

Installation Racks

An installation rack, or “dimmer rack”, contains the dimmer modules and the CEM+ control module and all their associated electrical connections. The rack enclosure protects the dimming components with a key-locking door that contains an air filter. Cool air is pulled through the vents in the door, through the filter and over the dimmers. The hot air is expelled at the top of the rack.

**CAUTION:** To ensure proper cooling of the rack, the door should not be left open and nothing should be placed on top of the rack during rack operation. Running your Sensor+ system with the door open exposes components to tampering and will allow dust contamination to accumulate, causing the system to overheat and shut down.

There are four models of Sensor+ installation racks:

- **SR6+**: This rack contains six positions for dimmer modules and a CEM+ control module. Using dual dimmer modules gives this rack a maximum of 12 dimmable circuits.
- **SR12+**: This rack contains 12 positions for dimmer modules and a CEM+ control module. Using dual dimmer modules gives this rack a maximum of 24 dimmable circuits.
- **SR24+**: This rack contains 24 positions for dimmer modules and a CEM+ control module. Using dual dimmer modules gives this rack a maximum of 48 dimmable circuits.
- **SR48+**: This rack contains 48 positions for dimmer modules and a CEM+ control module. Using dual dimmer modules gives this rack a maximum of 96 dimmable circuits.

CEM+ Control Module

The CEM+ control module is required for Sensor+ dimming systems - the system will not function without a properly configured CEM+. This module contains the rack “brain” and it processes incoming control signals and transmits that information to the individual dimmers. It also monitors the system status and reports any errors. The CEM+ module can be used to configure the system. Configuration and error data can be accessed either locally at the CEM+ keypad, or by using the Sensor+ Connect web browser interface.

A configuration can support up to 16 CEM+ modules (or racks) in a Group. The Group configuration is stored in all CEM+ modules in that group. A single ETCNet2 network may
contain up to 64 Groups (1024 racks total).
The CEM+ has an Ethernet data input for incoming EDMX data and two DMX512 input
ports (Port A and Port B). DMX Port B can be used as a DMX output port for one universe
of DMX on the last logical rack in the Group. Data management is determined in the Group
configuration.
The location of the CEM+ module is determined by the rack type:
• SR6+, SR12+ and SR24+: The CEM+ module is located at the bottom of the rack.
• SR48+: The CEM+ module is located in the middle of the rack, 24 positions from the
top.

WARNING: RISK OF ELECTRIC SHOCK! Do not apply power to a Sensor+ dimming system
without a properly installed CEM+ module. A missing CEM+ exposes dangerous
voltages and makes the system inoperable.

Sensor Dimmer Modules
Sensor dimmer modules are installed in module positions in the installation racks. Each
dimmer module may contain one or two dimmers (single or dual density) depending on the
dimmer’s current rating and rise time. All dimmer modules are protected by circuit breakers.

<table>
<thead>
<tr>
<th>120V Sensor Modules</th>
<th>Max BTUs</th>
<th>Max BTUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFM Air Flow Module</td>
<td>0 D20AFJ</td>
<td>Dual 20A Dimmer Module - 500µS - Advanced Features - GFI - Japan 810</td>
</tr>
<tr>
<td>BC15 Dual 15A Branch Circuit Breaker Module</td>
<td>&lt;10 D20AFN</td>
<td>Dual 20A Dimmer Module - 500µS - Neutral Connect 810</td>
</tr>
<tr>
<td>BC20 Dual 15A Branch Circuit Breaker Module</td>
<td>&lt;10 D20DHR</td>
<td>Dual 20A Dimmer Module - 800µS - Advanced Features 688</td>
</tr>
<tr>
<td>CC15 Dual 15A Constant Circuit Breaker Module</td>
<td>&lt;10 D20E</td>
<td>Dual 20A Dimmer Module - 500µS 810</td>
</tr>
<tr>
<td>CC20 Dual 20A Constant Circuit Breaker Module</td>
<td>&lt;10 D20F</td>
<td>Single 20A Fluorescent Dimmer Module &lt;10</td>
</tr>
<tr>
<td>CC50 Single 50A Constant Circuit Breaker Module</td>
<td>&lt;10 D20HR</td>
<td>Single 20A Dimmer Module - 800µS - Advanced Features 883</td>
</tr>
<tr>
<td>CC100 Half* 100A Constant Circuit Breaker Module</td>
<td>&lt;10 D25AFD</td>
<td>Dual 25A Delta Dimmer Module - 400µS - Advanced Features</td>
</tr>
<tr>
<td>D15 Dual 15A Dimmer Module - 350µS</td>
<td>380 D25D</td>
<td>Dual 25A Delta Dimmer Module - 400µS - Advanced Features</td>
</tr>
<tr>
<td>D15AF Dual 15A Dimmer Module - 500µS - Advanced Features</td>
<td>474 D50AF</td>
<td>Single 50A Dimmer Module - 500µS - Advanced Features 808</td>
</tr>
<tr>
<td>D15AFG Dual 15A Dimmer Module - 500µS - Advanced Features - GFI</td>
<td>474 D50AFD</td>
<td>Single 50A Delta Dimmer Module - 500µS</td>
</tr>
<tr>
<td>D15AFN Dual 15A Dimmer Module - 500µS - Neutral Connect</td>
<td>474 D50HR</td>
<td>Half* 50A Dimmer Module - 800µS - Advanced Features 1853</td>
</tr>
<tr>
<td>D15E Dual 15A Dimmer Module - 500µS</td>
<td>474 D100AF</td>
<td>Half* 100A Dimmer Module - 500µS - Advanced Features 1521</td>
</tr>
<tr>
<td>D15F Single 15A Fluorescent Dimmer Module</td>
<td>&lt;10 L10</td>
<td>Dual 10A Low Wattage Dimmer Module &lt;10</td>
</tr>
</tbody>
</table>
### 120V Sensor Modules (Continued)

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Description</th>
<th>Max BTUs</th>
<th>Max BTUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>D15HR</td>
<td>Custom Module - Please Call</td>
<td>L10F</td>
<td>Single 10A Low Wattage Fluorescent Dimmer Module</td>
</tr>
<tr>
<td>D20</td>
<td>Dual 20A Dimmer Module - 350µS - Advanced Features</td>
<td>522</td>
<td>R15AF Dual 15A Relay Module - Advanced Features</td>
</tr>
<tr>
<td>D20AF</td>
<td>Dual 20A Dimmer Module - 500µS - Advanced Features</td>
<td>810</td>
<td>R20AF Dual 20A Relay Module - Advanced Features</td>
</tr>
<tr>
<td>D20AFG</td>
<td>Dual 20A Dimmer Module - 500µS - Advanced Features - GFI</td>
<td>810</td>
<td>R20AFJ Dual 20A Relay Module - Advanced Features - Japan</td>
</tr>
</tbody>
</table>

### 230/240V Sensor Modules

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Description</th>
<th>Max BTUs</th>
<th>Max BTUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFM</td>
<td>Air Flow Module</td>
<td>ER15</td>
<td>Dual 15A Relay Module - Advanced Features</td>
</tr>
<tr>
<td>D25AFD</td>
<td>Dual 25A Delta Dimmer Module - 400µS - Advanced Features</td>
<td>ER15AF</td>
<td>Dual 15A Relay Module - Advanced Features</td>
</tr>
<tr>
<td>D25D</td>
<td>Dual 25A Delta Dimmer Module - 400µS</td>
<td>ER25</td>
<td>Dual 25A Relay Module - Advanced Features</td>
</tr>
<tr>
<td>D50AFD</td>
<td>Single 50A Delta Dimmer Module - 500µS</td>
<td>ER25AF</td>
<td>Dual 25A Relay Module - Advanced Features</td>
</tr>
<tr>
<td>ED15</td>
<td>Dual 3kW Dimmer Module - 225µS</td>
<td>474</td>
<td>HD15 Dual 3kW Dimmer Module - 240V</td>
</tr>
<tr>
<td>ED15AF</td>
<td>Dual 3kW Dimmer Module - 400µS - Advanced Features</td>
<td>474</td>
<td>HD15AF Dual 3kW Dimmer Module - 240V - Advanced Features</td>
</tr>
<tr>
<td>ED15N</td>
<td>Dual 3kW Dimmer Module - 225µS - Neutral Disconnect</td>
<td>474</td>
<td>HD25 Dual 3kW Dimmer Module - 240V</td>
</tr>
<tr>
<td>ED25</td>
<td>Dual 5kW Dimmer Module - 250µS</td>
<td>810</td>
<td>HD25AF Dual 5kW Dimmer Module - 240V - Advanced Features</td>
</tr>
<tr>
<td>ED25AF</td>
<td>Dual 5kW Dimmer Module - 500µS - Advanced Features</td>
<td>810</td>
<td>HD25F Single 25A Fluorescent Dimmer Module - 240V</td>
</tr>
<tr>
<td>ED25N</td>
<td>Dual 5kW Dimmer Module - 350µS - Neutral Disconnect</td>
<td>810</td>
<td>HD50AF Single 10kW Dimmer Module - 240V</td>
</tr>
<tr>
<td>ED50AF</td>
<td>Single 10kW Dimmer Module - 500µS - Advanced Features</td>
<td>R15AF</td>
<td>Dual 15A Relay Module - Advanced Features</td>
</tr>
<tr>
<td>EL5N</td>
<td>Dual 5A Low Wattage Dimmer Module</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Half density modules occupy two module positions.

---

**CAUTION:** Dimmer modules should only be removed by qualified personnel and must be replaced by modules of the same type, or by air flow modules, before restoring system power.

---

**WARNING:** RISK OF ELECTRIC SHOCK! Do not operate Sensor+ dimming systems with empty module positions. Open positions expose dangerous voltages and interfere with rack ventilation, causing the rack to overheat and shut down.
Sensor+ Dimming System Features

Play back Presets from the CEM+

The CEM+ module provides 128 Presets that can be recorded from EDMX, DMX, or directly set levels. You can name, set fade times and playback priority for each Preset. You can assign Presets to any of four Rooms in the configuration. You can also have the Group play back a Preset in case of data loss.

Sensor+ Connect and WYSILink for Feedback

Sensor+ Connect duplicates the functions of the CEM+ module on a PC or Emphasis Server on the ETCNet2 network. The Web browser interface allows you to monitor rack activity, reconfigure dimmer curves, record and activate presets, load and backup configurations, and many other features.

Access to the CEM+ and Sensor+ Connect configuration features is protected by specific user levels and passwords to limit system-altering features to selected personnel, while allowing basic operational functions to a wider range of users.

WYSILink functions are also available on Link-enabled Emphasis Servers and WYSIWYG PCs. Presets can be recorded and activated from within the Link mode. In systems with Advanced Features racks, detailed information is displayed in the About Dimmer and About Rack displays, and you can perform load recording functions right from the Emphasis Server or PC.

Note: Sensor+ Connect and Message logging are available on Emphasis Servers as a base functionality.

Advanced Features

Sensor+ Advanced Features (AF) racks provide additional reporting features that help you to quickly learn the status of your dimming system and diagnose problems. AF dimmer modules indicate the presence of data and the relative output of power with LED indicators on the modules themselves. Much more information can be displayed on the CEM+ modules integral LCD display, or on a PC on the network running Sensor+ Connect in a Web browser or WYSIWYG with the WYSILink upgrade.

Advanced Features include the ability to record and monitor individual dimmer loads. Constant comparison of actual dimmer loads against the recorded value lets the system signal you when a load value changes. The change usually indicates a lamp has burned out or failed, allowing you to make an immediate replacement.

Dimmer Doubling (60Hz systems only)

ETC’s Dimmer Doubler™ technology allows you to double the number of controllable circuits in your system without adding dimmer modules or running additional cable. The key to this system is the Dimmer Doubler two-fer.

The Dimmer Doubler two-fer is installed between a Sensor dimmer module and two ETC Source Four 77 volt fixtures. It splits the output of a single dimmer into two, separately-controlled outputs. You can then use an ETC control console to independently control the output of the two fixtures.

Note: For more information on using Dimmer Doubler two-fers, see the Dimmer Doubler User Manual. For more information configuring your system for use with Dimmer Doubler two-fers, see the CEM+ Configuration Manual.
Chapter 2
Basic Operation

This manual covers functions of the CEM+ and Sensor+ Connect that are available to the Guest and User login levels. Power User functions are described in the CEM+ Configuration Manual.

The CEM+ User Interface

You can access all the menus described in this chapter using the buttons on the face of the CEM+ module. Menus and messages are displayed on the integral 2x20 LCD display.

Basic use of the CEM+ user interface:

• Use \( \rightarrow \) to return to the main menu at any time.
• Use \( \uparrow \) and \( \downarrow \) to scroll through menus and through digits and letters in screens requiring user input.
• Use \( \checkmark \) to accept settings and to view the error list.
• Use \( \leftarrow \) to step back through menus.
• Use \( \leftarrow \) to access the Set Levels menu.
• Use \( \Rightarrow \) to reset the CEM+.
Sensor+ Connect Web Browser Interface

The Sensor+ Connect Web browser interface can be used instead of the direct buttons on the CEM+ module itself. You can use an Ethernet-capable PC connected to the ETCNet2 network and running Windows 2000 or XP and Internet Explorer 6 or later to browse into any of the Sensor+ racks on the network. If you are using an Emphasis Control System running version 1.8.0 software or better, there is a command in the WYSILink menu that automatically opens a browser window and connects to Sensor+ racks.

![Sensor+ Connect Web browser interface](image)

**Figure 2: The Sensor+ Connect Web browser interface**

**Note:** The Emphasis Server network settings are the default ETC values and ready for immediate use. No configuration is required.

You must set an IP address for any personal computer you plan to use on an ETCNet2 network. ETC recommends that the personal computer used on an ETCNet2 network is dedicated to that network so changes to network settings are kept to a minimum.

**Note:** If the computer you wish to use is currently being used on a non-ETCNet2 network please consult your Network Administrator before changing the IP address, Subnet Mask or Gateway IP addresses.
Default Network Settings for Your Computer

Prior to changing any Network settings on your personal computer please record the current settings in the following spaces below.

| IP Address | ______:_____:_____:____: |
| Subnet Mask | _____:_____:_____:____: |
| Gateway IP | ______:_____:_____:____: |

To use your personal computer on an ETCNet2 network that does not use a network router (i.e. hub and/or switch only), ETC recommends the following default settings:

| IP Address | 10.101.1.101 |
| Subnet Mask | 255.255.0.0 |
| Gateway IP | 10.101.1.101 |

Note: If you have a network that does include a network router, you must set the Gateway IP address to the appropriate port on the router.

Each additional computer on an ETCNet2 network must have it’s own IP address which must be different from any other computer on the same ETCNet2 network. Select from the following default range of IP addresses for an additional personal computer on the network:

| 10.101.1.101 | 10.101.1.113 |
| 10.101.1.102 | 10.101.1.114 |
| 10.101.1.103 | 10.101.1.115 |
| 10.101.1.104 | 10.101.1.116 |
| 10.101.1.105 | 10.101.1.117 |
| 10.101.1.106 | 10.101.1.118 |
| 10.101.1.107 | 10.101.1.119 |
| 10.101.1.108 | 10.101.1.120 |
| 10.101.1.109 | 10.101.1.121 |
| 10.101.1.110 | 10.101.1.122 |
| 10.101.1.111 | 10.101.1.123 |
| 10.101.1.112 | 10.101.1.124 |

Browse into a CEM+ from Internet Explorer 6:

Step 1: Open Internet Explorer 6.
Step 2: Type “http://10.101.101.101” into the address box and press RETURN. Sensor+ Connect will open in the browser window if the CEM+ at the entered address is online.

Note: 10.101.101.101 is the default address for a CEM+ in the first rack of the first group. Your system may use a different addressing scheme. If that is the case, simply enter the IP address of one of the racks in the group you want to browse.
CEM+ Basic Operation

The procedures covered in this section are available to users logged in as Guest, which requires no password or PIN, and User, which does require a password or PIN. Functions available to the Power User are described in the CEM+ Configuration Manual.

The Main Menu

The main menu is accessed using the and buttons on the CEM+ face panel. Each of the main menu items is described in the following pages. Each main menu item contains a number of sub-menus, each of which is illustrated in each section. To return to the CEM+ resting display (the display at the top of the diagram to the right), press .

Figure 3: The main menu
About

The About menu provides status information about the dimmers, racks, network and Group. Everything in the About menu is accessible by all users. No settings can be changed within the About menu, data can only be viewed.

Dimmer

About Dimmer provides information about a selected dimmer, including recorded and actual loads, the dimmer type, curve and maximum voltage. You can also view the current output level, the source of that level, and the dimmer's location.
Rack General
The Rack General menu provides the current ambient temperature and air flow status of the selected rack. It also displays the rack type, the air filter cleaning reminder setting, and the number of hours until the air filter cleaning reminder is due.

Rooms & Presets
About Rooms & Presets provides information on the room and preset settings for the rack you are currently browsing.

Network
About Network provides the network settings for the currently selected rack. You can view the settings for any rack in the Group.

Rack Data
About Rack Data provides status information for the DMX and EDMX inputs for any rack in the Group.

Rack Power
About Rack Power provides status information for the line feed power and the voltage headroom settings for any rack in the Group.

Identify Rack
Identify Rack flashes the beacon on the selected rack to identify it in the dimmer room.

Group
About Group provides the software version currently installed in the racks, the status of the Panic state and the name of the Group.

Rack Address
About Rack Address provides the DMX A and B starting addresses for each rack in the Group.
Login

The Login menu is where you enter the PIN number for the user level you want to access. **Guests** need no PIN to view the menu items accessible to them. **Users** will need to enter a four-digit PIN to gain access to features that are restricted. Use Left and Right to scroll the digits and use Enter to enter the set digit.

Figure 5: The Login menu
**Presets**

The Presets menus are used to activate and deactivate Presets at the rack. If you are logged in at the User level, you can also record and modify Presets from the CEM+.

There are four available Rooms and 128 available Presets in a single Group. A Room is a way of grouping dimmers - such as “Lobby” or “Auditorium”. An individual Preset can only control dimmers assigned to the same Room. For example, a Preset with dimmers assigned to the Room named “Lobby” cannot also control dimmers in the Room “Auditorium”.

Presets can also be assigned Priority. Priority is a function of ETCNet2 that defines how various sources of control interact with dimmers. The default priority for controllers on the network is 10. When controllers share the same priority level, a single dimmer assigned to those controllers will output the highest level it receives. If the controllers are at different priorities, the highest-priority controller (lowest priority number - a priority of 1 wins versus a priority 10) will win and the dimmer will output the level sent by that controller.

![Figure 6: The Presets menu](image)
Activate Preset
The Activate Preset menu allows you to activate a selected preset.

Deactivate Presets
The Deactivate Preset menu allows you to deactivate a selected preset.

Clear Presets (User only)
The Clear Presets menu allows a User to delete a selected preset.

Record Presets (User only)
The Record Presets menu allows a User to assign a preset number, and set the source for levels, the fade time and playback priority and the room. If the preset number is already recorded, you can record over it with the new settings, or if the preset is empty, you can record these settings to that selected number.

Set Fade Time (User only)
The Set Fade Time menu allows a User to update the fade time for a recorded preset.

Set Priority (User only)
The Set Priority menu allows a User to update the priority for a recorded preset.

Set Preset Name (User only)
The Set Preset Name menu allows a User to update the name of a recorded preset. Names are alphanumeric and can be up to 20 characters long (not all 20 characters will be visible on the LCD).

Set Room Name (User only)
The Set Room Name menu allows a User to set the name of a room.

Max Active Presets (User only)
The Max Active Presets menu allows a User to set the maximum number of active presets for a selected room.
Panic

The Panic menu allows a Guest to activate and deactivate the Panic look and allows a User to record and clear the Panic look.

Activate Panic

The Activate Panic menu toggles between “Activate” and “Deactivate”, depending on the status of the Panic look.

Record Panic (User only)

The Record Panic menu allows a User to record dimmers that currently have an output level at the Master Level, or greater, to the Panic look. You can set the Master Level to anything between 80% and 100%. When the Panic look is activated, the assigned dimmers will all output at the Master Level. You can also choose to set all other dimmers to turn off when panic is activated.

Clear Panic (User only)

The Clear Panic menu allows a User to clear the current Panic settings.
The Dimmer menu allows **Guest** access to setting and releasing dimmer levels, and allows **User** access to module setup items such as setting the module type, curve, name, firing mode and properties. The Dimmer menu also allows a **User** to perform a dimmer check.

![Diagram of the Dimmer menu](image-url)

**Figure 8: The Dimmer menu**
Set Levels
The Set Levels menu allows you to set a dimmer or a range of dimmers to a specified level at the CEM+. Levels set here take priority over any other level inputs, such as control consoles and architectural control systems. Levels set here do not take priority over levels generated by an active Panic look.
The button on the CEM+ face panel accesses this menu directly.

Release Levels
The Release Levels menu allows you to release the level of a dimmer or a range of dimmers. Once released, those dimmers are available to other control inputs.

Set Module Type (User only)
The Set Module Type menu allows a User to set a dimmer or range of dimmers to a specific module type and firing mode. If the module is set to “Fluorescent”, you also set the threshold in this menu. Threshold is the control level that must be present for the fluorescent dimmer to output voltage based on the selected curve.

Set Curve (User only)
The Set Curve menu allows a User to set a dimmer or a range of dimmers to a specific curve. A dimmer curve is a mathematical function that maps control levels to RMS output voltage. Curves are scaled from the minimum voltage to the maximum voltage (settings that are not available to the User login). The CEM+ supports the following curves: Square, Mod Square, Linear, Mod Linear, Sensor 2.0. See Dimmer Curves, page 35, for more information.

Set Dimmer Name (User only)
The Set Name menu allows a User to name a dimmer. Names are alphanumeric and can be up to 20 characters long (not all 20 characters will be visible on the LCD).

Set Firing Mode (User only)
The Set Firing Mode menu allows a User to set a dimmer or a range of dimmers to a specific firing mode. Available modes include Normal, Off, Switched, Fluorescent and DD (Dimmer Doubled).
- Off: turns the dimmer off.
- Normal: operates as a standard incandescent dimmer.
- Switched: dimmers output unregulated AC voltage when the control level is above the threshold level.
- DD (Dimmer Doubled): dimmer operates as two controllable circuits. See Dimmer Doubling (60Hz systems only), page 6.

Note: Changing the dimmer firing mode will cause a change to default settings for curve, minimum voltage, maximum voltage, threshold and regulation. Whenever a dimmer mode is set the defaults for that mode will be applied to the other dimmer properties.

Set Properties (User only)
The Set Properties menu allows a User to set Voltage Regulation, Dynamic Preheat, DC Output Prevent and Inrush Settings for a dimmer or range of dimmers.
- Voltage Regulation: when enabled, the dimmer will regulate to the desired output voltage. When disabled, the dimmer will be set to a constant firing time based on the control level. This setting defaults “on”. The ability to disable regulation is sometimes
useful when dimming non-tungsten loads.

- Dynamic Preheat: this setting allows quick blackouts on dimmers that are set to preheat. Preheat settings are not available to the **User** level login.
- DC Output Prevent: this setting offers protection on selected dimmers for loads that are sensitive to DC buildup, which can occur under certain conditions when positive and negative half-cycles become uneven.
- Inrush Protection: this setting protects against large voltage increases in a single AC cycle. This protection is useful for high-wattage loads that may cause nuisance tripping of circuit breakers and to limit peak currents in wiring and switchgear. This protection is particularly useful on RCD/GFCI protected circuits. Settings for inrush protection include: Instant, 100mS (for loads up to 10A), 300mS (for loads up to 25A) and 500mS (for loads of 50 or 100A).

**Dimmer Check (User only)**

The Dimmer Check menu allows a **User** to set an output level and then step through dimmers at a selected starting point.
Rack (User only - no Guest access)

The Rack menu includes menus for setting the rack name and patch settings. The Rack menu is available only to those logged in at the User level.

**Set Rack Name**

The Set Rack Name menu allows a User to set the name of the rack you are currently browsing. Names are alphanumeric and can be up to 20 characters long (not all 20 characters will be visible on the LCD).

**Set Patch Mode**

The Set Patch Mode menu allows a User to set the patch mode for a selected rack. The patch mode can be set to “Standard” or “Advanced”.

**Set Patch**

The Set Patch menu allows a User to enable and disable DMX and EDMX inputs, set their priority and create the patch for those input ports. The choices that appear are dependent on the patch mode set in the previous menu.

In Standard patching, you set the first dimmer number to be addressed by a selected DMX or EDMX address and the length of the DMX or EDMX stream to be used for that port - for example: setting the first dimmer to 1 and the DMX Start to 101 and the DMX Length to 24 will cause dimmer #1 to respond to input levels on DMX channel 101, dimmer #2 to respond to DMX 102, and so on until dimmer #24.

In Advanced patching, you set a discrete DMX or EDMX address for each dimmer number.

**Data Loss Behavior (User only)**

Data Loss Behavior can be set independently for each input port (DMX A, DMX B and EDMX) in each rack in the Group. Data loss behavior options are: Hold Last Look, Wait & Fade Out and Generate Event. When data is restored, the source look will fade in at a 2-second rate.

- **Hold Last Look**: the CEM+ will hold any active dimmers at whatever levels they were receiving when the data was lost. The dimmers will remain on until data is restored or the CEM+ is reset.
- **Wait & Fade**: the CEM+ will hold any active dimmers at whatever levels they were receiving when the data was lost for a user-defined amount of time and then fade those dimmers to zero (or to the levels generated by the next highest priority source) in a user-defined fade time. The maximum wait and fade time is 60:59 minutes.
- **Crossfade To**: this setting will play back Preset 128 when data is lost. The default fade time for Preset 128 is 2 seconds. If this time is changed, both sides of the crossfade (the fade into Preset 128 and the fade back into restored data) will use the new time.

**Set Network (User only)**

Set Network allows a User to enable or disable the network, enable or disable BootP (defaults to disabled) and set the network addressing for a selected rack.

**Set First Dimmer (User only)**

Set First Dimmer allows a User to set the first dimmer number in a selected rack. For example, in a two SR48 rack Group, Rack 1 can be set with a First Dimmer of 1, and Rack 2 can be set with a First Dimmer of 97.

**Set Temp Alarm (User only)**

The Temp Alarm is used to generate a warning when the ambient temperature monitored by the rack exceeds a user-defined level. Use the Set Temp Alarm menu to set that level for the selected rack.
Figure 9: The Rack menu
Set Phase Balance (User only)

The Set Phase Balance menu allows a User to set the type of phasing used by the selected rack and the voltage of the line feed power. Available settings include: Balanced-3Phase, Balanced-1Phase, Straight-3Phase and Straight-1Phase.

- Balanced-3Phase: rack is fed 3-Phase power and dimmer numbers are distributed numerically by phase, rather than by rack position. Example: dimmers 1 and 2 are in the top slot of a rack; dimmers 3 and 4 are located first on the second phase, 1/3 of the way down the rack; dimmers 5 and 6 are located first on the third phase, 2/3 of the way down the rack.

- Balanced-1Phase: rack is fed 1-Phase power and dimmer numbers are distributed numerically by bus bar, rather than by rack position. Example: dimmers 1 and 2 are in the top slot of a rack; dimmers 3 and 4 are located first on the second bus bar, 1/2 of the way down the rack.

- Straight-3Phase: rack is fed 3-Phase power and dimmer numbers are distributed numerically from top to bottom in the rack. Example: dimmers 1 and 2 are in the top slot of a rack, dimmers 3 and 4 are located in the next slot, etc.

- Straight1-Phase: rack is fed 1-Phase power and dimmer numbers are distributed numerically from top to bottom in the rack. Example: dimmers 1 and 2 are in the top slot of a rack, dimmers 3 and 4 are located in the next slot, etc.

Air Filter Timer (User only)

The Air Filter Timer menu allows a User to set the amount of time between air filter cleaning reminders for a selected rack. This timer counts down only when the fan is running in the rack.

Configure Fan (User only)

The Configure Fan menu allows a User to configure the behavior of the fan in the selected rack. Available settings include: No Data/15 Min and Always On. No Data/15 Min will allow the fan to shut off if there have been no dimmer levels sent to that rack in 15 minutes. When levels are sent to dimmers in the rack, the fan will start up automatically. The fan will always run for 15 minutes following a reset of the CEM+.
**Group (User only - no Guest access)**

The Group menu includes menus for recording loads, naming the group, setting the preferred units for temperature reporting, and language and login settings. The Group menu is available only to those logged in at the **User** level.

**Record Loads (User only)**

The Record Loads menu is used to record the loads on each dimmer. This is useful in Advanced Features systems where load reporting is desired.

**Name Group (User only)**

The Name Group menu allows a **User** to set the name of the Group. Names are alphanumeric and can be up to 20 characters long (not all 20 characters will be visible on the LCD).

**Set Language (User only)**

The Set Language menu allows a **User** to set the language of the user interface.

**Ambient Temp Type (User only)**

The Ambient Temp Type menu allows a **User** to set temperature reporting as either Fahrenheit or Celsius.

**Set Login Timeout (User only)**

The Set Login Timeout menu allows a **User** to set the time after which the CEM+ will automatically log the current user out and return to the default access level as set in the Group configuration. The timeout is based upon inactivity at the keypad.

**Set PIN (User only)**

The Set PIN menu allows a **User** to set the PIN for **User** level login. **Guests** require no PIN for access.
Chapter 3
Maintenance

The air filter in the door of your dimmer rack traps dust and dirt that would otherwise clog the air vents of your dimmer and CEM+ modules. This filter should be inspected regularly (every six months) and cleaned as needed. Also, the front faces of the dimmer and CEM+ modules can be vacuumed if your dimmer rack is being used in a highly dusty area.

Clean dimmer rack air filter:
Step 1: Open the dimmer rack door. The air filter is mounted on the inside of the door, held in on the bottom by a metal lip.
Step 2: Slide the filter up about 1 cm (1/2 inch) until the filter base clears the top edge of the lip. Pull the base out far enough to clear the retaining lip and slide the filter down and out of the door.

Step 3: Vacuum or blow dust out of the filter AWAY FROM THE DIMMER RACK.

Note: You can wash the filter under clear tap water, but it must be completely dry before you reinstall it. Do not use soap or other chemicals to clean the filter.

Step 4: Slide the top of the filter back up into the slot at the top of the door until the base clears the metal retaining lip on the bottom of the door.
Step 5: Let the filter drop back into place.
Step 6: Reset the Air Filter Timer in the Rack menu. This action requires a User password. To keep the same Air Filter Timer interval, simply press \( \odot \).
Step 7: Close the rack door.

Vacuum dust from dimmer modules:

**WARNING:** RISK OF ELECTRIC SHOCK! To avoid the possibility of electrical shock, turn off power at the main breaker before touching the rack with the vacuum nozzle.

Phase voltages inside the rack can be deadly. Do not remove rack modules when vacuuming dimmer racks. Only qualified technicians should expose the inside of the dimmer rack.

Step 1: Open the door and look at the dimmer module air vents, SCR power cube air inlets and the CEM+ air vent.

**Note:** Leave the modules inside the rack. Most dust collects on the dimmer module air vents and SCR power cube air inlets of the dimmer modules.

![Diagram of Dimmer Module Air Vents, SCR Power Cube Air Inlets, and CEM+ Air Vent]

**Figure 12: Vacuuming CEM+ rack modules**

Step 2: If a dust buildup is visible, vacuum the front of the modules. Use a narrow vacuum cleaner nozzle to vacuum dimmer module air vents, the SCR power cube air inlets and the CEM+ air vent. Do not push debris into the modules.
Step 3: Close the rack door.
Chapter 4
Service

Contacting ETC about equipment problems
If possible, please have this information available before contacting ETC about an equipment problem:

- Your location and job name
- Any error messages on the CEM+ status LCD display
- Related system problems or equipment failures

ETC Americas:
- Tel: +1 800 688 4116 (toll-free within USA)
- Tel: +1 608 831 4116 (from outside USA)
- Email: service@etcconnect.com

ETC Asia:
- Tel: +852 2799 1220
- Email: service@etcasia.com

ETC Europe:
- Tel: +44 (0)20 8896 1000
- Email: service@etceurope.com

Note: For the best service results, always tell your service representative you are using the CEM+ version of Sensor dimming system.

WARNING: RISK OF ELECTRIC SHOCK! Servicing Sensor CEM+ dimming equipment exposes high amperage power connections inside the rack. If possible, always turn off power at the main circuit breaker before servicing your system.

Changing Installation Rack Modules
All Sensor+ rack dimmer modules can be easily replaced without tools. Modules slide in and out of their slots and are ready to start dimming immediately.

Although Sensor modules, including the CEM+, can be replaced with power on, always turn rack power off at the main circuit breaker, if possible, before changing modules.

CAUTION: Operating a dimmer rack with open module slots disrupts airflow inside the rack, which can lead to rack overheating and subsequent rack shutdown.

Remove and replace a dimmer or airflow module:
Step 1: Turn off rack power at the main breaker, if possible.
Step 2: Open the rack door.
Step 3: Switch the dimmer module’s circuit breaker(s) to the “off” position.
Step 4: Grasp the dimmer module by the center of the main air vent.
Step 5: Pull the dimmer straight out.
Step 6: Ensure the circuit breaker(s) on the replacement module are in the “off” position.
Step 7: Insert the replacement dimmer or airflow module into the correct slot and firmly press the module into the slot until you feel the connections seat (the module face will be flush with the other modules).

Step 8: Switch the module’s circuit breaker(s) to the “on” position.

Step 9: Close and lock the Sensor rack door before applying power.

Remove and replace a CEM+ module:

Step 1: Turn off rack power at the main breaker.

Step 2: Open the rack door.

Step 3: Press the “eject” symbol on the right end of the spring-loaded handle and grab the other end of the handle, pulling it until it is perpendicular to the face of the CEM+. The CEM+ will be gently pushed out of the rack as you move the handle.

Step 4: Pull the CEM+ straight out.

Step 5: Firmly press the new CEM+ module into the correct slot until you feel the connections seat (the module face will be flush with the other modules).

Step 6: Close and lock the Sensor rack door before applying power.

Step 7: ONLY if directed to do so by an ETC-authorized service representative, transfer configuration and Backup look information to your new CEM+.

Dimmer module circuit breakers

Each dimmer is protected by a built-in circuit breaker on the left side of the module. Circuit breakers are turned on and off (or reset) using the switch handles on the left side of the dimmer modules. Dual-density dimmer modules have two circuit breaker switches.

Operate module circuit breakers:

Step 1: Open the dimmer rack door.

Step 2: Locate the dimmer module you want to control or reset. Handles on tripped circuit breakers will be to the right.

Step 3: Put the circuit breaker switch in the desired on or off position.

- Push the handle left to turn the dimmer on or reset a tripped breaker.
- Push the handle right to turn the dimmer off.
CEM+ Fuses

The CEM+ has two fuses:

- The F1 fuse is a 250V, 0.75 amp, fuse. CEM+ operating power and power for the dimmer module electronics, is drawn through this fuse. If F1 fails, the CEM+ will not operate and dimming will not work. The Sensor+ rack beacon will be dark. The fuse in the F2 position is a spare 0.75 amp fuse.

- Phase F3 fuse is a 250V, 5 amp fuse. Power for the rack's fan is drawn through this fuse. If F3 fails, the fan will stop running and the CEM+ will display an air flow error. The Sensor+ rack beacon will flash to signal a problem. The rack may shut down due to overheating. The fuse in the F4 position is a spare 5 amp fuse.

Replacing a fuse:

Step 1: Remove the CEM+ module (See Changing Installation Rack Modules, page 27).

Step 2: Locate and replace the defective fuse. Fuses are held in vertical fuse holders.

a: Use a flat-blade screwdriver to gently turn the cap of the fuse holder to the left until it comes free.

b: Lift the cap and the fuse straight out of the fuse holder.

c: Remove the defective fuse and replace it with a fuse of the same type. A spare fuse of each type is provided on the CEM+.

d: Replace the fuse and cap in the fuse holder and use a flat-blade screwdriver to gently turn the cap to the right to fully capture the fuse.

Step 3: Replace the CEM+ module and close the door.

Reset/Test Ground Fault Interrupt (GFI) dimmer modules

GFI modules have circuitry that compares the current between the phase and neutral wires on the dimmer circuit. If the module detects more than a 5mA current drop (ground fault) between phase and neutral, it trips the breaker. GFI dimmer modules from ETC comply with UL 943 if they are properly installed and maintained.
Reset a tripped GFI circuit breaker:

Step 1: Open the dimmer rack door.
Step 2: Locate the dimmer module you want to control or reset. Dual-density dimmer modules have two circuit breaker switches. Handles on tripped circuit breakers will be to the right.
Step 3: Put the circuit breaker switch in the desired On or Off position.
  • Push the handle left to turn the dimmer on or reset a tripped breaker.
  • Push the handle right to turn the dimmer off.

Figure 4: GFI Dimmer module circuit breakers

Testing GFI Circuit Breaker Functions
GFI dimmer modules must be tested monthly for proper GFI operation in order to comply with UL943 for life safety applications. Test results should be recorded on a test sheet that is easily accessible from the dimmer rack.

Note: GFI tests must be performed with rack power on.

Test the GFI circuit breakers:
Step 1: Open the dimmer rack door and locate the GFI modules you want to test.
Step 2: Push the Test switch just right of the circuit breaker handles:
  • If the GFI breaker is working, the breaker switches will trip to the right.
  • If the switches do not trip, the GFI circuit may need repair.

Figure 5: GFI Dimmer module circuit breakers

Step 3: Reset the breaker switches and log the test on the test sheet.
Step 4: Close the dimmer rack door.

WARNING: GFI testing must be performed and logged monthly to conform to UL 943 GFCI Life Safety requirements.
Troubleshooting

Your Sensor+ system helps you identify system problems with status reporting and diagnostic testing capabilities.

You will usually notice a system problem in one of two ways:

- The Sensor+ beacon on the dimmer rack begins blinking, indicating the CEM+ has detected a problem. The system may still continue to dim normally.
- You notice a problem with system performance. The beacon may be flashing, or the problem may be caused by another part of your lighting control system.

When either of these situations occur, you can follow these steps to isolate and correct the cause.

Make a preliminary examination of your system...

- Check the CEM+ display, Sensor+ Connect or WYSILink for error messages. For an explanation of error message causes and possible corrections, see CEM+ Error Messages, page 33.

If lights are stuck on...

- Check for an activated Preset at your CEM+. (This can lock some or all of your dimmer circuits at one level.)
- Make sure your Panic circuit is not activated. (This will drive some of your dimmer circuit to full and hold them there.)
- Make sure all direct dimmer levels at the CEM+ are cleared. (This can lock some or all of your dimmer circuits at one level.)

If lights won’t come on...

- Look for obstructions on top or in front of your installation rack that may be blocking rack ventilation.
- Open the door and look for dust buildup on the air filter or rack modules.
- Check for tripped dimmer module circuit breakers.
- Check for tripped breakers on your main circuit breaker panel.
- Check for loose or damaged control cables coming into your dimmer rack.

When you think you’ve found the problem...

- Correct any of these problems you find, press the reset button 🔄 on the front of the CEM+ module and observe the system to see if the problem still exists.

If you cannot locate or correct the problem...

If you are unable to eliminate the problem, contact your authorized ETC representative.

See Contacting ETC about equipment problems, page 27, for procedures on contacting ETC for technical help.
Appendix A
CEM+ Error Messages

If the CEM+ detects an error, it will flash the beacon and display the appropriate error message on the LCD display. A CEM+ will only display error messages for the same rack it is in - you can't browse to other racks to view their errors from a single CEM+.

Errors are also displayed in the WYSILink Message Log on Emphasis Control Systems and WYSILink PCs on the network. You can also view rack error messages in the Sensor+ Connect interface on Emphasis Control Systems or by browsing into a CEM+ using Internet Explorer 6 on a PC on the network.

View error messages on the CEM+ LCD display:
Step 1: Open the door of the rack with the blinking beacon. The CEM+ will display the message [Rack Errors].
Step 2: Press  to enter the error list. The number of errors and which error is currently displayed of that number are displayed at the top of the display.
Step 3: Press  and  to increment and decrement through the list, if necessary.

<table>
<thead>
<tr>
<th>CEM+ Error Message</th>
<th>Probable Cause</th>
<th>Possible Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMBIENT OVERTemp</td>
<td>Ambient temperature is higher than 115°F (46°C).</td>
<td>Lower dimmer room temperature.</td>
</tr>
<tr>
<td>AMBIENT TEMP HIGH</td>
<td>Ambient temperature is higher than 104°F (40°C).</td>
<td>Lower dimmer room temperature.</td>
</tr>
<tr>
<td>AMBIENT TEMP LOW</td>
<td>Ambient temperature is lower than 32°F (0°C).</td>
<td>Raise dimmer room temperature.</td>
</tr>
<tr>
<td>DIMMER ERROR</td>
<td>A dimmer in this rack has an error.</td>
<td>Use About Dimmer to check the specific error.</td>
</tr>
<tr>
<td>DATA ERROR PORT (A or B)</td>
<td>DMX512 data error</td>
<td>Check DMX512 port input cable and termination.</td>
</tr>
<tr>
<td>FREQUENCY ERROR</td>
<td>Feed power is not 50 or 60Hz. (±2.5Hz)</td>
<td>Check input frequency.</td>
</tr>
<tr>
<td>NO AIRFLOW</td>
<td>Insufficient airflow detected.</td>
<td>Check fan and air filter for obstruction.</td>
</tr>
<tr>
<td>NO DATA PORT (A or B)</td>
<td>No DMX512 data has been received by Port (A or B).</td>
<td>Check DMX512 source devices and input cables.</td>
</tr>
<tr>
<td>MODULE __ OVERTemp</td>
<td>Dimmer module has overheated and shut down.</td>
<td>Check airflow</td>
</tr>
<tr>
<td>PHASE (A, B or C) OFF</td>
<td>No voltage on phase (A, B or C).</td>
<td>Check line feed.</td>
</tr>
<tr>
<td>PHASE DETECT FAIL</td>
<td>CEM+ could not read the line feed phasing.</td>
<td>Re-seat the CEM+ and try again. If problem persists, replace the CEM+.</td>
</tr>
<tr>
<td>TEMP SENSOR STUCK</td>
<td>Ambient temperature sensor is stuck.</td>
<td>Replace CEM+.</td>
</tr>
<tr>
<td>ZERO CROSS ERROR</td>
<td>CEM+ hardware failure.</td>
<td>Replace CEM+.</td>
</tr>
<tr>
<td>SOFTWARE ERROR</td>
<td>CEM+ units running different versions of software are on the same network.</td>
<td>Install the same version of software on all CEM+ units.</td>
</tr>
<tr>
<td>PHASE (A, B or C) VOLTS HIGH</td>
<td>Voltage on phase (A, B or C) is higher than 140Vac.</td>
<td>Check line feed.</td>
</tr>
<tr>
<td>CEM+ Error Message</td>
<td>Probable Cause</td>
<td>Possible Corrective Action</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>PHASE (A, B or C) VOLTS LOW</td>
<td>Voltage on phase (A, B or C) is lower than 80Vac.</td>
<td>Check line feed.</td>
</tr>
<tr>
<td>LOW AIRFLOW</td>
<td>Airflow is low.</td>
<td>Check fans and air filter for obstruction.</td>
</tr>
<tr>
<td>CLEAN YOUR FILTER</td>
<td>This is a reminder to clean your air filter. It appears when the “Clean Time” clock has counted down to zero.</td>
<td>Reset the “Clean Time” counter to the number of hours you want between filter cleaning.</td>
</tr>
<tr>
<td>PHASE (A, B or C) HEADROOM</td>
<td>Incoming line voltage on phase (A, B or C) has dipped below the configuration-defined Headroom level.</td>
<td>Reduce the load on the indicated phase through repatching or lowering output levels of associated dimmers.</td>
</tr>
<tr>
<td>CONFIG MISMATCH ___</td>
<td>Configuration error.</td>
<td>Transfer configuration data from another rack.</td>
</tr>
<tr>
<td>BREAKER ___ TRIP</td>
<td>The circuit breaker on dimmer ___ has tripped.</td>
<td>Check circuit for cause of circuit breaker trip, such as too many lamps on the dimmer, or bad cabling.</td>
</tr>
<tr>
<td>SCR ___ STUCK ON</td>
<td>The SCR in dimmer ___ has failed on.</td>
<td>Replace dimmer module.</td>
</tr>
<tr>
<td>SCR ___ STUCK OFF</td>
<td>The SCR in dimmer ___ has failed off.</td>
<td>Replace dimmer module.</td>
</tr>
<tr>
<td>RCD ___ TRIP</td>
<td>The RCD in ___ has failed tripped.</td>
<td>Replace RCD module.</td>
</tr>
<tr>
<td>MODULE ___ REMOVED</td>
<td>Module has been removed from the rack.</td>
<td>Reinsert or replace module.</td>
</tr>
<tr>
<td>LOAD ___ CHANGE HIGH</td>
<td>Load is currently higher than the recorded load for this dimmer.</td>
<td>Rerecord the load, or check for additional or higher wattage lamp(s) on the circuit.</td>
</tr>
<tr>
<td>LOAD ___ CHANGE LOW</td>
<td>Load is currently lower than the recorded load for this dimmer.</td>
<td>Rerecord the load, or check for missing or burned-out lamp(s) on the circuit.</td>
</tr>
<tr>
<td>LOAD ___ NO LOAD</td>
<td>A load is recorded, but there is currently no load present on this dimmer.</td>
<td>Rerecord the load, or check for missing or burned-out lamp(s) on the circuit.</td>
</tr>
</tbody>
</table>
Dimmer Curves

Appendix B

Dimmer Curves determine how dimmers set voltage output in response to control signal input. To accommodate designer preferences and load response variations, Sensor offers five dimmer curve choices, which can be applied to individual dimmers.

**Linear curve**

The linear curve matches the control input percentage to Root Mean Squared (RMS) voltage output. Each percent increase in control level increases dimmer voltage output by the same amount.

![Figure 6: Linear dimmer curve](image-url)
**Modified linear curve**

A modified linear curve reduces the voltage change at low control levels for better performance in low-wattage fixtures.

![Modified linear dimmer curve](image1)

**Square law curve**

At low control levels, much of traditional incandescent fixture’s light output is in the invisible infrared spectrum. This results in poor visible response to low control levels. A square law curve applies a multiple derived from the square root of the control level (with full output equal to 1.00) to increase voltage response at low control levels to compensate for the infrared loss.

![Square law dimmer curve](image2)
Modified Square Law Curve

A standard square law curve may overcompensate for infrared loss, resulting in “steppy” response to incremental control changes at low levels. ETC’s modified square law curve applies a second multiple to the standard square law curve for more uniform response to control levels changes across the entire range of dimmer output.

Sensor 2.0 Curve

The Sensor 2.0 curve is the previous version of ETC’s modified square law curve. It provides backwards compatibility for shows created using earlier versions of ETC equipment and familiar response for designers who prefer the earlier version.
### Appendix C

**GFI Dimmer Test Sheet**

**Test Reminder:** For maximum protection against electrical shock, operate the Test switch on each GFI dimmer module at least once a month. Record the test date below using a fine-point indelible ink marker.

| Test Date | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
|-----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Test Date | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |

This test log must be posted in a conspicuous location near the GFI dimmers.
## Index

### A
- Advanced Features ............................................ 6
- Advanced patch .............................................. 20
- Air filter cleaning ............................................ 25
- Air filter timer ............................................... 22

### C
- CEM+ Control Module ........................................... 3
  - Replacement .................................................. 28
  - User interface ............................................... 7
  - View errors .................................................. 33
- Crossfade to ..................................................... 20

### D
- Data loss behavior ............................................ 20
- DC output prevent ............................................ 19
- Dimmer check .................................................. 19
- Dimmer Doubling .............................................. 6
- Dimmer menu ................................................... 17
- Dimmers .......................................................... 4
- GFI modules .................................................... 29
- Dynamic preheat ............................................... 19

### E
- Error messages .................................................. 33

### F
- Fan configuration .............................................. 22
- Feedback ......................................................... 6
- Firing mode ...................................................... 18
- First dimmer .................................................... 20
- Fuses ............................................................. 29

### G
- GFI dimmer modules ........................................... 29
  - Testing ......................................................... 30
- Group ............................................................. 3
- Group menu ..................................................... 23

### H
- Hold last look ................................................... 20

### I
- Inrush protection ................................................ 19

### L
- Login menu ....................................................... 13

### M
- Menus
  - Dimmer .......................................................... 17
  - Group ........................................................... 23
  - Login ............................................................ 13
  - Main ............................................................. 10
  - Panic ............................................................ 16
  - Presets .......................................................... 14
  - Rack ............................................................. 20
  - Modules ........................................................ 4
  - GFI dimmers .................................................... 29

### P
- Panic menu ........................................................ 16
- Patch modes .................................................... 20
- Presets ........................................................... 6
- Presets menu .................................................... 14

### R
- Rack menu ........................................................ 20
- Record loads .................................................... 23
- Replace a CEM+ .................................................. 28
- Replace fuses .................................................... 29

### S
- Sensor+ Connect ................................................ 6, 8
- Standard patch .................................................. 20
- Swap modules .................................................... 27

### T
- Technical Services ............................................. 27
- Test GFI dimmers ................................................ 30
- Threshold ........................................................ 18

### V
- Voltage regulation ............................................. 18

### W
- Wait & fade ...................................................... 20
- WYSILink .......................................................... 6
ATTENTION: The part numbers listed in this guide may differ from the parts required for your particular Source Four fixture. Part numbers for fixtures change occasionally as parts are replaced or upgraded.

To ensure that you are ordering the proper part for your specific fixture, please contact your ETC dealer, or ETC Customer Service for assistance.
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Fixture</td>
<td>1</td>
</tr>
<tr>
<td>Assembling basic fixture</td>
<td>2</td>
</tr>
<tr>
<td>Lamp Socket Assembly</td>
<td>3</td>
</tr>
<tr>
<td>Assembling lamp socket</td>
<td>4</td>
</tr>
<tr>
<td>Reflector Housing Assembly</td>
<td>7</td>
</tr>
<tr>
<td>Removing reflector</td>
<td>7</td>
</tr>
<tr>
<td>Installing reflector</td>
<td>8</td>
</tr>
<tr>
<td>Cleaning reflector</td>
<td>9</td>
</tr>
<tr>
<td>Front Barrel Assembly</td>
<td>10</td>
</tr>
<tr>
<td>Assembling front barrel</td>
<td>11</td>
</tr>
<tr>
<td>Lens Tubes - 19°, 26°, 36° and 50°</td>
<td>13</td>
</tr>
<tr>
<td>Assembling lens tube - 19°, 26°, 36° and 50°</td>
<td>14</td>
</tr>
<tr>
<td>Cleaning glass lens - 19°, 26°, 36°, 50° and all EDLT lenses</td>
<td>17</td>
</tr>
<tr>
<td>Lens Tube - 10°</td>
<td>18</td>
</tr>
<tr>
<td>Lens Tube - 5°</td>
<td>19</td>
</tr>
<tr>
<td>Assembling lens tubes - 5° and 10°</td>
<td>20</td>
</tr>
<tr>
<td>Cleaning polymer lens - 5° and 10°</td>
<td>20</td>
</tr>
<tr>
<td>Lens Tube - 14°</td>
<td>21</td>
</tr>
<tr>
<td>Assembling lens tube - 14°</td>
<td>22</td>
</tr>
<tr>
<td>Cleaning glass lenses - 14°</td>
<td>22</td>
</tr>
<tr>
<td>Lens Tube - 70°</td>
<td>23</td>
</tr>
<tr>
<td>Lenses - 70°</td>
<td>24</td>
</tr>
<tr>
<td>Assembling lens tube - 70°</td>
<td>25</td>
</tr>
<tr>
<td>Cleaning glass lens - 70°</td>
<td>25</td>
</tr>
<tr>
<td>Lens Tube - 90°</td>
<td>26</td>
</tr>
<tr>
<td>Lenses - 90°</td>
<td>27</td>
</tr>
<tr>
<td>Assembling lens tube - 90°</td>
<td>28</td>
</tr>
<tr>
<td>Cleaning glass lens - 90°</td>
<td>28</td>
</tr>
</tbody>
</table>

**ETC®, Emphasis®, Expression®, Insight™, Imagine™, Focus™, Express™, Unison®, Obsession® II, ETCNet2™, EDMX™, Source Four®, Revolution®, Sensor®, and WYSILink™ are either registered trademarks or trademarks of Electronic Theatre Controls, Inc. in the United States and other countries.**

All other trademarks, both marked and not marked, are the property of their respective owners.
## Basic Fixture

<table>
<thead>
<tr>
<th>Reference Number</th>
<th>Part Number</th>
<th>Description</th>
<th>Quantity Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7060A2008</td>
<td>Lamp socket assembly (See page 4)</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>7060A2011</td>
<td>Reflector housing assembly, single clutch</td>
<td>1</td>
</tr>
<tr>
<td>2A</td>
<td>7060A2020</td>
<td>Reflector housing assembly, double clutch</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>7060A2012</td>
<td>Front barrel assembly</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>7060A2000-K</td>
<td>5° lens tube, with knob (See page 19)</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>7060A2001-K</td>
<td>10° lens tube, with knob (See page 18)</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>7060A2050-K</td>
<td>14° lens tube, with knob (See page 21)</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>7060A2002-K</td>
<td>19° lens tube (6 x 16), with knob (See page 13)</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>7060A2003-K</td>
<td>25° lens tube (6 x 12), with knob (See page 13)</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>7060A2004-K</td>
<td>35° lens tube (6 x 9), with knob (See page 14)</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>7060A2005-K</td>
<td>50° lens tube (4.5 x 6), with knob (See page 15)</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>7060A2051-K</td>
<td>70° lens tube, with knob (See page 23)</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>7060A2052-K</td>
<td>90° lens tube, with knob (See page 26)</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>7060A4008-01</td>
<td>Knob set with male insert</td>
<td>2</td>
</tr>
<tr>
<td>14</td>
<td>HW5143</td>
<td>Washer, flat fiber</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>HW5197</td>
<td>Screw, 1/4-20 x 3/8, black zinc</td>
<td>1</td>
</tr>
</tbody>
</table>
Assembling basic fixture

Step 1: Follow instructions under Assembling lamp socket, page 4.
Step 2: Follow instructions under Reflector Housing Assembly, page 7.
Step 3: Follow instructions under Front Barrel Assembly, page 10.
Step 4: Assemble Lens Tubes following the instructions for your applicable lens degree application.
Step 5: Insert lens tube assembly (4-12) fully into the front barrel assembly (3). Align the mounting hole with the slot and secure with knob (13). See Figure 1.
Step 6: Install reflector housing (2) onto front barrel assembly (3) and align the two mounting holes. Secure with screw (15) on top, and knob (13) on bottom. Tighten both securely. See Figure 1.
Step 7: Install the lamp socket assembly (1) to the reflector housing (2) and secure with brass knurled screw on rear of lamp socket assembly.
Step 8: Release the gel retaining clip by pushing it sideways while gently pulling backwards.
Step 9: Insert the color frame.
Step 10: Lock the clip by pushing sideways while gently pushing it forward.
## Lamp Socket Assembly

<table>
<thead>
<tr>
<th>Reference Number</th>
<th>Part Number</th>
<th>Description</th>
<th>Quantity Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7060A3055</td>
<td>Housing, socket, casting, painted</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>7060A3007</td>
<td>Socket, light baffle casting, raw</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>7060A4007</td>
<td>Knob, X-Y, lamp set</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>7060A4008-02</td>
<td>Knob, Z, lamp set w/female insert</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>7060A4011</td>
<td>Bushing, cup</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>7060A3011</td>
<td>Hub, index, casting</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>7060A3012</td>
<td>Spring, lamp retainer</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>HW746</td>
<td>Spring, compression</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>7060B7019</td>
<td>Complete UL socket assembly</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>HW534</td>
<td>Nut, hex, 1/4-20, black zinc</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>7060A3025</td>
<td>Screw, 1/4-20 knurled head</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>HW746</td>
<td>Retaining ring, flat, sculpho</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>HW5123</td>
<td>Nut, hex, 3/16-18, black zinc</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>HW747</td>
<td>Washer, wave</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>7060A3056</td>
<td>Clamp, strain relief, painted</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>HW3103</td>
<td>Screw, 8-32 x 5/8 PHFHM, black zinc</td>
<td>2</td>
</tr>
<tr>
<td>17</td>
<td>HW5162</td>
<td>Bolt, 1/4-20 x 1 1/2, full thread, black zinc</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>HW5209</td>
<td>Clip, Tinnerman</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>7060B7003</td>
<td>48&quot; W420 wire, 16 gauge, 200° C/300V, green UL T1180/CSA-AWM w/hug J490T installed</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>W8195</td>
<td>36&quot; sleeve, fiberglass</td>
<td>1</td>
</tr>
<tr>
<td>21</td>
<td>HW749</td>
<td>Spring, ground</td>
<td>1</td>
</tr>
<tr>
<td>22</td>
<td>7060B7007</td>
<td>4&quot; W420 wire, 16 gauge, 200° C/300V, green UL T1180/CSA-AWM w/two J490T lugs installed</td>
<td>1</td>
</tr>
<tr>
<td>23</td>
<td>7060A4037</td>
<td>Handle, insulated rear, black</td>
<td>1</td>
</tr>
<tr>
<td>24</td>
<td>HW2181</td>
<td>Screw, 6-32 x 3/4, Taptite</td>
<td>4</td>
</tr>
<tr>
<td>25</td>
<td>7060A3085</td>
<td>Source Four Lamp Retainer Wire</td>
<td>1</td>
</tr>
</tbody>
</table>
Assembling lamp socket

Tools Required:

- Open-end adjustable wrench or a 7/16" socket
- Needle-nose pliers
- #2 Phillips screwdriver

Step 1: Set the crossbar of the retainer clip (25) under the two hooks on the clip bracket as shown in Figure 3.

Step 2: Place the Tinnerman clip (18) over the retainer clip crossbar between the two hooks and press it down firmly until it snaps into place.

Step 3: Insert the bolt (17) through the light baffle socket casting (2). See Figure 4.

Step 4: Install the green ground wire assemblies (19 and 22) on the bolt (17) with the prongs on the crimped connectors toward the casting. Run both wires through the indent in the lip around the bolt hole. Secure with nut (10) and tighten securely (60 inch pounds).

Step 5: Place the socket assembly (9) into the light baffle socket casting (2). Be sure it is well seated.
Step 6: Install the lamp retainer spring (7). The lamp retainer spring secures the socket. Insert the spring one end at a time, making sure the rectangular slot in each side of the spring seats on the corresponding tab in the casting. See Figure 4.

**Note:** If the spring does not seat correctly, coax it into place with a screwdriver or needle-nose pliers.

![Figure 4](image1)

Step 7: Install the bushing cup (5) into the housing socket casting (1) as shown in Figure 5. The cup should slide smoothly up and down, but not side to side.

Step 8: Insert the threaded end of the index hub (6) through the holes in the bushing cup and the back of the housing socket casting (1).

Step 9: Slide the X-Y knob (3) over the exposed index hub bolt (6), then insert the wave washer (14) on the bolt and secure with the 9/16 hex nut (13). Hand tighten the X-Y knob (3).

**Note:** Install the wave washer with the upward curve toward the hex nut.

![Figure 5](image2)

Step 10: Insert the knurled head screw (11) through the housing socket casting (1) as shown in Figure 6.

Step 11: Install the shorter green ground wire (22) onto the screw. The prongs on the crimped connector should be toward the casting.

Step 12: Install the ground spring (21) onto the screw and secure it with the Southco flat retaining ring (12). Install the Southco ring with its prongs away from the casting.

![Figure 6](image3)

![Figure 7](image4)
**Step 13:** Lay the leads in the bottom half of the cable clamp (located in the housing socket casting [1]), making sure that the fiberglass sleeving extends slightly past the screw holes in the housing socket casting. Install new sleeving if necessary. Then, route the wires as shown in Figure 7.

**Note:** Use pliers to straighten the Southco retaining ring (12) if it bends when you install it on the bolt.

**Step 14:** Install the top half of the cable clamp (15) and secure it with the two screws (16). Tighten the screws alternately to ensure a solid connection.

**CAUTION:** You must follow the wire routing diagram to ensure that the socket leads do not interfere with the lamp focus mechanism.

**Step 15:** Using the four screws (24), attach the handle (23) to the lamp socket assembly. See Figure 2.

**Step 16:** Place the compression spring (8) on the protrusion on the inside of the index hub. See Figure 6.

**Step 17:** Insert bolt (17) through spring (8) and through the index hub (6) of the housing socket (1), joining the two castings as shown in Figure 6. Make sure wires are not pinched between the two pieces.

**Step 18:** Before proceeding, check again to make sure the wires are still positioned as indicated in Figure 7. Adjust if necessary.

**Step 19:** Press the two castings together firmly so the bottom of the light baffle (2) sits on top of the cable clamp (15), then install Z lamp knob (4). Hand tighten the knob all the way to the right. See Figure 6.

**CAUTION:** You must install Z knob as described above to ensure proper lamp focus travel.

**Note:** To ensure that the clamp holds the cable tightly, flatten the cable, then fold over the sleeving before you install the top half of the clamp. Make sure the top edge of the cable clamp is even with the edge of the socket to prevent interference with lamp focus movement. Make sure sleeving is not pinched.

**CAUTION:** You must install Z knob as described above to ensure proper lamp focus travel.
Removing reflector

Tools Required:
- Minimally padded work surface (cardboard, carpet, or rubber mat recommended)

**WARNING:** This procedure may crack or break the reflector. Always wear gloves, safety glasses, and a dust mask when performing this procedure.
Step 1: Place the reflector housing face down on your work surface so that the concave reflector surface points downward.

Step 2: Loosen the clutch and rotate the yoke so that it is perpendicular to the housing at roughly a 90° angle. Tighten the clutch.

Step 3: Using the yoke as your handle, raise the housing assembly off of the work surface a few inches and then firmly tap the housing on the work surface. This should force the reflector out of its clips.

Step 4: Carefully lift the housing to see if the reflector is released. If it is not, repeat step 3 with slightly more force.

**Installing reflector**

**Note:** The following assumes all four reflector retainer clips (2) have already been riveted to the reflector housing casting (1) and the gate bushings (3) installed on the retainer clips. See Figure 8.

Step 1: Place the reflector housing casting (1) on a flat work surface with the large opening facing up.

Step 2: Install the reflector support spring (5) in the circular opening at the base of the casting.

Step 3: Insert the reflector (6) at an angle, under any three adjacent legs of the reflector's clips.

Step 4: Gently press down on the opposite side of the reflector until it snaps into place under the remaining clips.

**Note:** If the reflector does not snap in, turn the casting over. Gently pull on the side of the reflector that has not snapped in until the rest of the reflector slides into place.
Cleaning reflector

**WARNING:** Do not use ammonia-based or other harsh commercial cleaners. Clean reflector only as directed. Commercially available glass cleaning agents should be avoided as they may contain ammonia, other harsh chemical detergents or abrasive agents. These cleaners may damage the glass surface and the Anti-Reflective coatings. Do not immerse or soak the glass in any cleaning solution.

Remove dust with a blast of oil-free air or wipe with a clean, lint-free cloth. Isopropyl alcohol, distilled water or a 50%-50% mixture of each can be used to clean the glass surface.
Front Barrel Assembly

Shutter Assembly: The bottom divider plate (4) has four dimples punched into the surface; the top plate (6) has none. The middle divider plates (5) are noticeably thinner-gauge metal than the other two.

<table>
<thead>
<tr>
<th>Reference Number</th>
<th>Part Number</th>
<th>Description</th>
<th>Quantity Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7060A3052</td>
<td>Front barrel, top casting, black</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>7060A3053</td>
<td>Front barrel, bottom casting, black</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>7060A0025</td>
<td>Shutter blade assembly, 22 gauge</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>7060A001-01</td>
<td>Plate, divider with dimples (bottom)</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>7060A3003</td>
<td>Plate, gate (middle)</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>7060A001-02</td>
<td>Plate, divider (top)</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>HW754</td>
<td>Shutter spring</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>HW3105</td>
<td>Screw, 8-32 x 1/2, Taptite</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>7060A3045</td>
<td>Cover, iris slot</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>HW372</td>
<td>Screw, 8-32 x 1/4, black zinc</td>
<td>2</td>
</tr>
</tbody>
</table>
Assembling front barrel

Tools Required:
- #2 Phillips head screwdriver

**WARNING:** During assembly, the shutter springs can pop out of place. Always wear protective eyewear during this procedure.

Step 1: Stand the top and bottom front barrel castings (1 and 2) upright with the shutter end of the castings toward the bottom.

**Note:** The top front barrel casting contains the iris slot.

Step 2: Slide the bottom divider plate (4), into its place in the bottom casting (2). The dimples on the divider plate must point down.

**Note:** The bottom divider plate (4) has four dimples punched into the surface; the top plate (6) has none. The middle divider plates (5) are noticeably thinner-gauge metal than the other two. The notches on the divider plates must fit against the flanges in the casting so the plates do not move.

**WARNING:** Divider plate edges are sharp. Handle with caution.

Step 3: With the bottom barrel casting (2) to your left, place two shutter blades (3) on top of dimple plate (4) and opposite each other so together they form a barrier. The handles should extend past the barrel casting, rivets pointed down. These will be the side shutters (See Figure 13).

Step 4: Place a divider plate (5) on top of the two shutter blades.

Step 5: Place another shutter blade on top of the middle divider plates and perpendicular to the previously installed shutter blades. This will be the top shutter, so align the handle away from the bottom casting (2). Then place the other divider plate on top.

Step 6: Place the fourth shutter blade on top of the divider and through the bottom casting in the final shutter position. Pull the blade and plate assembly slightly forward to allow the handle to slip through the slot in the bottom casting. Then fully seat the blader assembly into the casting again.

Step 7: Place the top divider plate (6) on top of the fourth shutter blade.

**Note:** Make sure no shutter assembly components are under the pattern holder guides.
Step 8: With both front barrel castings still standing upright, join the two halves, sliding the handle of the top shutter blade through the slot in the top front barrel casting (1).

Step 9: Starting at the bottom of the castings (closest to the shutters), use four PHMS screws (9) to fasten the front barrel casting halves together, as shown. Hand tighten only (25 inch pounds).

**Note:** The ends of the two front barrel castings must be even. Adjust as necessary before completely tightening the nuts and screws. Failure to do this could interfere with the barrel rotation.

Step 10: Turn the front barrel assembly over so that the narrower end is on your work surface.

Step 11: Install the four shutter springs (7) between the four dimples in the shutter plate and the tabs in the lip of the casting.

**Note:** Install the springs at the joints in the castings on either of the tabs at the joint. Once they are installed, the springs at the joints will sit at a slight angle.

Step 12: Place iris slot cover (9) over the iris slot. Use two screws (10) to secure the cover.
### Lens Tubes - 19°, 26°, 36° and 50°

#### Reference Number | Part Number | Description | Quantity
--- | --- | --- | ---
1 | 7060A3169 | Lens tube, left, painted | 1
2 | 7060A3171 | Lens tube, right, painted | 1
3 | 7060A4009 | Bushing, guide | 8
4 | 7060A4012 | Pad lens support - asphere | 5
5 | 7060A4077 | Aspheric lens, 19° | 1
6 | 7060A4001 | Aspheric lens, 26° | 1
7 | 7060A4004 | Aspheric lens, 50° | 1
8 | 7060A4020 | Meniscus lens, 36° set, front | 1
8A | 7060A4021 | Bi-convex lens, 36° set, rear (36° Only) | 1
9 | 7060A3079 | Clip, gel retainer, 90° bend | 1
10 | HW750 | Spring, retainer | 1
11 | HW360 | Screw, Phillips, 8-32 x 5/8, Taptite | 4
12 | HW534 | Nut, hex, 1/4-20, black zinc | 2
13 | 7060A4008-01 | Knob set with male insert | 1
14 | HW5143 | Washer, flat, 1/4 | 1
15 | 7060A4033 | 19° lens tube label | 1
16 | 7060A4034 | 26° lens tube label | 1
17 | 7060A4035 | 36° lens tube label | 1
18 | 7060A4036 | 50° lens tube label | 1

#### Figure 14

*Note: Lenses are degree specific. Do not interchange lenses (i.e. do not place a 19° lens in a 26° slot).*

![Diagram](image_url)
Assembling lens tube - 19°, 26°, 36° and 50°

**Lens Positions**

The lens tube casting can accept either original or Enhanced Definition (ED) lenses. The lens positions are color-coded within the lens casting to match the colored dots on the lenses (see Figure 15). Only lenses bearing at least one dot of the indicated color should be placed in that position.

![Figure 15](image-url)
**Lens Markings**

The lenses are color-coded for identification. Normal lenses have a single dot of color while Enhanced Definition lenses have a combination of white dots and color dots. See Figure 16 for lens color coding.

<table>
<thead>
<tr>
<th>Lenses</th>
<th>Standard Lenses</th>
<th>Enhanced Definition Lenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>19°</td>
<td>19° ED</td>
<td>Rear lens - 1 white dot &amp; 1 blue dot</td>
</tr>
<tr>
<td></td>
<td>Lens - Red Dot* (one or two dots)</td>
<td>Front lens - 1 white dot &amp; 1 red dot</td>
</tr>
<tr>
<td>26°</td>
<td>26° ED</td>
<td>Rear lens - 1 white dot &amp; 1 yellow dot</td>
</tr>
<tr>
<td></td>
<td>Lens - Black Dot* (one or two dots)</td>
<td>Front lens - 1 white dot &amp; 2 red dots</td>
</tr>
<tr>
<td>36°</td>
<td>36° ED</td>
<td>Rear lens - 1 white dot &amp; 2 blue dots</td>
</tr>
<tr>
<td></td>
<td>Rear lens - Blue dot</td>
<td>Front lens - 1 white dot &amp; 1 orange dot</td>
</tr>
<tr>
<td></td>
<td>Front lens - Orange dot</td>
<td></td>
</tr>
<tr>
<td>50°</td>
<td>50° ED</td>
<td>Rear lens - 1 white dot &amp; 3 blue dots</td>
</tr>
<tr>
<td></td>
<td>Lens - Yellow Dot* (one or two dots)</td>
<td>Front lens - 1 white dot &amp; 1 green dot</td>
</tr>
</tbody>
</table>

* Align lens dots toward this end

* Some pre-2006 fixtures have lenses with two color code dots. There is no difference between lenses with one dot or two dots.

**Figure 16**
For maximum gel life with specific lens tubes, refer to the tables below.

<table>
<thead>
<tr>
<th>Lens Tube</th>
<th>Soft Focus Back (Lamp “flat”)</th>
<th>Sharp Focus (Lamp “cosine”)</th>
<th>Soft Focus Forward (Lamp “peak”)</th>
<th>Soft Focus Forward (Lamp “cosine”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>19°</td>
<td>worse</td>
<td>better</td>
<td>better</td>
<td>not applicable</td>
</tr>
<tr>
<td>26°</td>
<td>worse</td>
<td>better</td>
<td>better</td>
<td>not applicable</td>
</tr>
<tr>
<td>36°</td>
<td>better</td>
<td>better</td>
<td>worse</td>
<td>not applicable</td>
</tr>
<tr>
<td>50°</td>
<td>worse</td>
<td>better</td>
<td>better</td>
<td>not applicable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ED Lens Tube</th>
<th>Soft Focus Back (Lamp “flat”)</th>
<th>Sharp Focus (Lamp “cosine”)</th>
<th>Soft Focus Forward (Lamp “peak”)</th>
<th>Soft Focus Forward (Lamp “cosine”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>19°</td>
<td>worse</td>
<td>better</td>
<td>better</td>
<td>not applicable</td>
</tr>
<tr>
<td>26°</td>
<td>better</td>
<td>better</td>
<td>worse</td>
<td>not applicable</td>
</tr>
<tr>
<td>36°</td>
<td>better</td>
<td>better</td>
<td>worse</td>
<td>not applicable</td>
</tr>
<tr>
<td>50°</td>
<td>better</td>
<td>better</td>
<td>worse</td>
<td>not applicable</td>
</tr>
</tbody>
</table>

Assembling the lens tube

Tools Required:
- #2 Phillips head screwdriver

Step 1: Place the left and right lens tubes (1 & 2) face up on your work surface. Align the tubes so the colorframe grooves are to your left.

Step 2: Install lens support pads (4) as required inside both lens tubes. Four pads are required per lens. Insert pads short-side down, as shown in Figure 19.

Step 3: Install the 1/4-20 hex nut (13) in the left lens tube as shown.

Step 4: Install the short end of the gel retainer clip (9) in the left lens tube (1).

Step 5: Position the clip in the forward, locked position, then install the retainer spring (10) on the clip.

Step 6: Install the required lens (or lenses) (5, 6, 7, or 8 & 8A) in the correct position as shown on Figure 15.

**Note:** Install the lens with the painted dot facing the front of the tube. Seat the lens in the support pads so the dot remains visible.

Step 7: See Figure 14. Invert the right lens tube (2) and hold it above the left lens tube (1). Fit the clip (9) and spring (10) into the right lens tube. Gently place the right lens tube onto the left lens tube, making sure that the 1/4-20 hex nut and
retaining clip assembly stay properly seated. Make sure the lens stays straight by looking into the lens holder. The top edge of the lens should seat properly in the support pads.

Step 8: Install the PHMS screws (11) in four locations with Ny-lok nuts (12). The PHMS screw location on the bottom of the colorframe holder is threaded and does not require a Ny-lok nut. Hold the nuts tight against the casting and torque the screws to 25 inch pounds.

Step 9: Install the eight bushing guides (3). Point the narrow tab on the bottom toward the back of the tube; point the square tab toward the front. Squeeze the guides slightly so they bend in the middle then snap into place. Make sure the rounded side of the guide faces outward from the tube.

Cleaning glass lens - 19°, 26°, 36°, 50° and all EDLT lenses

**WARNING:** Do not use ammonia-based or other harsh commercial cleaners. Clean lens only as directed. Commercially available glass cleaning agents should be avoided as they may contain ammonia, other harsh chemical detergents or abrasive agents. These cleaners may damage the glass surface and the Anti-Reflective coatings. Do not immerse or soak the glass in any cleaning solution.

Remove dust with a blast of oil-free air or wipe with a clean, lint-free cloth. Isopropyl alcohol, distilled water or a 50%-50% mixture of each can be used to clean the glass surface.
## Lens Tube - 10°

<table>
<thead>
<tr>
<th>Reference Number</th>
<th>Part Number</th>
<th>Description</th>
<th>Quantity Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7060A3006</td>
<td>10° lens tube assembly, painted</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>7060A4009</td>
<td>Bushing, guide</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>HW750</td>
<td>Spring, retainer</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>HW8122</td>
<td>Bumper, recess rubber</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>7060A4025</td>
<td>Lens, 10°, 10&quot;</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>7060A3079</td>
<td>Clip, gel retainer</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>HW307</td>
<td>Screw, 8-32 x .38 lg, SPHMS, black zinc</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>HW3070</td>
<td>Nut, 8-32, 3/8, 1/4, black zinc</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>HW5104</td>
<td>Washer, 17/80 x .023, black zinc</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>HW5107</td>
<td>Screw, 1/4, 20x68 PHNMS, black zinc</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>HW5200</td>
<td>Washer, SPH, 253 x .281 x .438, black zinc</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>7060A4008</td>
<td>Knob, 2 lamp, with male insert</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>HW5143</td>
<td>Washer, FL, 1/4, 252 x .500 x .060, FL</td>
<td>1</td>
</tr>
<tr>
<td>Reference Number</td>
<td>Part Number</td>
<td>Description</td>
<td>Quantity Required</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------</td>
<td>-------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>1</td>
<td>7060A3095</td>
<td>5° lens tube assembly, painted</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>7060A4009</td>
<td>Bushing, guide</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>HW750</td>
<td>Spring, retainer</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>HW6122</td>
<td>Bumper, recess rubber</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>7060A4024</td>
<td>Lens, 5°, 10°</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>7060A3079</td>
<td>Clip, gel retainer</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>HW307</td>
<td>Screw, 8-32 x 3/8 lg, SPHMS, black zinc</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>HW370</td>
<td>Nut, 8-32, 3/8, 1/4, black zinc</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>HW30704</td>
<td>Washer, 170 x 0.020, black zinc</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>HW8170</td>
<td>Handle, 10-32 inserts</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>7060A3073</td>
<td>Handle backing plate</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>HW467</td>
<td>Screw, 10-32 x 1/2 PHTRMS</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>HW4445</td>
<td>Washer, 195 x 0.025 black zinc</td>
<td>2</td>
</tr>
<tr>
<td>14</td>
<td>HW5197</td>
<td>Screw, 1/4, 20x28 PHTRMS, black zinc</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>HW5200</td>
<td>Washer, SH, 250 x 0.025, black zinc</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>7060A4008</td>
<td>Knob, Z lamp, with male insert</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>HW5143</td>
<td>Washer, PL, 1/4, 250 x 0.060, PL</td>
<td>1</td>
</tr>
</tbody>
</table>
Assembling lens tubes - 5° and 10°

Tools Required:

• #2 Phillips head screwdriver

Step 1: Place the lens tube assembly (1) on your work surface. Align the assembly so that the colorframe grooves are to your left.

Step 2: If you are assembling a 5° tube, attach the handle (10) as shown in Figure 20, using the screws (12), washers (13) and backing plate (11).

Step 3: Install the required lens as shown in Figure 19 or Figure 20 in the tube using required bumpers (4), screws (7), nuts (8), and washers (9). The side of the lens with the fresnel grooves should face the front of the tube. The smooth side should face the rear.

Cleaning polymer lens - 5° and 10°

| WARNING: |
| Handle polymer lenses by their edges only. Never rub anything dry on a polymer lens. Do not use glass and window cleaners on the lens. This will damage the lens. |

Remove dust with a blast of oil-free air. If this is not sufficient, follow the instructions below.

Step 1: Dip the lens in a clean isopropyl alcohol/water mixture (9 parts water to 1 part isopropyl alcohol).

Step 2: Use a soft moistened nylon bristle brush to wash the lens’ smooth side in a linear (non-circular) motion.

Step 3: Use the same brush to lightly wash the lens’ ridged side by following its ridges.

Step 4: Dip the lens in a clean isopropyl alcohol/water mixture (9 parts water to 1 part isopropyl alcohol).

Step 5: Use air gun to dry the smooth surface. Use air gun to dry the ridged surface. Use air stream to move the liquid away from you. Using this method, remove as much liquid as possible. Inspect the lens for dirt. If necessary, repeat the entire process.
For maximum gel life with specific lens tubes, refer to the table below:

<table>
<thead>
<tr>
<th>Lens Tube</th>
<th>Soft Focus Back (Lamp &quot;flat&quot;)</th>
<th>Sharp Focus (Lamp &quot;cosine&quot;)</th>
<th>Soft Focus Forward (Lamp &quot;peak&quot;)</th>
<th>Soft Focus Forward (Lamp &quot;cosine&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14°</td>
<td>worse</td>
<td>good</td>
<td>beat</td>
<td>good</td>
</tr>
</tbody>
</table>

Figure 21
Assembling lens tube - 14°

Lens Markings and Positions
The lenses are color-coded for identification. The rear lens has two brown dots and the front lens has one brown dot. The lens positions are color-coded within the lens casting to match the colored dots on the lenses (see Figure 22).

Assembling the lens tube
Tools Required:
- #2 Phillips head screwdriver

Step 1: Place lens tube assembly face up on your work surface.
Step 2: Install the eight bushing guides (7). Point the narrow tab on the bottom toward the back of housing; point the square tab toward the front. Squeeze the guides slightly so they end in the middle, then snap into place. Make sure the rounded side of the guide faces outward from the tube.
Step 3: Install the front lens (10) in the tube using required bumpers (9), screws (12), nuts (11), and washers (13) as shown in Figure 21. Colored dot on lens should face towards the front.

Cleaning glass lenses - 14°

WARNING: Do not use ammonia-based or other harsh commercial cleaners. Clean lens only as directed.
Commercially available glass cleaning agents should be avoided as they may contain ammonia, other harsh chemical detergents or abrasive agents. These cleaners may damage the glass surface and the Anti-Reflective coatings. Do not immerse or soak the glass in any cleaning solution.

Step 1: Remove dust with a blast of oil-free air or wipe with a clean, lint-free cloth. Isopropyl alcohol, distilled water or a 50%-50% mixture of each can be used to clean the glass surface.
Step 2: If necessary, remove the front lens to access the front surface of the rear lens for cleaning. Remove the four screws (12), nuts (11), washers (13) and bumpers (9) and gently left out front lens as shown in Figure 21. Reassemble in reverse order.
For maximum gel life, refer to the table below:

<table>
<thead>
<tr>
<th>Lens Tube</th>
<th>Soft Focus Back (Lamp “flat”)</th>
<th>Sharp Focus (Lamp “cosine”)</th>
<th>Soft Focus Forward (Lamp “peak”)</th>
<th>Soft Focus Forward (Lamp “cosine”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>70°</td>
<td>best</td>
<td>good</td>
<td>worse</td>
<td>good</td>
</tr>
</tbody>
</table>

Reference Number | Part Number | Description | Quantity Required |
1 | See Figure 24 | 70° rear lens assembly | 1 |
2 | See Figure 24 | 70° front lens assembly | 1 |
3 | 7060A3179 | Lens tube casting, painted | 2 |
4 | 7060A4009 | Bushing, guide | 8 |
5 | HW370 | Nut, 8-32 | 2 |
6 | HW389 | Screw, Phillips, 8-32 x .62, LG, PRIMS | 2 |
7 | HW534 | Nut, Hex, 1/4-20 | 2 |
8 | 7060A2057 | Spin Assembly, lens tube | 1 |
9 | 7060A3180 | Gel clip | 1 |
10 | 7060A4144 | Label, 70° lens | 1 |
11 | HW750 | Spring, latch return | 1 |
12 | HW7289 | Rivot | 6 |

Figure 23
<table>
<thead>
<tr>
<th>Reference Number</th>
<th>Part Number</th>
<th>Description</th>
<th>Quantity Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7060A4134</td>
<td>Rear lens, 70°</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>7060A3185</td>
<td>Mounting Plate, 70° rear lens</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>7060A3186</td>
<td>Retaining ring</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>7060A4135</td>
<td>Front lens, 70°</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>7060A3187</td>
<td>Mounting Plate, 70°, front lens</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>HW1119</td>
<td>Screw, Philips, 4-40 x 1/4, SEAMS, PHMS</td>
<td>6</td>
</tr>
</tbody>
</table>

Install rear lens assembly in slot labeled "70° DEG REAR LENS". Colored dot faces front.

Install front lens assembly in slot labeled "70° DEG FRONT LENS". Colored dot faces front.

Align lens dots toward this end.

Figure 24
**Assembling lens tube - 70°**

**Lens Markings and Positions**

The lenses are color-coded for identification. The rear lens has two green dots and the front lens has one green dot. The lens positions are color-coded within the lens tube casting to match the colored dots on the lenses (see Figure 25).

![Figure 25](image)

**Assembling the lens tube**

Tools Required:
- #2 Phillips head screwdriver

**Step 1:** See Figure 24. Place rear lens (1) into mounting plate (2) with paint dots facing forward. Center the lens in the mounting plate and secure with the retaining ring (3) and screws (6). Lightly tighten all three screws while maintaining lens position, then tighten screws securely.

**Step 2:** See Figure 24. Place front lens (4) into mounting plate (5) with paint dots facing forward. Center the lens in the mounting plate and secure with the retaining ring (3) and screws (6). Lightly tighten all three screws while maintaining lens position, then tighten screws securely.

**Cleaning glass lens - 70°**

**WARNING:** Do not use ammonia-based or other harsh commercial cleaners. Clean lens only as directed. Commercially available glass cleaning agents should be avoided as they may contain ammonia, other harsh chemical detergents or abrasive agents. These cleaners may damage the glass surface and the Anti-Reflective coatings. Do not immerse or soak the glass in any cleaning solution.

Remove dust with a blast of oil-free air or wipe with a clean, lint-free cloth. Isopropyl alcohol, distilled water or a 50%-50% mixture of each can be used to clean the glass surface.
For maximum gel life, refer to the table below:

<table>
<thead>
<tr>
<th>Lens Tube</th>
<th>Soft Focus Back (Lamp &quot;flat&quot;)</th>
<th>Sharp Focus (Lamp &quot;cosine&quot;)</th>
<th>Soft Focus Forward (Lamp &quot;peak&quot;)</th>
<th>Soft Focus Forward (Lamp &quot;cosine&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>90°</td>
<td>best</td>
<td>good</td>
<td>good</td>
<td>worse</td>
</tr>
</tbody>
</table>

Reference Number  Part Number  Description  Quantity Required
---  ---------------  -------------------------------------------------  ------------------------
1    See Figure 27  90° rear lens assembly  1
2    See Figure 27  90° front lens assembly  1
3    7060A1179     Lens tube casting, painted  2
4    7060A4009     Bushing, guide  8
5    HW370         Nut, 8-32  2
6    HW359         Screw, Phillips, 8-32 x .37, LG, PHMS  2
7    HW324         Nut, Hex, 1/4-20  2
8    7060A2059     Spin Assembly, lens tube  1
9    7060A3180     Gel clip  1
10   HW750         Spring, latch return  1
11   7000A145      Label, 90° lens  1
12   HW729         Rivet  6
Table:

<table>
<thead>
<tr>
<th>Reference Number</th>
<th>Part Number</th>
<th>Description</th>
<th>Quantity Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7060A3181</td>
<td>Mounting plate, 90° rear lens</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>7060A4136</td>
<td>Rear lens, 90°</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>7060A3182</td>
<td>Retaining ring, 90°, rear lens</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>7060A3183</td>
<td>Mounting plate, 90°, front lens</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>7060A4137</td>
<td>Front lens, 90°</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>7060A3184</td>
<td>Retaining ring, 90°, front lens</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>HW1119</td>
<td>Screw, Philips, 4-40 x 1/4, SEMS, PHMS</td>
<td>1</td>
</tr>
</tbody>
</table>

Install rear lens assembly in slot labeled "90° DEG REAR LENS". Colored dots faces front.

Install front lens assembly in slot labeled "90° DEG FRONT LENS". Colored dot faces front.

Install nut (7) in casting

Align lens dots toward this end
Assembling lens tube - 90°

Lens Markings and Positions

The 90° lenses are color-coded for identification. The rear lens has two purple dots and the front lens has one purple dot. The lens positions are color-coded within the lens casting to match the colored dots on the lenses (see Figure 28).

Assembling the lens tube

Tools Required:
- #2 Phillips head screwdriver

Step 1: See Figure 27. Place rear lens (2) into mounting plate (1) with paint dots facing forward. Center the lens in the mounting plate and secure with the retaining ring (3) and screws (7). Lightly tighten all three screws while maintaining lens position, then tighten screws securely.

Step 2: See Figure 27. Place front lens (5) into mounting plate (4) with paint dots facing forward. Center the lens in the mounting plate and secure with the retaining ring (6) and screws (7). Lightly tighten all three screws while maintaining lens position, then tighten screws securely.

Cleaning glass lens - 90°

WARNING: Do not use ammonia-based or other harsh commercial cleaners. Clean lens and reflector only as directed. Commercially available glass cleaning agents should be avoided as they may contain ammonia, other harsh chemical detergents or abrasive agents. These cleaners may damage the glass surface and the Anti-Reflective coatings. Do not immerse or soak the glass in any cleaning solution.

Remove dust with a blast of oil-free air or wipe with a clean, lint-free cloth. Isopropyl alcohol, distilled water or a 50%-50% mixture of each can be used to clean the glass surface.
Source Four
User Manual

Production Dates: September 2004 - Present
# Table of Contents

Basic Assembly ................................................. 1
Fixture information ............................................. 2
Replacing the HPL Lamp ......................................... 4
Adjustments ....................................................... 5
  Centering lamp and adjusting the field ....................... 5
  Focusing the beam ............................................ 5
  Shaping the beam ............................................. 6
  Rotating the barrel assembly ................................ 7
  Adjusting the C-clamp ......................................... 7
  Adjusting the yoke position ................................ 8
Cleaning Lens and Reflector ................................. 9
  Cleaning 14°, 19°, 26°, 36°, 50°, 70°, 90° and all EDLT glass lenses .................................................. 9
  Cleaning 5° and 10° polymer lenses .......................... 9
  Cleaning the reflector ....................................... 10


---

ETC®, Emphasis®, Expression®, Insight™, Imagine™, Focus™, Express™, Unison®, Obsession® II, ETCNet2™, EDMX™, Source Four®, Revolution®, Sensor®, and WYSILink™ are either registered trademarks or trademarks of Electronic Theatre Controls, Inc. in the United States and other countries.

All other trademarks, both marked and not marked, are the property of their respective owners.
**Basic Assembly**

**WARNING:**

Please note the following safety warnings before use:

*Do not mount the fixture on or near combustible surfaces.*

*Do not operate the fixture without a lens installed.*

*Always hang the fixture with the color frame retaining clip in the locked position.*
**Fixture information**

**HPL lamp table**

**CAUTION:** Do not use lamps other than the HPL in Source Four fixtures. **Use of lamps other than HPL will void UL/cUL safety compliance and your warranty.**

<table>
<thead>
<tr>
<th>Lamp code</th>
<th>Watts</th>
<th>Volts</th>
<th>Initial Lumen</th>
<th>Color temp.</th>
<th>Average rated life</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPL 700/77</td>
<td>750</td>
<td>77</td>
<td>22,900</td>
<td>3,250°K</td>
<td>300 hours</td>
</tr>
<tr>
<td>HPL 550/77X</td>
<td>590</td>
<td>77</td>
<td>18,170</td>
<td>3,250°</td>
<td>300 hours</td>
</tr>
<tr>
<td>HPL 585/77X</td>
<td>590</td>
<td>77</td>
<td>12,160</td>
<td>3,250°</td>
<td>2000 hours</td>
</tr>
<tr>
<td>HPL 750/115</td>
<td>750</td>
<td>115</td>
<td>21,600</td>
<td>3,250°K</td>
<td>300 hours</td>
</tr>
<tr>
<td>HPL 750/115X</td>
<td>750</td>
<td>115</td>
<td>16,400</td>
<td>3,050°K</td>
<td>1500 hours</td>
</tr>
<tr>
<td>HPL 575/115</td>
<td>575</td>
<td>115</td>
<td>16,520</td>
<td>3,250°K</td>
<td>300 hours</td>
</tr>
<tr>
<td>HPL 575/115X</td>
<td>575</td>
<td>115</td>
<td>12,360</td>
<td>3,050°K</td>
<td>2000 hours</td>
</tr>
<tr>
<td>HPL 375/115</td>
<td>375</td>
<td>115</td>
<td>10,540</td>
<td>3,250°K</td>
<td>300 hours</td>
</tr>
<tr>
<td>HPL 375/115X</td>
<td>375</td>
<td>115</td>
<td>8,090</td>
<td>3,050°K</td>
<td>1500 hours</td>
</tr>
<tr>
<td>HPL 700/120</td>
<td>750</td>
<td>120</td>
<td>21,600</td>
<td>3,250°K</td>
<td>300 hours</td>
</tr>
<tr>
<td>HPL 700/120X</td>
<td>750</td>
<td>120</td>
<td>16,400</td>
<td>3,050°K</td>
<td>1500 hours</td>
</tr>
<tr>
<td>HPL 750/120</td>
<td>750</td>
<td>120</td>
<td>16,520</td>
<td>3,250°K</td>
<td>300 hours</td>
</tr>
<tr>
<td>HPL 575/120</td>
<td>575</td>
<td>120</td>
<td>12,360</td>
<td>3,250°K</td>
<td>2000 hours</td>
</tr>
<tr>
<td>HPL 750/230</td>
<td>750</td>
<td>230</td>
<td>19,750</td>
<td>3,250°K</td>
<td>300 hours</td>
</tr>
<tr>
<td>HPL 750/230X</td>
<td>750</td>
<td>230</td>
<td>15,600</td>
<td>3,050°K</td>
<td>1500 hours</td>
</tr>
<tr>
<td>HPL 575/230</td>
<td>575</td>
<td>230</td>
<td>14,600</td>
<td>3,250°K</td>
<td>400 hours</td>
</tr>
<tr>
<td>HPL 575/230X</td>
<td>575</td>
<td>230</td>
<td>11,780</td>
<td>3,050°K</td>
<td>1500 hours</td>
</tr>
<tr>
<td>HPL 375/230</td>
<td>375</td>
<td>230</td>
<td>7,250</td>
<td>3,000°K</td>
<td>1000 hours</td>
</tr>
<tr>
<td>HPL 750/240</td>
<td>750</td>
<td>240</td>
<td>19,750</td>
<td>3,200°K</td>
<td>300 hours</td>
</tr>
<tr>
<td>HPL 750/240X</td>
<td>750</td>
<td>240</td>
<td>15,600</td>
<td>3,050°K</td>
<td>1500 hours</td>
</tr>
<tr>
<td>HPL 575/240</td>
<td>575</td>
<td>240</td>
<td>14,600</td>
<td>3,050°K</td>
<td>400 hours</td>
</tr>
<tr>
<td>HPL 575/240X</td>
<td>575</td>
<td>240</td>
<td>11,780</td>
<td>3,050°K</td>
<td>1500 hours</td>
</tr>
<tr>
<td>HPL 375/240X</td>
<td>375</td>
<td>240</td>
<td>7,250</td>
<td>3,000°K</td>
<td>1000 hours</td>
</tr>
</tbody>
</table>

*To be used with ETC Dimmer Doubler™*

**Color frame holder.**

Retaining clip in the locked position

![Figure 2](image)

The color frame holder is equipped with a spring-loaded retaining clip that prevents color frames and accessories from falling out. See **Figure 2**.

**WARNING:** Make sure all color frame accessories are locked in position with the retaining clip before hanging the Source Four fixture.

**Step 1:** Release the retaining clip by pushing it sideways while gently pulling backwards.
Step 2: Insert the color frame.
Step 3: Lock the retaining clip by pushing sideways while gently pushing forward.

**Note:**

The performance of saturated colors may be less than desirable in any theatrical lighting fixture, especially when equipped with a 750w lamp. For best results, always use high-quality color media rated for high-temperature use.

ETC’s optional Conical Gel Extender, part # 7060A1048, will provide maximum color media life. For 14° lens tubes, use part # PSF1029. Gel Extenders are not recommended for 70° and 90° lens tubes due to the extremely wide-angle beam.

A variety of heat shield products is also available from many color media manufacturers. Follow the manufacturer’s instructions for the use of these products.

For maximum gel life with specific lens tubes, refer to the tables below.

<table>
<thead>
<tr>
<th>Lens Tube</th>
<th>Soft Focus Back (Lamp &quot;flat&quot;)</th>
<th>Sharp Focus (Lamp &quot;cosine&quot;)</th>
<th>Soft Focus Forward (Lamp &quot;peak&quot;)</th>
<th>Soft Focus Forward (Lamp &quot;cosine&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14°</td>
<td>worse</td>
<td>good</td>
<td>best</td>
<td>good</td>
</tr>
<tr>
<td>70°</td>
<td>best</td>
<td>good</td>
<td>worse</td>
<td>good</td>
</tr>
<tr>
<td>90°</td>
<td>best</td>
<td>good</td>
<td>good</td>
<td>worse</td>
</tr>
<tr>
<td>19°</td>
<td>worse</td>
<td>better</td>
<td>better</td>
<td>not applicable</td>
</tr>
<tr>
<td>26°</td>
<td>worse</td>
<td>better</td>
<td>better</td>
<td>not applicable</td>
</tr>
<tr>
<td>36°</td>
<td>better</td>
<td>better</td>
<td>worse</td>
<td>not applicable</td>
</tr>
<tr>
<td>50°</td>
<td>worse</td>
<td>better</td>
<td>better</td>
<td>not applicable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ED Lens Tube</th>
<th>Soft Focus Back (Lamp &quot;flat&quot;)</th>
<th>Sharp Focus (Lamp &quot;cosine&quot;)</th>
<th>Soft Focus Forward (Lamp &quot;peak&quot;)</th>
<th>Soft Focus Forward (Lamp &quot;cosine&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>19°</td>
<td>worse</td>
<td>better</td>
<td>better</td>
<td>not applicable</td>
</tr>
<tr>
<td>26°</td>
<td>better</td>
<td>better</td>
<td>worse</td>
<td>not applicable</td>
</tr>
<tr>
<td>36°</td>
<td>better</td>
<td>better</td>
<td>worse</td>
<td>not applicable</td>
</tr>
<tr>
<td>50°</td>
<td>better</td>
<td>better</td>
<td>worse</td>
<td>not applicable</td>
</tr>
</tbody>
</table>
Replacing the HPL Lamp

A lamp must be installed before you use the fixture.

**Note:** Verify that the HPL lamp you intend to install is suitable for your facility’s voltage; 115-, 120-, 230-, and 240-volt HPL lamps are available. See HPL lamp table, page 2. Operating HPL lamps above their rated voltage reduces lamp life and can cause premature lamp failure.

**WARNING:** Let the lamp cool before replacing.

Step 1: Disconnect power to the Source Four before installing the lamp.
Step 2: Loosen the knurled bolt on the back of the lamp housing and pull the housing out.
Step 3: Holding by the base, remove the HPL lamp from its box.

**CAUTION:** Use caution when installing or replacing any lamp. When installing/Replacing lamp, be sure to point the lamp away from your face and away from others before inserting it firmly into the assembly. This may prevent injuries if the lamp should break.

**Note:** To avoid premature lamp failure, do not touch the lamp glass. If you do, clean it carefully with isopropyl alcohol and a clean lint-free cloth. Allow to dry before operation.

Step 4: Align the flat sides of the lamp base with the retention brackets on either side of the socket as shown in Figure 3.
Step 5: Push down on the lamp base until the lamp seats firmly. When properly installed, the top of the lamp’s base will be even with the top edges of the retention brackets.

**CAUTION:** Improperly installed lamps cause premature lamp failure and socket problems.

Step 6: Press lamp retaining clip across lamp base to secure.
Step 7: Reinstall the lamp housing by aligning the bolt hole and tightening the knurled bolt.
Adjustments

Centering lamp and adjusting the field

The two concentric knobs located on the lamp housing allow you to align the lamp and adjust its field. See Figure 4. The outer knob centers the lamp within the reflector. The inner knob adjusts the lamp’s field.

Step 1: Turn on the Source Four and aim it at a flat surface. Adjust the barrel to create a hard edge.
Step 2: Unlock and loosen the outer knob by turning it counterclockwise.
Step 3: Gently move the outer knob from side to side and up and down until the lamp is centered within the reflector.
Step 4: Once the lamp is centered, turn the outer knob clockwise to lock it in place.
Step 5: Finally, turn the inner knob either clockwise or counterclockwise to achieve an optimum flat field. See Figure 5.

Focusing the beam

Step 1: Loosen the beam focus knob located under the barrel as shown in Figure 6.
Step 2: Slide the lens tube forward or backward to achieve the desired beam edge.
Step 3: Once the fixture is focused, tighten the beam focus knob.
Shaping the beam

The beam can be shaped using the shutters (see Figure 1), a pattern, an optional drop-in iris, or by rotating the barrel.

Pattern Projection

The pattern holder slot is on the top side of the barrel and in front of the shutters. It accommodates A-size, B-size and glass pattern holders (see Figure 7).

A-Size Pattern holder:
holds 3" diameter patterns

B-Size Pattern holder:
holds 2.5" and 2.75" diameter patterns

Figure 7

Note: Because the Source Four aperture is 3 inches wide, ETC recommends using A-size patterns for maximum pattern effectiveness.

Note: Enhanced Definition Lens Tubes (EDLT) provide for a crisper pattern projection.

Use an optional donut in the accessory holder to enhance pattern projection. Donut diameter range should be 2.5" to 2.75".

Drop-In Iris Slot

The drop-in iris slot is located on the top of the barrel and in front of the pattern holder slot. It accommodates either a drop-in iris or a motorized pattern device. When the slot is not in use, a small sheet metal cover secured with two Phillips screws prevents light leakage (see Figure 8).

Step 1: Use a Phillips screwdriver to loosen the screws on the drop-in iris slot cover. Do not remove screws.

Step 2: Slide the cover completely forward to expose the slot.

Step 3: Insert the iris or motorized pattern device. For an iris, install the flat side toward the shutters and make sure the iris handle extends from the slot.
Step 4: Slide the slot cover back toward the shutters until it meets the iris handle. Leave enough space to move the iris handle.

Step 5: Secure the drop-in iris slot cover by tightening the screws.

**Rotating the barrel assembly**

![Figure 9](image)

**Barrel rotation knob**

Step 1: Loosen the barrel rotation knob directly behind the shutters on the underside of the reflector housing (see Figure 9). Do not remove the barrel rotation knob.

Step 2: Rotate the barrel to the desired position (up to 25° in either direction from the centered position).

Step 3: Once the barrel is positioned, tighten the barrel’s rotation knob to lock it in place.

**Adjusting the C-clamp**

![Figure 10](image)

**C-clamp**

**Pan screw**

**Pipe bolt**

**Yoke bolt and lockwasher**

The C-clamp attaches the fixture to the mounting pipe and allows you to adjust the position of the fixture once it is mounted (see Figure 10).

Step 1: Tightly fasten the C-clamp to the yoke with the provided yoke bolt and lock washer.

Step 2: Place the C-clamp on mounting pipe, then tighten the pipe bolt to secure it.

Step 3: Loosen the C-clamp pan screw and rotate the yoke to the desired position.

Step 4: Tighten the pan screw to lock the fixture.
Adjusting the yoke position
The Source Four provides multi-positioning capabilities within its yoke for overall fixture height and angle.

Setting the fixture height within the yoke
The Source Four has a two-position yoke for modifying the overall height in which the fixture is mounted (see Figure 11). To change the height position, perform the following steps.

Step 1: Remove the yoke locking knobs, washers, and hex bolts from either side of the fixture.
Step 2: Raise or lower the fixture to the desired position within the yoke.
Step 3: Reinstall the yoke’s hex bolts, washers, and locking knobs.
Step 4: Tighten the yoke knobs to secure in position.

Setting the angle within the yoke

Step 1: Loosen the yoke locking knobs (see Figure 12). Do not remove them.
Step 2: Tilt the fixture to the desired position.
Step 3: Tighten the yoke locking knobs to secure in position.
Cleaning Lens and Reflector

**WARNING:** Do not use ammonia-based or other harsh commercial cleaners. Clean lens and reflector only as directed. Commercially available glass cleaning agents should be avoided as they may contain ammonia, other harsh chemical detergents or abrasive agents. These cleaners may damage the glass surface and the Anti-Reflective coatings. Do not immerse or soak the glass in any cleaning solution.

Replace lenses if they contain visible damage (cracks or deep scratches) that may impair their effectiveness.

**Cleaning 14°, 19°, 26°, 36°, 50°, 70°, 90° and all EDLT glass lenses**

**Step 1:** Remove the beam focus knob and retainer bolt from the barrel (see Figure 1). Remove the lens tube from the barrel.

**Step 2:** Remove dust with a blast of oil-free air or wipe with a clean, lint-free cloth. Isopropyl alcohol, distilled water or a 50%-50% mixture of each can be used to clean the glass surface.

**Step 3:** Slide the lens tube back into the barrel with the color frame retaining clip on top. Reinstall the beam focus knob and retainer bolt.

**Cleaning 5° and 10° polymer lenses**

To quickly clean the lenses, remove dust with a blast of oil-free air. If this is not sufficient, follow these steps.

**CAUTION:** Handle polymer lenses by their edges only. Never rub anything dry on a polymer lens.

**Step 1:** Remove the beam focus knob at the bottom of the barrel (see Figure 1). Remove the lens tube from the barrel.

**Step 2:** Use a Phillips screwdriver to remove the brackets that hold the lens in place. Remove the lens from the tube.

**Step 3:** Dip the lens in a clean isopropyl alcohol/water mixture (9 parts water to 1 part isopropyl alcohol).

**Step 4:** Use a soft moistened nylon bristle brush to wash the lens’ smooth side in a linear (non-circular) motion.

**Step 5:** Use the same brush to lightly wash the lens’ ridged side by following its ridges.

**Step 6:** Dip the lens in a clean isopropyl alcohol/water mixture (9 parts water to 1 part isopropyl alcohol).

**Step 7:** Dry the smooth and ridged surfaces with an air gun. Make sure the air flow moves liquid away from you.

**Step 8:** Inspect the lens for dirt. Repeat steps 3-7 if necessary.
Step 9: Set the lens back in the lens tube with the ridged side facing the front of the tube. Reinstall the lens brackets.

Step 10: Slide the lens tube back into the barrel with gel frame retainer on top. Reinstall beam focus knob.

Cleaning the reflector

**WARNING:** Unplug the fixture before attempting to clean the reflector.

To quickly clean the reflector, remove the lens tube and clean the dust from the reflector with a blast of oil-free air. You may also wipe the reflector with a clean lint-free cloth. If either method is not sufficient, follow these steps.

Step 1: To protect the lamp housing during cleaning, remove the lamp housing by loosening the knurled bolt and pulling the housing straight out. See Figure 3.

Step 2: Remove the barrel rotation knob located at the bottom of the barrel (see Figure 1). Use a Phillips screwdriver to remove the retainer bolt located on top of the reflector housing.

Step 3: Rotate the barrel 45° in either direction. Carefully remove the barrel from the reflector housing.

Step 4: Remove dust with a blast of oil-free air or wipe with a clean, lint-free cloth. Isopropyl alcohol, distilled water or a 50%-50% mixture of each can be used to clean the glass surface.

Step 5: Insert the barrel into the reflector housing with the iris/pattern slot on top. Align the triangles on both parts.

Step 6: While gently pressing in, rotate the barrel 45° clockwise until it sets into position, then rotate the barrel counterclockwise 45°. The barrel should be firmly attached and the triangles should be aligned.

Step 7: Reinstall the barrel rotation knob and tighten the retainer bolt.

Step 8: Reinstall the lamp housing and tighten the knurled bolt.
ETC ARCHITECTURAL

Unison® External Processing Rack

ER Series

GENERAL INFORMATION

Unison ER Series brings the power of Unison control to your distributed Unison Sensor or other DMX-512 dimming system.

APPLICATIONS
- Churches
- Hotels
- Convention Centers
- Theatres
- Schools
- Restaurants
- Theme Parks

FEATURES
- Low profile rack
- Fully pre-wired
- Easy installation, configuration and operation
- Scalable modular processing
- Rack mount options

GENERAL
- 100, 120, 230 and 277 Volt systems
- Ambient Temperature: 32-104°F/0-40°C
- Ambient Humidity: 30-90% (non-condensing)
- UL and cUL LISTED, CE Marked

ORDERING INFORMATION

100-277 Volt - ER Racks

<table>
<thead>
<tr>
<th>Model#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ER4-100</td>
<td>Surface mount - 100V External Processing Rack</td>
</tr>
<tr>
<td>ER4-230</td>
<td>Surface mount - 230V External Processing Rack</td>
</tr>
<tr>
<td>ER4-277</td>
<td>Surface mount - 277V External Processing Rack</td>
</tr>
</tbody>
</table>

Control Modules

<table>
<thead>
<tr>
<th>Model#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CME</td>
<td>Extended Architectural Control Module</td>
</tr>
<tr>
<td>CMEI</td>
<td>Extended Architectural Control Module w/ Network Connections</td>
</tr>
</tbody>
</table>

Options and Modules

<table>
<thead>
<tr>
<th>Model#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGP</td>
<td>Repeater Option Module</td>
</tr>
<tr>
<td>AIR</td>
<td>Rack Air Flow Option Module</td>
</tr>
</tbody>
</table>

Accessories

<table>
<thead>
<tr>
<th>Model#</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RM 5C</td>
<td>19&quot; Rack Mount Kit-5C</td>
</tr>
<tr>
<td>RM 8L</td>
<td>19&quot; Rack Mount Kit-8L</td>
</tr>
</tbody>
</table>
## Specifications

**General**
- External Processing Rack (ER4) houses the architectural control processor and option modules.
- Provides architectural lighting control for Union, Sensor, and other DMX512 dimming racks.
- Ambient room temperature: 0-40°C / 32-104°F.
- Ambient humidity: 30-90% non-condensing.
- All racks UL and cUL LISTED.

**Mechanical**
- 18-gauge formed steel panels.
- Fine-textured, scratch-resistant, epoxy paint.
- ER4 may be wall mounted, or rack mounted when installed with the Rack mount kit (RM SC).Tests, buttons, and side knockouts facilitate conduit entry.
- Full height hinged locking door.
- No tools required for module removal or installation.
- Front access to all wiring and terminations.

**Electrical**
- External Processing Racks are available in 100-120, 230 and 277 volt, single phase configurations.
- Completely pre-wired by the manufacturer.
- Designed to support the following wire terminations:
  - AC (single phase)
  - Echelon Link Power.
  - DMX512 In.
  - DMX512 Out.
  - RS232 Serial In/Out.
  - Category 5 UTP (CMEI only).
  - Multi-Mode Fiber Optic with ST Connector (CMEI only).
- Contractor supplies the input and control wiring.
- All control wire terminations are terminated via the factory-provided connectors.

### Control Module Variants
- CME - Control module with station processor.
- CMEI - Control module with station processor and network connections.
- The CM contains a nine button membrane overlay and a two line by 20 character LCD for system configuration, testing and diagnostics.
- The architectural station processor (S) accepts Echelon Link Power control signals from the Union control stations and remote interfaces.
- The Link Power network utilizes a polarity independent, low-voltage Class II twisted pair wiring.
- Belden type 8471 (unshielded) or Belden 8719 (shielded) or equivalent and (3) #14 EIC drain wire (drain wire not required for systems installed in metal conduit).
- Network wiring may not exceed 1500' (500m) without the use of a repeater (REP). The repeater option module increases network wire length in increments of 1500' (500m).
- Control wiring terminates in the ER rack via provided connectors.
- Architectural station processors require a Light Manager system configuration.
- Station configuration and program information are stored in non-volatile flash memory.
- A 3.5" floppy disk drive is used to facilitate loading of station configuration into the system processor (CME & CMEI).
- CMEI control modules allow connection to an Ethernet network for system configurations and monitoring, via Cat 5 or Fiber Optic.
- The architectural processor controls 512 dimmers, 512 zones with 32 wall stations - 4 LCD stations maximum.
- A Repeater option module (REP) may be used to increase station count in increments of 32.

### Option Module
- Option modules are housed in a formed steel body and require no discrete wire connections.
- Tool-free insertion and removal.

### Option Module Variants include:
- REP - Repeater Option module, which provides:
  - Repeated Link Power and 4A/FOS control power
  - Adds 1500' (500m) to the total potential wire run.
  - Pwers additional 32 wall stations.
  - Pows 4 LCD or PC interface stations.
- AIR - Airflow Option modules are required for any empty option module space in the ER4 enclosure.

### Accessories
- A 19" rack mount kit (RM SC) also available.

---

764 of 1217
Unison® External Processing Rack

ER Series

WIRING

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
<th>Maximum Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unison Link Power (LP)</td>
<td>Belkin 8471</td>
<td>1640' (500m)</td>
</tr>
<tr>
<td>AUX Power</td>
<td>[2] #18AWG</td>
<td></td>
</tr>
<tr>
<td>ESD Ground</td>
<td>[1] #14AWG</td>
<td></td>
</tr>
<tr>
<td>DMX</td>
<td>[1] Belkin 9225</td>
<td>1640' (500m)</td>
</tr>
<tr>
<td>ETCNet2</td>
<td>[1] CAT5-UTP</td>
<td>328 ft (100m)</td>
</tr>
</tbody>
</table>
Unison® External Processing Rack

ER Series

ER 4 Wall Mount

TOP VIEW

FRONT VIEW

BOTTOM VIEW

DIMENSIONS

<table>
<thead>
<tr>
<th>Rack Dimensions</th>
<th>Height</th>
<th>Width</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>inches</td>
<td>mm</td>
<td>inches</td>
</tr>
<tr>
<td>ER4</td>
<td>16.25</td>
<td>412.8</td>
<td>15.5</td>
</tr>
<tr>
<td>ER4-RM</td>
<td>17.50</td>
<td>448.5</td>
<td>19.0</td>
</tr>
</tbody>
</table>

ER 4 Rack Mount

TOP VIEW

FRONT VIEW

BOTTOM VIEW

WEIGHTS

<table>
<thead>
<tr>
<th>Rack Weights*—no modules</th>
<th>Weight</th>
<th>Shipping Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>lbs</td>
<td>kgs</td>
</tr>
<tr>
<td></td>
<td>kgs</td>
<td>lbs</td>
</tr>
<tr>
<td>ER4</td>
<td>20</td>
<td>9.24</td>
</tr>
<tr>
<td>ER4-RM</td>
<td>24</td>
<td>10.9</td>
</tr>
</tbody>
</table>

*Weights and Dimensions typical
ETC
ER4-120
Unison External Processing Rack
Manual Quick Guide

How do you configure the system?...........................................Page 5
How do you configure the architectural processor?........................Page 11
How do you maintain the system?...........................................Page 21
What does this error message mean?......................................Page 27
How do you use the menus?
Architectural menu..........................................................Page 33
Dimmer menu.................................................................Page 35

Have a question?.............................................................Page 23

Need more information?
Go on the web: www.etcconnect.com
ETC ARCHITECTURAL

ER & DR Dimming Rack
Unison™ Lighting Control System
Owner’s Manual
## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>3</td>
</tr>
<tr>
<td>Warning and notice conventions</td>
<td>3</td>
</tr>
<tr>
<td>Important notes</td>
<td>3</td>
</tr>
<tr>
<td>System configuration</td>
<td></td>
</tr>
<tr>
<td>To access configuration menus</td>
<td>5</td>
</tr>
<tr>
<td>To initialize a dimming rack</td>
<td>5</td>
</tr>
<tr>
<td>To detail dimming circuits</td>
<td>6</td>
</tr>
<tr>
<td>To enter Dimmer Doubling (DD) settings</td>
<td>7</td>
</tr>
<tr>
<td>To set dimmer levels in the Test submenu</td>
<td>8</td>
</tr>
<tr>
<td>To set dimmer levels in the Set All submenu</td>
<td>8</td>
</tr>
<tr>
<td>To set the Backup look</td>
<td>9</td>
</tr>
<tr>
<td>Configuring the Architectural Processor</td>
<td></td>
</tr>
<tr>
<td>To load a Unison Light Manager configuration in to the control processor</td>
<td>11</td>
</tr>
<tr>
<td>To bind control stations to the architectural processor</td>
<td>12</td>
</tr>
<tr>
<td>To unbind control stations (optional)</td>
<td>13</td>
</tr>
<tr>
<td>To enter the Date and Time local control settings</td>
<td>14</td>
</tr>
<tr>
<td>To enter your location settings</td>
<td>15</td>
</tr>
<tr>
<td>Working in the Setup menu</td>
<td>16</td>
</tr>
<tr>
<td>Working in the Diagnostics menu</td>
<td>19</td>
</tr>
<tr>
<td>To save the installed configuration</td>
<td>20</td>
</tr>
<tr>
<td>Maintaining Your Unison System</td>
<td></td>
</tr>
<tr>
<td>Cleaning dimming rack air filters</td>
<td>21</td>
</tr>
<tr>
<td>Appendix A: Frequently Asked Questions</td>
<td>23</td>
</tr>
<tr>
<td>Appendix B: Error Message Chart</td>
<td>27</td>
</tr>
<tr>
<td>Appendix C: Wall Station ID Chart</td>
<td>29</td>
</tr>
<tr>
<td>Appendix D: Rack Configuration Chart</td>
<td>31</td>
</tr>
<tr>
<td>Appendix E: Architectural Menu Flow Chart</td>
<td>33</td>
</tr>
<tr>
<td>Appendix F: Dimmer Menu Flow Chart</td>
<td>35</td>
</tr>
<tr>
<td>Appendix G: U.S. Time Zone and Location Map</td>
<td>37</td>
</tr>
</tbody>
</table>

770 of 1217
Introduction

Warning and notice conventions

Throughout this guide, these symbols are used to indicate warning, caution and points of interest.

Note
Calls your attention to important additional information.

Warning
Alerts you to dangers that could cause serious injury or death to you or those working with you.

Caution
Alerts you to dangers that could damage the equipment.

Important Notes

Warning: Risk of electrical shock.

This equipment should be installed and wired by a qualified electrician. Always follow applicable building and electrical codes when installing this equipment. If you are not sure if your installation complies with local or national codes, contact your local building inspector. Service by qualified personnel only.
System configuration
Unison rack dimming software version 2.0

To access configuration menus

1. Press the concealed menu activate button for three seconds. Menu screen will appear. See Figure 1 for concealed button.
2. Press [up arrow] or [down arrow] to scroll through bracketed options.
3. Press [Enter] to move bracket placement to the right.

![Diagram of control module interface](image)

Figure 1: Control module interface for the Dimmer Menu

To reset a Control Module

When the rack door is open, a Reset button is available in the top right corner. Pressing it restarts the Control Module using saved settings. Resetting will temporarily interrupt all Control Module processing. Lights will flash momentarily or may go out while system boots.

To initialize a dimming rack

Initialization refers to the programming of rack voltage, size and DMX start address. The first time you access menus on a Unison dimming rack, you must initialize the dimming system processor.

2. Press the concealed "Initialization activate" button for three seconds. The [Stat] menu will be displayed.
3. Use [A] or [V] to scroll to the [Rack] menu.
4. Press [Enter] to move the brackets underneath Control and use [A] or [V] to select the the appropriate dimming rack or external processing rack control module.
5. If you have selected a dimming rack, move the brackets underneath Rack and use [A] or [V] to select either DR6 or DR12.
6. Press [Enter] to move the brackets underneath Volt and use [A] or [V] to select the voltage that matches your feed, either 100-120, 120 Delta or 277 VAC.
7. Press [Enter] to move the brackets underneath Start and use [A] or [V] to enter a DMX512 channel number (between 1 and 512) applied to the first dimmer in the rack. Succeeding DMX channel numbers are automatically applied to the remaining dimmers.

Continued on next page...

Unison ER and DR Dimming Rack Owner's Manual
8. Press [Enter] to move the brackets underneath Sequencing. Select either Straight or Balanced.

Straight or Balanced refers to how the DMX addresses will be distributed to the dimmers. Straight indicates that the distribution will be sequential starting at one. Balanced indicates that sequential loads will be distributed evenly over the three phases in the rack.

Note: Single-phase racks cannot be phase balanced, as the racks are not split evenly.


To detail dimming circuits

The Unison dimming processor is designed to control (dim) multiple lighting circuits. Control of each circuit is based on installed module type, connected load type, DMX address and circuit mode.

1. Access configuration menu (press the Unison Menu activation button.)

2. Scroll to [CnfG] with [A] or [V] and press [Enter]. The brackets move to the circuit number.

Note: Circuit numbers start with “1” for the first dimmer in the top slot of the rack. A rack can have one or two dimmer circuits per module. Dimmer load wire lugs are also labeled by circuit number.

3. Select the desired circuit number with [A] or [V] and press [Enter]. The display changes to Module Type.

4. Select the correct module type with [A] or [V] and press [Enter]. The display changes to Load Type.

Table 1: Dimmer modules and load types

<table>
<thead>
<tr>
<th>Module Type</th>
<th>Description</th>
<th>Compatible loads</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-120 Volt Rack</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AFM</td>
<td>Required in empty dimmer slots</td>
<td>None</td>
</tr>
<tr>
<td>D15 and D20</td>
<td>Standard 15 or 20 amp dimmer</td>
<td>Incandescent, 2- and 4-wire fluorescent, Low voltage, Neon, Cold cathode (CC), Non-Dim</td>
</tr>
<tr>
<td>D15E and D20E</td>
<td>500/s rise time</td>
<td></td>
</tr>
<tr>
<td>D15G and D20G</td>
<td>300/s rise time</td>
<td></td>
</tr>
<tr>
<td>R15 and R20</td>
<td>15 and 20 amp mechanically held relay</td>
<td>Any switched load</td>
</tr>
<tr>
<td>D15F and D20F</td>
<td>15 and 20 amp fluorescent dimmer</td>
<td>3 wire fluorescent dimmer ballasts</td>
</tr>
<tr>
<td>CC15 and CC20</td>
<td>Direct connection from line to load</td>
<td>Non-dim loads like color changer power supplies</td>
</tr>
<tr>
<td></td>
<td>lugs protected by a 15 or 20 amp circuit breaker</td>
<td></td>
</tr>
</tbody>
</table>

Note: "CC" (constant current) module types do not indicate Cold Cathode.

277 Volt Rack

| AR15 and AR20  | 15 and 20 amp mechanically held relay      | Any switched load                       |
| AD15 and AD20  | 15 and 20 amp dimmer                       | Incandescent, 2- and 4-wire fluorescent, Low voltage, Cold cathode (CC), Non-Dim |
| AD15F and AD20F| 500/s rise time                            |                                         |
| AD15G and AD20G| 300/s rise time                            |                                         |
| AD15E and AD20E| 500/s rise time                            |                                         |
| AD15F and AD20F| 15 and 20 amp fluorescent dimmer           | 3 wire fluorescent dimmer ballasts      |

Electronic Theatre Controls, Inc.
5. Select the desired load type with [A] or [Y] and press [Enter]. The display changes to DMX. The number displayed refers to the DMX channel.

Note: When the Airflow module is selected, the display goes directly to the Save Changes? screen. The display returns to the Ckt screen where you can begin detailing another circuit.

Table 2: Load type setting options

<table>
<thead>
<tr>
<th>Load type</th>
<th>Setting options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-dim</td>
<td>DMX512 channel</td>
</tr>
<tr>
<td>Fluorescent (2, 3, 4 wire)</td>
<td>DMX512 channel, Ballast Type</td>
</tr>
<tr>
<td>Incandescent</td>
<td>DMX512 channel, DD (Dimmer Doubling) settings</td>
</tr>
<tr>
<td>Low Volt</td>
<td>DMX512 channel</td>
</tr>
<tr>
<td>Neon, CC (Cold Cathode)</td>
<td>DMX512 channel, Ballast Type</td>
</tr>
</tbody>
</table>

6. Select the desired DMX512 address with [A] or [Y] and press [Enter]. The brackets move to Mode.

Note: It is important to note the circuit to DMX channel assignments. Select the DD mode with [A] or [Y] and press [Enter].

Caution: Dimmer doubling is only available in 120V systems using Source Four fixtures with 7V lamps.

7. If a 2-, 3-, 4-wire fluorescent or Neon/CC is selected in load type, the display will move to Ballast Type. Use [A] or [Y] to scroll to the correct type.


To enter Dimmer Doubling (DD) settings

Dimmer Doubling (DD) can only be used in 120V systems using D15, D20, D15E, and D20E modules. This feature is used for applications where ETC Dimmer Doubling and Sourc 4 equipment is used. If you have not purchased Dimmer Doublers, this feature must be turned off.

1. Select either [DD_OFF] or [DD_ON] with [A] or [Y] to enable or disable Dimmer Doubling and press [Enter]. The display returns to [DD, DMX]. If you select [DD, Off], Save Changes? displays.

2. Select the desired DMX512 address with [A] or [Y] and press [Enter]. Use the default address number (the DMX address plus 256) unless a different address is specified. The display changes to [Save Changes?].
To set dimmer levels in the Test submenu

You can use the Test submenu to set dimmer levels to test your dimmer circuit wiring or lighting load operation. Test also allows you to view DMX levels being received by the dimming processor.

1. Access the configuration menu (press the Unison Menu activation button.)

2. Scroll to [Test] with [A] or [V] and press [Enter]. The brackets move to Ckt. The DMX input value for that circuit is displayed between a range of 0 and 255.

3. Use [A] or [V] to scroll to the desired circuit number and press [Enter]. The brackets move to Level. This shows all DMX to the rack. DMX levels are held at last look and DMX level changes have no effect.

4. Use [A] or [V] to scroll to the circuit output level. Circuit output will continuously match the levels as they scroll. Press [Exit] to set levels on another circuit or [Enter] to go to Restore DMX. (Restoring DMX will cancel all test levels.)

   Note: Circuit levels will remain at their test setting when you press [Exit]. You can set levels for all the dimmer circuits by repeating steps 2 and 3.

5. Use [A] or [V] to scroll to [Yes] to clear the test settings and restore DMX or [No] to temporarily keep the look and press [Enter].

   Note: If you keep the test settings, DMX512 input is disabled until you return to the Test menu and restore DMX.

To set dimmer levels in the Set All submenu

The [Set All] submenu is an additional test menu. It allows you to change all of the levels in the dimmer rack.

1. Access the configuration menu (press the Unison Menu activation button.)

2. Scroll to [Set All] with [A] or [V] and press [Enter].

3. Use [A] or [V] to change the level of all dimmers.

4. Press [Enter], and use [A] or [V] to scroll to [Yes] to clear the [Set All] and restore DMX. Or [No] to temporarily keep the look and press [Enter].
To set the Backup look

In the event of console failure, the backup look enables you to activate a single preset at the CMD or CMFD.

1. Access the configuration menu.
2. Scroll to [Backup] with [▲] or [▼] and press [Enter]. The brackets move to Mode.

3. Scroll to [Record] with [▲] or [▼] and press [Enter]. The system will record current levels.
   
   **Note:** Any "Test" or "Set All" levels will also be recorded if DMX is not active.

4. Use [▲] or [▼] to select if programmed backup look should play at boot-up of system processor. Select [Yes] or [No] and press [Enter].

5. Scroll to [Yes] to save changes and press [Enter].

   **Note:** playing the backup look will disable DMX or test levels to the dimming rack.
Configuring the Architectural Processor
Application and Light Manager software version 1.65

You configure the architectural processor for your system using the Unison (Architectural) menu. This menu lets you load the provided configuration, enter the Unison local control settings and other information used by the control processor.

Each Unison control system has one architectural processor.

▼ If your system has an External Processing Rack, its control module will contain the architectural processor.

▼ If your system does not have a processing rack, the architectural processor is in the control module of one of your Unison Dimmer Racks.

Note: You can tell which dimming rack control module contains the architectural processor by looking at the label on the right side of the faceplate. CMSd, CMFd and CMEI control modules contain an architectural processor. CMD modules do not.

From the dimming rack

▼ Access the Unison menu and scroll to [ARCH] with [↑] or [↓] and press [Enter]. The Unison menu will be displayed.

From the external processing rack

▼ Access the Unison menu and scroll to [ARCH] with [↑] or [↓] and press [Enter]. The Unison menu will be displayed.

To load a Unison Light Manager configuration into the control processor

The Light Manager configuration provides system parameters such as number of rooms, number of zones in each room, number of presets and type and placement of stations.

1. Open the rack door and find the 3.5" disk drive slot on the right side of the Control Module.
2. Insert the disk containing the configuration into the drive.
3. Access the Unison menu and scroll to [Load from Disk] with [↑] or [↓] and press [Enter].
4. Scroll to the desired configuration name with [↑] or [↓] and press [Enter].

Note: Reading a configuration will overwrite the configuration currently in the processor. Save to disk before reading in a new configuration if you are unsure.

5. Loaded displays when the configuration is loaded from the 3.5" floppy disk. Press [Enter] to return to the Unison menu.

Note: It is recommended that you reset the system after loading a configuration to save your internal flash memory.
To bind control stations to the architectural processor

Before the architectural processor can identify signals from the wall stations, it has to link each control station to its ID number. This process is called "binding." Systems with a single station of a particular type (preset, fader, LCD) will automatically bind with the associated ID number.

1. Access the Unison Menu, scroll to [Setup] with [△] or [▼] and press [Enter].

   → Note: Refer to the Control Station ID Chart to find the station ID number of the control you wish to bind.

2. From the [Setup] display, scroll to [Stations] with [△] or [▼] and press [Enter].

3. From the [Stations] display, scroll to [Connect] with [△] or [▼] and press [Enter].

4. The [Choose Room] display shows a list of rooms with unbound control stations. Scroll to the desired room with [△] or [▼] and press [Enter].

5. The [Choose Section] display shows the sections available in divided rooms. Scroll to the desired section with [△] or [▼] and press [Enter].

   → Note: If the selected room is not divided, this display is skipped.

6. The [Choose Station] display scrolls the names of unbound control stations in the section. Scroll to the desired control station with [△] or [▼] and press [Enter].

7. When a control station name is selected, the [Connect to] display shows a list of the station IDs available on the network for that type of station. Scroll to the correct ID with [△] or [▼] and press [Enter].

   → Note: When you are in the [Connect to] menu, pressing a control button on the station you choose in Step 6 will display the ID number of that station. You can use this feature to bind stations if you lose your Control Station ID Chart.

8. The LCD will display [Connected] when the station is bound. The control station is now ready. Press [Enter] to show the next room or section with unbound control stations. Press [Exit] to leave the [Connect] menu.

   → Note: After binding stations, ETC recommends saving the configuration.
To unbind control stations (optional)

When you need to remove or change a station, follow this procedure to unbind a control station from the architectural processor.

1. Access the Unison Menu, scroll to [Setup] with [▲] or [▼] and press [Enter].

2. Scroll to [Stations] with [▲] or [▼] and press [Enter].

3. Scroll to [Disconnect] with [▲] or [▼] and press [Enter].

4. In the Choose Room display [▲] or [▼] scrolls the names of rooms with bound control stations. Press [Enter] to select the desired room.

5. In the Choose Section display [▲] or [▼] scrolls the names of sections with bound control stations. Press [Enter] to select the desired section.

Note: The Choose Section display is skipped for undivided rooms.

6. After you select the section, the display shows a scrolling list of linked stations in that location. Scroll to the desired station with [▲] or [▼] and press [Enter].

7. The message "Disconnected" displays when the control station has been unbound. Press [Enter] to move to the next section or room with bound control stations. If there are no remaining bound control stations in the configuration, the display reverts to the Stations Connect menu.

8. Press [Exit] to move back through the Stations submenu until you return to the Unison menu.
To enter the Date and Time local control settings

Follow this procedure to set the date and time in the astronomical time clock in the architectural processor:

1. Access the Unison Menu, scroll to [Setup] with [▲] or [▼] and press [Enter].

2. Scroll to [Date/Time] with [▲] or [▼] and press [Enter].


4. The Month display scrolls all 12 months with [▲] or [▼]. Press [Enter] to select the correct month.

5. The Date display scrolls days from 1 to 31 with [▲] or [▼]. Press [Enter] to select the correct date.

6. The Hour display scrolls 24 hours in a 12 hour AM/PM format with [▲] or [▼]. Press [Enter] to select the correct hour.

7. The Minute display scrolls from 00 to 59 minutes with [▲] or [▼]. Press [Enter] to select the correct minute.

8. Date/Time Set appears when the Date/Time menu is complete. Press [Enter] to return the display to the Unison menu.
To enter your location settings

The Location menu allows you to enter the installation latitude, longitude, elevation, and time zone into the Unison astronomical time clock. Refer to the Location Map on page 37.

1. Access the Unison Menu, scroll to [Setup] with [△] or [▼] and press [Enter].

2. Scroll to [Location] with [△] or [▼] and press [Enter].

3. The Longitude (deg) display scrolls from 0 to 179 degrees East and West with [△] or [▼]. Press [Enter] to select the correct value.

4. The Longitude (min) display scrolls from 0 to 59 minutes of longitude with [△] or [▼]. Press [Enter] to select the correct value.

5. The Latitude (deg) display scrolls from 0 to 89 degrees North and South with [△] or [▼]. Press [Enter] to select the correct value.

6. The Latitude (min) display scrolls from 0 to 59 minutes of latitude with [△] or [▼]. Press [Enter] to select the correct value.

7. The Altitude display scrolls elevation values in increments of 100 feet (30.5m) with [△] or [▼]. Press [Enter] to select the correct value.

8. The Time Zone display scrolls from 1 to 12 hours before (+) or after (-) Greenwich Mean Time. Scroll to the correct Time Zone with [△] or [▼] and press [Enter].


10. Location Set displays when the Set Location menu is complete. Press [Enter] to return to the Unison menu.
Working in the Setup menu

All of the following Setup menu options will allow you to access, change or set information about your Unison system. See "Appendix E: Architectural Menu Flow Chart" on page 33, for help on maneuvering through the menus.

- **Stations**
  Use this menu to connect (bind) or disconnect stations to the Unison processor. See page 12.

- **Zones**
  Use this menu to change a zone's level, add a dimmer, remove a dimmer, or change the DMX input mode.

- **Presets**
  This option will let you activate, deactivate, record and change the fade time of a Preset.

- **Walls**
  Use this menu to open or close a wall.

- **Load net backup**
  Loads configurations over the network in special Master Controller applications.

- **Date/Time**
  Allows you to display or change the clock information about the system. See "To enter the Date and Time local control settings" on page 14.

- **Location**
  Allows you to display or change astronomical clock information about the system. See "To enter your location settings" on page 16.

- **Format disk**
  See page 20 for more information.

- **Processor/Address**
  Sets the processor IP address for all applications.

**Note:** If you change this address, you must reset the control module for the changes to take affect.

- **Information**
  This menu option gives you detailed information about your configuration, including: numbers of stations and connectors, numbers of rooms and sections, numbers of zones and dimmers, presets and their levels, and processor addresses. See "Working in the Setup Information Menu" on page 17.
Working in the Setup Information Menu

The following Setup menu options will allow you to access, change or set information in the Setup Information menu.

- Number of stations and number of connected stations in the configuration. "Stn:" indicates number of stations in the Light Manager configuration. "Con:" indicates number of bound physical station on the Union Link Power (ULP) network.

- Number of rooms and sections in the configuration

- Number of zones and dimmers in the configuration

- Number of presets and levels in the configuration

- Job or configuration name

- Job or configuration number

- Job location

- Job engineer

- Number of good Union Serial Access Protocol (USAP) commands received

- Number of USAP commands with bad objects

- Number of premature start bits

- Number of commands that were the wrong length
```
Setup Information
[MAC addr: ]

Setup Information
[IP: ]

Setup Information
[IPK: ]

Setup Information
[GW: ]

Setup Information
[CID: ]

▼ MAC address in Hex

▼ IP address

▼ IP Mask number

▼ IP Gateway number

▼ CID number
```
Working in the Diagnostics menu

As with the Setup menu, the Diagnostics menu will allow you to access advanced information about your configuration.

- **Run Macro**
  Runs selected Macro.

- **Stop Macro**
  Stops selected Macro.

- **Dimmers**
  This menu option gives you the specific DMX level information for the selected dimmer.

  ![Dimmer: El Di -> Es Do](image)

  This screen in the [Dimmer] menu shows you the current DMX and DMX levels going in and out of the processor.

- **Stations**
  Use this menu to find out which stations (and their ID numbers) are connected to the network.

- **All Zones Off**
  Turns off all zones that are currently on.

- **Initialize Flash**
  Clears and resets the current flash memory. This will erase the internal system memory.

- **Reset Stations**
  By selecting this option you will be performing a power-only reset on the AUX and Unison Link Power (ULP) lines.

- **Send Object Model**
  Used in specialized networked systems to send information about controls and wall stations.
To format floppy disk (optional)

If you have an unformatted double-sided, high-density disk, you can format it in the Control Module's disk drive.

1. Insert the disk into the disk drive on the right side of the control module. The write-protect tab must be closed. See Figure 2.

2. Access the Unison Menu, scroll to [Setup] with [a] or [v] and press [Enter].

3. Scroll to [Format Disk] with [a] or [v] and press [Enter].
   Formatting disk... displays while the Control Module is formatting the disk. Formatting may take a few moments.

   - "Disk Formatted" displays if formatting is successful. The disk is ready to record a configuration.

   - Formatting failed! displays if there is a problem formatting the 3.5" floppy disk.
   You should check the write-enable tab or use another disk.

To save the installed configuration

You should keep a copy of your installed Unison configuration to another 1.44 MB IBM
DS HD format 3.5" floppy disk (not your original configuration disk.) Saving the installed
configuration records binding and location information entered while binding stations
and setting up the system.

1. To use the Save to disk submenu, insert a correctly formatted disk (see Preparing a
   3.5" floppy disk, above), access the Unison menu, scroll to [Save to disk] with [a]
   or [v] and press [Enter].

2. The Choose Save Name display scrolls the nine name options used by the Control
   Module processor for saving configurations. Names begin with Unison and are
   numbered from 1 to 9. Scroll to the desired name with [a] or [v] and press [Enter].

3. Saved displays when the configuration is saved to the 3.5" floppy disk. Press
   [Enter] to return to the Unison menu.
Maintaining Your Unison System

Cleaning dimming rack air filters

Clean the filter on your dimmer cabinet every six months, more often if your system operates in a dusty environment.

**Caution:** Phase voltages inside the rack can be deadly. Do not remove rack modules. Only qualified technicians should expose the inside of the dimming cabinet. The Unison dimmer rack carries only an IP00 protection rating when control or dimmer modules are removed.

1. Open the dimmer rack door. The filter is mounted on the inside of the door, held in on the bottom by a metal clip.
2. Slide the filter up about 1/2 inch until the filter base clears the top edge of the lip. Pull the base out far enough to clear the retaining lip and slide the filter down and out.
3. Vacuum or blow dust out of the filter.

**Note:** You can wash the filter under clear tap water, but it must be completely dry before you reinstall it. Do not use soap or other chemicals to clean the filter.

4. Slide the top of the filter back into the slot at the top of the door until the base clears the metal retaining lip on the bottom of the door.

**Note:** When you clean the air filter, you should also check the dimmer air vents for dust. See "Vacuuming Dimming Racks" below.

5. Let the filter drop back into place and close the door.

### Vacuuming Dimming racks

You should inspect your dimming rack when you clean the air filter and vacuum the front of the dimmer modules if necessary.

1. Open the door and look at the modules’ air vents. If dust is thick enough to hide the paint color, vacuum the front of the modules.
2. Leave the modules inside the rack. Most dust collects on the dimmer choke vents and grills of the dimmer module.
3. Use a narrow vacuum cleaner nozzle to vacuum dimmer module air vents. Do not push debris into the modules.
4. Close the door.
Appendix A: Frequently Asked Questions

What voltage is required for the LCD station to operate?

The voltage at the LCD should be at least 9.6Vdc. If the voltage is too low the LCD will
get into a power cycling mode. The cycle is created when the backlight circuit draws
more current during the power-up stage, causing the voltage to drop to 5Vdc and reset
the unit. The unloaded output voltage of the AUX control power supply is set at 24Vdc
at the factory. The maximum output voltage is about 14Vdc.

Can I measure the voltages on the link power network to check for faults?

Yes, with a digital volt meter (DVM). Set the DVM to read DC volts and measure the
voltage across the link power terminals, it should read plus or minus 40.5Vdc +/- 1Vdc.
The polarity is not important. Also measure the voltage from each link power terminal
to an earth ground connection. The voltage should read either plus or minus 20.25Vdc
 +/- 1Vdc. One terminal will be 20.25 referenced to earth ground and the other will be
20.26Vdc referenced to earth ground. Abnormal reading will warrant an investigation
to find the fault.

Can any control module be hot-swapped?

No, the inrush current that charges the input capacitors is enough that it can arc across
the card edge connectors. This can damage the connectors and create high resistance
hot-spots on the connectors. Turn off the power feed breaker to the rack when
changing control modules.

I have a multi-rack DR12 system and a CMEd/CMBd control
module driving a series of wall stations. None of the wall
stations seem to be getting power, what’s wrong?

If the wall stations are wired to a properly installed architectural option PCB in one of
the racks, it is likely that the control module installed in that rack does not contain an
architectural processor. The CMEd/CMBd must be located in the same rack to which
the wall stations are wired.

I have a DR12 and regardless of what I do only modules
1,2,3,6,9 and 10 do anything.

The control module is configured for a 6 module rack. To fix the problem enter the
Rack Configuration menu and under the field [rack], select [DR12]. Remember, the menu
is entered by holding the hidden key located just above the second “N” in UNISON on
the membrane overlay. See page 5 for rack initialization instructions.

I have one or two loads that seem to cycle periodically.
When they are off, they’re off for about 2 minutes, then it
comes back on. What’s wrong?

It is likely that you have an over-temperature problem due to the accumulation of dust
in the air filter. The Unison sensor will attempt to restart the over-temperature module
after approximately 2 minutes. Over-temp conditions are detected on a by-module
basis. Thus, all circuits that are controlled by the module will be shut down.

Can the stations be reset without resetting the control
module?

Yes, from the [Diagnostic] section of the Architectural menu, scroll through the menu
until the [Reset Stations] selection appears and hit [Enter]. This will reset the AUX
control power and the link power supplies, which will reset all the stations on the
network.
My control module/stations/fan won't work. What's wrong? (277V only)

Most likely you have blown fuse F1 and it should be replaced. Fuses are located at the bottom of the rack on the left side of the enclosure. See Figure 5 for location of fuses.

I can't access my [ARCH] menu. I've got a dimmer rack with a CMBd/CMEd control module.

If a functioning architectural processor is installed, first enter the [RACK] menu. Scroll to [VOL] (or any other field), scroll up once, scroll down once (the field should be unchanged). Exit the [RACK] menu, answering [YES] to "Save Changes". Reset the control module. You should now be able to access the architectural processor if it exists.

This only occurs in dimming control modules with Architectural processing. Upon initial power-up the interface processor waits approximately 45 seconds for the Architectural processor to initialize. If the Architectural processor does not come on-line in that period, it is assumed that the Architectural processor does not exist and that information is written to non-volatile memory. Without an architectural processor, boot time is reduced from 45 seconds to 10 seconds as the interface processor simply ignores the Architectural processor. The above procedure forces the interface processor to re-recognize the Architectural processor if it exists.

I'm getting a "Zero Crossing" error on my control module. What does that mean? (277V only)

Either fuse F2 or F3 needs to be checked and/or replaced. Fuse F2 is for phase C, and F3 for phase B. See Figure 5 for location of fuses.

I have plugged in my control processor and all the zones have come to full.

Go into the Unison setup menu and scroll to the [DIAGNOSTIC] menu. From there scroll to "all zones off". This will take all levels to zero and you can finish installing the system.

I am trying to communicate with the Unison PC interface, but cannot get a connection.

Make sure that when you attach to the processor that Light Manager is not running. Make the serial connection first, then start Light Manager and try to get a connection. Also check "File/Setup PC Interface" for the correct COM port. Reboot if necessary.

I have a portable station that will not work when I plug it into any of the portable connectors.

When you first install a Unison system with portable stations you must first bind the portable station to each of the portable connectors. After that the portable station will know where it is connected and will work automatically.

I have a Preset station and when I try to play a preset all the LEDs chase.

If the station LEDs chase, it means the station is not "bound" to the processor. Follow the steps on page 12 to manually bind the station.

How do I bind stations?

See "To bind control stations to the Architectural processor" on page 12.
How many stations can I connect/What are the differences between processors?

- CMB - Basic architectural processor
  - 128 dimmers
  - 8 rooms
  - 1200 recordable levels
  - 16 stations (5 LCD)

- CME - Extended architectural processor
  - 512 dimmers
  - 64 rooms
  - 10000 recordable levels
  - 128 stations (5 LCD)

- CMEI - Extended architectural processor with network connections
  - 512 dimmers
  - 64 rooms
  - 10000 recordable levels
  - 126 stations (5 LCD)

My LCD screen looks all scrambled

Bitmap files for fonts and graphics have become corrupted. Try reloading your configuration. If you still have problems, contact ETC Technical Services at 800-776-4382.

I try to bind stations, and all I get is "-----" at the processor.

Either the station is already bound or is not being recognized by the processor. Check the link power connection.

Does it matter what I call my configuration?

No, provided it has a ".clg" suffix.

How do I play/stop a Backup look?

You need to go into the Union menu, and under [Backup] select [Play] or [Stop]. See "To set the Backup look" on page 9.

I set my Backup look to play at boot and now it won't stop.

You need to go into the Union menu, and under [Backup] select [Stop] and "Play At Boot" [No]. See "To set the Backup look" on page 9.

How do I upgrade my processor to a newer version of code?

Contact ETC Technical Services.

My processor will not read disks.

There might be a problem with the floppy drive. Call ETC Technical Services.

How long should the processor say "Booting"?

Depending on the size of the configuration and number of stations, the processor can display this message for a minute or more.
I keep pressing Reset on the CEM to reset my UPSAC, but the stations still don’t work.

The UPSAC system has an external Unison power supply that must be reset as well.

I plugged in my PC to the Interface station. How do I “talk” to the processor?

See the Unison Light Manager Manual, To configure a PC for live control, page 44 for details.

I want to record looks that I have set on my console to presets, how does that work?

In the Unison Light Manager Manual, see Modifying Zone Properties, page 22.
Appendix B: Error Message Chart

Upon starting and during operation of your system, the control module will display messages to indicate system status.

<table>
<thead>
<tr>
<th>DISPLAY MESSAGES</th>
<th>STATUS</th>
<th>SUGGESTED SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>System OK</td>
<td>System operating correctly</td>
<td>None required</td>
</tr>
<tr>
<td>Backup Active</td>
<td>Backup look playing</td>
<td>Turn backup look off</td>
</tr>
<tr>
<td>Test DMX Off</td>
<td>Test menu active</td>
<td>Restore DMX in test menu</td>
</tr>
<tr>
<td>Errors Exist</td>
<td>1 or more circuits have specific errors</td>
<td>Scroll through error list</td>
</tr>
</tbody>
</table>

If errors exist, use the right arrow button to scroll through the list of circuits and associated errors. Multiple errors can be seen by pressing [A] or [v].

Possible error types include:

<table>
<thead>
<tr>
<th>DISPLAY MESSAGES</th>
<th>STATUS</th>
<th>SUGGESTED SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSP_ERR</td>
<td>Indicates PC error</td>
<td>Cycle power - Call factory</td>
</tr>
<tr>
<td>No DMX</td>
<td>DMX is not being received</td>
<td>Hook up DMX or turn on console</td>
</tr>
<tr>
<td>DMX ERR</td>
<td>Bad DMX packets being received</td>
<td>Verify DMX wiring and termination</td>
</tr>
<tr>
<td>No Zero</td>
<td>One of the phases has failed to detect zero crossing. System is likely inoperable.</td>
<td>Call factory</td>
</tr>
<tr>
<td>Over Temp</td>
<td>One or more of the dimming modules has been shut off due to sensing of over-temp.</td>
<td>Make sure fan is running - Check rack filter - Check module input vents - Replace module.</td>
</tr>
<tr>
<td>Voltage Low</td>
<td>Rack is receiving insufficient voltage for initialized parameters.</td>
<td>Verify input voltage</td>
</tr>
<tr>
<td>Voltage High</td>
<td>Rack is receiving excess voltage for initialized parameters.</td>
<td>Verify input voltage</td>
</tr>
<tr>
<td>Arch Failure</td>
<td>The control module has been configured as a CME/CMEr or CMi/CMiB and communication with the architectural processor cannot be established.</td>
<td>The control module must be configured as a dimming module in the [Rack] menu, or call ETC.</td>
</tr>
<tr>
<td>Bypass Active</td>
<td>A power failure in the normal power feed was sensed. Dimmers have been driven to full, bypassing all control.</td>
<td>Restore normal power.</td>
</tr>
<tr>
<td>CPU 01 - 06 Fail</td>
<td>A dimming processor in a d-m module has failed.</td>
<td>Call ETC</td>
</tr>
</tbody>
</table>

**ETC contact information**

- Technical Service phone: 800-775-4382
- Technical Service fax: 800-836-1736
- System and Light Manager questions may be directed to: lightmanager@etconnect.com or service@etconnect.com

In the event of an emergency, for faster service please call the factory.
Appendix C: Wall Station ID Chart

Use the following chart to identify and track wall station neuron ID numbers.

<table>
<thead>
<tr>
<th>Job Name:</th>
<th>Date:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Room</th>
<th>Wall Station Type</th>
<th>ID tag</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Appendix D: Rack Configuration Chart

Use this chart to list dimmer load and circuit information.

<table>
<thead>
<tr>
<th>Dimmer circuit #</th>
<th>Module type</th>
<th>Load type</th>
<th>DMX512 #</th>
<th>DMX # (DD only)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix F: Dimmer Menu Flow Chart

The Dimmer Menu is accessible in the master controller and the Architectural Processor group. The Architectural Processor group is only available in Architectural Processor models. The Dimmer Menu is only available in Architectural Processor models.
Appendix G: U.S. Time Zone and Location Map

### Table 3: Longitude, Latitude and Time Zones of Major Cities

<table>
<thead>
<tr>
<th>City and State</th>
<th>Time Zone</th>
<th>Latitude</th>
<th>Longitude</th>
<th>City and State</th>
<th>Time Zone</th>
<th>Latitude</th>
<th>Longitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anchorage, AK</td>
<td>GMT-8</td>
<td>61° 10'N</td>
<td>149° 11'W</td>
<td>Fargo, ND</td>
<td>GMT-6</td>
<td>48° 59'N</td>
<td>96° 49'W</td>
</tr>
<tr>
<td>Montgomery, AL</td>
<td>GMT-6</td>
<td>32° 52'N</td>
<td>86° 17'W</td>
<td>Albuquerque, NM</td>
<td>GMT-7</td>
<td>35° 03'N</td>
<td>106° 32'W</td>
</tr>
<tr>
<td>Little Rock, AR</td>
<td>GMT-6</td>
<td>34° 43'N</td>
<td>92° 21'W</td>
<td>Las Vegas, NV</td>
<td>GMT-7</td>
<td>36° 12'N</td>
<td>116° 13'W</td>
</tr>
<tr>
<td>Phoenix, AZ</td>
<td>GMT-6</td>
<td>33° 52'N</td>
<td>112° 04'W</td>
<td>Buffalo, NY</td>
<td>GMT-5</td>
<td>42° 53'N</td>
<td>78° 51'W</td>
</tr>
<tr>
<td>Tucson, AZ</td>
<td>GMT-6</td>
<td>32° 54'N</td>
<td>110° 53'W</td>
<td>New York, NY</td>
<td>GMT-6</td>
<td>40° 48'N</td>
<td>73° 58'W</td>
</tr>
<tr>
<td>Los Angeles, CA</td>
<td>GMT-7</td>
<td>34° 05'N</td>
<td>118° 24'W</td>
<td>Syracuse, NY</td>
<td>GMT-5</td>
<td>43° 02'N</td>
<td>76° 06'W</td>
</tr>
<tr>
<td>San Diego, CA</td>
<td>GMT-7</td>
<td>32° 46'N</td>
<td>117° 05'W</td>
<td>Cincinnati, OH</td>
<td>GMT-5</td>
<td>39° 06'N</td>
<td>84° 31'W</td>
</tr>
<tr>
<td>San Francisco, CA</td>
<td>GMT-7</td>
<td>37° 47'N</td>
<td>122° 33'W</td>
<td>Cleveland, OH</td>
<td>GMT-5</td>
<td>41° 6'N</td>
<td>81° 40'W</td>
</tr>
<tr>
<td>Denver, CO</td>
<td>GMT-6</td>
<td>39° 46'N</td>
<td>104° 52'W</td>
<td>Oklahoma City, OK</td>
<td>GMT-6</td>
<td>35° 28'N</td>
<td>97° 30'W</td>
</tr>
<tr>
<td>Hartford, CT</td>
<td>GMT-5</td>
<td>41° 45'N</td>
<td>72° 41'W</td>
<td>Portland, OR</td>
<td>GMT-4</td>
<td>45° 32'N</td>
<td>122° 39'W</td>
</tr>
<tr>
<td>Washington, DC</td>
<td>GMT-5</td>
<td>38° 54'N</td>
<td>77° 00'W</td>
<td>Pittsburgh, PA</td>
<td>GMT-5</td>
<td>40° 26'N</td>
<td>79° 08'W</td>
</tr>
<tr>
<td>Miami, FL</td>
<td>GMT-5</td>
<td>26° 49'N</td>
<td>80° 13'W</td>
<td>Philadelphia, PA</td>
<td>GMT-5</td>
<td>49° 06'N</td>
<td>79° 08'W</td>
</tr>
<tr>
<td>Tampa, FL</td>
<td>GMT-5</td>
<td>27° 37'N</td>
<td>82° 28'W</td>
<td>Providence, RI</td>
<td>GMT-5</td>
<td>41° 46'N</td>
<td>71° 25'W</td>
</tr>
<tr>
<td>Atlanta, GA</td>
<td>GMT-5</td>
<td>33° 45'N</td>
<td>84° 09'W</td>
<td>Charleston, SC</td>
<td>GMT-5</td>
<td>33° 47'N</td>
<td>75° 59'W</td>
</tr>
<tr>
<td>Savannah, GA</td>
<td>GMT-5</td>
<td>31° 01'N</td>
<td>81° 07'W</td>
<td>Sioux Falls, SD</td>
<td>GMT-5</td>
<td>43° 52'N</td>
<td>96° 43'W</td>
</tr>
<tr>
<td>Honolulu, HI</td>
<td>GMT-5</td>
<td>21° 39'N</td>
<td>157° 48'W</td>
<td>Memphis, TN</td>
<td>GMT-5</td>
<td>39° 06'N</td>
<td>90° 00'W</td>
</tr>
<tr>
<td>Des Moines, IA</td>
<td>GMT-5</td>
<td>41° 34'N</td>
<td>93° 37'W</td>
<td>San Antonio, TX</td>
<td>GMT-5</td>
<td>29° 27'N</td>
<td>91° 49'W</td>
</tr>
<tr>
<td>Boise, ID</td>
<td>GMT-7</td>
<td>43° 36'N</td>
<td>119° 15'W</td>
<td>Dallas, TX</td>
<td>GMT-4</td>
<td>33° 29'N</td>
<td>96° 46'W</td>
</tr>
<tr>
<td>Chicago, IL</td>
<td>GMT-6</td>
<td>41° 50'N</td>
<td>87° 41'W</td>
<td>Fort Worth, TX</td>
<td>GMT-5</td>
<td>29° 45'N</td>
<td>93° 23'W</td>
</tr>
<tr>
<td>New Orleans, LA</td>
<td>GMT-6</td>
<td>0° 03'N</td>
<td>90° 55'W</td>
<td>Salt Lake City, UT</td>
<td>GMT-7</td>
<td>46° 55'N</td>
<td>111° 05'W</td>
</tr>
<tr>
<td>Boston, MA</td>
<td>GMT-5</td>
<td>42° 20'N</td>
<td>71° 01'W</td>
<td>Richmond, VA</td>
<td>GMT-5</td>
<td>37° 31'N</td>
<td>77° 28'W</td>
</tr>
<tr>
<td>Baltimore, MD</td>
<td>GMT-6</td>
<td>39° 18'N</td>
<td>76° 36'W</td>
<td>Burlington, VT</td>
<td>GMT-6</td>
<td>44° 29'N</td>
<td>79° 13'W</td>
</tr>
<tr>
<td>Honolulu, HI</td>
<td>GMT-5</td>
<td>20° 52'N</td>
<td>95° 10'W</td>
<td>Seattle, WA</td>
<td>GMT-5</td>
<td>47° 37'N</td>
<td>122° 21'W</td>
</tr>
<tr>
<td>Detroit, MI</td>
<td>GMT-4</td>
<td>42° 22'N</td>
<td>83° 06'W</td>
<td>Madison, WI</td>
<td>GMT-6</td>
<td>43° 04'N</td>
<td>89° 23'W</td>
</tr>
<tr>
<td>Minneapolis, MN</td>
<td>GMT-6</td>
<td>44° 57'N</td>
<td>93° 16'W</td>
<td>Minneapolis, MN</td>
<td>GMT-6</td>
<td>45° 01'N</td>
<td>87° 58'W</td>
</tr>
<tr>
<td>Kansas City, MO</td>
<td>GMT-6</td>
<td>39° 07'N</td>
<td>94° 33'W</td>
<td>Cheyenne, WY</td>
<td>GMT-5</td>
<td>30° 06'N</td>
<td>104° 47'W</td>
</tr>
<tr>
<td>Billings, MT</td>
<td>GMT-7</td>
<td>45° 47'N</td>
<td>106° 32'W</td>
<td>Vancouver, B.C.</td>
<td>GMT-6</td>
<td>49° 15'N</td>
<td>123° 07'W</td>
</tr>
<tr>
<td>Louisville, KY</td>
<td>GMT-6</td>
<td>39° 46'N</td>
<td>89° 41'W</td>
<td>Seattle, WA</td>
<td>GMT-6</td>
<td>47° 39'N</td>
<td>79° 33'W</td>
</tr>
<tr>
<td>Charlotte, NC</td>
<td>GMT-6</td>
<td>35° 11'N</td>
<td>89° 50'W</td>
<td>Minneapolis, MN</td>
<td>GMT-6</td>
<td>45° 30'N</td>
<td>73° 26'W</td>
</tr>
</tbody>
</table>
ETC ARCHITECTURAL

Unison® Button Station
Control Series

GENERAL INFORMATION

Unison button stations are specially designed for reliable, recall of pre-programmed presets or macros. Ideal for entrance locations.

APPLICATIONS
- Churches
- Hotels
- Convention Centers
- Meeting Rooms
- Schools
- Restaurants

FEATURES
- Programmable buttons
- Individual zone, and master control
- Preset recall
- Room combine
- Macro-activation
- Link Power control network
- Topology free wiring
- Connectorized station termination
- Designer appeal
- Custom station designs (1 gang shown) (wood/ metal)

DIMENSIONS

Front View

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.75&quot;</td>
<td></td>
</tr>
<tr>
<td>2.5&quot;</td>
<td></td>
</tr>
</tbody>
</table>

SIDE VIEW

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5&quot;</td>
<td></td>
</tr>
<tr>
<td>2.5&quot;</td>
<td></td>
</tr>
</tbody>
</table>

ORDERING INFORMATION

Button Stations

<table>
<thead>
<tr>
<th>Model #</th>
<th>Description</th>
<th>Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>U00001-1F</td>
<td>1 gang, 1 button</td>
<td>On/Off</td>
</tr>
<tr>
<td>U00001-2F</td>
<td>1 gang, 1 button</td>
<td>Entry</td>
</tr>
<tr>
<td>U00001-3F</td>
<td>1 gang, 1 button</td>
<td>Panic</td>
</tr>
<tr>
<td>U00002-1F</td>
<td>1 gang, 1 button</td>
<td>Open</td>
</tr>
<tr>
<td>U00002-2F</td>
<td>1 gang, 1 button</td>
<td>Close</td>
</tr>
<tr>
<td>U00005-1F</td>
<td>1 gang, 5 button</td>
<td>Preset 1-4, Off</td>
</tr>
<tr>
<td>U11001-1F</td>
<td>1 gang, 1 button</td>
<td>On/Off</td>
</tr>
<tr>
<td>U11001-2F</td>
<td>1 gang, 1 button</td>
<td>Entry</td>
</tr>
<tr>
<td>U11001-3F</td>
<td>1 gang, 1 button</td>
<td>Panic</td>
</tr>
<tr>
<td>U11002-1F</td>
<td>1 gang, 2 button</td>
<td>On, Off</td>
</tr>
<tr>
<td>U11002-2F</td>
<td>1 gang, 2 button</td>
<td>Open, Close</td>
</tr>
<tr>
<td>U11005-1F</td>
<td>1 gang, 5 button</td>
<td>Preset 1-4, Off</td>
</tr>
<tr>
<td>U11007-1F</td>
<td>1 gang, 7 button</td>
<td>Release, Lower, Preset 1-4, Off</td>
</tr>
<tr>
<td>U11010-1F</td>
<td>1 gang, 10 button</td>
<td>Preset 1-4, Off</td>
</tr>
<tr>
<td>U11X01-1F</td>
<td>1 gang, 1 keyswitch (maintained)</td>
<td>Lockout</td>
</tr>
<tr>
<td>U11X01-2F</td>
<td>1 gang, 1 keyswitch (maintained), 1 button</td>
<td>Lockout, On/Off</td>
</tr>
<tr>
<td>U11X01-3F</td>
<td>1 gang, 1 keyswitch (maintained), 1 button</td>
<td>Lockout, Entry</td>
</tr>
<tr>
<td>U11X01-4F</td>
<td>1 gang, 1 keyswitch (maintained), 1 button</td>
<td>Lockout, Panic</td>
</tr>
<tr>
<td>U11X02-1F</td>
<td>1 gang, 1 keyswitch (maintained), 2 button</td>
<td>Lockout, On, Off</td>
</tr>
<tr>
<td>U11X02-2F</td>
<td>1 gang, 1 keyswitch (maintained), 2 button</td>
<td>Lockout, Open, Close</td>
</tr>
<tr>
<td>U11X05-1F</td>
<td>1 gang, 5 button</td>
<td>Lockout, Preset 1-4, Off</td>
</tr>
</tbody>
</table>

*Product shown above
**Keyswitch options available in a variety of configurations.

Notes:
- Each station contains 1, 2, or 4 buttons
- Preset 1-4 display standard敬表 tones. (See ETC.)
- Also available in surface mount PS, and parallel PS configurations.

810 of 1217
**Unison® Button Station**

**Control Series**

**SPECIFICATIONS**

**MECHANICAL**

- Button stations shall consist of an electronic assembly and faceplate which shall utilize a cantilever sited switch array.
- Stations shall flush mount in industry standard 1-gang back boxes (provided by others).
- Surface mount back-boxes shall be available for one-gang stations.
- Station faceplates and button caps shall be constructed of injection molded, ABS plastic.
- Buttons shall contain an integral LED response indicator.
- Stations shall have no visible means of attachment.
- All station legends shall be silk-screened in a scratch and wear resistant dark gray paint.
- Button stations shall be available in white, ivory, gray and black. Custom colors shall be available with sample.
- Button stations shall be available with 1, 2, 5, 7, and 10 buttons. Custom button stations shall be available 1, 2, and 5 button stations shall be available with a maintained or momentary keywitch.

**ELECTRICAL**

- Button stations shall connect to Echelon® LOWWORKS® Link Power control network.
- Link Power network shall utilize low voltage Class II unshielded twisted pair, Belden type 8471 or equivalent and (1) R14 ESD drain wire (Drain wire not required when installed in grounded metal conduit).
- Link Power network wiring shall not exceed 1500’ (500m) without the use of a repeater. The REV, Repeater Option module shall increase network wire length in increments of 1500’ (500m). Maximum (4) LCD’s per power supply, total 32 stations per repeater.
- The Unison station protocol is Echelon Link Power.
- Link Power network shall be topology free and polarity independent. Wiring may be bus, loop, horse-run or any combination of these.
- All station terminations shall be connectorized.

**FUNCTIONAL**

- Buttons station components shall be designed to operate default or custom system functions.
- Optional button functions shall be programable via Light Manager.
- Button functions shall include: preset selection, manual mode activation, record mode activation, station lockout, relay, lower, macro activation, zone on/off control and wall open/close or toggle.
- Button station components shall allow programming of individual lockout levels.

---

**DIMENSIONS**

**Flush Backbox Dimensions**

<table>
<thead>
<tr>
<th>Gang</th>
<th>Height</th>
<th>Width</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>inches</td>
<td>cm</td>
<td>inches</td>
</tr>
<tr>
<td>1/2 (by 1G)</td>
<td>3.75</td>
<td>9.53</td>
<td>1.3</td>
</tr>
<tr>
<td>1 (RALC 690)*</td>
<td>3.75</td>
<td>9.53</td>
<td>2.0</td>
</tr>
</tbody>
</table>

**Surface Backbox Dimensions**

<table>
<thead>
<tr>
<th>Gang</th>
<th>Height</th>
<th>Width</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>inches</td>
<td>cm</td>
<td>inches</td>
</tr>
<tr>
<td>1/2 (by 1G)</td>
<td>3.75</td>
<td>9.53</td>
<td>1.75</td>
</tr>
<tr>
<td>1 (RALC 690)*</td>
<td>3.75</td>
<td>9.53</td>
<td>2.0</td>
</tr>
</tbody>
</table>

*or equivalent

**Faceplate Dimensions**

<table>
<thead>
<tr>
<th>Gang</th>
<th>Height</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>inches</td>
<td>cm</td>
</tr>
<tr>
<td>1/2</td>
<td>4.5</td>
<td>11.43</td>
</tr>
<tr>
<td>1</td>
<td>4.5</td>
<td>11.43</td>
</tr>
</tbody>
</table>
Catalog # Wall Flange

Stabilizer for the perimeter of Pipe Grids
Telescopic tube to fit 1.5" sch 40 pipe

Specifications:
5"Ø Base with four (4) mounting holes 7/16"Ø
8" long telescopic tube to fit 1.5" sch 40 pipe
Field Drilling of pipe is required.
Luminous Half Cylinder

- Timeless design updated to comply with ADA requirements.
- Available in two sizes, but easily modified to special lengths.
- Trim options offer design flexibility.
- Good value with durable construction.
- Can be fully enclosed with top and bottom covers.
The German company JB-lighting has been manufacturing automated lighting products for over 20 years—that’s just about as long as anybody in what is still a very new business. Although it is a well-known name in Europe, it is less familiar in the United States; however, last September, at the PLASA show in London, JB-lighting introduced an LED-based wash light with a feature that could help change that situation.

The product is the JBLED A7, and the feature is beam angle control, or zoom. To my mind, beam angle control on an automated wash light is a critical parameter that could help take a purely decorative lighting product and turn it into a useful tool. Wash lights have had variable angle control since the earliest Fresnel luminaire, and just about every automated wash light has this feature in one form or another. Although LED-based units have real strength in color control, beam angle control is a real help in gaining acceptance as a generic workhorse lighting instrument. JB-lighting is also taking a step towards getting better known outside of its home territories; its products, including the JBLED A7, will be exclusively distributed in North America through Creative Stage Lighting.

The progress with LED-based luminaires is dramatic. Although LEDs have really only been bright enough for illumination for a year or so, we are already seeing the third generation of units. Rapid changes in the emitters, and developments in optics and control, have made for very short product life cycles. How does the JBLED A7 compare with its recent antecedents, and can it truly replace its incandescent or HID-based cousins?

As always with these reviews, I measured a unit supplied to me by the manufacturer as typical of the model, for everything I can think of that’s measurable, from light source to output. I present those results here for you to use in your own determination. The JBLED A7 is fitted with a universal power supply rated from 100–240V 50/60Hz and, for these tests, the luminaire was run from a nominal 115V 60Hz supply (Figure 1).

**Light source**

The JBLED A7 uses 108 Luxeon emitters split evenly, with 36 each of red, green, and blue. The Luxeon emitters are very familiar, of course, being one of the commonest LEDs used by entertainment lighting manufacturers. In this case, they are arranged in regular RGB triads across the face of the circular fixture in what, at first glance, also looks to be a familiar and ubiquitous arrangement—but more of that in a moment (Figure 2).

One of the most important considerations with any LED fixture is heat management. LEDs are extremely heat-sensitive; a rise in temperature changes both the output of the LED die and its color, so keeping everything at a constant temperature is important for a consistent output. The JBLED A7 mounts the LED dies and their drivers (another source of heat) fairly close together on two parallel boards, but with a distinct air space between them. If you take a look from the side of the head (Figure 3) you can see right through from the air slots on one side to the air slots on the other. In between those two boards is a large die-cast aluminum heat sink, visible in Figure 3, cooled by a single temperature-controlled external fan mounted on the rear of the head on an inset plastic injection-molded cover (Figure 4). The unit ran in my tests for many hours continuously and, although I saw some temperature-related changes in...
output, they were kept to a very reasonable level, with a 7-10% drop in output as the unit warmed up to equilibrium. This is a very acceptable figure for LED luminaires.

**Optics**

Here’s where things start to get interesting. Instead of the normal fixed focal length TIR-based lens system used by many manufacturers, each of the 108 LEDs in the JBLED A7 has its own individual two-element zoom lens system. The first element is a fixed lens right above the die itself, which can be seen in Figure 5 as the domed elements over each single color chip array. The second lens elements are formed by a single plastic plate, which has 108 concave/convex lenslets molded across its surface (Figure 6). This lens plate is attached to a punched aluminum support plate (Figure 7) which, in turn, is mounted on the shafts of four small stepper-motor-driven linear actuators (Figure 6). As the four motors turn in sync, an internal lead screw is driven backwards and forwards, to give the lens plate about 3/8” of movement back and forwards. This movement of the front lenslets gives a very respectable 3:1 zoom range in the output; when the lens plate is right back close to the emitters, the unit is in its widest angle and zooms to narrow as the lens plate moves forward, away from the LEDs. As with all simple zoom lenses, I’m sure that this system is less efficient than a single fixed lens would be, but that’s a penalty you may be prepared to live with to get the zoom control. Figure 9 gives an overall view of the entire system.

**Output**

How do those zoom optics perform? I measured the unit in full output (red, green, and blue, all at full) as giving 3,418 lumens at a wide angle of 35.6°, ramping down to a slightly lower 2,936 lumens at the narrow angle of 12.9°. (Note that I always report field angles—that is the point at which the light has dropped to 10% of the peak value.) The beam profiles were very smooth, as can be seen in Figures 10 and 11. There was also good homogenization of the three colors, particularly at throws greater than 12-15°, with minimal colored shadows. I suspect the optical system helps with this. As I mentioned above, nothing comes for free, and the addition of a second lens inevitably means these are slightly lower output figures than some competitive units, but you get beam angle control instead. Which one you choose will depend on your needs for a particular show.

Usually with RGB-based fixtures, the full output has a very pinkish tinge, as the green emitters are overpowered by the red and blue. With the JBLED A7, however, it appears that some tweaking has gone on, as the unit instead gives a bluish white color. The color coordinates of the white were too far from the black body line for my measuring instruments to be able to calculate a sensible correlated color temperature result; however, using the color temperature channel, I was able to bring it back closer to the line and get a range of measurable whites from 12,000K to 2,900K. Of course, as you lower the color temperature, the light output drops as well, and I saw between 10% and 55% reduction as I went through the whites from the initial full level down to 2,900K.

The zoom function does a reasonable job of maintaining the homogenization throughout its range; however, the three different LED dies have slightly different shapes and sizes, and have different output profiles as well as the obvious different wavelengths. All these small differences combine, and the net result is that the lens divergence differs from color to color, and so the beam mix varies as the beam.
added significant smoothing algorithms to the incoming DMX512 signal, as the dimming output in slow fades was very smooth, and no steppiness was visible, except over the last two or three steps before black out. It looked to me as if they were interpolating internally to 12 or 16 bits from the eight bits of the DMX512 intensity channel. (The A7 offers the option of 16-bit control for the color channels, which is how I was running it, but not for intensity). The interpolation and predictive algorithms weren’t perfect, and I managed to fool them a couple of times, but the overall result was excellent—it’s difficult to enforce a smoothing algorithm while still recognizing and facilitating strobe effects and other rapid changes. This is a real issue with the use of LEDs, and JB-lighting has done a good job here. The strobe channel allowed a range of different strobe types at rates I measured from around 20Hz down to 1.9Hz at the slowest. The fixture also showed good color stability while dimming. This is hard to do in the paler colors, and shows that JB-lighting has put a lot of work into this function.

**Color system**

Of course, LED units are all about color, and the JBLED A7 presented a good range of controllable colors within the RGB gamut. As well as the expected RGB DMX channels, the unit also offers a color wheel channel, which allows rainbow and color-changing effects using a range of pre-programmed colors. I felt that the amber in this preprogrammed range was particularly useful. As mentioned above, there was some slight uneveness in the beam in the palest colors, but no problems in mid tones or saturated colors. Figure 13 shows the spectrum of the emitted
light when all LEDs are at full; Figure 14 shows it adjusted for a 3,000K white.

The output in the main primary colors as a percentage of full output was as follows.

<table>
<thead>
<tr>
<th>Color Mixing</th>
<th>Color</th>
<th>Cyan</th>
<th>Magenta</th>
<th>Yellow</th>
<th>Red</th>
<th>Green</th>
<th>Blue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>90%</td>
<td>21%</td>
<td>89%</td>
<td>10%</td>
<td>79%</td>
<td>11%</td>
<td></td>
</tr>
</tbody>
</table>

These figures confirm what was suspected: that JB-lighting is controlling the mix to ensure that there is enough green available to make a good white. Green is always the weak link in an RGB system, and usually there isn’t enough, so you end up with a pinkish result.

As mentioned above, the JBLED A7 offers a CTC control for color temperature. This adds a further layer of control to the same RGB LEDs.

I measured the PWM frequency of the JBLED A7 at a very low 120Hz (when set for 60Hz cameras) or 100Hz (when set for 50Hz cameras). I find that this low a frequency makes for visible flicker, either when the unit is moving fast or when an object moves past it. It might also cause problems with some cameras—for example, it confused my digital camera when taking the shots for this review. I’d also be concerned about aliasing with the 44Hz DMX512 signal, but saw no evidence of that in my testing. I suspect JB-lighting traded off the increase in resolution needed for its excellent dimming with the PWM frequency. That’s a hard decision to make.

**Pan and tilt**

The JBLED A7 has a pan range of 450° and tilt of 332°. A full range pan move took 3.2 seconds, while a more typical 180° move finished in 2.3 seconds.

Tilt took 2.3 seconds for a full move and 1.8 seconds for 180°. Positional repeatability on both pan and tilt was an excellent 0.08°—which is around 0.4° of error at a 20° throw.

Both pan and tilt use motors in the yoke arm, and use three-phase stepper motors, with a small positional encoder mounted to the back of the motor to reset the position if it is knocked or obstructed. Figure 15 shows the belt used for the tilt drive, while Figure 16 shows one of the motors with its associated encoder. Movement using these three-phase motors was very smooth, with no noticeable steps or jerks at any speed.

As an aside, I have a new and very handy tool for measuring pan and tilt angles on luminaries—my iPod Touch! A small, inexpensive application for the iPod (or iPhone) uses the internal accelerometers to turn the device into an accurate clinometer. This is much easier than the combination of protractors and squares I was using before.

**Noise**

There are six motors in the unit—pan, tilt, and the four linear actuators for zoom. There is also a cooling fan in the head. Pan was the noisiest function, but was still relatively quiet.

<table>
<thead>
<tr>
<th>Sound Levels</th>
<th>Normal Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient</td>
<td>&lt;35 dBA at 1m</td>
</tr>
<tr>
<td>Stationary</td>
<td>38 dBA at 1m</td>
</tr>
<tr>
<td>Homing/Initialization</td>
<td>40 dBA at 1m</td>
</tr>
<tr>
<td>Pan</td>
<td>45 dBA at 1m</td>
</tr>
<tr>
<td>Tilt</td>
<td>40 dBA at 1m</td>
</tr>
<tr>
<td>Zoom</td>
<td>41 dBA at 1m</td>
</tr>
</tbody>
</table>

**Electrical parameters**

The JBLED A7 has a fully power-factor-corrected auto-ranging (100–24V 50/60Hz) power supply and consumed 2.75A, 330W, with a power factor of 0.99, when running with all colors at full power.

The initialization time, from power up or from sending a reset command through the DMX512 control channel, was 51 seconds. The unit was well-behaved; it went to blackout before starting to move in reset, and didn’t illuminate again until the reset was finished.

**Electronics and control**

All electronics are distributed throughout the unit. The top box contains the power supply, DMX512 input, and the display and menu system. Motor control is in one yoke arm (Figure 17) and the main LED driver board is in the back of the head (Figure 18). The unit has a large, LCD-based display, offering the usual range of set up and diagnostic options (Figure 19). Interestingly, JB-lighting has fitted it with two sets of control buttons. The orientation of the display changes depending on
which set you use—you always use the buttons that are below the display. The JBLED A7 provides both five-pin and three-pin XLR connectors on the top box adjacent to the power cord for DMX512 in and out connections (Figure 20).

**Construction**

The unit is nicely constructed, using a combination of sheet metal, aluminum die cast parts, and molded plastic. The unit will sit directly on the floor, as shown in the photographs or, for suspension on truss, has two mounting points for omega clamps using quarter turn Camloc connectors. Access to the head and yoke arms is very easy for cleaning and maintenance; the top box is a little more involved. The overall shape with a disc-shaped head and small top box seems to be becoming a de-facto standard for LED based wash units.

**Conclusions**

As I mentioned at the top of this article, this is the first LED wash light with beam angle control that I’ve measured, but I’m sure it won’t be the last. The 3:1 zoom gives the JB-lighting JBLED A7 the potential to be a useful workhorse fixture. As always, I encourage you to try the unit in your own venue—LED fixtures are very difficult to measure accurately, and it’s even more important that you try them out in the actual circumstances they will be used. As always, my intent with this review is to aid your decision, but if my figures and your eyes disagree—then your eyes should win!

Mike Wood provides technical and intellectual property consulting services to the entertainment technology industry. He can be contacted at mike@mikewoodconsulting.com
JB LED A7

ZOOM TO THE MAX

The PLASA award-winning JB-lighting LED fixture
Available in the United States and Mexico
Exclusively from Creative Stage Lighting

Creative Stage Lighting
Phone: (518) 251-3302
creativestagelighting.com
ColorBlast TR
Industry-standard theatrical and rental LED wash fixture with intelligent color light
ColorBlast TR
Industry-standard theatrical and rental LED wash fixture with intelligent color light

ColorBlast TR is a rugged, full-color LED fixture designed specifically to withstand taxing stage, set, and touring environments. This rental-friendly fixture offers ease of installation and control, along with the ability to produce millions of saturated colors without gels or filters. It features a built-in power cable that can be extended up to 60 ft (18 m) with a standard 4-pin XLR patch cable, an elastomeric sleeve to protect the fixture from rough handling, and a pivoting bezel for easy exchange of lenses. An industrial-grade hinge affords quick and reliable fixture aiming and locking. The mounting base easily accommodates truss clamps and other mounting and positioning options. Designed with live entertainment in mind, ColorBlast TR is the ideal color-changing LED fixture for demanding temporary and touring environments.

- **Pivoting bezel and exchangeable lenses** — The pivoting bezel and included 23° soft-focus and 10° clear tempered glass lenses let you switch quickly between soft-edge wash lighting and extended beam projection.
- **Quick fixture aiming and locking** — An industrial-grade constant torque hinge offers stable, 110° fixture tilting for quick and dependable aiming. Standard set screws let you lock the fixture in position without special tools.
- **Versatile mounting options** — The pre-assembled mounting base offers a range of options for mounting on the floor or various stage truss clamps. An integral safety bracket lets you easily attach a safety cable.
- **On-board temperature monitoring** — A compensation circuit prevents damage to the fixture if operating temperatures rise to unsafe levels. An auto-cycling feature automatically restores normal operation after 30 minutes.
- **Innovative protective sleeve** — Because stage and set environments can take their toll on equipment, ColorBlast TR features an innovative elastomeric sleeve to protect the fixture and lens from the rigors of multiple setups and teardowns.
- **Accessories and additional spread lenses** — City Theatrical Inc. offers a line of accessories designed for ColorBlast TR, including top hats, half top hats, barndoors, egg crate louvers, glass spread lenses, and polycarbonate holographic lenses.
- **Industry-standard power and control** — ColorBlast TR works seamlessly with the full range of Philips controllers, including Light System Manager and iPlayer 3, or third-party controllers. City Theatrical Inc. offers a line of power / data supplies specifically designed for use with ColorBlast TR fixtures.
Photometrics

Photometric data is based on test results from an independent NIST traceable testing lab. IES data is available at www.philipscolorkinetics.com/support/ies.

ColorBlast TR
10° beam angle

**LED**  | **Lumens** | **Efficacy**
---|---|---
RGB | 960 | 13.7

---

**Zonal Lumen**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Lumen %</th>
<th>Lumen %</th>
<th>Lumen %</th>
<th>Lumen %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>65%</td>
<td>65%</td>
<td>65%</td>
<td>65%</td>
</tr>
<tr>
<td>60</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
</tr>
<tr>
<td>120</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>180</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Total Efficiency: 65%

---

**Coefficients Of Utilization - Zonal Cavity Method**

<table>
<thead>
<tr>
<th>RDC %</th>
<th>00</th>
<th>30</th>
<th>60</th>
<th>90</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

---

**Illuminance at Distance**

<table>
<thead>
<tr>
<th>Center Beam</th>
<th>Beam Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 m</td>
<td>1.0 m</td>
</tr>
<tr>
<td>1.0 m</td>
<td>2.0 m</td>
</tr>
<tr>
<td>2.0 m</td>
<td>4.0 m</td>
</tr>
<tr>
<td>4.0 m</td>
<td>8.0 m</td>
</tr>
<tr>
<td>8.0 m</td>
<td>16.0 m</td>
</tr>
</tbody>
</table>

---

ColorBlast TR
23° beam angle

**LED**  | **Lumens** | **Efficacy**
---|---|---
RGB | 859 | 12.3

---

**Zonal Lumen**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Lumen %</th>
<th>Lumen %</th>
<th>Lumen %</th>
<th>Lumen %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>65%</td>
<td>65%</td>
<td>65%</td>
<td>65%</td>
</tr>
<tr>
<td>60</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
<td>35%</td>
</tr>
<tr>
<td>120</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>180</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Total Efficiency: 65%

---

**Coefficients Of Utilization - Zonal Cavity Method**

<table>
<thead>
<tr>
<th>RDC %</th>
<th>00</th>
<th>30</th>
<th>60</th>
<th>90</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

---

**Illuminance at Distance**

<table>
<thead>
<tr>
<th>Center Beam</th>
<th>Beam Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 m</td>
<td>1.0 m</td>
</tr>
<tr>
<td>1.0 m</td>
<td>2.0 m</td>
</tr>
<tr>
<td>2.0 m</td>
<td>4.0 m</td>
</tr>
<tr>
<td>4.0 m</td>
<td>8.0 m</td>
</tr>
<tr>
<td>8.0 m</td>
<td>16.0 m</td>
</tr>
</tbody>
</table>

---

For lux multiply fc by 10.7
Specifications

Due to continuous improvements and innovations, specifications may change without notice.

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td></td>
</tr>
<tr>
<td>Beam Angle</td>
<td>10°</td>
</tr>
<tr>
<td>Lumens†</td>
<td>960</td>
</tr>
<tr>
<td>LED Channels</td>
<td>Red / Green / Blue</td>
</tr>
<tr>
<td>Mixing Distance</td>
<td>6 in (152 mm) to uniform light</td>
</tr>
<tr>
<td>Lumen Maintenance</td>
<td>50,000+ hours (50% @ 50°C (full output)</td>
</tr>
<tr>
<td>Electrical</td>
<td></td>
</tr>
<tr>
<td>Input Voltage</td>
<td>24 VDC via PDS-750 TX, PDS-375 TX, PDS-150x, or PDS-60</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>50 W maximum at full output, steady state</td>
</tr>
<tr>
<td>Control</td>
<td></td>
</tr>
<tr>
<td>Interface</td>
<td>DMX via power / data supply</td>
</tr>
<tr>
<td>Control System</td>
<td>Philips full range of controllers, including Light System Manager, Player 3, or any third-party controllers</td>
</tr>
<tr>
<td>Physical</td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td>8 x 13.5 x 2.6 in (203 x 343 x 66 mm)</td>
</tr>
<tr>
<td>Weight</td>
<td>6.4 lbs (2.9 kg)</td>
</tr>
<tr>
<td>Housing</td>
<td>Die-cast aluminum, powder-coated black finish</td>
</tr>
<tr>
<td>Lens</td>
<td>Clear glass / Frosted glass</td>
</tr>
<tr>
<td>Fixture Connections</td>
<td>6 ft (1.8 m) power / data cable with 4-pin XLR connector</td>
</tr>
<tr>
<td>Temperature Ranges</td>
<td>-40° – 122° F (-40° – 50°C) Operating</td>
</tr>
<tr>
<td></td>
<td>-4° – 122° F (-40° – 50°C) Startup</td>
</tr>
<tr>
<td></td>
<td>-4° – 176° F (-40° – 80°C) Storage</td>
</tr>
<tr>
<td>Humidity</td>
<td>0 – 95%, non-condensing</td>
</tr>
<tr>
<td>Maximum Cable Length</td>
<td>60 ft (18 m), with extension to built-in 6 ft (1.8 m) power cable</td>
</tr>
<tr>
<td>Certification and Safety</td>
<td>UL / cUL, FCC Class A, CE, PSE, C-Tick, SAA</td>
</tr>
<tr>
<td>Environment</td>
<td>Dry Location, IP20</td>
</tr>
</tbody>
</table>

† Lumen measurement complies with IES LM-79-08.
‡ L90 = 90% lumen maintenance (when light output drops below 50% of initial output). Ambient luminaire temperatures specified. Lumen maintenance calculations are based on lifetime prediction graphs supplied by LED source manufacturers. Calculations for white-light LED fixtures are based on measurements that comply with IES LM-80-08 testing procedures. Refer to www.philipsilluminetics.com/support/appnotes/1m-80-08.pdf for more information.

In addition to the PDS-750 TX power / data supply, City Theatrical Inc. offers a line of power / data supplies specifically designed for Blue TR fixtures. Visit www.citytheatrical.com for details.
Included in the box

- ColorBlast TR fixture with 6 ft (1.8 m) power cable
- Frosted glass 23" lens
- Protective elastic sleeve
- 3/16 in hex key wrench
- Installation Instructions

You must remove the fixture’s protective sleeve before you can attach the accessory holder. Reinstall the protective sleeve after use.

City Theatrical Inc. offers a line of polycarbonate holographic lenses for ColorBlast TR, with a range of symmetric and asymmetric beam angles. Visit www.citytheatrical.com for details.

Fixtures and Power / Data Supplies

ColorBlast TR fixtures are part of a complete low-voltage system which includes one or more power / data supplies and any Philips DMX or third-party controller.

<table>
<thead>
<tr>
<th>Item</th>
<th>Item Number</th>
<th>Philips 12NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>ColorBlast TR</td>
<td>116-000033-00</td>
<td>910503700581</td>
</tr>
<tr>
<td>Protective Sleeve</td>
<td>120-000062-00</td>
<td>910503700370</td>
</tr>
<tr>
<td>Mounting Base</td>
<td>120-000060-00</td>
<td>910503700369</td>
</tr>
<tr>
<td>Lenses (23&quot; frosted glass and 10&quot; clear glass)</td>
<td>120-000066-00</td>
<td>910503700367</td>
</tr>
<tr>
<td>Mounting Hinge and Hardware</td>
<td>120-000072-00</td>
<td>910503700515</td>
</tr>
<tr>
<td>POS-375 TRX</td>
<td>109-000030-01</td>
<td>910503703284</td>
</tr>
<tr>
<td>POS-750 TRX</td>
<td>109-000030-00</td>
<td>910503703219</td>
</tr>
<tr>
<td>SmartJack Pro</td>
<td>103-000034-00</td>
<td>910503700582</td>
</tr>
</tbody>
</table>

Use Item Number when ordering in North America.

Accessories

Designed specifically for the family of Blast fixtures, accessories provide additional options for controlling and dispersing light. Accessory holders screw to the side of the fixture and are required for mounting accessories. Accessory holders prevent accessories from falling out if the fixture is tipped or hung upside down.

<table>
<thead>
<tr>
<th>Item</th>
<th>Housing Color / Type</th>
<th>Item Number</th>
<th>Philips 12NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessory Holders</td>
<td>Black</td>
<td>120-000003-04</td>
<td>910503702840</td>
</tr>
<tr>
<td>Half Top Hats</td>
<td>Black</td>
<td>120-000009-04</td>
<td>910503702848</td>
</tr>
<tr>
<td>Top Hats</td>
<td>Black</td>
<td>120-000005-04</td>
<td>910503702844</td>
</tr>
<tr>
<td>Egg Crate Louvers</td>
<td>Black</td>
<td>120-000015-04</td>
<td>910503702852</td>
</tr>
<tr>
<td>Barn Doors</td>
<td>Black</td>
<td>120-000019-04</td>
<td>910503702856</td>
</tr>
<tr>
<td>Horizontal Glass Spread Lens a</td>
<td>36° (rads out) / 50° (rads in)</td>
<td>120-000025-00</td>
<td>910503703897</td>
</tr>
<tr>
<td>Horizontal / Vertical Glass Spread Lens a</td>
<td>40°</td>
<td>120-000025-01</td>
<td>910503703898</td>
</tr>
</tbody>
</table>

a Intended for use with Blast fixtures with 10" clear lens. Use Item Number when ordering in North America.
Installation

ColorBlast TR fixtures are designed for easy setup, configuration, and teardown. You can connect ColorBlast TR fixtures directly to a power/data supply, such as the PDS-750 TRX, using the built-in 6 ft (1.8 m) power cable with standard XLR connector.

Owner/User Responsibilities

It is the responsibility of the contractor, installer, purchaser, owner, and user to install, maintain, and operate ColorBlast TR fixtures in such a manner as to comply with all applicable codes, state and local laws, ordinances, and regulations. Consult with the appropriate electrical inspector to ensure compliance.

Create a Lighting Design Plan and Layout Grid

1. Determine the appropriate location of each power/data supply in relation to the light fixtures, and of the light fixtures in relation to each other.

   ColorBlast TR connects to the power/data supply over a built-in 6 ft (1.8 m) power cable with a standard 4-pin XLR male connector. The power cable can be extended with a standard XLR male to XLR female patch cable, up to a maximum overall length of 60 ft (18 m).

   The number of ColorBlast TR fixtures that each power/data supply can support is determined by the factors such as the supply’s capacity and number of available ports, line voltage, circuit load, voltage drop, and cable lengths. The PDS-750 TRX, for example, can support up to 12 ColorBlast TR fixtures, each with a cable of up to 60 ft (18 m).

2. On an architectural diagram or other diagram that shows the physical layout of the installation, identify the locations of all switches, controllers, power/data supplied, fixtures, and cables.

Start the Installation

1. Install all power/data supplies, including any interfaces with controllers. Power/data supplies and external controllers send power and control signals to the fixtures over the fixture’s leader cable.

2. Verify that all additional supporting equipment (switches, controllers) is in place.

3. Ensure that all additional parts and tools are available, including:
   - The included 3/16 in hex key wrench for locking the fixtures in position
   - A Phillips head screwdriver for removing the bezel screws
   - C-clamps or bases for pipe, truss, or floor mounting, as required

Install the Fixtures

Make sure the power is OFF before mounting and connecting ColorBlast TR fixtures.

1. The mounting base of each ColorBlast TR fixture provides a clearance hole for a 1/2 in bolt for mounting to a pipe, truss, weighted base, or floor using a standard theatrical C-clamp or other mounting hardware. When mounting ColorBlast TR, ensure that the installation is suitable and safe and that the hardware is properly rated for the task.
2. When mounting ColorBlast TR fixtures on the floor or a base, ensure that the fixture sits flush to the surface and use mounting hardware suitable for the mounting surface.

3. Connect each ColorBlast TR fixture to an available female 4-pin output on the power/data supply. ColorBlast TR fixtures are provided with a permanently connected 6 ft (1.8 m) cable. The cable can be extended with a standard XLR male to XLR female patch cable, up to a maximum overall length of 60 ft (18 m).

Exchanging ColorBlast TR Lenses

ColorBlast 12 TR is designed to let you quickly and easily exchange lenses. The clear 10\" lens is designed for long throw and spotlighting applications, while the frosted 23\" lens is designed for wash lighting applications. The 23\" lens is factory installed, and the 10\" lens is included in the box.

1. Remove the protective cover from the fixture.

2. Using a Phillips head screwdriver, remove the two lock-down screws located on each side of the fixture at the top of the bezel. (Do not remove the pivot screws on the edge of the bezel closest to the base.)

3. Using the tabs on the bezel, pivot the bezel forward to access the lens.

4. Remove the installed lens.

5. Clean both sides of the lens using a mild, non-abrasive cleaner. Handle the lens by the gasket, making sure not to touch or soil either surface. Place the lens in the fixture housing, making sure the gasket around the lens is properly fitted.

6. Close the bezel, tighten the lock-down screws, and replace the protective cover.
Attach Safety Cable (optional)
Each ColorBlast TR fixture is designed for use with a safety cable to tether it to a secure anchor point. When dictated by local or state code or advised by a structural engineer, attach a safety cable to the bracket on the back of the fixture using a standard carabiner clip. Attach the safety cable to the mounting surface using a method that follows the code or engineer’s requirements.

Address and Configure the Fixtures

Make sure the power is ON before addressing and configuring fixtures.

ColorBlast TR fixtures operate in 8-bit mode by default. You can configure ColorBlast TR to operate in 16-bit mode, which increases fixture resolution for smoother dimming.

In 8-bit mode, fixtures use one DMX address per LED channel (red, green, and blue). In 16-bit mode, fixtures use two DMX addresses per LED channel. The first DMX address corresponds to the “coarse” data for that channel, and the second corresponds to the “fine” data. By using double the number of DMX addresses, 16-bit mode increases fixture resolution from 256 dimming steps to 65,536 (256 x 256) dimming steps.

ColorBlast TR fixtures come factory-addressed with a starting DMX address of 1. For light show designs where fixtures work in unison, all fixtures can be assigned the same starting DMX address. For light show designs that show different colors on different fixtures simultaneously, you must assign unique DMX addresses to your fixtures and sort them in a useful order.

The PDS-750 TRX and other power/data supplies from City Theatrical Inc. offer convenient, automatic addressing appropriate for most ColorBlast TR installations. Starting from a base number that you set using onboard controls, the power/data supply automatically assigns unique, sequential DMX addresses to the installed fixtures. If your fixtures were previously addressed for use in other installations, you can easily reset them to starting DMX address 1 with the power/data supply’s built-in Mini-Zap button. Refer to the Operator’s Manual of your power/data supply for complete details.

Aim and Lock the Fixtures

Using the provided hex key wrench, loosen the tilting set screws located on the front of the fixture’s mounting base. Aim the fixture by tilting the beam as desired. Tighten the set screws to lock the fixture in place.
CONTENTS

The City Theatrical PDS-750-TR.................................................................3
Cautions........................................................................................................3
Compliance Certifications ........................................................................3
Compatibility with Color Kinetics Equipment ........................................3
Color Kinetics Fixtures Supported .........................................................3
Front Panel Controls .............................................................................4
Back Panel Features................................................................................5
Mains Power Requirements .....................................................................5
Connecting Color Kinetics fixtures to the PDS-750-TR .........................5
Operating Modes: CB, Pass Thru, or Stand-Alone ....................................6
  CB Mode .................................................................................................6
  Pass Thru Mode .....................................................................................6
  Stand-Alone Effects Mode ....................................................................7
Using the Mini-Zapi ................................................................................10
Installing the PDS-750-TR ....................................................................10
Software Options .....................................................................................11
Specifications........................................................................................12

FIGURES

Figure 1, PDS-750-TR, Front Panel .........................................................4
Figure 2, PDS-750-TR, Back Panel ..........................................................5
Figure 3 PDS-750-TR with C-Clamps ......................................................10
The City Theatrical PDS-750-TR
Thank you for using the City Theatrical PDS-750-TR™. Every effort has been made to anticipate your questions in this manual, but if you have any questions that we don’t answer here, or you want to discuss a special application, please feel free to contact us directly at City Theatrical.

The CTI PDS-750-TR is a portable power supply unit provided with DMX 512 / Color Kinetics® data management circuitry. It is designed to provide 24VDC power and standard DMX512 distribution connections with DMX field addressing capability for Color Kinetics Fixtures, including ColorBlast® 6, ColorBlast 12, and iColor Cove® (other CK fixtures are also supported, check with your favorite lighting shop or City Theatrical for details).

Cautions
The PDS-750-TR is intended for use only by qualified professionals. Connection, installation and hanging of this equipment must be performed in accordance with all pertinent local, regional and national safety codes and regulations.

The PDS-750-TR is intended for indoor use only.

Keep the unit dry! Do not operate the unit if it gets wet!

Do not operate in excessive heat/direct sunlight.

Be sure installation provides adequate ventilation. Both the front and the back side of the unit must be clear of obstruction and allow free airflow.

There are no user-serviceable parts inside! Refer to qualified service personnel!

Compliance Certifications
ETL Listed, Conforms to UL 508A
cETL Listed, Certified to Can/CSA Standard 22.2 14-95

Compatibility with Color Kinetics Equipment
The CTI PDS-750-TR is produced under license and with the cooperation and approval of Color Kinetics Inc. and is the only such entertainment power supply and control system approved for such use. City Theatrical, Inc. and Color Kinetics, Inc. have made every effort to assure that the CTI PDS-750-TR is fully compatible and will operate reliably with Color Kinetics CB and iColor Cove fixtures.

Color Kinetics Fixtures Supported
The PDS-750-TR will power and control the following Color Kinetics Fixtures:
- ColorBlast 12: 12 units, 1 per output
- ColorBlast 6: 24 units, 2 per output
- ColorBurst 6: 24 units, 2 per output
- ColorBurst 4: 48 units, 4 per output
- Colorsplash 2: 24 units, 2 per output
- iColor Cove: 96 units, 8 per output
Front Panel Controls
The PDS-750-TR front panel controls will generally look familiar to most professional users, with a Pilot/Status Light, 3 BCD DMX Address Switch array, and a system reset switch. In addition, the unit is provided with a Configuration BCD, overload indicators, and a Mini-Zapi™ Switch. All the control functions are described below:

1. Pilot / Status Light:
   - On = Power Present, System running
   - Blinking = No DMX
   - Solid = DMX Present
   - Green = CB Mode
   - Orange = Pass Thru Mode
   - Alternating Red/Green = Stand Alone Mode

2. Reset Switch: Press to reset the PDS-750-TR’s system microprocessor

3. DMX Address Switches: Left to right = 100’s, 10’s, 1’s
   - Set address to 000 for Pass Thru mode
   - Set address to any valid address 001 – 4761 for CB mode

4. Configuration Switch: Selects Stand-Alone Routines. Also may be used for special functions

5. Channel Overload Indicator: Lights if internal circuit breaker is tripped, indicating an overloaded output. If tripped, disconnect load and allow unit to cool (~ 2 minutes). Circuit

---

1 The unit may be addressed to start at any DMX value up to 512, however addresses above 476 will waste outputs, as DMX values will not exist for all outputs.
breaker will re-set. **Note:** If internal circuit breaker trips, something is wrong. Correct fault before using system!

6. **Mini-Zap™:** Resets any connected Color Kinetics CB fixtures to Light 001 (DMX 001, 002 & 003), preparing them for easy use with the **CB Mode** setting.

![Figure 2, PDS-750-TR, Back Panel](image)

**Back Panel Features**
- 7. IEC Power Inlet, Connect Mains Power Cord here.
- 8. DMX INPUT, 5P XLR Male Panel Mount connector, auto-terminated
- 9. DMX OUTPUT, 5P XLR Female Panel Mount connector, a re-generated, optically isolated DMX output (the Unit switches to passive hard-wired pass-thru if power is lost)
- 10. Fixture Output # 1, 4P XLR Female, for connection of Color Kinetics fixtures
- 11. Fan, do not obstruct
- 12. Fuse (10A 3AG)

**Mains Power Requirements**
The PDS-750-TR is compatible with 100-240 VAC, 50/60 Hz Mains Power. The unit is provided with a panel mount IEC Input connector for use with standard 100V – 240V cord sets.

**Connecting Color Kinetics fixtures to the PDS-750-TR**
The PDS-750-TR is provided with Female 4 pin XLR connectors for output connection to the CK fixtures. The connector pin out is as follows:
<table>
<thead>
<tr>
<th>PIN #</th>
<th>Signal</th>
<th>CK Cable Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1</td>
<td>+24VDC</td>
<td>Red</td>
</tr>
<tr>
<td>Pin 2</td>
<td>(n/c)</td>
<td></td>
</tr>
<tr>
<td>Pin 3</td>
<td>Data</td>
<td>White</td>
</tr>
<tr>
<td>Pin 4</td>
<td>DC Common</td>
<td>Black</td>
</tr>
</tbody>
</table>

Color Kinetics CB fixtures are provided with a permanently connected 60ft/20m cable. As 60ft/20m is the maximum length specified by Color Kinetics, this length should not be extended.

Color Kinetics manufactures an optional Data Amplifier/Repeater which may be inserted in the run if additional length is needed. Please contact City Theatrical or Color Kinetics for assistance and details.

**Operating Modes: CB, Pass Thru, or Stand-Alone**

The Unit can be configured for either DMX managed “CB” Mode, Pass Thru mode, or Stand-Alone Mode

**CB Mode**

In **CB Mode**, the system will route DMX (as CK Data protocol) to each output based on the selected DMX starting address. Each fixture is set as CK Light 1 (DMX 001, 002, 003). The PDS-750’s internal DMX Manager selectively routes DMX Data to each light output so that each light receives only the data packets that it is supposed to respond to. The effective DMX address of each fixture is a function of the starting address of the PDS-750, combined with the number of the output that fixture is connected to.

With the DMX Address set to 001: Fixture 1 = DMX 1, 2 & 3, Fixture 2 = DMX 4, 5, & 6, etc.

To put the unit into CB Mode, simply set the DMX Address switches to a desired address other than 000. The unit can be set to any valid DMX address, however please note that any starting address over 476 will disable some outputs.

**Configuration / system setup for CB (DMX managed) mode**

1. Using the on-board Mini-Zapi (see, Using the Mini-Zapi page 10) or Color Kinetics Zapi™, pre-address all CB fixtures as DMX 001.
2. Plug up to 12 of those CB fixtures into outputs 1 – 12
3. Connect the System to a DMX source via the DMX Input and connect power
4. Set the system’s DMX Address to the desired starting address value AAA
5. The 12 connected CB fixtures will respond as follows:
   - CB Fixture # 1 = DMX address AAA, AAA+1, AAA+2
   - CB Fixture # 2 = DMX address AAA+3, AAA+4, AAA+5
   - CB Fixture # 3 = DMX address AAA+6, AAA+7, AAA+8, etc.

**Pass Thru Mode**

In **Pass Thru mode**, the system will convert all the DMX values to CK Data protocol, and send that CK Data (with 24V power) to all 12 outputs. This mode is useful when powering i-Color Cove fixtures which have local address switches for each light. The Pass Thru Mode can also be suitable for CB fixtures when using the CTI PDS-750-TR in a system requiring Zapi
addressing schemes, such as when being used in combination with other Color Kinetics™ power supplies like the PDS-150™

Pass Thru Mode is selected whenever the DMX Address switches are set to all 0s (000) and the Config Switch is set to 0

Stand-Alone Effects Mode
In Stand-Alone Mode the PDS-750-TR will run various pre-programmed effects without need for a console. This is very useful for events like parties or trade shows, where a constantly running program is desired without the use of a console or show programming.

The unit is placed into Stand-Alone Mode using the Config BCD switch. When the unit is in Stand-Alone mode, the DMX Address switches become Effect controls. Different Stand-Alone Effects are selected via different setting combinations of the DMX Address switches and the Config switch

Configuration Switch Settings for different Stand-Alone Effects

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No Stand-Alone function. The System will operate normally in Pass-Thru or CB Modes, depending on the DMX Address switch settings.</td>
</tr>
<tr>
<td>1</td>
<td>Fixed Color. The DMX address BCDs are used to adjust the red, green and blue components. DMX 100s controls the red (0 is off and 9 is full), DMX 10s controls green and DMX 1s controls blue.</td>
</tr>
<tr>
<td>2</td>
<td>Color Wash (forward). The color wash effect moves sequentially around the spectrum of colors (Red, Magenta, Blue, Cyan, Green, Yellow &amp; White) repeating the same cycle over and over again at user definable speeds. The speeds are controlled by setting the DMX 10s &amp; ones to 1 of 48 possible settings. The following lists their settings and approximate fade times.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Setting</th>
<th>Approximate Fade Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>.25 sec</td>
</tr>
<tr>
<td>1</td>
<td>.3 sec</td>
</tr>
<tr>
<td>2</td>
<td>.4 sec</td>
</tr>
<tr>
<td>3</td>
<td>.6 sec</td>
</tr>
<tr>
<td>4</td>
<td>1.25 sec</td>
</tr>
<tr>
<td>5</td>
<td>2.55 sec</td>
</tr>
<tr>
<td>6</td>
<td>4 sec</td>
</tr>
<tr>
<td>7</td>
<td>5 sec</td>
</tr>
<tr>
<td>8</td>
<td>10 sec</td>
</tr>
<tr>
<td>9</td>
<td>15 sec</td>
</tr>
<tr>
<td>10</td>
<td>20 sec</td>
</tr>
<tr>
<td>11</td>
<td>25 sec</td>
</tr>
<tr>
<td>12</td>
<td>30 sec</td>
</tr>
<tr>
<td>13</td>
<td>35 sec</td>
</tr>
<tr>
<td>14</td>
<td>40 sec</td>
</tr>
<tr>
<td>15</td>
<td>45 sec</td>
</tr>
<tr>
<td>16</td>
<td>50 sec</td>
</tr>
<tr>
<td>17</td>
<td>1 min</td>
</tr>
<tr>
<td>18</td>
<td>1.2 min</td>
</tr>
</tbody>
</table>
3. Color Wash (reverse). Same as above but in counter clockwise rotation (White, Yellow, Green, Cyan, Blue, Magenta, & Red).

4. Cross-Fade. The Cross-Fade effect changes from one preset color to another than back again. The DMX 100s switch sets the starting color and the DMX 10s switch sets the ending color. The user specified speed is controlled by the DMX 1s switch. The following speeds are provided:

<table>
<thead>
<tr>
<th>Speed</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>5 sec</td>
</tr>
<tr>
<td>1</td>
<td>10 sec</td>
</tr>
<tr>
<td>2</td>
<td>30 sec</td>
</tr>
<tr>
<td>3</td>
<td>1 min</td>
</tr>
<tr>
<td>4</td>
<td>2 min</td>
</tr>
<tr>
<td>5</td>
<td>15 min</td>
</tr>
<tr>
<td>6</td>
<td>30 min</td>
</tr>
<tr>
<td>7</td>
<td>1 hr</td>
</tr>
</tbody>
</table>

5. The random color effect produces random colors at user definable speeds. The randomly generated color steps from one to the next without and fading. Speed is controlled by the DMX 10s and 1s digits. The following speeds are provided:

<table>
<thead>
<tr>
<th>Speed</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>5 sec</td>
</tr>
<tr>
<td>1</td>
<td>10 sec</td>
</tr>
<tr>
<td>2</td>
<td>30 sec</td>
</tr>
<tr>
<td>3</td>
<td>1 min</td>
</tr>
<tr>
<td>4</td>
<td>2 min</td>
</tr>
<tr>
<td>5</td>
<td>15 min</td>
</tr>
<tr>
<td>6</td>
<td>30 min</td>
</tr>
<tr>
<td>7</td>
<td>1 hr</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>---</td>
<td>----</td>
</tr>
<tr>
<td>1</td>
<td>.1 sec</td>
</tr>
<tr>
<td>2</td>
<td>.15 sec</td>
</tr>
<tr>
<td>3</td>
<td>.2 sec</td>
</tr>
<tr>
<td>4</td>
<td>.275 sec</td>
</tr>
<tr>
<td>5</td>
<td>.325 sec</td>
</tr>
<tr>
<td>6</td>
<td>.375 sec</td>
</tr>
<tr>
<td>7</td>
<td>.5 sec</td>
</tr>
<tr>
<td>8</td>
<td>.625 sec</td>
</tr>
<tr>
<td>9</td>
<td>.95 sec</td>
</tr>
<tr>
<td>10</td>
<td>1.25 sec</td>
</tr>
<tr>
<td>11</td>
<td>1.5 sec</td>
</tr>
<tr>
<td>12</td>
<td>1.875 sec</td>
</tr>
<tr>
<td>13</td>
<td>2.5 sec</td>
</tr>
<tr>
<td>14</td>
<td>3.125 sec</td>
</tr>
<tr>
<td>15</td>
<td>4.375 sec</td>
</tr>
<tr>
<td>16</td>
<td>5.625 sec</td>
</tr>
<tr>
<td>17</td>
<td>6.25 sec</td>
</tr>
<tr>
<td>18</td>
<td>9.375 sec</td>
</tr>
<tr>
<td>19</td>
<td>12.5 sec</td>
</tr>
<tr>
<td>20</td>
<td>15 sec</td>
</tr>
<tr>
<td>21</td>
<td>18.75 sec</td>
</tr>
<tr>
<td>22</td>
<td>31.25 sec</td>
</tr>
<tr>
<td>23</td>
<td>37.5 sec</td>
</tr>
<tr>
<td>24</td>
<td>56.25 sec</td>
</tr>
<tr>
<td>25</td>
<td>1.25 min</td>
</tr>
<tr>
<td>26</td>
<td>1.875 min</td>
</tr>
<tr>
<td>27</td>
<td>2.5 min</td>
</tr>
<tr>
<td>28</td>
<td>3.125 min</td>
</tr>
<tr>
<td>29</td>
<td>3.75 min</td>
</tr>
</tbody>
</table>

6 Fixed color strobe uses the DMX 100s switch to choose the color (1-Red, 2-Green, 3-Yellow, 4-Blue, 5-Magenta, 6-Cyan, 7-White, 8&9-Black). The strobe rate is controlled by the DMX 1s digit. The following rates are provided:

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>20/sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13/sec</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>10/sec</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>7.5/sec</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5/sec</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>4/sec</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>3/sec</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>2/sec</td>
<td></td>
</tr>
</tbody>
</table>

7 Variable color strobe steps from color to color (Red, Green, Yellow, Blue, Magenta, Cyan, & White) in a user definable time period at a strobe rate that is also user definable. The same strobe rate that is employed in the fixed color strobe is available via the DMX 1s digit. The step times between color changes are provided via the DMX 100s and 10s switches. The values and time periods are the same as the random color effect.
Using the Mini-Zapi
CB fixtures can be quickly re-addressed as "Light 1" (DMX 001, 002, & 003) using the Mini-Zapi.
1. Power Up the PDS-750-TR
2. Place the PDS-750-TR into Pass-Thru Mode
3. Connect the CB Fixture(s) to the PDS-750-TR.
4. Press the Mini-Zapi button.
5. The CB fixture(s) will light red for a moment and then flicker for a few seconds.
6. After the flickering stops, Power the system down.
7. Power the system back up to test the units.

Installing the PDS-750-TR
The PDS-750-TR can be mounted to a pipe or truss using standard theatrical C-clamps. The Unit is provided with ½" holes on each side of the case cover for attaching the C-clamps, and with a ⅛" hole in the left edge of the case cover for a safety cable. When mounting the PDS-750-TR in this way, all necessary care should be taken to assure that the installation is suitable and safe, and that the hardware is properly rated for the task.

Figure 3 PDS-750-TR with C-Clamps
Software Options
In addition to the standard software provided with the PDS-750, CTI also offers additional software versions as standard options which can be installed in your system at the time of order without additional cost. Available standard options include:

• Version 200a: This is the standard current version which most PDS-750s are provided with. Features are the normal features documented in this manual.

• Version 1.04: This is an expanded patch version which allows separate control of multiple CB fixtures per connection port. In this version, the Config BCD switch is used to select the number of DMX values sent to each port when the unit is placed in CB mode (DMX managed mode). Settings:
  - Config BCD set to 0 = 3 DMX values per port (standard operation)
  - Config BCD set to 6 = 6 DMX values per port allows 2 CB fixtures to be connected and run independently. One unit must be addressed as CK Light #1, the other addressed as CK Light # 2.

Notes
1. For 2-fixture configurations, a Color Kinetics Zapi must be used to pre-address the second light, as the CTI min-zapi™ will only address units as CK Light # 1.
2. Stand Alone features are not available with Ver. 1.04 software

• Version 1.04a: This is a "low noise" version that is otherwise identical in operation to 1.04. With version 1.04a, the PDS-750 only outputs level changes to the fixture ports. Since the CB fixtures hold the last the valid level data level sent until they receive a change, the operation of the units is effectively the same as if the DMX data is constantly resent. Since this version only sends changes, the total amount of activity on the data Ports is much lower, particularly with channels that are left off, as there is no data sent, not even 0s.

This software was developed to address the issues resulting from installations with cable runs that exceed the maximum limit recommended by Color Kinetics.

Notes
1. Since the data is only output when changes occur, a light that is connected after a level change will not respond to that change.
2. As with version 1.04, Stand Alone features are not available with Ver. 1.04a software.

Like all of City Theatrical's microprocessor based products, CTI can also develop custom software; contact us any time to discuss your unique requirements
Specifications

Dimensions: 18.50” x 5.218” x 8.50”

Weight: 13.5 Lbs.

Electrical Specifications:
- Input Power 100-240VAC 50/60 Hz 600 Watts
- Output Power 24VDC 20Amps Max

Features:
- Heavy Duty NEMA 1 Steel and Aluminum enclosure
- 100-240 VAC 50/60hz Mains Power (auto-ranging)
- Mounting points for C-Clamps & Safety Cable
- (12) 4P XLRF CK Data/24V Power output connectors for fixture connection
- DMX 512 Interface (see below)
- 1 x 750 Watt internal power supply
- 24VDC 3A current limited per circuit output with LED Fault Indication
- One-touch Mini-Zapi feature for reconfiguring fixtures with correct starting DMX Address
- Includes 7 types of user-configurable fade and chase routines for stand-alone operation
- In Stand-Alone Mode, selected routine is output to DMX Pass-Thru for synchronized Stand-Alone operation of many CB Supply systems

DMX 512 Interface:
- DMX Input via 5P XLR Male
- Isolated and repeated DMX Pass-Thru via 5P XLR Female
- DMX Address interface utilizing 3 Rotary BCD Switches for DMX Address configuration

CK Output Configuration
- 12 outputs providing Color Kinetics control protocol, +24VDC, and Ground
- “CB Mode”: DMX converted to CK protocol and output selectively to each port as per BCD address setting (see below)
- “iCove Mode”: All 512 DMX values converted to CK Protocol and output on all ports

Options:

<table>
<thead>
<tr>
<th>Rack mount</th>
<th>Terminal Block Output</th>
<th>4P XLR Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe Mount</td>
<td>ETL/cETL Version</td>
<td>CE Version</td>
</tr>
</tbody>
</table>

*Fixtures Supported: ColorBlast 12, ColorBlast 6, ColorBurst 6®, ColorBurst 4®, iColor Cove®*
PLATINUM SPOT 5R PRO

Elation Professional
6122 S Eastern Ave
Los Angeles, Ca 90040
www.elationlighting.com
CONTENTS

1. General Information .. .. .. 3
   a. Introduction .. .. 3
   b. Unpacking .. .. 3
   c. Customer Support .. .. 3
   d. Warranty Registration .. .. 4
   e. Discharge Lamp Warning .. .. 4
2. Safety Instructions .. .. .. 6
3. Features .. .. .. 8
4. General Guidelines .. .. .. 9
5. Fixture Overview .. .. .. 10
6. Lamp Installation .. .. .. 13
   a. Lamp Protection Circuitry .. .. .. 13
   b. Lamp installation .. .. .. 14
   c. Lamp optimization .. .. .. 15
7. Mounting and Installation .. .. 16
   a. Mounting Positions .. .. .. 16
   b. Mounting Points .. .. .. 17
   c. Securing .. .. .. 18
8. Understanding DMX .. .. .. 19
   a. DMX Cable Requirements .. .. .. 19
   b. DMX Terminator .. .. .. 20
   c. 3-Pin to 5-Pin Conversion .. .. .. 20
   d. DMX Addressing .. .. .. 21
9. Fixture Menu .. .. .. 23
10. DMX Addressing .. .. .. 35
11. Operation .. .. .. 37
12. Working with Built-In Programs .. .. .. 39
13. DMX Channel Traits .. .. .. 42
   a. DMX Channel Values .. .. .. 42
14. Error Codes .. .. .. 48
15. Cleaning and Maintenance .. .. .. 51
16. Photometric Data .. .. .. 52
17. Gobo Patterns .. .. .. 53
18. Dimensional Drawings .. .. .. 54
19. Circuit Schematic .. .. .. 55
20. Technical Specifications .. .. .. 56
21. Warranty .. .. .. 58

©Elation Professional, Los Angeles, Ca 2 www.ElationLighting.com
1. GENERAL INFORMATION

**INTRODUCTION:** Congratulations, you have just purchased one of the most innovative and reliable lighting fixtures on the market today! The Platinum Spot 5R Pro™ has been designed to perform reliably for years when the guidelines in this booklet are followed. Please read and understand the instructions in this manual carefully and thoroughly before attempting to operate this unit, *this fixtures uses a unique lamp that has very specific guidelines that must be strictly followed.* The manual contains important information regarding safety protocol that must be strictly adhered to at all times.

**UNPACKING:** Thank you for purchasing the Platinum Spot 5R Pro™ by Elation Professional®. Every Platinum Spot 5R Pro™ has been thoroughly tested and has been shipped in perfect operating condition. Carefully check the shipping carton for damage that may have occurred during shipping. If the carton appears to be damaged, carefully inspect your unit for damage and be sure all accessories necessary to operate the unit have arrived intact. In the event damage has been found or parts are missing, please contact our customer support team for further instructions. Please do not return this unit to your dealer without first contacting customer support at the number listed below.

**CUSTOMER SUPPORT:** Elation Professional® provides a customer support line, to provide set up help and to answer any question should you encounter problems during your set up or initial operation. You may also visit us on the web at www.elationlighting.com for any comments or suggestions. For service related issue please contact Elation Professional®. Service Hours are Monday through Friday 8:00 a.m. to 5:00 p.m. Pacific Standard Time.

Voice: (323) 582-3322  
Fax: (323) 832-9142  
E-mail: support@elationlighting.com  
Forum: www.ElationLighting.com/forum

**Warning!** To prevent or reduce the risk of electrical shock or fire, do not expose this unit to rain or moisture.

**Caution!** There are no user serviceable parts inside this unit. Do not attempt any repairs yourself, doing so will void your manufactures warranty.

*Please do not discard the shipping carton in the trash. Please recycle whenever possible.*
**WARRANTY REGISTRATION:** The Platinum Spot 5R Pro™ carries a two-year (730 days) limited warranty. Please fill out the enclosed warranty card to validate your purchase. All returned service items whether under warranty or not, must be freight pre-paid and accompany a return authorization (R.A.) number. The R.A. number must be clearly written on the outside of the return package. A brief description of the problem as well as the R.A. number must also be written down on a piece of paper and included in the shipping container. If the unit is under warranty, you must provide a copy of your proof of purchase invoice. Items returned without a R.A. number clearly marked on the outside of the package will be refused and returned at customer’s expense. You may obtain a R.A. number by contacting customer support at (323) 582-3322.

*Important: Damages caused by the disregard of the instructions in this user manual are not subject to warranty.***

**DISCHARGE LAMP WARNING:** This fixture is fitted with a discharge lamp, which is highly susceptible to damage if improperly handled. Never touch the lamp with your bare hands, as the oil from your hands will shorten lamp life. Also, never move the fixture until the lamps have had ample time to cool. Remember, lamps are not covered under warranty conditions.

**Lamp Replacement:** Please note that due to the nature of the Platinum 5R Lamp and the optical path of the Platinum Spot 5R Pro it is imperative to replace the lamp at the rated 2000 hour lamp life!

**UV RADIATION:** This fixture emits intense UV radiation, which is harmful to the eyes and skin. The intense luminance of the lamp can cause severe damage to the retina. Never operate this fixture with the protective covers removed, these covers have been specially designed to shield against UV radiation.

**Epileptic Warning:** Those suffering from epilepsy should avoid looking directly into the lamp at all times.

Avoid switching the fixture on and off repeatedly in short intervals, as this will reduce lamp life and intensity.
To achieve the intensity associated with discharge lamps, these lamps use gas sealed in a high-pressure environment to emit a brilliant output. Due to the high pressure involved with the construction of the lamp, the lamp may explode during prolonged extensive use. This risk is increased with age; added care is encouraged when dealing with older lamps. Thus, lamp must always be replaced at the end of their recommended duty cycle. Extreme caution should be used when operated this or any fixture fitted with a gas discharge lamp.

**Never open this fixture while in use!**

During the initial operation of this fixture, a light smoke or smell may emit from the interior of the fixture. This is a normal process and is caused by excess paint in the interior of the casing burning off from the heat associated with the lamp and will decrease gradually over time.

This device falls under protection-class 1. Therefore it is essential that the device be grounded properly.

All electrical connections should be performed by a qualified electrician.

Be sure the available voltage matches the voltage requirements of the unit.

Be sure the power cord is never crimped or damaged. If the power cord is damaged, replace it immediately with a new one of similar power rating.

Always disconnect from main power before performing any type of service or any cleaning procedure.

Only handle the power cord by the plug. Never pull out the plug by tugging the wire portion of the cord.

This fixture is designed for use indoors. Use of this fixture outdoors will void the manufactures warranty.

**Please be aware that damages caused by manual modifications to the device are not subject to warranty.**
2. SAFETY INSTRUCTIONS

The Platinum Spot 5R Pro™ is an extremely sophisticated piece of electronic equipment. To guarantee a smooth operation, it is important to follow the guidelines in this manual. Elation will not accept responsibility for damages resulting from the misuse of this fixture due to the disregard of the information printed in this manual.

1. Always be sure that the fan and the air inlets remain clean and are never blocked. Allow about 6" (15cm) between this fixture and other devices or a wall to allow for proper cooling.

2. Never touch the fixture during normal operation. This can cause severe personnel injuries and/or damage to the fixture.

3. Be sure to unplug the Platinum Spot 5R Pro™ from the power outlet before performing any service related issues.

4. Lamp Replacement; Allow at least 15 minutes after disconnecting main power before you open the Platinum Spot 5R Pro™. To prevent personal injury, never touch the lamp if you are not absolutely sure it has cooled.

5. Never look directly into the lamp beam. You risk injury to your retina, which may induce blindness.

6. Be sure to track and record the lamp running time. The lamp should be changed at the end of the specified lamp life, regardless of lamp output. You may also have to change the lamp if it shows any deformations or damage. The same is with all glass components, color filters, lenses and mirrors.

7. For safe operation, follow the Installation guide described in chapter two of this manual. Operating the Platinum Spot 5R Pro™ without suited safety aids such as safety cables or clamps can increase the risk of damage and/or personal injury.

8. Only qualified and certified personnel should perform installation.

9. When mounting this fixture, use only the original rigging parts included with this fixture. Any structural modification will void the original manufactures warranty and
may increase the risk of damage and/or personal injury.

10. To reduce the risk of fire or shock, do not expose this fixture to rain or moisture.

11. Do not attempt to operate this fixture if the power cord has become damaged or frayed.

**Important Notice:** Damages resulting from the disregard of safety and general user instructions found in this user manual are not subject to any warranty claims.
3. FEATURES

- Pan 540° or 630° (User selectable) / Tilt 270°
- 3 operation mode: DMX controlled, stand alone, or sound activated
- 8 user colors plus white (including UV filter)
- User selectable color change modes (mode 1: full colors, mode 2: split-colors)
- Two Gobos Wheels:
  - Wheel 1: Rotating gobo wheel with 8 gobos plus open, all gobos can be easily replaceable and gobo indexing
  - Wheel 2: Static/Fixed gobo wheel with 14 gobos plus open
- Strobe effect: 0~13 flashes per second or random strobe
- Prism and prism rotation, with 16 prism macros
- Frost Filter for Soft and Hard Edge Spot
- Bright Phillips Platinum 5R Lamp (189W / 8000K / 2000Hrs / 7950Lm)
- Dimmer intensity from 0%~100%
- Electronic Power Supply (AC 100V-240V~, 50Hz/60Hz)
- Control board with full color LCD graphic display and foil touch keyboard
- RDMX (Remote DMX addressing from any DMX console)
- Auto test for all functions
- Automatic Pan/Tilt Correction
- Built-in Iris (5% ~ 100%), with Iris Pulse Effect
- Glass Dichroic Reflector for Even Lamp Output
- Anti-Reflective Coated Lenses
- USITT DMX-512 Complaint (3-pin and 5-pin DMX Connections)
- Electronic Focus via DMX
- Upgradable Firmware via Elation “E-Loader”
- 7 User Assignable Program Presets - Internal Program: Edit and save programs to the incorporated EEPROM. Maximum of 64 scenes.
4. GENERAL GUIDELINES

This fixture is a professional lighting effect designed for use on stage, in nightclubs, in theatres, etc. Do not attempt operation or installation without a proper knowledge on how to do so.

This fixture was designed for indoor use only.

Consistent operational breaks may ensure that the fixture will function properly for many years to come.

Do not shake the fixture around. Avoid brute force when installing or operating the device.

While choosing an installation location, please be sure that the fixture will not be exposed to extreme heat, moisture or dust. The minimum distance between the fixture and a wall or flat surface should be at least 1 meter (about 3.5ft).

Always install the fixture with an appropriate safety cable. When installing the fixture in a suspended environment always be sure to use mounting hardware no less than M10 x 25 mm, also be sure the hardware is insert in the pre-arranged screw holes in the base of the fixture.

When using the quick release “Omega” cam-lock system, be sure the four quick lock fasteners are locked in the quick lock holes correctly.

Do not attempt to operate this fixture until you have familiarized yourself with its functions.

Do not permit operation by persons not qualified for operating this type of theatrical fixture; most damages are the result of operations by nonprofessionals.

Please use the original packaging to transport the fixture in for service.
5. FIXTURE OVERVIEW

1: Lens
2: Display
3: Wireless indicator
4: DC Switch
5: Microphone
6: Left Button
7: Down Button
8: Right Button
9: Mode/Esc Button
10: Up Button
11: Enter Button
12: Wireless DMX Antenna
13: Handle
14: Lamp Access Panel
15: 3-Pin DMX in
16: 3-Pin DMX out
17: 5-Pin DMX in
18: 5-Pin DMX out
19: Power Cord
20: Fuse
1. **Lens** – Main output lens.

2. **LED Menu Display** – Full color animated menu display.


4. **DC Switch** - Controls menu and display power when the unit is disconnected from mainpower.

5. **Microphone** – This microphone receives external low frequencies to trigger the unit in Sound-Active mode. This microphone is designed to receive low frequency sounds only, tapping on the microphone and high pitch sounds may not trigger the unit.

6. **Left Button** – This button is used to toggle through the menu display.

7. **Down Button** – The down button is used to toggle down or back through the menu functions and settings.

8. **Right Button** - This button is used to toggle through the menu display.

9. **Mode/Esc Button** - This button is used to access the menu functions.

10. **Up Button** – The up button is used to toggle forward through the menu functions and settings.

11. **Enter Button** – The enter button is used to enter into a certain menu function or to lock a function into memory.

12. **Wireless Antenna** – This antenna works with the built-in wireless DMX receiver. The built-in wireless DMX system works with any Elation wireless system or any compatible “EWDMX” system.
13. **Carrying Handle** – Please use this intergraded handled to move the fixture form location to location. Never carry the fixture by the head.

14. **Lamp Access Panel** – This panel provides access to the lamp and lamp socket assembly. Always allow ample time for the lamp to cool before attempting access to the lamp and lamp socket.

15. **3-PIN DMX Input Jack** – This jack accepts an incoming DMX signal via a male, 3- pin XLR jack.

16. **3-Pin DMX Output Jack** – This jack is used to send an incoming DMX signal to the next fixture in the DMX chain via a female, 3-pin XLR jack.

17. **5-PIN DMX Input Jack** – This jack accepts an incoming DMX signal via a male, 5- pin XLR jack.

18. **5-Pin DMX Output Jack** – This jack is used to send an incoming DMX signal to the next fixture in the DMX chain via a female, 3-pin XLR jack.

19. **Power Cord** – Plug into an appropriate power outlet to provide main power to the fixture.

20. **Fuse Holder Assembly** – This assembly houses the 4amp GMA safety fuse. Always replace the fuse with an exact match unless otherwise specified by an authorized Elation Service Technician. Using a fuse other than that specified could seriously damage the unit and will void your manufactures warranty.
6. LAMP INSTALLATION INSTRUCTIONS

Installing or replacing the lamp
For a proper and safe lamp change, please read this chapter carefully and follow all instructions.

Lamp Protection Circuitry
Because of the nature of the extreme heat associated with the Platinum 5R lamp and the tight nature of the internal optical system it is imperative that the lamp be replaced every 2000 hours. This is done to protect the internal optical system as well as prevent accidental lamp explosion, which could lead to hot glass particles falling from the fixture. Failure to change the lamp within 300 hours of operation will result in automatic shut down of the fixture’s electronics.

At 2000 hours the display will begin to flash “Replace The Lamp” and the lamp will flicker for the first five minutes of operation. At this point the lamp has reached the maximum rated life and should be replaced immediately. After the lamp has flickered for about five minutes it should strike normally allowing the fixture to be used temporarily until a replacement lamp can be installed. The fixture will continue to operate for an additional 300 hours, however the “Replace the Lamp” warning will continue to flash in the display. Keep in mind that the flicker protection circuitry will only work for about 300 hours (lamp clock life of 2000-2300 hours). After 2300 hours the fixture will no longer respond to DMX commands and immediately enter a hibernation mode that will electronically discontinue all fixture functionality with the exception of a few menu commands. The fixture will continue to enter hibernation mode until the lamp is replaced and the lamp clock has been reset. To replace the lamp follow the safety guidelines and procedures below;

Safety Regulations

• Always replace lamp every 2000 hours.
• Disconnect the unit’s main power supply.
• If you unit has been running, please allow the unit to cool for at least 15 minutes before attempting any type of service.
• Before the Platinum Spot 5R Pro™ is put into operation be sure all covers have been replaced, otherwise you risk damage to the retina and expose to UV radiation!

• When replacing an old lamp, always be sure to replace with an approved replacement. In this case a Philips MSD Platinum 5R lamp is required. Be sure the replacement lamp meets or exceeds the original lamp specifications, failure to do so may damage the fixture and void the manufactures warranty.

• Be sure to follow all the lamp handling procedures included with the new lamp. Never handle the new lamp with your bare hands as the oils from your skin may damage the lamp and cause premature lamp failure.

Installation Procedure:

1. Set the fixture on a flat surface and remove the two screws marked “A” and “B”.
2. Remove the cover plate to access the lamp.
3. Gently remove the old lamp by grasping the ceramic socket base and twisting it slightly in counter-clockwise direction until it becomes free.
4. Once the lamp becomes free, grasp the ceramic socket and gently pull away from the lamp.
5. Insert the new lamp securely. The lamp will only seat one way, please be sure to insert the lamp in the same position as the old one. Before reassembling the unit, be sure the new lamp is securely seated in the lamp socket. Always be sure to only use specified lamp types! (Philips MSD Platinum 5R).
6. Once the lamp has been inserted and secured into the socket, follow the lamp optimization instructions outlined below, then lock the lamp cover back in to place by securing screws “A” and “B”.

©Elation Professional, Los Angeles, Ca
7. Be sure to reset the lamp run time in the system menu to avoid any possibly of the lamp protection circuitry from accidently shutting off the lamp during normal operation.

8. If the lamp protection circuitry has already been initiated and the lamp run time is not reset the “Replace the Lamp” warning will continue to flash in the display and the fixture will eventually shut down. To reset the lamp running time follow the procedures below;
   A. Activate the menu by pressing the “Mode/Esc” button and toggle to “Information”
   B. Once at “Information” tap the “Enter” button and use the “Up” or “Down” buttons to toggle to “Time Information”
   C. Once at “Time Information” use either the “Up” or “Down” buttons to toggle to “L-Timer Password” and tap the “Enter” button. Then use the “Up” or “Down” buttons to enter the reset pass code, “038” and tap the “Enter” button once again. The display will automatically revert to “L-Timer Password,” next toggle down to “Clear Lamp Time”
   D. Once at “Clear Lamp Time” tap the enter button and select “ON.” The lamp timer has now been reset, use the “MODE/ESC” button to exit the menu and return to the home screen.

_Lamp Optimization_

Unlike traditional discharge lamps the Platinum 5R lamp does not require optimization. The lamp orientation and optimization procedure has been preset during the manufacturing process of the lamp.

Please remember that a MSD Platinum 5R lamp is not a hot-restrike lamp therefore, you must wait approximately 15 minutes before you can attempt to strike the lamp once it has been turned off.
7. MOUNTING AND INSTALLATION

**Cautions:**
For added protection mount the fixtures in areas outside walking paths, seating areas, or in areas were the fixture might be reached by unauthorized personal.

Before mounting the fixture to any surface, make sure that the installation area can hold a minimum point load of 10 times the device’s weight.

Fixture installation must always be secured with a secondary safety attachment, such as an appropriate safety cable.

Never stand directly below the device when mounting, removing, or servicing the fixture.

**Caution!**
When install the fixture be sure there is no highly inflammable material within a distance of 3.5 feet

**Mounting**
The Platinum Spot 5R Pro™ is fully operational in two different mounting positions, hanging upside-down from a ceiling, or set on a flat level surface (see illustration on next page). Be sure this fixture is kept at least 0.5m away from any flammable materials (decoration etc.). Always use and install the supplied safety cable as a safety measure to prevent accidental damage and/or injury in the event the clamp fails.

Refer to regulations BGV C1 (formerly VBG 70) and DIN VDE0711-217 for proper installation in Europe To ensure proper installation, only qualified staff should attempt installation.
Mounting points

Overhead mounting requires extensive experience, including amongst others calculating working load limits, a fine knowledge of the installation material being used, and periodic safety inspection of all installation material and the fixture. If you lack these qualifications, do not attempt the installation yourself. Improper installation can result in bodily injury.

CAUTION!
Be sure a qualified electrician performs all electrical connections.

Be sure to complete all rigging and installation procedures before connecting the main power cord to the appropriate wall outlet.
Clamp Mounting

The Platinum Spot 5R Pro™ provides a unique mounting bracket assembly that integrates the bottom of the base, the included “Omega Bracket,” and the safety cable rigging point in one unit (see the illustration below). When mounting this fixture to truss be sure to secure an appropriately rated clamp to the included omega bracket using a M10 screw fitted through the center hole of the “omega bracket”. As an added safety measure be sure to attached at least one properly rated safety cable to the fixture using on of the safety cable rigging point integrated in the base assembly.

Securing the Platinum Spot 5R Pro™

Regardless of the rigging option you choose for your Platinum Spot 5R Pro™ always be sure to secure your fixture with a safety cable. The fixture provides a built-in rigging point for a safety cable on the hanging bracket as illustrated above. Be sure to only use the designated rigging point for the safety cable and never secure a safety cable to a carrying handle.
8. UNDERSTANDING DMX

**DMX-512:** DMX is short for Digital Multiplex. This is a universal protocol used by most lighting and controller manufacturers as a form of communication between intelligent fixtures and controllers. DMX allows all makes and models of different manufacturers to be linked together and operate from a single controller. This is possible as long as all the fixtures and the controller are DMX compliant. A DMX controller sends the DMX data instructions to the fixture allowing the user to control the different aspects of an intelligent light. DMX data is sent out as serial data that travels from fixture to fixture via data “IN” and data “OUT” XLR terminals located on the fixtures (most controllers will only have output jacks).

**DMX Linking:** To ensure proper DMX data transmission, always use proper DMX cables and a terminator. When using several DMX fixtures try to use the shortest cable path possible. Never split a DMX line with a “Y” style connector. The order in which the fixtures are connected in a DMX line does not influence the DMX addressing. For example; a fixture assigned a DMX address of 1 may be placed anywhere in the DMX chain, at the beginning, at the end, or anywhere in the middle. The DMX controller knows to send data assigned to address 1 to that fixture no matter where it is located in the DMX chain. The Platinum Spot 5R Pro™ can be controlled via DMX-512 protocol. The Platinum Spot 5R Pro™ is a 23-channel DMX fixture (23 default, can also be 21 or 34). The DMX address is set electronically using the controls on the LCD menu.

**Data Cable (DMX Cable) Requirements (For DMX and Master/Slave Operation):** Your fixture and your DMX controller require a standard 3-pin or 5-pin XLR connector for data input and data output (the figure on the next page is of a 3-Pin XLR connector). If you are making your own cables, be sure to use two conductor shielded digital DMX cable rated at 120 ohms; this cable is designed for DMX transmission and may be purchased from your Elation dealer or at most professional lighting retailers. Your cables should be made with a male and female XLR connector on either end of the cable. Also, remember that a DMX line must be daisy chained and cannot be split, unless using an approved DMX splitter such as the Elation Opto Branch 4™ or DMX Branch/4™.
Be sure to follow the above figure when making your own cables. Do not use the ground lug on the XLR connector. Do not connect the cable’s shield conductor to the ground lug or allow the shield conductor to come in contact with the XLR’s outer casing. Grounding the shield could cause a short circuit and erratic behavior.

DMX-512 control connection

Connect the provided XLR cable to the female 3-pin XLR output of your controller and the other side to the male 3-pin XLR input of the moving head (Please refer to the diagram below.). You can chain multiple moving heads together through serial linking. The cable that should be used is two conductor, shielded DMX cable with XLR input and output connectors. Always be sure daisy chain your in and out data connections, never split or “Y” your DMX connections unless you are using an approved DMX splitter such as the Elation Opto Branch 4™ or DMX Branch/4™.
DMX-512 connection with DMX terminator

A DMX terminator should be used in all DMX lines especially in longer runs. The use of a terminator may avoid erratic behavior in your DMX line. A terminator is a 120 ohm 1/4 watt resistor that is connected between pins 2 and 3 of a male XLR connector (DATA + and DATA -). This fixture is inserted in the female XLR connector of the last fixture in your daisy chain to terminate the line. Using a line terminator (Elation part: DMX T PACK) will decrease the possibilities of erratic behavior.

Termination reduces signal errors and avoids signal transmission problems and interference. It is always advisable to connect a DMX terminal, (Resistance 120 Ohm 1/4 W) between PIN 2 (DMX-) and PIN 3 (DMX +) of the last fixture.

5-Pin XLR DMX Connectors. Some manufactures use 5-pin XLR connectors for DATA transmission in place of 3-pin. 5-pin XLR fixtures may be implemented in a 3-pin XLR DMX line. When inserting standard 5-pin XLR connectors in to a 3-pin line a cable adaptor must be used, these adaptors are readily available at most electric stores. The following chart details a proper cable conversion.

<table>
<thead>
<tr>
<th>3-Pin XLR to 5-Pin XLR Conversion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductor</td>
</tr>
<tr>
<td>Ground/Shield</td>
</tr>
<tr>
<td>Data Compliment (- signal)</td>
</tr>
<tr>
<td>Data True (+ signal)</td>
</tr>
<tr>
<td>Not Used</td>
</tr>
<tr>
<td>Not Used</td>
</tr>
</tbody>
</table>

Fixture DMX addressing;

All fixtures should be given a DMX starting address when using a DMX controller, so the correct fixture responds to the correct control signal. This digital starting address is the
channel number from which the fixture starts to “listen” to the digital control information sent out from the DMX controller. The allocation of this starting DMX address is achieved by setting the correct DMX address on the digital display located on the base of the fixture.

You can set the same starting address for all fixtures or a group of fixtures, or set different address for each individual fixture. Be advised that setting all your fixtures to the same DMX address will subsequently control all fixtures in the same fashion, in other words, changing the settings of one channel will affect all the fixtures simultaneously.

If you set each fixture to a different DMX address, each unit will start to “listen” to the channel number you have set, based on the quantity of control channels (DMX channels) of each fixture. That means changing the settings of one channel will only affect the selected fixture.

In the case of the Platinum Spot 5R Pro™, which is a 23 channel fixture (default), you should set the starting DMX address of the first unit to 1, the second unit to 24 (23 + 1), the third unit to 47 (23 + 24), and so on.

**Note:** During start-up the Platinum Spot 5R Pro™ will automatically detect whether a DMX data signal is being received or not. If DMX data signal is being received, the display will show "Address XXX" (XXX representing the actual DMX address). If the fixture is not receiving a DMX signal the display will flash. If your fixture is connected to a DMX controller and the display is flashing (not receiving a DMX signal), please check the following:

- The 3-PIN or 5-PIN XLR input plug (cable with DMX signal from controller) is not connected or is not inserted completely into the DMX input jack of the fixture.
- The DMX controller is switched off or defective.
- The DMX cable or connector is defective.
- A DMX terminator has been inserted into the last fixture in your DMX chain.
9. FIXTURE MENU

On-Board System Menu: The Platinum Spot 5R Pro™ comes with an easy to navigate, full color system menu. This next section will detail the functions of each command in the system menu.

LED Control Panel: The control panel located on the base of the fixture allows you to access the main menu and make all necessary adjustments to the Platinum Spot 5R Pro™. During normal operation, tapping the “MODE/ESC” key once will access the fixture’s main menu. Once in the main menu, you can navigate through the different functions and access the sub-menus with the Up and Down buttons. Once you reach a field that requires adjusting, tap the ENTER button to activate that field and use the UP and Down button to adjust the field. Tapping the Enter button once more will confirm your setting. Once a setting is saved, the display will briefly readout OK to confirm a new setting has been made and locked into memory. You may exit the main menu at any time without making any adjustments by tapping the MODE/ESC button.

MODE/ESC Button - To access the main menu locate the MODE/ESC button on the front of the unit. Press this button to activate the system menu. Tap the UP button until you reach the function you wish to change. When you reach the function you wish to change, tap the ENTER button once to select that menu function. When a function is selected, use the UP or DOWN button to change the function. Once your changes are made, tap the ENTER button yet again to lock the change in the system menu. To exit without making any changes, tap the MODE/ESC button.

The fixture contains a rechargeable battery back-up system that stores all settings and also allows the menu to be accessed when the fixture is not connected to power. To access the menu via battery power, press and hold the DC switch button for two seconds, this will activate the menu. The display will automatically turn off approximately one minute after all menu commands are completed.
**Default settings shaded.**

<table>
<thead>
<tr>
<th>Function Mode</th>
<th>Set DMX Address</th>
<th>DMX address setting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value Display</td>
<td>DMX value display</td>
</tr>
<tr>
<td></td>
<td>Slave Setting</td>
<td>Slave setting</td>
</tr>
<tr>
<td></td>
<td>Auto Program</td>
<td>Auto program</td>
</tr>
<tr>
<td></td>
<td>Music Control</td>
<td>Music control</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time Information</th>
<th>Time</th>
<th>Info</th>
<th>Time Information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>DMX address setting</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>DMX value display</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slave setting</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Auto program</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Music control</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temperature Info</th>
<th>Temp Info</th>
<th>Info</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Temperature in the head</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Software Version</th>
<th>Software version of each IC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lamp Control</th>
<th>Lamp Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Status Settings</th>
<th>Personal Info</th>
<th>Info</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fans Control</th>
<th>Fans Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Display Setting</th>
<th>Display Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

©Elation Professional, Los Angeles, Ca 24 www.ElationLighting.com
<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature C/F</td>
<td>Celsius/ Fahrenheit</td>
</tr>
<tr>
<td>Initial Effect</td>
<td>PAN =XXX</td>
</tr>
<tr>
<td>Wireless DMX</td>
<td>De-Act WDMX, Activate WDMX, Act &amp; Data Out, Rest WDMX Mem</td>
</tr>
<tr>
<td>Reset Default</td>
<td>ON/OFF, Restore factory set</td>
</tr>
<tr>
<td>Reset Function</td>
<td>Reset all motors, Reset Pan/Tilt, Reset color wheel, Reset gobos, Reset shutter and/or dimmer, Reset other motors</td>
</tr>
<tr>
<td>Test Channel</td>
<td>PAN</td>
</tr>
<tr>
<td>Manual Control</td>
<td>PAN =XXX, Fine adjustment of the lamp</td>
</tr>
<tr>
<td>Calibrate Values</td>
<td>Calibrate Password, Color wheel = XXX</td>
</tr>
<tr>
<td>User Mode Set</td>
<td>Standard Mode, Basic Mode, Extended Mode, User Mode A, User Mode B, User Mode C</td>
</tr>
<tr>
<td>Edit User Mode</td>
<td>Max Channel = XX, PAN = CH01</td>
</tr>
<tr>
<td>Select Programs</td>
<td>Auto Pro Part 1 = Program 1 ~ 10 Program 1, Auto Pro Part 2 = Program 1 ~ 10 Program 2, Auto Pro Part 3 = Program 1 ~ 10 Program 3</td>
</tr>
<tr>
<td>Edit Program</td>
<td>Program 1, Program Test Step 01 = SCxxx, Step 64 = SCxxx</td>
</tr>
<tr>
<td>Edit Scenes</td>
<td>Edit Scene 001 ~ Edit Scene 250, Pan, Tilt, --Fade Time-- --Secne Time-- Input By Outside</td>
</tr>
<tr>
<td>Rec. Controller</td>
<td>XX~XX, Scenes recorded from external source</td>
</tr>
</tbody>
</table>
9.1 *Function Mode*:

9.1. “Set DMX Address”

9.1.1 DMX address setting – This function is used to set or adjust the fixture’s starting DMX address. Every device controlled by DMX has to have a unique starting address. The addressing feature is what allows DMX to function properly. The DMX address of a fixture is what allows it to communicate with a controller properly. The DMX addressing also allows the fixture to ignore any DMX information coming from the controller that is not meant specifically for the fixture. Because each fixture is connected in a daisy-chain fashion it is imperative to assign a proper and unique starting DMX address to each and every fixture. The DMX address is non-destructive and will remain in the fixture’s memory even when the power to the unit is switched off. Memory is backed-up and retain by an internal power source that should last about five years. For proper DMX addressing see Section 10/Page 35 of this user manual.

9.1.2 “Value Display” - Display the DMX 512 value of each channel

With this function you can display the DMX 512 value of each channel. The display will automatically detail the changing DMX values as they are received from the controller.

9.1.3 “Set to Slave” - Slave setting for Master/Slave Operation

With this function, you can define the device as slave for operation in Master/Slave mode. Each slave setting will have a different function for a dynamic lightshow without a controller.

9.1.4 Auto Program

This function allows the internal programs to run in either stand-alone or master/salve mode. In “Master” mode the fixture will send DMX data to other fixtures connect via the DMX chain. In “Alone” mode the fixture will operate as a single fixture. The program for this mode is selected in the “Selectprogram” section of the control menu. You can set the number of steps under “Edit program”. You can edit the individual scenes under “Edit scenes”. With this function, you can run the individual scenes either automatically, i.e. with the adjusted Step-Time.
9.1.5 Music control

This function is similar to the “Auto Program” described in the previous section with the exception that this function will advance the built-in program via sound.

9.2 Information:

9.2.1 Time information

These functions will detail different time functions associated with the fixture.

Current Time
This function displays the running time of the fixture from the last power on. The display shows “XXXX”, where “XXXX” represents the number of hours the fixture has been running. This counter is automatically reset after every power-on.

Total Run Time
This function tracks the total running time of the fixture from the very first start-up. Where “XXXX” represents the total number of running hours. This time is non-destructive and will remain in the fixture’s memory indefinitely.

Last Run Hours
This function tracks a cycle run time. Use this function to keep track of rental period, or to note the time from the last service. This setting can be reset at any time.

“L-Timer Password.”
Lamp Hours. This function tracks the total number of lamp running hours. Where “XXXX” represents the number of hours the lamp has been running. This counter should be reset after every lamp change.

Lamp Off Time
This function displays the running time of the lamp from the last power on. The display shows “XXXX”, where “XXXX” represents the number of hours the lamp has been running since it was last struck. This counter is automatically reset after every power-on.

Timer Password
Use this function to enter the “Clear Last Run” password. Password is “038”
Clear Last Run
This function will allow the "Last Run Hours" function be cleared and reset.

L-Timer Password
Use this function to enter the "Clear Lamp Time" password. Password is "038"

Clear Lamp Time
This function resets the lamp "ON" time to zero. Please reset the lamp "ON" time at every lamp replacement. This procedure tracks the lamp running time so the lamp can be replaced at the end of it's recommended duty cycle.
• Select “Clear lamp time” in the system menu.
• The LCD will display “ON” or “OFF.” Were “ON” will reset the lamp time.
• Press enter to confirm.
• Press the Mode/Esc-button to return to the main menu.

9.2.2. Temperature Info.
This function will detail the internal head temperature in either Celsius or Fahrenheit.

9.2.3. Software version
This function will display the current operating software version of the fixture.
• The LCD will read “V-X.X”, “X.X” represents the version number, e.g. “V-1.0”, “V-2.6”.
• Use the UP and DOWN buttons to toggle through the software version of different IC’s.

9.3 Lamp Control:

9.3.1 Lamp On or Off
This function allows manual control of the lamp power via the on-board system menu.
• Select “ON” if you wish to strike the lamp or “OFF” to switch it off.
• Press “ENTER” to confirm.
• Press the Mode/Esc-button to return to the main menu.

9.3.2 Automatic La-On
When in the “ON” position, this function will automatically turn the lamp on when power is applied to the fixture
9.3.3 Lamp On Via DMX
When engaged, this function will allow the lamp to be switched “on” via a DMX controller. Select “ON” to enable this function or “OFF” to disable it.

9.3.4 Lamp Off Via DMX
When engaged, this function will allow the lamp to be switched “off” via a DMX controller. Select “ON” to enable this function or “OFF” to disable it.

9.3.5 Lamp On at Temp.
The fixture is designed to shut the lamp off when an excessive temperature is sensed inside the head by the on-board CPU. The lamp is shut down to prevent damage to the lamp and avoids possible internal damage to the head. This function sets the minimum temperature for lamp restrike after the lamp has been automatically shut off.

9.3.6 Lamp Off at Temp.
The fixture is designed to shut the lamp off when an excessive temperature is sensed inside the head by the on-board CPU. The lamp is shut down to prevent damage to the lamp and avoids possible internal damage to the head. This function sets the maximum internal operating temperature of the head before the lamp will automatically be shut down. This function can be set to activate at an internal temperature between 80° C and 139° C. Inside temperatures below 90° C are not critical. Temperatures above 90° C should lead to the lamp being switched off. Please note that the outside temperature should not exceed 45° C.

9.4 Personality:

9.4.1 Status setting

Address via DMX – This function allows the DMX address to remotely be adjusted from a DMX console. This setting requires special settings for both the controller and the fixture. RDMX is on by default. For operational instructions please see Section 10/Page 35 of this manual “Remote DMX addressing.”

No DMX Status – This function dictates how the fixture will function if it looses DMX signal during normal operation. The default function is set to hold, in which the fixture will lock into the last DMX signal it received and remain in that position until it...
is turned off or begins receiving a new DMX signal. If the fixture is turned on without any DMX signal, the fixture will automatically go in to sound-active mode. Available settings are: “Close” – Shutter flags will close. “Hold” – Fixture will remain at it’s last settings. “Auto” – Fixture will go into stand-alone mode, running the built-in program. “Music” – The fixture will go into sound-active mode.

**Pan Reverse** - This function allows you to invert all pan movements. Use the Up and Down buttons to turn this function On or Off. Press the Enter button to accept the change or the Mode button to cancel and return to the main menu. This function is “OFF” by default.

**Tilt Reverse** - This function allows you to invert all tilt movements. Use the Up and Down buttons to turn this function On or Off. Press the Enter button to accept the change or the Mode button to cancel and return to the main menu. This function is “OFF” by default.

**Pan Degree** – This function changes the maximum Pan resolution from either 540˚ or 630˚. The default function is 540˚. 630˚ operation allows for greater coverage, but slower pan movement.

**Feedback** – This function turns the feedback correction on or off. This function is set to “ON” as default. This function allows for automatic pan and tilt correction in the event either one disrupted during normal operation.

**Movement Speed** – This function changes the speed function of the Pan and Tilt motors. Use this function intergrading Platinum Spot 5R Pro into lighting rigs that includes original Design Spot 250s. There are 3 different mode variations;

- *Speed 1 (Default)*: Slower than the original Design Spot 250 for smoother, more precise movements.

- *Speed 2*: Pan and Tilt speeds are identical to the first generation Design Spot 250.

- *Speed 3*: includes a faster Pan speed. Pan speed is 0.5 seconds faster than original DS-250. Tilt speed will be the same as speed 2.
Mic Sensitivity – This function makes the internal microphone more or less sensitive to sound. This function only works in conjunction with the sound active modes. The default setting is 70% and setting range from 0% to 99%.

Hibernation– When activated, this function will automatically put the fixture in power stand-by mode after a defined period of time of no DMX activity. This prevents the fixture from expending power for extended periods in the event the fixture has been left on accidently. In stand-by mode the lamp and all motors will power down if no DMX signal is sent to the fixture for a period of 15 minutes (default, can be user defined). The fixture will automatically reset and return to normal operation once a DMX signal is sensed.

9.4.2 Fans Control -This function is used to change the functionality of the internal cooling fans. The available selections are: 1) “AUTO” – The fans will automatically switch between low and high speeds depending on the internal operating temperature. 2) “HIGH” – The fans will run in high-speed mode regardless of operating temperature. 3) “LOW” – The fans will remain in low speeds regardless of internal operating temperature.

9.4.3 Display Settings

Shutoff Time -The display is designed to turn off during normal operation to avoid excessive light in situations that require an extremely dark environment. This function will adjust the amount of time the display will remain on until it is automatic turned off. This function is disabled as default.

Display Reverse – This function will allow the entire display to be flipped by 180˚ to allow for better view when the fixture is hung from truss or a ceiling. This function is disabled as default.

LOCK – This function allows you to lock the keys on the display to prevent menu tampering. With this function you can activate the automatic keylock function. If this function is activated, the keys will be automatically locked in 15 seconds from the last command. In order to deactivate or temporarily deactivate the keylock function, press
the Mode/Esc Button for 3 seconds to regain access to the menu commands.

9.4.4 Temperature C/F – This function changes the temperature the unit will display from either Celsius or Fahrenheit. Fahrenheit is set as the default measurement.

9.4.5 Initial effect – This function allows a user to create and assign a custom “Home Position” into the fixture. Adjusting the Pan and Tilt values then locking those values into the fixture’s internal memory creates the new “Home” position.

8.4.6 Wireless DMX
This section will control the functionality of the built-in wireless DMX receiver. See page 37 for more information on operating this fixture via Wireless DMX.

9.4.7 Restore Default – This function is used to restore the factory settings of the device. All settings will be set back to the default values (shaded). Any edited scenes will be lost.

9.5 Reset Functions: The reset function returns a motor to the “Home” position. There are several reset functions available on this fixture. The list below details the functionality of each available selection.

- **Reset All**: This function will reset all internal motors to the home position.
- **Reset Pan and Tilt**: This function will only reset the pan and tilt motors to the home position.
- **Reset Colors**: This function will only reset the color wheel to the home position.
- **Reset Gobos**: This function will only reset the gobo wheels to the home position.
- **Reset Shutter**: This function will only reset the blackout shutter to the home position.
- **Reset Others**: This function will reset all other motors not associated with any in the previously listed reset commands to the home position.

9.6 Effect Adjust:
9.6.1 Test Channel – This menu function allows the user to select each individual fixture channel and test it’s function independently from the control board.

9.6.1 Lamp adjustment (manual control) – This function readies the fixture for lamp optimization in a simple single step procedure. This function will center the pan and tilt motors and at the same time open the shutter and bring the dimmer to 100%. The pan and tilt function will still operate if the fixture needs to be positioned to a flat clear surface. For more information on lamp optimization please see Section 6/Page 14.

9.6.2 Calibrate values – This function should only be performed by a qualified technician. This function allows a user to make small adjustments to the effect wheels (color, gobo, shutter, etc) to compensate for ware or in the event a sensor has been knocked slightly out of place. Because improper use of this function can result in undesired operation this function has been password protected. The password is 050 and must be entered each time the calibration menu function is entered. Because calibration is an extremely delicate procedure instruction on performing this action are left out of this manual. For a first time calibrator, please contact our customer support team for step-by-step instructions.

9.7 User Mode Set:

9.7.1 User mode – This function allows the user to create user defined channel orders allowing the fixture to match the channel order of other fixtures on the market for easier operation. A total of three user modes may be configured: User Mode A, User Mode B, and User Mode C.

9.7.2 Edit User mode – This function allows the user to make the actual changes in the user-defined modes that are created in the previous function.

9.8 EDIT PROGRAM: - The fixture comes equipped with a built-in DMX recorder that allows custom programs to be installed and recalled directly from the fixture’s control board. Programs can be created and stored using the fixture’s control board or by using an external DMX controller. For detailed instructions on how to complete this task please
see Section 12/ Page 39.

9.8.1 Select program – This function allows the user to select one of ten of the user defined built-in programs. This program is then accessed in “Function Mode” under “Program Run.”

9.8.2 Edit program – This function allows the user to edit the built-in programs.

9.8.3 Edit Scenes – This function allows the user to edit or define the actual scenes that are stored in the user defined built-in programs that are accessed in the previous step.

9.8.4 Rec Controller - The Platinum Spot 5R Pro features an integrated DMX recorder. Pre-programmed scenes can be transmitted to the fixture via any DMX compliant controller. This function allows those scenes to be stored in to the fixture’s built-in memory and then subsequently used to create the user-defined programs.
10. DMX ADDRESSING

Setting the DMX address - After the fixture is turned “ON” it will immediately complete a reset process that test all the fixture's functions. When the reset process concludes the LCD will display the fixture’s current DMX. If the fixture is not receiving a DMX signal, the display will flash continuously. To set or adjust a DMX address, please follow the procedure below:

1. Toggle through the menu by pressing the Up and Down buttons until the display reads “Address=XXX.” Tap the enter button to make changes to the address.
2. While the display is flashing use the “UP” and “DOWN” buttons to select a new address. Once the new address has been selected, lock the new address into the fixture’s memory by pressing the “ENTER” button.

The DMX address is non-volatile and will remain in the fixture’s memory even when the power to the unit is switched off. Memory is backed-up and retain by an internal power source that should last about five years.

Remote DMX addressing (RDMX) / Address Via DMX - This function allows the DMX address to be changed remotely from a DMX console. This setting requires special settings for both the controller and the fixture. RDMX is on by default. This function may be turned on and off, and is “ON” be default. Follow the procedure listed below to access the RDMX functions: Fixture Settings:

1. Access the main menu and use the UP or DOWN to get to the “Personality” menu, then press ENTER
2. Once in the “Personalities” menu, tap the UP or Down to get to the “Status Settings” menu, press ENTER.
3. Once in the “Status Settings” tap the UP or Down to get to the “Address via DMX” function and press ENTER.
4. “Address via DMX” is the menu function that activates the RDMX function.
5. Press the UP button to display “ON” to activate this function, or “OFF” to deactivate this function.
6. Press ENTER to confirm.
7. Press MODE/ESC to return to the main menu.
Controller Settings:

1. Set the DMX value of channel 1 to a value of 7.

2. Set the DMX value of channel 2 to a value of 7 or 8. When channel 2 is set to "7" you can adjust the starting address between 1 and 255. When set to "8" you can adjust the starting address between 256 and 511.

3. Use channel 3 to set your desired DMX starting address. For example: If you want to set the starting address to 57, set channel 1 to a value of "7," set channel 2 to a value of “7” and use channel 3 to set your address to 57 by selecting a channel value of 57. Example 2: If you want to set the starting address to 420, set channel 1 to a value of “7,” channel 2 to "8" and channel 3 to "164" (256+164=420).

4. Wait for approximately 20 seconds for the unit to complete the address reset function.
11. OPERATION

**Operating Modes:** The Platinum Spot 5R Pro™ can operate in six different modes. This next section will detail the differences in the operating modes.

- **Auto Program Mode (Master)** - The fixture will chase through the built-in programs, sending a DMX control signal to all other fixtures connect via DMX cables instruction for a synchronized light show.

- **Auto Program Mode (Stand-alone)** - The fixture will chase through the built-in program. This feature is great for storefront with custom logos, where as the logos need to be displayed but the use of a controller is unwanted.

- **Music Control Mode (Stand-alone)** - The fixture will react to sound, chasing through the built-in programs. Great for small clubs or DJ that do not want to bother with programming.

- **Music Control Mode (Master/Slave)** - You can daisy chain up to 16 fixtures together to get a synchronized light show without the need of an external controller. The fixtures will react to sound, chasing to a synchronized light show.

- **Set To Slave** – This function will set the fixture to slave mode for use in either the auto program or music control program modes

- **DMX control mode** -This function will allow you to control each individual fixture's traits with a standard DMX-512 controller such as the Elation® Show Designer 2.

11.1 **Stand-Alone Operation (Auto Program or Music Control):** This mode allows a single fixture to run to the built-in programs with or without sound. Only use this mode when running a single fixture, or when running several fixtures as individuals.

- Mount your fixture in a secure and stable manner.

- **For functionality without sound control:** Access the “Function” menu and select the “Auto Program” function, this will give you access to the “Auto Program” submenu. See page 24 for the menu breakdown. Once in the “Auto Program” submenu select “Alone”

- **For functionality that chases to sound:** Access the “Function” menu and select the “Music Control” function, this will give you access to the “Music
Control" submenu. See page 24 for the menu breakdown. Once in the
“Music Control” submenu select “Alone”

11.2 Master/Slave Operation (Auto Program or Music Control): This function allows
up to 16 fixtures to be linked together to provide a synchronized light show without
the use of a controller. Only use this when linking several Platinum Spot 5R Pros
together for use without a controller. Any fixture can act as a “Master or a “Slave.”

- Using XLR DMX cables, daisy chain your fixtures together via the XLR
connectors. Remember the Male XLR connector is the input and the
Female XLR connector is the output. The first fixture in the chain (master)
will use the female XLR connector only - The last fixture in the chain will use
the male XLR connector only. For longer cable runs we suggest a terminator
at the last fixture.

- For the unit functioning as the “Master” unit follow the same procedures
listed in the previous Stand-Alone section.

- For the “Slave” units, access the “Set To Slave” settings in the “Function
Mode” menu and assign each slave fixture a designation (Slave 1, Slave 2,
Slave 3 etc).

11.3 Universal DMX Control: This function allows you to use a universal DMX-512
controller such as the Elation® Show Designer 2™ or Elation® Show Designer 3™ to
control head movement, the color wheel, the shutter (strobe), and all other DMX traits.
A DMX controller allows you to create unique programs tailored to your individual
needs. The Platinum Spot 5R Pro™ uses 17 (default up to 24) DMX channels. See
page 42 for detailed description of the DMX traits. To control your fixture in DMX mode,
follow the set-up procedures on pages 19-22 as well as the set-up specifications that
are included with your DMX controller. Use the controller’s faders to control the various
DMX fixture traits. This will allow you to create your own programs.

- Follow the instruction on page 35 to set the DMX address.

- Be sure to use a terminator on the last fixture, especially for longer cable
runs (more than a 100 feet).

- For help operating in DMX mode consult the manual that was included with
your DMX controller.
12. WORKING WITH BUILT-IN PROGRAMS

The fixture comes equipped with a built-in DMX recorder that allows custom programs to be installed and recalled directly from the fixture’s control board. Programs can be created and stored using the fixture’s control board or by using an external DMX controller. The following instructions will detail the procedures for using the on-board system menu as well as using a DMX compliant controller.

Memory Statistics:

Quick Access Programs (Program Part): 3
Total Number of Programs: 10
Maximum Number of Steps (Scenes) per a Program: 64
Total Number of Scenes (Steps): 250

Step 1 – Building Scenes.

The control will store a maximum of 250 scenes. These scenes are then used to create the programs. A program can store one or a maximum of 64 scenes. Keep in mind that a scene can only be access when it is stored in a “Program.” If you wish to build a static scene (a scene consisting of no movement) for a logo or gobo projection, the scene must be stored inside a program. To build a scene follow the instructions below:

- Access the main menu and toggle to “Edit Programs” which is menu function 8.
- Then tap the “ENTER” button and toggle to “Edit Scenes,” menu function 8-3.
- When you get to the “Edit Scenes” function tap the “ENTER” button. The screen will then change to Edit Scene 001, this will be menu function 8-3-1. You can then press the “ENTER” button to begin to edit scene 1 or use the “UP” and “DOWN” buttons to toggle to access scenes 2-250.
- Once in the scene edit screen you have access to the functions listed below.

  - Tapping the “ENTER” button will instantly allow you to change the values of the selected function in real time. The values can be adjusted from 0~250. Once you achieved your desired value tap the “ENTER” button once again to automatically lock the value into the scenes memory. You can repeat the procedure for all functions listed below:
    - “Auto Program” – Allows access to all 23 of the fixture’s DMX traits.
    - “PAN” – pan movement.
- “PAN-Fine” – precision pan movement.
- “TILT” – tilt movement.
- “TILT-Fine” – precision tilt movement
- “Move Speed” – adjust pan and tilt motor speed
- “Gobo Wheel 1” – select gobos from gobo wheel 1
- “Gobo Rot. 1” – adjust gobo 1 indexing or rotation
- “Gobo Wheel 2” – select a gobo from gobo wheel 2
- “Prism” – select a prism, prism macro
- “Prism Rot.” – adjust the prism indexing or rotation
- “Color Speed” – adjust the CMY mixing speed
- “Color Macro” – select a built-in color mixing macro
- “Color Wheel” – select a color from the color wheel
- “Iris” – adjust the iris value
- “Focus” – adjust the focus value
- “Strobe” – adjust the strobe
- “Dimmer” – adjust the dimmer intensity
- “Scene Time” – set the hold time for the scene
- “Input By Out” – this function will store a scene from an external DMX console. See the next section for scene editing via an external DMX controller.

**Step 1B – Building Scenes from an External DMX Controller**
The fixture includes a simple built-in DMX recorder. This recorded allow you to build a scene using your own DMX console and then send that scene to the fixture to be stored inside one of the fixture scene storage banks. Many people may find this procedure easier and quicker than using the on board menu functions as in “Step 1.” To store a scene from an external DMX controller follow the procedures below:
- Using your DMX control build and store scenes as you normally would.
- Once you have built all your required scenes, enter the fixtures main menu and toggle to

**Step 2 – Editing Programs.**
The control will store a maximum of 10 programs. A program can store one or a maximum of 64 scenes. Keep in mind that a scene can only be access when it is stored inside one of the 10 available programs. Follow the procedure below to build an internal program:

• Access the main menu and toggle to “Edit Programs” which is menu function 8.
• Then tap the “ENTER” button and toggle to “Program 1” menu function 8-2-1.
• When you get to the “Program 1” function tap the “ENTER” button. The screen will then change to Edit Steps 01, this will be menu function 8-2-1-1. Use the “UP” and “DOWN” buttons to toggle through the scenes created in “Step 1.” Press the “ENTER” button to add a scene to the program. Tapping the “Enter” button will automatically lock the selected scene into the programs’ memory. Repeat the process until all the desired scenes have been added to the program. Each program can store a maximum of 64 scenes.
• To test the program access “Program Test” in the “Program Edit” menu function.

**Step 3 – Playing a Program**

To initiate a program follow the procedure below:

• Access the main menu and use the “Up” and “Down” to toggle to “Function Mode” and tap the “Enter” button.
• In the next screen select “Auto Program” and tap the “Enter” button.
• There are now two selections, “Master” and “Alone.” Select “Master” when running multiple fixtures in a master/slave configuration. See section 11.2 “Master/Slave Operation” on page 37 for proper set-up instructions. Select “Alone” when running a single fixture or when multiple fixtures in stand-alone mode. See section 11.1 “Stand-Alone Operation” on page 37 for proper set-up instructions.
13. DMX CHANNEL TRAITS:

The chart below details the channel layout for 23 DMX channels (default).

*In 8bit mode the “Pan Fine” and “Tilt Fine” channels are not used, thus converting the fixture into a 21-channel DMX fixture.*

### DMX channel function and values:

<table>
<thead>
<tr>
<th>Mode/Channel</th>
<th>Value</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>St</td>
<td>Ba</td>
<td>Ex</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>112-127</td>
<td>Color 8</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>128-189</td>
<td>Forwards rainbow effect from fast to slow</td>
<td></td>
</tr>
<tr>
<td>190-193</td>
<td>No rotation</td>
<td></td>
</tr>
<tr>
<td>194-255</td>
<td>Backwards rainbow effect from slow to fast</td>
<td></td>
</tr>
</tbody>
</table>

### Color Wheel Fine:
- 0-255 Color Wheel colour change to any position Fine

<table>
<thead>
<tr>
<th>6 4 7</th>
<th>Cyan Color :</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 4 7</td>
<td>0-255 Cyan (0-white, 255-100% Cyan)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7 5 9</th>
<th>Magenta Color :</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 5 9</td>
<td>0-255 Magenta (0-white, 255-100% magenta)</td>
</tr>
</tbody>
</table>

### Magenta Color Fine :
- 0-255 Magenta Fine

<table>
<thead>
<tr>
<th>8 6 11</th>
<th>Yellow Color :</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 6 11</td>
<td>0-255 Yellow (0-white, 255-100% Yellow)</td>
</tr>
</tbody>
</table>

### Yellow Color Fine :
- 0-255 Yellow Fine

### Rotating gobos, cont. rotation :
- 0-9 Open
- 10-19 Rot. gobo 1
- 20-29 Rot. gobo 2
- 30-39 Rot. gobo 3
- 40-49 Rot. gobo 4
- 50-59 Rot. gobo 5
- 60-69 Rot. gobo 6
- 70-79 Rot. gobo 7
- 80-89 Rot. gobo 8
- 90-104 Rot. gobo 1 shake
- 105-119 Rot. gobo 2 shake
- 120-134 Rot. gobo 3 shake
- 135-149 Rot. gobo 4 shake
- 150-164 Rot. gobo 5 shake
- 165-179 Rot. gobo 6 shake
- 180-194 Rot. gobo 7 shake
- 195-209 Rot. gobo 8 shake
- 210-255 Rot. gobo wheel cont. rotation slow to fast

### Rotating gobo index, rotating gobo rotation :
- 0-127 Gobo indexing
- 128-189 Forwards gobo rotation from fast to slow
<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>190-193</td>
<td>No rotation</td>
</tr>
<tr>
<td>194-255</td>
<td>Backwards gobo rotation from slow to fast</td>
</tr>
<tr>
<td>15</td>
<td><strong>Rotating gobo indexing Fine</strong></td>
</tr>
<tr>
<td>0-255</td>
<td>Fine indexing</td>
</tr>
</tbody>
</table>

**Fixed Gobos:**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-7</td>
<td>Open/hole</td>
</tr>
<tr>
<td>8-15</td>
<td>Gobo 1</td>
</tr>
<tr>
<td>16-23</td>
<td>Gobo 2</td>
</tr>
<tr>
<td>24-31</td>
<td>Gobo 3</td>
</tr>
<tr>
<td>32-39</td>
<td>Gobo 4</td>
</tr>
<tr>
<td>40-47</td>
<td>Gobo 5</td>
</tr>
<tr>
<td>48-55</td>
<td>Gobo 6</td>
</tr>
<tr>
<td>56-63</td>
<td>Gobo 7</td>
</tr>
<tr>
<td>64-71</td>
<td>Gobo 8</td>
</tr>
<tr>
<td>72-79</td>
<td>Gobo 9</td>
</tr>
<tr>
<td>80-87</td>
<td>Gobo 10</td>
</tr>
<tr>
<td>88-95</td>
<td>Gobo 11</td>
</tr>
<tr>
<td>96-103</td>
<td>Gobo 12</td>
</tr>
<tr>
<td>104-111</td>
<td>Gobo 13</td>
</tr>
<tr>
<td>112-119</td>
<td>Gobo 14</td>
</tr>
<tr>
<td>120-126</td>
<td>Gobo 1 shake slow to fast</td>
</tr>
<tr>
<td>127-133</td>
<td>Gobo 2 shake slow to fast</td>
</tr>
<tr>
<td>134-140</td>
<td>Gobo 3 shake slow to fast</td>
</tr>
<tr>
<td>141-147</td>
<td>Gobo 4 shake slow to fast</td>
</tr>
<tr>
<td>148-154</td>
<td>Gobo 5 shake slow to fast</td>
</tr>
<tr>
<td>155-161</td>
<td>Gobo 6 shake slow to fast</td>
</tr>
<tr>
<td>162-168</td>
<td>Gobo 7 shake slow to fast</td>
</tr>
<tr>
<td>169-175</td>
<td>Gobo 8 shake slow to fast</td>
</tr>
<tr>
<td>176-182</td>
<td>Gobo 9 shake slow to fast</td>
</tr>
<tr>
<td>183-189</td>
<td>Gobo 10 shake slow to fast</td>
</tr>
<tr>
<td>190-196</td>
<td>Gobo 11 shake slow to fast</td>
</tr>
<tr>
<td>197-203</td>
<td>Gobo 12 shake slow to fast</td>
</tr>
<tr>
<td>204-210</td>
<td>Gobo 13 shake slow to fast</td>
</tr>
<tr>
<td>211-217</td>
<td>Gobo 14 shake slow to fast</td>
</tr>
<tr>
<td>218-255</td>
<td>Gobo wheel rotation from slow to fast</td>
</tr>
</tbody>
</table>

**Fixed gobo indexing Fine:**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-255</td>
<td>Fixed gobo Fine indexing</td>
</tr>
</tbody>
</table>

**3 facet rotating prism, Prism / Gobo macros:**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-31</td>
<td>Open</td>
</tr>
<tr>
<td>32-127</td>
<td>Rot. Prism</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Dimmer intensity:
- 0-255: Intensity 0 to 100%

### Fine Dimmer intensity:
- 0-255: Dimmer intensity fine

### Iris:
- 0-191: Max. diameter to Min. diameter
- 192-223: Pulse closing fast to slow
- 224-255: Pulse opening slow to fast

### Iris Fine:
- 0-255: Iris Fine

### Frost:
- 0-191: Frost 0–100%
- 192-223: Pulse opening fast to slow
- 224-255: Pulse closing slow to fast
- 255: 100% Frost

### Speed Of CMY & Colour macro Speed:
- 0-255: Speed Max → Min

### Speed Pan/Tilt movement:
- 0-225: max to min speed
- 226-235: blackout by movement
- 236-245: blackout by all wheel changing
- 246-255: no function

### Colour macros - CMY and colour wheel:
- 0-7: OFF
- 8-15: Macro1
- 16-23: Macro2
- 24-31: Macro3
- 32-39: Macro4
- 40-47: Macro5
- 48-55: Macro6
- 56-63: Macro7
- 64-71: Macro8
- 72-79: Macro9
- 80-87: Macro10
- 88-95: Macro11
- 96-103: Macro12
- 104-111: Macro13
- 112-119: Macro14
- 120-127: Macro15
- 128-135: Macro16
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>136-143</td>
<td>Macro17</td>
<td></td>
</tr>
<tr>
<td>144-151</td>
<td>Macro18</td>
<td></td>
</tr>
<tr>
<td>152-159</td>
<td>Macro19</td>
<td></td>
</tr>
<tr>
<td>160-167</td>
<td>Macro20</td>
<td></td>
</tr>
<tr>
<td>168-175</td>
<td>Macro21</td>
<td></td>
</tr>
<tr>
<td>176-183</td>
<td>Macro22</td>
<td></td>
</tr>
<tr>
<td>184-191</td>
<td>Macro23</td>
<td></td>
</tr>
<tr>
<td>192-199</td>
<td>Macro24</td>
<td></td>
</tr>
<tr>
<td>200-207</td>
<td>Macro25</td>
<td></td>
</tr>
<tr>
<td>208-215</td>
<td>Macro26</td>
<td></td>
</tr>
<tr>
<td>216-223</td>
<td>Macro27</td>
<td></td>
</tr>
<tr>
<td>224-231</td>
<td>Macro28</td>
<td></td>
</tr>
<tr>
<td>232-239</td>
<td>Macro29</td>
<td></td>
</tr>
<tr>
<td>240-247</td>
<td>Macro30</td>
<td></td>
</tr>
<tr>
<td>248-255</td>
<td>Random CMY</td>
<td></td>
</tr>
</tbody>
</table>

**Lamp on/off, reset, internal programs:**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0-19</td>
<td>colour change normal</td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>colour change to any position</td>
<td></td>
</tr>
<tr>
<td>30-39</td>
<td>colour &amp; gobo change to any position</td>
<td></td>
</tr>
<tr>
<td>40-59</td>
<td>Lamp on</td>
<td></td>
</tr>
<tr>
<td>60-79</td>
<td>Lamp switch off</td>
<td></td>
</tr>
<tr>
<td>80-84</td>
<td>All motor reset</td>
<td></td>
</tr>
<tr>
<td>85-87</td>
<td>Scan motor reset</td>
<td></td>
</tr>
<tr>
<td>88-90</td>
<td>Colors motor reset</td>
<td></td>
</tr>
<tr>
<td>91-93</td>
<td>Gobo motor reset</td>
<td></td>
</tr>
<tr>
<td>94-96</td>
<td>Shutter &amp; Dimmer motor reset</td>
<td></td>
</tr>
<tr>
<td>97-99</td>
<td>Other motor reset</td>
<td></td>
</tr>
<tr>
<td>100-119</td>
<td>Internal program 1 (secne1~8 of EEPROM)</td>
<td></td>
</tr>
<tr>
<td>120-139</td>
<td>Internal program 2 (secne9~16 of EEPROM)</td>
<td></td>
</tr>
<tr>
<td>140-159</td>
<td>Internal program 3 (secne17~24 of EEPROM)</td>
<td></td>
</tr>
<tr>
<td>160-179</td>
<td>Internal program 4 (secne25~32 of EEPROM)</td>
<td></td>
</tr>
<tr>
<td>180-199</td>
<td>Internal program 5 (secne33~40 of EEPROM)</td>
<td></td>
</tr>
<tr>
<td>200-219</td>
<td>Internal program 6 (secne41~48 of EEPROM)</td>
<td></td>
</tr>
<tr>
<td>220-239</td>
<td>Internal program 7 (secne49~56 of EEPROM)</td>
<td></td>
</tr>
<tr>
<td>240-255</td>
<td>Music Control (secne of Program 1)</td>
<td></td>
</tr>
</tbody>
</table>
14. ERROR CODES:

When power is applied, the unit will automatically enter a “reset/test” mode. This mode brings all the internal motors to a home position. If there is an internal problem with one or more of the motors an error code will flash in the display in the form of “XXer” were as XX will represent a motor function. For example, when the display shows “Pan-ER,” it means there is some type of error with the pan motor. If there are multiple errors during the start-up process they will all flash in the display. For example: if the fixtures has errors on channel 1, channel 3, and channel 5 all at the same time, you will see the error message “Pan-Err,” “Tilt-Err,” and “Color-Err” flash repeated 5 times.

If an error does occur during the initial start-up procedure the fixture will self-generate a second reset signal and try to realign all the motors and correct the error, if the error persist after a second attempt a third attempt will be made.

If after a third attempt all the errors have not been corrected the fixture will make the following determinations: 1) 3 or more errors - The fixture cannot function properly with three or more errors therefore the fixture will place itself in a stand-by mode until subsequent repairs can be made. 2) Less than 3 errors - The fixture has less than 3 errors, therefore most other functions will work properly. The fixture will attempt to operate normally until the errors can be correct by a technician. The errors in question will remain flashing in the display as a reminder of internal errors.

Pan Movement error:
The yoke is not located in the default position after start-up or after a reset command. This message will appear after a fixture reset if the pan-yoke’s magnetic-indexing circuit malfunctions (sensor failed or magnet is missing) or there is a stepper motor failure (defective motor or a defective motor IC drive on the main PCB).

Tilt Movement error:
The head is not located in the default tilt position after start-up or after a reset command. This message will appear after a fixture reset if the tilt magnetic-indexing circuit malfunctions (sensor failed or magnet is missing) or there is a stepper motor failure (defective motor or a
defective motor IC drive on the main PCB).

**Color-wheel error:**
The color wheel is not located in the default position after start-up or after a reset command. This message will appear after a fixture reset if the color wheel's magnetic-indexing circuit malfunctions (sensor failed or magnet is missing) or there is a stepper motor failure (defective motor or a defective motor IC drive on the main PCB).

**Rotating gobo-wheel error:**
The gobo-wheel is not located in the default position after start-up or after a reset command. This message will appear after a fixture reset if the gobo wheel's magnetic-indexing circuit malfunctions (sensor failed or magnet is missing) or there is a stepper motor failure (defective motor or a defective motor IC drive on the main PCB).

**Rotating gobo indexing error:**
The gobo is not located in the default position after start-up or after a reset command. This message will appear after a fixture reset if the gobo positioning magnetic-indexing circuit malfunctions (sensor failed or magnet is missing) or there is a stepper motor failure (defective motor or a defective motor IC drive on the main PCB).

**Fix Gobo-wheel error:**
This message will appear after the reset of the fixture if the magnetic-indexing circuit malfunctions (sensor failed or magnet missing) or the stepping-motor is defective (or its drive circuit on the main PCB). The fix gobo wheel is not located in the default position after the reset.

**Prism Rotation error:**
This message will appear after the reset of the fixture and if the magnetic-indexing circuit malfunctions (sensor failed or magnet missing) or the stepping-motor is defective (or its drive circuit on the main PCB). The Prism wheel is not located in the default position after the reset.

**Focus-error:**
This message will appear after the reset of the fixture and if the magnetic indexing circuit
malfunctions (sensor failed or magnet missing) or the stepping-motor is defective (or its
driver circuit on the main PCB). The focus motor is not located in the default position after the
reset.

**Cyan Color Er**

(Cyan Color-wheel error) This message will appear after the reset of the fixture if the
magnetic-indexing circuit malfunctions (sensor failed or magnet missing) or the
stepping-motor is defective (or its drive circuit on the main PCB). The Cyan Color wheel is
not located in the default position after the reset.

**Magenta Color Er**

(Magenta Color-wheel error) This message will appear after the reset of the fixture if the
magnetic-indexing circuit malfunctions (sensor failed or magnet missing) or the
stepping-motor is defective (or its drive circuit on the main PCB). The Magenta Color-wheel
is not located in the default position after the reset.

**Yellow Color Er**

( Yellow Color-wheel error) This message will appear after the reset of the fixture and if the
magnetic-indexing circuit malfunctions (sensor failed or magnet missing) or the
stepping-motor is defective (or its driver circuit on the main PCB). The Yellow Color - wheel
is not located in the default position after the reset.

**ZOOM Er**

(ZOOM-wheel error) This message will appear after the reset of the fixture and if the
magnetic-indexing circuit malfunctions (sensor failed or magnet missing) or the
stepping-motor is defective (or its driver circuit on the main PCB). The zoom - wheel is not
located in the default position after the reset.
15. CLEANING AND MAINTENANCE

The following points have to be considered during the inspection:

1. Be sure all screws and fasteners are securely tightened at all times. Lose screws may fall out during normal operation resulting in damage or injury as larger parts could fall.

2. There must not be any deformations on the housing, color lenses, rigging hardware and rigging points (ceiling, suspension, trussing). Deformations in the housing could allow for UV radiation leakage. Damaged rigging points or unsecured rigging could cause the unit to fall and serious injure a person.

3. All mechanical parts and motors should not show any traces of serious wear and should rotate freely.

4. Electric power supply cables must not show any damage, material fatigue or sediments. Never remove the ground prong from the power cable.

Further instructions depending on installation and usage have to be adhered by a skilled installer and any safety problems should be addressed before attempting operation.

We recommend frequent cleaning of the fixture, this will ensure operational longevity and crisp light output. When cleaning, please use a moist, lint-free cloth. Never use alcohol or solvents.

There are no user serviceable parts inside this fixture with the exception of the lamp. Please refer all other service related issues to an authorized Elation service technician.

Should you decide to service the fixture yourself please order genuine Elation parts directly from Elation.
16. PHOTOMETRIC DATA:

![Graph showing photometric data for Platinum Spot 5R Pro™]
17. GOBOS:

Rotating GOBO

1->

Static GOBO

1->

8->
18. **DIMENSIONAL DRAWINGS:**

Note: Please add 76.5mm to the overall height when the included Omega -Clam is attached.
19. CIRCUIT SCHEMATICS
20. 2-YEAR LIMITED WARRANTY

A. Elation Professional® hereby warrants, to the original purchaser, Elation Professional® products to be free of manufacturing defects in material and workmanship for a period of two years, (730 days) from the date of purchase. This warranty shall be valid only if the product is purchased within the United States of America, including possessions and territories. It is the owner's responsibility to establish the date and place of purchase by acceptable evidence, at the time service is sought.

B. For warranty service, send the product only to the Elation Professional® factory. All shipping charges must be pre-paid. If the requested repairs or service (including parts replacement) are within the terms of this warranty, Elation Professional® will pay return shipping charges only to a designated point within the United States. If the entire instrument is sent, it must be shipped in its original package. No accessories should be shipped with the product. If any accessories are shipped with the product, Elation Professional® shall have no liability what so ever for loss of or damage to any such accessories, nor for the safe return thereof.

C. This warranty is void if the serial number has been altered or removed; if the product is modified in any manner which Elation Professional® concludes, after inspection, affects the reliability of the product; if the product has been repaired or serviced by anyone other than the Elation Professional® factory unless prior written authorization was issued to purchaser by Elation Professional®; if the product is damaged because not properly maintained as set forth in the instruction manual.

D. This is not a service contract, and this warranty does not include maintenance, cleaning or periodic check-up. During the period specified above, Elation Professional® will replace defective parts at its expense, and will absorb all expenses for warranty service and repair labor by reason of defects in material or workmanship. The sole responsibility of Elation Professional® under this warranty shall be limited to the repair of the product, or replacement thereof, including parts, at the sole discretion of Elation Professional®. All products covered by this warranty were manufactured after January 1, 1990, and bear identifying marks to that
effect.

E. Elation Professional® reserves the right to make changes in design and/or improvements upon its products without any obligation to include these changes in any products theretofore manufactured.

F. No warranty, whether expressed or implied, is given or made with respect to any accessory supplied with products described above. Except to the extent prohibited by applicable law, all implied warranties made by Elation Professional® in connection with this product, including warranties of merchantability or fitness, are limited in duration to the warranty period set forth above. And no warranties, whether expressed or implied, including warranties of merchantability or fitness, shall apply to this product after said period has expired. The consumer’s and or Dealer’s sole remedy shall be such repair or replacement as is expressly provided above; and under no circumstances shall Elation Professional® be liable for any loss or damage, direct or consequential, arising out of the use of, or inability to use, this product.

G. This warranty is the only written warranty applicable to Elation Professional® Products and supersedes all prior warranties and written descriptions of warranty terms and conditions heretofore published.
## 21. TECHNICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power Requirements</strong></td>
</tr>
<tr>
<td><strong>Fuse Protection</strong></td>
</tr>
<tr>
<td><strong>Power Consumption</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lamp</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
</tr>
<tr>
<td><strong>Lamp Wattage</strong></td>
</tr>
<tr>
<td><strong>Life time</strong></td>
</tr>
<tr>
<td><strong>Color temperature</strong></td>
</tr>
<tr>
<td><strong>Luminous flux</strong></td>
</tr>
<tr>
<td><strong>CRI</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Optical system</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parabolic dichroic glass reflector</strong></td>
</tr>
<tr>
<td><strong>Beam angle</strong></td>
</tr>
<tr>
<td><strong>Lenses hardened and tempered, anti-reflex coated</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Colors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>8 dichroic filter plus white, half-color compatible</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gobos</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gobo-wheel 1</strong>: 8 interchangeable rotating gobos plus &quot;open&quot;, 4 glass Gobos</td>
</tr>
<tr>
<td><strong>Gobo-wheel 2</strong>: 14 fixed gobos plus &quot;open&quot;</td>
</tr>
<tr>
<td><strong>Gobo outside diameter</strong> 14 mm, <strong>image size</strong> 7 mm</td>
</tr>
<tr>
<td><strong>Gobo thickness</strong> (max): glass = 1 mm, steel = 0.15 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prism</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rotating 3-face prism, rotating and variable in speed</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shutter / Strobe / Dimmer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strobe effect with variable speed</strong> 1 - 13 flashes per second</td>
</tr>
<tr>
<td><strong>Continuously mechanical dimmer</strong> 0 - 100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Iris</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Motor driven iris from open to close, variable speed, pulse effect</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Motor driven focus from near to far away</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DMX Channels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>23 (16bit – default) or 21 (8bit – user selectable) or 34 (16bit – user selectable)</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drive</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard DMX-512, 3 pole XLR; [+] = Pin 3, [-] = Pin 2, [Ground] = Pin 1 or 5 pole XLR; n/a = Pin 5, n/a = Pin 4, [+] = Pin 3, [-] = Pin 2, [Ground] = Pin 1</strong> Starting DMX [001].</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pan / Tilt</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pan - movement</strong></td>
</tr>
<tr>
<td><strong>Tilt - movement</strong></td>
</tr>
</tbody>
</table>
### Weights and Measures

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Width of the base</td>
<td>13” / 33.25cm (Including Handles)</td>
</tr>
<tr>
<td>Length of the base</td>
<td>14” / 35.74cm (Without Handles)</td>
</tr>
<tr>
<td>Width of Head</td>
<td>14” / 35.49cm</td>
</tr>
<tr>
<td>Height (head vertical)</td>
<td>17.6” / 44.63cm</td>
</tr>
<tr>
<td>Weight (net)</td>
<td>16.5 Kgs / 36.4 Lbs</td>
</tr>
</tbody>
</table>

### Operating Noise Levels (Base level 46.8dB)

<table>
<thead>
<tr>
<th>Mode:</th>
<th>1m = dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode: Auto</td>
<td>55.9 dB</td>
</tr>
<tr>
<td>Mode: High</td>
<td>56.2 dB</td>
</tr>
<tr>
<td>Mode: Auto</td>
<td>51.6 dB (Lamp off)</td>
</tr>
</tbody>
</table>

### Ambient Operating Temperature

-25°C ~ 45°C

*All specifications are subject to change at any time without notice.*
Lighting Connector Guide

This guide is a reference for the common connectors used in the Little Theatre. This is not a complete reference just the most common ones

Stage Pin

**Description**
- Used to connect fixtures to power
- Only allows connection in one direction

**Reference Image**
## Twist Lock

**Description**
- Used in the transmission of power
- Used in higher amperage connections than standard plugs

**Reference Image**

![Twist Lock Image](image)

## DMX

**Description**
- Normally 5 pins
- Similar design to DMX cables
- Used for the transmission of data to intelligent fixtures and dimmers

**Reference Image**

![DMX Image](image)
## Powercon

**Description**
- Used for the transfer of power
- Used on intelligent fixtures
- Allows for universal power supply

**Reference Image**
![Powercon Connector](image-url)
Performance: Exceptionally high quality transducers provide wide smooth frequency response, reducing the onset of ‘ear fatigue’ for those who must spend many hours wearing headsets. Deep, comfortable ear cushions have excellent external noise exclusion characteristics, and are washable with ordinary dish washing detergent. At 7.35 oz., the SMH210, and at 8.75 oz. the DMH220, (shown above) are much lighter than their appearances suggest. The noise-canceling microphone is mounted on a flexible, steel reinforced boom which can be easily twisted into a comfortable position. The flexible headband is adjustable. The normal transducer configuration for use with Production Intercom and compatible headset intercom systems are 400Ω ear speakers and a 2000Ω dynamic microphone. Electret microphones and lower impedance ear speakers for other applications are also available, and combinations of these transducers make up the various models. For use with Production Intercom and most headset communications systems the SMH210 and DMH220 are fitted with a 4-pin female XLR-type plug. For other applications many different plugs are available.

Durability: Because these headsets have only one moving part, and the microphone boom is flexible rather than hinged, a remarkable degree of durability is achieved. The light-weight cable consists of a copper shield around steel reinforced conductors, and is virtually unbreakable under normal circumstances. The assembly screws are hidden to prevent tampering. These headsets are easily field repairable. Production Intercom maintains a full inventory of replacement parts at reasonable prices and provides fast turnaround on repairs.

Value: Low initial cost (compared to other professional communications headsets of equivalent quality), combines with long working life and low cost of repairs to offer outstanding value.

Compatibility: 200 series headsets are compatible with Clear-Com® and all other popular headset intercom systems, as well as drive-thru restaurant systems, disk jockey systems and other applications.

Technical specifications: (Subject to change without notice) Ear speakers: 400Ω @ 1kHz Freq. response: 20–20kHz Dynamic Microphone: Uni-Directional 200Ω @ 1kHz Freq. response: 300–11kHz Sensitivity: 94dB SPl @ 1mW Distortion: Less than 0.5% Electret Microphone: Noise cancelling 2.2kΩ Freq. response: 20–20kHz Cable length: 59 in. (1.5 m) Steel reinforced Approx. weight: SMH210 7.35 oz. DMH220 8.75 oz.
SMH210 Single Muff Headset
Parts Guide

40-6502 Inner Headband Holder
45-6226 Label Holder Right and Left
40-6500 Left Ear Housing with Microphone Boom
17-6081 Grommet, Headband Clutch
31-6068 Screws, Headband Holder, Clutch
34-6010 Strain Relief, Cable Entry
17-6020 Clamping Ring, Strain Relief
37-6006 Microphone Cable (in Boom)
21-6017 Steel Cable Insert, Boom
16-6031 Fabric Dust Cover, EarSpeaker
84-7112 EarSpeaker, 400 Ohms
84-7104 EarSpeaker, 50 Ohms
41-6041 Ear Cushion Standard Left
41-6042 Foam Pad for 40-6578
40-6511 Adjustment Bellows
51-6041 Standard Cable (per foot)
40-6862(2) Microphone Housing, Upper Section
21-6017 Steel Cable Insert, Boom
16-6318 Felt Disk, Under Microphone
31-6067 Screw, Microphone Housing
37-6108 (DMH) Cable, Through Headband
84-6004 Microphone Dynamic 200 Ohms
40-6901(1) Microphone Housing, Lower Section

Additional Parts
DMH220 Dual Muff Headset

49-6035 (DMH) Headband Cushion
20-6054 (DMH) Steel Headband
40-6502 Inner Headband Holder
40-6511 Adjustment Bellows
40-6438 Headband Clutch
41-6015 Ear Cushion, Standard Right
40-6499 (DMH) Right Ear Housing

Notes:
(1) New part. Requires matching upper housing (below).
(2) New part. Requires matching lower housing (above).
Parts Not Shown:
41-6034 Ear Cushion, High Noise, Left (SMH)
41-6035 Ear Cushion, High Noise, Right (SMH)
51-6063 Split Cable, (per foot)
P9932 Microphone, Electret, Panasonic
1303C Microphone, Electret, Noise-Canceling

904 of 1217
Most compressor/gates provide less than musical compression, coupled with gating that swallows transients—or closes early, cutting off decay and reverb tails. The superb engineering in the 266XL ensures that both its compression and gating provide versatility and excellent sonic performance in situations where other compressors/gates typically produce undesirable processing artifacts.

When using the 266XL's AutoDynamic™ Attack and Release controls, artists and engineers will find that the center settings deliver classic dbx compression, while the full control range produces voicings that extend from slow "leveling" to aggressive "peak" limiting.

The Auto Dynamic™ circuitry continuously adjusts the actual attack and release times to optimally match the program material. Since users aren’t restricted to using the Attack and Release controls only in "peak" operation, they can tailor the response of the 266XL for individual tracks, mixed program material, special effects or system protection. As a result, production studios can use the versatile 266XL to replace multiple "single-purpose" limiters while sound reinforcement users can standardize on the 266XL for all of their applications.

The 266XL’s advanced gate circuitry uses a completely new, program-dependent timing algorithm to produce ultra-smooth release characteristics—even with complex signals, such as voice or reverb decays. dbx engineers went on to take advantage of the wide dynamic range and high precision of the dbx VCA to design in an extra-wide threshold range and ensure top gating performance for each application.

Separate precision LED displays for gain reduction, compression threshold and gate threshold allow quick, accurate setup, while the 266XL's intuitive operation lets users easily smooth uneven levels, add sustain to guitars, squash drums or tighten up mixes. In Stereo couple mode, the Channel 1 controls become Master controls, and Channel 2 follows precisely to ensure a rock solid stereo image—even with high amounts of compression. Professionals and newcomers will find that the 266XL sets up rapidly and musically the first time it is used, and every time thereafter.

Designed in the USA, the dbx 266XL processor is the result of an intensive engineering and product development effort aimed at taking advantage of the latest and best advances in manufacturing technology to deliver true dbx audio performance and reliability to our customers at the lowest possible cost. The 266XL puts a completely new level of compression/gate performance within everyone’s reach.

**FEATURES**

- Goof proof operation to smooth uneven levels, add sustain to guitars, squash drums or tighten up mixes.
- New gate timing algorithms ensure the smoothest release characteristics.
- Program-adaptive expander/gates.
- Great sounding dynamics control for any type of program material.
- Separate precision LED displays for gain reduction, compression threshold and gate threshold allow quick, accurate setup.
- Stereo or dual-mono operation.
- Balanced inputs and outputs on 1/4" TRS and XLR.
- Side Chain insert.
- Classic dbx "Auto" mode.
The compressor/gate shall have two identical channels, each with an audio frequency response of 50Hz-40kHz, 40引用中.5dB, a balanced input impedance of not less than 40kΩ, with a maximum input level of not less than -21dBu and a 1/4" TRS input connector. The output impedance shall be no more than 50Ω unbalanced, 100Ω balanced with a maximum output level of not less than +20dBu, a minimum load impedance at not more than 600Ω and the connector type shall be 1/4" TRS. Total Harmonic Distortion shall be less than 0.2% with any amount of compression at 1kHz, and Intermodulation Distortion shall be less than 0.2%. The unit shall have an output noise level of not more than -93dBu unweighted, and a dynamic range not less than 114dB. Outputs shall be gain adjustable in the amount of ±20dB from nominal gain via front-panel Output Gain controls, and all outputs shall be capable of driving a short circuit indefinitely with maximum input applied. The compressor attack and release times shall be selectable and program dependent. The gate attack time shall be ≤0.1ms. The compression threshold shall range from -40 to +20dB. The gate threshold range shall be from -10 to -3dBu. The compressor/gate shall have a stereo coupling switch as well as the following controls for each channel: Compressor Threshold, Compressor Ratio, Attack, Release, Auto switch Output, Gain, Expand/Gate Threshold, Expand/Gate Ratio, Bypass. The following metering LEDs shall exist for each channel: Compressor Threshold (Below, At Above), Gain Reduction and Gate Threshold (Above and Below). The unit shall operate from a power source of 100 VAC 50/60 Hz to 120 VAC 60 Hz for a domestic unit and 230 VAC 50 Hz for a European unit via IEC type AC cable and shall consume no more than 15 W. The net weight shall be 7lbs. (3.2kg). The unit shall be a dbx 266XL Compressor/Gate.

dbx engineers are constantly working to improve the quality of our products. Specifications are, therefore subject to change without notice.
dbx
266XL
Compressor/Gate
Manual Quick Guide

What do all these buttons/knobs do? .................................................................Page 5
What plugs into where? ..................................................................................Page 9
Something isn’t working? .................................................................Page 10

Need more information?
Go online: www.dbxpro.com
Call for support: (801) 568-7660
E-mail: customer@dbxpro.com
Owner/Operator Manual

Manuel d’utilisation

Bedienungsanleitung

Manual de instrucciones
IMPORTANT SAFETY INSTRUCTIONS

WARNING: FOR YOUR PROTECTION - READ THESE INSTRUCTIONS

KEEP THESE INSTRUCTIONS

READ ALL INSTRUCTIONS

WARNING: ALL INSTRUCTIONS

DO NOT USE THIS APPLIANCE NEAR WATER

CLEAN CORD WITH A DRY CLOTH

DO NOT BLOCK ANY OF THE VENTILATION OPENINGS, INSTALL IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS

DO NOT DESTROY, REMOVE ANY HEAT SOURCES SUCH AS RADIATORS, HEAT REGISTERS, STOVES, OR OTHER APPLIANCES EXCEPT THE APPLIANCE THAT PRODUCED HEAT

DO NOT USE A bgColor OWNERS INSTRUCTIONS

WARNING: THIS APPLIANCE MUST BE EARTHED

This appliance is designed to be connected to an earthed electrical supply system. It is important that proper earth continuity is maintained to minimize the risk of electric shock.

CONNECTION        WIRE COLOR
L1 L1 WHITE            GREENWELD GREEN
L2 L2 GREEN            BLACK
N   N BLUE             WHITE
E   E GREENWELD        GREEN

WARNING: IF THE GROUND IS DEFECTIVE, CERTAIN FAULT CONDITIONS IN THE UNIT OR IN THE SYSTEM TO WHICH IT IS CONNECTED CAN RESULT IN FULL LINE VOLTAGE BETWEEN CHASSIS AND EARTH GROUND. SERIOUS INJURY OR DEATH CAN THEN RESULT IF THE CHASSIS AND EARTH GROUND ARE TOUCHED SIMULTANEOUSLY.

SAFETY INSTRUCTIONS

NOTICE TO CUSTOMERS IF YOUR UNIT IS EQUIPPED WITH A POWER CORD

The cores in the mains lead are colour coded in accordance with the following code:

GREEN + YELLOW - Earth
BLUE - Neutral
BROWN - Live

As colours of the cores in the mains lead of this appliance may not correspond with the colours markings identifying the terminals in your plug, proceed as follows:

1. The core which is coloured green and yellow must be connected to the terminal in the plug marked with the letter "L" or earth symbol, or coloured green, green and yellow.
2. The core which is coloured blue must be connected to the terminal marked "N" or coloured black.
3. The core which is coloured brown must be connected to the terminal marked "L" or coloured red.

This equipment may require the use of a different line cord, attachment plug, or socket, depending on the available power source at installation. If the attachment plug needs to be changed, refer servicing to qualified service personnel who should refer to the table below. The green/yellow wire shall be connected directly to the unit chassis.

POWER SOURCE: 230 VAC, 50/60 Hz, 1.0 A

WARNING: IF THE GROUND IS DEFECTIVE, CERTAIN FAULT CONDITIONS IN THE UNIT OR IN THE SYSTEM TO WHICH IT IS CONNECTED CAN RESULT IN FULL LINE VOLTAGE BETWEEN CHASSIS AND EARTH GROUND. SERIOUS INJURY OR DEATH CAN THEN RESULT IF THE CHASSIS AND EARTH GROUND ARE TOUCHED SIMULTANEOUSLY.
IMPORTANT SAFETY INSTRUCTIONS

LITHIUM BATTERY WARNING

CAUTION!
This product may contain a lithium battery. There is danger of explosion if the battery is incorrectly replaced. Replace only with an Eveready CR 2032 or equivalent.
Make sure the battery is installed with the correct polarity. Discard used batteries according to manufacturer's instructions.

WARNING!

VAROITUS!
Paristo voi räjähtää, jos se on virheellisesti asennettu. Valitse paristo, joka on suositeltu paristofirmaan.

WARNING!

U.K. MAINS PLUG WARNING
A molded mates plug that has been cut off from the cord is unsafe. Discard the mates plug at a suitable disposal facility. NEVER UNDER ANY CIRCUMSTANCES SHOULD YOU INSERT A DAMAGED OR CUT MAINS PLUG INTO A 13 AMP POWER SOCKET. Do not use the mains plug without the fuse cover in place. Replacement fuse covers can be obtained from your local retailer. Replacement fuses are 13 amps and MUST be ASTA approved to BS1362.

DECLARATION OF CONFORMITY

Manufacturer’s Name: The Professional Products
Manufacturer’s Address: 400 S. Sandy Parkway
Sandy, Utah 84092, USA

declares that the product:
Product name: disc 360XL

meets the following Product Specifications:
IEC EN 55011 (1998)
EN 55020 (1991)

Supplementary Information:
The product is intended to comply with the requirements of the Low-Voltage Directive 72/23/EEC and the EMC Directive 89/336/EEC as amended by Directive 93/68/EEC.

European Contact: Your local the Sales and Service Office or
European Contact: Your local the Sales and Service Office or
northern Contact: Your local the Sales and Service Office or

Electromagnetic Compatibility

This unit conforms to the Product Specifications noted on the Declaration of Conformity. Operation is subject to the following two conditions:
• this device may not cause harmful interference, and
• this device must accept any interference received, including interference that may cause undesired operation.

Operation of this unit within significant electromagnetic fields should be avoided.
• use only shielded interconnecting cables.

910 of 1217
MANUAL CONTENTS

ENGLISH ................................................................. 2
FRANÇAIS ............................................................... 11
DEUTSCH ................................................................. 21
ESPAÑOL ................................................................. 31

ENGLISH CONTENTS

INTRODUCTION ....................................................... 4
OPERATING CONTROLS ............................................... 5
COMPRESSOR SECTION ............................................... 6
EXPANDER/GATE SECTION ........................................... 7
CONNECTING THE 266XL TO YOUR SYSTEM ..................... 9
TECHNICAL SUPPORT / FACTORY SERVICE ...................... 10
REGISTRATION AND USER FEEDBACK ........................... 10
SPECIFICATIONS .................................................... 41
BLOCK DIAGRAM .................................................... 43

266XL Compressor/Gate
Congratulations on choosing the dbx 266XL Compressor/Gate. The 266XL provides traditional dbx sonic quality and performance for the working musician, DI, studio operator or anyone who needs a friendly compressor/gate to achieve quality compression, gating and downward expansion quickly and easily. We recommend that you take a moment and read through the manual as it provides information that will assist you in using your unit to its fullest potential.

The 266XL’s compressor is packed with just the right features to effectively reduce and control the dynamic range of your audio, add punch to flabby, loose sounds, or add sustain to instruments. The 266XL begins with the classic dbx compression made famous by our 160 line of compressors. Just set the 266XL’s Attack and Release controls to 12:00 to get the same response as those units. But there’s more. We scaled the program-dependent Attack and Release controls with dbx’s AutoDynamic™ circuitry, so that the 266XL’s full range of controls produce voicings that extend from slow leveling to aggressive peak limiting.

**Common Compressor Applications:**
- Fattening a Kick Drum or Snare Drum
- Adding Sustain to Guitar or Synthesizer Strings
- Smoothing Out a Vocal Performance
- Raising a Signal Out of a Mix
- Preventing Sound System Overload
- Digital to Analog Transfers

The 266XL’s gate is ready to tackle all your gating needs, whether you need to remove unwanted noise or other background sounds, tighten drum sounds, or change the characteristic envelope of an instrument. The 266XL’s gate provides more flexibility than traditional switch gates because it actually functions as a combination gate/expander. Where switch gates are generally only suitable for a limited number of uses (e.g., gating percussion), the gate on the 266XL acts as a gentle downward expander at low Ratio settings (suitable for vocals, guitar, mixed program, etc.), and can effectively work as a switch gate when used at high Ratio settings.

**Common Gating Applications:**
- Gating Dry Percussive Sounds (e.g., Snare Drum, Kick Drum)
- Gating Sounds That Have Longer Decay (e.g., Cymbal, Piano)
- Gating Hum or Buzz From Live Instruments or Recorded Tracks
- Downward Expansion to Reduce Noise Under Smooth Sounds (e.g., Vocals, Woodwinds)

Refer to the following pages for suggested initial settings. These settings should suffice for traditional compressing and gating requirements. However, the 266XL can accomplish many more changes to sound quality. We recommend that you experiment with the 266XL’s controls; take our suggested settings and run with them, try totally different settings, and try unorthodox combinations of compressor and gating controls. You might be surprised at what you hear. Best of all, you may create the perfect sound quality for your needs.
**Stereo Couple Switch**

This switch sets the 266XL for Stereo or Dual Mono operation. Press the STEREO COUPLE switch in for stereo operation where Channel 1 becomes the master controller for both channels. All of Channel 2's controls, switches, and LEDs will be disabled (except for Channel 2's GAIN REDUCTION meter), since Channel 2 is the slave.

With the STEREO COUPLE switch out, the unit functions as two separate mono compressors/gates, each with its own independent controls.

The STEREO COUPLE switch lights red when the 266XL is stereo-coupled.

**Bypass Switch**

Press this switch in to bypass the front panel controls, effectively canceling the function and processing effect of the 266XL's compression, gating and gain settings. The input signal is still present at the 266XL's output, but is now unaltered by the 266XL's controls. Bypass is especially useful for making comparisons between processed and unprocessed signals. Note that with stereo operation (STEREO COUPLE switch pressed in), the Channel 1 Bypass switch controls both channels.

The Bypass switch lights red when Bypass mode is active.

**Gain Reduction (dB) Meter**

This meter displays the amount of signal attenuated from the input signal by the 266XL's Compressor or Expander/Gate. When the Compressor or Expander/Gate are both active, the meter displays the maximum amount of gain reduction for whichever function is greater - Compressor or Expander/Gate.

**Output Gain (dB) Control**

This control sets the overall gain of the 266XL, from -20dB to +20dB. The OUTPUT GAIN control is especially useful to compensate for the RMS level decrease which results from the 266XL's dynamic processing effects. After you adjust the 266XL's controls for the desired amount of compression, set the OUTPUT GAIN to add the same amount of gain that is shown on the GAIN REDUCTION meters. For example, if the average amount of gain reduction shown on the meters is 10dB, then setting the OUTPUT GAIN control to +10dB will compensate for the 10dB average level reduction at the output.

Note: The 266XL's Compressor and Expander/Gate control settings are interactive and can affect gain, so watch your playback levels.
COMPRESSOR SECTION

Note: Setting the Compressor RATIO to 1:1 will turn the Compressor off, regardless of the setting of the Compressor THRESHOLD control and BELOW/OVERSEASY/ABOVE LED status. Setting the Compressor THRESHOLD control to +20dB will prevent all but the highest level peaks from being compressed.

OVEREASY® Switch
Depress this switch to select the OverEasy® compression characteristic. The amber THRESHOLD LED turns on when the signal is in the OverEasy region. When the switch is out, the 266XL operates as a hard-knee compressor, and the amber LED does not light.

Compressor THRESHOLD Control and LEDs (BELOW/OVERSEASY/ABOVE)
Adjust this control to set the threshold of compression from -40dB to +20dB. In hard-knee mode, the threshold of compression is defined as the point above which the output level no longer changes on a 1:1 basis with changes in the input level.

In OverEasy mode the threshold of compression is defined as the middle of the OverEasy threshold region, that is, "half-way" into compression.

The three THRESHOLD LEDs indicate the relationship of the input signal level to the threshold of compression. The green LED lights when the signal is BELOW threshold, the red LED lights when the signal is above threshold, and the yellow LED lights when the OVEREASY switch is depressed and the input signal is in the OVEREASY range.

The 266XL's OverEasy compression permits extremely smooth, natural sounding compression, without artifacts, due to the gradual change of compression around the threshold. With OverEasy compression, input signals begin to gradually activate the 266XL's internal gain change circuitry as they approach the THRESHOLD reference level. They do not get fully processed by the RATIO, ATTACK and RELEASE controls until they have passed somewhat above the THRESHOLD reference level. As the signal level passes the THRESHOLD level, processing increases until it is fully processed to the extent determined by the control settings.

In hard-knee mode, the 266XL can provide abrupt compression effects as well as hard-limiting applications. Note that in hard-knee mode the amber LED will not light as the input signal passes across the threshold. The signal is either being compressed (over threshold) or it is not being compressed (under threshold).

Note: Even though no input signal is being applied, it is normal for the LEDs to flicker when the power is applied or removed.

Compressor RATIO Control
Adjust this control to set the amount of compression applied to the input signal. Clockwise rotation of this control increases the compression ratio from 1:1 (no compression) up to 1:1 (where the compressor can be considered to be a peak limiter, especially with faster ATTACK settings).

266XL Compressor/Gate
266XL Compressor/Gate

When an input is above the THRESHOLD setting reference level, the RATIO setting determines the number of decibels by which the input signal must increase in level to produce a 1dB increase in the signal level at the output of the 266XL. A setting of 2:1 indicates an input/output ratio wherein a 2dB increase in signal (above threshold) will produce a 1dB increase in output signal. A setting of <=1 indicates that an infinite increase in input level would be required to raise the output level by 1dB.

Compressor ATTACK and RELEASE Control
The ATTACK control sets the amount of time it takes the 266XL to begin compressing a signal once the detector has sensed a signal above threshold. The ATTACK range is from FAST (for a tighter and more noticeable compression effect with very little overshoot) to SLOW (for more delayed, gradual compression). A very fast ATTACK setting will cause the 266XL to act like a peak limiter even though RMS detection circuitry is used. Slower ATTACK settings cause the 266XL to act like an RMS or averaging detecting compressor/limiter.

The RELEASE control sets how fast the compression circuit returns the input to its original level. The RELEASE rate is from FAST (where compression follows the envelope of the program material very tightly) to SLOW (for very smooth compression).

There is no absolute right way to set the ATTACK and RELEASE controls. However, in general, you will want them set slow enough to avoid pumping or breathing sounds caused when background sounds are audibly modulated by the dominant signal energy, yet the release must be fast enough to avoid suppression of the desired signal after a sudden transient or lead note has decayed. For low frequency tones (e.g., bass guitar), set RELEASE and ATTACK to 2:00 or slower.

Note: ATTACK and RELEASE controls operate together and in conjunction with the RATIO control. Changing one control may necessitate changing another setting.

Auto Switch
This switch overrides both the ATTACK and RELEASE controls and enables preset program-dependent attack and release times. These times are derived from the input signal and continuously change to match its dynamics. Enabling this AUTO Function duplicates the “classic dbx sound” of the 266XL’s forerunners which have become standards in the industry.

EXPANDER/GATE SECTION

Note: The Expander/Gate is off when the Expander/Gate THRESHOLD is set to OFF.

Expander/Gate THRESHOLD Control and LEDs (BELOW/ABOVE)
Adjusting this control sets the level at which the gate will open and allow the signal at the input to pass through to the output. Turning the knob fully counterclockwise (to OFF) allows the gate to pass all signals unattenuated, effectively bypassing the gate. Turning the knob fully clockwise causes the gate to attenuate input signals below +15dBs. The depth of attenuation depends on the setting of the Expander/Gate RATIO control.

The two Expander/Gate LEDs indicate the relationship of the input signal level to the threshold setting. The red LED lights when the signal is BELOW threshold, the green LED lights when the signal is ABOVE threshold.
Expander/Gate RATIO Control
This control sets the amount of attenuation applied to the input signal once it is below the threshold, from gentle downward expansion (appropriate for mixed program, vocals, etc.), to a hard gating effect (which can be useful for percussion). Fairly low RATIO (and higher Expander/Gate THRESHOLD) settings work best for downward expansion, whereas higher RATIO settings (clockwise towards MAX) work best for gating. If a setting produces undesirable pumping, readjust the Expander/Gate RATIO or THRESHOLD setting.

Note: The attack and release rates of the Expander/Gate are program-dependent - very fast for transient material (e.g., percussion) and slower for material with slow attack (e.g., vocals).

Note: Fast gating of sustained low frequency signals can result in "chattering". To eliminate any "chattering" simply adjust the RATIO control. The proper THRESHOLD setting will also minimize false triggering and "chattering."

INPUT Jacks (CHANNEL 1 and 2)
Use 1/4" phone plugs or male XLR plugs to connect these inputs to your source. The 266XL's INPUT jacks accept either balanced or unbalanced signals. Input impedance is >40kΩ.

OUTPUT Jacks (CHANNEL 1 and 2)
The OUTPUT jacks accept 1/4" balanced or unbalanced phone plugs or female XLR plugs. Maximum output signal level is +10dBu. In the +4dBu setting, the balanced output impedance is 100Ω, and the unbalanced output impedance is 50Ω. In the -10dBV setting, the balanced output impedance is 1kΩ and the unbalanced output impedance is 500Ω.

OPERATING LEVEL Switch
This switch selects between a -10dBV and +4dBu nominal operating level. When the switch is in the IN position, a -10dBV operating level is selected. When it is in the OUT position, a +4dBu operating level is selected.

SIDECHAIN INSERT Jack
This jack accepts 1/4" TRS phone plugs and provides a connection to the 266XL detector path. The RING acts as a Send, carrying a buffered version of the signal present at the 266XL INPUT jack, at an impedance of 2kΩ. The TIP acts as a Return for equipment to feed the 266XL's detector circuitry, such as an equalizer for de-essing or frequency-sensitive gating/compression. You can also drive the 266XL Sidechain input with the output of most equipment, by using a 1/4" mono phone plug. Input Impedance is greater than 10kΩ.

Note: When a cable is plugged into this jack, it automatically breaks the connection from the INPUT jack to the 266XL's detector circuitry.

266XL Compressor/Gate
266XL Compressor/Gate

IEC - AC Power cord receptacle
Plug the AC power cord (supplied) into the 266XL. Plug the other end into a standard wall receptacle. Take care to route power cables away from audio lines. Note that the 266XL does not have a power switch. It is recommended that the 266XL be "On" at all times. Power consumption is low. If you do not plan to use the 266XL for an extended period of time, unplug it.

WARNING: It's wise to verify your actual line voltage is the same as the voltage level printed below the AC power receptacle. Connection to an inappropriate power source may result in extensive damage which is not covered by the warranty.

Caution: Never remove the cover. There are no user-serviceable parts inside.

Connecting the 266XL to your system

The 266XL can be used with any line-level device. Some common examples include mixing consoles, electronic musical instruments, patch bays, and signal processors. For all connections, refer to the following steps:

Turn off all equipment before making any connections.

Mount the 266XL in a 1U rack space (optional). The 266XL requires one rack space (height) and 1 rack space (width). It can be mounted above or below anything that doesn't generate excessive heat, since it requires no special ventilation. Ambient temperatures should not exceed 113°F (45°C) when equipment is powered.

Make connections via 1/4" phone or XLR jacks according to your requirements. Typical patch points include: a mixer's channel or subgroup inserts when using the 266XL on individual instruments or tracks; the mixer's main outputs when mixing; an instrument preamp's effects loop when using the 266XL for guitar or bass; main outs of a submixer (i.e., keyboard mixer) as the signal is sent to main mixer; between a DAT's output and an analog cassette input. When using a chain of processors, the 266XL may be placed either before or after effects or dynamics processors. We recommend you use common sense and experiment with different setups to see which one provides the best results for your needs.

Connect the AC power cord (shipped with the unit) to the 266XL's rear panel POWER connector and an appropriate AC power source to turn the unit ON.
TECHNICAL SUPPORT AND FACTORY SERVICE

The 266XL is an all-solid-state product with components chosen for high performance and excellent reliability. Each 266XL is tested, burned-in and calibrated at the factory and should require no interna adjustment of any type throughout the life of the unit. We recommend that your 266XL be returned to the factory only after referring to the manual and consulting with dbx Customer Service.

Our phone number, Fax number and address are listed on the back cover of this manual.

When you contact dbx Customer Service, be prepared to accurately describe the problem. Know the serial number of your unit. This is printed on a sticker attached to the side panel of the unit.

Note: Please refer to the terms of your Limited Two-Year Standard Warranty, which extends to the first end-user. After the warranty expires, a reasonable charge will be made for parts, labor, and packing if you choose to use the factory service facility. In all cases, you are responsible for shipping charges to the factory. dbx will pay return shipping if the unit is still under warranty.

Shipping Instructions: Use the original packing material if it is available. Mark the package with the name of the shipper, and with these words in red: DELICATE INSTRUMENT, FRAGILE! Insure the package properly. Ship prepaid, not collect. Do not ship parcel post.

REGISTRATION CARD AND USER FEEDBACK

We appreciate your feedback. After you have an opportunity to use your new 266XL, please complete the Registration Card and return it.
### 266XL Compressor / Gate

#### Specifications / Specifications / Technische Daten / Especificaciones

**Note:** Values are subject to change. Les valeurs peuvent être modifiées. / Technische Änderungen vorbehalten. / Las especificaciones están sometidas a cambio.

<table>
<thead>
<tr>
<th>Frequency Response / Réponse en fréquences / Frequenzgang / Frecuencia de transmisión</th>
<th>Flat 20Hz - 20kHz, ±0.25dB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input Impedance</strong></td>
<td>Balanced 50Ω, unbalanced 10kΩ</td>
</tr>
<tr>
<td><strong>Max Level</strong></td>
<td>&gt;21dBu</td>
</tr>
<tr>
<td><strong>Output Impedance</strong></td>
<td>Balanced 50Ω, unbalanced 10kΩ</td>
</tr>
<tr>
<td><strong>Max Output Level</strong></td>
<td>&gt;26.5dBu</td>
</tr>
<tr>
<td><strong>Distortion + Noise</strong></td>
<td>1.3% at rated power level</td>
</tr>
<tr>
<td><strong>Intermodulation Distortion</strong></td>
<td>1.5% at rated power level</td>
</tr>
<tr>
<td><strong>Dynamic Range</strong></td>
<td>&gt;114dB</td>
</tr>
<tr>
<td><strong>Dynamic Compression Ratio</strong></td>
<td>&gt;100:1, non-preset</td>
</tr>
<tr>
<td><strong>Crossover Networks</strong></td>
<td>0Hz, 20Hz to 20kHz</td>
</tr>
<tr>
<td><strong>Cable Length</strong></td>
<td>True RMS Power Handling™</td>
</tr>
<tr>
<td><strong>Cable Size</strong></td>
<td>&gt;6.5mm²</td>
</tr>
<tr>
<td><strong>Amplifier Input</strong></td>
<td>True RMS Power Handling™</td>
</tr>
<tr>
<td><strong>THRESHOLD</strong></td>
<td>Overload at 1kHz: +24dBu, +30dBu</td>
</tr>
<tr>
<td><strong>COMPRESSOR</strong></td>
<td>&gt;26.5dBu, +30dBu</td>
</tr>
<tr>
<td><strong>RELAY</strong></td>
<td>1:1 to 10:1</td>
</tr>
<tr>
<td><strong>ATTACK Time</strong></td>
<td>0.5 to 10ms</td>
</tr>
<tr>
<td><strong>EFFECTIVE GAIN</strong></td>
<td>Storable Program Dependent AutoDynamic™</td>
</tr>
<tr>
<td><strong>COMPRESSOR GAIN</strong></td>
<td>Storable Program Dependent AutoDynamic™</td>
</tr>
<tr>
<td><strong>OVP / Operation Voltage</strong></td>
<td>29.5VAC / 120VAC 50/60Hz, 33VAC 50/60Hz</td>
</tr>
<tr>
<td><strong>Power Consumption</strong></td>
<td>15 Watts</td>
</tr>
<tr>
<td><strong>Current Consumption</strong></td>
<td>0.4A</td>
</tr>
</tbody>
</table>

---

**Unbalanced**

---

**Balanced**

---

**Note:** Values are subject to change. Les valeurs peuvent être modifiées. / Technische Änderungen vorbehalten. / Las especificaciones están sometidas a cambio.
Operating Temperature
Temperaturas de funcionamiento
Temperaturs de funcionamiento
Temperaturer de funktionering

33°F to 122°F
6°C to 49°C
6°C to 49°C
8°C to 55°C

Dimension (W x D x H)
Dimensiones (Ancho x Esp. x Alt.)
Dimension (B x D x H)

1-7/8" x 5-3/4" x 17/8"
45 x 140 x 45 mm

Weight
Peso
Gewicht
Peso

30 lbs / 13.6 kg
24 lbs / 10.9 kg
18 lbs / 8.3 kg
22 lbs / 10.0 kg

266XL Compressor / Gate
**BP-1**

**Headset Station**

(BeltPack)

- **Performance**
- **Durability**
- **Value**
- **Compatibility**

**Performance:** The BP-1 portable headset station may be worn on the belt or hung on the wall by its sturdy belt-clip. Soft plastic strips on the underside help hold it in place when set on top of a console. The matte black finish minimizes visibility.

Frequency response has been carefully shaped to optimize both intelligibility and long-term listening comfort. A mic limiter circuit reduces overload distortion. The high bridging impedance ensures that system and sidetone levels do not vary as other stations are switched in and out of the circuit.

The top panel contains controls for switching the microphone on and off, for controlling listening level, and for signaling. They are easily identifiable by touch. A recessed, screwdriver-adjustable control is provided for varying the level of the user's voice to be heard in his own earphone (Sidetone). A long-life, extremely bright, 4-segment LED serves as the signal light.

The bottom panel provides a 3-pin female XLR for connection to the system; a 3-pin male XLR for looping onwards to the next station, and; a 4-pin male XLR for connection of any standard communications headset with a dynamic microphone.

**Durability:** The ribbed, extruded aluminum case; glass-filled nylon end bezels; internal support system for the PC board; best-quality XLR-type connectors, and; recessed controls, all contribute to the outstanding ability of the BP-1 to withstand rough usage.

**Value:** The comparatively low price of the BP-1 is made possible by the minimized assembly cost resulting from simplicity of construction. Simple construction also affords the use of higher quality components, and increases the ease (thus lowering the cost) of servicing.

**Compatibility:** The BP-1 is plug-in compatible with Clear-Com® and other popular headset intercom systems.

**Technical Specifications:** (Subject to change without notice.)

- Power requirement: 24 ~ 30VDC, 10 mA quiescent, 30mA max. (with signal lamp lit)
- Headphone output: 1 ~ 4k ohms acceptable, 200 ohms ideal
- Microphone input: 200 ~ 600 ohms Dynamic
- Sidetone rejection: >50dB
- Audio bridging impedance: 200 ohms unbalanced
- Size: 3.70 x 4.30 x 1.50 in. (93.98 x 109.22 x 63.5 mm)
- Weight: 13.5 oz. (0.383Kg+)

Production Intercom, Inc.

http://www.beltpack.com  P.O. Box 3247  Barrington, IL 60011-3247  U.S.A.  support@beltpack.com

Voice: 847-381-5350  Fax: 847-381-4360

Sales & Technical Assistance - U.S.A., Alaska, Hawaii, Canada and Puerto Rico: 800-562-5872

923 of 1217
Operating Instructions

1. Plug a headset into the XLR type 4-pin socket on the back of the unit. The headset wiring standard is shown in Fig. 1. In Production Intercom systems, the phase of the earphone is the reverse of that sometimes used. This was done to reduce the effect that the headset connector and wiring has on the headset station bridging impedance and "Sidetone" (See #8) adjustment stability. Either standard of headset wiring will work with Production Intercom headset stations.

2. Plug the standard microphone cable from your power supply or master station into the XLR 3-pin type socket on the back of the unit.

3. Press the mic. button and partly turn up the 'Listen level' ( ) control on your unit and others on the same circuit as yourself.

4. You should now be able to communicate with any other outstations.

5. The thumb operated 'Listen-level' control regulates the loudness of your headset earphone(s). It has NO effect on how loudly others hear you.

6. The microphone amplifier gain is factory adjusted to suit most types of headset microphones. It contains a limiter/compressor which compensates for differences in microphone output and voice levels. Should your chosen headset have too little mic. output, please contact your dealer.

7. The flash (signal) push button flashes a light in all outstations connected to your circuit. It is used to attract attention in the event that a user has removed his/her headset.

8. The screwdriver preset controls the level of your own voice in your headset. This adjustment is called 'Sidetone'. This is set at the factory at a level suitable to the majority of the users. This can be altered for personal preference or adjusted for deep cancellation allowing the headset to be removed and used to monitor.

9. Aside from a reduction in 'Sidetone' stability incurred when a Clear-Com® station is used in a Production Intercom communications system, the two systems are compatible.

Specifications:
- Headset Microphone Impedance: 200 Ω preferred, 30 Ω to 1 K Ω acceptable.
- Headset Earphone Impedance: 150-600 Ω preferred, 8 Ω - 4 K Ω acceptable.
- Voltage: 24V DC nominal, 15-30V DC acceptable.
- Current consumption: 10 mA with speech, 30 mA with signal lamp activated.
- Lamp type: 4-segment 2mA LED
- Line bridging impedance: 200Ω unbalanced
- Sidetone cancellation: 0dB to 55dB

Production Intercom Inc.
P.O. Box 3247, Barrington, IL 60011-3247
Voice: (847) 381-5350 Fax: (847) 381-4360 Sales & Technical Assistance (US & Can): (800) 562-5872
e-mail: support@bellpack.com Web: bellpack.com
Printed in U.S.A. Rev.009/1

924 of 1217
Controls:
Talk: Push on/push off, self-indicating switch
Listen level: Thumbwheel operated potentiometer
Signal: Non-latching push button switch.
Squelch: Screwdriver adjust, recessed potentiometer.

Headset Connector Wiring

Belt Pack connections

Station Connections
Male
Gnd (Shield) → ① → ② → +24 VDC → ③ → Communications

Station Connections
Female
+24 VDC → ② → ① → Gnd (Shield) → ③ → Communications
Production Intercom

Operating Instructions
Portable Headset Stations (Beltpacks)
HS-1 Series Fixed Headset Stations

Models Available:
BP-1 - Single Circuit Beltpack
HS-1 (series) Fixed Headset Stations
BP-1S - Beltpack supports two circuits with only one being active at a time.
BP-2 - Beltpack supports two circuits, mixed to a single earpiece.
BP-2B - Beltpack supports two circuits, discretely into either side of a dual muff headset.

BP-1 and HS-1:
The following instructions are for the BP-1 Beltpack. The HS-1 Fixed Headset Station circuitry is identical.
Mechanical layout and the manner of connection are different. See page 4 for connector instructions for HS-1.

1. Plug a headset into the XLR type 4-pin socket on the back of the unit. The headset wiring standards are shown on the next page. In Production Intercom systems, the phase of the earphone is the reverse of that sometimes used. This was done to reduce the effect that the headset connector and wiring has on the headset station bridging impedance and Sidetone (See #8) adjustment stability. Either standard of headset wiring will work with Production Intercom headset stations.

2. Plug the standard microphone cable from your power supply or master station into the XLR 3-pin type socket on the back of the unit.

3. Press the microphone button and partly turn up the listen level control on your unit and others on the same circuit as yourself.

4. You should now be able to communicate with any of these other outstations.

5. The thumb operated listen level control regulates the loudness of your headset earphone(s). It has NO effect on the microphone level.

6. The microphone amplifier gain is factory adjusted to suit most types of headset microphones. It contains a limiter/compressor which compensates for differences in microphone output and voice levels. Should your chosen headset have too little microphone output, please contact us to arrange a modification.

7. The flash (signal) push button flashes a light in all outstations connected to your circuit. It is used to attract attention in the event that a user has removed his headset.

8. The screwdriver preset controls the level of your own voice in your headset. This adjustment is called Sidetone and is set at the factory at a level suitable to the majority of the users. Sidetone can be adjusted for personal preference or for deep cancellation allowing the headset to be removed and used to monitor the action.

Production Intercom, Inc. - P.O. Box 3247 - Barrington, IL 60011 - (847)381-5350 Fax (847)381-4360
Note: Sidetone controls have a null-point near the 12 o’clock position where sidetone is most deeply canceled. Rotating the control either side of the 12 o’clock position will increase sidetone levels.

9. Aside from a reduction in sidetone stability incurred when a Clear-Com® station is used in a Production Intercom communications system, the two systems are compatible.

**Headset Connector Wiring - SMIH210 Single Muff Headset**

**Station Connector Wiring**

**Headset Connector Wiring - DMII220**
dual muff headsets or headsets with each earpeaker being greater than 100 ohms. Earspeakers are connected in parallel to a common signal.

**Headset Connector Wiring - DMII224**
dual muff headsets or headsets with each earpeaker being less than 100 ohms. Earspeakers are connected in series to a common signal.

Production Intercom, Inc. - P.O. Box 3247 - Barrington, IL 60011 - (847)381-5350 Fax (847)381-4360
BP-I Upgrade:
These instructions apply only to BP-I's with a yellow LED signal lamp. To upgrade an older BP111 with a large amber signal lamp button incorporating an incandescent lamp, see BP111 upgrade instructions.
1. Remove the 4 screws which hold the bezels in place from the front and back of the unit.
2. Turn the front plate on its side and withdraw the whole unit from the back of the extrusion. It is NOT necessary to disconnect the XLR connectors or the back plate from the PC board.
3. De-solder the LED wires from the switch and the PC board. Note the positions.
4. Pull the old LED out from the rear of the front plate. A slight twist with a pair of pliers will remove the LED and the hot melt glue holding it in place. Remove what is left of the plastic bezel from the front plate.
5. Remove R36 (right beside the signal light switch) and replace it with the 390 ohms resistor in the kit.
6. Insert the new 4-segment LED from the front of the front plate with the red wire towards the center of the plate. Push it firmly into place.
7. Solder the red lead to the front, inside, pin on the top of the signal light switch (where you removed the old connection).
8. Solder the yellow lead into the hole in the PC board from which you removed the old lead (next to R36).
9. Test and reassemble.

BP-111 Upgrade:
These instructions apply only to BP-111's with a large amber signal light button incorporating an incandescent lamp. To upgrade an older BP-1 with a yellow LED signal lamp see BP-1 upgrade instructions.
1. Remove the 4 screws which hold the bezels in place from the front and back of the unit.
2. Discard the front plate and withdraw the whole unit from the back of the extrusion. It is NOT necessary to disconnect the XLR connectors or the back plate from the PC board.
3. Remove the plastic button from the signal light switch and de-solder the lamp holder from the top of the switch. Remove and discard the lamp holder.
4. Insert the new 4-segment LED from the front of the new front plate with the red wire towards the center of the plate. Push it firmly into place.
5. Solder the red lead to the front, inside, pin on the top of the signal light switch.
6. Solder the yellow lead to the front, outside, pin on the top of the signal light switch. This wire has a 1/2 watt 390 ohms resistor soldered in line with it.
7. Drop the front plate through the extrusion from the rear, and re-insert the electronics.
8. Test and complete the re-assembly.

The upgrade kit is:
P/N BP-1 Upgrade

Production Intercom, Inc. - P.O. Box 3247 - Barrington, IL 60011 - (847)381-5350 Fax (847)381-4360
BP-1S:
The BP-1S is a single circuit beltpack with a front panel switch permitting communication with circuit "A" or Circuit "B", but not both. Each of the 3-pin XLR connectors on the rear panel is used for connection to a separate circuit. Therefore loop-through is not possible with this model. To insert BP-1S in a system where loop-through is desirable, use a pair of Y-cables (YV-2) or a pair of SB-1 Splitter/Isolator boxes.

Either or both of the rear panel connections may be made at any time.

Headsets should be wired according to the BP-1 instructions.

Caution: Do NOT switch to a circuit which is not connected while the volume control is turned up. Feedback "squeal" may be quite loud.

BP-1SL:
As of the end of October 1997, the BP-1S was replaced with the BP-1SL.
A second signal light was added to respond to a signal from the unselected circuit.

HS-1 and HS-1M Fixed Headset Stations:
As stated earlier, the circuitry for the fixed headset stations is identical to that of the belt packs. The HS-1 is a single circuit station whereas the HS-1M is fit with a rotary switch and can select one of (up to nine) the circuits attached to it.

Listen and sidetone levels are adjusted the same way as the belt packs.

Connecting Rack Mounted, Single-Circuit HS-1R:
These enclosed HS-1's are fitted with one male and one female 3-pin XLR connector. One connector is used to connect the station to the system, and the other to loop onwards to the next station in the system. By convention, and to avoid confusion with microphone jacks, the female connector is considered the input. Reversing these connections will not affect the operation of the station. Wire plugs to be connected to the station as in the diagram, left.

Station Connector Wiring

Production Intercom, Inc. - P.O. Box 3247 - Barrington, IL 60011 - (847)381-5350 Fax (847)381-4360
Connecting Rack Mounted Multi-Circuit HS-1MR:

These enclosed multi-circuit HS-1’s are fitted with 6-pin XLR connectors. One is used for connecting the station to the system, and the other is used for looping onwards to the next station in the circuit. As wired at the factory, these stations can only be connected to 4 circuits - the limit being the number of available pins in the XLR.

Units can be provided on special order with connectors providing sufficient connector pins to connect up to 9 circuits. Wire plugs to be connected to the station as in the diagram above.

Note: There is no industry standard for the configuration of pins in 6-pin XLR’s. Different manufacturer’s 6-pin XLR’s will not mate properly to the connector installed on the unit. Technical Projects uses Neutrik® XLR’s, and one plug is included with your unit. Neutrik connectors are readily available from numerous sources, including Technical Projects.

BP-2 and BP-2B:
The BP-2 and BP-2B are best understood if thought of as two separate beltpacks in one enclosure. Each has its own complete set of controls and its own rear panel XLR for connection to its own circuit.

The BP-2 mixes the two audio inputs from the two circuits to which it is connected and may be used with either a single muff or a dual muff headset. The headset connector is 4-pin.

The BP-2B (binaural) maintains the separation of the two audio inputs from the two circuits to which it is connected and feeds each signal to one side of a dual muff headset. The headset connector is 5-pin.

Note: On both the BP-2 and the BP-2B, circuit A must be connected in order for circuit B to operate. Circuit A may be used alone. Circuit B may not.

1. Plug a headset into the XLR socket on the rear panel. Headset wiring standards are shown on the next page. In Production Intercom systems, the phase of the earphone(s) is the reverse of that sometimes used. This was done to reduce the effect that the headset connector and wiring has on the headset station bridging impedance and sidetone adjustment stability. (See #8) Either standard of headset wiring will work with Production Intercom headset stations.

2. Plug a standard microphone cable from each of two circuits on your master station or power supply into each of the 3-pin sockets on the rear panel.

Note: BP-2s and BP-2Bs have two 3-pin circuit connectors and can not be looped-through. To loop-through a Y-cable (YC-2) or SB-1 Splitter/Isolator Box must be used.

Production Intercom, Inc. - P.O. Box 3247 - Barrington, IL 60011 - (847)381-5350 Fax (847)381-4360
BP-2 - Headset Connector Wiring
Circuits A and B signals are mixed and distributed to both earphones of the DMH220 dual muff headset.

Station Connector Wiring

BP-2B - Headset Connector Wiring
Circuits A and B signals are discretely distributed to the left and right earphones of the DMH220 dual muff headset.

Note: Single muff headsets (SMH210) having connectors wired for the BP-1 may be used with the BP-2 station (see page 2), but not the BP-2B.

3. Press the microphone buttons and partly turn up the listen level controls on your unit and others on the same circuits.

4. You should now be able to communicate with any of these other stations.

5. The thumb operated listen level controls regulate the loudness of your headset earphone(s). It has NO effect on the microphone level.

6. The microphone amplifier gain is factory adjusted to suit most dynamic headset microphones. It contains a limiter/compressor which compensates for differences in microphone output and voice levels. Should your chosen headset have too little microphone output, please contact us to arrange a modification.

7. The flash (signal) push buttons flash a light in all outstations connected to the same circuit. It is used to attract attention in the event that a user has removed his headset.

8. The screwdriver-adjust preset controls, accessible through the front panel, control the level of your own voice in your own headset. This adjustment is called sidetone. Sidetone is factory set at a level suitable to the majority of users. It can be altered for personal preference, or for deep cancellation allowing the headset to be removed and used to monitor the action.

   Note: Sidetone controls have a null-point near the 12 o'clock position where sidetone is most deeply canceled. Rotating the control either side of the 12 o'clock position will increase sidetone levels.

Production Intercom, Inc. - P.O. Box 3247 - Barrington, IL 60011 - (847)381-5350 Fax (847)381-4360
ARCHITECTS SPECIFICATIONS

GQX-3102

The graphic equalizer shall be stereo (2 channels). Each channel shall consist of 31 bands centered on standard ISO frequencies at intervals of 1/3 octave and covering a frequency range of 50Hz to 20kHz. Individual bands shall be activated by linear slide faders with a 45mm travel, metal actuator shafts and a tactile center detent. The range of equalization per band shall be either ±6dB or ±12dB selected via a 2-position switch. The equalizer shall have a gain of unity with all sliders centered, and shall have a maximum in/out level of +4dB. Frequency response shall be ±0.25dB 10Hz to 20kHz. Hum and noise shall be at least -90dBa and SMPTE intermodulation distortion or THD shall be less than .01% at full output. Input impedance shall be 20k ohms balanced, 10k ohms unbalanced. Output impedance shall be 200 ohms. Inputs and outputs shall be active (transformerless) balanced type on both XLR, 1/4" phone jacks and barrier strip terminals. Individual filters shall be Wien-bridge type and connected in a summing circuit optimized for minimum filter interaction and constant bandwidth at any slider setting. Boost and cut characteristics shall be fully symmetrical, with the filter being electrically removed from the circuit in the center (flat) position. Individual filters shall be accurate to within 3% of indicated center frequency and shall be non-adjustable to insure long term accuracy. The equalizer shall also include an 18dB per octave high pass filter tunable from 45Hz to 200Hz, equipped with a bypass switch. A 2 color bargraph meter shall be employed to show overall output level and an LED indicator shall show overload conditions. Input gain shall be adjustable over-sensitivity to +6dB, and an overall EQ bypass switch shall be included. The equalizer shall weigh 13.8 lbs net and mount in a standard 19" rack using 3 spaces (5.25" high). The power requirement shall be 110-115VAC, 50-60Hz, 20W. The unit shall be an Ashly Audio GQX-3102.

Features:
- Detented Metal-Shaft Fader
- Precision Wien-bridge Filters for Accurate Response and Low Distortion
- Constant "Q" Design with Low Ripple and Accurate Response Near the "Flat" Setting
- Selectable 18dB or 6dB range
- Switchable-Tunable Low-Cut Filter
- 10 Position, 2 Color LED Level Meter plus Peak LED Indicators
- Balanced XLR, 1/4", and Barrier Strip Inputs
- Servo-Balanced XLR, 1/4", and Barrier Strip Outputs
- Rider Friendly
- 5-Year Worry-Free Warranty
### General Specifications GQX-3102

<table>
<thead>
<tr>
<th>INPUT</th>
<th>FILTERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type: Active Balanced</td>
<td>Type: Constant Q/Wave-Bridge</td>
</tr>
<tr>
<td>Impedance: 20k ohm</td>
<td>Plane: 2 X 34</td>
</tr>
<tr>
<td>Min. Level: 0dBa</td>
<td>Rectifiers: 1/2 W, Zener</td>
</tr>
<tr>
<td>MAX. Level: 0dBa</td>
<td>TolRENCE: 2%</td>
</tr>
<tr>
<td>OUTPUT</td>
<td>Range: 50 or 520</td>
</tr>
<tr>
<td>Type: 500m Ohm Balanced</td>
<td>Subsonic Filter: 180Hz, 8.2kHz</td>
</tr>
<tr>
<td>Min. Lead Impedance: 600 ohm</td>
<td>Power Requirements: 12VAC, 20-60Hz, 17W</td>
</tr>
<tr>
<td>Max. Level: 250W @ 8 ohm</td>
<td>Shipping Weight: 15 Lbs</td>
</tr>
<tr>
<td>Frequency Response: 50Hz-20kHz</td>
<td>Dimensions: 19&quot; x 5.25&quot; x 8.75&quot;</td>
</tr>
<tr>
<td>THD (20Hz-20kHz): 0.01% @ 100kHz</td>
<td>I/O Connectors: EIA, 1/4&quot;, and Barrier Strip</td>
</tr>
<tr>
<td>Output Noise (50Hz-20kHz): 52dBa</td>
<td></td>
</tr>
</tbody>
</table>

### Rear Panel GQX-3102

![Rear Panel Diagram]

### Applications:
- Churches
- Studios
- Concerts
- Dance/Night Clubs
- PA Systems
- Monitor Racks
- Auditoriums
- Lecture Halls
- Sports Stadiums
- Outdoor Festivals

---

Ashly manufactures a complete and comprehensive line of Graphic and Parametric Equalizers, Electronic Crossovers, Power Amplifiers, Compressor-Limiters, Mixers, and Amplifier Input Options. Please call, write or visit our web site for information on any of these Ashly Products.

Ashly Audio Inc., 847 Hodi Road, Webster, NY 14580-9103, Toll Free (800) 828-6308, Telephone (585) 872-0010, FAX (585) 872-0739

Internet: http://www.ashly.com, email: info@ashly.com

---

933 of 1217
ASHLY
GQX-3102
Graphic Equalizer
Manual Quick Guide

What plugs in where?.................................................................Page 4
What do the controls do?............................................................Page 6
Something isn't working?.........................................................Page 10
Want the warranty information?..............................................Page 11

Want more information?
Go to www.ashly.com
# Table Of Contents

1 INTRODUCTION .................................................. 3

2 UNPACKING .................................................... 3

3 AUDIO CONNECTORS AND CABLES .......................... 4
   3.1 Inputs .................................................. 4
   3.2 Servo-Balanced Output ............................... 4
   3.2 Grounding .............................................. 5

4 AC POWER ..................................................... 5

5 CONTROLS ..................................................... 6
   5.1 Gain ..................................................... 6
   5.2 High-Pass Filter ...................................... 6
   5.3 Equalization .......................................... 6
   5.4 EQ Bypass Switch ..................................... 6
   5.5 Range Switch .......................................... 6
   5.6 Level Meters .......................................... 6

6 TYPICAL APPLICATIONS ...................................... 6
   6.1 General Tone Control .................................. 6
   6.2 Feedback Control ...................................... 7
   6.3 Console Channel Equalization ....................... 7
   6.4 Large Room Equalization ............................ 7

7 DESIGN THEORY ................................................ 8

8 TROUBLESHOOTING TIPS .................................... 10

9 DIMENSIONS .................................................. 10

10 SPECIFICATIONS ........................................... 11

11 WARRANTY INFORMATION .................................. 11

12 SCHEMATICS .................................................. 12
1. INTRODUCTION

Congratulations on your purchase of an Ashly GQX series graphic equalizer. The GQX series equalizers are a second generation design including many refinements on our original GQ models. Lower noise and distortion, greater accuracy, and additional output options are the result. We continue using "Q" enhanced Wein bridge filters and interleaved summing for constant "Q", low ripple, and minimum filter interaction. A servo-balanced output stage simulates a true transformer output to allow interfacing with virtually any type of load.

2. UNPACKING

As a part of our system of quality control, every Ashly product is carefully inspected before leaving the factory to ensure flawless appearance. After unpacking, please inspect for any physical damage. Save the shipping carton and all packing materials, as they were carefully designed to reduce to minimum the possibility of transportation damage should the unit again require packing and shipping. In the event that damage has occurred, immediately notify your dealer so that a written claim to cover the damages can be initiated.

The right to any claim against a public carrier can be forfeited if the carrier is not notified promptly and if the shipping carton and packing materials are not available for inspection by the carrier. Save all packing materials until the claim has been settled.

-WARNING-
THIS APPARATUS MUST BE EARTHED
3. AUDIO CONNECTORS AND CABLES

Your QX series equalizer is provided with three different connector types: 1/4 inch stereo phone jacks, three pin XLR type connectors, and a terminal strip. These connectors will allow interfacing to most professional audio products. Inputs as well as servo-balanced outputs can be used balanced or unbalanced. When possible, we recommend balanced connections between all components in your system, as this eliminates ground-loop induced hum and noise.

3.1 Inputs

If inputs are used unbalanced, the signal should be on the (1) connection and the (-) connection must be tied to ground. A mono phone plug used as an unbalanced connection will automatically ground the ring of the jack which is the (-) connection. When using a stereo plug, XLR connector, or terminal strip for an unbalanced signal, the (-) input connection MUST be tied to ground, or loss of signal level may result.

3.2 Servo-Balanced Output

The Ashly servo-balanced output circuit is an active balanced output. This circuit maintains a constant output level (or difference voltage) between the (+) and (-) output terminals, regardless of either terminal being connected to ground as in an unbalanced output connection. This servo-balanced output has an advantage over conventional active balanced outputs in that the signal level is unchanged when either the (+) or the (-) output terminals are connected to ground. A conventional active balanced output would suffer a signal loss of 1/2 the output voltage (or -6dB) if one of the output terminals were grounded in an unbalanced connection.
Furthermore, if common-mode voltage (such as 60Hz noise voltage) gets induced on the output signal lines, the resulting 60Hz noise current into the servo-balanced circuit would be insignificant because the common-mode output impedance is high. A conventional active balanced output would cause significant noise current resulting in more noise.

Essentially, the servo-balanced output circuit behaves like a transformer balanced output because it maintains a constant level into balanced and unbalanced lines with a low differential impedance and a high common-mode impedance. The servo-balanced output also does not suffer from problems associated with output transformers such as low-frequency distortion, susceptibility to magnetic fields and poor frequency response.

3.3 Grounding

The terminal strip has two ground connections, one for input ground and one for chassis ground. The equalizer is shipped with a jumper strap connecting these two grounds. Normally, this strap should be left in place so the chassis and input grounds are connected. In a rackmount installation where the equalizer is connected to other equipment with unbalanced inputs or outputs and the rack itself provides a good electrical connection between the equalizer chassis and the other equipment, it may be desirable to remove this strap to isolate the input ground from chassis ground and avoid a ground loop.

Unless you have such an installation and have a hum problem you can’t solve by other means (ie: using balanced input and output connections), leave the ground jumper strap in place.

4. AC POWER

Your GQX equalizer should be connected to a standard 3-wire grounded electrical outlet supplying 120 Volts, 50-60 Hz (some export models are wired for 240 Volts, and are labeled as such). To reduce the risk of ground loop hum, connect all audio equipment to the same electrical power source. Removal of the ground pin is both unlawful and dangerous, as a potential shock hazard could result.

This unit will perform normally within an AC voltage range of 93 to 130 volts. Voltages less than this, as found in "brown-out" conditions, will reduce headroom and decrease power supply regulation. While this may affect performance, the equalizer will continue to function during a brown-out. In the event of a blown fuse, replace only with same type fuse. No user serviceable parts are inside the chassis. Overall power consumption is less than 25 watts.
5. CONTROLS

5.1 Gain
The gain control adjusts the overall gain of the equalizer when the EQ switch is "on". It is generally used to compensate for level changes due to the equalization process, but can also allow the equalizer to adjust overall system level and gain structure. Overall gain with this control is from +6dB to -∞.

5.2 High-Pass Filter
The high-pass filter can be used to supplement the frequency response achieved by the bandpass filters. It's function is to "roll off" the response below a given frequency to eliminate subsonic interference like wind noise, floor rumble, and microphone "pops". The rolloff frequency is adjustable between 141Hz and 280Hz on the 31-band models, and is fixed at 401Hz on the 15-band model.

5.3 Equalization
The individual equalization faders adjust the gain or loss at each filter frequency. There are 31 of these faders per channel on the GQX-3101 and GQX-3102 third octave models, and 15 faders per channel on the GQX-1502 two-thirds octave model. By adjusting a combination of faders, an overall frequency response can be developed and the physical position of the faders will give an approximate visual indication of this response.

5.4 EQ Bypass Switch
This switches the Graphic Equalization and gain adjustments. This way, the effect of any equalization can be compared to a "flat" response. This switch does not defeat the High-pass filter.

5.5 Range Switch
This switch selects the operating range of the individual equalization faders between 15dB and 6dB on the two 31 band models. The 15dB settings should be used when this much equalization is needed. The 6dB setting allows finer resolution on the fader settings.

5.6 Level Meters
On the GQX-3101 and GQX-3102 31 band models, a 10-segment, two color LED level meter indicates the output level of the equalizer. A Clip indicator LED on all models illuminates when any point in the equalizer signal path reaches a level within 3dB of clipping.

6. TYPICAL APPLICATIONS

6.1 General Tone Control
The graphic equalizer is a very useful device for general tone shaping because it is intuitive and easy to adjust. The visual reference provided by the slider position gives an approximate idea of the frequency response generated, with the lower frequencies on the left and higher frequencies on the right. To use the power of an equalizer effectively, you need to translate your idea of the tone you want to produce into a range of numerical frequencies. This is simple after a little practice. Here are a few references which are useful for starting points:
Very low bass (the “wind” in a kick drum, almost felt as much as heard -40Hz-80Hz.

The low register of a male voice - 200Hz

The low register of a female voice - 350Hz

Lower midrange (“warmth” frequencies) - 400Hz-1KHz

Upper midrange (“harshness”, snare drum “bite”, “hot” sound) - 2.5KHz-4KHz.

Sibilance (“ss” sounds, cymbal “sizzle”) - 8KHz-15KHz.

Try using these starting points as a guide when you want more or less of these types of sounds. Adjust by ear from there. It is always a good idea to remember that a little equalization usually works out much better than a lot, and that there are many audio problems which can not be solved with equalization alone.

6.2 Feedback Control

A graphic equalizer can be used to provide some control over moderate feedback problems, but does not have enough flexibility or resolution to handle severe situations. You will achieve the best results when you can eliminate one or two feedback points by setting one or two sliders for no more than a 6dB cut. Often you can find a feedback point by boosting sliders in succession to determine which frequency ranges contain the feedback modes, and then cutting those ranges. Be very careful in this process to avoid explosive feedback and possible system and hearing damage! If you find feedback points with many equalizer bands, remember that cutting every band may not help (all you will do is reduce system gain). The combination of a graphic equalizer for tone control and a parametric equalizer (such as the Ashly PEQ-571 or PEQ-572) for feedback control is highly recommended.

6.3 Console Channel Equalization

Many mixing consoles provide only simple equalization for individual channels. If your console has channel inserts, you can patch your graphic equalizer into a channel that’s being used for something important (like your lead singer) and use it to tailor the sound of this channel exactly the way you want.

6.4 Large Room Equalization

Large rooms tend to suffer from multiple reflections with long time delays, long reverberation times, and “ring-modes”, all of which lead to reduced intelligibility and a generally “muddy” sound. As sound travels long distances through the air, high frequencies are attenuated more than low frequencies. In general, large rooms benefit from some low frequency roll-off, high frequency boost, and attenuation of ring mode frequencies. As in the case of feedback control, a graphic equalizer can help reduce an isolated ring-mode or two, but a tunable narrow-band equalizer such as a parametric is more effective here.
7. DESIGN THEORY

While most graphic equalizers look very much the same, there are several important differences in the circuitry used to implement various designs.

Perhaps the major differences are in the filters. Some equalizers use a filter made of a capacitor, an inductor, and a resistor, or "RLC" filter. The advantage here is simplicity, but the real disadvantage is the inductor itself. An inductor is a coil of wire with a core of some sort. Inductors are susceptible to burn fields and they are large and expensive.

Other equalizers use the same basic approach, but replace the inductor with a "simulated inductor," which is actually a circuit comprised of an amplifier, a capacitor, and a couple of resistors. This adds parts but is less expensive than a real inductor. The problem with this approach is that simulation is less than ideal; it produces an inductor with high resistive loss resulting in poor curve shape when used in a filter.

Another problem with all these "RLC" designs is that large capacitors must be used for the lower frequency filters, limiting the choice to large, expensive non-polar types or electrolyte capacitors with poor audio performance. Also, when this filter type is combined with a potentiometer to adjust the equalization, the resistance of this pot affects the "Q" of the filter so that a little equalization produces a much broader curve than a lot of equalization.

The other filter approach is a true bandpass filter. This can be made with no inductors and more practical sized capacitors; the "Q" is easily set and remains constant, and the parts count is reasonable. There are several types of bandpass filters suitable for this job. Ashly uses a "Q" enhanced Wein-bridge filter. Because it is a "symmetrical" design using matched tuning components, the "Q" is easily set and is very stable.

Figure 7.1: Passive RLC Filter Design

Figure 7.2: Simulated Inductor Filter Design

Figure 7.3: Wein-Bridge Filter Design
In designing a graphic equalizer, a selection of filter sharpness must be made. More sharpness (higher Q) produces less filter overlap and tighter control over an individual band, but also causes "ripple" in the frequency response when many filters are boost or cut together to produce a flat response. We feel that the graphic equalizer's primary use is for "voicing" and tone control, and have set our filter sharpness to produce a maximum of 1dB ripple.

The summing system in a graphic equalizer is also important. Since there are a number of filters which combine to produce the overall response, it is important that the filters not interact (they WILL overlap, but the response of one filter should not modify the response of another). Ashly uses an "interleaved" summing system where every other filter uses the same summing amplifier so that adjacent filters never share the same drive and feedback signals. This allows the filters to maintain their natural response.

*On most graphic equalizers, frequency response ripple is produced by overly sharp filters. (13-band equalizer, all bands boosted 15dB)*

*Ashly's GQX graphic equalizers use slightly broader filters producing less ripple.*
8. TROUBLESHOOTING TIPS

8.1 No Audio Output
Check AC power - is the pilot light on?
Check in/out connections - are they reversed?
Are you sure you have an input signal?

8.2 EQ Controls Don’t Work
Is the master EQ switch in?
The lowest and highest frequency sliders may be beyond the range of the program material or speakers and may produce little or no audible effect.

8.3 Peak Light Flashing or Stays On All the Time
If the peak light flashes, the signal level to the equalizer is too high. Turn down the gain. If it is on all the time, disconnect the input and output cables. If it is still on, the unit must be returned for service.

8.4 Distorted Sound
This will only be caused by too much signal which will show on the Clip LED. If the LED is not flashing, there is an overload somewhere else in the signal path. Adjust the relative gain of each component in your chain to keep everything at a comfortable level.

8.5 Excessive Hum or Noise
Hum will usually be caused by a ground loop between components. Try using the suggested balanced input and output hook-ups if the other pieces of equipment used in conjunction with your equalizer have balanced inputs and outputs.

Noise (excessive hiss) can be caused by insufficient drive signal. Make sure you are sending a nominal 0 dBu line level signal to the equalizer. Most noise problems occur because gain is applied to audio signals too late in the chain. For best performance, apply gain to individual source signals as early as possible, like at the mixer input section. As gain increases, it also boosts the noise content of that signal. Any cumulative noise built up in a mixed signal will only be increased by using an equalizer as a gain device, so make every attempt to operate the equalizer with as little gain as possible.

Note: Unshielded cables, improperly wired connections, and cable with broken strands (shorts, etc.) are the most common problems. Make sure you use good quality cable with connectors soldered firmly on the correct pin. When in doubt, get in touch with your Ashly dealer, or call the Ashly service department at 800-828-6308.

9. DIMENSIONS

---

ASHLY
10. SPECIFICATIONS

Model ....................... GQX1502 .................. GQX3101/3102

Input
Type ...................... Active Balanced .......... Active Balanced
Impedance ............... 20kΩ ...................... 20kΩ
Max. Level ............... +23dBu ................... +23dBu
Connectors ............. 1/4" Phone Jack, XLR & Barrier Strip

Output
Type ...................... Servo-Balanced .......... Servo-Balanced
Source Impedance ........ 200Ω ...................... 200Ω
Min. Load Impedance .... 600Ω ...................... 600Ω
Max. Level ............... +23dBu ................... +23dBu
Connectors ............. 1/4" Phone Jack, XLR & Barrier Strip

Overall
Frequency Response ........ ±25dB ...................... ±25dB
Total Harmonic Distortion .... <0.1%@±20dBu .......... <0.1%@±20dBu
IM Distortion (SMpte) ........ <0.1%@±20dBu .......... <0.1%@±20dBu
Output Hum and Noise (unweighted) .......... <96dBu ............... <96dBu
Channel Separation .......... >85dB @ 1kHz ........... >95dB @ 1kHz
Gain Control .............. --- to +6dB .......... --- to +6dB
(EQ in, all faders flat, 20Hz-20kHz unless otherwise noted)

Filters
Type ..................... Constant Q/Wein Bridge
Number ................. 2x15 .................... 1x31 / 2x31
Bandwidth .............. 2/3 octave ............. 1/3 octave
Tolerance .............. ±3% ..................... ±3%
Range ................. ±15dB ................... ±6 or ±15 dB
Subsonic Filter ........ 18dB/octave @ 40Hz ........ 12dB/oct.14-280Hz

Power Requirements
Nominal Voltage ........ 120VAC, 50-60Hz (240VAC available)
Minimal Voltage ......... 93VAC
Power ..................... 24W .................... 24W

Shipping Weight ......... 10lbs .................. 10lbs/15lbs

Dimensions ................... 19"Lx3.5"(5.25")Hx6"D

II. WARRANTY INFORMATION

Thank you for your expression of confidence in Ashly products. The unit you have just purchased is protected by a five-year warranty. To establish the warranty, be sure to fill out and mail the warranty card attached to your product. Fill out the information below for your records.

Model Number __________________________ Serial Number __________________
Dealer ______________________________ Date of Purchase __________________
Dealer’s Address ________________________ __________________________
Dealer’s Phone ______________________ Salesperson __________________
Figure 12.2: GQX 1502 Schematic Diagram
Performance: LS-3 Series Talkback Loudspeaker Stations operate in three different modes: 1) press-to-talk/release-to-listen, using the loudspeaker as both microphone and speaker (as shown in the photo above); 2) simultaneous talk and listen (full duplex) when an LSM-1 gooseneck microphone is plugged into the front panel, and; 3) as a head or hand set station when either is plugged into the front panel XLR. Modes 2 and 3 are invoked automatically when the unit senses the presence of the microphone, headset, or handset.

No switching is required. A 3 Watt audio amplifier and quality loudspeaker provide highly intelligible, full-range reproduction. Front panel controls provide for turning the microphone on or off (the gooseneck microphone or the microphone in the headset/handset); a volume control which regulates the level of the loudspeaker or the earphone in the head/or handset; a combination signal lamp/signal button; a 3-position on-off-on talk switch, a recessed control for setting the level of the gooseneck microphone to be heard in the loudspeaker (sidetone); a recessed control for setting the loudspeaker volume in an override mode, and; an LED to indicate when override has been remotely activated. LS-3 stations include unique circuitry which permits the front panel controls to be overridden from a remote source when the remote source is fitted with an OGON override generator card. Volume can be turned up or down, and the LS-3 switched from Off to Talk or Listen. Typically this feature is used to restore volume at an LS-3 in a remote location where it may have been turned down or off, but other combinations are also possible. The override mode is set up by removing links on the PC board except for the volume level which is established by setting the front panel recessed control marked Override.

Other versions: Pictured above is the LS-3T which includes a back box and may be used on a table-top or be surface mounted on a wall via its rear panel key-hole slots. The unit is also available as a plain LS-3, without the back box, for surface mounting in a 6-gang suneye wall electrical box. A 19" rack-mount version is referred to as an LS-3R. All these versions are also available with a rotary switch for selecting one to nine different circuits. These are the LS-3M, LS-3MT and LS-3MR.

Durability: The heavy aluminum front plate resists bending and twisting. The lever switches are of best American manufacture. The signal lamp button is Swiss made and rated for millions of cycles.

Value: Multi-mode capability, full-duplex, hands-free operation (without feedback) and unique override facility all come at a price equivalent to ordinary loudspeaker stations.

Compatibility: LS-3's are compatible with Clear-Com® and other popular headset intercom systems. Override capability is limited to operation within a Production Intercom system.

Technical specifications: (Subject to change without notice)

Power required: 24 30 VDC 160 mA
(depending upon volume level)
Microphone: 200 600 unbalanced
Audio Output: Speaker - 3W max. 96dB SPL at 1 m.
Headset - 8 to 4K
Line Bridging Impedance: Audio - 200 , DC - 5K
Size: (LS-3 Only) [W x H x D] 11.6x4.5x1.8 in.
(294.6x115.6x45.7 mm)
Weight: 1.25 lbs. (.7 Kg)

Production Intercom Inc.
P.O. Box 3247, Barrington, IL 60011-3247
Voice: (847) 381-5360 Fax: (847) 381-4363 Sales & Technical Assistance (US & Can): (800) 562-5872
email: support@bellpack.com Web: bellpack.com

Printed in USA.

951 of 1217
Operating Instructions

LS-3
Talkback
Loudspeaker Stations

Note: Connection instructions for various LS-3 models are on a separate sheet.

Three Operating Modes

You have purchased the most sophisticated Talkback loudspeaker station available. It can be used, without modification, in any one of three modes. In all modes the signal light button is operative, and the volume control adjusts the level of either the loudspeaker or the headphone/handset earspeaker. The LS-3 detects the mode of operation which you have chosen, and automatically adjusts itself.

1. Press-to-Talk Mode:
As the term implies, the operator merely presses the Off/Listen/Talk switch to its Talk position to communicate with other stations on the system. The loudspeaker acts as a microphone in this position. The spring-loaded switch will return to the Listen position when released. The Off/Listen/Talk switch will mute the loudspeaker when placed in the Off position. The signal lamp will still operate with this switch turned Off.

2. Headset/Handset Mode:
Plugging a headset or telephone handset into the front panel 4-pin XLR will cause the LS-3 to function exactly as a 'beltpack' or headset station. The LS-3 detects the presence of the headset or handset, and automatically disconnects the loudspeaker. The Microphone On/Off switch is used to mute the microphone in the headset or handset. The Off/Listen/Talk switch should be left in the Listen position in this mode.

3. Full Duplex, Hands-free Mode:
When an LSM-1 or 2 gooseneck microphone is plugged into the front panel 4-pin XLR, the LS-3 detects this and shifts to its full duplex, hands-free mode. The gooseneck microphone and the built-in loudspeaker operate simultaneously, with none of the 'clipping off' of initial consonants, as happens in a VOX operated circuit. The operator may speak and listen at the same time, without any switching. The very high 'sidetone rejection' performance of Production Intercom systems permits this use without feedback, and at surprisingly high levels. For best performance in this mode, the recessed sidetone control (accessible through the front panel) must be optimized. See the section below on Sidetone Adjustment. Only one LS-3 may be used in this mode within any one acoustic environment. Attempting to use more than one without acoustic isolation may result in serious feedback problems. In a noisy environment, the Microphone On/Off switch may be used to mute the output of the microphone to other stations. A hand-held push-to-talk microphone (HH5) may be substituted for the gooseneck microphone to obtain the same results.

Production Intercom Inc.
P.O. Box 3247, Barrington, IL 60011-3247
Voice: (847) 381-5350 Fax: (847) 381-4369 Sales & Technical Assistance (US & Can): (800) 562-5872
E-mail: support@bellpack.com Web: bellpack.com

Printed in U.S.A.

Page 952 of 1217
Signal Lamp Operation

The signal lamp button, when pressed, lights itself and all other signal lamps in stations on the same communications circuit. The signal lamp circuit may also be modified to provide audible annunciation, or to activate a relay. A Technical Note is available for these modifications. The signal circuit is not affected by the Off/Talk/Listen switch.

'Sidetone'

Sidetone is simply the sound of your own voice, heard in your own ear, when referring to a headset or telephone handset. When the LS-3 is used in its full duplex mode, we are expanding that definition to include the sound of your own voice, picked up by the gooseneck microphone, and reproduced by the LS-3's loudspeaker.

Unlike 'belt packs' and headset stations, the sidetone control in an LS-3 is automatic when a headset or hand set is connected to the unit. If the sidetone control (accessible through the front panel) is only active when the station is being used in its full duplex, hands-free mode, with an LSM-1 or 3 gooseneck microphone plugged in. In this mode, sidetone adjustment is critical to best performance. It is the reduction of sidetone to near zero which allows the microphone and the loudspeaker to be active simultaneously without producing feedback. Before plugging in the gooseneck microphone, adjust the volume to a comfortable level when listening to other stations. Next turn Off as disconnect all the other stations in the system. Do not adjust the volume. Plug in the gooseneck microphone and switch the Mic. switch to On. Adjust the sidetone control with a small screwdriver while tapping lightly on the microphone. The quietest position will be a 'null point' somewhere near the center of the control's rotation (near 12 o'clock).

Override Control Feature

LS-3's are equipped with a receive circuit which responds to a control tone generated elsewhere in the system by an OG904 Override Generator module. An OG904 can be fitted into any Production Intercom station which can be used with a headset, handset, or microphone. This includes 'belt packs', headset stations, master stations, or other LS-3's. The override tone may be triggered by a separate switch added to any of these devices, or by their microphone On/Off switch.

When the LS-3 detects the control tone, it will switch to a predetermined mode, regardless of the position of any of its front panel controls. The volume may be raised or lowered. The status may be shunted from Off to Listen. The Talk function may be disabled.

Typical among applications for this feature are: restoring volume in a dressing room where the front panel control has been turned down; muting a station when communications should not be heard at that location, and; muting a second LS-3 in a nearby location while the first is sending.

There are five modes of control, determined by the position of the recessed Override level control accessible through the front panel, and adding or removing links on the rear PC board.

Mode 0: No override function
Mode 1: Switch to preset override volume level
Mode 2: As mode 1, plus shunts Off/Listen/Talk from Off to Listen
Mode 3: As mode 1, plus shunts Off/Listen/Talk from any position to Listen.
Mode 4: As mode 1, plus shunts Off/Listen/Talk from Talk to Listen
As supplied from the factory, your LS-3 is set for Mode 3.

The mode is established by links on the rear PC board.

Set the mode as follows:

<table>
<thead>
<tr>
<th>MODE</th>
<th>Link 1</th>
<th>Link 2</th>
<th>Link 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Cut</td>
<td>Cut</td>
<td>Cut</td>
</tr>
<tr>
<td>1</td>
<td>Make</td>
<td>Cut</td>
<td>Cut</td>
</tr>
<tr>
<td>2</td>
<td>Make</td>
<td>Make</td>
<td>Cut</td>
</tr>
<tr>
<td>3</td>
<td>Make</td>
<td>Make</td>
<td>Make</td>
</tr>
<tr>
<td>4</td>
<td>Make</td>
<td>Cut</td>
<td>Make</td>
</tr>
</tbody>
</table>

Compatibility with Clear-Com®

Production intercom stations are compatible with Clear-Com® and other popular systems operating on an unbalanced line. A Production intercom station added to a Clear-Com® system will operate as its Clear-Com® equivalent. Due to differences in bridging impedances, you may not be able to achieve sufficient sidetone rejection in an LS-3 (connected to a Clear-Com® system) to use the LS-3 in its full duplex hands-free mode.
This Important Product Information Guide contains use, safety, handling, disposal and recycling, regulatory, and software license information, as well as the limited warranty for your Mac Pro. Retain documentation for future reference.

For a downloadable version of the Mac Pro Quick Start Guide and the latest version of this Important Product Information Guide, visit support.apple.com/manuals/macpro.

Port Information

- **Line out port**
  Connect Mac Pro to a receiver that has an optical audio input port using a TOSLINK cable, or connect to external accessories using an auxiliary cable with a standard 3.5 mm connector.

- **Headphone port**
  Connect headphones or headsets with a standard 3.5 mm connector.

- **Four high-speed USB 3.0 ports**
  Connect your iOS and other USB devices.

- **Six Thunderbolt 2 ports**
  Connect Thunderbolt-compatible devices for high-speed data transfer, or connect a display or video adapter that uses Thunderbolt or Mini DisplayPort.

- **Two Gigabit Ethernet ports**
  Connect to a high-speed 10/100/1000Base-T Ethernet network, connect a DSL or cable modem, or connect to another computer and transfer files.

- **HDMI port**
  Connect Mac Pro to the HDMI port of a high-definition TV using an HDMI cable.

Important Safety and Handling Information

**WARNING:** Failure to follow these safety instructions could result in fire, electric shock, or other injury or damage to Mac Pro or other property. Read all safety information below before using Mac Pro.

**Proper handling**
Handle your Mac Pro with care. It is made of metal, plastic, and sensitive electronic components. Operate your Mac Pro on a non-carpeted, solid, and stable work surface that allows for adequate air circulation under, above, and around the computer.

Do not place or store items on top of your Mac Pro.

**Water and wet locations**
Keep your Mac Pro away from sources of liquid and/or humidity, such as drinks, washbasins, bathtubs, and shower stalls. Protect your Mac Pro from moisture, dampness or wet weather, such as rain, snow, and fog.

**Power**
Unplug the power cord (by pulling the plug, not the cord) and disconnect all connected cables if any of the following conditions exist:
- You want to add memory or SSDs
- The power cord or plug becomes frayed or otherwise damaged
- You spill something into or onto the housing
- Your Mac Pro is exposed to rain or excess moisture
- Your Mac Pro has been dropped or the housing has been damaged
- You suspect that your Mac Pro needs service or repair
- You want to clean the housing (use only the recommended procedure described later in this document)

**Important:** The only way to turn off power completely is to unplug the power cord. Make sure at least one end of the power cord is within easy reach so that you can unplug your Mac Pro when you need to.

**Electrical rating**
- **Voltage:** 100 to 240 V AC
- **Current:** 6 A, maximum
- **Frequency:** 50 to 60 Hz

**WARNING:** Your AC cord has a three-wire grounding plug (a plug that has a third grounding pin). This plug fits only a grounded AC outlet. If you are unable to insert the plug into a grounded AC outlet, contact a licensed electrician to replace it with a properly grounded AC outlet.

**Hearing loss**
Listening to sound at high volumes may damage your hearing. Background noise, as well as continued exposure to high-volume levels, can make sounds seem quieter than they actually are. Use only compatible earbuds, headphones, or headsets with your Mac Pro. Turn on the audio and check the volume before inserting anything into your ear. For more information about hearing loss, see www.apple.com/sound.

**WARNING:** The headphone port ( headphone port ( headphone port ( + ) and the line out port ( ) are located next to each other. Plug your headphones only into the headphone port and not the line out port. If you plug your headphones into the line out port by mistake, the sound output will be unpleasantly or startlingly loud.

**Medical conditions**
If you have a medical condition that you believe could be affected by using Mac Pro (for example, seizures, blackouts, eyestrain, or headaches), consult with your physician prior to using Mac Pro.
High-consequence activities This Mac Pro is not intended for use where the failure of the computer could lead to death, personal injury, or severe environmental damage.

Operating environment Operating your Mac Pro outside these ranges may affect performance:

Operating temperature: 50° to 95° F (10° to 35° C)
Storage temperature: -4° to 113° F (-20° to 45° C)
Relative humidity: 5% to 90% (noncondensing)
Operating altitude: 0 to 16,400 feet (0 to 5000 meters)

Do not operate your Mac Pro in areas with significant amounts of debris, dust, or ash from cigarettes, cigars, ashtrays, stoves, or fireplaces.

Turning on your Mac Pro Never plug in your Mac Pro unless all of its internal and external parts are in place. Operating your Mac Pro when parts are missing may be dangerous and may damage your Mac Pro.

Carrying your Mac Pro Before you lift or reposition your Mac Pro, verify that the enclosure release switch located next to the I/O panel is in the locked position. Shut down your Mac Pro and disconnect all cables and cords connected to it before carrying it. To lift your Mac Pro, hold it with one hand on the bottom.

Using connectors and ports Never force a connector into a port. When connecting a device, make sure the port is free of debris, that the connector matches the port, and that you have positioned the connector correctly in relation to the port.

Storing your Mac Pro If you are going to store your Mac Pro for an extended period of time, keep it in a cool location (ideally, -4° to 113° F or -20° to 45° C).

Changing Memory and SSDs The enclosure release should always be in the locked position except when removing the housing. When the housing is replaced after changing memory or the SSD, be sure to put the lock back in the locked position. Failure to do so may result in physical damage to your Mac Pro from falling because the case lock switch was not locked when Mac Pro was lifted using the top handle.

Do Not Make Repairs Yourself Don’t open your Mac Pro except to install memory and solid state drives (SSD), and don’t attempt to repair your Mac Pro by yourself. Your Mac Pro doesn’t have any user-serviceable parts, except for memory and SSDs. Please follow instructions provided by Apple in memory and SSD kits. If your Mac Pro needs service, contact an Apple Authorized Service Provider or Apple for service.

If you open your Mac Pro or install items other than memory and SSDs, you risk damaging your equipment. Such damage isn’t covered by the limited warranty on your Mac Pro. You can find more information about getting service at www.apple.com/support/macpro/service/faq.

WARNING: Never push objects of any kind into this product through the ventilation openings in the housing. Doing so may be dangerous and damage your computer.

Cleaning your Mac Pro
Follow these guidelines when cleaning the outside of your Mac Pro and its components:

• Shut down your Mac Pro and disconnect all cables.
• Use a damp, soft, lint-free cloth to clean the exterior of your Mac Pro. Avoid getting moisture in any openings. Do not spray liquid directly on your Mac Pro.
• Don’t use aerosol sprays, solvents, or abrasives.

Understanding Ergonomics
Here are some tips for setting up a healthy work environment.

Keyboard
When you use the keyboard, your shoulders should be relaxed. Your upper arm and forearm should form an approximate right angle, with your wrist and hand in roughly a straight line.

Change hand positions often to avoid fatigue. Some computer users might develop discomfort in their hands, wrists, or arms after intensive work without breaks. If you begin to develop chronic pain or discomfort in your hands, wrists, or arms, consult a qualified health specialist.

Mouse
Position the mouse at the same height as the keyboard and within a comfortable reach.

Chair
An adjustable chair that provides firm, comfortable support is best. Adjust the height of the chair so your thighs are horizontal and your feet are flat on the floor. The back of the chair should support your lower back (lumbar region). Follow the manufacturer’s instructions for adjusting the backrest to fit your body properly.

You might have to raise your chair so that your forearms and hands are at the proper angle to the keyboard. If this makes it impossible to rest your feet flat on the floor, you can use a footrest with adjustable height and tilt to make up for any gap between the floor and your feet. Or you can lower the desktop to eliminate the need for a footrest. Another option is to use a desk with a keyboard tray that’s lower than the regular work surface.

Display
Arrange the display so that the top of the screen is slightly below eye level when you’re sitting at the keyboard. The best distance from your eyes to the screen is up to you, although most people seem to prefer 18 to 28 inches (45 to 70 cm).
Position the display to minimize glare and reflections on the screen from overhead lights and nearby windows. The stand lets you set the display at the best angle for viewing, helping to reduce or eliminate glare from lighting sources you can't move.

More information about ergonomics is available on the web: www.apple.com/about/ergonomics

Apple and the Environment
At Apple, we recognize our responsibility to minimize the environmental impacts of our operations and products. For more information, go to www.apple.com/environment.

Learning More, Service, and Support
If you need service, contact Apple or take your Mac Pro to an Apple Authorized Service Provider. You can find more information about your Mac Pro through Help Center, online resources, System Information, and Apple Hardware Test.

Help Center
You can often find answers to your questions, as well as instructions and troubleshooting information, in Help Center on your Mac. Click the Finder icon, click Help in the menu bar, and choose Help Center.

Online Resources
For online service and support information, go to www.apple.com/support and choose your country from the pop-up menu. You can search the AppleCare Knowledge Base, check for software updates, or get help from Apple's discussion forums.

System Information
To get information about your Mac Pro, use System Information. It shows you what hardware and software is installed, the serial number and operating system version, how much memory is installed, and more. To open System Information, choose Apple () > About This Mac from the menu bar and then click More Info.

Apple Hardware Test
You can use the Apple Hardware Test (AHT) application to help determine if there’s a problem with one of the computer's components, such as the memory or processor.

To use Apple Hardware Test: Disconnect all external devices from your computer, except the display, keyboard, and mouse. If you have an Ethernet cable connected, disconnect it. Restart your computer while holding down the D key. When the AHT chooser screen appears, select the language for your location. Press the Return key or click the right arrow button. When the AHT main screen appears (after about 45 seconds), follow the onscreen instructions. If AHT detects a problem, it displays an error code. Make a note of the error code before pursuing support options. If AHT doesn't detect a hardware failure, the problem might be software related.

Important: If Apple Hardware Test doesn't appear after restarting, hold down the Command (⌘), Option, and D keys and restart the computer to access Apple Hardware Test from the Internet. Be sure to reconnect your Ethernet cable. Your computer must be connected to a network that has access to the Internet.

AppleCare Service and Support
Your Mac Pro comes with 90 days of technical support and one year of hardware repair warranty coverage at an Apple Retail Store or an Apple-authorized repair center, such as an Apple Authorized Service Provider. You can extend your coverage by purchasing the AppleCare Protection Plan. For information, visit www.apple.com/support/products or visit the website address for your country listed later in this section.

If you need assistance, AppleCare telephone support representatives can help you with installing and opening applications, and troubleshooting. Call the support center for your country.

Your 90 days of complimentary telephone support begins on the date of purchase.

United States: 1-800-275-2273
www.apple.com/support

Australia: (61) 1-300-321-456
www.apple.com/au/support

Canada: 1-800-263-3394
(English) www.apple.com/ca/support
(French) www.apple.com/ca/fr/support

Ireland: (353) 1850 946 191
www.apple.com/ie/support

New Zealand: 00800-7666-7666
www.apple.com/nz/support

United Kingdom: (44) 0844 209 0611
www.apple.com/uk/support

Telephone numbers are subject to change, and local and national telephone rates may apply. A complete list is available on the web: www.apple.com/support/contact/phone_contacts.html
Regulatory Compliance Information

FCC Compliance Statement
This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference that may cause undesired operation. See instructions if interference to radio or television reception is suspected.

Radio and Television Interference
This computer equipment generates, uses, and can radiate radio-frequency energy. If it is not installed and used properly—that is, in strict accordance with Apple's instructions—it may cause interference with radio and television reception.

This equipment has been tested and found to comply with the limits for a Class B digital device in accordance with the specifications in Part 15 of FCC rules. These specifications are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

You can determine whether your computer system is causing interference by turning it off. If the interference stops, it was probably caused by the computer or one of the peripheral devices.

If your computer system does cause interference to radio or television reception, try to correct the interference by using one or more of the following measures:

- Turn the television or radio antenna until the interference stops.
- Move the computer to one side or the other of the television or radio.
- Move the computer farther away from the television or radio.
- Plug the computer into an outlet that is on a different circuit from the television or radio. (That is, make certain the computer and the television or radio are on circuits controlled by different circuit breakers or fuses.)

If necessary, consult an Apple Authorized Service Provider or Apple. See the service and support information that came with your Apple product. Or consult an experienced radio/television technician for additional suggestions.

Important: Changes or modifications to this product not authorized by Apple Inc. could void the EMC compliance and negate your authority to operate the product.

This product has demonstrated EMC compliance under conditions that included the use of compliant peripheral devices and shielded cables (including Ethernet network cables) between system components. It is important that you use compliant peripheral devices and shielded cables between system components to reduce the possibility of causing interference to radios, television sets, and other electronic devices.

Responsible party (contact for FCC matters only):
Apple Inc. Corporate Compliance
1 Infinite Loop, MS 91-1EMC
Cupertino, CA 95014

Wireless Radio Use
This device is restricted to indoor use when operating in the 5.15 to 5.25 GHz frequency band.

Exposure to Radio Frequency Energy
The radiated output power of the computer is below the FCC and EU radio frequency exposure limits. Nevertheless, it is advised to use the wireless equipment in such a manner that the potential for human contact during normal operation is minimized.

FCC Bluetooth® Wireless Compliance
The antenna used with this transmitter must not be colocated or operated in conjunction with any other antenna or transmitter subject to the conditions of the FCC Grant.

Canadian Compliance Statement
This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme aux normes CNR exemptes de licence d'Industrie Canada. Le fonctionnement est soumis aux deux conditions suivantes : (1) cet appareil ne doit pas provoquer d'interférences et (2) cet appareil doit accepter toute interférence, y compris celles susceptibles de provoquer un fonctionnement non souhaité de l'appareil.

Bluetooth Industry Canada Statement
This Class B device meets all requirements of the Canadian interference-causing equipment regulations.

Cet appareil numérique de la Class B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Industry Canada Statement
CAN ICES-3 (B)/NMB-3(B).
This device complies with RSS 210 of Industry Canada.
European Compliance Statement
This product complies with the requirements of European Directives 2006/95/EC, 2004/108/EC, and 1999/5/EC.

Europe–EU Declaration of Conformity

Magyar
Alulírott, Apple Inc. nyilatkozom, hogy a Mac Pro megfelel a vonatkozó alapvető követelményeknek és az 1999/5/EC irányelv egyéb előírásainak.

Malti
Hawnhekk, Apple Inc., jiddikjara li dan Mac Pro jikkonforma mal-htigijiet essenzjali u ma provvedimenti ohraj releventi li hemm fid-Direttiva 1999/5/EC.

Nederlands
Hierbij verklaart Apple Inc. dat het toestel Mac Pro in overeenstemming is met de essentiële eisen en de andere bepalingen van richtlijn 1999/5/EG.

Norsk
Apple Inc. erklærer herved at dette Mac Pro-apparatet er i samsvar med de grunnleggende kravene og øvrige relevante krav i EU-direktivet 1999/5/EF.

Polski
Nieiniejszym Apple Inc. oświadcza, że ten Mac Pro są zgodne z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 1999/5/EC.

Português
Apple Inc. declara que este dispositivo Mac Pro está em conformidade com os requisitos essenciais e outras disposições da Directiva 1999/5/EC.

Română
Prin prezenta, Apple Inc. declară că acest aparat Mac Pro este în conformitate cu cerințele esențiale și cu celelalte prevederi relevante ale Directivei 1999/5/CE.

Slovensko
Apple Inc. izjavlja, da je ta Mac Pro skladne z bistvenimi zahtevami in ostalimi ustreznimi določili direktive 1999/5/ES.

Slovenščina
Apple Inc. izjavlja, da je toto Mac Pro skladno z bistvenimi zahtevami in ostalimi ustreznimi določili direktive 1999/5/ES.

Suomi
Apple Inc. vakuuttaa täten, että tämä Mac Pro spílha základné požiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.

Suomi
Apple Inc. vakuuttaa täten, että tämä Mac Pro spílha základné požiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.

Svenska
Härmed intygar Apple Inc. att denna Mac Pro står i överensstämme med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.

A copy of the EU Declaration of Conformity is available at:
www.apple.com/euro/compliance

This device can be used in the European Community.

European Community Restrictions
This device is restricted to indoor use in the 5150 to 5350 MHz frequency range.
Japan VCCI Class B Statement

この装置は、クラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。取扱説明書に従って正しい取り扱いをして下さい。VCCI-B

本製品は、EMC基準の周辺機器およびシステムコンポーネント間にシールドケーブル（イーサネットネットワークケーブルを含む）が使用されている状況で、EMC基準が保証されています。ラジオ、テレビ、およびその他の電子機器への干渉が発生する可能性を低減するため、EMC基準の周辺機器およびシステムコンポーネント間にシールドケーブルを使用することが重要です。

重要：Appleの許可を得ることなく本製品に変更または変装を加えると、電磁調和性（EMC）および無線に準拠しない製品を操縦するための許可を取り消されるおそれがあります。

External USB Modem Information

When connecting your Mac Pro to the phone line using an external USB modem, refer to the telecommunications agency information in the documentation that came with your modem.

ENERGY STAR® Compliance

As an ENERGY STAR® partner, Apple has determined that standard configurations of this product meet the ENERGY STAR® guidelines for energy efficiency. The ENERGY STAR® program is a partnership with electronic equipment manufacturers to promote energy-efficient products.

Reducing energy consumption of products saves money and helps conserve valuable resources. This computer is shipped with power management enabled with the computer set to sleep after 10 minutes of user inactivity. To wake your computer, click the mouse or press any key on the keyboard.

For more information about ENERGY STAR®, visit:
www.energystar.gov

Russia, Kazakhstan, Belarus

EAC
Disposal and Recycling Information

This symbol indicates that this product and/or battery should not be disposed of with household waste. When you decide to dispose of this product and/or its battery, do so in accordance with local environmental laws and guidelines.

For information about Apple’s recycling program, recycling collection points, restricted substances and other environmental initiatives, visit www.apple.com/environment.

Battery Disposal Information

Dispose of batteries according to your local environmental laws and guidelines.

China Battery Statement

警告：不要刺破或焚烧。该电池不含水银。

Taiwan Battery Statement

警告：請勿戳刺或焚燒。此電池不含汞。

Türkiye

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Brasil—Informações sobre descarte e reciclagem

O símbolo indica que este produto e/ou sua bateria não devem ser descartadas no lixo doméstico. Quando decidir descartar este produto e/ou sua bateria, faça-o de acordo com as leis e diretrizes ambientais locais. Para informações sobre substâncias de uso restrito, o programa de reciclagem da Apple, pontos de coleta e telefone de informações, visite www.apple.com/br/environment.

Turkey

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Brazil—Informações sobre descarte e reciclagem

The symbol above means that according to local laws and regulations your product and/or its battery shall be disposed of separately from household waste. When this product reaches its end of life, take it to a collection point designated by local authorities. The separate collection and recycling of your product and/or its battery at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment.

Türkiye

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Brazil—Informações sobre descarte e reciclagem

The symbol above means that according to local laws and regulations your product and/or its battery shall be disposed of separately from household waste. When this product reaches its end of life, take it to a collection point designated by local authorities. The separate collection and recycling of your product and/or its battery at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment.

Türkiye

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

China Disposal Information

Dispose of this product according to your local environmental laws and guidelines.

Taiwan Disposal Information

廢電池請回收

China Recycling Information

For information about Apple’s recycling program, recycling collection points, restricted substances and other environmental initiatives, visit www.apple.com/environment.

Turkey
türkçe

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Brazil—Informações sobre descarte e reciclagem

O símbolo indica que este produto e/ou sua bateria não devem ser descartadas no lixo doméstico. Quando decidir descartar este produto e/ou sua bateria, faça-o de acordo com as leis e diretrizes ambientais locais. Para informações sobre substâncias de uso restrito, o programa de reciclagem da Apple, pontos de coleta e telefone de informações, visite www.apple.com/br/environment.

Brazil—Informações sobre descarte e reciclagem

O símbolo indica que este produto e/ou sua bateria não devem ser descartadas no lixo doméstico. Quando decidir descartar este produto e/ou sua bateria, faça-o de acordo com as leis e diretrizes ambientais locais. Para informações sobre substâncias de uso restrito, o programa de reciclagem da Apple, pontos de coleta e telefone de informações, visite www.apple.com/br/environment.

Brazil—Informações sobre descarte e reciclagem

O símbolo indica que este produto e/ou sua bateria não devem ser descartadas no lixo doméstico. Quando decidir descartar este produto e/ou sua bateria, faça-o de acordo com as leis e diretrizes ambientais locais. Para informações sobre substâncias de uso restrito, o programa de reciclagem da Apple, pontos de coleta e telefone de informações, visite www.apple.com/br/environment.
Software License Agreement
Use of Mac Pro constitutes acceptance of the Apple and third-party software license terms found at:
www.apple.com/legal/sla

Apple One-Year Limited Warranty Summary
Apple warrants the included hardware product and accessories against defects in materials and workmanship for one year from the date of original retail purchase. Apple does not warrant against normal wear and tear, nor damage caused by accident or abuse. To obtain service call Apple, visit an Apple owned retail store or an Apple authorized service provider—available service options dependent on country in which service is requested and may be restricted to original country of sale. Call charges and international shipping charges may apply depending on location. Subject to the full terms and detailed information on obtaining service available at www.apple.com/legal/warranty and www.apple.com/support, if you submit a valid claim under this warranty, Apple will either repair, replace, or refund your computer at its own discretion. Warranty benefits are in addition to rights provided under local consumer laws. You may be required to furnish proof of purchase details when making a claim under this warranty.

For Australian Consumers: Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure. Apple Pty Ltd, PO Box A2629, Sydney South NSW 1235. Tel: 133-622.

For Brazilian Consumers: Warranty benefits are in addition to rights provided under local consumer laws, except for the 1-year warranty that already comprises the full term of legal warranty provided by the Brazilian consumer defense code/regulations.
Magic Trackpad
Quick Start

Your wireless Apple Magic Trackpad uses Bluetooth® technology to connect to your Mac and comes with two AA batteries installed.

Read these instructions to update your software, learn about the indicator light, pair and use your trackpad, and replace the batteries.

Updating Your Software
To use your Apple Magic Trackpad and all its features, update your Mac to Mac OS X version 10.6.4 or later, and then install the latest trackpad software.

To update to the latest version of Mac OS X, choose Apple () > Software Update from the menu bar and follow the onscreen instructions.

When installation is complete and you restart your Mac, use Software Update again to make sure all available updates are installed.
About the Indicator Light
The indicator light displays the status of your Apple Magic Trackpad and the batteries.

- When you first turn on your trackpad, the indicator light glows steadily for 2 to 3 seconds, indicating the batteries are good.

- If your trackpad isn’t paired with a Mac, the light blinks to indicate your trackpad is in discovery mode and ready to pair (pairing means connecting your trackpad and Mac to each other wirelessly).

- If you don’t pair your trackpad with your Mac within 3 minutes, the light and the trackpad turn off to conserve battery life. Press the On/off button on your trackpad to turn it on again, allowing you to pair it with your Mac.

- When your trackpad is on and connected, the indicator light turns off.

Turning on Your Trackpad
To turn your on trackpad, press and hold the on/off button until the indicator light comes on.
Pairing Your Apple Magic Trackpad

To use your Apple Magic Trackpad with your Mac, you first pair them so they can communicate wirelessly.

To pair your trackpad:
1. Choose Apple () > System Preferences, and then click Trackpad.
2. Click “Set Up Bluetooth Trackpad …” in the lower-right corner.
3. Press the On/off button on your trackpad to turn it on.
4. Click Continue when your trackpad is detected.

Once your trackpad is paired with your Mac, use Software Update again to make sure you have the latest software installed.

Removing a Pairing

After you pair your Apple Magic Trackpad with a Mac, you can pair it again with a different Mac. To do this, you first remove the existing pairing and then pair the trackpad again.

To pair with a different Mac:
1. Choose Apple () > System Preferences, and then click Bluetooth.
2. Select your trackpad in the Bluetooth preferences pane.
3. Click the Delete (−) button in the lower-left corner.

To pair your trackpad again, see “Pairing Your Apple Magic Trackpad.”
Using Your Apple Magic Trackpad

Your Apple Magic Trackpad has a Multi-Touch surface for moving the pointer and performing gestures. To set up gestures and set other options, choose Apple () > System Preferences, and then click Trackpad.

Position your Apple Magic Trackpad on a firm level surface. When you move the pointer or perform gestures, you can rest your hand comfortably on the Apple Magic Trackpad and slide your fingers lightly on the surface.

When you perform trackpad gestures, slide your fingers lightly on the trackpad surface. Trackpad gestures work in many applications.

Here are some ways to use your Apple Magic Trackpad:

• Drag two fingers up, down, or sideways to scroll in an active window.
• Secondary-click (right-click) to access shortcut menu commands.
• Use two-finger pinching to zoom in or out on PDFs, images, photos, and more.
• Use two-finger rotating to rotate photos, pages, and more.
• Swipe three fingers to rapidly page through documents, move to the previous or next photo, and more.
• Swipe four fingers left or right to activate Application Switcher so you can cycle through open applications. Four-finger swiping works in the Finder and all applications.
• Swipe four fingers up or down to show the desktop or display all open windows in Exposé.

For more information, see Trackpad preferences or choose Help > Mac Help and search for “trackpad.”
Renaming Your Apple Magic Trackpad
Your Mac automatically gives your Apple Magic Trackpad a unique name the first time you pair it. You can rename it in Bluetooth preferences.

To rename your trackpad:
1 Choose Apple () > System Preferences, and then click Bluetooth.
2 Select your trackpad in the Bluetooth pane of System Preferences.
3 Choose Rename from the Action () pop-up menu in the lower-left corner.
4 Enter a name and click OK.

Changing the Batteries
Your Apple Magic Trackpad comes with two AA batteries installed. You can replace them with alkaline, lithium, or rechargeable AA batteries.

Important: Dispose of batteries according to your local environmental laws and guidelines.

To change the batteries:
1 Use a coin to remove the battery compartment cover.

Battery compartment cover
2 Insert the batteries into the battery compartment as shown here.

3 Replace the battery compartment cover.

**WARNING:** Replace or recharge both batteries at the same time. Don't mix old batteries with new batteries and don't mix battery types (for example, alkaline and lithium batteries). Don't open or puncture the batteries, install them backwards, or expose them to fire, high temperatures, or water. Don't charge nonrechargeable AA batteries. Keep batteries out of the reach of children.

**Battery Level Indicator**
To check the battery level, choose Apple () > System Preferences, and then click Trackpad. The battery level indicator is in the lower-left corner.

**Note:** When you aren't using the Apple Magic Trackpad, it goes to sleep to conserve battery power.

If you won't be using your trackpad for an extended period, turn it off.
Cleaning
To clean the outside of your trackpad, use a lint-free cloth. Don’t get moisture in any openings or use aerosol sprays, solvents, or abrasives.

Ergonomics
When using your Apple Magic Trackpad, it’s important to find a comfortable posture, change your position often, and take frequent breaks.

For information about ergonomics, health, and safety, visit the Ergonomics website at www.apple.com/about/ergonomics.

More Information
For more information about using your Apple Magic Trackpad, open Mac Help and search for “trackpad.”

For support and troubleshooting information, user discussion boards, and the latest Apple software downloads, go to www.apple.com/support.
# Regulatory Compliance Information

**FCC Compliance Statement**
This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation. See instructions if interference to radio or television reception is suspected.

L'utilisation de ce dispositif est autorisée seulement aux conditions suivantes: (1) il ne doit pas produire de brouillage et (2) l'utilisateur du dispositif doit être prêt à accepter tout brouillage radioélectrique reçu, même si ce brouillage est susceptible de compromettre le fonctionnement du dispositif.

**Radio and Television Interference**
This computer equipment generates, uses, and can radiate radio-frequency energy. If it is not installed and used properly—that is, in strict accordance with Apple's instructions—it may cause interference with radio and television reception.

This equipment has been tested and found to comply with the limits for a Class B digital device in accordance with the specifications in Part 15 of FCC rules. These specifications are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

You can determine whether your computer system is causing interference by turning it off. If the interference stops, it was probably caused by the computer or one of the peripheral devices. If your computer system does cause interference to radio or television reception, try to correct the interference by using one or more of the following measures:
- Turn the television or radio antenna until the interference stops.
- Move the computer to one side or the other of the television or radio.
- Move the computer farther away from the television or radio.
- Plug the computer into an outlet that is on a different circuit from the television or radio. (That is, make certain the computer and the television or radio are on circuits controlled by different circuit breakers or fuses.)

If necessary, consult an Apple Authorized Service Provider or Apple. See the service and support information that came with your Apple product. Or, consult an experienced radio/television technician for additional suggestions.

**Important:** Changes or modifications to this product not authorized by Apple Inc. could void the EMC compliance and negate your authority to operate the product.

This product was tested for EMC compliance under conditions that included the use of Apple peripheral devices and Apple shielded cables and connectors between system components.

It is important that you use Apple peripheral devices and shielded cables and connectors between system components to reduce the possibility of causing interference to radios, television sets, and other electronic devices.

**Responsible party (contact for FCC matters only):**
Apple Inc. Corporate Compliance
1 Infinite Loop, MS 26-A
Cupertino, CA 95014

**Industry Canada Statements**
Complies with the Canadian ICES-003 Class B specifications. Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada. This device complies with RSS 210 of Industry Canada.

This Class B device meets all requirements of the Canadian interference-causing equipment regulations. Cet appareil numérique de la Class B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

**Europe — EU Declaration of Conformity**
For more information, see www.apple.com/euro/compliance.

**Apple and the Environment**
Apple Inc. recognizes its responsibility to minimize the environmental impacts of its operations and products. More information is available on the web at: www.apple.com/environment
VCCI Class B Statement

情報処理装置等電波障害自主規制について

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置が家庭環境で使用されることを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取扱をしてください。

Singapore Wireless Certification

Complies with IDA Standards
DB00063

Korea Statements

"일반적으로 QR코드는 안정적인 휴대용변환기"에요.
이 기기는 가정용('B급')으로 전자파적합등록을 한 기기로서 주거지역에서는 물론 이 외의 장소에서 사용하는 것을 목적으로 하며,
모든 지역에서 사용할 수 있습니다.

Korea KC&C Statements

AMD/A1339

Taiwan Wireless Statement

無線設備的警告聲明

經型式認證合格之低功率射頻電機，非經許可，公司、業者或使用者均不得擅自變更頻率、加大功率或變更發射天線之設計及功能，低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改用其他頻率或依該發射單位之指示及改用於適當之防護措施，並承擔因此所造成之一切責任。

中国

| 有害或  | 紅色 | 電路板 | 附件 | 电池 |
| 腐蚀性 | 材料 | | | |
| 铅 (Pb) | X | 0 | 0 | X |
| 汞 (Hg) | O | 0 | 0 | 0 |
| 銀 (Ag) | O | 0 | 0 | 0 |
| 多溴聯苯 | O | 0 | 0 | 0 |
| 多溴聯苯醚 | O | 0 | 0 | 0 |

O: 警告该材料在该部件中所占比例材料中的含量均在 SJ/T 11363-2006 规定的限量要求以下。
X: 表示该材料在该部件中某一物质材料中的含量未超出 SJ/T 11363-2006 规定的限量要求。

根据中国电子行业标准 SJ/T 11364-2006 及相关的中国政府法规，本产品及其某些内部或外部组件上可能带有环保使用期限标识，取决于组件和组件制造商，产品及其组件上的使用期标识可能有所不同。组件上的使用期限标识优先于产品上任何与之相冲突的或不同的环保使用期限标识。

2010

Turkey

EEE Yönetmeliğine (Elektrikli ve Elektronik Eşyalarda Bazı Zararlı Maddelerin Kullanımının Sınırlandırılması Nın Dair Yönetmeliğ) uygundur.

Disposal and Recycling Information

When this product reaches its end of life, please dispose of it according to your local environmental laws and guidelines.

For information about Apple’s recycling program, visit www.apple.com/environment/recycling.
Battery Disposal Information
Dispose of batteries according to your local environmental laws and guidelines.


Nederlands: Gebruikte batterijen kunnen worden ingeleverd bij de chemokar of in een speciale batterijcontainer voor klein chemisch afval (kca) worden gedeponeerd.

Taiwan:

Bateria电池回收

Brasil: Informações sobre descarte e reciclagem.

O símbolo indica que este produto e/ou sua bateria não devem ser descartadas no lixo doméstico. Quando decidir descartar este produto e/ou sua bateria, faça-o de acordo com as leis e diretrizes ambientais locais. Para informações sobre o programa de reciclagem da Apple, pontos de coleta e telefone de informações, visite www.apple.com/br/environment.

European Union—Disposal Information:

The symbol above means that according to local laws and regulations your product should be disposed of separately from household waste. When this product reaches its end of life, take it to a collection point designated by local authorities. Some collection points accept products for free. The separate collection and recycling of your product at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment.

© 2010 Apple Inc. All rights reserved.
Apple, the Apple logo, Exposé, Mac, and Mac OS are trademarks of Apple Inc., registered in the U.S. and other countries. Finder and Multi-Touch are trademarks of Apple Inc.
The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by Apple is under license.
Intercom Main Station

The MS-200 is a full featured main station combining an outboard power supply with the facilities to control two independent communications circuits. The 2 rack-unit high (3.50 in.) cabinet is available with rack-mount side panels, plain side panels or side panels with handles. All three configurations are priced the same.

The MS-200 has two independent communications circuits (A & B). The operator may communicate with stations connected to either A or B, or both A and B by pressing the circuit On switches. The two circuits remain independent, and stations connected to one cannot speak to stations connected to the other. During rehearsals, or other activities where a single common communications circuit would be desirable, pressing the Link button will accomplish that. Each circuit also has its own combination signal lamp/signal switch which will light all the signal lamps on that circuit when pressed. Thus an operator at the MS-200 can cue or guide two separate groups of personnel who are otherwise independent. If preferred, a gooseneck microphone (LSM-2 or LSM-4, sold separately) may be plugged into the front panel headset jack, with the front panel speaker switched On. In this mode, an adjustment of the sidetone null control will permit the MS-200 to be operated fully duplex, hands free, no press-to-talk. The operator may monitor either or both circuits while his/her own microphone (either headset or gooseneck) is turned Off.

A front panel switch diverts the output of the headset (or gooseneck) microphone to a rear panel 600Ω balanced output, permitting paging through a remote paging amplifier, eliminating the need for a separate microphone for this purpose. To activate the remote amplifier, a pair of normally open contacts, accessible on the rear panel, are closed when the Mic switch is moved to the Page position. Individual microphone-level and line-level auxiliary inputs are provided, each with its own volume control. These allow external sources such as program feeds, run-of-the-show relays, paging announcements or other background information to be mixed onto the communication circuit(s). Front panel buttons allow the auxiliary signal(s) to be sent to one, both, or neither of the two communications circuits. These inputs are normally unbalanced.

Technical specifications:  (Subject to change without notice)
Power requirement: 100-240VAC, .022A (No load) .55A @ 2ADC out
Power output: 2.0A @ 24VDC Continuous
Line termination: Audio - 200Ω DC - 5kΩ
Transducer impedances: Mic. 200Ω Earphone 400Ω
Aux. Inputs: Mic. 200Ω -60dBu Line 1kΩ -26dBu

Weight: 8.25 lbs. 3.74 kg
Size: (Excl. ears) 3.43H x16.88W x 7.00in D 87.12 x 426.75 x 177.8 mm

Production Intercom Inc.
P.O. Box 3247  Barrington, IL  60011-3247
Voice: (847) 381-5350 Fax: (847) 381-4280 Gates & Technical Assistance (US & Can): (800) 562-5872
e-mail: info@beltpack.com Web: beltpack.com

979 of 1217
Architects and Engineers Specifications
The MS-200 is a full featured main station combining an onboard power supply with the facilities to control two independent communications circuits. The 2 rack-unit high (3.50 in.) cabinet is available with rack-mount side panels, plain side panels or side panels with handles. All three configurations are priced the same.

The MS-200 has two independent communications circuits (A & B). The operator may communicate with stations connected to either A or B, or both A and B by pressing the circuit key switch. The two circuits remain independent, and stations connected to one cannot speak to stations connected to the other. During rehearsals, or other activities where a single common communications circuit would be desirable, pressing the "link" button will accomplish that. Each circuit also has its own combination signal lamp/signal switch which will light all the signal lamps on that circuit when pressed. Thus an operator at the MS-200 can use or guide two separate groups of personnel who are otherwise independent. If preferred, a gooseneck microphone (LSM-1 or LSM-2, sold separately) may be plugged into the front panel headset jack, with the front panel speaker switched on. In this mode, an adjustment of the gooseneck control will permit the MS-200 to be operated fully duplex, hands free, no press-to-talk. The operator may monitor either or both circuits while his/her own microphone (either headset or gooseneck) is turned off.

A front panel switch directs the output of the headset (or gooseneck) microphone to a rear panel 600Ω balanced output, permitting paging through a remote paging amplifier, eliminating the need for a separate microphone for this purpose. To activate the remote amplifier, a pair of normally open contacts, accessible on the rear panel, are closed when the Mic switch is moved to the "Page" position. Individual microphone-level and line-level auxiliary inputs are provided, each with its own volume control. These allow external sources such as program feeds, run-of-the-show relays, paging announcements or other background information to be mixed onto the communication circuit(s). Front panel buttons allow the auxiliary signal(s) to be sent to one, both, or neither of the two communications circuits. These inputs are normally unbalanced.

The MS-200 may be fitted with the accessory OCS04 Override Generator Card which will permit the operator to override the front panel controls of loudspeaker stations in the system which are equipped with the Override feature. (See the LS-3 data sheet)

Additional circuits may be added to the MS-200 by adding the mating MSM-2 (two additional circuits - C & D) or the MSM-3 (four additional circuits - C, D, E & F). A rear panel D-Sub connector is provided for this purpose.

Extra MS-200's may be used in a system, deriving their power from the central unit. Simply loop through using the A and/or B rear panel XLR's. An additional onboard power supply is not required in this application.

Technical specifications: (Subject to change without notice)

- Power requirement: 100-120VAC, 0.2A (no load) 0.55A @ 12VDC out
- Power output: 2.0A @ 24VDC Continuous
- Line termination: Audio - 200Ω DC - 5kΩ
- Transducer impedance: Idc. 2000, Telephone 400Ω
- Aux. Input: Mic. 200Ω, 6kΩ, Line 1kΩ - 36dBu

MS-200
Intercom
Main Station

- Performance
- Durability
- Value
- Compatibility

Production Intercom Inc.
P.O. Box 5247, Burlington, MA 01803 USA
Voice: (847) 381-5350 Fax: (847) 381-4399 Sales & Technical Assistance (US & Canada): (800) 562-5872
e-mail: support@beltpack.com Web: beltpack.com

981 of 1217
Operating Instructions

General Description

The best description of the operation of the MS-200 is contained within the descriptions of the operation of the controls and connections shown on pages 2 and 3. In general . . . .

The MS-200 with its external power supply is intended to be the central control point for two separate circuits of outstations. Outstations can be portable headsets stations (usually referred to as belt packs), fixed headset stations, loudspeaker stations, remote stage manager stations, or additional MS-200's (less their power supplies).

Outstations should be organized into two logical groups which will each then become a party-line circuit. The two (A & B) groups of 3 rear panel male XLR-type connectors are used to connect the outstations to the MS-200 using 2-conductor shielded microphone cable fitted with 3-pin XLR-type connectors. As many as three runs (on each circuit) may be started at the MS-200, but outstations usually have In and Out connectors allowing outstations to be daisy-chained together. An accessory SS-1 splitter box (see page 4) may be used to combine sub-groups of stations with either circuit. The stations on each circuit will be in constant communication with each other regardless of settings at the MS-200 (as long as power is supplied).

The MS-200 may communicate with both groups (circuits) of remote stations separately or simultaneously, without tying the two together. Pressing either or both Circ buttons connects the MS-200. These buttons turn green when the connection is made. The operator may monitor either or both circuits while his/her microphone is either on or off. Each circuit has its own signal lamp/button which, when pressed, lights all the other signal lamps on that circuit. The lamp will also light whenever any outstation on the circuit presses their signal button.

The MS-200 provides XLR inputs (see page 3) and level controls (see page 2) for audio signals originating at a mixer (line level) or directly from a microphone (mic. level). This program will then be heard on the MS-200's speaker or headset, and, by switching the front panel selectors, either or both circuits. Level at the MS-200 is regulated by the front panel controls. Level at the outstations is controlled by the outstation's level control.

The MS-200 may be used with an optional goose-neck microphone (LSM-1, 2 or 3), in combination with its built-in loudspeaker, or with a headset or headset. When used with a goose-neck microphone the sidetone control should be adjusted to minimize feedback. In noisy situations the LSM-2 noise canceling microphone should be used. The output of the microphone (headset or goose-neck) may be momentarily redirected to a remote paging amplifier by shifting the front panel switch to its page position.

Connections and Cable

Remote stations are connected to the MS-200 using 2-conductor shielded microphone cable fitted with 3-pin XLR-type connectors. Cable type and size are determined by the total length of all runs, but in general we recommend that the individual conductors be no smaller than 22 AWG. For longer runs and for permanent installations in conduit, please consult with the Applications Note 'Cable Type and Size' from Technical Projects. Pin configurations are shown below.

![Connection Diagram]

The paging output is a combination 3-circuit (tip/ring/sleeve) 1/4"phone jack and a 3-pin XLR-type female XLR. The paging output appears as a balanced 600Ω signal across the tip and ring of the 1/4" and pins 2 and 3 of the XLR. The sleeve of the 1/4" and pin 1 of the XLR are connected to chassis ground. The normally open contacts are across the tip and ring of the 3.5mm stereo jack, with no connection to the grounded sleeve.

Production Intercom Inc.
P.O. Box 3247, Barrington, IL 60011-3247
Voice: (847) 381-5350 Fax: (847) 381-4569 Sales/Technical Assistance (US & CAN): (800) 352-3872
e-mail: support@beltpack.com Web: beltpack.com

982 of 1217
1. Main: On/off control - turns orange when on, push on/push off
2. Speaker: Turns yellow when speaker is on.
3. Blank: Remove plug to install switch for override accessory (See optional accessories on page 4).
4. Auxiliary (Line): Use this knob to control the loudness of an auxiliary line level program at the MS-200 and also throughout the system. Typically this is a feed from an audio mixer which enables crew members, who may be far from the stage, to monitor the performance, or as a cue feed to dressing rooms, green rooms, etc.
5. Switch: Sends the auxiliary audio signal (line level or mic. level) to outstations on circuit A.
6. Switch: Sends the auxiliary audio signal (line level or mic. level) to outstations on circuit B. Note: The auxiliary audio signal will not be heard at the MS-200 unless it is directed to one or both of the communications circuits.
7. Auxiliary (Mic): This control serves the same function as #4 but for a signal directly from a microphone.
8. Sidetone: This recessed screwdriver-adjust potentiometer controls the loudness of your own voice heard in your own ear. It does not affect the level heard at other stations. Normal hearing position is 2 o'clock. When using the MS-200 with an accessory gooseneck microphone, the sidetone adjustment should be fine-tuned to minimize feedback. This is a "null" control, that is, the position of greatest sidetone rejection will be found somewhere just on either side of the 12 O'clock position.
9. DC: This LED indicates that the MS-200 is receiving DC power from its power supply. If this lamp goes out it may indicate that the protective circuit in the power supply has shut down. Unplug the power supply then plug it back in. If the LED does not light, or lights then goes out quickly, check for short circuits in the inter-station cabling.
10. Signal A: The lamp in this push-button lights whenever any other station in circuit 'A' has its signal lamp button pressed. To signal other stations in circuit 'A', press this button.
11. Circuit A: Pressing this button connects the MS-200 to the other stations in circuit 'A'. Other stations in circuit 'A' may communicate among themselves regardless of the position of this button. When the MS-200 is connected, the button turns green.
12. Link: This switch allows the operator to combine the stations on circuit B with the stations on circuit A.
13. Listen Level: This control adjusts the level of the signal heard in the operators headset, or from the loudspeaker.
14. Circuit B:  This button has the same functions as #11 above but for circuit 'B'.  Circuits 'A' and 'B' are not connected together, even though both buttons are pressed in at the same time. The operator of the MS-200 may speak and listen to both circuits simultaneously, but stations on circuit 'A' may not communicate with stations on circuit 'B' and vice-versa unless the Link switch is switched in.
15. Signal B: Same functions as #10 above, but for circuit 'B'.
16. Mic. Switch: In the Off position, this switch permits the operator to continue to monitor either or both circuits without being heard at the remote stations. In the Page position, the output from the microphone preamplifier is directed through a high quality audio transformer to an output jack on the rear panel. In this way the microphone may be used to page through a separate paging amplifier, eliminating the need to remove the headset to use a separate microphone. It also closes a set of normally open contacts for switching a remote paging amplifier.
17. Headset or microphone connector: Use any good communications headset with a dynamic microphone of about 2000 ohm impedance, and earphone(s) from 8Ω to 400Ω, or with a gooseneck microphone (LSM-1 or LSM-2). Any make of 4-pin XLR connector will fit. The pin configuration is shown on page 1.
1. Normally Open Contacts: This 3-circuit, 3.5mm jack is connected to a pair of contacts which are normally open. They close when the front panel microphone switch is moved to the Page position. It is intended to be used in conjunction with the Paging Output (92), for activating a paging amplifier.

2. Paging Output: This unique jack combines a 3-circuit phone jack and a 3-pin XLR. It provides for connection to a paging amplifier. Output is 600Ω, balanced and appears across the tip and ring of a phone jack or pins 2 & 3 of an XLR. The sleeve of the phone plug and pin 1 of the XLR are connected to chassis ground. When the front panel microphone switch is moved to the 'Page' position, the output of the microphone preamplifier is routed through a high-quality audio transformer to this jack.

3. Link (MSM-2/3): The MSM-2 and MSM-3 add additional circuits to the MS-300. The MSM-2 provides circuits 'C' and 'D'. The MSM-3 provides circuits 'C', 'D', 'E' & 'F'. The cable for connection to this 9-pin D-Sub connector is provided with the MSM-2 and MSM-3.

4. Auxiliary Input (Microphone): The output of a low impedance microphone connected to this 3-pin male XLR jack will be heard throughout the intercom system. Level is controlled at the front panel. Typical application is to connect a microphone hanging over the stage so that the technical crew and backstage performers can monitor the performance regardless of their distance from the stage. The auxiliary signal can be routed to circuit A, circuit B, both, or neither, using front panel switches. This input is unbalanced. Connect pin 1 to the shield in the microphone cable along with one (probably black) conductor. Connect the other (probably white) conductor to pin 2. No connection is made to pin 3.

5. Auxiliary Input (Line): This input performs the same function as #4 above, but for an unbalanced line level signal, typically from a mixer or preamplifier. This input has its own front panel level control and may be used simultaneously with input #4.

6-7-8. Circuit 'A': To/from remote stations.

9-10-11. Circuit 'B': To/from remote stations.

12. Power Input: Connect the outboard power supply to this 3-pin jack. You may also connect this 3-pin jack to any of the 3 XLR outputs on the back of a PS-1A power supply, or the single jack on a PS-1B. Whatever the source, the MS-200 requires well filtered, hum-free 24VDC. Pin connections are shown on page 1.

**Even if you don't read anything else, please read this!**

The most common cause of poor system performance or failure is poor grounding of the shield in the 2-conductor shielded microphone cable used to interconnect intercom stations. In this application, the shield performs 4 functions: as the shield; as the zero volt reference for the +24VDC on pin 2; as the zero volt reference for the +12VDC which appears on pin 3 when signal lamps are activated, and as the return for the audio signal on pin 3. Check carefully that the shield is connected to the ground lug in XLR connectors, or touching a grounded metal surface inside any junction boxes which are part of the system.

**Support!**

If we can help you to lay out your headset intercom system, or maximize the flexibility of your equipment, please call. Technical support will be cheerfully provided.
Optional Accessories

1. OGO94 Override Generator Module:
Production Intercom talkback loudspeaker stations contain circuitry which responds to an ultrasonic signal by overriding their front panel switches and controls to preset positions and levels. This feature may be used to restore volume at a speaker station which has been accidentally turned down, to mute a loudspeaker station during selected messages, and, to switch a loudspeaker station back to its Listen mode from Off or Talk. When an OGO94 is installed in the MSM-1 it provides the triggering signal for the override function. The output of the OGO94 may be wired internally to affect either or both circuits. A front panel push-button switch which is part of this kit may be either latching or momentary. The OGO94 is available factory installed or as a kit. Installation is primarily mechanical, with some soldering required. Set-up requires a frequency counter.

2. MSM-2 and MSM-3 Additional Circuits Modules:
These units are housed in one rack unit-high cabinets. The MSM-2 adds two additional circuits to an MSM-1. The MSM-3 adds 4 additional circuits to an MSM-1. Both are supplied with a cable to interconnect to the MSM-1.

3. Plain, Rack-Mount and Handle Side Panels:
MSM-1’s are shipped with each mount side panels, 1U (1.75") high. Plain side panels are available, as are side panels incorporating carry handles. The MSM-1 may be ordered with your preference of side panels, or replacement side panels may be ordered as an accessory.

4. Gooseneck Microphones:
Two gooseneck microphones are available for the MSM-1. Both are fitted with 4-pin XLR-type connectors and may be plugged directly into the front panel 4-pin XLR. In this configuration it is assumed that the operator will be listening via the MSM-1’s accessory rack-mount speaker or similar. The LSM-1 is an omni-directional microphone and should operate successfully in most applications. The LSM-2 is a close-talking, noise-canceling microphone intended for noisy locations. The key phrase is close-talking...this microphone is intended to be used at less than an inch from the operators lips. In most environments an LSM1 gooseneck microphone can be used with the accessory speaker constantly switched on in a full-duplex (simultaneous talk/listen) mode and at a satisfactory listening levels without feedback. This may require adjustment of the front panel sidetone control (See page 2, Item #4) If feedback occurs before the speaker level is sufficiently high, the front panel microphone On/Off switch can be used; or substituting an LSM-2 should be considered.

5. SB-1 Splitter/Isolator:
The SB-1 Splitter/Isolator is packaged in the same extrusion as our belt packs. It may be used as a 1-in/4-out splitter or, when its isolate button is pressed in 1-in/2+2 out with two outlets being part of the inputted circuit and the other two entering an all new isolated communications circuit.

6. BP-2 Belt Pack:
Though not technically an accessory to the MSM-1, the BP-2 should be considered whenever an additional branch circuit needs to be created from one of the existing stations on circuit A or circuit B. A common example is an isolated spot connecting fellow-spot operators to a lighting director who is himself on one of the MSM-1’s two prime circuits.

Specifications

Electronic:
- Microphone Impedance: 200Ω Ideal, 30~1kΩ O.K.
- Earphone/Speaker Impedance: 8~4kΩ
- Power requirement: +24~+30VDC
- Line termination impedance: Audio - 200Ω, DC-5kΩ
- Microphone level aux. input: Impedance: 200Ω Unbalanced
- Sensitivity: -60dBu Max.
- Line level Aux. Input: Impedance: 10kΩ unbalanced
- Sensitivity: -26dBu

Mechanical:
- Standard 19" Rack Mount: Height- 1U (1.75"/44.45mm)
- Supplied with rack mount flanges integral to side panels.
- Plain side panels available for table top use.
- Dimensions (H x W x D) excluding rack mount flanges:
  - 1.68 x 16.88 x 7.00in. 42.67 x 428.75 x 177.8mm.
  - Weight: 6.25lbs./2.835kg.

Warranty Information
Production Intercom products are covered by a limited one-year warranty against defects in materials and/or workmanship. Full details of the warranty are available from Production Intercom, or your dealer.
CX Series User Manual
Installed Sound Professional Audio Amplifiers

2-Channel Low-impedance Models:
CX302
CX502
CX702
CX902
CX1102

4-Channel Low-impedance Models:
CX254
CX404

70 Volt Direct Output Models:
CX204V (4-channel)
CX302V (2-channel)
CX602V (2-channel, 8 ohm capable)
CX1202V (2-channel, 4 and 8 ohm capable)
Important Safety Precautions & Explanation of Symbols

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. **WARNING:** To prevent fire or electric shock, do not expose this equipment to rain or moisture. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any ventilation openings.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding plug has two blades and a grounding prong. The wide blade or third prong are provided for your safety. If the provided plug does not fit your outlet, consult an electrican for the replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched, particularly plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Use only attachments/accessories specified by QSC Audio Products, LLC.
12. Use only with hardware, brackets, stands, and components sold with the apparatus or by QSC Audio Products, LLC.
13. Unplug the apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in this manual.

The lightning flashes printed next to the OUTPUT terminals of the amplifier are intended to alert the user to the risk of hazardous energy. Output connectors that could pose a risk are marked with the lightning flash. Do not touch output terminals while amplifier power is on. Make all connections with amplifier turned off.

The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous" voltage within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to humans.

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE THE COVER. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL.

WARNING: To prevent fire or electric shock, do not expose this equipment to rain or moisture.

**FCC INTERFERENCE STATEMENT**

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

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

© Copyright 2005 & 2007, QSC Audio Products, LLC.
QSC® is a registered trademark of QSC Audio Products, LLC.
"QSC" and the QSC logo are registered with the U.S. Patent and Trademark Office.
All trademarks are the property of their respective owners.

Downloaded from www.Manualslib.com manuals search engine
Introduction

Thank you for purchasing this QSC power amplifier. Please read the following directions to obtain the best results.

The CX model line-up features:

- 2 channel and 4 channel low-impedance or transformerless 70V output models
- Each channel pair has its own DataPort and Mode Switch
- QSC DataPorts connect to the most advanced QSC accessories and monitoring systems
- Mode switches for Clip Limit, Low Frequency Filter, Stereo, Bridge Mono, and Parallel Inputs
- QSC PowerLight high-performance, compact, and lightweight switching power supply
- Complete amplifier protection and monitoring
- Barrier strip output connectors
- XLR and terminal block balanced input connectors
- Gain controls are recessed and detented
- Security cover for gain controls prevents tampering
- Active inrush current limiting eliminates need for power sequencing
- LED indicators for power, parallel or bridge mode, input signal presence, -20dB, -10dB, and clip/protect
- Optional front panel handles
- Optional IT-42 isolated output transformer for CX302 for 25V, 70V, and 100V (or 50V, 140V, and 200V bridge mode)

Unpacking

Factory packed carton contains:

- CX amplifier
- User’s manual
- Security cover for gain controls
- Adhesive rubber feet (for non-rack mount applications)
- 3-pin terminal block input connectors
- Spade lug output connectors
- IEC-type detachable power cord

Use the same type carton when shipping the amplifier.

Front Panel

(CX404 shown, other models similar)
Rear Panel

(CX404 shown, other models similar, 2-Ch. models equipped with XLR inputs as well)

Rack Mounting
Optional handles shown. Use four screws and washers to mount the amplifier to the equipment rack rails. To use the amplifier outside a rack, attach the self-adhesive rubber feet to the bottom.

Cooling
Air flows from the rack, into the back of the amplifier, and out the front. This keeps the rack cool. The fan automatically runs faster when the amp is working hard.

Do not block the front or rear air vents!

AC Mains Connection
Connect AC power to the IEC socket on the back of the amplifier. NOTE: Turn off the AC power switch before connecting AC power. The AC Switch must be turned on to use remote control systems or the Standby function.

The correct AC line voltage is shown on the serial number label, on the rear panel. Connecting to the wrong line voltage may damage the amplifier or increase the risk of electric shock.
Setting the Mode Switches

Two-Channel Models: One mode switch controls each channel’s independent clip limiting and low frequency (LF) filtering. The switches can set the amplifier’s operating mode for Stereo, Parallel, or Bridge operation.

Four-Channel Models: There are two mode switches; one controls the operation of channels 1-2, the other controls the operation of channels 3-4. It is not possible to bridge or parallel channels 1 or 2 with channels 3 or 4.

Setting Clip Limiters

Each channel has a clip limiter with its own on-off switch. The limiter only responds to actual clipping, and automatically compensates for load and voltage variations. Clip limiting is generally recommended, especially to protect high frequency drivers.

Set switch UP (ON position) to use Clip Limiting. Switch 1 controls the first channel. Switch 10 controls the second channel.

Selecting Stereo, Parallel, or Bridge Mode

Each of the channel pairs can be set for normal Stereo operation, Parallel Input mode, or Bridge Mono mode. On four-channel models, Ch.1 can be bridged or paralleled with Ch.2. Ch.3 can be bridged or paralleled with Ch.4.

Stereo Mode: Each channel within the pair remains independent, and each may be used for a different signal.

Parallel Mode: This setting connects both inputs of a pair together. One signal feeds both channels. Do not connect different sources to each input. Each channel’s Gain control and speaker connection remain independent.

Bridge Mode: This setting combines both channels of a pair into a single channel with twice the output voltage. Use only the first channel’s input and Gain control. Set the second channel’s Gain control at minimum.

Do not connect different inputs to each side of a channel pair when operating in parallel or bridge mode.

Setting Low Frequency Filters

Each channel has a 12dB per octave Low Frequency filter that can be set on or off. Low impedance models can be set for 33 or 75 Hertz and distributed output (“V” models) for 50 or 75 Hertz to prevent saturation of the 70V speaker transformers. This reduces distortion and prevents amplifier overload.

Low Impedance Models: The filter should only be turned off for driving subwoofers. The 33 Hz setting usually works well with loudspeakers that have large LF drivers (12” or larger). The 75 Hz setting works well with compact (smaller size) loudspeakers. Check the loudspeaker’s specifications and select the setting closest to the loudspeaker’s low frequency capability.

High Impedance (“V”) Models: The filter should only be turned off for driving subwoofers with special low frequency transformers. The 50 Hz setting usually works well with high quality speaker transformers. The 75 Hz setting works well with speech-grade speakers and transformers.

Low Frequency Filter (“V” model shown): Each channel has its own switches for LF filter on/off and frequency selection.

• The first channel uses switches 2.3. The second channel uses switches 8.9.

• Switches 3 and 8 turn the LF filter ON or OFF.

• Switches 2 and 9 select 33/75 Hz (low Z) or 50/75 Hz (“V” models) or 75 Hz.

• On four-channel models, the second mode switch has switches for Ch.3 and Ch.4.
DataPort

Two-channel models have one DataPort, four-channel models have two DataPorts (one for Ch.1-2, one for Ch.3-4). The DataPort connects to optional QSC accessories and processing devices. DataPort devices provide remote Standby control, monitoring, DSP processing, filter and crossover functions. The CX’s DataPort supports the full "V1" DataPort feature set. Two-channel models support directly-mounted DSP "modules". Four channel models require remote mounting of accessory modules connected with DataPort cables.

Each DataPort connects to its respective channel pair; Ch.1-2 or Ch.3-4. Each channel pair may use its DataPort or the Terminal Block inputs. When using the DataPort, do not connect to that channel’s Terminal Block inputs. Amplifier Standby is controlled only by the Ch.1-2 DataPort.

DataPort Tips:
1- DataPort 1-2 controls Standby for the entire amplifier. The AC switch must be turned ON before the DataPort can control the power.
2- Each DataPort controls and monitors the signals to its respective channel pair (Ch.1-2, Ch.3-4).
3- Do not use the Bridge Mono or Parallel mode switches when using DataPort Inputs. The signal level may be reduced. For more information, see the Owner’s Manual for the DataPort device.
4- A DataPort device is normally used to control the signal gain before entering the amplifier. Set the front panel Gain controls at maximum after confirming correct operation. If desired, install the protective cover to prevent tampering.
5- Each channel uses a separate internal heat sink. The heat sink temperatures are reported on that pair’s DataPort.
6- Consult your QSC dealer or the QSC web site for the latest DataPort products.

Inputs

Each channel has a balanced 3-pin terminal block input. Two channel models also feature XLR inputs. The input impedance is 12k ohm balanced or 6k ohm unbalanced. A set of terminal block connectors is included in the carton. Terminal block wiring is connected with simple hand tools, and inputs can be changed quickly. XLR inputs are connected with standard cables and can be changed quickly. Pinouts are marked on the rear panel.

Balanced connections are recommended to reduce AC hum and interference, especially with long cable runs. Unbalanced connections may be suitable for short cables. The signal’s source impedance should be less than 600 ohms. If the DataPort is being used for input signals, do not connect cables to the terminal blocks.

Terminal Block Connectors
Balanced inputs: Strip the wires ¼ inch (6mm) and connect to the plug as shown. Be sure to tighten the screws firmly.

Unbalanced inputs: Strip the wires ¼ inch (6mm) and connect to the plug as shown. The middle pin must be connected to the shield pin as shown. Be sure to tighten the screws firmly.

XLR Inputs (2-Ch. models only)
Balanced inputs: Connect to the plug as shown.
Unbalanced inputs: Connect to the plug as shown. Pin 3 and pin 1 must be connected with a jumper as shown.
Outputs

Wiring connections are shown on the back of the chassis. Carefully note the polarity marks, which are arranged to make Bridge Mode connections easier. Four-channel models are shown in the examples; two-channel models are similar.

OUTPUT TERMINAL SAFETY WARNING! Do not touch output terminals while amplifier power is on. Make all connections with amplifier turned off. Risk of hazardous energy!

Low Impedance Outputs

Stereo and Parallel Mode– Connect each loudspeaker to its own channel of the amplifier, as shown on the chassis label. The mode configuration switches must be set for Stereo or Parallel mode.

Bridge Mode– Bridge mode configures the channel pair to drive a single high-power loudspeaker load. The mode configuration switches must be set for Bridge mode. Use only the first channel’s input and Gain control. Set the second channel’s Gain control at minimum.

Distributed Outputs (“V” models, 70V/140V)

Stereo and Parallel Mode– Connect each 70V circuit to its own channel of the amplifier, as shown on the chassis label. The mode configuration switches must be set for Stereo or Parallel mode.

70V Output– Risk of hazardous energy! Class 2 wiring shall be used for 70V outputs.

Bridge Mode– Bridge mode configures the channel pair to drive a single 140V audio circuit. The mode configuration switches must be set for Bridge mode. Use only the first channel’s input and Gain control. Set the second channel’s Gain control at minimum. Connect the load as shown on the chassis label.

140V BRIDGE MODE PRECAUTIONS:

Class 3 Wiring shall be used for bridged mono 140V outputs.

Connect only 140V distributed audio circuits in bridged mode. Do not use 70V loads in bridge mode! Use Stereo or Parallel mode channels to drive 70V loads. 140V is the minimum for bridge mode operation.

Loads Rated by Model

Be sure the model amplifier you are using is rated for the load!

An asterisk (*) indicates the model is rated for the load. (S/P)= Stereo/Parallel mode (Bc)= Bridge mode

<table>
<thead>
<tr>
<th>LOAD</th>
<th>E12504</th>
<th>E3200</th>
<th>E3260</th>
<th>E4260</th>
<th>E5780</th>
<th>E6780</th>
<th>E8780</th>
<th>E27100</th>
<th>E27204</th>
<th>E30386</th>
<th>E30406</th>
<th>E30426</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Ohms</td>
<td>*</td>
<td></td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>4 Ohms</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>8 Ohms</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>16 Ohms</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>70 Volt</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>140 Volt</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

70V stereo or parallel connection- Each 70V zone connects to its respective channel. Ensure that all speaker connections maintain proper polarity.

140V Bridge connection– Wire each bridged pair to a 140V circuit as shown. Check for proper polarity.
LED Indicators

The LED indicators can be used to monitor system operation and identify common problems.

**POWER**: GREEN, above the BRIDGE (BRDG) and PARALLEL (PAR) indicators.

- **Normal indication**: AC switch ON; LED will illuminate.
- **If no indication**: Check AC power cord and AC outlet. Confirm that DataPort 1-2 is not holding the amp in 'Standby' mode.

**CLIP**: RED, adjacent the channel number markings.

- **Normal indication**: Illuminates whenever the amplifier is driven beyond full power. The resulting distortion corresponds to the brightness of the LED. Distortion that causes only brief flashing may not be audible.
- **Abnormal indication**: Bright red illumination while the amp is being used indicates either thermal muting or a shorted output. If the amplifier overheats, the fan will run at full speed, and operation should resume within one minute. Allow the fan to run, and make sure the amplifier ventilation is adequate.

**SIGNAL, -20dB, -10dB**: GREEN, under each Clip LED.

- **Normal indication**: The SIGNAL indicator illuminates when the input signal exceeds -35 dB, the -20dB indicator illuminates when the signal exceeds -20dB, and the -10dB indicator illuminates when the signal exceeds -10dB.
- **If no indication**: Check Gain settings and increase gain if necessary. Check input connections and audio source for signal. If the Clip LED illuminates with little or no Signal indication, check the output wiring for shorts.
- **Abnormal indication**: If the SIGNAL (SIG), -20dB, or -10dB LED illuminates with no signal input, there may be system oscillations or some other malfunction. Disconnect the load and fully reduce the gain. If the LED remains on, the amp may need servicing.

**BRDG and PAR**:

Each channel pair has a YELLOW LED for Bridge Mode, and an ORANGE LED for Parallel mode. These show how the rear panel switches are set (see Setting the Mode Switches). In Stereo mode, both LEDs should be OFF.

---

**LED indicators on 2-channel models.**

<table>
<thead>
<tr>
<th>CH 1</th>
<th>CH 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLIP</td>
<td>CLIP</td>
</tr>
<tr>
<td>-20dB</td>
<td>-20dB</td>
</tr>
<tr>
<td>-10dB</td>
<td>-10dB</td>
</tr>
<tr>
<td>SIGNAL</td>
<td>SIGNAL</td>
</tr>
<tr>
<td>POWER</td>
<td>POWER</td>
</tr>
</tbody>
</table>

**LED indicators on 4-channel models.**

<table>
<thead>
<tr>
<th>CH 1</th>
<th>CH 2</th>
<th>CH 3</th>
<th>CH 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLIP</td>
<td>CLIP</td>
<td>CLIP</td>
<td>CLIP</td>
</tr>
<tr>
<td>-20dB</td>
<td>-20dB</td>
<td>-20dB</td>
<td>-20dB</td>
</tr>
<tr>
<td>-10dB</td>
<td>-10dB</td>
<td>-10dB</td>
<td>-10dB</td>
</tr>
<tr>
<td>SIGNAL</td>
<td>SIGNAL</td>
<td>PAR</td>
<td>PAR</td>
</tr>
<tr>
<td>SIG</td>
<td>SIG</td>
<td>SIG</td>
<td>SIG</td>
</tr>
</tbody>
</table>

---

Downloaded from www.Manualslib.com manuals search engine
**Gain Controls**

The Gain controls are recessed and can be adjusted with a small screwdriver or flat tool. If desired, the Gain Control Security Cover can be installed to prevent changes to the installer’s settings.

Turn the gain controls clockwise to increase gain and counter clockwise to decrease gain. The maximum voltage gain of the amplifier varies depending on the model designation. Maximum voltage gain for each model is shown on the front panel label in parentheses adjacent the 0dB attenuation setting.

The Gain controls are marked in dB of attenuation. There are 21 detents for repeatable adjustments. The upper 14 steps are about 1 dB each, and settings should normally be made within this range. The range below -14 dB should not be used for normal program levels, as the input headroom could be exceeded, but can be used for testing at reduced levels. At the minimum setting, the signal is completely cut off.

**Gain Control Security Plate**

The cover blocks access to the Gain settings. The LED indicators are still visible to monitor the system’s operation.

1. Use a 9/64" or 3.5 mm hex driver to loosen the screw several turns. Do not remove it completely.
2. Slide the right end of the cover under the loosened screw.
3. Insert the left end tabs into the last row of ventilation slots, and slide the panel fully to the right. It should lock into the slots.
4. Confirm that the LED’s are visible through the cover. Tighten the hex screw carefully.

**CX902 shown with gain control security plate installed.**

---

---

---

---
Specifications 2-Channel Low-Impedance Models

<table>
<thead>
<tr>
<th>OUTPUT POWER (Watts)</th>
<th>CX302</th>
<th>CX502</th>
<th>CX702</th>
<th>CX902</th>
<th>CX1102</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 - 20k Hz, 0.03% THD, 8 Ohms/Ch.</td>
<td>200</td>
<td>300</td>
<td>425</td>
<td>550</td>
<td>700</td>
</tr>
<tr>
<td>20 - 20k Hz, 0.05% THD, 4 Ohms/Ch.</td>
<td>325</td>
<td>500</td>
<td>700</td>
<td>900</td>
<td>1100</td>
</tr>
<tr>
<td>1kHz, 1.0% THD (EIA), 8 Ohms/Ch.</td>
<td>215</td>
<td>325</td>
<td>475</td>
<td>625</td>
<td></td>
</tr>
<tr>
<td>1kHz, 1.0% THD (EIA), 4 Ohms/Ch.</td>
<td>375</td>
<td>550</td>
<td>825</td>
<td>1050</td>
<td></td>
</tr>
<tr>
<td>Bridge Mono, 20 - 20k Hz, 0.1% THD, 16 Ohms</td>
<td>600</td>
<td>800</td>
<td>1200</td>
<td>1500</td>
<td>1700</td>
</tr>
<tr>
<td>Bridge Mono, 20 - 20k Hz, 0.1% THD, 8 Ohms</td>
<td>400</td>
<td>600</td>
<td>850</td>
<td>1100</td>
<td>1400</td>
</tr>
<tr>
<td>Bridge Mono, 1kHz, 1.0% THD, 8 Ohms</td>
<td>700</td>
<td>1000</td>
<td>1500</td>
<td>2000</td>
<td></td>
</tr>
<tr>
<td>Bridge Mono, 1kHz, 1.0% THD, 4 Ohms</td>
<td>1200</td>
<td>1600</td>
<td>2400</td>
<td>3000</td>
<td>3400</td>
</tr>
</tbody>
</table>

DISTORTION, SMPTE-IM: <0.01% <0.01% <0.02% <0.02% <0.02%

FREQUENCY RESPONSE
20 - 20kHz, ±0.2dB at 10dB below rated output power, all models (-3dB points: 8 Hz and 100 kHz)

SIGNAL to NOISE, unweighted
20 - 20kHz, -106dB -107dB -106dB -104dB -106dB

VOLTAGE GAIN
31.5x (30dB) 40.0x (32dB) 50.5x (34dB) 56.6x (35dB) 56.6x (35dB)

INPUT SENSITIVITY, Vrms
for rated power into 8 Ohms: 1.26 (+4.2dBu) 1.23 (+4.0dBu) 1.16 (+3.5dBu) 1.17 (+3.6dBu) 1.35 (+4.8dBu)
for rated power into 4 Ohms: 1.14 (+3.4dBu) 1.12 (+3.2dBu) 1.05 (+2.6dBu) 1.06 (+2.7dBu) 1.17 (+3.6dBu)

OUTPUT CIRCUIT TYPE
AB AB H H H

INPUT IMPEDANCE
6k ohms unbalanced, 12k ohms balanced, all models

DYNAMIC HEADROOM
2 dB at 4 Ohms, all models

DAMPING FACTOR
>500 at 8 Ohms, all models

AMPLIFIER PROTECTION
Short circuit, open circuit, thermal, ultrasonic and RF protection. Stable into reactive or mismatched loads.

COOLING
Continuously variable speed fan; back-to-front air flow through heat sink tunnel.

CONTROLS
Front: AC POWER switch, gain controls (1 control per channel, 21 detents)
Back: 10-position DIP switch with Clip Limiter (1 per Ch.), LF Filter on/off (1 per Ch.), LF filter select: 33 or 50 Hz (1 per Ch.), Stereo/Parallel/Bridge mode selection switches

LED INDICATORS
POWER (green, 1 each), SIGNAL, -10dB, -20dB (green, 1 each per Ch.), CLIP (red, 1 each per channel), BRDG and PAR (yellow, 1 each)

CONNECTORS
Input: 3-pin terminal blocks ("euro" or "Phoenix" type) and XLRs (pin 2 positive)
Output: barrier strip connectors with protective shroud
Other: QSC DataPort connector (supports full "V1" feature set)

LOAD PROTECTION
Turn-on/turnoff muting, AC coupling (DC fault blocking), Clip limiting.

POWER REQUIREMENTS
Refer to rear panel serial number label. Configured at factory for 100, 120 or 220-240 VAC, 50-60 Hz.

DIMENSIONS
19.0" (48.3 cm) W, 3.5" (8.9 cm) H, 14" (35.6 cm) D (from front mounting rails, including rear support ears)

WEIGHT
21 pounds (9.5 kg) net; 27 pounds (12.3 kg) shipping

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE
<table>
<thead>
<tr>
<th>Specifications 4-Channel Low-Impedance Models</th>
<th>CX254</th>
<th>CX404</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTPUT POWER (Watts)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 - 20k Hz, 0.03% THD, 8 Ohms/Ch.</td>
<td>170</td>
<td>250</td>
</tr>
<tr>
<td>20 - 20k Hz, 0.05% THD, 4 Ohms/Ch.</td>
<td>256</td>
<td></td>
</tr>
<tr>
<td>1kHz, 1.0% THD (EIA), 8 Ohms/Ch.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1kHz, 1.0% THD (EIA), 4 Ohms/Ch.</td>
<td>450</td>
<td></td>
</tr>
<tr>
<td>Bridge Mono, 20 - 20k Hz, 0.1% THD, 8 Ohms/Ch.</td>
<td>340</td>
<td>500</td>
</tr>
<tr>
<td>Bridge Mono, 20 - 20k Hz, 0.1% THD, 4 Ohms/Ch.</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Bridge Mono, 1kHz, 1.0% THD, 8 Ohms/Ch.</td>
<td>900</td>
<td></td>
</tr>
<tr>
<td>Bridge Mono, 1kHz, 1.0% THD, 4 Ohms/Ch.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DISTORTION, SMPTE-IM</td>
<td>&lt;0.01%</td>
<td>&lt;0.01%</td>
</tr>
<tr>
<td>FREQUENCY RESPONSE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIGNAL to NOISE, unweighted, 20 - 20k Hz</td>
<td>-106 dB</td>
<td>-106 dB</td>
</tr>
<tr>
<td>VOLTAGE GAIN</td>
<td>29.0x (29dB)</td>
<td>36.5x (31dB)</td>
</tr>
<tr>
<td>INPUT SENSITIVITY, Vrms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>for rated power into 8 Ohms</td>
<td>1.28 (+4.4dBu)</td>
<td>1.22 (+3.9dBu)</td>
</tr>
<tr>
<td>for rated power into 4 Ohms</td>
<td>1.08 (+2.9dBu)</td>
<td>EIA: 1.16 (+3.5dBu)</td>
</tr>
<tr>
<td>OUTPUT CIRCUIT TYPE</td>
<td>AB</td>
<td>AB</td>
</tr>
<tr>
<td>INPUT IMPEDANCE</td>
<td>6k ohms unbalanced, 12k ohms balanced, all models</td>
<td></td>
</tr>
<tr>
<td>DYNAMIC HEADROOM</td>
<td>2 dB at 4 Ohms, all models</td>
<td></td>
</tr>
<tr>
<td>DAMPING FACTOR</td>
<td>&gt;500 at 8 Ohms, all models</td>
<td></td>
</tr>
<tr>
<td>AMPLIFIER PROTECTION</td>
<td>Short circuit, open circuit, thermal, ultrasonic and RF protection. Stable into reactive or mismatched loads</td>
<td></td>
</tr>
<tr>
<td>COOLING</td>
<td>Continuously variable speed fan; back-to-front air flow through heat sink tunnel</td>
<td></td>
</tr>
<tr>
<td>CONTROLS</td>
<td>Front: AC POWER switch, gain controls (1 control per channel, 21 detents)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Back: 10-position DIP switch (1 per channel pair) with Clip Limiter (1 per Ch.), LF Filter on/off (1 per Ch.), LF filter select: 33 or 50 Hz (1 per Ch.), Stereo/Parallel/Bridge mode selection switches (1 set per Ch. pair)</td>
<td></td>
</tr>
<tr>
<td>LED INDICATORS</td>
<td>POWER (green, 1 each), SIGNAL, -10dB, -20dB (green, 1 each per Ch.), CLIP (red, 1 each per channel), BRDG and PAR (yellow, 1 each per Ch. pair)</td>
<td></td>
</tr>
<tr>
<td>CONNECTORS</td>
<td>Input: 3-pin terminal block (&quot;euro&quot; or &quot;Phoenix&quot; type)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Output: barrier strip connectors with protective shroud, one barrier strip per Ch. pair</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other: two QSC DataPort connectors (supports full &quot;V1&quot; feature set), one DataPort per Ch. pair</td>
<td></td>
</tr>
<tr>
<td>LOAD PROTECTION</td>
<td>Turn-on/tumoff muting, AC coupling (DC fault blocking), Clip limiting</td>
<td></td>
</tr>
<tr>
<td>POWER REQUIREMENTS</td>
<td>Refer to rear panel serial number label. Configured at factory for 100, 120 or 220-240 VAC, 50-60 Hz</td>
<td></td>
</tr>
<tr>
<td>DIMENSIONS</td>
<td>19.0” (48.3 cm) W, 3.5” (8.9 cm) H, 14” (35.6 cm) D (from front mounting rails, including rear support ears)</td>
<td></td>
</tr>
<tr>
<td>WEIGHT</td>
<td>21 pounds (9.5 kg) net; 27 pounds (12.3 kg) shipping</td>
<td></td>
</tr>
</tbody>
</table>

**SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE**
## Specifications 2- and 4-Channel Distributed 70V Line Models

<table>
<thead>
<tr>
<th>Specification</th>
<th>CX204V</th>
<th>CX302V</th>
<th>CX602V</th>
<th>CX1202V</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OUTPUT POWER (Watts)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 - 20k Hz, 0.03% THD, 70V/Ch.</td>
<td>200</td>
<td>200</td>
<td>400</td>
<td>800</td>
</tr>
<tr>
<td>20 - 20k Hz, 0.03% THD, 8 Ohms/Ch.</td>
<td></td>
<td></td>
<td>500</td>
<td>700</td>
</tr>
<tr>
<td>20 - 20k Hz, 0.05% THD, 8 Ohms/Ch.</td>
<td></td>
<td></td>
<td>400</td>
<td>1100</td>
</tr>
<tr>
<td>1k Hz, 0.05% THD (EIA), 70V/Ch.</td>
<td>220</td>
<td>250</td>
<td>440</td>
<td>1000</td>
</tr>
<tr>
<td>1k Hz, 0.1% THD (EIA), 70V/Ch.</td>
<td>300</td>
<td>300</td>
<td>600</td>
<td>1200</td>
</tr>
<tr>
<td>Bridge Mono, 140V, 20 - 20k Hz, 0.1% THD</td>
<td>400</td>
<td>400</td>
<td>800</td>
<td>850</td>
</tr>
<tr>
<td>Bridge Mono, 140V, 1k Hz, 0.1% THD</td>
<td>440</td>
<td>600</td>
<td>1200</td>
<td>2400</td>
</tr>
<tr>
<td>Bridge Mono, 1k Hz, 0.1% THD, 16 Ohms</td>
<td>1200</td>
<td>1400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bridge Mono, 1k Hz, 0.1% THD, 8 Ohms</td>
<td></td>
<td></td>
<td>2300</td>
<td></td>
</tr>
<tr>
<td><strong>DISTORTION, SMPTE-IM</strong></td>
<td>&lt;0.02%, all models</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>FREQUENCY RESPONSE</strong></td>
<td>20 - 20k Hz, ±0.2dB at 10dB below rated output power, all models (-3dB points: 8 Hz and 100 kHz)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SIGNAL to NOISE, unweighted, 20 - 20k Hz</strong></td>
<td>-106 dB, all models</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>VOLTAGE GAIN</strong></td>
<td>56.6x (35dB) all models</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INPUT SENSITIVITY, Vrms</strong></td>
<td>1.26V (+4.2dBu) for rated power at 70.7V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OUTPUT CIRCUIT TYPE</strong></td>
<td>AB</td>
<td>AB</td>
<td>AB</td>
<td>H</td>
</tr>
<tr>
<td><strong>INPUT IMPEDANCE</strong></td>
<td>6k ohms unbalanced, 12k ohms balanced, all models</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DYNAMIC HEADROOM</strong></td>
<td>2 dB at 4 Ohms, all models</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DAMPING FACTOR</strong></td>
<td>&gt;500 at 8 Ohms, all models</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>AMPLIFIER PROTECTION</strong></td>
<td>Short circuit, open circuit, thermal, ultrasonic and RF protection. Stable into reactive or mismatched loads</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>COOLING</strong></td>
<td>Continuously variable speed fan; back-to-front air flow through heat sink tunnel</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **CONTROLS**                           | Front: AC POWER switch, gain controls (1 control per channel, 21 detents)  
|                                        | Back: 10-position DIP switch with Clip Limiter (1 per Ch.), LF Filter on/off (1 per Ch.), LF Filter select: 35 or 55 Hz (1 per Ch.), Stereo/Parallel/Bridge mode selection switches |
| **LED INDICATORS**                     | POWER (green, 1 each), SIGNAL, -10dB, -20dB (green, 1 each per Ch.), CLIP (red, 1 each per channel), BRDG and PAR (yellow, 1 each) |
| **CONNECTORS**                         | Input: 3-pin terminal blocks (“euro” or “Phoenix” type) and XLRs (pin 2 positive)  
|                                        | Output: barrier strip connectors with protective shroud  
|                                        | Other: QSC DataPort connector (supports full “V1” feature set) |
| **LOAD PROTECTION**                    | Turn-on/off muting, AC coupling (DC fault blocking), Clip limiting. |
| **POWER REQUIREMENTS**                 | Refer to rear panel serial number label. Configured at factory for 100, 120 or 220-240 VAC, 50-60 Hz. |
| **DIMENSIONS**                         | 19.0” (48.3 cm) W, 3.5” (8.9 cm) H, 14” (35.6 cm) D (from front mounting rails, including rear support ears) |
| **WEIGHT**                             | 21 pounds (9.5 kg) net; 27 pounds (12.3 kg) shipping |

**SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE**
## Thermal Loss Table

This table provides typical thermal loss in BTU/hr. and kcal/hr. for each model as a function of load and output power level.

- 1/8 power (pink noise) represents typical program with occasional clipping. Use this rating for most applications.
- 1/3 power (pink noise) represents severe program with heavy clipping.
- Full power (sine) are continuous sine wave driven at 1% clipping.

Thermal or overcurrent cutback limits duration of full power 2 Ohm operation.

### Current Draw Table (in Amperes)

This table provides typical current draw for each model as a function of load and output power level. Units of measurement are Amperes r.m.s.

NOTE! Current draw shown is for 120 VAC line. For 230 VAC models, multiply values shown by 0.5.

- 1/8 power (pink noise) represents typical program with occasional clipping. Use this rating for most applications.
- 1/3 power (pink noise) represents severe program with heavy clipping.
- Full power (sine) is continuous sine wave driven at 1% clipping.

Thermal or overcurrent cutback limits duration of full power 2 Ohm operation.

### Table Data

<table>
<thead>
<tr>
<th>Model</th>
<th>Load</th>
<th>Idle</th>
<th>1/8 Power (pink noise)</th>
<th>1/3 Power (pink noise)</th>
<th>Full Power (sine)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BTU/hr kcal/hr</td>
<td>BTU/hr kcal/hr</td>
<td>BTU/hr kcal/hr</td>
<td>BTU/hr kcal/hr</td>
<td>BTU/hr kcal/hr</td>
</tr>
<tr>
<td>C204V</td>
<td>120</td>
<td>35</td>
<td>1740</td>
<td>410</td>
<td>2825</td>
</tr>
<tr>
<td>8 Ohms (x2)</td>
<td>115</td>
<td>10</td>
<td>1115</td>
<td>275</td>
<td>1460</td>
</tr>
<tr>
<td>4 Ohms (x2)</td>
<td>115</td>
<td>10</td>
<td>1810</td>
<td>455</td>
<td>2340</td>
</tr>
<tr>
<td>C208</td>
<td>1045</td>
<td>80</td>
<td>1045</td>
<td>80</td>
<td>4435</td>
</tr>
<tr>
<td>8 Ohms (x2)</td>
<td>200</td>
<td>50</td>
<td>665</td>
<td>115</td>
<td>720</td>
</tr>
<tr>
<td>4 Ohms (x2)</td>
<td>200</td>
<td>50</td>
<td>395</td>
<td>75</td>
<td>1015</td>
</tr>
<tr>
<td>C404</td>
<td>740</td>
<td>60</td>
<td>1740</td>
<td>410</td>
<td>2755</td>
</tr>
<tr>
<td>8 Ohms (x4)</td>
<td>200</td>
<td>50</td>
<td>1125</td>
<td>245</td>
<td>1278</td>
</tr>
<tr>
<td>4 Ohms (x4)</td>
<td>200</td>
<td>50</td>
<td>565</td>
<td>115</td>
<td>570</td>
</tr>
<tr>
<td>C408</td>
<td>1570</td>
<td>395</td>
<td>1965</td>
<td>450</td>
<td>2340</td>
</tr>
<tr>
<td>8 Ohms (x4)</td>
<td>200</td>
<td>50</td>
<td>1570</td>
<td>395</td>
<td>2145</td>
</tr>
<tr>
<td>4 Ohms (x4)</td>
<td>200</td>
<td>50</td>
<td>785</td>
<td>170</td>
<td>920</td>
</tr>
<tr>
<td>C604</td>
<td>450</td>
<td>90</td>
<td>430</td>
<td>90</td>
<td>530</td>
</tr>
<tr>
<td>8 Ohms (x2)</td>
<td>200</td>
<td>50</td>
<td>1810</td>
<td>455</td>
<td>2340</td>
</tr>
<tr>
<td>4 Ohms (x2)</td>
<td>200</td>
<td>50</td>
<td>455</td>
<td>100</td>
<td>500</td>
</tr>
<tr>
<td>C802</td>
<td>8 Ohms (x2)</td>
<td>220</td>
<td>55</td>
<td>800</td>
<td>175</td>
</tr>
<tr>
<td>4 Ohms (x2)</td>
<td>220</td>
<td>55</td>
<td>400</td>
<td>85</td>
<td>510</td>
</tr>
<tr>
<td>C1102</td>
<td>1195</td>
<td>325</td>
<td>1195</td>
<td>325</td>
<td>1760</td>
</tr>
<tr>
<td>8 Ohms (x2)</td>
<td>220</td>
<td>55</td>
<td>1195</td>
<td>325</td>
<td>1760</td>
</tr>
<tr>
<td>4 Ohms (x2)</td>
<td>220</td>
<td>55</td>
<td>595</td>
<td>130</td>
<td>730</td>
</tr>
</tbody>
</table>

Downloaded from www.Manualslib.com manuals search engine

998 of 1217
Precauciones importantes de seguridad y explicación de los símbolos

1- Lea estas instrucciones.
2- Conserve estas instrucciones.
3- Observe todas las advertencias.
4- Siga todas las instrucciones.
5- ADVERTENCIA: Para prevenir incendios o descargas eléctricas, no exponga este equipo a la lluvia ni a la humedad. No use este aparato cerca del agua.
6- Limpie solo con un paño seco.
7- No obstruya ninguna abertura de ventilación.
8- No lo instale cerca de fuentes de calor tales como radiadores, registros térmicos, estufas ni otros aparatos (inclusive amplificadores) que produzcan calor.
9- No anule ningún elemento de seguridad de la clavija polarizada o de la clavija con conexión a tierra. Una clavija polarizada tiene dos hojas, una más ancha que la otra. Una clavija con conexión a tierra tiene dos hojas y un terminal de conexión a tierra. La hoja ancha o el tercer terminal se proporcionan para su seguridad. Si la clavija que se le proporciona no cabe en su tomacorriente, consulte con un electricista para reemplazar el tomacorriente obsoleto.
10- Proteja el cable de alimentación para que no camine sobre él ni se le comprima, particularmente las clavijas, las tomas de corriente y el punto en donde sale del aparato.
11- Use sólo piezas/accesorios especificados por QSC Audio Products, LLC.
12- Use sólo con herraje, soportes, estantes y componentes vendidos con el aparato o por QSC Audio Products, LLC.
13- Desenchufe el aparato durante tormentas eléctricas o cuando no lo vaya a usar durante periodos prolongados de tiempo.
14- Refiera todo el servicio a personal calificado. Es necesario dar servicio al aparato cuando sufra algún daño, como cuando se daña el cable de alimentación eléctrica o la clavija, cuando se derraman líquidos o caen objetos sobre el aparato, cuando éste ha estado expuesto a la lluvia o humedad, cuando no opere normalmente o cuando se haya caído.

El signo de exclamación dentro de un triángulo equilátero tiene la intención de alertar al usuario de la presencia de importantes instrucciones de operación y mantenimiento (servicio) en este manual.

Los rayos impresos cerca de los terminales de SALIDA del amplificador tienen la intención de alertar al usuario del riesgo de energía peligrosa.

Los conectores de salida que pudiesen representar un riesgo están marcados con el símbolo del rayo. No toque los terminales de salida mientras el amplificador está encendido. Asegúrese de que todas las conexiones con el amplificador estén apagadas.

El símbolo del rayo con una punta de flecha dentro de un triángulo equilátero tiene la intención de alertar al usuario de la presencia de voltaje "peligroso" no aislado dentro de la caja del producto, que puede ser de magnitud suficiente para constituir un riesgo de descarga eléctrica a los seres humanos.

PRECAUCIÓN: PARA REDUCIR EL RIESGO DE DESCARGA ELÉCTRICA, NO QUITE LA CUBIERTA. EL INTERIOR NO CONTIENE PIEZAS A LAS QUE EL USUARIO PUEDA DAR SERVICIO. REFIERA EL SERVICIO A PERSONAL CALIFICADO.

ADVERTENCIA: Para prevenir incendios o descargas eléctricas, no exponga este equipo a la lluvia ni a la humedad.

DECLARACIÓN DE LA FCC RESPECTO A LA INTERFERENCIA
NOTA: Este equipo ha sido probado y se ha determinado que cumple con los límites de un dispositivo digital Clase B, en virtud de la parte 15 de las reglas de la FCC. Estos límites están diseñados para proporcionar protección razonable contra interferencia dañina en una instalación residencial. Este equipo genera, usa y puede irradiar energía de radiofrecuencia, y si no se instala y usa de acuerdo con las instrucciones, puede causar interferencia dañina con las comunicaciones de radio. Sin embargo, no hay garantía que no ocurrirá interferencia en una instalación en particular. Si este equipo causa interferencia dañina a la recepción de radio o televisión, lo cual se puede determinar al apagar y encender el equipo, se recomienda al usuario que trate de corregir la interferencia en una o más de las siguientes maneras:
- Aumente la separación entre el equipo y el receptor.
- Conecte el equipo en un tomacorriente de un circuito diferente al cual está conectado el receptor.
- Consulte al distribuidor o a un técnico experimentado de radio o TV para solicitar ayuda.

© Copyright 2005 & 2007, QSC Audio Products, LLC
QSC® es una marca comercial registrada de QSC Audio Products, LLC.
“QSC” y el logotipo de QSC están registrados con la Oficina de Patentes y Marcas Comerciales de los Estados Unidos.
Todas las marcas comerciales son propiedad de sus respectivos dueños.
**Introducción**

Muchas gracias por la compra de este amplificador de potencia QSC. Por favor lea las siguientes instrucciones para obtener los mejores resultados.

El modelo CX tiene las siguientes características:
- Modelos de salida de 70V de baja impedancia o sin transformadores de 2 y de 4 canales
- Cada par de canales tiene su propio conector DataPort y conmutador de modo
- Los conectores DataPort QSC conectan a los accesorios y sistemas de supervisión QSC más avanzados
- Conmutadores de modo para límite de recorte, filtro de baja frecuencia, y entradas estereofónicas, monopuenteadas y paralelas
- Suministro de potencia de conmutación QSC PowerLight de alto rendimiento, compacto y ligero
- Protección y control completos del amplificador
- Conectores de salida con barra protectora
- Conectores de entrada balanceada XLR y de bloque de terminales
- Los controles de ganancia están empotrados y con retenes
- La cubierta de seguridad de los controles de ganancia evita las alteraciones
- La limitación activa de la corriente de entrada elimina la necesidad de secuenciación de la potencia
- Indicadores LED de potencia, modo paralelo o puenteado, presencia de señal de entrada, -20dB, -10dB, y recorte/protección
- Asas opcionales para el panel frontal
- Transformador IT-42 de salida aislada para CX302 para 25V, 70V y 100V (o modo puenteado de 50V, 140V y 200V)

**Desempaquete**

La caja empacada en fábrica contiene:
- Amplificador CX
- Manual del usuario
- Cubierta de seguridad para los controles de ganancia
- Patas adhesivas de caucho (para aplicaciones de montaje que no sean en bastidor)
- Conectores de entrada de tres patas al bloque de terminales
- Conectores de salida de lengüeta de pala
- Cable de alimentación desprendible tipo IEC

Cuando embarque el amplificador utilice el mismo tipo de caja.

**Panel frontal**

(Se muestra el modelo CX404, es similar a otros modelos)
**Montaje en bastidor**

Se muestran las asas opcionales. Use cuatro tornillos y arandelas para montar el amplificador en los rieles del bastidor del equipo. Para usar el amplificador sin bastidor, instale las patas de caucho autoadhesivas en la parte inferior.

**Enfriamiento**

El aire fluye desde el bastidor hacia el interior por la parte posterior del amplificador y hasta afuera por la parte frontal. Esto mantiene la rejilla fría. El ventilador automáticamente funciona más rápido cuando el amplificador está trabajando mucho.

¡No obstruya las ventilas frontales o posteriores!

**Conexión a la línea principal de CA**

Conecte la CA en el receptáculo IEC que se encuentra en la parte posterior del amplificador. NOTA: Apague el conmutador de CA antes de conectar la CA. El conmutador de CA debe estar encendido para usar los sistemas de control remoto o la función de Espera.

El voltaje correcto de la línea de CA se muestra en la etiqueta del número de serie que se encuentra en el panel posterior. Si se conecta un voltaje de línea incorrecto se puede dañar el amplificador o aumentar el riesgo de una descarga eléctrica.
Ajuste de los conmutadores de modo

Modelos de dos canales: Un conmutador de modo controla la limitación de recorte independiente y la filtración de baja frecuencia (LF) de cada canal. Los conmutadores pueden ajustar el modo de operación del amplificador en estéreo, paralelo o en puente.

Modelos de cuatro canales: Hay dos conmutadores de modo; uno controla la operación de los canales 1-2, y el otro controla la operación de los canales 3-4. No es posible conectar en puente o en paralelo los canales 1 o 2 con los canales 3 o 4.

Ajuste de los limitadores de recorte

Cada canal tiene un limitador de recorte con su propio conmutador de encendido y apagado. El limitador sólo responde al recorte real, y compensa automáticamente las variaciones de carga y de voltaje. Generalmente se recomienda la limitación de recorte, especialmente para proteger excitadores de alta frecuencia.

Ajuste el conmutador HACIA ARRIBA (posición de ENCENDIDO) para usar la limitación de recorte.
El conmutador 1 controla el primer canal.
El conmutador 10 controla el segundo canal.

Selección del modo Estéreo, Paralelo o Puenteado

Cada uno de los pares de canales se pueden ajustar para operar en modo estéreo normal, modo de entrada en paralelo o modo monopuenteado. En modelos de cuatro canales, el canal 1 se puede conectar en puente o en paralelo con el canal 2; el canal 3 se puede conectar en puente o en paralelo con el canal 4.

Modo estéreo: Cada canal dentro del par permanece independiente, y cada uno se puede usar para una señal diferente.

Modo paralelo: Este ajuste conecta entre sí ambas entradas de un par. Una señal alimenta ambos canales. No conecte fuentes diferentes a cada entrada. El control de ganancia y la conexión del altavoz de cada canal permanecen independientes.

Modo puenteado: Este ajuste combina ambos canales de un par en un solo canal con dos veces el voltaje de salida. Use sólo la entrada y el control de ganancia del primer canal. Ajuste el control de ganancia del segundo canal al mínimo.

No conecte entradas diferentes a cada lado de un par de canales cuando opere en modo paralelo o puenteado.

Ajuste de los filtros de baja frecuencia

Cada canal tiene un filtro de baja frecuencia de 12dB por octava que se puede activar o desactivar. Los modelos de baja impedancia se pueden ajustar para 33 o para 75 Hertzios y una salida distribuida (modelos "V") para 50 o 75 Hertzios para prevenir la saturación de los transformadores del altavoz de 70V. Esto reduce la deformación y evita la sobrecarga del amplificador.

Modelos de baja impedancia: El filtro sólo se debe desactivar para accionar los subwoofers. El ajuste de 33 Hz generalmente funciona bien con altavoces que tienen excitadores LF (de 12" o más). El ajuste de 75 Hz funciona bien con altavoces compactos (de menor tamaño). Revise las especificaciones de los altavoces y seleccione el ajuste que sea más similar a la capacidad de baja frecuencia del altavoz.

Modelos de impedancia alta ("V"): El filtro sólo se debe desactivar para accionar los subwoofers con transformadores especiales de baja frecuencia. El ajuste de 50 Hz usualmente funciona bien con transformadores de altavoces de alta calidad. El ajuste de 75 Hz funciona bien con altavoces y transformadores de calidad paralante.
DataPort

Los modelos de dos canales tienen un DataPort, los modelos de cuatro canales tienen dos DataPorts (uno para los canales 1-2, uno para los canales 3-4). El DataPort se conecta a accesorios y dispositivos de procesamiento QSC opcionales. Los dispositivos DataPort permiten el control remoto de las funciones de filtrado y cruce. El DataPort del CX apoya todo el conjunto de características del DataPort "V1". Los modelos de dos canales soportan "módulos" DSP directamente montados. Los modelos de cuatro canales requieren el montaje remoto de módulos accesorios conectados con cables DataPort.

Cada DataPort se conecta a su respectivo par de canales; canales 1-2 o canales 3-4. Cada par de canales puede usar su DataPort o las entradas del bloque de terminales. Cuando se use el DataPort, no lo conecte a las entradas del bloque de terminales de ese canal. La espera del amplificador es controlada solamente por el DataPort de los canales 1-2.

Sugerencias sobre el DataPort:
1- El DataPort 1-2 controla la característica de espera para todo el amplificador. El conmutador de CA se debe ENCENDER antes de que el DataPort pueda controlar la potencia.
2- Cada DataPort controla y supervisa las señales a su respectivo par de canales (canales 1-2, canales 3-4).
3- No utilice los conmutadores de modo monopuenteado o paralelo cuando utilice las entradas DataPort. Es posible que se reduzca el nivel de la señal. Si desea más información consulte el Manual del Propietario del dispositivo DataPort.
4- Normalmente se usa un dispositivo DataPort para controlar la ganancia de la señal antes de que entre en el amplificador. Ajuste los controles de ganancia del panel frontal al máximo después de confirmar la operación correcta. Si lo desea, instale la cubierta protectora para evitar alteraciones.
5- Cada canal utiliza un disipador de calor interno separado. Las temperaturas del disipador de calor se reportan en el DataPort de ese par.
6- Consulte con su distribuidor QSC o visite el sitio Web de QSC para ver los últimos productos DataPort.

Entradas:
Cada canal tiene una entrada balanceada de tres patas al bloque de terminales. Los modelos de dos canales también tienen entradas XLR. La impedancia de entrada es de 12k ohmios balanceada o 6k ohmios no balanceada. En la caja se incluye un conjunto de conectadores del bloque de terminales. El cableado del bloque de terminales está conectado con simples herramientas de mano, y las entradas se pueden cambiar rápidamente. Las entradas XLR están conectadas con cables estándar y se pueden cambiar rápidamente. Los conjuntos de patas están marcados en el panel posterior.

Se recomiendan conexiones balanceadas para reducir el zumbido y la interferencia de la CA, especialmente en tramos largos de cable. Las conexiones no balanceadas pueden ser adecuadas para tramos cortos de cable. La impedancia de la fuente de la señal debe ser menor de 600 ohmios. Si el DataPort que se está usando es para señales de entrada, no conecte los cables en los bloques de terminales.

Conectadores del bloque de terminales.

Entradas balanceadas: Quite 1/4 de pulgada (6 mm) de aislamiento del cable y conecte la clavija como se muestra Asegúrese de apretar firmemente los tornillos.

Entradas no balanceadas: Quite 1/4 de pulgada (6 mm) de aislamiento del cable y conecte la clavija como se muestra. La pata central debe estar conectada con la pata de blindaje como se muestra. Asegúrese de apretar firmemente los tornillos.

Entradas XLR (solamente modelos de dos canales)

Entradas balanceadas: Conecte a la clavija como se muestra.

Entradas no balanceadas: Conecte a la clavija como se muestra. La pata 3 y la pata 1 se deben conectar con un puente como se muestra.
**Salidas**

Las conexiones del cableado se muestran en la parte posterior del chasis. Note detenidamente las marcas de polaridad, que están configuradas para facilitar las conexiones del modo puenteado. En el ejemplo se muestran los modelos de cuatro canales; los modelos de dos canales son similares.

¡ADVERTENCIA SOBRE LA SEGURIDAD DE LOS TERMINALES DE SALIDA!

No toque los terminales de salida mientras el amplificador está encendido. Asegúrese de que todas las conexiones con el amplificador estén apagadas. ¡Riesgo de energía peligrosa!

**Salidas de baja impedancia**

- **Modo estéreo y en paralelo**: Conecte cada altavoz a su propio canal del amplificador, como se muestra en la etiqueta del chasis. Los conmutadores de configuración de modo deben ajustarse en modo estéreo o paralelo.

- **Modo puenteado**: El modo puenteado configura el par de canales para que excite una sola carga de alta potencia del altavoz. Los conmutadores de configuración de modo se deben ajustar en el modo puenteado. Use sólo la entrada y el control de ganancia del primer canal. Ajuste el control de ganancia del segundo canal al mínimo.

- **Conexión en estéreo o en paralelo de baja impedancia**: Cada carga de altavoz se conecta a su canal respectivo. Asegúrese de que todas las conexiones del altavoz mantengan la polaridad adecuada.

- **Salidas distribuidas (modelos "V", 70V/140V)**
  - **Modo estéreo y en paralelo**: Conecte cada circuito de 70V a su propio canal del amplificador, como se muestra en la etiqueta del chasis. Los conmutadores de configuración de modo deben ajustarse en modo estéreo o paralelo.
  - **Salida de 70V**: ¡Riesgo de energía peligrosa! Se debe usar un cableado Clase 2 para las salidas de 70V.
  - **Modo puenteado**: El modo puenteado configura el par de canales para que excite a un solo circuito de sonido de 140V/200V. Los conmutadores de configuración de modo se deben ajustar en el modo puenteado. Use sólo la entrada y el control de ganancia del primer canal. Ajuste el control de ganancia del segundo canal al mínimo. Conecte la carga como se muestra en la etiqueta del chasis.

PRECAUCIONES CON EL MODO PUENTEADO DE 140V:

El cableado de Clase 3 se debe usar para las salidas monopuenteadas de 140V.

Conecte sólo circuitos de sonido distribuido de 140V en modo puenteado.

¡No use cargas de 70V en modo puenteado! Use los canales de modo estéreo o paralelo para excitar cargas de 70 V. 140V es el mínimo para una operación de modo puenteado.

**Cargas clasificadas por modelo**

<table>
<thead>
<tr>
<th>Carga</th>
<th>LOAD</th>
<th>CX254</th>
<th>CX362</th>
<th>CX404</th>
<th>CX582</th>
<th>CX782</th>
<th>CX802</th>
<th>CX1182</th>
<th>CX2040V</th>
<th>CX1382V</th>
<th>CX3420V</th>
<th>CX1420V</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Ohms</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
</tr>
<tr>
<td>4 Ohms</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
</tr>
<tr>
<td>8 Ohms</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
</tr>
<tr>
<td>16 Ohms</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
</tr>
<tr>
<td>70 Volts</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
</tr>
<tr>
<td>140 Volts</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
<td>S/P</td>
</tr>
</tbody>
</table>

Un asterisco (*) indica que el modelo está clasificado para la carga.

(S/P)= Modo estéreo/paralelo
(Br.)= Modo puenteado

**PRECAUCIONES:**

¡Asegúrese de que el amplificador modelo que está usando esté clasificado para la carga!
**Indicadores LED**

Los indicadores LED se pueden usar para supervisar la operación del sistema e identificar problemas comunes.

**POTENCIA:** VERDE, sobre los indicadores de PUENTE (BRDG) y PARALELO (PAR).

- **Indicación normal:** Comutador de CA ENCENDIDO: El LED se iluminará.
- **Si no hay indicación:** Revise el cable de alimentación de CA y el tomacorrientes de CA. Confirme que el DataPort 1-2 no esté reteniendo al amplificador en modo de 'Espera'.

**RECORTE:** ROJO, adyacente a las marcas de números del canal.

- **Indicación normal:** Se ilumina siempre que el amplificador se excita a más de la potencia total. La deformación resultante corresponde a la brillantez del LED. La deformación que causa sólo un destello breve puede no ser audible.
- **Durante el silenciamiento, el LED se ilumina completamente. Esto ocurre durante el silenciamiento "Encendido-Apagado" normal.**
- **Indicación anormal:**
  - Una iluminación roja brillante cuando el amplificador se está usando indica ya sea silenciamiento térmico o una salida cortocircuitada.
  - Si el amplificador se sobrecalienta, el ventilador funcionará a toda velocidad, y la operación se debe reanudar en un lapso de un minuto. Permita el funcionamiento del ventilador y asegúrese de que la ventilación del amplificador sea adecuada.
  - Un circuito de salida cortocircuitado o sobrecargado causará destello excesivo de recorte y posiblemente calentamiento excesivo.
  - Si la deformación es audible sin una indicación de recorte, el problema es ya sea antes o después del amplificador. Revise si los altavoces están dañados o si la fuente de la señal está sobrecargada. El control de ganancia del amplificador debe estar en la mitad superior de su intervalo para evitar la sobrecarga de la entrada.

**SEÑAL, -20dB, -10dB:** VERDE, debajo de cada LED de recorte.

- **Indicación normal:** El indicador de SEÑAL se ilumina cuando la señal de entrada excede -35 dB, el indicador de -20dB se ilumina cuando la señal excede -20dB, y el indicador de -10dB se ilumina cuando la señal excede -10dB.
- **Si no hay indicación:** Revise los ajustes de ganancia y aumente la ganancia si es necesario. Revise las conexiones de entrada y la fuente de audio para ver si hay señal. Si el LED de recorte se ilumina con poca o nada indicación de señal, revise el cableado de salida para ver si hay algún cortocircuito.
- **Indicación anormal:** Si la SEÑAL (SIG), el LED de -20dB o el LED de -10dB se ilumina sin entrada de señal, puede haber oscilaciones del sistema o algún otro mal funcionamiento. Desconecte la carga y reduzca totalmente la ganancia. Si el LED permanece encendido, es posible que el amplificador necesite servicio.

**BRDG y PAR:**

Cada par de canales tiene un LED AMARILLO para el modo de puenteado y un LED ANARANJADO para el modo paralelo. Estos muestran la manera en que están ajustados los comutadores del panel posterior (véase Ajuste de los comutadores de modo). En el modo estéreo, ambos LED deben estar APAGADOS.
Controles de Ganancia

Los controles de ganancia están empotrados y se pueden ajustar con un destornillador pequeño o con una herramienta plana. Si se desea, se puede instalar la cubierta de seguridad del control de ganancia para evitar que se hagan cambios a los ajustes del instalador.

Gire hacia la derecha los controles de ganancia para aumentar la ganancia y hacia la izquierda para reducir la ganancia. La ganancia de máximo voltaje del amplificador varía dependiendo de la designación del modelo. La ganancia de máximo voltaje para cada modelo se muestra en la etiqueta del panel frontal entre paréntesis, junto al ajuste de atenuación de 0dB.

Los controles de ganancia están marcados en dB de atenuación. Hay 21 retenes para ajustes repetibles. Los 14 pasos superiores son de aproximadamente 1 dB cada uno, y normalmente los ajustes deben hacerse dentro de este intervalo. El intervalo menor de -14 dB no se debe usar para los niveles normales del programa, ya que se podría exceder el espacio libre de entrada, pero se puede usar para hacer pruebas a niveles reducidos. En el ajuste mínimo, la señal se corta completamente.

Placa de Seguridad del Control de Ganancia

La cubierta bloquea el acceso a los ajustes de ganancia. Los indicadores LED aún están visibles para supervisar la operación del sistema.

1. Use un destornillador hexagonal de 9/64" o de 3.5 mm para aflojar el tornillo varias vueltas. No lo saque completamente.
2. Deslice el extremo derecho de la cubierta debajo del tornillo aflojado.
3. Introduzca las lengüetas terminales izquierdas en la última fila de ranuras de ventilación, y deslícelas completamente hacia la derecha. Se deben fijar en las ranuras.
4. Confirme que los LED sean visibles a través de la cubierta. Apriete cuidadosamente el tornillo hexagonal.

El modelo CX902 se muestra con la placa de seguridad del control de ganancia instalada.
### Tabla de pérdida térmica

Esta tabla proporciona la pérdida térmica típica en BTU/hr. y en kcal/hr. para cada modelo como una función de la carga y del nivel de potencia de salida.

- 1/8 de potencia (ruido rosa) representa el programa típico con recorte ocasional. Use esta clasificación para la mayoría de las aplicaciones.
- 1/3 de potencia (ruido rosa) representa un programa de sonido pesado con recorte excesivo.
- La potencia total (sello) es una onda senoidal continua excitada a un recorte del 1%. La reducción térmica o de la sobrecorriente limita la duración de la operación de potencia total de 2 ohmios.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CDM64</td>
<td>200</td>
<td>50</td>
<td>135</td>
<td>145</td>
<td>135</td>
<td>145</td>
</tr>
</tbody>
</table>

### Tabla de gasto de corriente (en amperios)

Esta tabla proporciona la corriente típica gastada para cada modelo como una función de la carga y del nivel de potencia de salida. Las unidades de medición son Amperes r.m.s.

- 1/8 de potencia (ruido rosa) representa el programa típico con recorte ocasional. Use esta clasificación para la mayoría de las aplicaciones.
- 1/3 de potencia (ruido rosa) representa un programa de sonido pesado con recorte excesivo.
- La potencia total (sello) es una onda senoidal continua excitada a un recorte del 1%. La reducción térmica o de la sobrecorriente limita la duración de la operación de potencia total de 2 ohmios.

### Cómo comunicarse con QSC Audio Products

**Dirección postal:**
QSC Audio Products, LLC
1675 MacArthur Boulevard
Costa Mesa, CA 92626-1458 EE.UU.

**Números de teléfono:**
- Número principal: (714) 754-6175
- Ventas y Comercialización: (714) 957-7100 o número sin costo (sólo EE.UU.) (800) 854-4079
- Servicio al cliente: (714) 957-7150 o línea sin costo (sólo en EE.UU.) (800) 772-2834

**Números de fax:**
- Ventas y Comercialización FAX: (714) 754-6174
- Servicio al Cliente FAX: (714) 754-6173

**World Wide Web:**
www.qscaudio.com

**Correo electrónico:**
- info@qscaudio.com
- service@qscaudio.com

---

Downloaded from www.Manualslib.com manuals search engine
Précautions importantes et explication des symboles

1- Lire ces instructions.
2- Conserver ces instructions.
3- Respecter tous les avertissements.
4- Suivre toutes les instructions.
5- AVERTISSEMENT : Pour écarter les risques d’incendie et d’électrocution, ne pas exposer ce matériel à la pluie ou l’humidité. Ne pas utiliser cet appareil près de l’eau.
6- Nettoyer uniquement avec un chiffon sec.
7- Ne pas bloquer les bouches d’aération.
8- N’installer à proximité d’aucune source de chaleur comme des radiateurs, des registres de chaleur, des poêles ou d’autres appareils (y compris des amplis) qui dégagent de la chaleur.
9- Ne pas éliminer la sécurité de la fiche polarisée ou de terre. Une fiche polarisée comporte deux broches, l’une étant plus large que l’autre. Une fiche de terre a trois broches dont une broche de terre. La broche large ou troisième broche assure la sécurité. Si la fiche fournie n’entre pas dans la prise, consulter un électricien pour faire remplacer la prise absolument.
10- Protéger le cordon d’alimentation pour que personne ne puisse marcher dessus, qu’il ne puisse pas être pincé, surtout les fiches, les prises confort et le point d’émergence du cordon de l’appareil.
11- Utiliser uniquement les accessoires spécifiés par QSC Audio Products, LLC
12- Utiliser uniquement avec la visserie, les supports, socles et composants vendus avec l’appareil ou par QSC Audio Products, LLC
13- Débrancher l’appareil en cas d’orage électrique ou lorsqu’il est inutilisé pendant longtemps.
14- Confiert toutes les réparations à un personnel qualifié. Une réparation s’impose lorsque l’appareil a été endommagé d’une manière quelconque, par exemple endommagement du cordon d’alimentation ou de sa fiche, déversement de liquide ou chute d’objets sur ou à l’intérieur de l’appareil, exposition de l’appareil à la pluie ou l’humidité, fonctionnement anormal ou chute de l’appareil.

Le point d’exclamation dans un triangle équilatéral a pour objet de signaler à l’utilisateur la présence d’instructions importantes d’utilisation et de maintenance (réparation) dans ce manuel.

Les éclairs apparaissant à côté des bornes de sortie (OUTPUT) de l’amplificateur ont pour objet de signaler à l’utilisateur le risque que présente une énergie dangereuse. Les connecteurs de sortie pouvant poser un risque sont signalés par un éclat. Ne pas toucher les bornes de sortie lorsque l’amplificateur est sous tension. Etablir tous les branchements avec l’amplificateur hors tension.

L’éclair fléché situé dans un triangle équilatéral a pour objet de signaler à l’utilisateur la présence d’une tension « dangereuse » non isolée dans le boîtier du produit suffisante pour présenter un risque d’électrocution pour l’homme.

ATTENTION : POUR RÉDUIRE LES RISQUE D’ÉLECTROCUTION, NE PAS RETIRER LE CAPOT. AUCUNE PIÈCE RÉPARABLE PAR L’UTILISATEUR À L’INTÉRIEUR. CONFIER TOUTE RÉPARATION À UN PERSONNEL QUALIFIÉ.

AVERTISSEMENT : Pour écarter les risques d’incendie et d’électrocution, ne pas exposer ce matériel à la pluie ou l’humidité.

DÉCLARATION DE LA FCC RELATIVE AUX INTERFÉRENCES

REMARCQ : Suite à des tests, cet appareil s’est avéré conforme aux limites d’un appareil numérique de classe B, dans le cadre de la section 15 des règlements de la FCC. Ces limites visent à fournir une protection raisonnable contre les interférences nuisibles dans une installation résidentielle. Cet appareil produit, utilise et peut rayonner une énergie haute fréquence et, s’il n’est pas installé et utilisé conformément aux instructions, il risque d’interférer avec les communications radio. Toutefois, il n’est pas possible de garantir l’absence d’interférences dans une installation particulière. Si cet appareil cause des interférences nuisibles à la réception radio ou TV, ce qui peut être déterminé en l’éteignant puis en le rallumant, l’utilisateur est encouragé à essayer de corriger l’interférence en prenant l’une au moins des mesures suivantes : Récupération ou déplacement de l’antenne réceptrice, Éloignement de l’appareil par rapport au récepteur, Branchement de l’appareil sur une prise secteur appartenant à un autre circuit que celui du récepteur, Solllicitation de l’assistance du revendeur ou d’un spécialiste radio/TV.

© Copyright 2005 & 2007, QSC Audio Products, LLC
QSC® est une marque déposée de QSC Audio Products, LLC
QSC et le logo QSC sont des marques déposées auprès de l’U.S. Patent and Trademark Office.
Toutes les marques de commerce appartiennent à leur propriétaire respectif.
Introduction

Merci d’avoir acheté cet amplificateur QSC. Prière de lire les instructions suivantes pour obtenir les meilleurs résultats.

La série des modèles CX comporte :
- des modèles 2 ou 4 canaux à faible impédance ou des modèles 70 V sans transformateur
- chaque paire de canaux a son propre DataPort et commutateur de mode
- les ports de données DataPort QSC permettent un branchement sur les accessoires et systèmes de contrôle QSC les plus avancés
- commutateurs de mode pour limite d’amplitude, filtre basse fréquence, stéréo, pont mono et entrées parallèles
- alimentation à découpage haute performance, compact et légère QSC PowerLight
- protection et contrôle complets de l’amplificateur
- connecteurs de sortie de bornier à cloisons
- connecteurs d’entrée équilibrés de bornier et XLR
- Commandes de gain encastrées et à détente
- couvercle de sécurité pour commandes de gain empêchant toute altération
- la limitation de courant d’appel active élimine la nécessité de séquencement d’alimentation
- voyants d’alimentation, mode parallèle ou pont, présence de signal d’entrée, -20dB, -10dB et limite d’amplitude/protection
- poignées de panneau avant en option
- transformateur de sortie isolé IT-42 en option pour CX302 pour 25 V, 70 V et 100 V (ou mode pont 50 V, 140 V et 200 V)

Déballage

Le carton préparé en usine contient les éléments suivants :
- amplificateur CX
- manuel d’utilisation
- couvercle de sécurité pour commandes de gain
- pieds en caoutchouc adhésifs (pour installations sans bâti)
- connecteurs d’entrée du bornier à 3 broches
- connecteurs de sortie embrochables
- cordon d’alimentation détachable du type CEI

Utiliser le même type de carton pour renvoyer l’amplificateur.

Panneau avant

(CX404 en photo, autres modèles similaires)
Installation sur bâti
Pour utiliser l’amplificateur hors d’un bâti, attacher les pieds en caoutchouc auto-adhésifs à la base.

Refroidissement
L’air circule à partir du bâti, passe par l’arrière de l’amplificateur et en ressort par devant. Le bâti se trouve ainsi refroidi. Le ventilateur tourne automatiquement plus vite lorsque l’amplificateur fonctionne à haute puissance.

Branchement de l’alimentation secteur (~)
Connecter l’alimentation secteur (~) à la prise CEI située à l’arrière de l’amplificateur. REMARQUE : Placer l’interrupteur de marche/arrêt sur Arrêt avant de brancher sur secteur. L’interrupteur de marche/arrêt doit être sur Marche pour permettre l’utilisation de systèmes de télécommande ou la fonction Attente.

La tension secteur (~) correcte est indiquée sur l’étiquette du numéro de série, sur le panneau arrière. Le branchement de l’amplificateur sur une tension secteur incorrecte risque d’endommager l’appareil et d’augmenter le risque d’électrocution.
Réglage des commutateurs de mode

Modèles à 2 canaux : un commutateur de mode commande le limitation d’amplitude et le filtrage basse fréquence (LF) indépendants pour chaque canal. Les commutateurs peuvent régler le mode de fonctionnement de l’amplificateur sur Stéréo, Parallèle ou Pont.

Modèles à 4 canaux : deux commutateurs de mode ; l’un commande le fonctionnement des canaux 1 et 2, l’autre celui des canaux 3 et 4. Il est impossible de brancher en pont ou en parallèle le canal 1 ou 2 avec le canal 3 ou 4.

Réglage des limiteurs d’amplitude

Chaque canal a un limiteur d’amplitude et son propre interrupteur de marche/arrêt. Le limiteur répond uniquement à une limitation réelle et compense automatiquement les variations de charge et de tension. La limitation de l’amplitude est généralement recommandée, surtout pour protéger les étages d’attaque de haute fréquence.

Relier le commutateur (position Marche) pour utiliser la fonction de limitation d’amplitude.
Le commutateur 1 commande le premier canal.
Le commutateur 10 commande le second canal.

 Sélection du mode Stéréo, Parallèle ou Pont

Chacune des paires de canaux peut être réglée pour un fonctionnement stéréo normal, un mode d’entrée parallèle ou un mode pont mono. Sur les modèles à 4 canaux, le canal 1 peut être branché en pont ou en parallèle avec le canal 2 ; le canal 3 peut être branché en pont ou en parallèle avec le canal 4.

Mode stéréo - Chaque canal de la paire reste indépendant et peut être utilisé pour un signal différent.

Mode parallèle - Ce réglage connecte les deux entrées d’une paire. Un signal alimente les deux canaux. Ne pas brancher de sources différentes sur chaque entrée. Les connexions de commande de gain et de haut-parleur de chaque canal restent indépendantes.

Mode Pont - Ce réglage combine les deux canaux d’une paire en un canal unique présentant deux fois la tension de sortie. Utiliser uniquement la commande de gain du second canal.

Ne pas connecter différentes entrées de chaque côté d’une paire de canaux en mode parallèle ou pont.

Réglage des filtres basse fréquence

Chaque canal a un filtre basse fréquence de 12 dB par octave qui peut être activé ou désactivé. Les modèles à faible impédance peuvent être réglés pour une sortie de 33 ou 75 Hz et les modèles V (sortie distribuée) pour 50 ou 75 Hz afin d’empêcher la saturation des transformateurs des haut-parleurs de 70 V. Ceci réduit la distorsion et empêche la surcharge de l’amplificateur.

Modèles à faible impédance : Le filtre doit uniquement être désactivé pour le pilotage de caissons d’extrêmes graves. Le réglage 33 Hz fonctionne généralement bien avec des haut-parleurs munis de grands étages d’attaque LF (de 30,5 cm et plus). Le réglage 75 Hz fonctionne bien avec les haut-parleurs compacts (petite taille). Consultez les caractéristiques techniques du haut-parleur et sélectionnez le réglage le plus proche de sa capacité basse fréquence.

Modèles à haute impédance (modèles V) : Le filtre doit uniquement être coupé pour le pilotage de caissons d’extrêmes graves dotés de transformateurs basse fréquence spéciaux. Le réglage 50 Hz fonctionne généralement bien avec des transformateurs de haut-parleurs de haute qualité. Le réglage 75 Hz fonctionne bien avec les haut-parleurs et transformateurs de qualité phonie.
DataPort

Les modèles à 2 canaux ont un DataPort ; les modèles à 4 canaux ont deux DataPort (un pour les canaux 1 et 2, un pour les canaux 3 et 4). Le DataPort permet le branchement d'accessoires et dispositifs de traitement QSC en option. Les dispositifs DataPort proposent des fonctions de télécommande (pour mise en attente), contrôle, processeur de champ sonore numérique, filtre et filtre passif. Le DataPort du CX prend en charge l'ensemble complet des fonctions DataPort V1. Les modèles à 2 canaux prennent en charge le montant à distance des modules accessoires branchés à l'aide de câbles DataPort.

Chaque DataPort se connecte à sa paire de canaux respective : C. 1-2 ou C. 3-4. Chaque paire de canaux peut utiliser son DataPort ou les entrées du bornier. Si le DataPort est utilisé, ne pas effectuer de branchement aux entrées de bornier de ce canal. La mise en attente de l'amplificateur est commandée uniquement par le DataPort C.1-2.

Conseils relatifs aux connecteurs DataPort :
1- Le DataPort 1-2 commande la fonction Attente pour l'ensemble de l'amplificateur. L'interrupteur de marche/arrêt doit être mis sur Marche pour que le DataPort puisse commander l'alimentation.
2- Chaque DataPort commande et contrôle les signaux en fonction de sa paire de canaux respective (C. 1-2, C. 3-4).
3- Ne pas utiliser les commutateurs de mode Pont mono ou Parallèle avec des entrées DataPort. Le niveau du signal pourrait s'en trouver réduit.
4- Un dispositif DataPort est normalement utilisé pour régler le gain du signal avant son entrée dans l'amplificateur. Régler les commandes de gain du panneau avant au maximum après avoir confirmé le fonctionnement correct. Au besoin, installer le couvercle de protection pour empêcher que quelqu'un y touche.
5- Chaque canal utilise un dissipateur de chaleur interne séparé. Les températures du dissipateur de chaleur sont signalées au DataPort de cette paire.
6- Consulter un revendeur QSC ou le site Web QSC pour se renseigner sur les derniers produits DataPort.

Entrées
Chaque canal a une entrée de bornier à 3 broches équilibrée. Les modèles à 2 canaux ont également des entrées XLR. L'impédance d'entrée est de 12 kio-ohms (équilibrée) ou de 6 kio-ohms (non équilibrée). Un ensemble de connecteurs de bornier se trouve dans le carton. Le câblage du bornier se connecte à l'aide d'outils manuels simples et les entrées se changent rapidement. Les entrées XLR sont connectées par des câbles standard et peuvent être changées rapidement. La légende des broches se trouve sur le panneau arrière.

Les connexions équilibrées sont recommandées pour diminuer le ronflement et les interférences, surtout avec de longs câbles. Les connexions non équilibrées peuvent être adaptées à des câbles courts. L'impédance de source du signal doit être inférieure à 600 ohms. Si le DataPort est utilisé pour les signaux d'entrée, ne pas connecter de câbles aux borniers.

Connecteurs de bornier

Entrées équilibrées : dénuder les fils sur 6 mm et connecter à la fiche comme illustré. Serrer fermement les vis.

Entrées non équilibrées : dénuder les fils sur 6 mm et connecter à la fiche comme illustré. La broche centrale doit être connectée comme suit à la broche de protection. Serrer fermement les vis.

Entrées XLR (modèles à 2 canaux seulement)

Entrées équilibrées: connecter à la fiche comme illustré.

Entrées non équilibrées: connecter à la fiche comme illustré. Les broches 3 et 1 doivent être connectées avec un cavalier comme illustré.
Sorties

CONSIGNE DE SÉCURITÉ LIÉE AUX BORNES DE SORTIE ! Ne pas toucher les bornes de sortie lorsque l’amplificateur est sous tension. Établir tous les branchements avec l’amplificateur hors tension. Risque d’énergie dangereuse !

Sorties à faible impédance
Mode Stéréo et Parallèle - Connecter chaque haut-parleur à son propre canal de l’amplificateur, comme illustré sur l’étiquette du châssis. Les commutateurs de configuration de mode doivent être régulés conformément au mode Stéréo ou Parallèle.

Mode Pont - Le mode Pont configure la paire de canaux sélectionnée pour piloter une charge unique de haut-parleur grande puissance. Les commutateurs de configuration de mode doivent correspondre au réglage du mode Pont. Utiliser uniquement l’entrée et la commande de gain du premier canal. Régler au minimum la commande de gain du second canal.

Sorties distribuées (modèles V, 70 V/140 V)
Mode Stéréo et Parallèle - Connecter chaque circuit de 70 V à son propre canal de l’amplificateur, comme illustré sur l’étiquette du châssis. Les commutateurs de configuration de mode doivent être régulés conformément au mode Stéréo ou Parallèle.

Sortie 70 V - Risque d’énergie dangereuse ! Un câblage de classe 2 doit être utilisé pour les sorties 70 V.


PRÉCAUTIONS LIÉES AU MODE PONT 140 V :
Un câblage de classe 3 doit être utilisé pour les sorties 140 V mono en pont.

Connecter uniquement des circuits audio distribués 140 V en mode Pont. Ne pas utiliser de charges 70 V en mode Pont ! Utiliser les canaux de mode Stéréo ou Parallèle pour piloter des charges de 70 V. 140 V est la charge minimale pour un fonctionnement en mode Pont.

Charges nominales indiquées par modèle
S’assurer que l’amplificateur utilisé a des valeurs nominales adaptées à la charge !

Un astérisque (*) indique le modèle est adapté à la charge.
(S/P) = mode Stéréo/Parallèle
(Br.) = mode Pont
**Voyants**

Des voyants peuvent être utilisés pour contrôler le fonctionnement du système et identifier les problèmes courants.

**POWER** : VERT, au-dessus des voyants BRIDGE (BRDG) et PARALLEL (PAR).

- **Indication normale** : ON (sous tension) : voyant allumé.
- **Pas d’indication** : vérifiez le cordon d’alimentation et la prise secteur. Confirmez que le DataPort 1-2 ne maintient pas l’amplificateur en mode Attente.

**CLIP** : ROUGE, adjacents aux numéros de canaux.

- **Indication normale** : s’allume chaque fois que l’amplificateur est piloté au-delà de la puissance maximale. La distorsion résultante engendre l’allumage du voyant. Il est possible que la distorsion ne cause qu’un bref clignotement ne soit pas audible.
- **Durant l’activation du silencieux**, le voyant s’allume complètement. Ceci se produit durant la mise en marche/arrêt normale du silencieux.
- **Indication anormale** :
  - Son allumage en rouge vif lorsque l’amplificateur est utilisé indique l’activation d’un silencieux thermique ou une sortie court-circuitée.
  - Si l’amplificateur surchauffe, le ventilateur tourne à plein régime et son fonctionnement reprend sous une minute. Laisser tourner le ventilateur et s’assurer que la ventilation de l’amplificateur est adéquate.
  - Un court-circuit ou un circuit de sortie surchargé engendre le clignotement excessif du voyant Clip et une surchauffe possible.
  - Si la distorsion est audible sans indication du voyant Clip, le problème se situe soit en amont, soit en aval de l’amplificateur. Vérifier l’état des haut-parleurs ou la source du signal surchargé. La commande de gain de l’amplificateur doit être dans la moitié supérieure de sa plage pour empêcher la surcharge de l’entrée.

**SIGNAL, -20dB, -10dB** : VERT, sous chaque voyant Clip.

- **Indication normale** : Le voyant SIGNAL s’allume lorsque le signal d’entrée dépasse -35 dB, le voyant -20dB s’allume lorsque le signal dépasse -20 dB et le voyant -10dB s’allume lorsque le signal dépasse -10 dB.
- **Pas d’indication** : vérifier les réglages de gain et augmenter le gain au besoin. Vérifier les connecteurs d’entrée et la source audio correspondant au signal. Si le voyant Clip s’allume avec peu voire pas d’indication Signal, vérifier la présence de courts-circuits au niveau du câblage de sortie.

**BRDG et PAR** :

Chaque paire de canaux a un voyant JAUNE pour le mode Pont et un voyant ORANGE pour le mode Parallèle. Ces voyants reflètent le réglage des commutateurs du panneau arrière (cf. Réglage des commutateurs de mode). En mode Stéréo, les deux voyants doivent être éteints.
Commandes de Gain

Les commandes de gain sont renfoncées et se règlent avec un petit tournevis ou un outil plat. Au besoin, installer le couvercle de sécurité des commandes de gain pour empêcher toute modification des réglages de l’installateur.

Tourner les commandes de gain dans le sens des aiguilles d’une montre pour augmenter le gain et dans le sens inverse pour le diminuer. Le gain de tension maximum de l’amplificateur varie selon le modèle. Le gain de tension maximum pour chaque modèle apparaît sur l’étiquette du panneau avant entre parenthèses, adjacent au réglage d’atténuation 0 dB.

Les commandes de gain sont indiquées en dB d’affaiblissement. Il existe 21 détentes pour des réglages reproductibles. Les 14 paliers supérieurs sont d’environ 1 dB chacun et les réglages doivent normalement être effectués dans cette plage. La plage inférieure à -14 dB ne doit pas être utilisée pour des niveaux de programme normaux, car la marge de sécurité pourrait être dépassée, mais elle peut être utilisée pour des tests à des niveaux réduits. Au réglage minimal, le signal est complètement coupé.

Couvercle de Sécurité des Commandes de Gain

Le couvercle bloque l’accès aux réglages du gain. Les voyants sont toujours visibles pour contrôler le fonctionnement du système.

1. Utiliser une clé de 3,5 mm pour desserrer la vis (donner plusieurs tours). Ne pas la retirer complètement.
2. Glisser l’extrémité droite du couvercle sous la vis desserrée.
3. Insérer les ergots de l’extrémité gauche dans la dernière rangée de fentes de ventilation, puis glisser entièrement le panneau à droite. Il doit se bloquer dans les fentes.
4. Confirmer que les voyants sont visibles à travers le couvercle. Serrer avec précaution la vis à six pans.

CX902 en photo avec plaque de sécurité de commande de gain installée.
Tableau de déperdition de chaleur

Ce tableau fournit la déperdition de chaleur typique en BTU/h et kcal/h pour chaque modèle sous la forme d’une fonction de la charge et du niveau de puissance de sortie.

- 1/8 de puissance (bruit rose) représente un programme typique avec limitation d’amplitude occasionnelle. Utilisez cette valeur nominale pour la plupart des applications.
- 1/3 de puissance (bruit rose) représente un programme sévère avec forte limitation d’amplitude.
- Pleine puissance (régime sinusoïdal) représente une onde sinusoïdale continue avec une limitation d’amplitude de 1 %. La réduction thermique ou d’une surintensité limite la durée de fonctionnement de 2 ohms à pleine puissance.

Tableau d’appel de courant (en ampères)

Ce tableau indique l’appel de courant typique pour chaque modèle sous la forme d’une fonction de la charge et du niveau de puissance de sortie. L’unité de mesure est l’ampère (valeur efficace).

REMARQUE ! L’appel de courant indiqué correspondant à une alimentation secteur de 120 V (~). Pour les modèles de 230 V (~), multipliez les valeurs indiquées par 0,5.

- 1/8 de puissance (bruit rose) représente un programme typique avec limitation d’amplitude occasionnelle. Utilisez cette valeur nominale pour la plupart des applications.
- 1/3 de puissance (bruit rose) représente un programme sévère avec forte limitation d’amplitude.
- Pleine puissance (régime sinusoïdal) représente une onde sinusoïdale continue avec une limitation d’amplitude de 1 %. La réduction thermique ou d’une surintensité limite la durée de fonctionnement de 2 ohms à pleine puissance.

Comment prendre contact avec QSC Audio Products

Adresse postale : QSC Audio Products, LLC
1675 MacArthur Boulevard
Costa Mesa, CA 92626-1468, États-Unis

Numéros de téléphone :
- Standard (714) 754-6175
- Ventes & Marketing (714) 957-7100 ou numéro vert (États-Unis seulement) (800) 854-4070
- Service clientèle (714) 957-7150 ou numéro vert (États-Unis seulement) (800) 772-2834

Télécopieur : Ventes & Marketing TÉLÉCOPIEUR (714) 754-6174
Service clientèle TÉLÉCOPIEUR (714) 754-6173

Site Web : www.qscaudio.com

Courriel : info@qscaudio.com
service@qscaudio.com

Downloaded from www.Manualslib.com manuals search engine
1. Diese Anleitung sorgfältig durchlesen.
2. Diese Anleitung gut aufbewahren.
3. Alle Warnungen beachten.
4. Alle Anweisungen befolgen.
7. Keine Lüftungsöffnungen blockieren.
10. Das Netzkabel so verlegen, dass niemand darauf treten oder es eingeklemmt werden kann. Dies gilt insbesondere für Stecker, Steckdosen und die Stelle, an der das Kabel aus dem Gerät austritt.

Das Ausrufezeichen in einem Dreieck soll den Benutzer auf das Vorhandensein wichtiger Betriebs- und Wartungsanleitungen in diesem Handbuch aufmerksam machen.


Das aus einem Blitz mit einer Pfeilspitze bestehende Symbol in einem Dreieck soll den Benutzer auf das Vorhandensein nicht isolierter, gefährlicher Spannungen innerhalb des Gehäuses aufmerksam machen, die stark genug sein können, um einen elektrischen Schlag abzugehen.

VORSICHT: ZUR REDUZIERUNG DES STROMSCHLAGRISIKOS DIE ABDECKUNG NICHT ABNEHMEN. KEINE VOM BENUTZER ZU WARTENDEN INNENKOMponentEN. FÜR ALLE WARTUNGSARBEITEN DARÜF QUALIFIZIERTES PERSONAL EINSETZEN.

ACHTUNG: Zur Vermeidung von Bränden und Stromschlägen darf diese Ausrüstung weder Regen noch Feuchtigkeit ausgesetzt werden.

FCC-HINWEIS ZU EMPFANGSSTÖRUNGEN

Einführung
Wir freuen uns, dass Sie sich für diesen Hochleistungsverstärker von QSC entschieden haben. Bitte lesen Sie die folgende Anleitung, um optimale Ergebnisse beim Gebrauch dieses Produkts zu erzielen.

Funktionsmerkmale CX-Modelle:
• Niederohmige oder transformatorlose 2-Kanal- und 4-Kanal-70-Volt-Ausgangsmodelle
• Jedes Kanalpaar ist mit seinem eigenen DataPort und Betriebsartenschalter ausgestattet.
• QSC DataPorts können an die höchstentwickelten QSC-Zubehörprodukte und Kontrollsysteme angeschlossen werden.
• Betriebsartenschalter für Clippgrenze, Niederfrequenzfilter, Stereo, Bridge-Mono und Paralleleingänge.
• Kompaktes und leichtes QSC PowerLight-Hochleistungs-Schaltnetzteil.
• Komplett(e) Verstärkerschutz und -überwachung.
• Barrier-Strip-Ausgangsanschlüsse.
• Symmetrische XLR- und Klemmenleisten-Eingangsanschlüsse.
• Eingelassene und arretierte Verstärkungsregler.
• Schutzabdeckung für die Verstärkerabdeckung verhindert Manipulationen.
• Aktive Einschaltstrombegrenzung macht Sequenzschaltungen unnötig.
• LED-Anzeigen für Einschaltzustand, Parallel- oder Überbrückungsmodus, Vorhandensein eines Eingangssignals, -20 dB, -10 dB und Clip/Schutz
• Optionale Frontplattengriffe
• Optionaler entkoppelter Ausgangstransformator IT-42 für CX302 für 25 V, 70 V und 100 V (bzw. 50 V, 140 V und 200 V im Überbrückungsmodus)

Auszapcken
Der werkseitig verpackte Karton enthält die folgenden Komponenten:
• Verstärker CX
• Benutzerhandbuch
• Schutzabdeckung für die Verstärkungsregler
• Gummihaftfüße (für Anwendungen, die keinen Rack-Einbau vorsehen)
• 3-Stift-Klemmenleisten-Eingangsstecker
• Gabelschuh-Ausgangsanschlüsse
• Abnehmbares Netzkabel des Typs IEC

Verwenden Sie zum Verschicken des Verstärkers den gleichen Karton.

Frontplatte
(CX404 abgebildet; andere Modelle sind ähnlich)
**Rückplatte**

(CX404 abgebildet; andere Modelle sind ähnlich. 2-Kan.- Modelle sind ebenfalls mit XLR-Eingängen versehen)

- 1- CH1-Klemmenleisten-Eingangsstecker
- 2- DataPort-Anschluss
- 3-CH2-Klemmenleisten-Eingangsstecker
- 4- Betriebsartenschalter
- 5- Barrier-Strip-Ausgangsanschlüsse
- 6- Belüftungsschlitze
- 7- Betriebsartenschalter-Einstelldiagramme
- 8- IEC-Netzanschluss

**Rack-Einbau**


**Kühlung**


**Netzanschluss**

Schließen Sie den Netzstrom an der IEC-Buchse auf der Rückseite des Verstärkers an. **HINWEIS:** Schalten Sie vor dem Anschließen des Netzstroms den Betriebsschalter aus. Vor Gebrauch des Fernbediensystems und der Standby-Funktion muss der Betriebsschalter eingeschaltet werden.

**Luftströmung in QSC-Verstärkern:** Das Gebläse saugt kalte Luft in die Rückseite des Verstärkers ein. Auf der Verstärkervorderseite wird warme Luft ausgeblasen.

**Die vorderen und hinteren Belüftungsschlitze nicht blockieren!**

Die richtige Netzspannung ist auf dem Seriennummernaufkleber auf der Rückplatte angegeben. Wenn eine falsche Netzspannung angelegt wird, kann der Verstärker beschädigt und das Stromschlagrisiko erhöht werden.

34

Downloaded from www.Manualslib.com manuals search engine
Einstellen der Betriebsartenschalter


Einstellen der Clipbegrenzer
Jeder Kanal verfügt über einen Clipbegrenzer mit eigenem Ein/Ausschalter. Der Begrenzer spricht nur auf ein tatsächliches Clipping an und kompensiert Last- und Spannungsschwankungen automatisch. Eine Clipbegrenzung wird generell empfohlen, insbesondere zum Schutz von Hochfrequenz-Druckkamptremibern.

Zum Aktivieren der Clipbegrenzung den Schalter nach OBERN (in die EIN-Stellung) schieben: Schalter 1 steuert den ersten Kanal, Schalter 10 steuert den zweiten Kanal.

Auswahl des Stereo-, Parallel- oder Überbrückungsmodus
Jedes der Kanalpaare kann auf normalen Stereobetrieb, auf einen Parallel-Eingangsbetrieb oder auf einen Bridge-Mono-Modus eingestellt werden. Bei 4-Kanal-Modellen kann Ch. 1 mit Ch. 2 überbrückt oder parallel geschaltet werden; Ch. 3 kann mit Ch. 4 überbrückt oder parallel geschaltet werden

Stereo-Modus: Jeder Kanal in dem Paar bleibt unabhängig und kann für ein jeweils anderes Signal verwendet werden.


Schließen Sie beim Betrieb im Parallel- oder Überbrückungsmodus nicht verschiedene Eingänge an jeder Seite eines Kanalpaares an.

Einstellen der Niederfrequenzfilter

Niederohmige Modelle: Der Filter sollte nur zum Treiben von Subwoofern ausgeschaltet werden. Die 33-Hz-Einstellung funktioniert gewöhnlich gut mit Lautsprechern mit großen NF-Treibern (30,48 cm oder größer). Die 75-Hz-Einstellung funktioniert gut mit kompakten (kleineren) Lautsprechern. Überprüfen Sie die technischen Daten des Lautsprechers und wählen Sie die Einstellung aus, die der Niederfrequenzkapazität des Lautsprechers am nächsten kommt.

Hochohmige (\(\mu\)V-) Modelle: Der Filter sollte nur zum Treiben von Subwoofern mit speziellen Niederfrequenztransformatoren ausgeschaltet werden. Die 50-Hz-Einstellung eignet sich für hochwertige Lautsprecher-Transformatoren normalerweise sehr gut. Die 75-Hz-Einstellung eignet sich gut für Lautsprecher und Transformatoren für die Sprachwiedergabe.
**DataPort**


Jeder DataPort wird mit seinem zugehörigen Kanalpaar (Ch. 1-2 oder Ch. 3-4) verbunden. Jedes Kanalpaar kann seinen DataPort oder die Klemmenleisteneingänge verwenden. Beim Gebrauch des DataPort dürfen keine Verbindungen zu den Klemmenleisteneingängen dieses Kanals hergestellt werden. Das Verstärker-Standby wird nur vom Ch. 1-2-DataPort gesteuert.

**Tipps zum Gebrauch des DataPort:**

1. DataPort 1-2 steuert das Standby für den ganzen Verstärker. Der DataPort kann die Leistung nur bei eingeschaltetem Netzschalter regeln.
2. Jeder DataPort steuert und überwacht die an sein zugehöriges Kanalpaar (Ch. 1-2, Ch. 3-4) gesendeten Signale.
6. Informationen über die neuesten DataPort-Produkte erhalten Sie von Ihrem QSC-Händler oder der QSC-Website.

**Eingänge**


**Klemmenleisteneinschlüsse**

**Symmetrische Eingänge:** Isolieren Sie die Drahtleiter um 6 mm ab und verbinden Sie sie wie gezeigt mit den Klemmen. Ziehen Sie die Schrauben fest an.

**Asymmetrische Eingänge:** Isolieren Sie die Drahtleiter um 6 mm ab und verbinden Sie sie wie gezeigt mit den Klemmen. Der mittlere Stift muss wie gezeigt mit dem Abschirmstift verbunden werden. Ziehen Sie die Schrauben fest an.

**XLR-Eingänge (nur bei 2-Kan.-Modellen)**

**Symmetrische Eingänge:** Wie gezeigt mit dem Stecker verbinden.

**Asymmetrische Eingänge:** Wie gezeigt mit dem Stecker verbinden. Stift 3 und Stift 1 müssen wie gezeigt mit einer Steckbrücke verbunden werden.
Ausgänge

**AUSGANGSKLEMMEN-SICHERHEITSHINWEIS!** Die Ausgangsklemmen bei eingeschaltetem Verstärker nicht berühren. Alle Verbindungen bei ausgeschaltetem Verstärker herstellen. Risiko gefährlicher Energien!

Niederohmige Ausgänge


Verteilte Ausgänge (.V”-Modelle, 70 V/140 V)

70-V-Ausgang – Risiko gefährlicher Energien! Für 70-V-Ausgänge müssen Drahtleitungen der Klasse 2 verwendet werden.


**VORSICHTSHINWEISE FÜR DEN 140-V-ÜBERBRÜCKUNGSMODUS:**
Für 140-V-Bridge-Mono-Ausgänge müssen Drahtleitungen der Klasse 3 verwendet werden.

Es dürfen nur verteilte 140-V-Audiokreise im überbrückten Modus angeschlossen werden. Im Überbrückungsmodus keine 70-V-Lasten verwenden! Verwenden Sie zum Treiben von 70-V-Lasten Kanäle im Stereo- oder Parallelmodus. Die Mindestlast für den Betrieb im Überbrückungsmodus beträgt 140 V.

Nennlasten nach Modell
Achten Sie darauf, dass das vorgesehene Verstärkermodell auch für die jeweilige Last aus gelegt ist!

Ein Sternchen (**) verweist darauf, dass das Modell für die Last ausgelegt ist. (S/P)= Stereo-/Parallelmodus (Br.)= Bridge-Modus

Hier ein Tabelle mit den Nennlasten je Modell und Lastspannung:

<table>
<thead>
<tr>
<th>LOAD</th>
<th>CX1114</th>
<th>CX2982</th>
<th>CX1064</th>
<th>CX1942</th>
<th>CX1982</th>
<th>CX1174</th>
<th>CX1182</th>
<th>CX3282</th>
<th>CX3282V</th>
<th>CX3952V</th>
<th>CX1182V</th>
<th>CX1282V</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Ohm</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>4 Ohm</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>8 Ohm</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>16 Ohm</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>70 Volt</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>140 Volt</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>
Mithilfe der LED-Anzeigen können der Systembetrieb überwacht und häufig auftretende Probleme identifiziert werden.

**EINSCHALTZUSTAND: GRÜN, oberhalb der BRIDGE (BRDG)- und PARALLEL (PAR)-Anzeigen.**

**Normalanzeige:** Netzschalter EIN: LED leuchtet auf.

**Wenn keine Anzeige erfolgt:** Überprüfen Sie Netzkabel und Steckdose. Stellen Sie sicher, dass DataPort 1-2 den Verstärker nicht im „Standby“-Modus hält.

**CLIP:** ROT, neben der Kanalnummermarkierung.

**Normalanzeige:** LED leuchtet auf, wenn der Verstärker mit mehr als der vollen Nennleistung betrieben wird. Die resultierende Klangverzerrung steht in Bezug zur Helligkeit der LED-Anzeige. Eine Klangverzerrung, die nur ein kurzes Aufleuchten verursacht, ist möglicherweise überhaupt nicht hörbar.

- Während der Stummschaltung leuchtet die LED in ganzer Helligkeit auf. Dieser Fall tritt während der normalen „Ein-Aus“-Stummschaltung auf.

**Nicht normale Anzeige:**
- Ein hell rotes Aufleuchten der LED-Anzeige während des Betriebs des Verstärkers weist auf ein wärmebedingtes Stummschalten oder einen kurzgeschlossenen Ausgang hin.
- Wenn sich der Verstärker überhitzt, läuft das Gebläse mit maximaler Drehzahl und der Betrieb sollte binnen einer Minute wieder aufgenommen werden. Lassen Sie das Gebläse laufen und stellen Sie sicher, dass der Verstärker nicht mehr belastet wird.

**SIGNAL, -20 dB, -10 dB:** GRÜN, unterhalb jeder Clip-LED.

**Normalanzeige:** Die SIGNAL-Anzeige leuchtet auf, wenn das Eingangssignal -35 dB übersteigt; die -20 dB-Anzeige leuchtet auf, wenn das Signal -20 dB übersteigt, und die -10 dB-Anzeige leuchtet auf, wenn das Signal -10 dB übersteigt.

**Wenn keine Anzeige erfolgt:** Überprüfen Sie die Verstärkungseinstellungen und erhöhen Sie bei Bedarf die Verstärkung. Überprüfen Sie die Eingangsschaltungen und die Audioquelle auf Signale. Wenn die Clip-LED aufleuchtet, obwohl gar kein oder nur ein schwaches Signal angezeigt wird, überprüfen Sie die Ausgangsverdrahtung auf Kurzschlüsse.

**BRDG und PAR:**

**Verstärkungsregler**

Die Verstärkungsregler sind eingelassen und können mit einem kleinen Schraubenzieher oder einem anderen Flachwerkzeug eingestellt werden. Auf Wunsch kann die Schutzabdeckung der Verstärkungsregler angebracht werden, um Änderungen an den vom Installationspersonal vorgenommenen Einstellungen zu verhindern.

Drehen Sie die Verstärkungsregler nach rechts, um die Verstärkung zu erhöhen, und nach links, um sie zu reduzieren. Die maximale Spannungsverstärkung des Verstärkers hängt vom jeweiligen Modell ab. Die maximale Spannungsverstärkung ist auf dem Frontplattenetikett (in Klammern neben der 0-dB-Dämpfungseinstellung) angegeben.


**Verstärkungsregler-sicherheitsplatte**


1. Lösen Sie die Schraube mit einem 3,5-mm-Sechs kantschraubendreheransatz um mehrere Umdrehungen, ohne sie jedoch vollständig zu entfernen. 
2. Schieben Sie die rechte Kante der Abdeckung unter die gelockerte Schraube. 
4. Stellen Sie sicher, dass die LED-Anzeigen durch die Abdeckung sichtbar sind. Ziehen Sie die Sechs kantschraube vorsichtig wieder an.

Im Bild ist das Modell CX902 mit installierter Verstärkungsregler-Schutzplatte dargestellt.
Wärmeverlusttabelle

Die nebenstehende Tabelle enthält typische Wärmeverlustwerte in BTU/Std. und kcal/Std. für jedes Modell als Funktion des Last- und Ausgangsleistungspegels.

- 1/8 Leistung (Rosa-Rauschen) entspricht einem typischen Programm mit gelegentlichem Clipping. Verwenden Sie diese Nennleistung für die meisten Anwendungen.
- 1/3 Leistung (Rosa-Rauschen) entspricht einem intensiven Programm mit starkem Clipping.
- Volle Leistung (Sinus) sind kontinuierliche Sinuswellen, die mit 1-%-Clipping angetrieben werden. Wärme- oder Überstromreduzierung begrenzt die Dauer der vollen Nennleistung beim 2-Ohm-Betrieb.

Stromaufnahmetabelle (in Ampere)


HINWEIS! Die angegebene Stromaufnahme bezieht sich auf ein 120-VAC-Netz. Für 230-V-Modelle müssen diese Werte mit 0,5 multipliziert werden.

- 1/8 Leistung (Rosa-Rauschen) entspricht einem typischen Programm mit gelegentlichem Clipping. Verwenden Sie diese Nennleistung für die meisten Anwendungen.
- 1/3 Leistung (Rosa-Rauschen) entspricht einem intensiven Programm mit starkem Clipping.
- Volle Leistung (Sinus) sind kontinuierliche Sinuswellen, die mit 1-%-Clipping angetrieben werden.
- Wärme- oder Überstromreduzierung begrenzt die Dauer der vollen Nennleistung beim 2-Ohm-Betrieb.

Kontaktinformationen für QSC Audio Products

Postanschrift: QSC Audio Products, LLC
1675 MacArthur Boulevard
Costa Mesa, CA 92626-1468 USA

Telefonnummern:
Zentrale: +1 (714) 754-6175
Verkauf und Marketing: +1 (714) 957-7100 oder gebührenfrei (nur in den USA) (800) 854-4079
Kundendienst: +1 (714) 957-7150 oder gebührenfrei (nur in den USA) +1 (800) 772-2834

Faxnummern:
Verkauf und Marketing (FAX): +1 (714) 754-6174
Kundendienst (FAX): +1 (714) 754-6173

Internet: www.qscaudio.com
E-Mail: info@qscaudio.com
service@qscaudio.com
重要的安全注意事项和符号说明

1. 阅读这些规定。
2. 保存好这些规定。
3. 注意所有警告。
4. 遵守这些规定。
5. 警告：为避免着火或电击，不要将设备暴露于雨中或湿滑环境中，不要靠近水的地方使用本设备。
6. 只能用于布擦拭。
7. 不要堵塞通风口。
8. 不要安装在会产生热量的设备附近，如散热器、热调节装置、炉子或其他设备。（包括放大器）。
9. 为了保护或限制插头的安全性，插头应有两个叶片，一个较宽，另一个较窄。此插头有两个叶片以及一个接地爪。较宽的叶片或接地爪是为了保护安全装备。如所提供的插头和您的插座不匹配，请向电工咨询更换合适的插座。
10. 保持电线防止被破坏或挤压。需要时请停止插头、电源插座及其他设备的使用。
11. 仅限使用 QSC Audio Products, LLC 有限公司指定的附件 / 配件。
12. 仅限使用 QSC Audio Products, LLC 有限公司出售的硬件。如没有，代理商及配件。
13. 在使用期间按时间不用时，请拔下本设备的插头。
14. 由合格人员进行维修。如果设备损坏，必须进行维修。例如电源线或插头损坏，液体进入或物体落入本设备。设备遭受雨淋或受潮，不能正常工作，或曾跌落等情况下。

等边三角形内的惊叹号是提醒用户本手册中重要的操作和维护（维修）说明。

放大器输出端旁边的闪电符号警告用户有触电危险。有可能造成危险的输出连接器都标有闪电符号。放大器电源打开时切勿触摸输出端子，进行所有连线之前先切断放大器电源。

等边三角形内带箭头的闪电符号，警告用户该产品外壳内有非绝缘“危险”电压，会对人体产生电击危险。

小心：为避免电击危险，请不要移除盖板。内部无用户能维修的零件。联络合格的专业人士进行维修。

警告：为避免起火或电击，不要使设备淋雨或受潮。

FCC 干扰声明

注意：本设备已经测试符合 “FCC 规则”第 15 部分中 B 类数字设备的限制。所规定的这些限制是为了提供合理的保护，防止对住宅设施造成有害干扰。此设备会产生、使用和发出无线电频率能量，如果不按照指导进行安装和使用，可能会对无线电通信造成有害干扰。但是，不保证在某一安装条件下绝对会产生干扰。如果本设备对无线电或电视接收造成了有害干扰（通过关闭后打开设备可以确认），建议用户采取以下一项或多项措施来排除此干扰：

1. 改换接收天线的方向或重新放置。
2. 增大设备和接收器之间的间距。
3. 将设备使用电源插座与接收器所使用的插座分开。
4. 咨询经销商或有经验的无线电或电视技术人员以获取帮助。

© 版权 2005 & 2007：QSC Audio Products, LLC 有限公司
QSC® 是 QSC Audio Products, LLC 的注册商标
“QSC”以及 QSC 标志已在美国专利商标局注册
所有商标归其各自拥有者所有。
简介
非常感谢您购买 QSC 功率放大器，请阅读以下说明，以获得产品的最佳效果。

CX 型号的连线特点：
- 2 通道和 4 通 低阻抗或无变压器 70V 输出型
- 各通道均有单独的数控氧和模式转换器
- QSC 数字环连接最先进的 QSC 附件和监控系统
- 低频限制、低频控制、立体声、单声道和并行输入模式转换器
- QSC PowerLight 开关式电源性能好、体积小、重量轻
- 完整的放大器保护和监控
- 遥控端口和输出连接器
- XLR 以及接线盒平衡输入连接器
- 内置温度控制和温度保护
- 增益控制有弹簧具有稳定装置
- 增益控制的安全盖则可防止对其造成损坏
- 方便插入电流插座，无需进行电源时序控制
- LED 指示灯显示电源、并行或桥接模式、输入信号、-20dB、-10dB、以及削波 / 保护状态
- 适配的前面板手柄
- 用于 CX302 的选配 1T-42 独立输出变压器，可具有 25V、70V 和 100V（或 50V、14V 和 200V 桥接模式）

拆包
出厂包装箱内包括以下内容：
- CX 放大器
- 用户手册
- 增益控制安全盖板
- 螺钉橡胶脚垫（用于非机架式安装）
- 引脚接线盒输入连接器
- 平接线片输出连接器
- IEC 型可分离电源线

运送放大器时使用同一类型的包装箱。

前面板
（所示为 CX404，其它型号类似）

1- 电源开关  4- 安全面板固定螺丝
2- 冷却空气排风口  5- 增益控制
3-LCD 指示灯  6- 安全面板固定槽
后面板
（所示为 CX404，其他型号相似；2 通道型也配有 XLR 输入）

1- 通道 1 接线盒输入连接器 5- 阻挡模块输出连接器
2- 数据线连接器 6- 冷却进风口
3-CH2 接线盒输入连接器 7- 模式转换器设置图
4- 模式转换器 8- IEC 电源连接器

机架安装
按如下所示的步骤安装：用四颗螺栓和垫圈将放大器安装到设备机架导轨上。要在机架外使用放大器，需在底部装上自粘性橡胶脚垫。

冷却
空气从机架流入放大器后方，从前面流出。这可使机架冷却。放大器工作量增大时，风扇自动加大转速。

不要挡住前面或后面的通风口！

QSC 放大器中的气流：冷却风扇将冷空气吸入放大器后部，热风从放大器前盖流出。

交流电源连接
连接交流电源到放大器后面的 IEC 插槽。注意：在连接交流电源前需关闭交流电源开关。要使用远程控制开机或待机功能，必须打开交流电源开关。

正确的交流线压在后面板的序列号标签上注明。连接错误的线压会损坏放大器或增加电击危险。

Downloaded from www.Manualslib.com manuals search engine
**设置模式切换器**

**双通道型**：一个模式开关用于设置双通道切换，可以设定在放大器的任一模式，如立声、并行或桥接。

**四通道型**：有四个模式切换开关，一个控制通道 1-2，另一个控制通道 3-4，无须将通道 1 或 2 与通道 3 或 4 桥接或并行。

**设置消声限制器**

每个通道都需要一个自选开关的消声限制器。限制器有实际的消声作用，且自动对负载和电压变化进行补偿。建议使用消声限制器，特别是对高频驱动器的消声限制。

设置开关向上 (ON (开) 位置) 以使用消声限制器。

开关 1 控制第一通道。

开关 10 控制第二通道。

**选择立体声、并行或桥接模式**

各通道对都可以设置为正常立体声模式、并行输入模式或单桥模式。对于四通道型号，通道 1 可以与通道 2 桥接或并行。

**立体声模式**

对内的两个通道是独立的，各自都可用一个不同的信号。

**并行模式**

该设置将信号发送到两个输入端点并标示，一个信号将被送到两个声道，不要将不同的输入送到各输入点。每个通道的增益控制和扬声器连接都是独立的。

**桥接模式**

该设置将声中的一个声道结合为一个声道，输出电压为原来的两倍，只使用一个声道的输入和增益控制，将第二声道的增益控制设置为最小。

**在并行或桥接模式下不要连接其他的输入到通道对的任一端。**

**设置低频滤波器**

各通道都可设置为开或关的 12 dB/八分音度低频滤波器。低阻抗型号可以设置为 33 或 75 Hz。分布式输出 (“V” 型号) 为 50 或 75 Hz 以防止 70V 扬声器变压器磁性饱和，这会减少失真并防止放大器超载。

**低频滤波器**

低频滤波器（所为 “V” 型号）：各通道有自己的切换开关用于设定 LF 过滤器的开/关和进行频率选择。

1. 第一个通道使用开关 1 开关，第二通道使用开关 2 和开关 3，第二通道使用开关 8 开关 9 的方式。
2. 开关 3 和开关 8 可将 LF 滤波器置于开/关状态。
3. 开关 2 和开关 9 选择 33/75 Hz (低 2) 或 50/75 Hz (“V” 型) 75 Hz。
数据块

四通道 放大器上的数据块。

数据块

通道型号有三个数据块，四通道型号有两个数据块（一个用于通道 1-2，另一个用于通道 3-4）。数据块连接到配套的 QSC 附件和处理设备。数据块设备提供远程控制指令、监控、

DSP 处理、频谱分析和滤波功能。CX 数据块支持全部“V1”数据块功能，四通道型号支持

直接安装的“DSP 模块”。四通道型号建议安装数据块电路连接的附属模块进行远程装载。

各数据块通过其各自的通道对：通道 1-2 或 3-4。每个通道对可使用其数据块或接线盒输入。使用数据块时，不要连接该通道的接线盒输入。放大器端只受通道 1-2 数据块控制。

数据块技巧：
1- 数据块 1-2 控制整个放大器的待机情况。在数据块可以控制电源之前，交流电开关必须

置于开。
2- 各数据块控制并监视输出各自通道对（通道 1-2 或 3-4）的信号。
3- 在使用数据块输入时，不要用串极或并行模式开关，信号级会降低。要了解更多信息，请参见数据块设备所有者手册。
4- 数据块设备通常用于控制输入放大器前的信号增益。确认操作无误后，将前面板增益控制设为最大。如果

需要，安装防护罩，防止未经授权的修改。
5- 每一通道使用单独的内部散热片，通道对的数据块显示散热片的温度。
6- 咨询您的 QSC 经销商或 QSC 网站了解最新的数据块产品。

输入端

每一通道都有一个平衡的 3 引脚接线盒输入端。通道型号也有 XLR 输入。输入阻抗为 12k 欧姆（平衡）

或 6k 欧姆（非平衡），包装箱装有一套接线盒连接器。可用简单的手工工具连接接线盒，可快速进行输入更

改。XLR 输入端皆以标准电缆连接并可快速更换，引线在后面板上标出。

建议采用平衡连接以降低交流噪声和干扰。特别在使用长电缆的情况下，非平衡连接适用于短电缆的情况，信
号的源阻抗应低于 600 欧姆。如果数据块作为用于输入信号，不要连接到接线盒。

接线盒连接器

平衡输入：将线剥去 1/4 英寸（6 mm），连接到底连接器上，如图所示，拧紧螺

丝。

非平衡输入：将线剥去 1/4 英寸（6 mm），连接到底连接器上，如图所示，中间的引

脚必须连接到屏蔽引脚上，如图所示，拧紧螺丝。

XLR 输入（仅限双通道 型号）

平衡输入：如图所示连接到插头。

非平衡输入：如图所示连接到插头。引脚 3 和

引脚 1 必须用跳线连接，如图所示。
输出端

输出端子安全警告！放大器电源打开时切勿接触输出端子。进行所有连接之后先关闭放大器电源。有触电的危险！

低阻抗输出

立体声和并行模式—将各扬声器端到各自的放大器通道，如机箱标签上所示。模式设置开关必须设置为立体声或并行模式。

桥接模式—桥接模式对通道对进行配置以驱动单一高功率扬声器负载。模式配置开关必须设置为桥接模式。只使用一个声道的输入端和增益控制。将第二声道的增益控制设置为最小。

分布式输出（“V”型，70V/140V）

立体声和并行模式—将各70V电路连到各自的放大器通道，如机箱标签上所示。模式设置开关必须设置为立体声或并行模式。

70V 输出 - 危险电源！对于70V输出，应使用2类配线连接。

桥接模式 — 桥接模式设置通道对以驱动单一70V音频电路。模式配置开关必须设置为桥接模式。只使用一个声道的输入端和增益控制。将第二声道的增益控制设置为最小，输出负载，如机箱标签所示。

140V 桥接模式注意事项；

对于单信140V输出。应使用3类配线。

在桥接模式中，只连接140V分布式音频电路。在桥接模式中，不要使用70V负载。使用立体声或并行模式通道驱动70V负载，140V是桥接模式运行的最小值。

按型号额定负载

确保所用型号的放大器与该负载匹配！

星号（*）表示该型号和负载匹配。

（S/P）= 立体声 / 并行模式
（Br.）= 桥接模式

<table>
<thead>
<tr>
<th>LOAD</th>
<th>EX254</th>
<th>EX282</th>
<th>EX304</th>
<th>EX372</th>
<th>EX392</th>
<th>EX392</th>
<th>EX392</th>
<th>EX304</th>
<th>EX336V</th>
<th>EX360V</th>
<th>EX3124V</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Ohms</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>4 Ohms</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>8 Ohms</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>16 Ohms</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>70 Volt</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>140 Volt</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
LED 指示灯

LED 指示灯可用于监视系统运行和标识一般问题。

电源：绿色，在桥接（BRDG）和并行（PAR）指示灯上方。
正常指示：交流电源开，LED 点亮。
如果没有显示：检查交流电源线和交流插座。确认插头 1-2 未将放大器置于“待机”模式。

削波：红色，靠近通道编号标记。
正常指示：当放大器超出满功率驱动时会闪亮。失真结果与 LED 的亮度对应。短时闪烁对应的失真几乎感觉不到。
- 在静音状态下，LED 完全闪亮。当处于正常的“开-关”音量下会发生此种情况。
异常显示：
- 如果放大器正在使用时发出明亮闪光，说明是静音或是短路输出。
- 如果放大器过热，风扇会全速运转，运行会在一分钟内重新开始。让风扇运转，确保放大器有足够的通风。
- 短路或过载输出电源会造成过度的削波闪烁和可能过热。如果可以感觉到失真，而没有出现削波指示，问题可能发生在放大器之前或之后。检查是否有损伤的扬声器或超载信号源。放大器增益控制应在此范围的上半段以防止输入过载。

信号：-20dB，-10dB: 绿色，在各削波 LED 的下方。
正常指示：如果输入信号超过 -35dB，则信号指示灯亮，如果信号超过 -25dB，则 -20dB 指示灯亮，如果信号超过 -10dB，则 -10dB 指示灯亮。
如果没有显示：检查信号设置，如果没有可增大增益，检查输入端连接和信号的音频源。如果削波 LED 闪烁只有很少或没有信号显示，检查输出线是否短路。
异常显示：如果在信号时信号（SIG），-20dB 或 -10dB LED 亮起，可能是由系统波动或其它故障造成的。断开负载，大幅度降低增益。如果 LED 仍然亮着，放大器可能需要进行维修。

桥接和并行模式：
桥接模式下，每个通道对都有一个黄色 LED。并行模式下则为橙色 LED，显示如何设置后面板切换器（见设置模式切换器）。在立体声模式下，两个 LED 都应该是关闭的。
增益控制

增益控制调整，可以用小型螺丝刀或平板工具进行调整。如果需要，可以安装增益控制安全盖板，防止改动安装者的设置。

顺时针转动增益控制会增大增益；逆时针转动则减小增益。型号不同，放大器的最大电压增益也不同，各型号的最大电压增益显示在前面板标签上的括号中，靠近 0 dB 衰减设置。

增益控制按分贝 (dB) 衰减。有 21 个制动机可进行重复调试。上面的 14 步大约是每步 1 dB，正常的设置应该在这个范围内。低于 -14 dB 的范围不能用于正常程序电平。因为输入噪声可能被放大，但可在降低电平下测试。最小设置下，信号完全被切断。

增益控制安全盖

该盖板防止改动增益设置。仍然可以看到监视系统运行的 LED 指示器。

1. 使用 9/64” 或 3.5 mm 六角扳手将螺丝松开孔眼，不要完全松开。
2. 滑动松开螺丝后盖板的右端。
3. 插入左端标签到一排通凤槽，将面板全部推到右面。锁入插槽内。
4. 确定可通过盖板看到 LED，小心地拧紧六角螺丝。

热损表

此表格列出各型号的典型热损，单位： Btu/小时 和瓦/小时，为负数和输出功率等级的函数。

-1/8 功率（粉红噪声）表示偶尔脉冲的典型程序。此表数据可用于大多数情况。

所示 CX902 装有增益控制安全盖。
热损表

此表格列出各型号的典型热损，单位：BTU/小时，千卡/小时，为负载和输出功率等级的函数。

- 1/8 功率（粉红色）表示热扩散的典型程序。此数值适于大多数情况。
- 1/6 功率（粉红色）表示严重限制的严苛程序。
- 全功率（正方形）为 1% 限幅的连续正弦波驱动。

热量或过电流削减限制全功率 2 欧姆运行的时间。

最大电流表（单位：安培）

本表格列出各型号的典型最大电流。为负载和输出功率等级的函数。计算单位为安培 r.m.s。

注意！所示最大电流为 120 VAC 的情况，对于 230VAC 型号，将所示值乘以 0.5。

- 1/8 功率（粉红色）表示热扩散的典型程序。此数值适于大多数情况。
- 1/6 功率（粉红色）表示严重限制的严苛程序。
- 全功率（正方形）为 1% 限幅的连续正弦波驱动。

热量或过电流削减限制全功率 2 欧姆运行的时间。

联系 QSC Audio Products

邮寄地址：
QSC Audio Products, LLC
1675 MacArthur Boulevard
Costa Mesa, California 92626–1468 USA

电话号码：
主号码 (714) 754–6175
销售和市场传真 (714) 957–7100 或免费电话（仅限美国）(800) 454–4079
客服 (714) 957–7150 或免费电话（仅限美国）(800) 772–2854

传真：
销售与市场传真 (714) 754–6174
客服传真 (714) 754–6173

网址：www.qscaudio.com
E-mail: info@qscaudio.com
service@qscaudio.com

Downloaded from www.Manualslib.com manuals search engine
How to Contact QSC Audio Products

Cómo comunicarse con QSC Audio Products

Comment prendre contact avec QSC Audio Products

Kontaktinformationen für QSC Audio Products

联系 QSC Audio Products

Mailing address: QSC Audio Products, LLC
1675 MacArthur Boulevard
Costa Mesa, CA 92626-1468 USA

Telephone Numbers:

- Main Number (714) 754-6175
- Sales & Marketing (714) 957-7100 or toll free (USA only) (800) 854-4079
- Customer Service (714) 957-7150 or toll free (USA only) (800) 772-2834

Facsimile Numbers:

- Sales & Marketing FAX (714) 754-6174
- Customer Service FAX (714) 754-6173

World Wide Web: www.qscaudio.com

E-mail:

- info@qscaudio.com
- service@qscaudio.com
Explanation of graphical symbols

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to humans.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (service) instructions in the literature accompanying the product.

Caution:

Risk of Electric Shock. Do not open.

Caution: To reduce the risk of electric shock, do not remove the cover. No user-serviceable parts inside. Refer servicing to qualified service personnel.

Warning: To prevent fire or electric shock, do not expose this equipment to rain or moisture.

Explication des symboles graphiques

Le symbole éclair avec une pointe de flèche à l'intérieur d'un triangle équilatéral est utilisé pour avertir l'utilisateur de la présence à l'intérieur du coffret de "tension non-isolée dangereuse" d'amplitude suffisante pour constituer un risque de choc électrique pour l'homme.

Le point d'exclamation à l'intérieur d'un triangle équilatéral est employé pour avertir l'utilisateur de la présence d'instructions importantes pour le fonctionnement et l'entretien (service) dans les documents accompagnant l'appareil.

Attention!

Risque de choc électrique. Ne pas ouvrir.

Attention: Pour éviter les risques de choc électrique, ne pas enlever le couvercle. Cet appareil ne comporte aucune pièce pouvant être réparée par l'utilisateur. Confier l'entretien à un technicien qualifié.

Avertissement: Pour éviter le risque de choc électrique ou d'incendie, n'exposez cet appareil ni à l'humidité excessive ni aux projections d'eau (pluie, inondation, etc...)

Vorsicht

Elektrischer Schlages. Nicht öffnen!

VORSICHT: Um Gefährdung durch elektrischen Schlag zu vermeiden, darf das Gehäuse nicht geöffnet werden. Es befinden sich keine vom Benutzer reparaturbaren Teile im Inneren des Gerätes. Überlassen Sie jegliche Reparatur dem qualifizierten Fachmann.

Warning: Um die Gefahr eines Brandes bzw. eine Verletzung durch elektrischen Schlag zu vermeiden, sollten Sie das Gerät niemals Regen oder Feuchtigkeit aussetzen.

Precaución

Riesgo de descarga eléctrica, no lo abra.

PRECAUCIÓN: Para reducir el riesgo de descarga eléctrica, no quite la tapa. El usuario no debe ajustar los componentes internos. Para mantenimiento solicite la ayuda de personal cualificado.

Aviso: Para evitar un incendio o una descarga eléctrica, no expone este equipo a la lluvia o humedad.
<table>
<thead>
<tr>
<th>TABLE OF CONTENTS ▲ TABLE DES MATIÈRES ▲ INHALTSVERZEICHNIS ▲ TABLA DE LAS MATERIAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
</tr>
<tr>
<td>Expansion</td>
</tr>
<tr>
<td>Specification</td>
</tr>
<tr>
<td>General Information</td>
</tr>
<tr>
<td>Troubleshooting</td>
</tr>
<tr>
<td>Amplificationality</td>
</tr>
<tr>
<td>Instrumentation</td>
</tr>
<tr>
<td>Amplification</td>
</tr>
<tr>
<td>Piece m: no sound</td>
</tr>
<tr>
<td>Piece m: distorsed sound</td>
</tr>
<tr>
<td>Piece m: no channel separation</td>
</tr>
<tr>
<td>Piece m: no sound</td>
</tr>
<tr>
<td>Operation</td>
</tr>
<tr>
<td>BÆTHER</td>
</tr>
<tr>
<td>Operation</td>
</tr>
<tr>
<td>AC power switch</td>
</tr>
<tr>
<td>In tempçrature d alimentation CA</td>
</tr>
<tr>
<td>Temperature control</td>
</tr>
<tr>
<td>Gain controls</td>
</tr>
<tr>
<td>Control de la parte CA</td>
</tr>
<tr>
<td>Control de la parte CA</td>
</tr>
<tr>
<td>LED indicators</td>
</tr>
<tr>
<td>Indicadores Cﺞ</td>
</tr>
<tr>
<td>LED de la parte CA</td>
</tr>
<tr>
<td>Fan cooling</td>
</tr>
<tr>
<td>Ventilador de la parte CA</td>
</tr>
<tr>
<td>Inner working</td>
</tr>
<tr>
<td>SPECIFICATIONS</td>
</tr>
<tr>
<td>Specifications</td>
</tr>
<tr>
<td>WARRANTY INFORMATION</td>
</tr>
<tr>
<td>Información de garantía</td>
</tr>
<tr>
<td>GARANTÍA DE BERNARDI EDNIS</td>
</tr>
<tr>
<td>ADDRESS &amp; TELEPHONE INFORMATION</td>
</tr>
<tr>
<td>ADRESSE &amp; TELEFON NUMEROS</td>
</tr>
<tr>
<td>DIRECCIÓN Y TELEFONO</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Declaration of Conformity

OSCAudio Products, Inc. declares its sole responsibility that the above-named product is in compliance with the Council Directive 89/336/EEC of 3 May 1989 on the harmonization of the laws of the Member States relating to electromagnetic compatibility, as well as the requirements of the harmonized product standard EN 50082-1 related to the limits and the methods of measurement of radio disturbance characteristics of broadcast receivers and associated equipment, as well as the requirements of the harmonized product standard EN 55013 related to the limits and the methods of measurement of radio disturbance characteristics of broadcast receivers and associated equipment.

OSCAudio Products, Inc. further declares its sole responsibility that the above-named product is in compliance with the Council Directive 93/68/EEC of 22 July 1993, which amends the previous mentioned directive, as well as the requirements of the harmonized product standard EN 60965, related to safety requirements of the harmonized product standard EN 60965, related to safety requirements for mains-operated electronic and related apparatus for household and similar general use.

Declaración de Conformidad

OSCAudio Products, Inc. declara que este producto cumple con la Directiva 89/336/CEE sobre la armonización de las leyes de los Estados Miembros referente a la compatibilidad electromagnética, así como las especificaciones de la norma armonizada EN 50082-1 relativas a los límites y métodos de medida de las características de interferencia radiada de los equipos de recepción de transmisiones de radio y equipos asociados, y EN 55013 relativas a la inmunidad electromagnética de los equipos de transmisión de radio y equipos asociados.

OSCAudio Products, Inc. declara que este producto cumple con la Directiva 93/68/CEE de 22 de julio de 1993, que amplía la anterior mencionada directiva, así como las especificaciones de la norma armonizada EN 60965 relativas a la seguridad para los equipos eléctricos de uso doméstico y que funcionan a través de la red de alimentación eléctrica.
The PLX Series Amplifiers. PowerWave™ technology and a refined audio structure combine studio-quality performance with touring-quality portability. Three fan-cooled, 2-channel, 2-RU, amps provide unprecedented power in a strong, compact chassis.

Features
- Independent, user-deflatable clip limiters
- Fully selectable low-frequency filter, choice of 30 or 60 Hz rolloff
- Stereo (dual-channel), parallel-input, or bridged mono operating modes
- Balanced inputs, both XLR and ¼” (6.3 mm) TRS
- Binding post and Neutrik Speakon™ outputs
- Decorated gain controls
- Front panel LED indicators for power, signal, -80 and -60 dB, clip/protect, parallel inputs, and bridged mono mode
- QSC’s exclusive high-performance PowerWave switching technology power supply

Les amplificateurs de la série PLX. La technologie PowerWave™ et une circulatio audio raffinée sont combinais pour déterminer une qualité sonore digne d'un studio d'enregistrement, avec la robustesse requise pour la tournée. Ces amplificateurs ventilés, 2 canaux, occupent 2 espaces minimax, vous permettent un niveau de puissance sans précédent dans un châssis compact et solide.

Caractéristiques
- Limitateurs d’excédent indépendants, commutables par l’utilisateur
- Filtres passe-haut commutables, avec choix d’occuper 30 ou 60 Hz
- Modes d’opération stéréo (dual canal), parallèle, ou mono
- Entrées symétriques par prises XLR et ¼” (6.3 mm)
- Sorties sur bornes à cavalier et prises Speakon
- Contrôles de gain à décalage
- Indicateurs DEL sur le panneau avant pour alimentation, présence de signal, -80 dB, -60 dB, écrêtage/protect, modes mono et parallèle
- Bloc d’alimentation à commutation haute performance utilisant la technologie PowerWave exclusive à QSC


Ausstattungsmerkmale
- unabhängige, abschaltbare Sperrschalter
- Erweiterbaren Hochpassfilter: 30 oder 60 Hz Eingangswiderstand
- Stereo (Doppelkanal), Parallel- oder Mono Betriebsmodus
- Symmetrische Eingänge—XLR und Steckdosen
- Neutrik-Speakon® und Ausgangsklemmen
- Rasteranschluss
- LED-Statusanzeigen für Power, -20 dB, -60 dB und Clip/Protect, parallel und Monoblockbetrieb
- QSC’s patentierte PowerWave Netzsteckdose

La ligne de amplificadores PLX. La tecnología PowerWave™ y una estética acústica rica se han combinado para ofrecer la calidad de estudio con la portabilidad necesaria para el sonido en vivo. Estos amplificadores de dos canales con enfriamiento por ventiladores y que ocupan dos espacios en un rack, ofrecen una increíble potencia en un compacto y resistente amistoso.

Características
- Limitador de picos independiente
- Filtros de frecuencia de gravis completamente seleccionables con la elección de atenuación entre 30 y 60 Hz
- Estéreo (dos canales), modos de operación para entradas paralelas, o “paralelo/mono” en uno
- Entradas balanceadas, con conectores XLR y 6.3 mm TRS
- Pastes de amarillo y salidas Neutrik Speakon™
- Controles de ganancia con rastreo
- Indicadores LED en el panel frontal para el encendido, la señal de entrada, niveles de -20 y -60 dB, para protección de sobrecarga, entradas paralelas, modo “paralelo” en uno
- Tecnología de encordado exclusivo de QSC PowerWave en la fuente de alimentación.
Front panel
1. Power switch
2. Cooling vents
3. Gain control (Channel 1)
4. CLIP, -10 dB, -30 dB and SIGNAL indicator LEDs, both channels
5. Gain control (Channel 2)
6. POWER, BRIDGE, and PARALLEL indicator LEDs
7. Handles

Panneau avant
1. Commande marche/arrêt
2. Bouches de ventilation
3. Commande de gain (Canal 1)
4. DBs CLIP(limite), -10 dB, -30 dB et SIGNAL (aux deux canaux)
5. Commande de gain (Canal 2)
6. DBs POWER(au montage), BRIDGE (mode mono point), et PARALLEL (entrées parallèles)
7. Poignées

Vorderseite
1. Netzschalter
2. Abluftöffnungen
3. Pegelsteller (Kanal 1)
4. LED-Anzeige für CLIP, -10 dB, -30 dB und SIGNAL (Beide Kanäle)
5. Pegelsteller (Kanal 2)
6. LED-Anzeige für POWER (Betrieb), BRIDGE (Mono-Beidseitschaltung) und PARALLEL (Eingangsparallelschaltung)
7. Griff

Panel frontal
1. Intensitatschalter de encendido
2. Rejillas de ventilación
3. Control de ganancia (Canal 1)
4. Índicadores LED de CLIP, -10 dB, -30 dB y SIGNAL (dos canales)
5. Control de ganancia (Canal 2)
6. Índicadores LED de POWER (encendido), BRIDGE (operación en mono) y PARALLEL (entradas paralelas)
7. Asas
Rear panel
1. XLR inputs, Channels 1 and 2
2. Configuration switch
3. Configuration switch chart
4. TRS inputs, Channels 1 and 2
5. Speaker output, Channel 1 plus Channel 2
6. Speaker output, Channel 2
7. Binding post outputs, Channels 1 and 2
8. Cooling air inlet vents
9. Serial number label
10. AC power cable

Panneau arrière
1. Entrées XLR (Canaux 1 et 2)
2. Sélecteur de configuration
3. Diagramme du sélecteur de configuration
4. Entrées TRS (Canaux 1 et 2)
5. Sorties haut-parleur (Canal 1 et 2)
6. Sorties haut-parleur (Canal 2)
7. Sorties sur bornes à écrou (Canaux 1 et 2)
8. Bouches de ventilation
9. Étiquette du numéro de série
10. Câble d'alimentation secteur

Rückseite
1. XLR-Eingänge (Kanäle 1 und 2)
2. Konfigurationsschalter
3. Erklärung des Konfigurationsschalters
4. Stereoklinke (Kanäle 1 und 2)
5. Sprachausgang (Kanal 1 mit Kanal 2)
6. Sprachausgang (Kanal 2)
7. Ausgangsklemme (Kanäle 1 und 2)
8. Lufteinlaßöffnung
9. Seriennummer
10. Netzkabel

Panel posterior
1.Entradas XLR (Canales 1 y 2)
2.Selector de configuración
3. Esquema del selector de configuración
4. Entradas TRS (Canales 1 y 2)
5. Salida de altavoz (Canal 1 con Canal 2)
6. Salida de altavoz (Canal 2)
7. Salidas postes de a mano
8. Ranuras de ventilación
9. Etiqueta del número de serie
10. Cable de alimentación
FEATURES & SETUP

Clip Limiter

WHAT IT IS
When the audio signal drives the amp’s output circuit beyond its power capability it clips, flattening the peaks of the waveform. The clip limiter detects this and quickly reduces the gain to minimize the amount of overdrive. To preserve as much of the program dynamics as possible, limiting occurs only during actual clipping.

Each channel has its own clip limiter, and you can switch it on or off independently, as shown at left.

WHEN TO USE IT (OR NOT)
When driving full-range speakers, clip limiting reduces high frequency distortion caused by overloads. It also protects higher frequency drivers from excessive overdrive and hard clipping harmonics.

When driving subwoofers, some users let the amplifier go without limiting because it gives the “punch” to kick drums and similar sounds.

CAUTION: Clip limiting reduces extreme audio peaks, allowing a higher average signal level without audible distortion. However, increasing the gain with the clip limiter engaged until clipping is again audible can double the average output power. Be careful not to exceed the power rating of your speakers.

CARACTERÍSTICAS Y AJUSTES

Clip Limiter

¿QUÉ ES?
Cuando la señal de audio excede la capacidad de salida del amplificador más allá de su capacidad de potencia se sitúa con los picos de la forma de onda. El limitador de picos detiene este funcionamiento, y rápidamente reduce la ganancia para minimizar la cantidad de distorsión. Para conservar las dinámicas del programa al máximo, la limitación sólo ocurre durante el instante mismo de la saturación. Cada canal tiene su propio limitador de picos, siendo los dos pueden activar o desactivar independientemente, como se muestra a la izquierda.

¿CUÁNDO (O CUÁNDO NO) U SALVAR?
Cuando se usan bocinas de mando completa, el limitador de picos reduce la distorsión de las frecuencias agudas causada por la supercarga de graves. También protege a los altavoces de graves de las frecuencias de saturación y las armónicas deseñadas.

¿CUÁNDO (O CUÁNDO NO) SALVAR?
Cuando se usan subwoofers, algunos prefieren usar los picos del amplificador sin limitación para obtener un "punch" adicional en el bombo de la batería y otros sonidos similares.

ADVERTENCIA: El limitador de picos reduce señales extremas de saturación, permitiendo un nivel de señal más alto sin distorsión audible. Sin embargo, aumenta la ganancia con el limitador de picos activado puede doblar la capacidad de salida. Tenga cuidado de no sobrepasar el límite de potencia de sus bocinas.

AUSSTATTUNG & EINSTELLUNGEN

Clip Limiter

BESCHREIBUNG
Wenn das Ausgangssignal die Ausgangs- verstärkung übersteigt, wird das Signal gekippt, was zu einer Abbauung der Welligkeit führt. Der Clip Limiter (Spitzenbegrenzung) erkennt dies und verlangsamt sofort die Verstärkung um die Stärke der Übersteuerung zu reduzieren. Um dabei gleichzeitig aber noch dynamisch zu gelingen, spricht der Spitzenbegrenzer nur während echter Übersteuerungen der Kanäle an. Einzelkanal hat seinen eigenen Clip Limiter, der überwacht und abgeschaltet werden kann (siehe Zeichnung).

EINSATZ DES LIMITERS

Einige Anwender benutzen aber die Übersteuerung der Verstärker um bei Sub-Woofer Systemen zusätzlich Pumpe für die Bass-Ornament oder ähnlich perkussives Instrumente zu erhalten.


CARACTERÍSTICAS Y AJUSTES

Clip Limiter

¿QUÉ ES?
Cuando la señal de audio excede el circuito de salida del amplificador más allá de su capacidad de potencia se sitúa con los picos de la forma de onda. El limitador de picos detiene este funcionamiento, y rápidamente reduce la ganancia para minimizar la cantidad de distorsión. Para conservar las dinámicas del programa al máximo, la limitación sólo ocurre durante el instante mismo de la saturación. Cada canal tiene su propio limitador de picos, siendo los dos pueden activar o desactivar independientemente, como se muestra a la izquierda.

¿CUÁNDO (O CUÁNDO NO) SALVAR?
Cuando se usan bocinas de mando completa, el limitador de picos reduce la distorsión de las frecuencias agudas causada por la supercarga de graves. También protege a los altavoces de graves de las frecuencias de saturación y las armónicas deseñadas.

¿CUÁNDO (O CUÁNDO NO) SALVAR?
Cuando se usan subwoofers, algunos prefieren usar los picos del amplificador sin limitación para obtener un "punch" adicional en el bombo de la batería y otros sonidos similares.

ADVERTENCIA: El limitador de picos reduce señales extremas de saturación, permitiendo un nivel de señal más alto sin distorsión audible. Sin embargo, aumenta la ganancia con el limitador de picos activado puede doblar la capacidad de salida. Tenga cuidado de no sobrepasar el límite de potencia de sus bocinas.
FEATURES & SETUP

Input Filter

WHAT IT IS

The low-frequency (LF) filter eliminates signals below either 30 Hz or 50 Hz. This improves bass performance by limiting sub-sonic cone motion, making more power available for the speakers' rated frequency range.

The filter settings for each channel are controlled independently through the DIP switch settings shown. When the filter is turned off, a 5 Hz rolloff protects against DC or deep sub-sonic inputs.

WHEN TO USE IT (OR NOT)

As a rule, your speakers will sound better with proper filtering. Unless you already have filtering in a preceding device, match the setting to the low-frequency rating of your speakers. Avoid bass reflex, ported, etc. speakers as they are especially sensitive to crossover at frequencies below their rated limit.

The 50 Hz filter works well with most compact full-range speakers, and has a slight boost at 100 Hz for greater fullness. The 30 Hz filter is intended for subwoofers and large full-range cabinets. The "off" position should be used only for applications such as studio playback monitoring, where you need to know if there are unwanted sub-sonic signals present in your mix.

CARACTÉRISTIQUES ET LEUR UTILISATION

Filtres d’entrée

DESCRIPTION

Le filtre passe-haut, lorsque réduit, limite le niveau de signal sous 30 Hz ou 50 Hz. Ce filtre améliore la performance du système en limitant le mouvement excessif du cône du haut-parleur de basses à des fréquences infrasoniques, donnant plus de puissance disponible dans le spectre audível.

Les ajustements des filtres pour chaque canal sont faits séparément sur les interrupteurs DIP que montre ci-contre. Lorsque le filtre est désactivé, un filtre passe-haut à 5 Hz entre en fonction afin de prévenir le haut-parleur de fréquences continues, et d’ajouter aux signaux infrasoniques.

UTILISATION

En règle générale, les haut-parleurs fonctionnent bien avec un filtre bien ajusté. A moins que d’autres équipements en amont dans la chaîne ne souillent le filtre, ajustez le filtre sur l’amplificateur en accord avec votre haut-parleur. Les enceintes à résonance (bass reflex, etc.) sont particulièrement sensibles aux suraccents des cônes aux fréquences inférieures à la fréquence d’arrêt de l’amplificateur.

Le filtre à 50 Hz fonctionne bien avec des enceintes pleine gamme compactes, et le filtre augmenter le gain autour de 100 Hz pour un son plus riche. Le filtre à 30 Hz est prévu pour les enceintes de sous-graves et pour les grosses enceintes pleine gamme. La position "off" est désactivée, elle est utilisée dans des applications telles l’écoute en studio, lorsque désiré vérifier l’absence de signal infrasonique dans le mix.

AUSSTATTUNG & EINSTELLUNGEN

Eingangssfilter

BESCHREIBUNG

Ein LF- oder Hochpassfilter schneidet Frequenzen unterhalb 30 Hz, bzw. 50 Hz ab. Hierdurch wird die Basswiedergabe verbessert, da ultimativ höhere Frequenzen abgeschnitten werden, und hierdurch mehr Last für den endgültige Wiedergabe zur Verfügung steht.

Die Filtereinstellungen werden durch die links abgebildeten DIP-Schalter eingestellt. Bei abgeschaltetem Filter werden die Frequenzen unterhalb 5 Hz unterdrückt, damit ein Schutz von Geräuschpadding und Intermodulationen besteht.

SCHNITTSTÜCKE DER EINGANGSFILTER

In der Regel werden Ihre Lautsprecher bei richtiger Filterung besser klingen. Falls nicht schon an einer Stelle eine entsprechende Filterung stattgefunden hat, stellen Sie die Filterung entsprechend dem Frequenzgang Ihrer Lautsprecher ein. Beidseitige Lautsprecher (z.B. Bassreflex, ported, etc.) sind auch mit nur einer Verwendung empfohlen gegen zu große Auswirkungen der Membrane unterhalb des spezifizierten Frequenzbereichs.

Der 50 Hz Filter arbeitet besten mit praktisch allen Boxen. Er ist sehr günstig und sehr flexibel. Der 50 Hz Filter liegt für Subwoofer und große freistehende Kabinett gedacht. Die "OFF"-Einstellung sollte nur für Anwendungen wie z.B. eine Studioabdeckung verwendet werden, wo es darauf ankäme, hochfrequente Anteile im Mix zu erkennen.

CARACTERÍSTICAS Y AJUSTES

Filtro de entrada

¿QUÉ ES?

El filtro de frecuencias graves (IF) permite atenuar señales abajo de los 30 Hz hasta 50 Hz. Esto mejora el rendimiento de las frecuencias graves limitando una porción de audio no auditiva que puede mover el cañón, dejando más potencia disponible para el rango de frecuencia de las bocinas.

Los ajustes del filtro para cada canal se controlan individualmente con el interruptor tipo DIP como se describe. Un atenuador de 5 Hz ofrece protección contra DC o entradas de frecuencias ultrasonoras cuando se apaga el filtro.

¿CUÁNDO (O CUÁNDO NO) SE DEBE USAR?

Por regla general, sus bocinas son mejor con el filtro apagado. A menos que anteriormente haya utilizado otro aparato para filtar y haya igualado las frecuencias graves de sus bocinas. Las bocinas con ventanillas como las bocinas reflex, portadas, etc. son especialmente sensibles a la desplazamiento desvanecido de los cañones causado por frecuencias por debajo de su límite.

El filtro de 50 Hz funciona bien con la mayoría de las bocinas de mano completa, y ofrece un sonido más rico a los 100 Hz para equilibrar el cañón del sonido. El filtro de 50 Hz está diseñado para subwoofers y para gabinetes de mano completa de gran tamaño. La posición "OFF"—apagado—permite usarlas en trabajos de monitorización en el estudio, donde usted necesita saber si su mezcla huele a tonos ultrasonoros no deseados.
FEATURES & SETUP
Parallel input mode
WHAT IT IS
The "Parallel Input" switch lets you operate the amplifier in parallel mode, delivering the same signal to both channels without using a Y-cable. Each channel drives its own speaker load, with independent gain, filtering, and clipping limits.

SETH switch positions 4, 5, and 6 to "On" to couple the inputs together. Turn the switches off for stereo, bi-ampl, or other 2-channel modes. The yellow PARALLEL LED indicates the front panel warns you when the switches are set to parallel.

When the inputs in parallel, you can use the other set of input connectors to carry the signal to other amps. This is often called a "daisy-chain."

WHEN TO USE IT
Parallel inputs when driving two speakers with one input signal (parallel mode) without keeping separate control of both channels’ gain, filtering, and limiting. Use them in bridged mono mode to patch the signal to additional amplifiers through the extra input jacks. See page 12 for an explanation of amp operating modes.

NOTE: If you’re using a balanced signal, use only balanced patch cables, even one unbalanced cable will unbalance the entire signal chain, possibly causing hum.

Patch the input signal to additional amps

CARACTÉRISTIQUES ET LEUR UTILISATION
Mode entrées parallèles
DESCRIPTION
Les interrupteurs "Parallel Inputs" vous permettent d’utiliser l’amplificateur en mode parallèle, où le même signal est livré aux deux canaux sans avoir à utiliser un câble "Y". Chaque canal pilote son propre haut-parleur, avec régulation propre de gain, de filtre et de limiteur.

Ajustez les interrupteurs 4, 5, et 6 en position "on" pour joindre les entrées des deux canaux. Laissez les interrupteurs en position "off" pour utilisation en mode stéréo, bi-amplification, ou toute autre application 2 canaux. La DEL jaune PARALLEL sur le panneau avant affiche pour indiquer que l’amplificateur est réglé en mode parallèle.

Lorsque les entrées sont réglées en mode parallèle, vous pouvez utiliser le connecteur de la seconde entrée pour envoyer le signal vers un autre amplificateur. Ajoutez ce type branchement de chaîne en guirlande, ou "daisy chain".

UTILISATION
Joignez les entrées (mod parallèle) quand vous voulez connecter deux haut-parleurs avec des ajustements de gain, de filtre et de limiteur à partir d’un même signal. Voir la page 12 pour les explications des modes d’application.

NOTE: si vous utilisez un signal câble asymétrique dans la chaîne rendra la chaîne à symétrique, avec tous les désavantages de ce type de connexion.

NOTE: désengager les interrupteurs "parallel inputs" quand vous avez des signaux différents aux deux canaux.

AUSSTATTUNG & EINSTELLUNGEN
Parallelbetrieb
BESCHREIBUNG

Stellen Sie die Schaltstellungen 4, 5 und 6 auf "ON" um die Eingänge zu verbinden. Schalten Sie die Schalter für Stereo, Bi-Amping oder einen anderen 2-Kanalbetrieb. Die grüne PARALLEL LED auf der Frontplatte leuchtet auf, wenn Parallelbetrieb gewählt wurde.

Mit parallel geschalteten Eingängen können die anderen Eingangskanäle benutzt werden, um das Signal an weiteren Verstärker zu liefern.

EINSATZ DES PARALLEL-BETRIEBS
Schalten Sie die Eingänge parallel, wenn zwei Lautsprecher mit einem Signal angeschlossen sind, und dabei aber getrennte Vorsteuerung, Filtrierung oder Begrenzung benutzt werden soll.

Wählen Sie die Modus Mono Mode (Modus Single-Channel) um die Signale an zusätzliche Verstärker mit Hilfe der übrigen Eingangsleitungen zu verbinden (siehe auch Seite 12 für weitere Betrachtungen).

BITTE BEACHTEN: Wenn Sie ein symmetrisches Eingangssignal anlegen, benutzen Sie auch einen symmetrischen Kabel, um das Kabel das Gesamtsignal symmetrisch werden lässt, was möglicherweise Brummern verursachen kann.

BITTE BEACHTEN: Schalten Sie den Parallelbetrieb aus, wenn zwei separate Signale eingespeist werden sollen.

CARACTERÍSTICAS Y AJUSTES
Modo de entradas paralelas
¿Qué ES?
El interruptor "Parallel Input" permite operar el amplificador en modo paralelo, enviando la misma señal a ambos canales sin necesidad de utilizar un cable tipo "Y". Cada canal controla su propia carga de altavoces, con ganancia independiente, filtros y limitadores de picos.

Ajuste los interruptores 4, 5 y 6 en la posición de "ON", para conectar las entradas. Coloque los interruptores en la posición de "OFF" para manipular el modo en el modo estereomono, bi-amplificado, o cualquier otro modo de 2 canales. El indicador LED amarillo para el modo PARALEL en el panel frontal, se activa cuando el interruptor ha sido ajustado en el modo paralelo.

Con las entradas en paralelo, usted puede usar los conectores de la otra entrada para enviar la señal a otras amplificadoras. Lo que comúnmente se conoce como una cadena "daisy chain".

¿CUÁNDO USAR LO?
Utilice la entrada paralela cuando alimenten dos bocinas con una sola señal de entrada (modo paralelo); mientras se mantiene control por separado de la ganancia, los filtros y la limitación de ambos canales. Use el modo "paralelo" en modo mono para conectar la señal a amplificadoras adicionales pero sólo con conectores extra de entrada. Consulte la página 12 para una explicación completa de los modos de operación del amplificador.

NOTA: Si usa una señal balanceada, utilice únicamente cables adecuados. Un solo cable no balanceado puede afectar el recorrido de la señal y producir zumbidos.

NOTA: Cuando alimenta el amplificador con dos señales independientes, coloque el interruptor "Parallel Inputs" en la posición apagada — "OFF".
FEATURES & SETUP

Bridge mono mode

WHAT IT IS

Bridge mono mode combines the power of both amp channels into one speaker, resulting in twice the voltage swing, four times the peak power, and approximately three times the sustained power of a single channel.

This mode uses Channel 1’s input, gain, control, input filter, and clip limiter. Channel 2’s have no effect.

The "BRIDGE" LED on the front panel indicates when the amp is in bridge mono mode.

WHEN TO USE IT (OR NOT)

Use bridge mono to deliver the power of both channels to a single 8-ohm load. Set switch position 7 to “BRIDGE MONO ON.” Use channel 1’s inputs, and connect the speaker as shown.

BRIDGE MONO PRECAUTIONS:

This mode puts a high demand on the amplifier and speaker. Excessive clipping may cause protective muting or speaker damage. Be sure the speaker has a sufficient power rating.

Output voltages greater than 100 volts rms are available between the amplifier’s bridge terminals. NEC CLASS 3 wiring methods, as specified in accordance with national and local codes, must be used to connect the speaker.

CARACTÉRISTIQUES ET LEUR UTILISATION

Mode ponte mono

DESCRIPTION

Le mode ponte mono combine la puissance des deux canaux pour utilisation sur un seul haut-parleur, doublant la tension, quadruplant la puissance de crête, et donnant environ le triple de la puissance continue par rapport à un canal simple. En mode ponte, utiliser l’entrée, la gain, le filtre et le limiteur du canal 1, le canal 2 étant sans effet.

La DEL "BRIDGE" sur le panneau avant ailleurs pour indiquer que l’amplificateur est réglé en mode ponte mono.

UTILISATION

Utiliser le mode ponte mono pour améliorer la puissance des deux canaux sur une seule charge de 8-ohms. Ajuster l’interrupteur 7 en position “Tout.” Utiliser l’entrée du canal 1 et brancher la charge tel qu’indiqué ci-contre.

PRÉCAUTIONS EN MODE MONO PONTE:

Le mode ponte mono place un stress supplémentaire sur l’amplificateur et le haut-parleur. L’excès de niveau peut causer la mise en sourdine par le circuit de protection et peut endommager le haut-parleur. Veuillez vous assurer que le haut-parleur a une pente de sortie acceptable dans le cas d’un amplificateur.

Des points de tension de plus de 100 volts m.s. sont possibles entre les bornes de sortie de l’amplificateur en mode ponte mono. Installer votre système selon les codes électriques locaux et nationaux du site d’installation.

AUSSTATTUNG & EINSTELLUNGEN

Monobrückebetrieb

BESCHREIBUNG


Die LED "BRIDGE" auf der Vorderseite leuchtet auf, wenn diese Betriebsart gewählt wurde.

EINSATZ DES MONOBÜCKEBETRIEBES

Verwenden Sie diese Betriebsart, um die Leistung beider Kanäle von einem einzigen 8- oder 4-Ohm-Lautsprecher zur Verfügung zu stellen. Stellen Sie den Schalter 7 auf "BRIDGE MONO ON." Verwenden Sie die Eingänge von Kanal 1 und schließen Sie die Lautsprecher wie aus der Zeichnung an. Einstellen des Monobrückebetriebs

VORSICHTSMAßNAHMEN:

Diese Betriebsart stellt hohe Anforderungen an die Verstärker und Lautsprecher. Übermäßiges Übersteuern kann zu Schäden des Verstärkers und auch Lautsprecher herbeiführen. Stellen Sie sicher, dass der Lautsprecher entsprechende Leistungen verarbeiten kann.

Ausgangsspannungen von mehr als 100 Volts m.s. liegen zwischen den Ausgangsanschlüssen an. Daher müssen die einschlägigen Sicherheitsmaßnahmen beim Anschluss der Lautsprecher beachtet werden.

CARACTERÍSTICAS Y AJUSTES

Modo puenteado en mono

¿QUÉ ES?

El modo puenteado en mono combina la potencia de ambos canales de amplificador hacia una boina, aumentando dos veces el consumo de voltaje, cuatro veces la potencia de picos y aproximadamente tres veces la potencia de sustentamiento de un solo canal. Este modo utiliza la entrada, el control de ganancia, filtro y limitador del canal 1. Los controles del canal 2 no producen ningún efecto.

El LED marcado "BRIDGE" en el panel frontal, indica la posición del amplificador en el modo "puenteado" en mono.

¿CUÁNDO (O CUÁNDO NO) USARLO?

Utilice el modo puenteado en mono para pasar la potencia de ambos canales, a una sola carga de 8 ó 4 ohmios. Ajuste el selector numérico 7 en la posición "BRIDGE MONO ON." Use los entradas del canal 1 y conecte la bocina como se muestra en la figura.

PRECAUCIONES DEL MODO PUENTEADO EN MONO

Este modo implica un gran requerimiento para el amplificador y las bocinas. La saturación excesiva puede provocar un silencio para proteger de cualquier daño a la bocina. Asegúrese de que ésta tenga el rango de potencia necesario.

Las voltajes de salida mayores a 180 voltios RMS están disponibles entre las terminales "puenteadas" del amplificador. Los métodos de conexión CLASS 3 (NEC), se especifican de acuerdo a los códigos locales o nacionales, y deben utilizarse para conectar la bocina.
FEATURES & SETUP

What are the differences among Stereo, Parallel Input, and Bridge Mono modes?

STEREO MODE
This is the "normal" way of using the amplifier, in which each channel is fully independent. Separate signals are input to each channel, and separate speakers are used.

Examples:
- Two channel (stereo) playback.
- Two independent mono signals, such as main and monitors.
- Bi-amp operation, with the low frequencies in Channel 1 and the highs in Channel 2.

PARALLEL INPUT MODE
This mode is just like Stereo mode, except that the inputs for Channel 1 and Channel 2 are internally connected together. A signal into any input jack will therefore drive both channels at the same time. Each channel's gain control still functions as usual, and each channel feeds its own speaker load. You can patch the input signal on to additional amplifiers by using any of the remaining input jacks.

Example:
- One mono signal driving both channels, with independent gain control for each speaker.

CARACTÉRISTIQUES ET LEUR UTILISATION

Modes stéréo, parallèle et ponté, quelles sont les différences?

MODE STÉRÉO
C’est la façon "normale" d’utiliser l’amplificateur, où l’on utilise deux canaux indépendants. Des signaux différents peuvent être transmis aux deux enceintes, des réglages de gain, de filtre et de phase sont possibles, et des haut-parleurs distincts sont branchés aux deux sorties.

Exemples:
- Écoute stéréo (écho).
- Deux signaux mono indépendants, tel mix principal et moniteur de scène.
- Utilisation de l’amplification bi-ou tri-amplification, avec des basses fréquences amplifiées par le canal 1 et les aigus par le canal 2 (requiert l’utilisation d’un séparateur de fréquences électronique vendu séparément).

PARALLEL INPUT MODE
Cette mode est similaire à celle du mode stéréo, mais les entrées pour les canaux 1 et 2 sont internement connectées. Un signal entrant dans n’importe quel jack alimente les deux canaux en parallèle. Chaque canal dispose de son propre control de gain, et chaque canal alimente son propre haut-parleur.

Example:
- Un signal mono alimente simultanément les deux canaux, avec gain indépendant pour chaque haut-parleur.

AUSSTATTUNG & EINSTELLUNGEN

Unterschiede zwischen Stereo-, Parallel- und Monobrückennebetrieb

STEREOBetrieb
Diese ist die "normale" Betriebsart eines Verstärkers, bei der beide Kanäle vollständig unabhängig arbeiten. An den Eingängen liegen separate Signale an, und an den Ausgängen sind unabhangige Lautsprecher angeschlossen.

Beispiele:
- Zweikanal (Stereo)-Wiedergabe
- Zwei unabhangige Monosignale wie z.B. Summen- und Monitormix
- Bi-Amp-Betrieb, mit den beiden Frequenzzarten an Kanal 1 und den Höhen an Kanal 2

PARALLEL Betrieb

Beispiel:
- Ein Monosignal speist beide Kanäle, mit unababhängiger Verstärkereinstellung für jedes Lautsprechersystem

CARACTERÍSTICAS Y AJUSTES

¿Cuáles son las diferencias entre los modos Estéreo, Entradas Paralelas y Puenteado en Mono?

MODO ESTÉREO
Esta es la manera "normal" de usar el amplificador, donde cada canal funciona independientemente. Con señales separadas conectadas a las entradas, botones de ganancia que controlan su propio canal y bocinas separadas conectadas a cada salida.

Ejemplos:
- Reproducción de dos canales (Estéreo).
- Dos señales mono independientes, como la de la mezcla principal (main) y la de los monitores.
- Operación bi-amplificada, con las frecuencias graves por el canal 1 y las frecuencias agudas por el canal 2.

MODO DE ENTRADAS PARALELAS
Esto es como el modo estéreo, excepto que las entradas para el canal 1 y el canal 2, están unidas internamente. Una señal conectada a cualquiera de las entradas alimenta a ambos canales directamente. Los controles de ganancia de cada canal funcionarán de la misma manera, y cada canal lleva su propia carga para la bocina.

Ejemplo:
- Una señal monofónica que alimenta a ambos canales, con controles de ganancia independientes para cada sistema de bocinas.
FEATURES & SETUP

BRIDGE MONO MODE
This mode combines the full power capabilities of both channels into a single speaker system. The amplifier internally configures so that both channels operate as a unit. This delivers double the output voltage, resulting in four times the peak power and three times the sustained power into a single 8- or 4-ohm speaker load. The Bridge Mono mode section on page 11 describes the special speaker connection used.

Examples:
- Driving a single 8-ohm speaker with the combined 4x4 ohm power of both channels.
- Driving a single 4-ohm speaker with the combined 2x4 ohm power of both channels.

Precautions:
- Bridge: Mono mode makes it possible to drive thousands of watts into a single speaker. AC current consumption will usually be higher. Avoid excessive signal level, and make sure the wiring and speaker can handle the power.
- If the load is less than 4-ohms, or parallel connections occur the amplifier will probably mute for several seconds during peaks.
- Do not use 2-ohm loads.

SEE THE ADDITIONAL BRIDGE MONO MODE WARNINGS ON PAGE 11.

CARACTÉRISTIQUES ET LEUR UTILISATION

MODE PONTE MONO
Ce mode combine la puissance des deux canaux vers une seule sortie. L’amplificateur est néanmoins décalé de façon à ce que les deux canaux fonctionnent en tandem. Ce brusquement double la tension de sortie, ce qui mûrisse par un facteur de 4 la puissance en pointe et triple la puissance en continu par rapport à un canal simple dans un charge de 4 ou de 8 ohms. La section Mode ponté mono en page 11 décrit les brusquements spéciaux des haut-parleurs en ce mode.

Exemples:
- faire fonctionner un haut-parleur de 8 ohms avec la puissance combinée à 4 ohms des deux canaux.
- faire fonctionner un haut-parleur de 4 ohms avec la puissance combinée à 2 ohms des deux canaux.

Précautions:
- Le mode ponté mono permet d’envoyer des milliers de watts de puissance vers un seul haut-parleur. La consommation de courant sera plus élevée. Stéruser que le câblage et le haut-parleur peuvent supporter la puissance générée.
- Si la charge (haut-parleur) est de moins de 4 ohms ou que des surtensions pénètrent dans l’amplificateur, il est possible que l’amplificateur passe en mode protection pour quelques secondes lors de surtensions.
- Ne pas utiliser des charges de 2 ohms.

VOIR LES INSTRUCTIONS ADDITIONNELLES POUR UTILISATION EN MODE PONTE MONO EN PAGE 11.

AUSSTATTUNG & EINSTELLUNGEN

MONOBRENNETRIEB
Diese Betriebsart addiert die volle Leistung beider Kanäle für eine einzelnen Lautsprechersysteme. Der Verstärker wird intern konfiguriert, so daß beide Kanäle wie ein einzelner Kanal funktionieren. Hierdurch wird unverändert die doppelte Ausgangsspannung, die dreifache Spitzennennleistung und verantwortlich die dreifache Dauerleistung eines Einzelkanals in eine 8 oder 4Ω Last zur Verfügung. Weitere Erläuterungen zur besonderen Art des Amplitrons der Lautsprecher finden Sie auf Seite 11.

Beispiele:
- Betrieb eines einzelnen 8Ω-Lautsprechers mit der addierten 4Ω-Leistung beider Kanäle.
- Betrieb eines einzelnen 4Ω-Lautsprechers mit der addierten 2Ω-Leistung beider Kanäle.

Vorsichtsmaßnahmen:
- Im Monobrückeneinsatz können tiefere Töne bei Ansteuerung an einen einzelnen Lautsprecher abgegeben werden. Die Schaltüberspannungen des Verstärkers und leiten als normal sein. Vorsichtshalber überprüfen Sie daher über einen Signalgenerator und stellen Sie sicher, daß die Kompression und der Lautsprecher die hohe Leistung verarbeitet können.
- Bei Lasten kleiner als 4Ω oder zu großen Überspannungen kann der Verstärker für einige Sekunden abschalten.
- 2Ω Lasten dürfen nicht betrieben werden.

BITTE BEACHTEN SIE DIE WARNHINWEISE AUF SEITE 11.

CARACTERÍSTICAS Y AJUSTES

MODO PUENTEA DO EN MONO
Este modo combina la capacidad total de potencia de ambos canales, en un solo sistema de bocinas. El amplificador se reconfigura internamente de manera que ambos canales operen como uno. Esto produce el doble de voltaje de salida, cuatro veces la potencia en pico y tres veces la potencia de sustento en cargas de 8 y 4 ohmios. La sección del modo “Puenteadado en Mono” en la página 11 describe la conexión usada para las bocinas.

Ejemplos:
- Para alimentar una bocina de 8 ohmios, con la potencia de dos canales de 4 ohmios.
- Para alimentar una bocina de 4 ohmios, con la potencia de dos canales de 2 ohmios.

Precauciones:
- El modo de puenteado en mono puede mandar niveles de voltaje a una sola bocina. El consumo de corriente alterna (AC) también sentirá mayor. Evite niveles de señales excesivos, y asegúrese de que el cableado y las bocinas resistan la potencia.
- Si la carga es menor a 4 ohmios, ó la saturación es muy frecuentes, el amplificador puede emitir un pitido (función Mute) durante los picos por varios segundos.
- No use cargas de 2 ohmios.

LEA LAS PRECAUCIONES ADICIONALES PARA EL MODO DE PUENTEA DO EN MONO EN LA PÁGINA 11.
INSTALLATION
Use four screws and washers when mounting the amplifier to the front rail(s).
Support the amp at the rear also, especially in mobile and touring use;
rear rail mounting ear kits are available from QSC’s technical services department or by special order from your dealer or distributor.

Einbau
Bauen Sie vier Befestigungsschrauben und Unterlegscheiben zum Montage im Vorderbild in das Rack.
Stützen Sie den Verstärker auch an seiner Rückseite ab. Dies gilt besonders für den mobilen Einsatz. Rückwandige Einbausätze können direkt bei QSC oder den jeweiligen Händlern oder Distributoren bestellt werden.

Instalación
Utilice cuatro tornillos con arandelas cuando coloque el amplificador en la parte frontal del rack.
Coloque el amplificador también en la parte trasera, especialmente cuando vaya a transportar el equipo. Los kits de montaje trasero están disponibles en el departamento de servicios técnicos de QSC o pidálos directamente a su distribuidor.
**Connections**

**Inputs**

Each channel has active balanced XLR and ¼ inch (6.3 mm) inputs wired in parallel. The input impedance is 12 kΩ balanced, 6 kΩ unbalanced.

Balanced signals are less prone to AC hum, but unbalanced signals can be suitable for short cable runs. The signal source's output impedance should be less than 600Ω to avoid high frequency loss in long cables.

**Balanced inputs:** Use the XLR or ¼ inch (6.3 mm) TRS input jacks.

**Unbalanced inputs:** Connect the unused side of the unbalanced input to ground, as shown below left. A tip-sleeve (6.3 mm) connector will correctly terminate the unused side of the input without modification.

For two-channel stereo operation, use the inputs for both Channel 1 and Channel 2, for parallel or bridged mono operation, use the Channel 1 input. See the section on operating modes for more explanation. To patch the audio signal to other amps (parallel and bridged modes only), see the instructions for using parallel inputs on page 9.

**Conexiones**

**Entradas**

Cada canal tiene entradas activas balanceadas XLR y ¼” (6.3 mm), alineadas en paralelo. La impedancia de entrada es de 12 kΩ en la balanizada, 6 kΩ en la no balanceada.

Las señales balanceadas son menos propensas a inducir ruido, pero las señales no balanceadas pueden ser adecuadas para cables cortos. La impedancia de salida de la fuente de señal debe ser menor de 600Ω para evitar la pérdida de frecuencias altas en cables largos.

**Entradas balanceadas:** Use las entradas XLR o TRS de ¼” (6.3 mm).

**Entradas no balanceadas:** Conecte el lado libre de la salida balanceada a tierra, como se muestra a la izquierda. Con un conector de tip-sleeve de 6.3 mm se puede conectar correctamente el lado no utilizado de la fuente de señal sin modificar.

En el modo estéreo, use las entradas de ambos canales (sólo para paralelo). En el modo monofónico, use la entrada de Canal 1. Consulte la sección de los modos de operación para más explicaciones. Para conectar el signal de audio a otros amplificadores (sólo para paralelo y monofónico), consulte las instrucciones en la página 9.

**Anschluss**

**Eingänge**

Jeder Kanal verfügt über symmetrische XLR- und 6,3 mm Stereoklinke-Eingänge. Die Eingangsimpedanz beträgt symmetrisch 12 kΩ, unsymmetrisch 6 kΩ.

Symmetrische Signale werden weniger Beeinflusst, vor allem in asymmetrischen Verbindungen, wobei Abweichungen bei kurzen Kabelverbindungen häufig ausreichend sind. Die Eingangsimpedanz sollte dabei mehr als 600Ω betragen, um eine Höhenverlust bei längeren Kabelverbindungen zu vermeiden.

**Symmetrische Eingänge:** Verwenden Sie die XLR oder 6,3 mm Stereoklinke-Eingänge. Ein asymmetrisches Signal wird nicht beeinflusst.

**Unsymmetrische Eingänge:** Verwenden Sie die unbalancierten XLR- und 6,3 mm Stereoklinke-Eingänge.

**Entradas**

**Entradas balanceadas:** Use las entradas XLR o TRS de ¼” (6.3 mm).

**Entradas no balanceadas:** Conecte el lado libre de la salida balanceada a tierra, como se muestra a la izquierda. Con un conector de tip-sleeve de 6.3 mm se puede conectar correctamente el lado no utilizado de la fuente de señal sin modificar.

Para la operación en dos canales (estéreo), use las entradas de los canales 1 y 2. Para la operación en paralelo o monofónico, use la entrada del canal 1. La sección de los modos de operación contiene una explicación más detallada. Para enviar el señal de audio a otros amplificadores (sólo en los modos paralelo o monofónico), consulte las instrucciones para entradas paralelas en la página 9.
**CONNECTIONS**

**Speakon™ Outputs**

The PLX amplifier offers a choice of output connections, with two Neutrik NL4MD Speakon jacks and two pairs of "touchproof" binding posts.

The Speakon connector is designed specially for high-power speaker connections. It locks in place, prevents shock hazard, and assures the correct polarity.

The upper Speakon jack has both Channel 1 and Channel 2 outputs, so it is especially useful for parallel, biamp, or bridged mono-operation (see bridged mono operation precautions on page 12). The other Speakon carries only Channel 2's output. See the illustrations at left.

For easier insertion, use the new style NL4FC Speakon connectors with quicklock thumb latches.

**SPEAKER CABLEING**

Longer wire runs and shorter lengths minimize both loss of power and degradation of damping factor. Do not place speaker cables next to input wiring.

**WARNING**: To prevent electric shock, do not operate the amplifier with any of the conductor portions of the speaker wire exposed.

---

**CONEXIONES**

**Salidas Speakon™**

El amplificador PLX ofrece varias opciones de salida, con dos conectores Neutrik Speakon NL4MD y dos pares de terminales con tapa.

El conector Speakon superior tiene las salidas de los canales 1 y 2, y se usa para una operación en paralelo, biampificada, o puentear en mono (a la recomendación de la página 12). El otro conector Speakon solo tiene la salida del canal 2. Observe las ilustraciones a la izquierda.

Para facilitar la inserción de los conectores, recomendamos que use los nuevos conectores Speakon NL4FC corrientes.

---

**Anschlüssе**

**Ausgänge Speakon™**

Der PLX Verstärker stellt mindestens Ausgangskabel Ihrer Wahl ein. Neutrik NL4MD Sprecherkabel und zwei Paare von hochisolierten Schraubklemmen werden geliefert.

Der Sprecheranschluss ist speziell für die Ausführung von Dauerkabeln konzipiert. Er verhindert elektrische Schläge und bietet die richtige Polarisität.

Die obere Ausgangskabel enthält beide Kabel, so dass sie besonders für Parallelschaltung, Biamping oder Mono-Betrieb geeignet ist (vgl. Abbildungen auf Seite 12). Der andere Ausgangskabel enthält nur die Signale von Kabel 2 (siehe auch informative Abbildung). Für eine leichte Anbindung verwenden Sie die Neutrik-Sprecherkabel der neuen Generation.

---

**CONEXIONES**

**Salidas Speakon™**

El amplificador PLX ofrece varias opciones de salida, con dos conectores Neutrik Speakon NL4MD y dos pares de terminales con tapa.

El conector Speakon superior tiene las salidas de los canales 1 y 2, y se usa para una operación en paralelo, biampificada, o puentear en mono (a la recomendación de la página 12). El otro conector Speakon solo tiene la salida del canal 2. Observe las ilustraciones a la izquierda.

Para facilitar la inserción de los conectores, recomendamos que use los nuevos conectores Speakon NL4FC corrientes.
CONNECTIONS

Binding post outputs

1. Strip back insulation not more than 13 mm (1/2 inch).
2. Insert wire fully so that none of the conductor is exposed, tighten screw (use care if necessary).
3. Non-European models only.
4. Spade lug must have insulated bands to prevent electric shock.

WARNING: To prevent electric shock, do not operate the amplifier with any of the conductor portion of the speaker wire exposed.

Connections for stereo and parallel operations.

Connections for bridged mono operation. See bridged mono operating precautions on page 11.

SPEAKER CABLEING

Larger wire sizes and shorter lengths minimize both loss of power and degradation of damping factor. Do not place speaker cables next to input wiring.

Operating voltage (AC mains)

Make sure you connect the amplifier to the correct AC line voltage, which is shown on the serial number label. Connecting to the wrong line voltage is dangerous and may damage the amplifier.

TENSION D'UTILISATION (alimentation CA)

Vous devez vous assurer de respecter la tension alimentation à une source de courant alternatif de tension correcte, tel que spécifié sur l'étiquette du numéro de série. Connecter à une source de courant autre qu'indiqué est dangereux et pourrait endommager l'amplificateur.

NETZANSCHLUÈSE

Anschlussklemmen

Das Kabelkunde nicht länger als 13 mm abschneiden.


WARNING: Um elektrische Schäden zu vermeiden, müssen Kabelklemme здесь komplett abgeschnitten auftreten.

AVERTISSEMENT: Afin de prévenir les risques de choc électrique, ne pas utiliser l'amplificateur lorsque une portion de l'attache ne sont pas exposées. Les instructions et précautions à suivre pour le branchement monopolaire sur page 12.

CÂBLAGE DU HAUT-PARLEUR

Les câbles de fort calibre et les courtes distances minimisent les pertes de puissance et la dégradation du coefficient d'amortissement. Évitez de placer les câbles de haut-parleurs à proximité des câbles d'entrée.

LAUTSPRECHERKABEL

Dicker und kürzer Kabel vermindern soviel Leistungseintrag wie eine Verlängerung des Dämpfungsfaktors. Verwenden Sie keine Ausgangskabel neben den Eingangskabeln.

TENSION DE USO (alimentación CA)

Asegúrese de que el amplificador esté conectado a la tensión correcta del suministro de corriente alternativa (AC) con el voltaje adecuado, el cual aparece en la etiqueta con el número de serie. Conectar a una línea de voltaje diferente es peligroso y puede dañar el equipo.

VOLTAGE DE OPÉRATION (alimentación CA)

Assurez-vous de connecter l'amplificateur à une ligne de courant alternatif (AC) à la tension appropriée, laquelle apparaît sur l'étiquette avec le numéro de série. Connecter à une ligne de tension différente est dangereux et peut endommager l'amplificateur.
OPERATION

AC power switch
Before applying power, check all connections and turn down the gain controls. The “soft start” sequence starts with the POWER indicator LED at half brightness. A couple of seconds later the fan starts and the amplifier cycles through one second of protective muting, indicated by the CLIP LED glowing bright red. The POWER indicator then changes to full brightness and the amplifier is ready.

Gain controls
The gain controls are detented for repeatable adjustment. The actual voltage gain of the amplifier is shown in dB. Maximum gain is 40x, or 32 dB.

LED indicators
At full brightness, the green POWER LED indicates that the amplifier is operating. Half brightness means the amp is in its startup sequence.

As the signal increases, the green SIGNAL, -2dB, and -10dB LED indicators light respectively at 0.1%, 1%, and 10% of full power.

The red CLIP LED indicator flashes during overload (clipping). A bright, steady glow indicates protective muting. If this occurs during use, seek technical advice.

The yellow BRIDGE LED indicates the amp is in its bridged mono mode.

The yellow PARALLEL LED indicates the Parallel input switches are set.

UTILISATION

Interrupteur d’alimentation CA
Avant de mettre l’amplificateur en marche, vérifier toutes les connexions et fermer les commandes de gain. La séquence de démarrage “soft start” débute par l’indicateur POWER à mi-brillance. Après quelques secondes, le ventilateur se met en marche et l’amplificateur passe en mode protecteur pendant une seconde, tel qu’indiqué par le LED CLIP en rouge. L’indicateur POWER passe alors à pleine brillance et l’amplificateur est prêt à fonctionner.

Contrôles de gain
Les commandes de gain à l’appareil permettent les ajustements rapides. Le gain en tension de l’amplificateur est indiqué en dB. Le gain maximum est de 40x, soit 32 dB.

Indicateurs DEL
À pleine brillance, le DI (döße dynamical increment) vert de l’indicateur POWER indique que l’amplificateur est en marche. À demi-brillance, il indique que l’amplificateur est en mode protecteur.

Au fur et à mesure que le niveau de signal augmente, les DEL vertes SIGNAL, -2dB, et -10dB s’allument respectivement à 0.1%, 1%, et 10% de la pleine puissance de l’amplificateur.

La DEL CLIP est désignée par le LED rouge à sursurchage (clipping). La DEL rouge allumée indique que l’amplificateur est en mode protecteur.

La DEL jaune BRIDGE indique que l’amplificateur est en mode mono.
La DEL jaune PARALLEL indique que l’amplificateur est en mode parallèle.

BETRIEB

Netzschalter
Bevor Sie einschalten, überprüfen Sie alle Verbindungen und drehen Sie die Verstärkung zurück. Die Softstart-Sequenz beginnt mit einer Halbbrillanz der POWER LED. Einige Sekunden später beginnt der Ventilator zu laufen und der Verstärker schaltet für etwa 1 Sekunde stumm, sobald die rote CLIP LED hell aufleuchtet. Danach erscheint die POWER-Anzeige in voller Helligkeit und der Verstärker ist betriebsbereit.

Verstärkungsregler
Die Regler werden als Rastpotentiometer ausgelegt, um reproduzierbare Einstellungen zu erhalten. Die tatsächliche Verstärkung wird in dB angezeigt. Volle Verstärkung entspricht 40x, oder 32 dB.

LED-Anzeige
Bei voller Helligkeit zeigt die grüne POWER LED die Betriebssicherheit des Verstärkers an. Hohe Helligkeit bedeutet, daß sich der Verstärker in der Startsequenz befindet.

Bei steigendem Eingangssignal, leuchten die grünen SIGNAL, -2dB und -10dB LED weiterhin auf und zeigen 0.1%, 1% und 10% der möglichen volle Leistung an.

Die rote CLIP LED leuchtet während Überbelastung (Clipping) auf. Ein leuchten, gleichmäßiges Leuchten zeigt, außerdem schützende Stammsschutz an. Falls dieser Zustand während des Betriebs auftritt, lesen Sie bitte den Abschnitt „Fehlerbehebung“.

Die gelbe BRIDGE LED leuchtet auf, wenn der Verstärker Monoschaltung betrieben wird.

Die gelbe PARALLEL LED zeigt an, daß die Parallel Input Selector eingestellt wurde.

OPERACIÓN

Interruptor de encendido
Antes de enchufar el equipo, revise las conexiones y baje los controles de ganancia. La secuencia de encendido “suave” incluye el indicador LED POWER a media luz. Un par de segundos después el ventilador se enciende y el amplificador hace un silencio manifiesto de protección, que se puede visualizar en los indicadores LED rojos de CLIP. Después el indicador POWER se enciende completamente y el amplificador está listo para operar.

Controles de ganancia
Los controles de ganancia han sido diseñados para un ajuste continuo. El voltaje de ganancia del amplificador aparece en décibels. La ganancia máxima es de 40x, o 32 dB.

Indicadores LED
La luz verde en el LED de POWER indica que el amplificador está encendido. Y a medida que la señal aumenta, los LED indicadores verdes de SIGNAL, los -2dB y -10dB, se iluminan respectivamente al 0.1%, 1%, y 10% de la potencia máxima.

El indicador LED Rojo de CLIP, parpadea cuando hay saturación (clipping). Cuando permanece encendido indica "excedimiento" (función de protección). Si esto ocurre durante el uso, lea la sección "Falla de protección".

El LED amarillo de BRIDGE indica que el amplificador está en modo de puenteado en mono.

El LED amarillo de PARALLEL indica que los interruptores de entrada paralela han sido activados.
**OPERATION**

Fan cooling

The fan speed varies automatically to maintain safe internal temperatures. Keep the front and rear vents clean to allow full air flow. Hot air exhausts out the front of the amp so it does not heat the interior of the rack. Make sure that plenty of cool air can enter the rack, especially if there are other units which exhaust hot air into it.

**SAFE OPERATING LEVELS**

The amp’s protective muting system guards against excessive internal temperatures. With normal ventilation and 4- to 8-ohm loads, the amplifier will handle any sound signal level including overdrive—but make sure that the speakers can handle the full power! However, lower load impedances and higher signal levels produce more internal heating. Into 2-ohm loads, frequent or prolonged clipping (indicated by constant flashing of the red CLIP LED) may trigger power cutback or even protective muting.

**SAFE OPERATING LEVELS**

The amp’s protective muting system guards against excessive internal temperatures. With normal ventilation and 4- to 8-ohm loads, the amplifier will handle any sound signal level including overdrive—but make sure that the speakers can handle the full power! However, lower load impedances and higher signal levels produce more internal heating. Into 2-ohm loads, frequent or prolonged clipping (indicated by constant flashing of the red CLIP LED) may trigger power cutback or even protective muting.

**VENTILATION**

Le ventilateur à vitesse variable s’ajuste automatiquement pour maintenir une température interne raisonnable. Veillez à garder les ailettes et les sorties d’air libres d’obstructions afin de permettre une circulation d’air.

L’air chaud sort par le haut du ventilateur afin de passer au travers de l’intré activé de l’unité de refroidissement. Assurez-vous que beaucoup d’air frais puisse entrer à l’intérieur du coffret. Tout particulièrement si vous utilisez d’autres appareils qui soufflent leur air chaud à l’intérieur du coffret.

**LEVELS OF USE**

Le circuit de protection de l’amplificateur est en fonction et met le signal en sourdine lors de la température excédant. Avec une charge de 4 ou 8 ohm et une ventilation normale, l’amplificateur fonctionne sans aucun problème, incluant les surcharges, assurant que les haut-parleurs peuvent accepter toute la puissance de l’amplificateur. Il est possible que des charges d’impuissance plus faibles ou des niveaux de signal plus élevés génèrent plus de chaleur. Ainsi, une charge de 2 ohms accompagnée de surcharges constantes, tel qu’indiqué par l’allumage continu de la DEL CLIP, pourrait amener l’amplificateur à réduire le niveau de puissance, voire à arrêter la sortie en mode protection, avec mise en sourdine. Le mode pointe mince double l’impédance des sorties de l’amplificateur (4Ω) dans le cas de la charge minimum. L’amplificateur continuera de réguler la mise en sourdine. Si cette condition se prolongerait lors de l’utilisation, voir la section dépannage du manuel.
Troubleshooting

Problem: no sound

➢ INDICATION: POWER indicator not lit
  • Check the AC plug.
  • Confirm that the AC outlet works by plugging in another device. If too many amplifiers are used on one outlet, the building's circuit breaker may trip and shut off power.
  • An overload in bridged mono mode may cause the amplifier to click off for three seconds, indicated by the tail light POWER LED, followed by a normal restart cycle. Check the load impedance (4 ohms minimum), or reduce signal level. CLIP LEDs glowing bright red indicate a thermal shutdown.
  • An amplifier which keeps shutting off may have a serious internal fault. Turn it off, remove AC power, and have the amplifier serviced by a qualified technician.

➢ INDICATION: SIGNAL LED not lit
  • If the green POWER indicator LED is at full brightness and the fan is running, yet the signal LED and no signal check input. Make sure the signal source is operating, and try another input. Connect the source to another channel or amplifier to confirm its operation.

➢ INDICATION: DEL SIGNAL éteints check
  • If the DEL POWER is all on and that the ventilator functions, but no DEL SIGNAL rester éteints, vérifier l'existence de signal. Assurez-vous que la source fonctionne normalement, puis essayer d'autres câbles de raccord. Brancher le signal de source à un autre canal d'amplificateur pour confirmer la présence de signal.

Dépannage

Problème: pas de son

➢ INDICATION: DEL "POWER" ÉTEINT
  • Vérifiez le branchement du cordon d'alimentation.
  • Assurez-vous que la source de courant fonctionne en y branchant un autre appareil. Un trop grand nombre d'amplificateurs raccordés au même circuit peuvent faire déclencher le déroutage, coupant l'alimentation.
  • Une surcharge en mode ponté mono peut déclencher momentanément l'amplificateur, tel qu'indiqué par la DEL POWER allumé à demi- éclaire, suivi par cycle normal d'allumage. Vérifiez l'impédance de la charge (4 ohms minimum), ou réduisez le niveau de signal.
  • L'allumage continu des CLIP indique la mise en sourdisse par le circuit de protection à cause de surchauffe.
  • Un amplificateur qui passe continuellement en mode protection peut être défectueux. Éteignez l'amplificateur, débranché, puis faites le vérifier par un technicien compétent.

➢ INDICATION DEL SIGNAL éteints
  • Si la DEL POWER est allumée et que le ventilateur fonctionne, mais que les DEL SIGNAL restent éteintes, vérifiez l'existence de signal. Assurez-vous que la source fonctionne normalement, puis essayez d'autres câbles de raccord. Branchez le signal de source à un autre canal d'amplificateur pour confirmer la présence de signal.

Fehlerbehebung

Problem: kein Ton

➢ ANZEICHEN: POWER ANZEIGE LEUCHTET NICHT
  • Überprüfen Sie den Netzstecker.
  • Stellen Sie sicher, daß die Steck-
    - dox Strom läuft, indem Sie ein
    - anderes Gerät einschalten. Fehle zu
    - viele Verstärker anschlüßen und
    - die Verzögerung aufheben.

  • Eine Überlastung im Mono-
    - modus kann den Verstärker für
drei Sekunden stummstellen, was
durch eine blinkende POWER-
    - LED angezeigt wird. Überprüfen Sie
    - die Impedanz der angeschlossenen
    - Lautsprecher (minimal 6 ohm), oder
    - reduzieren Sie den Signalpegel.

  • Eine leitende, nach unten laufende,
    - CLIP-LED angibt eine thermische
    - Überhitzung.

  • Ein Verstärker, der sich spontan
    - abschaltet, kann einen interinern
    - Defekt haben. Schalten Sie ihn aus,
    - trennen Sie ihn von der
    - Netzverbindung und lassen Sie
    - den Verstärker von qualifizierten
    - Servicepersonal überprüfen.

➢ ANZEICHEN: SIGNAL ANZEIGEN LEUCHTEN NICHT
  • Wenn die grüne POWER LED in
    - voller Helligkeit leuchtet, der Lüfter
    - läuft, die Signal-LEDs aber kein
    - Signal anzeigen, überprüfen Sie den
    - Eingang. Stellen Sie sicher, daß
    - die Quelle aktiv ist und versuchen
    - Sie mit einem anderen Eingangs-
    - kabel. Schließen Sie die Quelle an
    - einen anderen Verstärker an, um
    - sicherzustellen, daß sie arbeitet.

Busqueda de averías

Problema: no hay sonido

➢ INDICACIÓN: EL INDICADOR DE ENCENDIDO NO SE ILUMINA
  • Revise el cable de corriente.
  • Confirme que la toma de corriente funciona conectando otro aparato. Si se conectan muchos amplificadores a una sola toma, el circuito se sobrecarga y se desconecta.

  • Una sobrecarga en el modo de
    - paralelo puede causar un apagado momentáneo, como de
    - tres segundos; y el indicador LED de
    - POWER baja la intensidad de su
    - luz, minimizando la sensación de
    - encendido. Verifique la impedancia de
    - carga (4 ohms mínimo), o
    - reduzca el nivel de la señal. Si el
    - LED rojo de CLIP no se ilumina
    - indicará un apagado térmico.

  • Un amplificador que se apague
    - de manera espontánea, puede tener
    - una falla interna. Apagado,
    - desconectado de la toma de
    - corriente y llevado con un técnico
    - especializado para su revisión.
TRoubleshooting

No sound (continued)

- INDICATION: SIGNAL LEDs responding to signal level
  - If the green SIGNAL, -20 dB, and -10 dB indicators are lighted normally, the fault is somewhere between the amp and the speaker. Check the speaker wiring for breaks. Try another speaker and cable.

- INDICATION: CLIP LEDs BRIGHT AND STEADY
  The amplifier is in protective muting.
  - One second of muting is normal when the amp is turned on or off.
  - Overheating will cause protective muting. The fault will be running at full speed and the display will be hot to the touch. Sound should resume within a minute as the amplifier cools down to a safe operating temperature. Check for proper ventilation. If the fan isn’t running at all, the amplifier requires servicing.

- INDICATION: CLIP LED FLAShING
  - If the red CLIP indicator flashes when signal is applied, the amplifier output may be limited. Check the speaker wiring for stray strands or breaks in the insulation.

DÉPANNAGE

Pas de son (suite)

- INDICATION: DEL DE SIGNAL fonctionnement normalement
  - Si les DEL SIGNAL, -20 dB et -10 dB fonctionnent normalement, le problème se situe entre l’afficheur et l’enceinte. Vérifiez l’intégrité du câble de haut-parleur. Essayez un autre câble et un autre haut-parleur.

- INDICATION: DEL CLIP allumées en continu
  L’amplificateur est en mode protection.
  - La mise en sourdine pour une seconde est normale lors de la mise à l’arrêt et l’arrêt à la marche de l’amplificateur.
  - La surchauffe entraîne la mise en sourdine de l’amplificateur. Le ventilateur tourne alors à pleine vitesse et le chasis semble chaud au toucher. Le défaut devrait réapparaître après un délai de 1 minute.

FEHLERBEHEBUNG

Kein Ton (Fortsetzung)

- ANZEICHEN: SIGNAL ANZEIGEN LEUCHTEN NORMAL
  - Wenn die grüne SIGNAL, -20 dB- und -10 dB-LEDs normal aufleuchten, liegt der Fehler an einer Stelle zwischen Verstärker und Lautsprecher. Überprüfen Sie die Lautsprecherkabel auf Untreuelemente. Schließen Sie einen anderen Lautsprecher mit anderen Kabeln an.

- ANZEICHEN: CLIP ANZEIGE LEUCHTET HELL UND GLEICHMÄSSIG
  Die Schutzschaltung hat den Verstärker abgeschaltet.
  - Eine Abschaltung für eine Sekunde Dauer ist beim Einschalten normal.


BUSEQUEDA DE AVERÍAS

No hay sonido (continuación)

- INDICACIÓN: EL INDICADOR LED DE “SIGNAL” y LOS INDICADORES DE NIVELES SE ENCENDEN AL DETECTAR EL NIVEL DE LA SEÑAL
  - Si los indicadores LED verde de SIGNAL, -20 dB y -10 dB parpadean, la falla ocurre entre el amplificador y las bocinas. Revise los cables de las bocinas, intente cambiarse o cambiarlos los cables.

- INDICACIÓN: LOS INDICADORES CLIP PERMANECEN ENCENDIDOS
  El amplificador está haciendo un "enmarchamiento" (martello) de protección.
  - Un segundo de silenciamiento (corte) es normal cuando se enciende o se apaga el amplificador.
  - El sobrecalentamiento puede causar "enmarchamiento" de protección. El ventilador está funcionando a su máxima velocidad y el armazón o caja del amplificador estará caliente al tacto. El sonido se suspenderá por un minuto mientras el amplificador vuelve a una temperatura adecuada de operación. Puede oírse el ventilador de operación. Si el ventilador no se mueve, el amplificador necesita mantenimiento.

- INDICACIÓN: EL INDICADOR LED DE CLIP PARPADEA
  - Si este sucede cuando entra una señal, la alta del amplificador puede estar en corto circuito. Vaya a los cables de las bocinas y revise si están alambres sanas o averías en el aislamiento.
**TROUBLESHOOTING**

**Problem: distorted sound**

> **INDICATION: CLIP LED FLASHING**
> - If the red CLIP indicator flashes before all three signal indicators do, the load impedance is probably low or distorted. Unplug each speaker one-by-one after the amplifier if the CLIP LED goes out when you disconnect a cable, that cable or speaker is shorted. Try another cable and speaker to locate the fault.

> **INDICATION: CLIP INDICATOR NOT FLASHING**
> - This could be caused by a faulty speaker or loose connection. Check the wiring and try another speaker.
> - The signal source may be clipping. Keep the amplifier gain controls at least halfway up so that the source does not have to be overdriven.

---

**Dépannage**

**Problème: son distorsionné**

> **Indication: DEL CLIP CLIGNOTE**
> - Si la DEL CLIP clignote avant que les trois DEL de niveau de signal, ou l’impédance de charge est trop faible, ou la sortie de l’amplificateur est court-circuitée. Dénichez les haut-parleurs un à un à l’amplificateur. Si la DEL CLIP s’éteint quand vous déconnectez un câble, ou le câble ou le haut-parleur est court-circuité. Essayez un autre câble pour une autre haut-parleur pour localiser le problème.

> **Indication: DEL CLIP N’ALLUMENT PAS**
> - Peut être dû à du claquage ou un haut-parleur défectueux. Vérifiez le claquage et essayez un autre haut-parleur.
> - Le signal peut être distorsionné à la source. Utilisez l’amplificateur avec les commandes de gain au moindre de mis en cause afin d’éviter d’altérer la source de signal.

---

**Problem: no channel separation**

- Check the yellow PARALLEL or BRIDGE MONO LED on the front panel, which indicate the switch settings on the back of the amplifier. Neither should be lit if dual-channel, bi-amp, or stereo use where different signals go to each channel. Make sure the "Parallel input" and "Bridge Mode" switches are OFF.
- Make sure other equipment in the signal path, such as mixers, preamps, etc., are set for stereo, not mono.

---

**Problem: pas de séparation des canaux**

- Assurez-vous que les DEL jaunes PARALLEL et BRIDGE MONO sont éteintes sur le panneau avant, ce qui indiquera la position des interrupteurs sur le panneau arrière. Si l’une ou l’autre n’est pas allumée pour une utilisation en mode stéréo, bi-amplification, ou deux canaux, quand des signaux distincts sont envoyés aux deux canaux de l’amplificateur. Assurez-vous que les interrupteurs PARALLEL et BRIDGE sont en position OFF.
- Assurez-vous que les autres équipements dans la chaîne audio en amont, n’est pas pré-amplificateur, mixeur ou autre, sont réglés en mode stéréo, et non en mono.

---

**Problem: keine Kanal trennung**

- Überprüfen Sie die Vorstellen, gelten PARALLEL oder BRIDGE MONO LEDs, welche die Schalterstellung auf der Rückseite anzeigt. Keine sollte im 2-Kanal-, Bi-Amp oder Stereobetrieb aufleuchten, bei denen unterschiedliche Signale an den einzelnen Kannel zugeführt wurden. Stellen Sie sicher, daß die "Parallel Input" und "Bridge Mode" Schalter auf OFF stehen.
- Stellen Sie sicher, daß andere Geräte der Signalkette, z.B. Mixer o. Ä. nicht im Monobetrieb laufen.

---

**Problem: problema sin separación entre los canales**

- Revise los indicadores amarillos PARALLEL o BRIDGE MONO en el panel frontal al amplificador, que indican la posición de los interruptores en la parte de atrás del amplificador. Ninguno debe iluminarse si usan los modos de dos canales, bi-amplificación o estéreo. Revise que los interruptores "Parallel Input" y "Bridge mode" estén apagados.
- Verifique el resto del equipo en el trayecto de la señal, como mezcladores, preamplificadores, etc., están ajustados en estéreo y no en mono.
TROUBLESHOOTING

Problem: hum
- The PowerWave™ supply eliminates internal hum fields, but AC transformers in other devices may cause hum. Move cabling and signal sources to identify "hot spots" in the system. Cables with faulty shielding are a frequent entry point for hum.

Problem: hiss
- Upgrading the amplifier input to confirm that the hiss is coming from the source or a device upstream, erratic or popping noises indicate an electronic fault in the offending unit.
- To keep the normal noise floor low, operate the primary signal source at full level, without clipping, and avoid boosting the signal further between the source and the amplifier.

Problem: squeals and feedback
- Microphone feedback should be controlled with mic controls. If noise continues to build up with zero mic gain, there is a serious fault in the signal processors or cables. Working in succession from the signal source towards the amplifier, check each device in the signal path by reducing its gain or unplugging it.

DÉPANNAGE

Problème: ronflement
- Le bloc d'alimentation PowerWave élimine les champs magnétiques intenses, mais il est possible que les blocs d'alimentations d'autres appareils génèrent du bruit sous forme de ronflement (hum). Désactivez les câbles et/ou les appareils du système afin de localiser les sources de bruit. Les câbles avec un blindage défectueux sont une source commune de ronflement.

Problème: souffle
- Débrancher le câble d'entrée pour confirmer que le bruit provient d'autres équipements dans la chaîne audio en amont, soit les pré-amplificateurs, mixer ou autres; des bruits transitoires pourraient indiquer un problème électronique dans l'unité en cause.
- Afin de réduire le niveau de bruit du fond au minimum, utiliser les sources à un niveau de signal élevé, sans distorsion ou effort, et ajuster le niveau final sur l'amplificateur.

Problème: bruits et effet Larsen
- L'effet Larsen (feedback) par les microphones devrait être contrôlé sur le mixeur. Si le problème persiste avec les microphones, il existe une source de bruit dans le système. Soit au niveau électronique ou au niveau du câblage. En travaillant à partir de la source, vérifiez chaque appareil de la chaîne en réduisant le gain ou en le mettant hors circuit.

FEHLERBEHEBUNG

Problem: Brummen

Problem: Rauschen/Zischen
- Um den normalen Störgeräusch-pegel nieder zu halten, empfiehlt es sich, die Quelle mit vollem Pegel, aber ohne Übersteuerung zu betreiben. Achten Sie darauf, den Signalpegel zwischen Quelle und Verstärker weiter anzulegen.

Problem: Pfeifen und Rückkopplungen

BUSQUEDA DE AVERÍAS

Problema: zumbidos
- La fuente de alimentación PowerWave™ elimina los zumbidos internos, pero los transformadores de corriente alterna (AC) de otros aparatos pueden causarlos. Mueva las bocinas y la fuente de la señal para encontrar las "partes chisporroteantes" del sistema. Los cables con aislamiento defectuoso por lo general son un punto de entrada de zumbidos y ruidos.

Problema: ruido (hiss)
- Desconecte la entrada del amplificador para ver si el ruido proviene desde la fuente de la señal o de otro aparato intermedio. El ruido permanece o explota cuando se acerca o aleja del equipo eléctrico en la unidad.
- Para mantener el ruido de paso normal abajo, mantenga la fuente de la señal a un volumen máximo, sin saturación, y absténgase de restablecer la señal entre la fuente y el amplificador.

Problema: chillidos y retroalimentación
- La malalimentación del micrófono puede controlarse desde el mezclador. Si el ruido continua, aún con la guía del micrófono en escena, entonces es probable que haya una falta seria en los procesadores de señales o en los cables. Siga el trazado de la señal y desconecte o baje el volumen de los aparatos una por una hasta el amplificador.
INNER WORKINGS

An impressive amount of technology is packed "under the hood" of a PX Series amplifier. Thousands of watts of power flow inches away from state-of-the-art fuse inputs. Precise circuit layout and thorough protection ensure that all of this activity occurs smoothly and safely.

So, what actually happens the power switch?

Soft Start Sequence. The first task is to charge the primary energy reservoir without drawing a large surge current. A special inrush resistor allows just enough current to charge the energy tank in three seconds. Meanwhile, a low-power switching supply provides power to start up the main supply. After these seconds, a relay bypasses the inrush resistor and full power operation is enabled. The audio circuits now are ready to Eliminate Start-up Transients. When the red CUP LED lights go out, the amplifier is ready for action.

PowerWave™ Technology. High-current switching devices draw over 10,000 watts of peak power from the main energy reservoir which is replenished directly from the AC line for maximum efficiency. Conventional amplifiers must isolate the energy tank with a large AC transformer, which weakens the flow of current, allows greater sag and load, and produces hum. The PowerWave supply performs voltage conversion at a very high frequency, allowing better coupling through a much smaller isolation transformer.

SOUS LE CAPOT

Une quantité impressionnante de technologie se trouve "sous le capot" des amplificateurs de série PX de GSC. Des milliers de watts de puissance flottent à des centaines de milliards de cycles par seconde à travers des circuits répartis et protégés de manière efficace. L’amplificateur est prêt à fonctionner avec la technologie PowerWave. Ces dispositifs de commutation à courant élevé peuvent passer plus de 10,000 watts en puissance de pointe à partir du reservoir d’énergie principal, qui est immédiatement alimenté par la source de courant CA. Les amplificateurs conventionnels doivent isoler l’énergie dans le reservoir d’énergie par une turbine de grande taille, ce qui réduit la qualité du son. La technologie PowerWave permet une commutation à fréquence très haute, ce qui rend possible un meilleur couplage des signaux aux entrées de l’amplificateur.

INNERER AUFBAU


OPERACIÓN INTERNA

Una impresionante tecnología se encuentra "bajo el capó" de los amplificadores SX Series. Tal como se puede ver, el flujo de energía fluye a través de una inmensa cantidad de componentes. La inmutabilidad de los componentes electrónicos y de las redes de protección suprime cualquier anomalía que pueda ocurrir. Después de estos segundos, se bloquea la resistencia de entrada y se abre para imposibilitar cualquier dano de encendido. Cuando las rojas de CUP se apagan, quiere decir que el amplificador esta listo para usarse.

La tecnología PowerWave™. Los audífonos con interrupciones de corriente alta "aplanan" más de 10,000 vatios de potencia en picos desde el momento de encendido en la salida. La GSC proporciona una solución directa para este problema. La mejor solución es el uso de una fuente de alimentación que pueda manejar los picos de corriente. Los amplificadores convencionales deben estar muy amables con el circuito en la salida, evitando cualquier forma de daño. La fuente de alimentación PowerWave hace la conversión de voltaje a una frecuencia muy alta, acaparándose a su vez un transformador de aislamiento más pequeño.
INNER WORKINGS

High Performance Audio. High speed power transistors convert the DC power into the full range audio output which drives the speakers. High-current design and special dual sense output feedback correct errors on both sides of the speaker terminals, improving damping and control of speaker motion. The power devices are directly mounted to isolated heat sinks, which form a short, wide air tunnel in front of the fan for optimum cooling.

A thermal sensor embedded in each channel’s heat sink monitors the temperature, and controls fan speed, thermal shutdowns, and bias current, ensuring maximum audio clarity at all temperatures and signal levels. A circuit monitors the transistors’ temperature and triggers protective cutback only when actually needed.

The output circuit is actively clamped during clipping for smooth and very fast recovery. The clamp also provides a proportional clipping limiter which actually senses the depth of clipping and responds accordingly.

The balanced inputs use premium 0.1% precision resistors for very high noise rejection. The precision components used in the input filters and all other circuitry ensure accurate performance.

Shutdown. The amplifier mates as soon as power is shut off, preventing turn-on noises. Serious faults trigger a shutdown of the power supply; the high switching frequency cuts off power within microseconds to limit damage.

SOUS LE CAPOT

Audio haute performance. Des transistors de puissance à haute vitesse convertissent cette puissance en une sortie audio pleine gamme qui alimente les haut-parleurs. La conception à haut débit et le circuit spécial de rétroaction double détecte et controle les erreurs sur les tensions positives et négatives des haut-parleurs, optimisant ainsi le débit de l’ensemble avec un contrôle parfait du mouvement du câble du haut-parleur. Les composants de puissance sont montés directement sur le radiateur isolé, qui lui-même forme un tunnel d’air large et court directement devant le ventilateur, pour un refroidissement optimal.

Une sonde thermique est montée à même le radiateur de chaque canal pour contrôler la température et piloter la vitesse du ventilateur tout le circuit de protection, le circuit de polarisation, assurant ainsi une performance audio maximale à tout niveau de température ou signal. Le circuit supprime la distorsion des transistors et active le délestage de protection qui est également nécessaire.

L’étage de sortie est bloqué électriquement lors de l’ouverture pour obtenir un fonctionnement très doux et ultra rapide. Le circuit de blocage pilote aussi le circuit limiteur proportionnel, en déclenchant la montée d’onde tant et aussi longtemps que nécessaire.

Les entrées symétriques utilisent des résistances de précision à 0.1% afin d’obtenir un facteur de distortion (CMRR) très élevé. Les composants de précision utilisés dans les filtres et aux autres étapes du circuit audio assurant une reproduction des plus fidèles.

Arrêt. L’amplificateur passe en mode auto de d’arrêt, diminuant ainsi la puissance utile. Toute panne majorante déclenche le bloc d’alimentation ; le circuit de refroidissement à haute fréquence est désactivé en quelques microsecondes afin de limiter les dommages.

INNERER AUFBAU


Der Ausgangskreis wird während der Übersteuerung aktiv reduziert, um eine wacklige und schnelle Wiedergabe des Signals zu ermöglichen. Diese Dämpfung dient deshalb nicht nur zur Lautstärke der Leitung, sondern auch zur Sicherung der Signalübertragung.

Die symmetrischen Eingänge verhindern hochfrequente 0.1% Eingangswiderstände für beide Störungen. Alle Bauteile, die in den Eingängen liegen, weisen eine hohe Isolierung auf, gestattend eine elektromagnetische Störung.

Absetzen. Der Vorspanner schaltet die Ausgangsteuerung an, sobald die Netzbetriebsspannung abgeschnitten wird um durch Austausch eines Lautsprechers auszuwechseln. Schon geringste Fehler verursachen ein Ausschalten des Netzsteuerelementes, die hohe Schaltgeschwindigkeit des Netzsteuerelementes schaltet dabei weniger als Mikrosekunden und um, Schädien zu begrenzen.

OPERACIÓN INTERNA

Audio de alto rendimiento. Las transistores de potencia de alta velocidad, convierten esta energía DC en una salida de audio de rango completo que llega a los altavoces. El diseño de conmutación alta y baja salida especial de dosis de señal completa errores en ambos lados de las terminales de los altavoces, mejorando la anodización y el control del mando de la misma. Los aparatos de potencia están colocados sobre superficies con aislamiento térmico, lo que forma un túnel de aire frente al ventilador para un enfriamiento óptimo.

Un sensor térmico puesto en cada canal monitoriza la temperatura y controla la velocidad del ventilador, del acoplamiento térmico y el control de polarización (bias), asegurando máxima calidad de audio a cualquier temperatura y nivel de señal. Un circuito monitorea la disipación de los transistores y realiza cortes de protección sólo cuando realmente se necesita.

El circuito de salidas se comprime activamente durante la sobrecarga para permitir una recuperación rápida y suave. El componente también alimenta un limitador de picos proporcional, el cual maximiza el rendimiento del picos y respeta de manera simultánea. Las entradas balanceadas son resistencias prenium del 0.1% de precisión para un alto rango a la salida. Las componentes de precisión usadas en los filtros de entrada y el resto de los componentes del circuito se aseguran un funcionamiento fácil.

Apagado. El amplificador asimismo se apaga provisionalmente y, una vez corregido el fallo, se vuelve a encender manteniendo una operación normal de los circuitos. La frecuencia a la izquierda corta la potencia en microsegundos para evitar un daño mayor.
<table>
<thead>
<tr>
<th>SPECIFICATIONS</th>
<th>SPÉCIFICATIONS</th>
<th>TECHNISCHE DATEN</th>
<th>ESPECIFICACIONES</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Output Power in Watts</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 Hz–20 kHz @ 0.05% THD 8Ω per channel</td>
</tr>
<tr>
<td>20 Hz–20 kHz @ 0.06% THD 4Ω per channel</td>
</tr>
<tr>
<td>0.1 kHz @ 1% THD 8Ω per channel</td>
</tr>
<tr>
<td>0.2 kHz @ 1% THD 4Ω per channel</td>
</tr>
<tr>
<td>Bridge Mode: 8Ω, 20 Hz–20 kHz, 0.1% THD</td>
</tr>
<tr>
<td>4Ω, 1 kHz, 1% THD</td>
</tr>
<tr>
<td>1200</td>
</tr>
</tbody>
</table>

Dynamic Headroom:
2 dB @ 4Ω

Distortion:
SNR-48m < 0.01% < 0.01% < 0.02% < 0.02% < 0.02%

Frequency Response:
20 Hz–20 kHz, ±0.15 dB
3 dB points: 5 Hz and 100 kHz

Damping Factor:
> 900 @ 4Ω

Noise (unweighted 20 Hz to 20 kHz, below mixed output):
106 dB 107 dB 108 dB 107 dB 107 dB

Voltage Gain:
40x (32 dB)

Input Sensitivity, V RMS:
full mixed power @ 8Ω | 1.0V (+2 dB) | 1.2V (+3.9 dB) | 1.5V (+6.5 dB) | 1.7V (+8.8 dB) | 1.9V (+11.7 dB)
full mixed power @ 4Ω | 0.9V (+1.3 dB) | 1.1V (+3.2 dB) | 1.3V (+6.8 dB) | 1.5V (+8.8 dB) | 1.7V (+11.7 dB)

Input Impedance:
6 KΩ unbalanced
12 KΩ balanced

Controls:
Front: AC switch, Ch. 1 and Ch. 2 gain knobs with 11 detents
Rear: 10-position DIP switch

Indicators:
POWER: Green LED CUP: Red LED, 1 per channel
PARALLEL: Yellow LED X-10 db: Green LED, 1 per channel
BRIDGED: Yellow LED SIGNAL: Green LED, 1 per channel

Connectors:
Input: XLR and 1/4” 6.3 mm TRS, tip and pin 2 positive
Output: “Touch-Proof” binding posts and Neutrik Speakon™

Cooling:
Continuously variable speed fan, back-to-front air flow

Amplifier Protection:
Full short circuit, open circuit, thermal, ultrasonic, and RF protection
Stable into reactive or mismatched loads
## Specifications

### Load Protection
Turn-on turn-off muting, DC fault power supply shutdown, clip limiting.

### Output Circuit Type
- **AB**: Class AB complementary linear output
- **H**: Class H 2-step high efficiency circuit

### Dimensions
- 19.0" (48.3 cm) wide, 3.5" (8.9 cm) tall (rack spaces)
- 13.3" (33.5 cm) deep rack mounting to rear support ears

### Weight
- Shipping: 27 lbs (12.3 kg)
- Net: 21 lbs (9.5 kg)

### Power Requirements
- Available for 120 or 220–240 VAC, 50/60 Hz

### Power Consumption @ 120 VAC (Both Channels Driven)

<table>
<thead>
<tr>
<th>Channel</th>
<th>Typ.</th>
<th>Full*</th>
<th>Max*</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>0.9 A</td>
<td>0.9 A</td>
<td>3.8 A</td>
</tr>
<tr>
<td>R</td>
<td>0.9 A</td>
<td>0.9 A</td>
<td>3.8 A</td>
</tr>
</tbody>
</table>

* Multiply currents by 0.5 for 230V units

### Power Consumption Notes
1. 3/8 power with pink noise represents typical program with occasional clipping.
2. 1/3 power with pink noise represents severe program with heavy clipping.
3. Continuous sine wave at 1% clipping.
4. Thermal or overcurrent cutback limits duration.

---

US patents pending

**Specifications Subject to Change Without Notice**
## Warranty Information

**Disclaimer**

OSC Audio Products, Inc. is not liable for any damage to speakers, amplifiers, or any other equipment that is caused by negligence or improper installation and/or use of the PLX amplifier.

### Product Warranty

OSC guarantees the PLX to be free from defective material and/or workmanship for a period of three years from the date of sale, and will replace defective parts and repair malfunctioning products under this warranty when the defect occurs under normal installation and use. Provided the unit is returned to our factory via prepaid transportation with a copy of the proof of purchase, i.e., sales receipt. This warranty does not extend to any product which has been subjected to misuse, neglect, accident, improper installation, or where the date code has been removed or defaced.

## Informations de Garantie

**Décharge**

L'entreprise OSC Audio Products, Inc. ne peut être tenue responsable de tout dommage à des haut-parleurs, amplificateur, ou tout autre équipement qui pourrait être dû à la négligence ou mauvaise installation et/ou utilisation d'un amplificateur PLX.

### Garantie de Produit

OSC garantit le produit PLX libre de défaut de pièce et/ou de fabrication, et ce pour une période de trois ans à partir de la date d'achat, et remplacera les pièces défectueuses et réparera le produit sous l'effet de cette garantie en autant que le produit est installé et utilisé de façon normale, et que le produit est retourné à notre usine port payé, accompagné d'une copie de la preuve d'achat, i.e., facture originale. Cette garantie est conditionnelle à ce qu'une inspection du produit retourné révèle, selon notre jugement, un défaut de fabrication. Cette garantie ne couvre pas les produits ayant subi abus, négligence, accident, installation incorrecte, ou dont le code de date a été enlevé ou rendu illisible.

## Garantie - Bedingungen

**Haftungserklärung**

OSC Audio Products, Inc. haftet nicht für Schäden an Lautsprechern, Verstärkern, oder anderen Geräten, die durch Fehlverwendung im Betrieb oder durch die unzulässige Installation verursacht wurden.

### Produktgarantie


## Información de Garantía

**Atención**

OSC Audio Products, Inc. no es responsable por daños a las bocinas, amplificadores o cualquier otro equipo que sea causado por negligencia o mala instalación o uso de las amplificadores PLX.

### Garantía

OSC garantiza que el PLX estará libre de defectos en piezas o mano de obra por un periodo de tres años de la fecha de venta, y cambiará las partes que no funcionen y amplificará productos cubiertos por esta garantía mientras que el defecto se deba a condiciones normales de uso y asumiendo que la unidad será enviada a nuestra fábrica vía transporte prepagado con una copia de la prueba de compra (ejemplo: recibo de venta). Esta garantía dependerá de una inspección del producto devuelto y deberá indicar, a nuestro juicio, un defecto de fábrica. Esta garantía no se extiende a ningún producto que ha sido sometido a uso fuera de nuestras recomendaciones, accidentes, instalación defectuosa y si el código de la fecha ha sido enmendado o retirado.
**Mailing address / Adresse postale / Postanschrift / Dirección postal:**
GSC Audio Products, Inc.
1675 MacArthur Boulevard
Costa Mesa, CA 92626-1498 USA

**Telephone Numbers / Numéros de téléphone / Telefonnummern / Números de teléfono:**

<table>
<thead>
<tr>
<th>Service / Service / Dienstleistungen / Servicio</th>
<th>USA</th>
<th>Germany</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mailing address / Adresse postale / Postanschrift</td>
<td>GSC Audio Products, Inc.</td>
<td>1675 MacArthur Boulevard</td>
<td>Costa Mesa, CA 92626-1498 USA</td>
</tr>
<tr>
<td>Telephone / Téléphone / Telefon / Teléfono</td>
<td>+746 4175</td>
<td>+746 4175</td>
<td>+746 4175</td>
</tr>
<tr>
<td>Sales Direct Line / Ligne directe ventes / Verkaufs-Direkt / Líneas directas ventas</td>
<td>+746 4170</td>
<td>+746 4170</td>
<td>+746 4170</td>
</tr>
<tr>
<td>Sales &amp; Marketing / Ventes &amp; marketing / Verkauf u. Marketing / Ventas y marketing</td>
<td>+800 854-4079</td>
<td>(800) 854-4079</td>
<td>(800) 854-4079</td>
</tr>
<tr>
<td>Customer Service / Service à la clientèle / Kundendienst / Servicio a la clientela</td>
<td>+746 4175</td>
<td>+746 4175</td>
<td>+746 4175</td>
</tr>
<tr>
<td>Facsimile Numbers / Numéros de télécopieur / Telefonnummern / Números de FAX</td>
<td>+746 4174</td>
<td>+746 4174</td>
<td>+746 4174</td>
</tr>
<tr>
<td>Customer Service FAX / Télécopie service à la clientèle / Kundendienst-Teletex / FAX servicio a la clientela</td>
<td>+746 4175</td>
<td>+746 4175</td>
<td>+746 4175</td>
</tr>
</tbody>
</table>

**World Wide Web:**
www.gscaudio.com

**BBS/World Group:**
1200-14400 bpc: 8N1
+746 88-7587
(800) 856-6083

**CompuServe:**
GCS/AUDIO
E-mail:
info@gscaudio.com
service@gscaudio.com
gsc_audio@compserve.com
OVERVIEW

The Shure SM57 unidirectional dynamic microphone is exceptional for musical instrument pickup or for vocals. With its bright, clean sound and carefully contoured presence rise, the SM57 is ideal for live sound reinforcement and recording. It has an extremely effective cardioid pickup pattern which isolates the main sound source while minimizing background noise. In the studio, it is excellent for recording drums, guitar, and woodwinds. For musical instruments or vocals, the SM57 is a consistent choice of professional performers.

FEATURES

• Frequency response tailored for drums, guitars, and vocals
• Uniform cardioid pickup pattern isolates the main sound source while reducing background noise
• Pneumatic shock-mount system cuts down handling noise
• Extremely durable under the heaviest use
• Supplied break-resistant swivel adapter that rotates 180°
• Legendary Shure quality, ruggedness, and reliability
MODEL SM57 DYNAMIC MICROPHONE

SPECIFICATIONS

Type
Dynamic

Frequency Response
40 to 15,000 Hz

![TYPICAL FREQUENCY RESPONSE]

Polar Pattern
Unidirectional (cardioid), rotationally symmetrical about microphone axis, uniform with frequency.

![TYPICAL POLAR PATTERNS]

Sensitivity (at 1,000 Hz)
Open Circuit Voltage: -54.5 dSIV/Pa* (1.5 mV)
*1 Pa = 94 dB SPL

Impedance
Rated impedance is 150Ω (310Ω actual) for connection to microphone inputs rated low impedance.

Polarity
Positive pressure on diaphragm produces positive voltage on pin 2 with respect to pin 3.

![INTERNAL CONNECTIONS]

Connector
Three-pin professional audio connector (male XLR type)

Case
Dark gray, enamel-painted, die-cast steel with a polycarbonate grille and a stainless steel screen.

![DIMENSIONS]

Swivel Adapter
Positive-action, break-resistant, adjustable through 180°, with standard 5/8 in.-27 thread

Net Weight (without cable)
284 grams (10 oz)

FURNISHED ACCESSORIES
Swivel Adapter ............... A26D
Storage Bag .................. 28A13

REPLACEMENT PARTS
Cartridge .......................... R57
Screen and Grille Assembly .... RPM210

OPTIONAL ACCESSORIES
Windscreen ........................... A2W3
Desk Stand .......................... S37A, S36A
Isolation Mount .................... A56M
Dual Mount ........................ A35M, A38M
Cable (7.5 m [25 ft]) .............. C25E, C25F
APPLICATION AND PLACEMENT

Some of the most common applications and placement techniques for the SM57 are listed in the following table. Remember that microphone technique is largely a matter of personal taste—there is no single “correct” microphone position.

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>SUGGESTED MICROPHONE PLACEMENT</th>
<th>TONE QUALITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tom-Toms</td>
<td>One SM57 on each tom, or between each pair of toms; 25 mm (1 in.) to 75 mm (3 in.) above the heads. Aim each mic at the top heads.</td>
<td>Medium attack, balanced sound.</td>
</tr>
<tr>
<td></td>
<td>On double head toms, remove the bottom head and place a mic inside aimed at the head.</td>
<td>Medium attack, balanced sound.</td>
</tr>
<tr>
<td>Snare Drum</td>
<td>25 mm (1 in.) to 76 mm (3 in.) above the rim of the top head of the drum. Aim the mic at the head.</td>
<td>Most “snap” from drumstick impact.</td>
</tr>
<tr>
<td></td>
<td>If desired, place a second mic just below the rim of the bottom head.</td>
<td>More “snooze” sound.</td>
</tr>
<tr>
<td>Guitar &amp; Bass Amplifiers</td>
<td>25 mm (1 in.) from the speaker, on-axis with the speaker cone.</td>
<td>Most attack, emphasized bass.</td>
</tr>
<tr>
<td></td>
<td>150 mm (6 in.) to 300 mm (12 in.) away from speaker and on-axis with speaker cone.</td>
<td>Medium attack, full, balanced sound.</td>
</tr>
<tr>
<td></td>
<td>50 cm (19 in.) to 1 m (3 ft) back from the speaker, on-axis with the speaker cone.</td>
<td>Softer attack, thinner, reduced bass sound.</td>
</tr>
<tr>
<td>Brass &amp; Woodwinds</td>
<td>Basic: 3 m (10 ft) to 1 m (3 ft) away, on-axis with bell of instrument.</td>
<td>Bright, clear sound.</td>
</tr>
<tr>
<td></td>
<td>Woodwinds: 25 mm (1 in.) to 150 mm (6 in.) away, on-axis with bell of instrument.</td>
<td>Bright, clear sound.</td>
</tr>
<tr>
<td></td>
<td>Bell of the instrument 90° off-axis from the front of the mic.</td>
<td>Softer, mellow sound.</td>
</tr>
<tr>
<td>Vocal &amp; Speech</td>
<td>25 mm (1 in.) to 150 mm (6 in.) from the vocalist’s mouth.</td>
<td>Rich, warm sound.</td>
</tr>
</tbody>
</table>

PROXIMITY EFFECT

When the sound source is less than 6 mm (1/4 in.) from the microphone, the microphone boosts bass frequencies by 6 to 10 dB at 100 Hz, creating a warmer and richer bass sound than when farther away. This effect, known as proximity effect, happens in unidirectional microphones like the SM57. The SM57 low-frequency roll-off provides greater control, allowing the user to take full advantage of proximity effect.
GENERAL RULES FOR MICROPHONE USE
1. Aim the microphone toward the desired sound source and away from unwanted sources.
2. Locate the microphone as close as practical to the desired sound source.
3. Work close to the microphone for extra bass response.
4. Use only one microphone per sound source.
5. Locate multiple microphones at least three times as far from other microphones as from the sound source.
6. Use as few microphones as practical.
7. Place microphones away from sound reflecting surfaces.
8. Add a windscreens when using the microphone outdoors, for closeup speech, or vocals.
9. Avoid excessive handling to minimize mechanical noise.

SPECIFICATIONS
Type
Dynamic

Frequency Response
40 to 15,000 Hz (see Figure 2)

Impedance
Rated impedance is 150Ω (≥1Ω actual) for connection to microphone inputs rated 100Ω impedance.

Polarity
Positive pressure on diaphragm produces positive voltage on pin 2 with respect to pin 3 (see Figure 4).

Connector
Three-pin professional audio connector (male XLR type)

Case
Dark gray, enameled-painted, die-cast steel with a polycarbonate grille and a stainless steel screen.

Swivel Adapter
Positive-action, break-resistant, adjustable through 180°

Net Weight (without cable)
234 grams (10 oz)

Certification
Eligible to bear CE Marking. Conforms to European EMC Directive 89/336/EEC. Meets applicable tests and performance criteria in European Standard EN55103 (1998) parts 1 and 2, for residential (E1) and light industrial (E2) environments.

FURNISHED ACCESSORIES
Swivel Adapter ................................................. A25D
Storage Bag .................................................. 26A13

OPTIONAL ACCESSORIES
Windscreen ...................................................... A2WS-GR
Desk Stand .................................................... S37A, S39A
Isolation Mount ............................................ A55M
Dual Mount ................................................... A25M, A26M
Cable (7.8 m [25 ft]) ........................................ C26E, C25F

REPLACEMENT PARTS
Cartridge ....................................................... R57
Screen and Grille Assembly ........................... RPM210

For additional service or parts information, please contact Shure’s Service department at 1-800-516-2525. Outside the United States, please contact your authorized Shure Service Center.
**Features**
- Ultra-compact two-way system
- 2x 5.25-in LF (angled baffles)/2x horn-loaded 1-in exit HF (170° x 58° coverage pattern)
- "Stealth" enclosure provides ultra-wide coverage virtually unseen
- High output, high definition sound from an ultracompact enclosure

**Description**
A 2-way full range system (passive LF/HF crossover) in a unique ultra-low-profile dual baffle enclosure. Includes 4x 5.25-in woofers and 2x 1-in exit compression drivers on dual constant directivity horns with a combined 170° x 58° coverage pattern.

**Applications**
The UB42's unique "Stealth" enclosure provides extreme wide-angle coverage while virtually disappearing from view. Surprisingly high output with high definition. Comprehensive mounting/suspension points. Six year warranty.

Applications include use as in:
- Large Theaters (underbalcony fill/delay)
- Small Theaters (underbalcony fill/delay)
- Large HDW's (underbalcony fill/delay)
- Arenas (distributed)
- Major Hall (distributed)

**Performance**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Response (1 Watt @ 1 m)</td>
<td>±3 dB 70 Hz to 18 kHz, -10 dB 55 Hz</td>
</tr>
<tr>
<td>Efficiency / Axial Sensitivity (dB SPL, 1 Watt @ 1m)</td>
<td>94</td>
</tr>
<tr>
<td>Impedance (Ohms)</td>
<td>8</td>
</tr>
<tr>
<td>Power Handling, AES Standard (Watts)</td>
<td>350</td>
</tr>
<tr>
<td>Calculated Maximum Output (dB SPL @ 1m)</td>
<td>Peak 125, 4</td>
</tr>
<tr>
<td>Nominal Coverage Angle, -6 dB Points (degrees)</td>
<td>Horizontal 170, Vertical 50</td>
</tr>
<tr>
<td>Recommended High-Pass Frequency</td>
<td>24 dB/Octave 50 Hz</td>
</tr>
</tbody>
</table>

**Physical**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>LF Subsystem</td>
<td>4x 5.25-in cones</td>
</tr>
<tr>
<td>HF Subsystem</td>
<td>2x 1-in exit compression driver on constant directivity horn</td>
</tr>
<tr>
<td>Configuration</td>
<td>2-way, full range</td>
</tr>
<tr>
<td>Powering</td>
<td>Passive LF/HF crossover</td>
</tr>
<tr>
<td>Cabinet Type (Shape)</td>
<td>Horizontal wing</td>
</tr>
<tr>
<td>Enclosure Materials</td>
<td>Baltic birch plywood</td>
</tr>
<tr>
<td>Finish</td>
<td>Black catalyzed polyurethane</td>
</tr>
<tr>
<td>Connectors</td>
<td>2-terminal barrier</td>
</tr>
<tr>
<td>Suspension Hardware</td>
<td>(3) 1/4&quot;-20 threaded mounting points (1 each top and sides)</td>
</tr>
<tr>
<td>Grille</td>
<td>Vinyl coated perforated steel</td>
</tr>
<tr>
<td>Mounting Bracket</td>
<td>QB0010</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Inches</th>
<th>Millimeters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>6.25</td>
<td>159</td>
</tr>
<tr>
<td>Width</td>
<td>35.25</td>
<td>895</td>
</tr>
<tr>
<td>Depth</td>
<td>14.36</td>
<td>365</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weight</th>
<th>Pounds</th>
<th>Kilograms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net</td>
<td>32</td>
<td>14.6</td>
</tr>
<tr>
<td>Shipping</td>
<td>39</td>
<td>17.7</td>
</tr>
</tbody>
</table>
The two-way full range loudspeaker systems shall incorporate 4x 5.25" LF transducers and 2x 1-in exit compression driver HF transducers.

The HF drivers shall be loaded on dual constant directivity horns with a combined nominal coverage pattern of 17° (h) x 60° (v). The LF drivers shall be mounted on separate angled baffles to match the HF horn's coverage angle. An internal passive filter network shall provide fourth order acoustical crossover and system equalization.

System frequency response shall vary no more than ±3 dB from 70 Hz to 18 kHz measured on axis. The loudspeaker shall produce a Sound Pressure Level (SPL) of 94 dB SPL at 1 meter with a power input of 1 Watt, and shall be capable of producing a peak output of 125.4 SPL on axis at 1 meter. The loudspeaker shall handle 350 Watts of amplifier power (AES Standard) and shall have a nominal impedance of 8 Ohms.

The loudspeaker enclosure shall be irregular in shape, featuring a low vertical profile and a wide horizontal arch. It shall be constructed of 1/2-in thickness void-free cross-spine-laminated Baltic birch plywood and shall employ extensive internal bracing. It shall be finished in black catalyzed polyurethane. Input connectors shall be 2-terminal barrier strip. A total of three 1/4"-20 Threaded Mounting Points (1 each top and sides) shall be provided. The front of the loudspeaker shall be covered with a vinyl coated perforated steel grille.

The two-way full range loudspeaker shall be the EAW model UB42.
Loudspeaker Owner’s Manual

Congratulations on the purchase of your new EAW loudspeaker. You now own one of the finest professional audio products available - the result of exceptional engineering and meticulous craftsmanship. Please read these instructions to get the maximum performance from your new loudspeaker.

Section 1 Read This First

1.1 Rigging Precautions

Prior to suspending any EAW loudspeaker enclosures, it is essential that the user be familiar with the load ratings, rigging techniques, and special safety considerations appropriate for this use. Use only the mounting/rigging points on the loudspeaker enclosure intended for this purpose. The user must determine the load requirements, dynamic loading and any other contributing factors affecting the flown loudspeakers. The user must determine the proper safety factor for specific applications and the required load rating of the connection to structure. EAW strongly recommends that all rigging be done by qualified personnel in accordance with and in compliance with all federal, state and local regulations, relative to properly securing suspended loads.

NOTICE: The user assumes liability for proper design, installation and use of rigging systems.

EAW strongly recommends the following rigging system practices:

1. Documentation: Thoroughly document the rigging design with detailed drawings and parts lists.

2. Analysis: Have a licensed structural engineer, registered architect or other qualified professional review and approve the rigging design before its implementation.

3. Installation: Have a qualified professional rigger install and inspect the rigging system.

DANGER: Loudspeakers should be suspended only by persons with a knowledge of proper hardware and rigging techniques. When stacking or pole-mounting loudspeakers, be sure they are stabilized and secured from falling over or being accidentally pushed over. Failure to follow these precautions may result in damage to the equipment, personal injury or death.

Section 2 Unpacking

2.1 Shipping Damage

You should have visually inspected the outside of the shipping carton and noted any damage on the shipping bill you signed. After unpacking, if you find concealed damage to the loudspeaker, save the packing materials for the carrier’s inspection, notify the carrier immediately and file a shipping damage claim. Although EAW will help in any way possible, it is always the responsibility of the receiving party to file any shipping damage claim. The carrier will help prepare and file this claim.
2.2 Returning Products to EAW

If this loudspeaker must be returned to EAW, contact the EAW Service Department for a Return Authorization. Use the original shipping carton and packing materials. If the shipping carton is damaged, contact EAW for a new carton at a nominal cost. EAW will not be responsible for damage caused by inadequate packing.

Section 3 Description

3.1 System Overview

This loudspeaker is intended for professional use. The construction, components and hardware have been designed to provide robust, reliable performance for its intended application. Please ensure that you fully understand its proper installation and operation before use.

Section 4 Operation

4.1 Amplifier Power Requirements

There is no exact answer to the question of what amplifier size you should use for a loudspeaker. The power rating in EAW's specifications only means it has passed our standard noise test, providing a rating that can be used as a point of comparison with other loudspeakers. This rating does not necessarily correspond to the best amplifier size to use. Rather, the amplifier should be sized according to both the sound levels required and the type of audio signals that will be reproduced. If you are unsure of how to determine this, consult with a qualified professional or contact EAW's Application Support Group (see paragraph 4.5). Preventing damage to the loudspeaker is a function of operating your audio system so that the loudspeaker is not stressed beyond its design limits. If operated improperly, such as driven into clipping, even an amplifier sized below EAW's power rating can cause damage to your loudspeaker.

4.2 Audio Signal Connections

The input connector on the loudspeaker will be one of the following types with the pin connections as listed. Because of possible production changes, check the input panel labeling to verify proper connections. For barrier strips, the proper connections are marked for each terminal on the loudspeaker input label.

---

Cable Connector Views From Wiring Side
4.3 Two Connectors

If the loudspeaker has two connectors for the same mode of operation, they are wired in parallel so you can "daisy chain" multiple loudspeakers together to a single amplifier channel.

4.4 Loudspeaker Cable

To minimize power losses and provide a sufficient damping factor (DF) for low frequency drivers, use loudspeaker cable with conductor sizes per the following chart. For cable lengths over 200 feet at 8 ohms and over 100 feet at 4 ohms, the conductor sizes needed for an adequate damping factor are rarely practical for physical and cost reasons. For these situations, 10 AWG / 25 metric gauge are recommended as the most practical sizes.

<table>
<thead>
<tr>
<th>Cable Length</th>
<th>8 ohm Loudspeakers</th>
<th>4 ohm Loudspeakers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AWG / Metric Gauge</td>
<td>AWG / Metric Gauge</td>
</tr>
<tr>
<td>10 ft / 3 m</td>
<td>16 / 14</td>
<td>14 / 16</td>
</tr>
<tr>
<td>25 ft / 8 m</td>
<td>14 / 16</td>
<td>12 / 20</td>
</tr>
<tr>
<td>50 ft / 15 m</td>
<td>12 / 20</td>
<td>10 / 25</td>
</tr>
<tr>
<td>Over 75 ft / 25 m</td>
<td>10 / 25</td>
<td>10 / 25</td>
</tr>
</tbody>
</table>

**Minimum Loudspeaker Cable Conductor Sizes**

4.5 Signal Processing

Many EAW loudspeakers are designed to be used with an electronic signal processor such as EAW's MX Series Close Coupled™ Processors, the analog MX250 or digital MXS700 and MXS750. Contact EAW's Application Support Group to determine the correct processor and settings for your loudspeaker.

**Eastern Acoustic Works**

**EAW Applications Support Group**
Tel 800-992-5013 (USA only)
One Main Street
Tel 508-234-6158
Waltham, MA 02154 USA
e-mail eap@eaw.com
Web Site www.eaw.com
4.6 Operating Tips

- Do NOT drive any of your electronic equipment into clipping, particularly the power amplifiers. This can easily damage the loudspeaker.
- If driven into clipping, even the amplifier with a power output rating lower than EAW’s power rating can cause damage to a loudspeaker.
- Avoid sustained microphone feedback. This can quickly cause failure of mid and high frequency drivers.
- Avoid extreme boosts on equalizers as these can cause excessive input to the drivers at the boosted frequencies. Generally, cutting frequencies is preferred to correct for frequency response problems. These problems include attenuating feedback frequencies or reducing excessive energy at certain frequencies due to room acoustics.
- With appropriate signal processing, your loudspeaker should produce exceptionally good sound. If used in a room with problematic acoustics, there is little you can do to overcome room problems with electronic adjustments. Your best solution is careful placement and aiming of the loudspeaker so that most of the sound is directed only at the audience.
- EAW loudspeakers are capable of sound levels that can be damaging to human hearing. Take precautions so that audiences are not exposed to such levels. If you must expose yourself to these kinds of volume levels, wear adequate hearing protection.
- Take care when moving or lifting the loudspeaker. Injury to you or damage to the loudspeaker can result from careless handling.

Section 5 Service and Maintenance

5.1 Warranty

Your EAW loudspeaker is warranted against factory defects for a period of six years (five years for Weather Protected products) from the date of purchase. See your warranty card for the complete warranty statement.

IMPORTANT: Retain your sales receipt as this is proof of your warranty coverage.

5.2 How to Contact EAW Service

Eastern Acoustic Works  Tel  800-992-5013, ext. 6001 (USA only)
EAW Service Department  Tel  508-234-6158, ext. 6001
One Main Street  Fax  508-234-3776
Whitinsville, MA 01588 USA  e-mail  service@eaw.com
  Web Site  www.eaw.com

5.3 Literature and Specifications

Eastern Acoustic Works  Tel  800-992-5013, ext. 253 (USA only)
EAW Literature Department  Tel  508-234-6158, ext. 253
One Main Street  Fax  508-234-8251
Whitinsville, MA 01588 USA  e-mail  litperson@eaw.com
  Web Site  www.eaw.com

Page 6
5.4 Maintenance

Your EAW loudspeaker normally requires no regular maintenance for normal use. However, you can do several things to keep your loudspeaker in good operating and cosmetic condition.

1. Testing: Periodically test your loudspeaker for proper performance. A simple test is to play a CD through it using well-defined, articulate, wide-range program material. Listen to ensure all drivers are working properly and for any evidence of distortion or other extraneous sounds. Test at several volume levels: very low, normal, and high.

2. Mounting/Rigging: Any mounting or rigging hardware should be regularly inspected for security, wear, deformation, corrosion, and any other circumstances that may affect the load handling capability.

3. Cleaning: Cleaning the exterior of the enclosure will depend on the type of "dirt". Dust, food spills or similar can usually be removed with a cloth dampened with water or a mild household cleaner. Avoid using any strong solvents as this may damage the finish.

4. Scratches or Dents: Minor scratches on the enclosure can be painted over with an outdoor latex paint or simply colored in with a "Sharpie" or artist's marking pen. More serious gouges or dents should be sanded out, filled with wood putty and repainted. Black touch-up paint in pints (part #80050) or quarts (part #80049) is available from the EAW Service Department. Tips for repainting are on EAW's website: http://eaw.com/pages/TechSupport/FAQs/RepaintInstructions.pdf.

Section 6 Troubleshooting

Loudspeaker difficulties usually fall into one of the following categories. The causes for each problem are listed in the most likely order of probability.

6.1 No Sound or Low Output

1. Loudspeaker cables or connectors are mis-wired or faulty. Check all cabling. Refer to these instructions for correct loudspeaker cable connections. The best way to check a suspect cable is to swap it with a known good cable. Read the loudspeaker's input panel to verify correct cable connections.

2. Electronic equipment is not turned on or level controls are not adjusted properly. Make sure that all equipment in the signal path is powered up and that all controls are set to appropriate levels for normal operation.

3. Loudspeaker is not working. Connect the loudspeaker cable to a known good loudspeaker leaving all equipment set to the same levels. If the problem disappears, the loudspeaker is probably not working. Contact EAW Service for appropriate troubleshooting.

6.2 Distorted Sound

1. The power amplifier is clipping. The signal level is exceeding the limits of your system and you must reduce the level.

2. Other electronic equipment is clipping. Ensure that no equipment in the signal chain is being overdriven. For example: input(s) or summing bus in the mixing console, equalizers, etc.

3. Driver(s) not working properly. Contact EAW Service for appropriate troubleshooting.
6.3 Partial Sound (Some Frequency Bands Missing)

1. Incorrect EQ settings in the electronic equipment. Ensure all EQ settings and filters on the mixing console or preamplifier and on other equipment are set for normal operation. Ensure level controls on electronic crossovers and associated amplifiers are correctly set and that all cables and connections for such equipment are working properly.

2. Incorrect processor configuration. Make sure the processor configuration is correct for the loudspeaker and its intended mode of operation.

3. Incorrect mode switch setting on the loudspeaker input panel. Ensure this switch is set for the operating mode you are using: single, bi-amplified or tri-amplified.

4. Driver(s) not working properly. Contact EAW Service for appropriate troubleshooting.

5. The crossover network inside the loudspeaker is not working properly. Contact EAW Service for appropriate troubleshooting.
FEATURES

- Ultra-compact twoway system
- 2x 5.25-in LF (angled baffles)/horn-loaded 1-in exit HF (120° x 50° coverage pattern)
- High output, high-definition sound from an ultracompact enclosure

DESCRIPTION

A 2-way full-range system (passive LF/HF crossover) in an ultracompact dual baffle enclosure. Includes 2x 5.25-in woofers and a 1-in exit compression driver on a 120° x 50° constant directivity horn.

APPLICATIONS

The UB22i is engineered to provide extra-wide-angled coverage (horizontal) from a wall mounted position. Surprisingly high output with high definition. Effective as a delay loudspeaker in a larger system or in a distributed background/foreground music system. Comprehensive mounting/suspension points. Six year warranty.

Applications include:
- Large Theaters (fill/relay)
- Small Theaters (fill/relay)
- Boardrooms
- Small HOFs (fill/relay)
- Restaurants
- Retail Spaces (distributed)

PERFORMANCE

| Frequency Response (1 Watt @ 1m) | 23 dB | 100 Hz to 19 kHz
| -10 dB | 60 Hz
| Axial Sensitivity (68 SPL, 1 Watt @ 1m) | 94 |
| Impedance (Ohms) | 4 |
| Power Handling, AES Standard (Watts) | 200 |
| Calculated Maximum Output (dB SPL @ 1m) | 123.0 |
| Long Term | 117.0 |
| Nominal Coverage Angle, -6 dB points (degrees) |
| Horizontal | 120 |
| Vertical | 50 |

PHYSICAL

| Configuration | 2-way, full range |
| Powering | Full range (passive LF/HF crossover) |
| LF Subsystem | 2x 5.25-in, woofer |
| HF Subsystem | 1x 1-in exit/1-in voice coil compression driver on CD horn |
| Cabinet Type (shape) | Square with curved face, dual angled baffles |
| Enclosure Materials | Baltic birch plywood & MDF |
| Finish | Black textured polyurethane |
| Connectors | 2x terminal barrier strip |
| Suspension Hardware | (4) 1/4-20 threaded mounting suspension points (1 each top, bottom and sides) |
| Grille | Woven coated perforated steel |
| Companion Systems | Mounting Bracket 606002 |
| Dimensions | Inches Millimeters |
| Height | 11.75 | 298 |
| Width | 11.75 | 298 |
| Depth | 7.50 | 191 |
| Weights | Net Weight | Pounds Kilograms |
| | 17 | 7.5 |
| | 19 | 8.6 |
A & E SPECIFICATIONS

The two-way full range loudspeaker systems shall incorporate 2x 5.25-in LF transducers and a 1-in exit compression driver HF transducer.

The HF driver shall be loaded on a constant directivity horn with a nominal coverage pattern of 120° (h) x 50° (v). The LF drivers shall be mounted on separate angled baffles to match the HF horn's coverage angle. An internal passive filter network shall provide fourth order acoustical crossover and system equalization.

System frequency response shall vary no more than ±3 dB from 100 Hz to 19 kHz measured on axis. The loudspeaker shall produce a Sound Pressure Level (SPL) of 94 dB SPL on axis at 1 meter with a power input of 1 Watts, and shall be capable of producing a peak output of 123.0 SPL on axis at 1 meter. The loudspeaker shall handle 200 Watts of amplifier power (AES Standard) and shall have a nominal impedance of 4 Ohms.

The loudspeaker enclosure shall be rectangular in shape with the exception of the rounded front baffle. It shall be constructed of 3/4-in medium density fiberboard (MDF) with the exception of the baffle which shall be 15mm thickness void-free cross-grain-laminated Baltic birch plywood. The enclosure shall employ extensive internal bracing. It shall be finished in black catalyzed polyurethane. Input connectors shall be 2-terminal barrier strip. A total of four 1/4"-20 Threaded Mounting Points (1 each top, bottom and sides) shall be provided. The front of the loudspeaker shall be covered with a vinyl coated perforated steel grille.

The two-way full range loudspeaker shall be the EAW model UB221.
Loudspeaker Owner's Manual

Congratulations on the purchase of your new EAW loudspeaker. You now own one of the finest professional audio products available - the result of exceptional engineering and meticulous craftsmanship. Please read these instructions to get the maximum performance from your new loudspeaker.

Section 1  Read This First
1.1  Rigging Precautions

Prior to suspending any EAW loudspeaker enclosures, it is essential that the user be familiar with the load ratings, rigging techniques, and special safety considerations appropriate for this use. Use only the mounting/rigging points on the loudspeaker enclosure intended for this purpose. The user must determine the load requirements, dynamic loading and any other contributing factors affecting the flown loudspeakers. The user must determine the proper safety factor for specific applications and the required load rating of the connection to structure. EAW strongly recommends that all rigging be done by qualified personnel in accordance with and in compliance with all federal, state and local regulations, relative to properly securing suspended loads.

NOTICE: The user assumes liability for proper design, installation and use of rigging systems.

EAW strongly recommends the following rigging system practices:

1. Documentation: Thoroughly document the rigging design with detailed drawings and parts lists.
2. Analysis: Have a licensed structural engineer, registered architect or other qualified professional review and approve the rigging design before its implementation.
3. Installation: Have a qualified professional rigger install and inspect the rigging system.

DANGER: Loudspeakers should be suspended only by persons with a knowledge of proper hardware and rigging techniques. When stacking or pole-mounting loudspeakers, be sure they are stabilized and secured from falling over or being accidentally pushed over. Failure to follow these precautions may result in damage to the equipment, personal injury or death.

Section 2  Unpacking
2.1  Shipping Damage

You should have visually inspected the outside of the shipping carton and noted any damage on the shipping bill you signed. After unpacking, if you find concealed damage to the loudspeaker, save the packing materials for the carrier's inspection, notify the carrier immediately and file a shipping damage claim. Although EAW will help in any way possible, it is always the responsibility of the receiving party to file any shipping damage claim. The carrier will help prepare and file this claim.
2.2 Returning Products to EAW

If this loudspeaker must be returned to EAW, contact the EAW Service Department for a Return Authorization. Use the original shipping carton and packing materials. If the shipping carton is damaged, contact EAW for a new carton at a nominal cost. EAW will not be responsible for damage caused by inadequate packing.

Section 3 Description

3.1 System Overview

This loudspeaker is intended for professional use. The construction, components and hardware have been designed to provide robust, reliable performance for its intended application. Please ensure that you fully understand its proper installation and operation before use.

Section 4 Operation

4.1 Amplifier Power Requirements

There is no exact answer to the question of what amplifier size you should use for a loudspeaker. The power rating is EAW's specifications only means it has passed our standard noise test, providing a rating that can be used as a point of comparison with other loudspeakers. This rating does not necessarily correspond to the best amplifier size to use. Rather, the amplifier should be sized according to both the sound levels required and the type of audio signals that will be reproduced. If you are unsure of how to determine this, consult with a qualified professional or contact EAW's Application Support Group (see paragraph 4.5). Preventing damage to the loudspeaker is a function of operating your audio system so that the loudspeaker is not stressed beyond its design limits. If operated improperly, such as driven into clipping, even an amplifier sized below EAW's power rating can cause damage to your loudspeaker.

4.2 Audio Signal Connections

The input connector on the loudspeaker will be one of the following types with the pin connections as listed. Because of possible production changes, check the input panel labeling to verify proper connections. For barrier strips, the proper connections are marked for each terminal on the loudspeaker input label.

![Cable Connector Views From Wiring Side](Image)

Page 3
4.3 Two Connectors

If the loudspeaker has two connectors for the same mode of operation, they are wired in parallel so you can "daisy chain" multiple loudspeakers together to a single amplifier channel.

4.4 Loudspeaker Cable

To minimize power losses and provide a sufficient damping factor (DF) for low frequency drivers, use loudspeaker cable with conductor sizes per the following chart. For cable lengths over 200 feet at 8 ohms and over 100 feet at 4 ohms, the conductor sizes needed for an adequate damping factor are rarely practical for physical and cost reasons. For these situations, 10 AWG / 25 metric gauge are recommended as the most practical sizes.

<table>
<thead>
<tr>
<th>Cable Length</th>
<th>8 ohm Loudspeakers</th>
<th>4 ohm Loudspeakers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AWG / Metric Gauge</td>
<td>AWG / Metric Gauge</td>
</tr>
<tr>
<td>10 ft / 3 m</td>
<td>16 / 14</td>
<td>14 / 16</td>
</tr>
<tr>
<td>25 ft / 8 m</td>
<td>14 / 16</td>
<td>12 / 20</td>
</tr>
<tr>
<td>50 ft / 15 m</td>
<td>12 / 20</td>
<td>10 / 25</td>
</tr>
<tr>
<td>Over 75 ft / 25 m</td>
<td>10 / 25</td>
<td>10 / 25</td>
</tr>
</tbody>
</table>

Minimum Loudspeaker Cable Conductor Sizes

4.5 Signal Processing

Many EAW loudspeakers are designed to be used with an electronic signal processor such as EAW's MX Series Close Coupled™ Processors: the analog MX250 or digital MX8700 and MX8750. Contact EAW's Application Support Group to determine the correct processor and settings for your loudspeaker.

Eastern Acoustic Works
EAW Applications Support Group Tel 800-992-5013 (USA only)
One Main Street Tel 508-234-6158
Whitinsville, MA 01588 USA e-mail stag@eaw.com
Web Site www.eaw.com
4.6 Operating Tips

- Do NOT drive any of your electronic equipment into clipping, particularly the power amplifiers. This can easily damage the loudspeaker.

- If driven into clipping, even the amplifier with a power output rating lower than EAW's power rating can cause damage to a loudspeaker.

- Avoid sustained microphone feedback. This can quickly cause failure of mid and high frequency drivers.

- Avoid extreme boosts on equalizers as these can cause excessive input to the drivers at the boosted frequencies. Generally, cutting frequencies is preferred to correct for frequency response problems. These problems include attenuating feedback frequencies or reducing excessive energy at certain frequencies due to room acoustics.

- With appropriate signal processing, your loudspeaker should produce exceptionally good sound. If used in a room with problematic acoustics, there is little you can do to overcome room problems with electronic adjustments. Your best solution is careful placement and aiming of the loudspeaker so that most of the sound is directed only at the audience.

- EAW loudspeakers are capable of sound levels that can be damaging to human hearing. Take precautions so that audiences are not exposed to such levels. If you must expose yourself to these kinds of volume levels, wear adequate hearing protection.

- Take care when moving or lifting the loudspeaker. Injury to you or damage to the loudspeaker can result from careless handling.

Section 5 Service and Maintenance

5.1 Warranty

Your EAW loudspeaker is warranted against factory defects for a period of six years (five years for Weather Protected products) from the date of purchase. See your warranty card for the complete warranty statement.

IMPORTANT: Retain your sales receipt as this is proof of your warranty coverage.

5.2 How to Contact EAW Service

<table>
<thead>
<tr>
<th>EAW Service Department</th>
<th>Tel</th>
<th>800-992-5013, ext. 6001 (USA only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Main Street</td>
<td>Tel</td>
<td>508-234-6158, ext. 6001</td>
</tr>
<tr>
<td>Whitinsville, MA 01588 USA</td>
<td>Fax</td>
<td>508-234-3776</td>
</tr>
<tr>
<td></td>
<td>e-mail</td>
<td><a href="mailto:service@eaw.com">service@eaw.com</a></td>
</tr>
<tr>
<td></td>
<td>Web Site</td>
<td><a href="http://www.eaw.com">www.eaw.com</a></td>
</tr>
</tbody>
</table>

5.3 Literature and Specifications

<table>
<thead>
<tr>
<th>EAW Literature Department</th>
<th>Tel</th>
<th>000-992-5013, ext. 253 (USA only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>One Main Street</td>
<td>Tel</td>
<td>508-234-6158, ext. 253</td>
</tr>
<tr>
<td>Whitinsville, MA 01588 USA</td>
<td>Fax</td>
<td>508-234-8251</td>
</tr>
<tr>
<td></td>
<td>e-mail</td>
<td><a href="mailto:literature@eaw.com">literature@eaw.com</a></td>
</tr>
<tr>
<td></td>
<td>Web Site</td>
<td><a href="http://www.eaw.com">www.eaw.com</a></td>
</tr>
</tbody>
</table>
5.4 Maintenance

Your EAW loudspeaker normally requires no regular maintenance for normal use. However, you can do several things to keep your loudspeaker in good operating and cosmetic condition.

1. Testing: Periodically test your loudspeaker for proper performance. A simple test is to play a CD through it using well-defined, articulate, wide-range program material. Listen to ensure all drivers are working properly and for any evidence of distortion or other extraneous sounds. Test at several volume levels: very low, normal and high.

2. Mounting/Rigging: Any mounting or rigging hardware should be regularly inspected for security, wear, deformation, corrosion, and any other circumstances that may affect the load handling capability.

3. Cleaning: Cleaning the exterior of the enclosure will depend on the type of “dirt.” Dust, food spills or similar can usually be removed with a cloth dampened with water or a mild household cleaner. Avoid using any strong solvents as this may damage the finish.

4. Scratches or Dents: Minor scratches on the enclosure can be painted over with an outdoor latex paint or simply colored in with a “Sharpie” or artist’s marking pen. More serious gouges or dents should be sanded out, filled with wood putty and repainted. Black touch-up paint in pints (part #810059) or quarts (part #810049) is available from the EAW Service Department. Tips for repainting are on EAW’s website:

Section 6 Troubleshooting

Loudspeaker difficulties usually fall into one of the following categories. The causes for each problem are listed in the most likely order of probability.

6.1 No Sound or Low Output

1. Loudspeaker cables or connectors are mis-wired or faulty. Check all cabling. Refer to these instructions for correct loudspeaker cable connections. The best way to check a suspect cable is to swap it with a known good cable. Read the loudspeaker’s input panel to verify correct cable connections.

2. Electronic equipment is not turned on or level controls are not adjusted properly. Make sure that all equipment in the signal path is powered up and that all controls are set to appropriate levels for normal operation.

3. Loudspeaker is not working. Connect the loudspeaker cable to a known good loudspeaker leaving all equipment set to the same levels. If the problem disappears, the loudspeaker is probably not working. Contact EAW Service for appropriate troubleshooting.

6.2 Distorted Sound

1. The power amplifier is clipping. The signal level is exceeding the limits of your system and you must reduce the level.

2. Other electronic equipment is clipping. Ensure that no equipment in the signal chain is being overdriven. For example: input(s) or summing bus in the mixing console, equalizers, etc.

3. Driver(s) not working properly. Contact EAW Service for appropriate troubleshooting.
6.3 Partial Sound (Some Frequency Bands Missing)

1. Incorrect EQ settings in the electronic equipment. Ensure all EQ settings and filters on the mixing console or preamplifier and on other equipment are set for normal operation. Ensure level controls on electronic crossovers and associated amplifiers are correctly set and that all cables and connections for such equipment are working properly.

2. Incorrect processor configuration. Make sure the processor configuration is correct for the loudspeaker and its intended mode of operation.

3. Incorrect mode switch setting on the loudspeaker input panel. Ensure this switch is set for the operating mode you are using: single, bi-amplified or tri-amplified.

4. Driver(s) not working properly. Contact EAW Service for appropriate troubleshooting.

5. The crossover network inside the loudspeaker is not working properly. Contact EAW Service for appropriate troubleshooting.
XK-24 Programmable Keypad
Product Manual

- Model XK-24-USB-R
- 24 Keys
- Individual Key Backlighting
- Designed in USA by P.I. Engineering
- Sold and supported in the USA and UK
- USA: www.xkeys.com
- UK: www.x-keys-uk.com

Box Contents
This package contains:
1- X-keys XK-24
1- Installation CD
1- Replacement key set (2 tall, 1 wide, 1 key puller)
2- Angled feet
2- Legend Sheets (1 blank, 1 pre-printed)
1- Product Manual

Quick Start for Windows
1. Run the MacroWorks 3 (MW3) installation program from the enclosed disc.
2. Plug in the X-keys and wait for Windows to recognize it.
3. Press the programming switch (located on the top edge of the XK-24) to open the MW3 programming window (or click on the MW3 taskbar icon and select the device).
4. Press any key on the X-keys (or double-click on the key image) to begin recording a macro.
5. Type keystrokes or select text, shortcut, or function. Multiple lines of keystrokes, text, shortcuts, and functions may be entered on a single key.
6. Press the key again (or click Save) to complete programming.
7. When finished, press the programming switch again to close the programming window.

To quickly learn how to use MW3 watch the brief tutorials on the disc or on our website. Consult the MW3 help file for complete instructions and tips on programming and using your X-keys.

Mac Users
Install ControllerMate for X-keys from the enclosed disc or visit the Apple page in the Software section of our website for a free download. ControllerMate for X-keys is published by OrderedBytes in partnership with P.I. Engineering. For full programming instructions and support, please visit www.orderedbytes.com/controllermate/.
Developers
P.I. Engineering offers a free Software Development Kit with code samples in C#, C++ and .NET. Please visit the Developers section on our website: xkeys.com/develop.php.

Support
Should you encounter difficulty with the installation or programming, please open the MW3 or ControllerMate Help File or check the troubleshooting guide on our web site. You may also contact technical support.
USA: tech@xkeys.com | Phone: 1-517-655-5523
UK: support@x-keys-uk.com | Tel + 44 (0)1869 338428

Compatibility
X-keys USB devices require MacroWorks 3 for Windows XP, Vista, or 7 or ControllerMate for Mac OS-X. The X-keys XK-24 also has a “Hardware Mode” to emulate a USB keyboard, mouse, or game controller (joystick) on any USB enabled operating system (including Linux). Learn more about Hardware Mode on our web site or contact Technical Support.

Identifying the Keys
Select appropriate icons or use the blank legend sheet to create your own key legends. The keycaps snap off with a fingernail or small screwdriver. Apply the label under the keycap, and replace it. The key caps hold a legend 0.575” wide and 0.5” high (14.6mm x 12.7mm). Other options are available for printing legends for multiple units. See more information on our website.

Large Keys
The included double-keys replace two single keys on the X-keys. To install a double key cap, remove two adjacent keys with the provided key-puller. Press the double-key in place over the two exposed switch stems and configure it in MW3 using the Large Key Wizard in the Tools menu. Large quad (2x2) keycaps are also available.

Backlighting
All keys on the XK-24 have two backlighting colors (red and blue) and advanced programming functions in MW3 allow the user to manipulate them. By default when MW3 recognizes the XK-24, blue backlighting indicates the unit is ready for operation or programming. If you program a red layer shift or toggle key, the backlighting will also indicate the active layer.

Feet
The included angled feet may be snapped in to the bottom of the XK-24 to give it a slight tilt in either portrait or landscape orientation.
Compatible Accessories

Please visit the Accessories page on our website for details on the following.

- X-keys USB Extender – up to 150 feet via CAT 5 cable
- Tall, wide, and quad keycaps
- Colored and transparent key caps
- Blank key blockers

Other Products from P.I. Engineering

- X-keys XK-60/XK-80 – 60 or 80 programmable keys
- X-keys XK-12+Joystick – 12 keys with a precision joystick
- X-keys XK-12+Jog & Shuttle – 12 keys with jog & shuttle
- X-keys XK-12+Touchpad – 12 keys with touchpad
- X-keys XK-3 Foot Pedal – three programmable pedals
- X-keys XK-4 Stick – four programmable keys
- X-keys XK-8 Stick – eight programmable keys
- X-keys XK-16 Stick – sixteen programmable keys
- X-keys XK-68+Joystick - 68 keys with a precision joystick
- X-keys XK-68+Jog & Shuttle – 68 keys with jog & shuttle
- X-keys Switch Interface – 12 switch ports
- X-keys Encoder Board – 128 switch points

FCC Declaration of Conformity

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

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

Any changes or modifications not expressly approved by the manufacturer could void the user’s authority to operate the equipment.

CE Declaration of Conformity

We, P.I. Engineering, Inc., declare that the X-keys is in conformance with:

- EMC Directive 2004/108/EC, tested in accordance with EN 55022 and 55024
Contact Information

<table>
<thead>
<tr>
<th>USA Sales</th>
<th>USA Technical Support</th>
<th>USA Shipping Address</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="mailto:sales@piengineering.com">sales@piengineering.com</a></td>
<td><a href="mailto:tech@piengineering.com">tech@piengineering.com</a></td>
<td>P.I. Engineering</td>
</tr>
<tr>
<td>Phone: 1-517-655-5523</td>
<td>Phone: 1- 517-655-5523</td>
<td>101 Innovation Parkway</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UK Sales</th>
<th>UK Technical Support</th>
<th>UK Shipping Address</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="mailto:sales@x-keys-uk.com">sales@x-keys-uk.com</a></td>
<td><a href="http://www.x-keys-uk.com">www.x-keys-uk.com</a></td>
<td>Contact Sales</td>
</tr>
<tr>
<td>Tel + 44 (0)1869 338428</td>
<td><a href="mailto:support@x-keys-uk.com">support@x-keys-uk.com</a></td>
<td>Manor Farmhouse Clifton</td>
</tr>
<tr>
<td>www-x-keys-uk.com</td>
<td></td>
<td>Banbury OX15 9PA</td>
</tr>
</tbody>
</table>

Limited Warranty

For all X-keys products purchased and installed in the United States, Canada and the United Kingdom, P.I. Engineering warrants that the X-keys product will be free from defects in materials and workmanship under normal use and service, and will meet the specifications presented by P.I. Engineering at the time of original purchase, for one year as evidenced by a copy of the purchase receipt. Under this warranty, P.I. Engineering will, at its sole option, repair or replace any X-keys product which is defective, provided that you are responsible for (i) the cost of transportation of the product to P.I. Engineering or its designated service facility, and (ii) any loss or damage to the product resulting from such transportation.

Upon discovery of a defect in the product within the Warranty Period, you should notify P.I. Engineering Technical Support to obtain an RMA (return authorization number) and instructions for shipping the product to a service location designated by P.I. Engineering. You should send the product, shipping charges prepaid, to the designated location, accompanied by the return authorization number, your name, address, and telephone number, proof of purchase, and a description of the defect. P.I. Engineering will pay for return of product(s) to the customer. P.I. Engineering shall have no responsibility to repair or replace the X-keys product if the failure has resulted from accident, abuse, mutilation, misuse, or repair/Modification performed by any entity other than P.I. Engineering.

In the event that the above limitations are held unenforceable, P.I. Engineering’s liability for any damages to you or to any party shall not exceed the purchase price you paid, regardless of the form of any claim. This limited warranty is governed by the laws of the United States of America and the state of Michigan.

X-keys Electronic design: P.I. Engineering, Inc., Patent # 4964075 © 2013 P.I. Engineering, Inc. All rights reserved.

Y-mouse, Y-see two, Y-key key, X-keys, and the “P.I. Eclipse” are trademarks of P.I. Engineering, Inc.

PS/2 is a registered trademark of International Business Machines, Inc.

All other trademarks are property of their respective owners.

USA: www.piengineering.com □ www.xkeys.com
UK: www.x-keys-uk.com

PI Part#0826

1097 of 1217
40-Input, 25-Bus Digital Rack Mixer with 16 Programmable MIDAS Preamps, FireWire*/USB Audio Interface and iPad/iPhone* Remote Control

- 40-input channel, 25-bus, 3U rack-mountable digital mixer for live and installed sound application
- 16 MIDAS-designed, fully programmable mic preamps for audiophile sound quality
- 8 XLR outputs plus 6 additional line in/outputs, 2 phones connectors and a talkback section with XLR mic input
- 32 x 32 channel USB 2.0 audio interface
- iPad* and iPhone* apps for professional remote operation available free of charge—no host PC required
- High-resolution 5” day-viewable Color TFT for easy viewing of workflow components and parameters
- Main LCR, 6 matrix buses and all 16 mix buses each featuring inserts, 6-band parametric EQ’s and full dynamics processing, plus 8 DCA and 6 mute groups
- Virtual FX rack featuring 8 true-stereo FX slots include high-end simulations such as Lexicon 480L*, PCM70*, EM7250* and Quantec QRS* etc.
- 40-Bit floating-point DSP features “unlimited” dynamic range with no internal overload and near-zero overall latency (0.8 msec)
- Powerful scene management for convenient handling of complex productions
- 48-channel Digital Snake ready** via dual AES50 ports, featuring KLARK TEKNIK’S SuperMAC networking capability for ultra-low jitter and latency

16 MIDAS-design mic preamps provide plenty of inputs—and with its dual AES50 ports, X32 RACK can support up to six S16 digital snakes for massive I/O connectivity. 8 powerful stereo FX engines coupled with ultra-flexible routing options make the X32 RACK the ideal choice for handling audio now—and as your needs grow.

40-Input Channel, 25-Bus Digital Rack Mixer with 16 Programmable MIDAS Preamps, FireWire*/USB Audio Interface and iPad/iPhone* Remote Control

It can be your top-notch studio recording interface today, control a complex theatre production tomorrow, or sit securely in your side-rack while you’re mixing your band’s club gig from your iPad. The X32 RACK is a revolutionary new product genre that combines finest analog I/O and powerful digital connectivity, with ample processing for 40 channels, 25 buses and up to 152 signal sources.

While every parameter of your mix can be adjusted directly on the X32 RACK through its 800 x 480 graphic UI, networked remote control literally makes room for new possibilities. Several instances of our XControl PC/Mac application, XiControl app for iPad/iPad mini and XiQ app for iPhone/iPod touch allow controlling the mix from exactly the place you find most suitable.
- USB type-A connector providing file storage and uncompressed stereo recordings plus show presets and system updates
- ULTRANET connectivity for BEHRINGER’S P16 Personal Monitoring System**
- Networked remote control via Ethernet for show setups with on-screen software editor
- Built-in expansion port for audio interface cards or digital networking bridges
- MIDI In/Out for remote scene recall or controlling other MIDI equipment
- Future firmware updates, incl. new FX “Plug Ins”, downloadable from behringer.com free of charge
- Conceived and designed by BEHRINGER Germany

*iPad and iPhone are trademarks of Apple Inc. All third-party trademarks are the property of their respective owners. Their use neither constitutes a claim of the trademarks by MUSIC Group nor affiliation of the trademark owners with MUSIC Group. Product names are mentioned solely as a reference for X32 Rack compatibility and effects.

**P16 Personal Monitoring System and Digital Snake are not included.
X32 RACK Live Performance Setup with S16 and P16 Monitor System

Digital cable (CAT5)

Analog Cable

P16-D Distributor

Out 1-8 to FOH amps/loudspeakers delay line amps/loudspeakers, plus broadcast feeds (analog)

S16 Stage box (Left)

S16 Stage box (Right)

P16 Bus signals Out

Phones

AES50 CH 1-32 In

AES50 CH 1-16

Out 9-16 to FOH amps/loudspeakers delay line amps/loudspeakers, plus broadcast feeds (analog)

AES50 CH 17-32 In

P16-D Distributor

Bass Player

Vocal 1

2nd Guitarist

Background Vocal 2

Guitarist

Keyboardist

Background Vocal 1

Background Vocal 3

Drummer

POWERPLAY P16 M Digital Personal Mixers

Voc 1 Floor wedges

Percussionist

Spare

F1320D Active floor monitors

Vocal 1

Keyboards

Percussion

IEM

Phones

IEM

IEM

IEM

IEM

IEM

IEM

IEM

Phone

IEM
**X32 RACK Recording Studio Setup**

### Control Room
- B3031A Studio Monitors
- Monitor/Control Room Out
- Rack Expander
- Sampler
- Computer tower with DAW software

### Recording Room
- B3031A Studio Monitors
- Digital Snake S16
- P16-D Distributor
- POWERPLAY P16-M Personal Monitor Mixers

### S16 Input List
1. Lead Vocal
2. Vocal 2
3. Vocal 3
4. Vocal 4
5. Vocal 5
6. Acoustic Guitar
7. Rhythm E. Guitar
8. Lead E. Guitar
9. E. Bass (via DI)
10. Kick
11. Snare
12. Tom 1
13. Tom 2
14. Floor Tom
15. Overhead 1
16. Overhead 2
### Specifications

**Processing**

| Number of processing channels | 32 input channels, 8 aux in channels, 8 FX return channels, 16 buses, 6 matrices, main L6 | MD48 |
| Internal effects engines, true stereo / mono | 8 / 16 | MD48 |
| Internal total recall scenes (incl. preamp and fader) | 100 | MD48 |
| Signal processing | 40 bit floating point | MD48 |
| AD/DA conversion | 24-bit @ 44.1 / 48 kHz, 192 dB Dynamic range | MD48 |
| Local I/O latency (Local I/O latency > output processing > stagebox output) | 0.8 ms | MD48 |
| Retimed I/O latency (stagebox in > output processing > stagebox output) | 1.1 ms | MD48 |
| Total number of accessible input sources / outputs | 115 / 118 | MD48 |

**Connectors**

| XLR inputs, programmable mic preamps, designed by MD48 | 16 | MD48 |
| Talkback mic input, XLR | 1 x 3-pin (no internal mix) | MD48 |
| XLR inputs / outputs | 2 / 2 | MD48 |
| XLR outputs | 8 | MD48 |
| Monitoring outputs, 1 x TRS balanced | 2 | MD48 |
| Aux inputs / outputs, 1 x TRS, balanced | 6 / 6 | MD48 |
| Phones output, 1 x TRS | 3 stereo (in front panel) | MD48 |
| AES3 in, EBU output, XLR | | MD48 |
| AES35 ports, SuperMAC | 2 | MD48 |
| Expansion card (optional) | 32 channel audio input / output, various standards | MD48 |
| P-16 connector, Ethernet (no power supplied) | 1 | MD48 |
| MIDI inputs / outputs | 1 / 1 | MD48 |
| Ethernet, USB, rear panel | | MD48 |
| 4-core remote control | | MD48 |
| USB Type A, top panel, for audio and data input / output | 1 | MD48 |

**Input Characteristics**

| Preamp Design | MD48 |
| THD = noise, 20 dB gain, 0 dBu input | < 0.0006% A-weighted | MD48 |
| Input impedance XLR, unbal. / bal. | 3 kΩ / 10 kΩ | MD48 |
| Non-clip maximum input level, XLR | > 22 dBu | MD48 |
| Phantom Power | 48 V | MD48 |
| Equivalent input noise level, XLR (input balanced) | 121 dBu | MD48 |
| EMR, XLR, @ 20 dB gain (typical) | > 70 dB | MD48 |
| EMR, XLR, @ 40 dB gain | > 80 dB | MD48 |

**Frequency / Output Characteristics**

| Input sensitivity, 48 kHz sample rate, 0 dB to -1 dB | | MD48 |
| Dynamic range, analog in to analog out (typical) | 105 dB | MD48 |
| A/D Dynamic range, preamp and converter (typical) | 109 dB | MD48 |
| D/A Dynamic range, converter and output | 109 dB | MD48 |
| Cross talk rejection @ 1 kHz, adjacent channels | 100 dB | MD48 |
| Output level, XLR, nominal / max. | > 4 dBu / > 27 dBu | MD48 |
| Output impedance, XLR, unbal. / bal. | 75 Ω / 75 Ω | MD48 |
| Input impedance TRS jack, unbal. / bal. | 20 Ω / 40 Ω | MD48 |
| Non-clip maximum input level, TRS | +16 dBu | MD48 |
| Nominal output level, TRS | > 4 dBu / +16 dBu | MD48 |
| Output impedance, TRS, unbal. / bal. | 100 Ω / 300 Ω | MD48 |
| Phones output impedance / level | 40 Ω / > 25 dBm (stereo) | MD48 |
| Residual noise level, XLR and TRS | > 87 dBu A-weighted | MD48 |
X32 RACK DIGITAL MIXER

40-Input, 25-Bus Digital Rack Mixer with 16 Programmable MIDAS Preamps, USB Audio Interface and iPad/iPhone Remote Control
MUSIC AND RESELLERS ARE NOT AGENTS OF AUTHORIZED FULLFILLERS AND RESELLERS ONLY.

1. Follow all instructions.
2. Heed all warnings.
3. Preste atención a todas las advertencias.
4. Siga todas las instrucciones.
5. Keep these instructions.
6. Caution: Do not defeat the safety purpose of the polarized or groundingtype plug. A polarized plug has two blades with one wider than the other. A groundingtype plug has two blades and a third grounding prong. The wide blade or third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
7. In case of malfunction or defects, disconnect the apparatus from the mains.
8. Use only the power supply specified in this manual.
9. Do not install the apparatus near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
10. Do not expose this appliance to rain or moisture, does not operate normally, or has been dropped or damaged in any manner. Return the apparatus to the nearest authorized service personnel only.
11. The mains plug or an appliance coupler serves as the disconnect device. The disconnect device shall remain readily operable.
12. Do not defeat the safety purpose of the polarized or groundingtype plug. A polarized plug has two blades with one wider than the other. A groundingtype plug has two blades and a third grounding prong. The wide blade or third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
13. Do not expose this apparatus near water.
14. Heed all warnings.
15. Preste atención a todas las advertencias.
16. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

This symbol, wherever it appears, alerts you to important safety rules. DO NOT忽略 safety cautions! Read them carefully and make sure you understand them.

LEGAL DISCLAIMER
EXCEPT FOR ANY IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

ALL TRADEMARKS ARE THE PROPERTY OF THEIR RESPECTIVE OWNERS. MUSIC GROUP. COM (c) 2013 MUSIC GROUP. LTD. © 2013 MUSIC GROUP. RESERVADOS TODOS LOS DERECHOS.
cha do tipo ligação à terra dispõe fi

do que a outra. Uma polarizada dispõe de duas palhetas sendo uma mais larga resíduos ou os serviços de recolha de resíduos fi

polarizadas ou do tipo de ligação à terra. Uma

os serviços municipais locais, a entidade de gestão de chas

Não anule o objectivo de segurança das 9.

equipamento usado para reciclagem, é favor contactar produzam calor.

informação acerca dos locais onde poderá deixar o seu 10.

carregam corrente elétrica de magnitude

terminais marcados com o símbolo

Importantes instruções de segurança

SECAO DE TRAS). Não existem peças substituíveis por secção de trás). Não existem peças substituíveis por

QUADRO N° 315110 A N° 315120

acorda , como por exemplo: no caso do cabo

uma unidade deve estar sempre acessível.

CURTA CIRCUITO DE ALAVANCA DE COMANDO

Preste atenção a todos os avisos.

3.

Porto da Arrabida Road Town, Tortola, Ilhas Virgens Britânicas

MUSIC group, favor veri

GARANTIA LIMITADA

5.

PRODUTOS, AQUECEDORES, E FORNECEDORES DE VELOCIDADE

6.

© 2013 MUSIC

7.

acordo com as instruções do fabricante.

8.

nacional. Este produto deverá

o produto não deve ser eliminado indica que

não proceda a reparações ou intervenções, que não as indica que

durante longos períodos de alimentação ou

parâmetros máximos de segurança e utilização, que não a adequação ao dispositivo.

importante que acompanham o

Preste atenção a todos os avisos.

9.

informativo do aparelho que acompanham o

10.

informação acerca dos locais donde poderá deixar o seu

11.

Para reduzir o risco de incêndios ou

12.

importante que acompanham o

13.

14.

assessoria qualificada e oficializada.

15.

mover o conjunto carrinho/dispositivo para evitar danos

16.

17.

sujeito a salpicos, nem devem ser colocados em cima

18.

19.

20.

21.

22.

23.

24.

25.

26.

27.

28.

29.

30.

31.

32.

33.

34.

35.

36.
Step 1: Hook-up

Basic Connections
Connexions Básicas
Grundle Anschlüsse
Page Monitoring Preferences.

**SAVOIR Faire**

La touche CLEAR SOLO s'allume pour indiquer qu'une page est fermée.

Appuyez sur cette touche pour désactiver la fonction SOLO de toutes les voies.

La touche TALK activa el micrófono Talkback o de línea interior a un sistema de monitorización. El piloto se iluminará en rojo para indicarle que la vista Recorder está inactiva.

**FR**

Enfrentement des groupes permettent d'accéder à différents menus sur l'ÉCRAN PRINCIPAL.

Eectuer les connexions à une manguera digital S16 u otros productos de la gama X32. Debe usar siempre una conexión a una manguera digital S16.

**ES**

La pantalla CHANNEL le muestra el canal que está activo en ese momento.

La LED s'allume para indicar que un conector de 6,3 mm o RCA está en uso.

**FR**

Les Leds de TYPE DE VOIE indiquent le type de canal cuando lo pulse.

**ES**

Los pilotos CHANNEL TYPE le indican qué tipo de señal está siendo procesada.

Le potentiomètre MONITOR LEVEL permet de régler le niveau du casque et des sorties de micro d'ordre par un câble XLR.

**FR**

El mando MONITOR LEVEL ajusta el volumen de las señales de entrada y salida.

**ES**

La tarjeta X-USB le ofrece 32 canales de audio a un sistema de monitorización P16.

**FR**

Appuyez sur cette touche pour désactiver la fonction SOLO de toutes les voies.

**ES**

El botón CLEAR SOLO se ilumina para indicarle que la vista Recorder está inactiva.

**FR**

Recorder View est fermée.

**ES**

Los pilotos CHANNEL TYPE le indican qué tipo de señal está siendo procesada.

El medidor INPUT METER le muestra el nivel de señal del equipo.

**FR**

Le réglage CHANNEL SELECT permet de faire défiler le menu qu'au moins une des voies est en mode SOLO.

**ES**

El botón SOLO dirige el canal activo a las rutas de monitorización. El piloto se iluminará en color verde.

**FR**

Le réglage CHANNEL LEVEL permet de régler le niveau du casque et des sorties de micro d'ordre.

**ES**

El mando MAIN LR LEVEL le permite ajustar el nivel del bus de salida stereo principal.

**FR**

Le connecteur ETHERNET permet d'envoyer et recevoir les pages sur l'ÉCRAN PRINCIPAL.

**ES**

Los conectores ETHERNET envía 16 canales de audio a un sistema de monitorización P16.

**FR**

Le connecteur ULTRANET permet d'envoyer 16 voies bidirectionnelles en CAT-5e blindé pour eectuer les connexions à une manguera digital S16 u otros productos de la gama X32. Debe usar siempre una conexión a una manguera digital S16.

**ES**

El conector ULTRANET envía 16 canales de audio a un sistema de monitorización P16.

**FR**

Les connecteurs AES50 permettent de connecter un boitier multipaire numérique vers tout ordinateur équipé d'un logiciel WAV.

**ES**

Las tomas AES50 entre los boîtiers X32 y S16.

**FR**

La PANTALLA PRINCIPAL le muestra de información sobre el menú activo en la parte inferior de la PANTALLA PRINCIPAL.

**ES**

Los botones PAGE SELECT le permiten eectuar los ajustes y la selección on/off.

**FR**

Les connecteurs MIDI IN/OUT permettent d'activer/désactiver les paramètres des menus que aparecen indicados en la parte inferior de la PANTALLA PRINCIPAL.

**ES**

Las tomas MIDI IN/OUT permiten a la unidad recibir el signal par câbles XLR. Les signaux de sortie de la PANTALLA PRINCIPAL.

**FR**

Les interrupteurs ON/OFF permet de placer la fonction SOLO de toutes les voies.

**ES**

El botón CLEAR SOLO se ilumina para indicarle que la vista Recorder está inactiva.

**FR**

Les connecteurs MIDI IN/OUT permettent de connecter un boitier multipaire numérique commandant un terminal numérique par un câble MIDI standards DIN de 5 puntas standard.

**ES**

Las tomas MIDI IN/OUT permiten a la unidad conectar un terminal MIDI por medio de cables MIDI estándar DIN de 5 puntas estándar.

**FR**

Le connecteur ON/OFF permet de placer la fonction SOLO de toutes les voies.

**ES**

El botón CLEAR SOLO se ilumina para indicarle que la vista Recorder está inactiva.

**FR**

Les commandes MIDI par câbles MIDI standards permettent de connecter un boitier multipaire numérique commandant un terminal numérique par un câble MIDI standards DIN de 5 puntas standard.

**ES**

Las tomas MIDI IN/OUT permiten a la unidad conectar un terminal MIDI por medio de cables MIDI estándar DIN de 5 puntas estándar.
X32 RACK DIGITAL MIXER Controls

Passo 2: Controles

4. ON/OFF: Liga e desliga a alimentação.

5. MAIN MENU: Abre menus.

6. MAIN METER: Indica o nível Main Mono ou Main Stereo.

7. MAIN DISPLAY: Exibe dados permanentes sobre o menu atualmente selecionado.

8. CHANNEL LEVEL: Controle do nível de saída de cada canal.

9. TALKBACK: Conecta um microfone.

10. MAIN LR LEVEL: Ajusta o barramento Main Stereo Out.

11. DATA/AUDIO: Ligar/desligar o ecrã de gravação/audiodescencion.

12. Michelle: Cheque as preferências de monitoramento.

13. SOLO: Rotêa canal.

14. SEITENWAHL-Taster: Passo pelo menu.

15. CHANNEL NUMBER: Exibe canal selecionado.

16. MUTE: Coloca canal em silêncio.

17. OSC: Controle baseado em OSC para controle remoto.

18. MONITOR LEVEL: Ajusta volume de saída de fone de ouvido e monitor.

19. MONITOR: Emite áudio para fone de ouvido e monitor.

20. MONITOR LEVEL: Controle do volume de saída do monitor.

21. MONITOR: Emite áudio a fone de ouvido e monitor.


23. MONITOR LEVEL: Controle do volume de saída do monitor.

24. MAIN LR LEVEL: Ajusta o barramento Main Stereo Out.

25. MONITOR: Emite áudio a fone de ouvido e monitor.


27. ULTRANET: Envia 16 canais de áudio.

28. BEREICH: De 72 dB. Die zugehörige LED leuchtet.

29. LAYERWAHL-Taster: Chama diferentes funções.

30. ASSIGN: Portas AES50 A e B para AES50.

31. VARIABLE: Mic/Line-Vorverstärker mit einem Gain.

Passo 3: Gerenciamento

1. LAYERWAHL-Taster: Chama diferentes funções.

2. MIC/LINE: Pré-amplificadores.

3. MAIN DISPLAY: Exibe dados permanentes sobre o menu atualmente selecionado.

4. SOLO: Rotêa canal.

5. MAIN METER: Indica o nível Main Mono ou Main Stereo.

6. MAIN DISPLAY: Exibe dados permanentes sobre o menu atualmente selecionado.

7. LAYERWAHL: Chama diferentes funções.

8. MIcro/Line: Pré-amplificadores.

9. MAIN LR LEVEL: Ajusta o barramento Main Stereo Out.

10. DATA/AUDIO: Ligar/desligar o ecrã de gravação/audiodescencion.

11. MAIN MENU: Abre menus.

12. MAIN METER: Indica o nível Main Mono ou Main Stereo.

13. MAIN DISPLAY: Exibe dados permanentes sobre o menu atualmente selecionado.

14. MAIN MENU: Abre menus.

15. MAIN METER: Indica o nível Main Mono ou Main Stereo.

16. MAIN DISPLAY: Exibe dados permanentes sobre o menu atualmente selecionado.

17. MAIN METER: Indica o nível Main Mono ou Main Stereo.

18. MAIN DISPLAY: Exibe dados permanentes sobre o menu atualmente selecionado.

19. MAIN METER: Indica o nível Main Mono ou Main Stereo.

20. MAIN DISPLAY: Exibe dados permanentes sobre o menu atualmente selecionado.

21. MAIN METER: Indica o nível Main Mono ou Main Stereo.

22. MAIN DISPLAY: Exibe dados permanentes sobre o menu atualmente selecionado.

23. MAIN METER: Indica o nível Main Mono ou Main Stereo.

24. MAIN DISPLAY: Exibe dados permanentes sobre o menu atualmente selecionado.

25. MAIN METER: Indica o nível Main Mono ou Main Stereo.

26. MAIN DISPLAY: Exibe dados permanentes sobre o menu atualmente selecionado.

27. MAIN METER: Indica o nível Main Mono ou Main Stereo.

28. MAIN DISPLAY: Exibe dados permanentes sobre o menu atualmente selecionado.

29. MAIN METER: Indica o nível Main Mono ou Main Stereo.

30. MAIN DISPLAY: Exibe dados permanentes sobre o menu atualmente selecionado.

31. MAIN METER: Indica o nível Main Mono ou Main Stereo.
Sección de almacenamiento de ajustes del ecualizador.

- los parámetros del procesador de efectos elegido siempre están en el bisel de la pantalla para cambiar a las distintas páginas de la pantalla.

- evita que la señal incluyan (en este orden):

  1. Levels. Cuando la active, la consola anulará la función de gran utilidad de una forma de funciones de gran utilidad.

- En el menú Scenes, pulse el botón Utility para que aparezcan opciones de copia, carga,

- almacenamiento o asignación de nombres a escenarios de

- almacenamiento I/D principal

- los ajustes de panorama I/D principal

- Ajuste de panorama I/D principal

- Unos puntos de inserción de canales o buses

- solo están justo debajo de la pantalla.

- La página de preferencias generales de la pantalla incluye (en este orden):

  1. Nivel mono/central

  2. Ajuste de panorama I/D principal

  3. Configuración de los

  4. Funciones de gran utilidad de una forma de funciones de gran utilidad.

- La página de preferencias generales de la pantalla incluye (en este orden):

  1. Nivel mono/central

  2. Ajuste de panorama I/D principal

  3. Configuración de los

  4. Funciones de gran utilidad de una forma de funciones de gran utilidad.

- En las páginas Routing, el pulsar el botón Utility le

- mostrando distintas informaciones de estado de gran utilidad.

- NOTA: Los grupos DCA del X32 RACK pueden ser

- necesidad de instalar ningún driver.

- para que aparezcan opciones de copia, carga,

- almacenamiento o asignación de nombres a

- almacenamiento I/D principal

- los ajustes de panorama I/D principal

- Ajuste de panorama I/D principal

- Unos puntos de inserción de canales o buses

- solo están justo debajo de la pantalla.

- La página de preferencias generales de la pantalla incluye (en este orden):

  1. Nivel mono/central

  2. Ajuste de panorama I/D principal

  3. Configuración de los

  4. Funciones de gran utilidad de una forma de funciones de gran utilidad.

- La página de preferencias generales de la pantalla incluye (en este orden):

  1. Nivel mono/central

  2. Ajuste de panorama I/D principal

  3. Configuración de los

  4. Funciones de gran utilidad de una forma de funciones de gran utilidad.

- En las páginas Routing, el pulsar el botón Utility le

- mostrando distintas informaciones de estado de gran utilidad.

- NOTA: Los grupos DCA del X32 RACK pueden ser

- necesidad de instalar ningún driver.

- para que aparezcan opciones de copia, carga,

- almacenamiento o asignación de nombres a

- almacenamiento I/D principal

- los ajustes de panorama I/D principal

- Ajuste de panorama I/D principal

- Unos puntos de inserción de canales o buses

- solo están justo debajo de la pantalla.

- La página de preferencias generales de la pantalla incluye (en este orden):

  1. Nivel mono/central

  2. Ajuste de panorama I/D principal

  3. Configuración de los

  4. Funciones de gran utilidad de una forma de funciones de gran utilidad.
X32 RACK MIXER: Mise en œuvre

3: Puesta en marcha

1. Conecte el panel de entrada en el panel de salida (QA-00-B9-A9-

2. Conecte el panel de entrada en el panel de salida (QA-00-B9-A9-)

3. Conecte el panel de entrada en el panel de salida (QA-00-B9-A9-

4. Conecte el panel de entrada en el panel de salida (QA-00-B9-A9-

5. Conecte el panel de entrada en el panel de salida (QA-00-B9-A9-

6. Conecte el panel de entrada en el panel de salida (QA-00-B9-A9-

7. Conecte el panel de entrada en el panel de salida (QA-00-B9-A9-

8. Conecte el panel de entrada en el panel de salida (QA-00-B9-A9-

9. Conecte el panel de entrada en el panel de salida (QA-00-B9-A9-

10. Conecte el panel de entrada en el panel de salida (QA-00-B9-A9-}

11. Conecte el panel de entrada en el panel de salida (QA-00-B9-A9-}

12. Conecte el panel de entrada en el panel de salida (QA-00-B9-A9-}

13. Conecte el panel de entrada en el panel de salida (QA-00-B9-A9-}

14. Conecte el panel de entrada en el panel de salida (QA-00-B9-A9-}

15. Conecte el panel de entrada en el panel de salida (QA-00-B9-A9-}
Les étapes du traitement de ce signal sont les réglages de l'égaliseur 6 bandes totalement paramétrique et pré-EQ. Le Compresseur/expandeur (commutable post-EQ) sont toujours associés, situés sous l'écran.

Si aucun changement n'a été effectué depuis l'ajout d'une scene, vous pouvez cycles directement depuis la page produit de la X32 RACK et de concevoir leur propre logiciel de gestion. Il est conseillé de commencer par placer la console X32 RACK sous tension, et de la placer hors tension du démarrage, en mode Mute ou Solo. Remarquez cependant que l'état actif/inactif de la fonction correspondante. Les groupes de DCA et des sous-groupes. Vous pouvez modifier les DCA uniquement les fonctions de gestion à l'iPad et dans un mode d'emploi séparé disponible en ligne.

Les réglages de synchronisation et de fréquence de l'application, vous pouvez, par exemple, régler les tensions à nouveau sans maintenir la touche de mise à jour n’a pas été effectuée depuis l’ajout d’une scene. En présence d’une touche ou d’un commutateur, l’interface utilisateur de l’application est optimisée pour la fonction est inactive ; lorsqu’il est jaune, l'état actif/inactif de la fonction correspondante.

Astuce : La communication à distance avec la console doit être hors tension) et les bus de mixage 1-16. Le traitement des bus peut être préréglé (dans la page Setup/Global) ou être uniquement les fonctions de gestion à l'iPad et "Utility", située à droite de la page Setup/Con. Les paramètres de la page Setup/Global indiquent le statut des ports AES50 A et B, de la carte, ainsi que le chargement d’une scène n’a pas été effectuée depuis l’ajout d’une scene. Le niveau des sorties générales. Il est conseillé de commencer par placer la console X32 RACK sous tension, et de la placer hors tension du démarrage, en mode Mute ou Solo. Remarquez cependant que l'état actif/inactif de la fonction correspondante. Les groupes de DCA et des sous-groupes. Vous pouvez modifier les DCA uniquement les fonctions de gestion à l'iPad et dans un mode d'emploi séparé disponible en ligne.

Astuce : La communication à distance avec la console doit être hors tension) et les bus de mixage 1-16. Le traitement des bus peut être préréglé (dans la page Setup/Global) ou être uniquement les fonctions de gestion à l'iPad et "Utility", située à droite de la page Setup/Con. Les paramètres de la page Setup/Global indiquent le statut des ports AES50 A et B, de la carte, ainsi que le chargement d’une scène n’a pas été effectuée depuis l’ajout d’une scene. Le niveau des sorties générales. Il est conseillé de commencer par placer la console X32 RACK sous tension, et de la placer hors tension du démarrage, en mode Mute ou Solo. Remarquez cependant que l'état actif/inactif de la fonction correspondante. Les groupes de DCA et des sous-groupes. Vous pouvez modifier les DCA uniquement les fonctions de gestion à l'iPad et dans un mode d'emploi séparé disponible en ligne.
wird angezeigt, dass verschiedene kreisförmige Symbole korrekt sind.

Mischen Sie durch entsprechenden Regler drehen, was ob Mischpult-Szenen zugreifen könnte. Rotes Feld angezeigt wird, prüfen Sie bitte, Einstellungen für das Mischpult kann man Routing-Szenerien zugreifen, bei allen stufenlosen Einstellungen oder Pult neu gestartet wird. Wenn Displays.

Mit den Page- und Layer-Tastern an der Seite des X32 RACK-Feld ein breiter rechteckiger Button (d. h. erhöht) werden: Synchronisations- und Sample Rate-Einstellungen an der Seite des X32 RACK kann man Beleuchtungsfunktion zugewiesen ist, wird am unteren Rand des Bildschirms verwenden Sie die 6 zugehörigen Routing-Szenen aufzurufen. Beispiel:

Anzeigen informieren über die korrekte Verbindung.


Es ist auch ein separater Remote Editor für Fernsteuerung ist OSC-basiert (Open Sound Control). Die Kommunikation der X32 RACK ist OSC-basiert (Open Sound Control). Fernsteuerung ist OSC-basiert (Open Sound Control).

Details zum OSC-Protokoll Details zum Downloaden, Einrichten und Betreiben des X32 RACK Windows/OS X/Linux Software.

X32 RACK DIGITAL MIXER Erste Schritte

Quick Start Guide

X32 RACK DIGITAL MIXER

X32 RACK iPad App

X32 RACK DIGITAL MIXER Erste Schritte

Quick Start Guide

X32 RACK DIGITAL MIXER

X32 RACK DIGITAL MIXER Erste Schritte

Quick Start Guide

X32 RACK DIGITAL MIXER

X32 RACK DIGITAL MIXER Erste Schritte

Quick Start Guide
Para fazer sentido (verifique as configurações de sincronização e taxa de amostragem requer a re-inicialização da mesa.

Nas páginas de roteamento, ao se pressionar o botão 'Utility', pode-se carregar ou salvar presets de cenários de roteamento diferentes.

O cartão de expansão X-USB permite um certo controle muda o equipment de ar.

Indicadores com formato de pequenos quadrados permitem um certo espaço e suporte.

NOTA: Os grupos X32 RACK DCA podem ser selecionados usando o controle Channel Select.

ATENÇÃO: Favor, não bloquear as aberturas da mesa com o equipamento de ar.

OBSERVAÇÃO: A X32 RACK pode ser travada contra uso não intencional através da ativação do protocolo OSC (controle de som aberto), compartilharemos detalhes sobre como fazer o download do software existente.

Ao ser pressionado, o código S16 openingScene mostrará um "X". Mantenha 'Home' pressionado por aproximadamente 5 segundos para travar o sistema de som estiver conectado. Isto prevenirá possíveis ruínos inesperados.

OBS: Os grupos X32 RACK DCA podem ser NOTA: Os grupos X32 RACK DCA podem ser selecionados usando o controle Channel Select.

Segure o botão USB desapertado enquanto liga a mesa com o painel superior enquanto a mesa é desligada

Quando nenhum arquivo de atualização estiver disponível no drive USB, ou quando ele estiver sequência de inicialização regular.

Quando estiver trabalhando com qualquer tela do campo. Ao ser pressionado, o código --S16-- sending sends B: - A: S16

Quando a sequência de inicialização regular.

Seguro enquanto liga a mesa com o painel superior enquanto a mesa é desligada.

OBS: Os grupos X32 RACK DCA podem ser selecionados usando o controle Channel Select.

OBS: Os grupos X32 RACK DCA podem ser selecionados usando o controle Channel Select.

OBS: Os grupos X32 RACK DCA podem ser selecionados usando o controle Channel Select.
## Specifications

### Processing
- **Number of processing channels**
  - 32 input channels, 8 aux channels, 8 FX return channels, 16 aux buses, 6 matrices, main LRC
- **Internal effects engines**, true stereo / mono
- **Internal total recall scenes** (incl. preamp and fader) 100

### Signal processing
- **40-bit floating point A/D-D/A conversion** (Cirrus Logic A/D CS5368, D/A CS4385)
  - 24-bit @ 44.1 / 48 kHz, 114 dB dynamic range

### Connectors
- **XLR inputs**, programmable mic preamps, designed by MIDAS 16
- **Talkback mic input**, XLR 1 external (no internal mic)
- **RCA inputs/outputs** 2/2
- **XLR outputs** 8
- **Monitoring outputs** ¼" TRS balanced 2
- **Aux inputs/outputs**, ¼" TRS balanced 6/6
- **Phones outputs**, ¼" TRS 1 stereo (front panel)
- **AES50 ports**, SuperMAC 2
- **Expansion card slot**
- **P-16 connector**, Ultranet (no power supplied) 1
- **MIDI inputs / outputs** 1/1
- **Ethernet, RJ45**, rear panel, for remote control 1
- **USB Type A**, front panel, for audio and data export/import 1

### Mic Input Characteristics
- **Preamp design** MIDAS
- **THD + noise**, 20 dB gain, 0 dBu out < 0.006% A-weighted
- **Input impedance XLR jack**, unbal. / bal. 5 kΩ / 10 kΩ
- **Non clip maximum input level, XLR** +23 dBu
- **Phantom power**, switchable per input 48 V
- **Equivalent input noise level, XLR (input shorted)** -128 dBu
- **CMRR, XLR, @ 20 dB gain** (typical) > 70 dB
- **CMRR, XLR, @ 40 dB gain** > 80 dB

### Input/Output Characteristics
- **Frequency range** @ 48 kHz sample rate, 0 dB to -1 dB 10 Hz - 22 kHz
- **Dynamic range, analog in to analog out** (typical) 106 dB
- **A/D dynamic range, preamp to converter** (typical) 109 dB
- **D/A dynamic range** converter and output 108 dB
- **Cross talk rejection @ 1 kHz, adjacent channels** 100 dB
- **Output level, XLR, nom./max.** +4 dBu / +21 dBu
- **Output impedance, XLR, unbal. / bal.** 75 Ω / 75 Ω
- **Input impedance TRS jack**, unbal. / bal. 20 kΩ / 40 kΩ
- **Non clip maximum input level, TRS** +16 dBu
- **Nominal output level, TRS** +4 dBu / +16 dBu
- **Output impedance, TRS, unbal. / bal.** 150 Ω / 300 Ω
- **Phones output impedance / level** 40 Ω / +25 dBm (stereo)
- **Residual noise level, XLR and TRS** -87 dBu A-weighted

### Display
- **Main screen** 5", 800 x 480, 262k color TFT
- **Main meter** 18-segment (-45 dB to clip)

### Power
- **Switch-mode power supply**
- **Autorange 100-240 V (50/60 Hz)**
- **Power consumption** 60 W

### Physical
- **Standard operating temperature range** 5°C – 40°C (41°F – 104°F)
- **Dimensions** 132 x 483 x 287 mm (5.2 x 19 x 11.3")
- **Weight** 6.5 kg (14.4 lbs)

---

*including all channel and bus processing, excluding insert effects and line delays

---

[1] iPhone, iPad, and OS X are trademarks of Apple Inc., registered in the US and other countries. Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

[2] Cirrus Logic is a trademark of Cirrus Logic Inc. Linux is a registered trademark of Linus Torvalds.
Especificaciones técnicas

Procesado
Número de canales de procesado: 32 canales de entrada, 8 canales auxiliares, 8 canales de retorno de efectos, 16 buses auxiliares, 6 matrices, canales LRC principales

Número de efectos internos: 8 / 16

Escenas de carga total internas (incluyen previo y fader): 100

Procesado de señal: 40 bits punto flotante

Conversión A/D-D/A (Cirrus Logic A/D CS5368, D/A CS4385): 24 bits @ 44,1 / 48 kHz, 114 dB rango dinámico

Latencia E/S local (entrada local > procesado de mesa* > salida local): 0,8 ms

Latencia E/S en red (entrada stagebox > procesado de mesa* > salida stagebox): 1,1 ms

Conectores

Entradas XLR, previos de micro programables, diseñados por MIDAS: 16

Entrada de micro Talkback, XLR: 1 externo (sin micro interno)

Entradas/salidas RCA: 2/2

Salidas XLR: 8

Salidas de monitorización, 6,3 mm TRS balanceado: 2

Entradas/salidas auxiliares, 6,3 mm TRS balanceado: 6/6

Salidas de auriculares, 6,3 mm TRS: 1 stereo (panel frontal)

Puertos AES50, SuperMAC: 2

Ranura de tarjeta de expansión: 32 canales de entrada/salida audio, distintos standards

Conector P-16, Ultranet (sin fuente de alimentación): 1

Entradas/salidas MIDI: 1/1

Ethernet, RJ45, panel trasero, para control remoto: 1

USB tipo A, panel frontal, para importación/exportación de audio y datos: 1

Características de Entrada de Micro

Diseño de previo: MIDAS

THD + ruido: < 0,006% medición A

Impedancia de entrada de toma XLR, no balanceado / bal.: 5 kΩ / 10 kΩ

Nivel de entrada máximo sin saturación, XLR: +23 dBu

Alimentación fantasma, conmutable por cada entrada: 48 V

Nivel de ruido de entrada equivalente, XLR (entrada cortada): -128 dBu

CMRR, XLR, @ 20 dB ganancia (típico): > 70 dB

CMRR, XLR, @ 40 dB ganancia (típico): > 80 dB

Características de Entrada/Salida

Rango de frecuencia, @ 48 kHz frecuencia de muestreo, 0 a -1 dB: 10 Hz - 22 kHz

Rango dinámico, entrada analógica a salida analógica (típico): 106 dB

Rango dinámico A/D, previo a convertidor (típico): 109 dB

Rango dinámico D/A, convertidor y salida: 108 dB

Rechazo de cruce de señal @ 1 kHz, canales adyacentes: 100 dB

Nivel de salida, XLR, nominal / máxima: +4 dBu / +21 dBu

Impedancia de salida, XLR, no balanceado / bal.: 75 Ω / 75 Ω

Impedancia de entrada toma TRS, no balanceado / bal.: 20 kΩ / 40 kΩ

Nivel de entrada máxima sin saturación, TRS: +16 dBu

Nivel de salida nominal, TRS: +4 dBu / +16 dBu

Impedancia de salida, TRS, no balanceado / bal.: 150 Ω / 300 Ω

Impedancia de salida / nivel de auriculares: 40 Ω / +25 dBm (stereo)

Nivel de ruido residual, XLR y TRS: -87 dBu medición A

Pantalla

Pantalla principal

TFT de color 5", 800 x 480, 262k

Medidor principal

18 segmentos (-45 dB a saturación)

Alimentación

Fuente de alimentación de modo conmutable

Rango automático 100-240 V (50/60 Hz)

Consumo

60 W

Especificaciones físicas

Rango de temperaturas de funcionamiento standard: 5°C – 40°C (41°F – 104°F)

Dimensiones: 132 x 483 x 287 mm (5,2 x 19 x 11,3“)

Peso: 6,5 kg (14,4 lbs)

* incluyendo todo el procesado de canales y buses, pero excluyendo los efectos de inserción y los retardos de línea
## Caractéristiques techniques

### Traitement

**Nombre de voies avec traitement**
- 32 voies d'entrée, 8 voies Aux, 8 voies de retour d'effets, 16 bus Aux, 6 matrices,

**Processeurs d'effets internes**, véritable stéréo / mono 8 / 16

Rappel interne total des scènes (y compris préampli et fader) 100

**Traitement du signal** 40 bits, virgule flottante

Conversion A/N-N/A (Cirrus Logic A/N CS5368, N/A CS4385) 24 bits à 44,1 / 48 kHz, plage dynamique de 114 dB

Latence E/S (entrées locales > console* > sorties locales) 0,8 ms

Latence réseau (entrée multipaire > console* > sortie multipaire) 1,1 ms

### Connecteurs

**Entrées XLR, préamplis micro programmables, conçus par MIDAS**
- 16

**Entrée micro d'ordre, XLR**
- 1 externe (plus micro interne)

**Entrées/sorties RCA**
- 2/2

**Sorties XLR**
- 8

**Sorties retours, Jacks stéréo 6,35 mm symétriques**
- 2

**Entrées/sorties Aux, Jacks stéréo 6,35 mm symétriques**
- 6/6

**Sorties casque, Jacks stéréo 6,35 mm symétriques**
- 1 stéréo (face avant)

**Ports AES50, SuperMAC**
- 2

**Port pour carte d'extension**
- 32 canaux d'entrées/sorties audio, divers formats

**Connecteur P-16, Ultranet (sans alimentation fournie)**
- 1

**Entrées/sorties MIDI**
- 1/1

**Ethernet, RJ45, face arrière, pour télécommande**
- 1

**USB Type A, face supérieure, pour export/import audio et de données**
- 1

### Caractéristiques des Entrées Micro

**Conception des préamplis** MIDAS

- DHT + bruit, gain de 20 dB, 0 dBu en sortie
- < 0,006% pondérée en A

**Impédance d'entrée XLR, asymétrique/symétrique**
- 5 kΩ / 10 kΩ

**Niveau d'entrée max. avant écrêtage, XLR**
- +23 dBu

**Alimentation fantôme, commutable par entrée**
- 48 V

**Bruit équivalente rapporté en entrée, XLR (entrée en CC)**
- -128 dBu

**Réjection de mode commun, XLR, gain de 20 dB (type)**
- > 70 dB

**Réjection de mode commun, XLR, gain de 40 dB**
- > 80 dB

### Caractéristiques des Entrées/Sortie

**Plage de fréquence à échantillonnage 48 kHz, 0 dB à -1 dB** 10 Hz - 22 kHz

**Plage dynamique, entrée analogique vers sortie analogique (type)**
- 106 dB

**Plage dynamique A/N, préampli vers convertisseur**
- 109 dB

**Plage dynamique N/A, convertisseur et sortie**
- 108 dB

**Réjection de la diaphonie à 1 kHz, voies adjacentes**
- 100 dB

**Niveau de sortie, XLR, nominal/max.**
- +4 dBu / +21 dBu

**Impédance de sortie, XLR, asymétrique/symétrique**
- 75 Ω / 75 Ω

**Impédance d'entrée, Jack stéréo 6,35 mm, asymétrique/symétrique**
- 20 kΩ / 40 kΩ

**Niveau d'entrée max. avant écrêtage, Jack stéréo 6,35 mm**
- +16 dBu

**Niveau de sortie nominal, Jack stéréo 6,35 mm**
- +4 dBu / +16 dBu

**Impédance / niveau de la sortie casque**
- 40 Ω / +25 dBm (stéréo)

**Bruit résiduel, XLR et Jack stéréo 6,35 mm**
- -87 dBu, mesure pondérée en A

* y compris traitements des voies et bus, les effets externes et ligne de retard ne sont pas pris en compte

---

**Écran principal**
- 5", TFT, 800 x 480, 262 000 couleurs

**Afficheur principal**
- 18 segments (-45 dB à écrêtage)

**Alimentation**
- Alimentation à découpage
- Automatique de 100 à 240 V (50/60 Hz)

**Consommation électrique**
- 60 W

**Données Physiques**
- Plage de température de fonctionnement standard
  - 5°C – 40°C (41°F – 104°F)

- **Dimensions**
  - 132 x 483 x 287 mm (5,2 x 19 x 11,3")

- **Poids**
  - 6,5 kg (14,4 lbs)

---

Technische Daten

Signalbearbeitung

- Anzahl der Bearbeitungskanäle:
  - 32 Eingangskanäle, 8 Aux-Kanäle, 8 FX Return-Kanäle, 16 Aux-Busse, 6 Matrizen, Main LRC

- Interne Effekt-Engines, true stereo / mono

- 8 / 16 Interne Total Recall Scenes (inkl. Vorverstärker und Fader)

- 40-Bit Fließkomma

- A/D-D/A Wandlung (Cirrus Logic A/D CS5368, D/A CS4385)

- 24-Bit @ 44,1 / 48 kHz, 114 dB Dynamikbereich

- Lokale E/A-Latenz (Eingang > Pultbearbeitung* > Ausgang): 0,8 ms

- Netzwerk E/A-Latenz (Stagebox In > Pultbearbeitung* > Stagebox Out): 1,1 ms

Anschlüsse

- XLR-Eingänge, programmierbare Mikrofon-Vorverstärker, entwickelt von MIDAS: 16

- Talkback-Mikrofoneingang, XLR: 1 extern (kein internes Mikrofon)

- Cinch-Eingänge/Ausgänge: 2/2

- XLR-Ausgänge: 8

- Monitoring-Ausgänge 6,3 mm TRS symmetrisch: 2

- Aux-Eingänge/Ausgänge, 6,3 mm TRS symmetrisch: 6/6

- Kopfhörer-Ausgänge, 6,3 mm TRS: 1 stereo (Vorderseite)

- AES50 Ports, SuperMAC: 2

- Erweiterungskarte: 32-Kanal Audio-Eingang/Ausgang, verschiedene Standards

- P-16 Anschluss, Ultranet (ohne Spannungsversorgung): 1

- MIDI-Eingänge/Ausgänge: 1/1

- Ethernet, RJ45, Rückseite, für Fernbedienung: 1

- USB Typ A, Vorderseite, für Audio- und Daten-Export/Import: 1

Mikrofoneingang Kenndaten

- Vorverstärker-Entwicklung: MIDAS

- Klirrfaktor + Rauschen, 20 dB Gain, 0 dBu Out: < 0,006% A-bewertet

- Eingangsimpedanz XLR, unsymm. / symm.: 5 kΩ / 10 kΩ

- Max. Eingangspegel vor dem Clipping, XLR: +23 dBu

- Phantomspannung, schaltbar pro Eingang: 48 V

- Äquivalentes Eingangsrauschen, XLR (Eingang kurzgeschlossen): -128 dBu

- Gleichtaktunterdrückung, XLR, @ 20 dB Gain (typisch): > 70 dB

- Gleichtaktunterdrückung, XLR, @ 40 dB Gain: > 80 dB

Eingänge/Ausgänge Kenndaten

- Frequenzbereich, @ 48 kHz Samplerate, 0 dB bis -1 dB: 10 Hz - 22 kHz

- Dynamikbereich, Analog In auf Analog Out (typisch): 106 dB

- A/D Dynamikbereich, Vorverstärker auf Wandler (typisch): 109 dB

- D/A Dynamikbereich, Wandler und Ausgang: 108 dB

- Übersprechdämpfung @ 1 kHz, Nachbarkanäle: 100 dB

- Ausgangspegel, XLR, nom./max.: +4 dBu / +21 dBu

- Ausgangsimpedanz, XLR, unsymm. / symm.: 75 Ω / 75 Ω

- Eingangsimpedanz TRS, unsymm. / symm.: 20 kΩ / 40 kΩ

- Max. Eingangspegel vor dem Clipping, TRS: +16 dBu

- Nominaler Ausgangspegel, TRS: +4 dBu / +16 dBu

- Ausgangsimpedanz, TRS, unsymm. / symm.: 150 Ω / 300 Ω

- Kopfhörer-Ausgangsimpedanz / Pegel: 40 Ω / +25 dBm (stereo)

- Eigenrauschen, XLR und TRS: -87 dBu A-bewertet

Display

- Haupteinheit: 5", 800 x 480, 262k Farb-TFT

- Hauptpegelanzeige: 18 Segmente (-45 dB bis Clipping)

Spannungsversorgung

- Schaltnetzteil: Automatische Bereichswahl 100 - 240 V (50/60 Hz)

- Leistungsaufnahme: 60 W

Abmessungen & Gewicht

- Standard Betriebstemperaturbereich: 5°C – 40°C (41°F – 104°F)

- Abmessungen: 132 x 483 x 287 mm (5,2 x 19 x 11,3”)

- Gewicht: 6,5 kg (14,4 lbs)

*einschließlich gesamte Kanal- und Bus-Bearbeitung, ausschließlich Insert-Effekte und Line-Delays

Dados técnicos

Processamento

Número de canais de processamento
32 canais de entrada, 8 canais auxiliares, 8 canais FX return, 16 aux buses, 6 matrizes, main LRC

Motores de efeito internos, estéreo verdadeiro / mono
8 / 16

Total de cenas de recall internas (incl. pré-amplificador e fader)
100

Processamento de sinal

Ponto flutuante 40-bit

Conversão A/D-D/A (Cirrus Logic A/D CS5368, D/A CS4385)
faixa dinâmica 24-bit @ 44,1 / 48 kHz, 114 dB

Latência E/S Local (entrada local > processamento de mesa* > saída local)
0,8 ms

Latência de E/S de rede (entrada stagebox > processamento de mesa* > saída stagebox)
1.1 ms

Conectores

Entradas XLR, pré-amplificador de microfone programáveis, projetados por MIDAS
16

Entrada de microfone Talkback, XLR
1 externo (nenhum microfone interno)

Entradas/saídas RCA
2/2

Saídas XLR
8

Saídas de monitoramento
¼ " TRS balanceado
2

Saídas/entradas Aux, ¼ " TRS balanceado
6/6

Saídas de fone, ¼ " TRS
1 estéreo (painel frontal)

Portas AES50, SuperMAC
2

Slot de cartão de expansão
32 entradas/saídas de áudio de canais, padrões diversos

Conector P-16, Ultranet (sem alimentação)
1

Entradas/saídas MIDI
1/1

Ethernet, RJ45, painel traseiro, para controle remoto
1

USB Tipo A, painel frontal, para exportação/importação de áudio e dados
1

Características da Entrada de Microfone

Design do pré-amplificador
MIDAS

THD + ruído, 20 dB ganho, 0 dBu out
< 0.006% A-ponderada

Jack XLR de impedância de entrada, não bal. / bal.
5 kΩ/10 kΩ

Nível de entrada máximo sem clip, XLR
+23 dBu

Alimentação fantasma, comutável por entrada
48 V

Nível de ruído de entrada equivalente, XLR (entrada em curto-circuito)
-128 dBu

CMRR, XLR, @ 20 dB ganho (típico)
> 70 dB

CMRR, XLR, @ 40 dB ganho
> 80 dB

Características de Entrada/Saída

Faixa de frequência, @ 48 kHz taxa de amostragem, 0 dB a -1 dB
10 Hz - 22 kHz

Faixa dinâmica, análoga in para análoga out (típica)
106 dB

Faixa dinâmica A/D, pré-amplificador para conversor (típica)
109 dB

Faixa dinâmica D/A, conversor e saída
108 dB

Rejeição de Cross talk @ 1 kHz, canais adjacentes
100 dB

Nível de saída, XLR, nom./máx.
+4 dBu / +21 dBu

Impedância de saída, XLR, não bal. / bal.
75 Ω/75 Ω

Jack TRS de impedância de entrada, não bal. / bal.
20 kΩ/40 kΩ

Nível de entrada máximo sem clip, TRS
+16 dBu

Nível de saída nominal, TRS
+4 dBu / +16 dBu

Impedância de saída, TRS, não bal. / bal.
150 Ω/300 Ω

Impedância / nível de saída de fones
40 Ω/+25 dBm (estéreo)

Nível de ruído residual, XLR e TRS
-87 dBu A-ponderada
This page contains important information about the Behringer X32 rack digital mixer. It includes details on cable selection, compliance with European and American regulations, fuse replacement, and method of contact for support.

1. Important information

2. To fully comply with national legislation, Behringer X32 must be made using shielded CAT5/5e or CAT6 cables.

3. Faulty fuses must be replaced with fuses of the same type and rating without exception.

4. Before plugging the product into a power socket, please make sure you are using the voltage adequate for your model. If in doubt, check the information on the product's label.

5. Before returning the product, visit www.behringer.com and check if your problem is described and solved there. Alternatively, you can send us a request for support online via our website.

6. If your country is not listed under "Support", please send your request for support online to the MUSIC Group distributor for your country.

7. To process your repair claim more quickly and efficiently, please register your purchase using the simple online form.

8. Other important information.
X32 RACK DIGITAL MIXER

Responsible Party Name: MUSIC Group Services US Inc.
Address: 18912 North Creek Parkway, Suite 200 Bothell, WA 98011, USA
Phone Number: +1 425 672 0816

X32 RACK DIGITAL MIXER complies with the FCC rules as mentioned in the following paragraph:

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

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

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

Important information:
Changes or modifications to the equipment not expressly approved by MUSIC Group can void the user's authority to use the equipment.
We Hear You
Sound Connector Guide

This guide is a reference for the common connectors used in the Little Theatre. This is not a complete reference just the most common ones.

XLR

**Description**

- Standard Microphone Cable
- Contain 3 and 7 pins
- Provides Balanced Audio

**Reference Image**
RCA

Description
• Common component to component connection
• Used in personal audio systems
• Can be used with audio or video

Reference Image

Banana Plug

Description
• Used for audio transfer from amplifier to speaker
• Becoming less popular

Reference Image
Phone (1/8” and 1/4”)

<table>
<thead>
<tr>
<th>Description</th>
<th>Reference Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Most are TRS</td>
<td></td>
</tr>
<tr>
<td>• Tip, Ring, Sleeve</td>
<td></td>
</tr>
<tr>
<td>• Uses</td>
<td></td>
</tr>
<tr>
<td>• Headphones</td>
<td></td>
</tr>
<tr>
<td>• Guitars</td>
<td></td>
</tr>
<tr>
<td>• Loudspeakers</td>
<td></td>
</tr>
</tbody>
</table>

Speakon

<table>
<thead>
<tr>
<th>Description</th>
<th>Reference Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Used for transmission of audio to speakers</td>
<td></td>
</tr>
<tr>
<td>• No possible confusion with other types of cables</td>
<td></td>
</tr>
</tbody>
</table>
# Table of Contents

**Table of Contents**

- **Usage Notice** .............................................. 2
- **Safety Information** ........................................ 2
- **Precautions** ............................................... 3
- **Eye Safety Warnings** ....................................... 5
- **Product Features** .......................................... 5
- **Introduction** .................................................. 7
  - **Package Overview** ......................................... 7
  - **Product Overview** ........................................... 8
    - **Main Unit** ................................................. 8
    - **Control Panel** ........................................... 9
    - **Input/Output Connections** .............................. 10
    - **Remote Control** .......................................... 11
- **Installation** .................................................. 12
  - **Connecting the Projector** ................................. 12
    - **Connect to Computer/Notebook** ......................... 12
    - **Connect to Video Sources** ............................... 13
  - **Powering On/Off the Projector** ........................... 14
    - **Powering On the Projector** ............................. 14
    - **Powering Off the Projector** ............................ 15
    - **LED Indicator Messages** ................................. 15
  - **Adjusting the Projected Image** ............................ 16
    - **Adjusting the Projector’s Height** ....................... 16
    - **Adjusting the Projector’s Zoom / Focus** ............. 17
    - **Adjusting Projection Image Size** ....................... 17
- **User Controls** ............................................... 18
  - **Using the Control Panel** .................................. 18
  - **Using the Remote Control** ................................. 19
    - **Remote Control Battery Installation** .................... 20
  - **On-screen Display Menus** ................................ 21
    - **How to operate** ........................................... 21
    - **Menu Tree** ................................................ 22
    - **Picture** .................................................... 24
    - **Screen** ..................................................... 26
    - **Setting** .................................................... 28
    - **Setting | Security** ........................................ 30
    - **Volume** ..................................................... 31
    - **Options** ................................................... 32

**Options**

- **Options | Lamp Settings** .................................. 34
- **3D** ........................................................... 35
- **Interactive** .................................................. 36
- **LAN** .......................................................... 37
- **Web Management** ............................................ 38

**Appendices** ................................................... 44

- **Troubleshooting** ............................................. 44
  - **Projector Problems** .................................... 47
  - **Remote Control Problems** ................................. 47
  - **Sound Problems** .......................................... 47
  - **3D Problems** ............................................... 47
  - **On Screen Messages** ...................................... 48
- **Replacing the lamp** ......................................... 49
- **Replacing and cleaning the optional dust filter** .......... 50
- **Compatibility Modes** ....................................... 51
  - **RS232 Protocol Function List** ............................. 55
- **Ceiling Mount Installation** .................................. 57
- **Optoma Global Offices** ..................................... 58
- **Regulation & Safety Notices** ................................. 60

**Replacing and cleaning the optional dust filter**
Usage Notice

Safety Information

The lightning flash with arrow head within an equilateral triangle is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE. DANGEROUS HIGH VOLTAGES ARE PRESENT INSIDE THE ENCLOSURE. DO NOT OPEN THE CABINET. REFER SERVICING TO QUALIFIED PERSONNEL ONLY.

Class B emissions limits
This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Important Safety Instruction
1. Do not block any ventilation openings. To ensure reliable operation of the projector and to protect from over heating, it is recommended to install the projector in a location that does not block ventilation. As an example, do not place the projector on a crowded coffee table, sofa, bed, etc. Do not put the projector in an enclosure such as a book case or a cabinet that restricts air flow.
2. Do not use the projector near water or moisture. To reduce the risk of fire and/or electric shock, do not expose the projector to rain or moisture.
3. Do not install near heat sources such as radiators, heaters, stoves or any other apparatus such as amplifiers that emits heat.
4. Clean only with dry cloth.
5. Only use attachments/accessories specified by the manufacturer.
6. Do not use the unit if it has been physically damaged or abused. Physical damage/abuse would be (but not limited to):
   - Unit has been dropped.
   - Power supply cord or plug has been damaged.
   - Liquid has been spilled on to the projector.
   - Projector has been exposed to rain or moisture.
   - Something has fallen in the projector or something is loose inside.
Do not attempt to service the unit yourself. Opening or removing covers may expose you to dangerous voltages or other hazards. Please call Optoma before you send the unit for repair.
7. Do not let objects or liquids enter the projector. They may touch dangerous voltage points and short out parts that could result in fire or electric shock.
8. See projector enclosure for safety related markings.
9. The unit should only be repaired by appropriate service personnel.
Precautions

Please follow all warnings, precautions and maintenance as recommended in this user’s guide.

⚠️ Warning- Do not look into the projector’s lens when the lamp is on. The bright light may hurt and damage your eyes.

⚠️ Warning- To avoid the risk of fire or electric shock, do not expose this projector to rain or moisture.

⚠️ Warning- Please do not open or disassemble the projector as this may cause electric shock.

⚠️ Warning- When replacing the lamp, please allow the unit to cool down. Follow instructions as described on pages 49.

⚠️ Warning- This projector will detect the life of the lamp itself. Please be sure to change the lamp when it shows warning messages.

⚠️ Warning- When the lamp is approaching the end of its lifetime, the message “Lamp Warning: Lamp life exceeded.” will show on the screen. Please contact your local reseller or service center to change the lamp as soon as possible.

⚠️ Warning- Reset the “Clear Lamp Hours” function from the on-screen display “Options | Lamp Settings” menu after replacing the lamp module (refer to page 34).

⚠️ Warning- When switching the projector off, please ensure the cooling cycle has been completed before disconnecting power. Allow 90 seconds for the projector to cool down.

⚠️ Warning- Do not block the light path between the light source and the lens with any objects. Doing so could cause the object to catch on fire.
Usage Notice

Do:

- Turn off and unplug the power plug from the AC outlet before cleaning the product.
- Use a soft dry cloth with mild detergent to clean the display housing.
- Disconnect the power plug from AC outlet if the product is not being used for a long period of time.

Do not:

- Clean the lens.
- Block the slots and openings on the unit provided for ventilation.
- Use abrasive cleaners, waxes or solvents to clean the unit.
- Use under the following conditions:
  - In extremely hot, cold or humid environments.
    - Ensure that the ambient room temperature is within 5 - 40°C.
    - Relative Humidity is 5 - 40°C, 80% (Max.), non-condensing.
  - In areas susceptible to excessive dust and dirt.
  - Near any appliance generating a strong magnetic field.
  - In direct sunlight.
Usage Notice

Eye Safety Warnings

Avoid staring/facing directly into the projector beam at all times. Keep your back to the beam as much as possible.

When projector is used in a classroom, adequately supervise students when they are asked to point out something on the screen.

In order to minimize the lamp power, use room blinds to reduce ambient light levels.

Product Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>WXGA (1280x800)</th>
<th>XGA (1024x768)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projection system</td>
<td>DLP®</td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>WXGA</td>
<td>XGA</td>
</tr>
<tr>
<td>Computer compatibility</td>
<td>IBM PC and compatibles, Apple Macintosh, iMac and VESA standards: SXGA, XGA, SVGA, VGA, WXGA, UXGA</td>
<td></td>
</tr>
<tr>
<td>Video compatibility</td>
<td>NTSC (3.58/4.43), PAL (B/D/G/H/I/M/N), SECAM (B/D/G/K1/L), HDTV (720p, 1080i, 1080p), SDTV (480i, 480p, 576i, 576p)</td>
<td></td>
</tr>
<tr>
<td>Aspect ratio</td>
<td>Auto, 4:3, 16:9, 16:10</td>
<td></td>
</tr>
<tr>
<td>Displayable colors</td>
<td>1.07 billion colors</td>
<td></td>
</tr>
<tr>
<td>Projection lens</td>
<td>F# 2.6</td>
<td></td>
</tr>
<tr>
<td>Projection screen size</td>
<td>80.2” - 96.6” (Diagonal)</td>
<td>68” - 81.9” (Diagonal)</td>
</tr>
<tr>
<td>Max. focus screen size</td>
<td>70” - 100” (Diagonal)</td>
<td>60” - 90” (Diagonal)</td>
</tr>
<tr>
<td>Projection distance</td>
<td>517 mm - 759 mm (±10mm)</td>
<td>522 mm - 802 mm (±10mm)</td>
</tr>
<tr>
<td>Throw ratio</td>
<td>0.35</td>
<td>0.43</td>
</tr>
<tr>
<td>Horizontal scan rate</td>
<td>30 k - 100 kHz</td>
<td></td>
</tr>
</tbody>
</table>
## Usage Notice

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical refresh scan rate</td>
<td>50 - 120 Hz</td>
</tr>
<tr>
<td>Keystone correction</td>
<td>±15 degrees</td>
</tr>
<tr>
<td>Weight</td>
<td>8 Kg (17.64 lbs)</td>
</tr>
<tr>
<td>Dimensions (W x D x H)</td>
<td>357 (W) x 367 (D) x 135 (H) mm (excluding foot)</td>
</tr>
<tr>
<td></td>
<td>357 (W) x 367 (D) x 231 (H) mm (including reflection mirror)</td>
</tr>
<tr>
<td>Power supply</td>
<td>AC 100 - 240 V, 50 - 60 Hz</td>
</tr>
<tr>
<td>Power consumption</td>
<td>Normal mode: 350W ±10% @ 110Vac (Bright mode @ full power)</td>
</tr>
<tr>
<td></td>
<td>ECO mode: 290W ±10% @ 110Vac (Video mode @ eco power)</td>
</tr>
<tr>
<td></td>
<td>Standby &lt; 0.5 W</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>5°C to 40°C / 41°F to 104°F</td>
</tr>
<tr>
<td>I/O connectors</td>
<td>Power socket x 1</td>
</tr>
<tr>
<td></td>
<td>LAN (RJ45) x 1</td>
</tr>
<tr>
<td></td>
<td>RS232 x 1</td>
</tr>
<tr>
<td></td>
<td>DC12V x 1</td>
</tr>
<tr>
<td></td>
<td>HDMI x 1</td>
</tr>
<tr>
<td></td>
<td>VGA input x 2</td>
</tr>
<tr>
<td></td>
<td>VGA output x 1</td>
</tr>
<tr>
<td></td>
<td>S-Video x 1</td>
</tr>
<tr>
<td></td>
<td>Composite x 1</td>
</tr>
<tr>
<td></td>
<td>3.5 mm audio jack input x 2</td>
</tr>
<tr>
<td></td>
<td>RCA (L/R) audio jack input x 2</td>
</tr>
<tr>
<td></td>
<td>3.5 mm audio jack input (Microphone)x 1</td>
</tr>
<tr>
<td></td>
<td>3.5 mm audio jack input x 1</td>
</tr>
<tr>
<td></td>
<td>Mini USB B x 1</td>
</tr>
<tr>
<td>Standard package contents</td>
<td>AC power cord x 1</td>
</tr>
<tr>
<td></td>
<td>VGA cable x 1</td>
</tr>
<tr>
<td></td>
<td>Remote control x 1</td>
</tr>
<tr>
<td></td>
<td>CR2025 Battery x 1</td>
</tr>
</tbody>
</table>
Introduction

Package Overview

Unpack and inspect the box contents to ensure all parts listed below are in the box. If something is missing, please contact our customer service.

- Projector
- Remote Control
- Battery
- AC Power Cord
- VGA Cable

Note: Due to different applications in each Country, some regions may have different accessories.
Introduction

Product Overview

Main Unit

1. Focus Ring
2. Lens
3. IR Receiver
4. Control Panel
5. Lamp Cover
6. Input / Output Connection Ports
7. Power Socket
8. Elevator Feet
9. Elevator Feet
10. Elevator Feet Spacer
Control Panel

1. Power LED
2. Power 
3. Menu / Exit
4. Lamp LED
5. Temp (Temperature) LED
6. Source
7. Resync
8. Four Directional Select Keys
9. IR Receiver
1. Mini USB Connector
2. HDMI Connector
3. VGA Output Connector
4. LAN Connector
5. Audio In 1 Connector (For VGA In 1 Connector)
6. S-Video Connector
7. Left/Right RCA Audio Input Connector (For S-Video Connector)
8. Audio Output Connector
9. 12V Trigger Relay Connector (12V, 250mA)
10. RS232 Connector
11. VGA In 1 Connector
12. VGA In 2 Connector
13. Audio In 2 Connector (For VGA In 2 Connector)
14. Composite Video Input Connector
15. Left/Right RCA Audio Input Connector (For Composite Video Input Connector)
16. 3.5mm Microphone Input Connector
17. Power Socket
Remote Control

Before using the remote control for the first time, remove the transparent insulation tape. See page 20 for battery installation.

1. Source
2. ReSync
3. HDMI
4. Video
5. 3D
6. Menu
7. Four Directional Select Keys
8. Freeze
9. Blank
10. Mute
11. Power
12. PC
13. Keystone
14. Aspect
15. Volume +/-
Connecting the Projector

Connect to Computer/Notebook

Due to the difference in applications for each country, some regions may have different accessories.

(*) Optional accessory
Due to the difference in applications for each country, some regions may have different accessories.

(*) Optional accessory

1. Power Cord
2. *Microphone Cable
3. *Audio Cable Jack/RCA
4. *S-Video Cable
5. *Audio Cable
6. *VGA to HDTV (RCA) Cable
7. *HDMI Cable
8. *12V DC Jack
9. *Composite Video Cable
Powering On/Off the Projector

Powering On the Projector

1. Securely connect the power cord and signal cable. When connected, the Power LED will turn red.

2. Turn on the lamp by pressing “ ” button on the control panel or on the remote control. The Power LED will turn blue.

3. Turn on your source that you want to display on the screen (computer, notebook, video player, etc). The projector will detect the source automatically and will display on the screen.

4. If you connected multiple sources at the same time, press the “Source” button on the remote control to switch between inputs.
Powering Off the Projector

1. Press the “Ô” button on the control panel or on the remote control to turn off the projector. The following message will be displayed on the screen. Press the “Ô” button again to confirm.

2. The Power LED will turn red and blink rapidly after the projector is turned off. And the fans will continue to operate for about 90 seconds to ensure that the system cools properly.

3. Once the system has finished cooling, the Power LED will stop blinking and turn solid red to indicate standby mode.

4. It is now safe to unplug the power cord.

LED Indicator Messages

<table>
<thead>
<tr>
<th>Message</th>
<th>Lamp LED (Red)</th>
<th>Temp LED (Red)</th>
<th>Power LED (Red)</th>
<th>Power LED (Blue)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Plug</td>
<td>Flash ON to OFF 100ms</td>
<td>Flash ON to OFF 100ms</td>
<td>Flash ON to OFF 100ms</td>
<td>-</td>
</tr>
<tr>
<td>Standby</td>
<td>-</td>
<td>-</td>
<td>ON</td>
<td>-</td>
</tr>
<tr>
<td>Power button ON</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>ON</td>
</tr>
<tr>
<td>Cooling state</td>
<td>-</td>
<td>-</td>
<td>0.5 second H(ON), 0.5 second L(Off) flashing</td>
<td>-</td>
</tr>
<tr>
<td>Power button OFF: Cooling completed; Standby Mode</td>
<td>-</td>
<td>-</td>
<td>ON</td>
<td>-</td>
</tr>
<tr>
<td>Firmware download</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>-</td>
</tr>
<tr>
<td>Thermal sensor error, OSD showing as below: 1. Make sure air in and outlets are not blocked. 2. Make sure the environment temperature is under 40 degree C.</td>
<td>-</td>
<td>ON</td>
<td>-</td>
<td>ON</td>
</tr>
<tr>
<td>Fan lock error, OSD showing as below: The projector will switch off automatically.</td>
<td>-</td>
<td>0.5 second H(On), 0.5 second L(Off) flashing</td>
<td>-</td>
<td>ON</td>
</tr>
<tr>
<td>Lamp error (Lamp, Lamp driver, Color wheel)</td>
<td>ON</td>
<td>-</td>
<td>-</td>
<td>ON</td>
</tr>
</tbody>
</table>
Installation

Adjusting the Projected Image

Adjusting the Projector’s Height

The projector is equipped with elevator feet for adjusting the image height.

1. To raise the image:
   Use screw in feet to raise the image to the desired height angle and fine-tune the display angle.

2. To lower the image:
   Use screw in feet to lower the image to the desired height angle and fine-tune the display angle.
Installation

Adjusting the Projector’s Zoom / Focus

To focus the image, rotate the focus ring until the image is clear.

Adjusting Projection Image Size

Refer to the graphics and table shown as below to determine the screen size and projection distance.

- Adjusting the vertical image position

<table>
<thead>
<tr>
<th>WXGA Series</th>
<th>Screen Size (16:10)</th>
<th>Projection Distance (A)</th>
<th>Projection Distance (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Diagonal (inch)</td>
<td>mm</td>
<td>Inch</td>
</tr>
<tr>
<td>70</td>
<td>1,778</td>
<td>20.4</td>
<td>517</td>
</tr>
<tr>
<td>80</td>
<td>2,032</td>
<td>23.5</td>
<td>596</td>
</tr>
<tr>
<td>87.2</td>
<td>2,215</td>
<td>25.8</td>
<td>655</td>
</tr>
<tr>
<td>90</td>
<td>2,286</td>
<td>26.7</td>
<td>677</td>
</tr>
<tr>
<td>100</td>
<td>2,540</td>
<td>29.9</td>
<td>759</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>XGA Series</th>
<th>Screen Size (4:3)</th>
<th>Projection Distance (A)</th>
<th>Projection Distance (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Diagonal (inch)</td>
<td>mm</td>
<td>Inch</td>
</tr>
<tr>
<td>60</td>
<td>1,524</td>
<td>20.6</td>
<td>524</td>
</tr>
<tr>
<td>70</td>
<td>1,778</td>
<td>24.1</td>
<td>612</td>
</tr>
<tr>
<td>77</td>
<td>1,956</td>
<td>26.5</td>
<td>673</td>
</tr>
<tr>
<td>80</td>
<td>2,032</td>
<td>27.5</td>
<td>699</td>
</tr>
<tr>
<td>90</td>
<td>2,286</td>
<td>31.0</td>
<td>786</td>
</tr>
</tbody>
</table>

Projection Distance A(mm)=Screen size(mm) x 0.296, Tolerance is around 3.1%
Ex: Projection Distance (655mm)=Screen size(2215mm) x 0.296

This table is for user’s reference only.
# User Controls

## Using the Control Panel

<table>
<thead>
<tr>
<th>Control</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POWER</strong></td>
<td>Turn the projector on/off.</td>
</tr>
<tr>
<td>Power LED</td>
<td>Indicate the projector’s status.</td>
</tr>
<tr>
<td>Menu / Exit</td>
<td>Launch the on-screen display (OSD) / Exit a menu.</td>
</tr>
<tr>
<td>ReSync</td>
<td>Automatically synchronize the PC analog timing to its optimized condition.</td>
</tr>
<tr>
<td>Source</td>
<td>Select an input signal.</td>
</tr>
<tr>
<td>Four Directional Select Keys</td>
<td>Use ▲▼◄► to select items or make adjustments to your selection.</td>
</tr>
<tr>
<td>Lamp LED</td>
<td>Indicate the projector’s lamp status.</td>
</tr>
<tr>
<td>Temp LED</td>
<td>Indicate the projector’s temperature status.</td>
</tr>
</tbody>
</table>
# User Controls

## Using the Remote Control

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>Select an input signal.</td>
</tr>
<tr>
<td>ReSync</td>
<td>Automatically synchronize the PC analog timing to its optimized condition.</td>
</tr>
<tr>
<td>HDMI</td>
<td>Switch to HDMI source.</td>
</tr>
<tr>
<td>Video</td>
<td>Switch to Composite Video or S-Video source.</td>
</tr>
<tr>
<td>3D</td>
<td>Press the “3D” to turn the 3D OSD menu on/off.</td>
</tr>
<tr>
<td>Menu</td>
<td>Launch or Exit the on-screen display(OSD).</td>
</tr>
<tr>
<td>Four Direction Select Keys</td>
<td>Press ▲▼◄► direction buttons to select items or make adjustments.</td>
</tr>
<tr>
<td>Freeze</td>
<td>Press to freeze the image. Press it again to un-freeze the image.</td>
</tr>
<tr>
<td>Blank</td>
<td>Hide the screen picture. Press again to display screen picture.</td>
</tr>
<tr>
<td>Mute</td>
<td>Mute the volume of speakers and audio out. Press again and switch to normal volume.</td>
</tr>
<tr>
<td>Power</td>
<td>Power on/off the projector.</td>
</tr>
<tr>
<td>PC</td>
<td>Switch to VGA 1/VGA2 source.</td>
</tr>
<tr>
<td>Keystone</td>
<td>Adjust image until the sides are vertical.</td>
</tr>
<tr>
<td>Aspect</td>
<td>Use this function to choose your desired aspect ratio.</td>
</tr>
<tr>
<td>Volume +/-</td>
<td>Increase / decrease audio volume.</td>
</tr>
</tbody>
</table>
Remote Control Battery Installation

1. Press firmly and slide the battery cover off.
2. Install new battery into the compartment.

Remove the old battery and install new one (CR2025). Ensure that the side with a “+” is facing up.

3. Put the cover back.

---

To ensure safe operation, please observe the following precautions:

- Use CR2025 type battery.
- Avoid contact with water or liquid.
- Do not expose the remote control to moisture or heat.
- Do not drop the remote control.
- If the battery has leaked in the remote control, carefully wipe the case clean and install new battery.
- Risk of an explosion if battery is replaced by an incorrect type.
- Dispose of used battery according to the instructions.
On-screen Display Menus

The Projector has multilingual On-screen Display menus that allow you to make image adjustments and change a variety of settings. The projector will automatically detect the source.

How to operate

1. To open the OSD menu, press the "Menu" button on the remote control or on the control panel.

2. When OSD is displayed, use the ►►▲▼ buttons to select the desired item and adjust the settings by the ►► buttons.

3. If the setting has ► icon, you could press the ► button to enter another sub menu. Press the “Menu” button to close the sub menu after adjustment.

4. After adjusting the settings, press the “Menu” button to go back to the main menu.

5. To exit, press the “Menu” button again. The OSD menu will be closed and the projector will automatically save the new settings.
## Menu Tree

<table>
<thead>
<tr>
<th>Main Menu</th>
<th>Sub Menu</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Picture</strong></td>
<td>Color Mode</td>
<td>Bright / PC / Movie / Game / User</td>
</tr>
<tr>
<td></td>
<td>Wall Color</td>
<td>White / Light Yellow / Light Blue / Pink / Dark Green</td>
</tr>
<tr>
<td></td>
<td>Brightness</td>
<td>0~100</td>
</tr>
<tr>
<td></td>
<td>Contrast</td>
<td>0~100</td>
</tr>
<tr>
<td></td>
<td>Sharpness</td>
<td>0~31</td>
</tr>
<tr>
<td></td>
<td>Saturation</td>
<td>0~100</td>
</tr>
<tr>
<td></td>
<td>Hue</td>
<td>0~100</td>
</tr>
<tr>
<td></td>
<td>Gamma</td>
<td>0~10</td>
</tr>
<tr>
<td></td>
<td>Brilliant Color</td>
<td>Low / Mid / High</td>
</tr>
<tr>
<td></td>
<td>Color Space</td>
<td>Auto / RGB / YUV</td>
</tr>
<tr>
<td><strong>Screen</strong></td>
<td>Aspect Ratio</td>
<td>Auto / 4:3 / 16:9 / 16:10</td>
</tr>
<tr>
<td></td>
<td>Phase</td>
<td>0~31</td>
</tr>
<tr>
<td></td>
<td>Frequency</td>
<td>-50~50</td>
</tr>
<tr>
<td></td>
<td>H. Position</td>
<td>-10~10</td>
</tr>
<tr>
<td></td>
<td>V. Position</td>
<td>-10~10</td>
</tr>
<tr>
<td></td>
<td>Digital Zoom</td>
<td>1~10</td>
</tr>
<tr>
<td></td>
<td>V. Keystone</td>
<td>20~20</td>
</tr>
<tr>
<td></td>
<td>Ceiling Mount</td>
<td>Front / Front Ceiling / Rear / Rear Ceiling</td>
</tr>
<tr>
<td><strong>Setting</strong></td>
<td>Language</td>
<td>English / Deutsch / Français / Italiano / Español / Português / Polski / Pусский / Svenska / 日本語 / 한국어 / 繁體中文</td>
</tr>
<tr>
<td></td>
<td>Menu Location</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Closed Caption</td>
<td>Off / CC1 / CC2 / CC3 / CC4</td>
</tr>
<tr>
<td></td>
<td>VGA Out (Standby)</td>
<td>Off / On</td>
</tr>
<tr>
<td></td>
<td>Auto Screen (12V Out)</td>
<td>Off / On</td>
</tr>
<tr>
<td></td>
<td>Test Pattern</td>
<td>Off / On</td>
</tr>
<tr>
<td></td>
<td>Security</td>
<td>Security</td>
</tr>
<tr>
<td></td>
<td>Change Password</td>
<td>000000</td>
</tr>
<tr>
<td></td>
<td>Reset</td>
<td>No / Yes</td>
</tr>
<tr>
<td><strong>Audio</strong></td>
<td>Mute</td>
<td>Off / On</td>
</tr>
<tr>
<td></td>
<td>Volume</td>
<td>0~32</td>
</tr>
<tr>
<td></td>
<td>Microphone Volume</td>
<td>0~32</td>
</tr>
<tr>
<td><strong>Options</strong></td>
<td>Logo</td>
<td>Default / User</td>
</tr>
<tr>
<td></td>
<td>Logo Capture</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Auto Source</td>
<td>Off / On</td>
</tr>
<tr>
<td></td>
<td>Input</td>
<td>HDMI / VGA 1 / VGA 2 / S-Video / Composite</td>
</tr>
<tr>
<td></td>
<td>Auto Power Off (Min)</td>
<td>0~120</td>
</tr>
<tr>
<td><strong>Lamp Settings</strong></td>
<td>Lamp Hours Used (Normal)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lamp Hours Used (ECO)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lamp Life Reminder</td>
<td>Off / On</td>
</tr>
<tr>
<td></td>
<td>Lamp Power Mode</td>
<td>ECO / Normal</td>
</tr>
<tr>
<td></td>
<td>Clear Lamp Hours</td>
<td>No / Yes</td>
</tr>
<tr>
<td></td>
<td>Dynamic Black</td>
<td>Off / On</td>
</tr>
<tr>
<td></td>
<td>High Altitude</td>
<td>Off / On</td>
</tr>
<tr>
<td></td>
<td>Dust Filter Reminder</td>
<td>Filters Reminder (Hour)</td>
</tr>
<tr>
<td></td>
<td>Cleaning Up Reminder</td>
<td>No / Yes</td>
</tr>
<tr>
<td><strong>Information</strong></td>
<td>Model Name / SNID / Source / Resolution / Software Version / Color Space / Aspect Ratio</td>
<td></td>
</tr>
</tbody>
</table>
## User Controls

<table>
<thead>
<tr>
<th>Main Menu</th>
<th>Sub Menu</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3D</strong></td>
<td><strong>3D</strong></td>
<td>Auto / Off / On</td>
</tr>
<tr>
<td></td>
<td><strong>3D Invert</strong></td>
<td>Off / On</td>
</tr>
<tr>
<td><strong>3D Format</strong></td>
<td><strong>Frame Packing</strong> / Side-by-Side(Half) / Top and Bottom / Frame Sequential / Field Sequential</td>
<td></td>
</tr>
<tr>
<td><strong>1080p @ 24</strong></td>
<td><strong>96Hz / 144Hz</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Interactive</strong></td>
<td><strong>Interactive Settings</strong></td>
<td>Off / IR Camera</td>
</tr>
<tr>
<td><strong>LAN</strong></td>
<td><strong>LAN Settings</strong></td>
<td>Off / On</td>
</tr>
<tr>
<td></td>
<td><strong>DHCP</strong></td>
<td>Off / On</td>
</tr>
<tr>
<td></td>
<td><strong>IP Address</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Subnet Mask</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Gateway</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>DNS</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Store</strong></td>
<td>No / Yes</td>
</tr>
<tr>
<td></td>
<td><strong>Reset</strong></td>
<td>No / Yes</td>
</tr>
</tbody>
</table>
**User Controls**

**Picture**

---

**Color Mode**

There are many factory presets optimized for various types of images. Use the ◄ or ► button to select the item.

- Bright: For brightness optimization.
- PC: For meeting presentation.
- Movie: For playing video content.
- Game: For game content.
- User: Memorize user's settings.

**Wall Color**

Use this function to choose a proper color according to the wall. It will compensate the color deviation due to the wall color to show the correct image tone.

**Brightness**

Adjust the brightness of the image.

- Press the ◄ button to darken image.
- Press the ► button to lighten the image.

**Contrast**

The Contrast controls the difference between the lightest and darkest parts of the picture. Adjusting the contrast changes the amount of black and white in the image.

- Press the ◄ button to decrease the contrast.
- Press the ► button to increase the contrast.
**User Controls**

---

**Sharpness**
Adjust the sharpness of the image.
- Press the ◄ button to decrease the sharpness.
- Press the ► button to increase the sharpness.

**Saturation**
Adjust a video image from black and white to fully saturated color.
- Press the ◄ button to decrease the amount of saturation in the image.
- Press the ► button to increase the amount of saturation in the image.

---

**Hue**
Adjust the color balance of red and green.
- Press the ◄ button to increase the amount of green in the image.
- Press the ► button to increase the amount of red in the image.

---

**Gamma**
Effects the representation of dark scenery. With greater gamma value, dark scenery will look brighter.

---

**BrilliantColor™**
This adjustable item utilizes a new color-processing algorithm and enhancements to enable higher brightness while providing true, more vibrant colors in picture. The range is from “1” to “10”. If you prefer a stronger enhanced image, adjust toward the maximum setting. For a smoother, more natural image, adjust toward the minimum setting.

---

**Color Temp.**
Adjust the color temperature. At higher temperature, the screen looks colder; at lower temperature, the screen looks warmer.

---

**Color Space**
Select an appropriate color matrix type from Auto, RGB or YUV.

---
User Controls

Screen

---

Aspect Ratio

- **Auto**: Keep the image with original width-height ratio and maximize the image to fit native horizontal or vertical pixels.
- **4:3**: The image will be scaled to fit the screen and displayed using a 4:3 ratio.
- **16:9**: The image will be scaled to fit the width of the screen and the height adjusted to display the image using a 16:9 ratio.
- **16:10**: The image will be scaled to fit the width of the screen and the height adjusted to display the image using a 16:10 ratio.

Phase

Synchronize the signal timing of the display with the graphic card. If the image appears to be unstable or flickers, use this function to correct it.

Frequency

Change the display data frequency to match the frequency of your computer’s graphic card. Use this function only if the image appears to flicker vertically.

H. Position

- Press the ◄ button to move the image left.
- Press the ► button to move the image right.

V. Position

- Press the ◄ button to move the image down.
- Press the ► button to move the image up.

---

Note:

- “H. Position” and “V. Position” ranges will depend on input source.
**User Controls**

---

**Digital Zoom**
Press the ◄ button to reduce the size of an image.
Press the ► button to magnify an image on the projection screen.

**V Keystone**
Press the ◄ or ► button to adjust image distortion vertically. If the image looks trapezoidal, this option can help make the image rectangular.

**Ceiling Mount**
- Front: The image is projected straight on the screen.
- Front Ceiling: This is the default selection. When selected, the image will turn upside down.
- Rear: When selected, the image will appear reversed.
- Rear Ceiling: When selected, the image will appear reversed in upside down position.
Setting

---

**Language**
Choose the multilingual OSD menu. Press the ◄ or ► button into the sub menu and then use the ▲ or ▼ button to select your preferred language. Press ► on the remote control to finalize the selection.

---

**Menu Location**
Choose the menu location on the display screen.

---

**Closed Caption**
Use this function to enable close caption menu. Select an appropriate closed captions option: Off, CC1, CC2, CC3, CC4.

---

**LAN (Standby)**
Choose “On” to enable LAN connection. Choose “Off” to disable LAN connection.
**User Controls**

---

**VGA OUT (Standby)**
Choose “On” to enable VGA OUT connection.

**Auto Screen (12V Out)**
Choose “On”, the down/up move of electronic screen will be related with power on/off of Projector.

**Test Pattern**
Display a test pattern.

**Security**
Refer next page.

**Reset**
Choose “Yes” to return the parameters on all menus to the factory default settings.
User Controls

Setting | Security

Security
- On: Choose “On” to use security verification when turning on the projector.
- Off: Choose “Off” to be able to switch on the projector without password verification.

Change Password
- First time:
  - Press the ► button to set the password.
  - The password has to be 6 digits.
  - Use the ▲ or ▼ on the remote control to select your new password on the screen and then press ► to confirm it.
- Change Password:
  - Use the ▲ or ▼ on the remote control to enter your current password on the screen and then press ► to confirm it.
  - Enter a new password (6 digits in length) then press “Enter” to confirm it.
  - Enter the new password again and press “Enter” to confirm it.
- If the incorrect password is entered for 3 times, the projector will automatically shut down.
- If you have forgotten your password, please contact your local office for support.

Password default value is “000000” (first time).
**User Controls**

**Volume**

- **Mute**
  - Choose “On” to turn mute on.
  - Choose “Off” to turn mute off.

- **Volume**
  - Press the ◀ button to decrease the volume.
  - Press the ► button to increase the volume.

- **Microphone Volume**
  - Press the ◀ button to decrease the microphone Volume.
  - Press the ► button to increase the microphone Volume.
Options

---

**Logo**

Use this function to set the desired startup screen. If changes are made they will take effect the next time the projector is powered on.

- Default: The default startup screen.
- User: Use stored picture from "Logo Capture" function.

**Logo Capture**

Press ► button to capture an image of the picture currently displayed on screen.

- For successful logo capture, please ensure that the onscreen image does not exceed the projector’s native resolution. (WXGA:1280x800).
- “Logo Capture” is not available when 3D is enabled.
- Before active this function, it is recommended that “Aspect Ratio” is set to the “Auto”.

---

**Auto Source**

- On: The projector will search for other signals if the current input signal is lost.
- Off: The projector will only search current input connection.

**Input**

Press ► button to enable/disable input sources. The projector will not search for inputs that are not selected.
Auto Power Off (min)
Sets the countdown timer interval. The countdown timer will start, when there is no signal being sent to the projector. The projector will automatically power off when the countdown has finished (in minutes).

Lamp Settings
Refer to page 34.

Dynamic Black
- On: The pictures with the optimum contrast will be displayed by automatically providing signal compensation to suit the pictures concerned.
- Off: Turn off this function.

High Altitude
- On: The built-in fans run at high speed. Select this option when using the projector at altitudes above 2500 feet/762 meters or higher.
- Off: The built-in fans automatically run at a variable speed according to the internal temperature.

Filters Remind (Hour)
- Filters Remind (Hour): Set the filter reminder time
- Cleaning Up Reminder: Select “Yes” to reset the dust filter hour counter after replacing or cleaning the dust filter.

Information
Display the projector information for model name, SNID, source, resolution, software version, color space and aspect ratio on the screen.
Options | Lamp Settings

**Lamp Hours Used (Normal)**
Display the projection time of normal mode.

**Lamp Hours Used (ECO)**
Display the projection time of ECO mode.

**Lamp Life Reminder**
- On: Choose “On” to show the lamp end of life warning message.
- Off: Choose “Off” to hide the lamp end of life warning message.

**Lamp Power Mode**
- Normal: Normal mode.
- ECO: Use this function to dim the projector lamp which will lower power consumption and extend the lamp life.

**Clear Lamp Hours**
Choose “Yes” to reset the lamp hour counter after replacing the lamp.
User Controls

3D

3D
- Auto: When a HDMI1.4a 3D timing identification signal is detected, the 3D image is selected automatically.
- Choose “Off” to disable 3D function.
- Choose “On” to enable 3D function.

3D Invert
If you see a discrete or overlapping image while wearing DLP 3D glasses, you may need to execute “Invert” to get best match of left/right image sequence to get the correct image.

3D Format
Use this feature to select the 3D format. Options are: “Frame Packing”, “Side-by-Side (Half)”, “Top and Bottom”, “Frame Sequential” and “Field Sequential”.

1080p@24
Use this feature to select 96 or 144Hz refresh rate as using 3D glasses in the 1080p @ 24 frame packing.
Interactive

Interactive Settings

Use this feature to select the Interactive Pen function. Options are: “Off” and “IR Camera”. Choose “Off” to disable the Interactive Pen function.

You need to unplug the Mini USB cable that connects NB/desktop with the projector before using the Interactive function. After you complete the Interactive Settings in OSD, use Mini USB cable to connect NB/desktop with the projector.

The IR camera Interactive function needs an external IR camera. Please refer to below figure and plug in IR camera to projector before projector was installed.
LAN Settings

- DHCP: If a DHCP server exists in the network to which the projector is connected, the IP address will automatically be acquired when you select DHCP On. If DHCP is Off, manually set the IP Address, Subnet Mask, and Gateway. Use ▲ or ▼ to select the number of IP address, Subnet Mask, and Gateway.
- IP Address: Select an IP address.
- Subnet Mask: Configure the Subnet Mask of the LAN connection.
- Gateway: Check the Gateway address with your network/system administrator if you configure it manually.
- DNS: Check the DNS Server IP address with your network/system administrator if you configure it manually.
- Store: Choose “Yes” to save the changes made in network configuration settings.
- Reset: Choose “Yes” to return the display parameters on all menus to the factory default settings.
User Controls

Web Management

1. Turn on DHCP to allow a DHCP server to automatically assign an IP, or manually enter the required network information.

2. Open your web browser and type in IP Address from the OSD LAN.

3. Based on network web-page for the input-string in [tools] tab, the limitation for Input-Length is in the below list ("space" and the other punctuation key included):

<table>
<thead>
<tr>
<th>Category</th>
<th>Item</th>
<th>Input-Length (characters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projector</td>
<td>Projector Name</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Location</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Administrator</td>
<td>21</td>
</tr>
<tr>
<td>Admin Password</td>
<td>New Password</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Confirm</td>
<td>4</td>
</tr>
</tbody>
</table>

Note: The characters allowed to be input are 0-9, and a-z.
User Controls

When making a direct connection from your computer to the projector

Step 1: Find an IP Address (192.168.10.100) from LAN function of projector.

Step 2: To open Network Connections, click Start, click Control Panel, click Network and Internet Connections, and then click Network Connections. Click the connection you want to configure, and then, under Network Tasks , click Change settings of this connection.

Step 3: On the General tab, under This connection uses the following items, click Internet Protocol (TCP/IP), and then click “Properties.”

Step 4: Click Use the following IP address, and type in as below:
- IP address: 192.168.10.99
- Subnet mask: 255.255.255.0

Step 5: To open Internet Options, click IE web browser, click Internet Options, click the Connections tab and click “LAN Settings...”

Step 6: The Local Area Network (LAN) Setting dialog box appears, In the Proxy Server area, cancel the Use a proxy server for your LAN check box., then click “OK” button twice.

Step 7: Open your IE and type in the IP address of 192.168.10.100 in the URL then press “Enter” key.
User Controls

Projector Information Page

- Projector Information page by entering the projector’s IP address at the web browser. See “LAN Settings” section.
- Language: Allows you to set the language for web management.

LAN Settings Page

- Set up the Projector Name, Location and Administrator information (up to 21 characters for each field). Press Save to store the settings.
- Choose DHCP to assign an IP address to the projector from a DHCP server automatically, or Manual to assign an IP address manually.
- Set up the IP Address, Device ID and Port information on the Crestron function.
User Controls

Projector Status and Control Page

- Projector Status: There are 4 status: Standby, Warning up, Lamp On, Power Saving and Cooling. Click the Refresh button to refresh the status and control settings.
- Auto Power Off: Auto Power Off can be set to Off(0) or 1~120 minutes. See “Auto Power Off (min)” function.
- Alert Status: There are three error status: Lamp warning, Low lamp life, and Temperature warning. Your projector might lock up in protection mode if any of the alerts is activated. To exit protection mode, click the Clear to clear the Alert Status before you could Power ON your projector.
- Ceiling Mount: Allows you to select the projector mode, depending on how the projector is mounted. There are four projection modes: Front, Front Ceiling, Rear and Rear Ceiling. See “Ceiling Mount” function.
- Source Select: The Source Select menu allows you to select your projector's input source. You can select VGA 1/VGA 2, S-Video, Composite Video and HDMI.
- Color Mode: Select a mode to optimize the display image based on how the projector is being used. See “Color Mode” function.
- Blank Screen: Select On/Off to hide/unhide the screen picture.
- Aspect Ratio: Allows you to select the aspect ratio to adjust how the image appears.
- Brightness: Select value to adjust the brightness of the image.
- Contrast: Select value to adjust the display contrast.
- Volume: Select the value (0~32) for the audio volume
- Mute: Choose “On” to turn mute on. Choose “Off” to turn mute off.
- Microphone Volume: Select the value (0~32) for the Microphone Volume.

- Click the Auto Adjust button to adjust the settings automatically.
- Click the Factory Reset button to restore the factory default settings.
E-mail Setting Page

- **E-mail Alert**: You can set whether to be notified by email (Enable) or not (Disable).
- **To/Cc/From**: You can enter email address of sender (From) and recipients (To/Cc) to receive notification when an abnormality or warning occurs.
- **Out going SMTP server, User name, and Password** should be provided by your network administrator or MIS.
- **Alert Condition**: You can select the abnormalities or warnings to be notified by email. When any of the alert conditions occur, an email will be sent to the recipients (To/Cc).

![Email Setting Page](image)

- Click the Save button to save the settings.

Security Setting Page

![Security Setting Page](image)
Set up an administrator password to access the Web Management.

Step 1. Password: Click Enable first.
Step 2. New Password: Enter the new password.
Step 3. Confirm Password: Confirm the new password then Submit
Step 4. Password: Click Enable then Submit.

Login page of Web Management:

- Contact Service Center if you forget your administrator password.

**Login Page**

Administrator Password: Enter the Administrator Password and click Login button.

**Crestron**

- For more information, please visit http://www.crestron.com & www.crestron.com/getroomview/
Appendices

Troubleshooting

If you experience a problem with your projector, please refer to the following information. If a problem persists, please contact your local reseller or service center.

No image appears on-screen
- Ensure all the cables and power connections are correctly and securely connected as described in the "Installation" section.
- Ensure the pins of connectors are not crooked or broken.
- Check if the projection lamp has been securely installed.
- Ensure that the “Blank” feature is not turned on.

Partial, scrolling or incorrectly displayed image
- Press “Auto Sync” on the remote control.
  - If you are using a PC:
    - For Windows 95, 98, 2000, XP, Windows 7:
      1. Open the “My Computer” icon, the “Control Panel” folder, and then double click on the “Display” icon.
      2. Select the “Settings” tab.
      3. Verify that your display resolution setting is lower than or equal to 1080p.
      4. Click on the “Enter”.
    - For Windows Vista:
      1. From the “My Computer” icon, open the “Control Panel” folder, and double click the “Appearance and Personalization”
      2. Select “Personalization”.
      3. Click “Adjust screen resolution” to display “Display Settings”. Click on the “Enter”.

Troubleshooting
Appendices

- If the projector is still not projecting the whole image, you will also need to change the monitor display you are using. Refer to the following steps.
  1. Select the “Change” under the “Monitor” tab.
  2. Click on “Show all devices”. Next, select “Standard monitor types” under the SP box; choose the resolution mode you need under the “Models” box.
  3. Verify that the resolution setting of the monitor display is lower than or equal to 1080p.

- If you are using a Notebook:
  - First, follow the steps above to adjust resolution of the computer.
  - Press the toggle output settings. example: [Fn]+[F4]

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Key Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acer</td>
<td>[Fn]+[F5]</td>
</tr>
<tr>
<td>Asus</td>
<td>[Fn]+[F8]</td>
</tr>
<tr>
<td>Dell</td>
<td>[Fn]+[F8]</td>
</tr>
<tr>
<td>Gateway</td>
<td>[Fn]+[F4]</td>
</tr>
<tr>
<td>IBM/Lenovo</td>
<td>[Fn]+[F7]</td>
</tr>
<tr>
<td>HP/Compaq</td>
<td>[Fn]+[F4]</td>
</tr>
<tr>
<td>NEC</td>
<td>[Fn]+[F3]</td>
</tr>
<tr>
<td>Toshiba</td>
<td>[Fn]+[F5]</td>
</tr>
</tbody>
</table>

Mac Apple:
System Preference ⇒ Display ⇒ Arrangement ⇒ Mirror display

- If you experience difficulty changing resolutions or your monitor freezes, restart all equipment including the projector.

⚠️ The screen of the Notebook or PowerBook computer is not displaying your presentation

Some Notebook PCs may deactivate their own screens when a second display device is in use. Each has a different way to be reactivated. Refer to your computer’s documentation for detailed information.

⚠️ Image is unstable or flickering
  - Adjust the “Phase” to correct it. Refer to the “Screen” section for more information.
  - Change the monitor color setting from your computer.
Appendices

- **Image has vertical flickering bar**
  - Use "Clock" to make an adjustment. Refer to the “Screen” section for more information.
  - Check and reconfigure the display mode of your graphic card to make it compatible with the product.

- **Image is out of focus**
  - Adjust the “Focus Ring” on the projector lens.
  - Make sure the projection screen is within the required distance. Refer to Page 17.

- **The image is stretched when displaying 16:9 DVD title**
  When you play anamorphic DVD or 16:9 DVD, the projector will show the best image in 16:9 format on projector side.
  - If you play 4:3 format DVD title, please change the format as 4:3 in projector OSD.
  - If the image is still stretched, you will also need to setup the display format as 16:9 (wide) aspect ratio type on your DVD player.

- **Image is too small or too large**
  - Move the projector closer to or further from the screen.
  - Press "Menu" on the remote control or on the control panel. Go to “Screen” -> “Aspect Ratio” and try the different settings.

- **Image has slanted sides:**
  - If possible, reposition the projector so that it is centered on the screen and below the bottom of the screen.
  - Use “Screen” --> "V Keystone" from the OSD to make an adjustment.

- **Image is reversed**
  - Select “Screen” --> “Ceiling Mount” from the OSD and adjust the projection direction.
Appendices

Projector Problems

⚠️ The projector stops responding to all controls
- If possible, turn off the projector, then unplug the power cord and wait at least 20 seconds before reconnecting power.

⚠️ Lamp burns out or makes a popping sound
- When the lamp reaches its end of life, it will burn out and may make a loud popping sound. If this happens, the projector will not turn on until the lamp module has been replaced. To replace the lamp, follow the procedures in the “Replacing the Lamp” section on pages 49.

Remote Control Problems

⚠️ If the remote control does not work
- Check the operating angle of the remote control is within ±30° both horizontally and vertically of one of the IR receivers on the projector.
- Make sure there are not any obstructions between the remote control and the projector. Move to within 7 m (±0°) of the projector.
- Make sure the batteries are inserted correctly.
- Replace batteries if they are exhausted.

Sound Problems

⚠️ If no sound from the projector
- If you are playing an external source, make sure you have an audio cable securely connected between the source device and the projector’s audio input.
- Please make sure the external speakers are not connected.
- Make sure the volume is not set to minimum.
- Make sure the “Volume --> Mute” function is set to “Off”.

3D Problems

⚠️ Blurry double image
- Select “3D” --> “3D” from OSD and choose “Off” to avoid normal 2D image is blurry double image.
Two images, Side-by-Side(Half) format
- Select “3D” --> “3D Format” from OSD and choose “Side-by-Side(Half)” for input signal is HDMI 1.4a 3D. 3D Format is only supported on 3D Timing on page 54.

Image does not display in 3D
- Check if the battery of 3D glasses is drained.
- Check if the 3D glasses is turned on.
- Select “3D” --> “3D Format” from OSD and choose “Side-by-Side(Half)” for input signal is HDMI 1.4a 3D. 3D Format is only supported on 3D Timing on page 54.

On Screen Messages
- Power off confirm

- Fan lock error

- No source found

- Out of display range

- Over temperature

Please:
1. Make sure air in and outlets are not blocked.
2. Make sure the environment temperature is under 40 degree C.
Replacing the lamp

The projector automatically detects the lamp life. When the lamp life is nearing the end of use, you will receive a warning message.

When you see this message, please contact your local reseller or service center to change the lamp as soon as possible. Make sure the projector has been cooled down for at least 60 minutes before changing the lamp.

Lamp Replacement Procedure:

1. Switch off the projector power by pressing the “idle” button.
2. Allow the projector to cool down for at least 60 minutes.
3. Disconnect the power cord.
4. Unscrew the two screws on the cover.  
5. Lift up and remove the cover.  
6. Unscrew the two screws on the lamp module.  
7. Pull up the lamp handle and remove the lamp module slowly and carefully.  
To replace the lamp module, reverse the previous steps.
8. Turn on the projector and use “Lamp Reset” after the lamp module is replaced.
Replacing and cleaning the optional dust filter

We recommend cleaning the dust filter after every 500 hours of use, clean it more often if the projector is used in a dusty environment.

Please clean the dust filters for better performance.

When you see this message, please find following steps for cleaning procedure:

1. Switch off the projector power by pressing the "OFF" button.
2. Disconnect the power cord.
3. Pull the latch by the arrow direction. 1
4. Remove the dust filter slowly and carefully.
5. Clean or replace the dust filter. 2
6. Turn on the projector and use “Reset Dust Filter” after the dust filter is replaced.

The optional dust filter should be used in dusty environments.
If the dust filter is installed, proper maintenance will prevent overheating and related damage to the projector.
## Compatibility Modes

- VGA Analog
  - PC signal

<table>
<thead>
<tr>
<th>Modes</th>
<th>Resolution</th>
<th>V. Frequency [Hz]</th>
<th>H. Frequency [Hz]</th>
</tr>
</thead>
<tbody>
<tr>
<td>VGA</td>
<td>640x480</td>
<td>60</td>
<td>31.5</td>
</tr>
<tr>
<td></td>
<td>640x480</td>
<td>67</td>
<td>35.0</td>
</tr>
<tr>
<td></td>
<td>640x480</td>
<td>72</td>
<td>37.9</td>
</tr>
<tr>
<td></td>
<td>640x480</td>
<td>75</td>
<td>37.5</td>
</tr>
<tr>
<td></td>
<td>640x480</td>
<td>85</td>
<td>43.3</td>
</tr>
<tr>
<td></td>
<td>640x480</td>
<td>120</td>
<td>61.9</td>
</tr>
<tr>
<td>IBM</td>
<td>720x400</td>
<td>70</td>
<td>31.5</td>
</tr>
<tr>
<td>SVGA</td>
<td>800x600</td>
<td>56</td>
<td>35.1</td>
</tr>
<tr>
<td></td>
<td>800x600</td>
<td>60</td>
<td>37.9</td>
</tr>
<tr>
<td></td>
<td>800x600</td>
<td>72</td>
<td>48.1</td>
</tr>
<tr>
<td></td>
<td>800x600</td>
<td>75</td>
<td>46.9</td>
</tr>
<tr>
<td></td>
<td>800x600</td>
<td>85</td>
<td>53.7</td>
</tr>
<tr>
<td></td>
<td>800x600</td>
<td>120</td>
<td>77.4</td>
</tr>
<tr>
<td>Apple, MAC II</td>
<td>832x624</td>
<td>75</td>
<td>49.1</td>
</tr>
<tr>
<td>XGA</td>
<td>1024x768</td>
<td>60</td>
<td>48.4</td>
</tr>
<tr>
<td></td>
<td>1024x768</td>
<td>70</td>
<td>56.5</td>
</tr>
<tr>
<td></td>
<td>1024x768</td>
<td>75</td>
<td>60.0</td>
</tr>
<tr>
<td></td>
<td>1024x768</td>
<td>85</td>
<td>68.7</td>
</tr>
<tr>
<td></td>
<td>1024x768</td>
<td>120</td>
<td>99.0</td>
</tr>
<tr>
<td>Apple, MAC II</td>
<td>1152x870</td>
<td>75</td>
<td>68.7</td>
</tr>
<tr>
<td>SXGA</td>
<td>1280x1024</td>
<td>60</td>
<td>64.0</td>
</tr>
<tr>
<td></td>
<td>1280x1024</td>
<td>72</td>
<td>77.0</td>
</tr>
<tr>
<td></td>
<td>1280x1024</td>
<td>75</td>
<td>80.0</td>
</tr>
</tbody>
</table>
### Appendices

<table>
<thead>
<tr>
<th>Modes</th>
<th>Resolution</th>
<th>V. Frequency [Hz]</th>
<th>H. Frequency [Hz]</th>
</tr>
</thead>
<tbody>
<tr>
<td>QuadVGA</td>
<td>1280x960</td>
<td>60</td>
<td>60.0</td>
</tr>
<tr>
<td></td>
<td>1280x960</td>
<td>75</td>
<td>75.2</td>
</tr>
<tr>
<td>SXGA+</td>
<td>1400x1050</td>
<td>60</td>
<td>65.3</td>
</tr>
<tr>
<td>UXGA</td>
<td>1600x1200</td>
<td>60</td>
<td>75.0</td>
</tr>
</tbody>
</table>

- Extended wide timing

<table>
<thead>
<tr>
<th>Modes</th>
<th>Resolution</th>
<th>V. Frequency [Hz]</th>
<th>H. Frequency [Hz]</th>
</tr>
</thead>
<tbody>
<tr>
<td>WXGA</td>
<td>1280x720</td>
<td>60</td>
<td>44.8</td>
</tr>
<tr>
<td></td>
<td>1280x800</td>
<td>60</td>
<td>49.6</td>
</tr>
<tr>
<td></td>
<td>1366x768</td>
<td>60</td>
<td>47.7</td>
</tr>
<tr>
<td></td>
<td>1440x900</td>
<td>60</td>
<td>59.9</td>
</tr>
<tr>
<td>WSXGA+</td>
<td>1680x1050</td>
<td>60</td>
<td>65.3</td>
</tr>
</tbody>
</table>

- Component signal

<table>
<thead>
<tr>
<th>Modes</th>
<th>Resolution</th>
<th>V. Frequency [Hz]</th>
<th>H. Frequency [Hz]</th>
</tr>
</thead>
<tbody>
<tr>
<td>480i</td>
<td>720x480(1440x480)</td>
<td>59.94(29.97)</td>
<td>15.7</td>
</tr>
<tr>
<td>576i</td>
<td>720x576(1440x576)</td>
<td>50(25)</td>
<td>15.6</td>
</tr>
<tr>
<td>480p</td>
<td>720x480</td>
<td>59.94</td>
<td>31.5</td>
</tr>
<tr>
<td>576p</td>
<td>720x576</td>
<td>50</td>
<td>31.3</td>
</tr>
<tr>
<td>720p</td>
<td>1280x720</td>
<td>60</td>
<td>45.0</td>
</tr>
<tr>
<td>720p</td>
<td>1280x720</td>
<td>50</td>
<td>37.5</td>
</tr>
<tr>
<td>1080i</td>
<td>1920x1080</td>
<td>60(30)</td>
<td>33.8</td>
</tr>
<tr>
<td>1080i</td>
<td>1920x1080</td>
<td>50(25)</td>
<td>28.1</td>
</tr>
<tr>
<td>1080p</td>
<td>1920x1080</td>
<td>23.98/24</td>
<td>27.0</td>
</tr>
<tr>
<td>1080p</td>
<td>1920x1080</td>
<td>60</td>
<td>67.5</td>
</tr>
<tr>
<td>1080p</td>
<td>1920x1080</td>
<td>50</td>
<td>56.3</td>
</tr>
</tbody>
</table>
## Appendices

- **HDMI Digital**
  - **PC signal**

<table>
<thead>
<tr>
<th>Modes</th>
<th>Resolution</th>
<th>V. Frequency [Hz]</th>
<th>H. Frequency [Hz]</th>
</tr>
</thead>
<tbody>
<tr>
<td>VGA</td>
<td>640x480</td>
<td>60</td>
<td>31.5</td>
</tr>
<tr>
<td>VGA</td>
<td>640x480</td>
<td>67</td>
<td>35.0</td>
</tr>
<tr>
<td>VGA</td>
<td>640x480</td>
<td>72</td>
<td>37.9</td>
</tr>
<tr>
<td>VGA</td>
<td>640x480</td>
<td>75</td>
<td>37.5</td>
</tr>
<tr>
<td>VGA</td>
<td>640x480</td>
<td>85</td>
<td>43.3</td>
</tr>
<tr>
<td>VGA</td>
<td>640x480</td>
<td>120</td>
<td>61.9</td>
</tr>
<tr>
<td>IBM</td>
<td>720x400</td>
<td>70</td>
<td>31.5</td>
</tr>
<tr>
<td>SVGA</td>
<td>800x600</td>
<td>56</td>
<td>35.1</td>
</tr>
<tr>
<td>SVGA</td>
<td>800x600</td>
<td>60</td>
<td>37.9</td>
</tr>
<tr>
<td>SVGA</td>
<td>800x600</td>
<td>72</td>
<td>48.1</td>
</tr>
<tr>
<td>SVGA</td>
<td>800x600</td>
<td>75</td>
<td>46.9</td>
</tr>
<tr>
<td>SVGA</td>
<td>800x600</td>
<td>85</td>
<td>53.7</td>
</tr>
<tr>
<td>SVGA</td>
<td>800x600</td>
<td>120</td>
<td>77.4</td>
</tr>
<tr>
<td>Apple, MAC II</td>
<td>832x624</td>
<td>75</td>
<td>49.1</td>
</tr>
<tr>
<td>XGA</td>
<td>1024x768</td>
<td>60</td>
<td>48.4</td>
</tr>
<tr>
<td>XGA</td>
<td>1024x768</td>
<td>70</td>
<td>56.5</td>
</tr>
<tr>
<td>XGA</td>
<td>1024x768</td>
<td>75</td>
<td>60.0</td>
</tr>
<tr>
<td>XGA</td>
<td>1024x768</td>
<td>85</td>
<td>68.7</td>
</tr>
<tr>
<td>XGA</td>
<td>1024x768</td>
<td>120</td>
<td>99.0</td>
</tr>
<tr>
<td>Apple, MAC II</td>
<td>1152x870</td>
<td>75</td>
<td>68.7</td>
</tr>
<tr>
<td>SXGA</td>
<td>1280x1024</td>
<td>60</td>
<td>64.0</td>
</tr>
<tr>
<td>SXGA</td>
<td>1280x1024</td>
<td>72</td>
<td>77.0</td>
</tr>
<tr>
<td>SXGA</td>
<td>1280x1024</td>
<td>75</td>
<td>80.0</td>
</tr>
<tr>
<td>QuadVGA</td>
<td>1280x960</td>
<td>60</td>
<td>60.0</td>
</tr>
<tr>
<td>QuadVGA</td>
<td>1280x960</td>
<td>75</td>
<td>75.2</td>
</tr>
<tr>
<td>SXGA+</td>
<td>1400x1050</td>
<td>60</td>
<td>65.3</td>
</tr>
<tr>
<td>UXGA</td>
<td>1600x1200</td>
<td>60</td>
<td>75.0</td>
</tr>
</tbody>
</table>
### Appendices

- **Extended wide timing**

<table>
<thead>
<tr>
<th>Modes</th>
<th>Resolution</th>
<th>V. Frequency [Hz]</th>
<th>H. Frequency [Hz]</th>
</tr>
</thead>
<tbody>
<tr>
<td>WXGA</td>
<td>1280x720</td>
<td>60</td>
<td>44.8</td>
</tr>
<tr>
<td></td>
<td>1280x800</td>
<td>60</td>
<td>49.6</td>
</tr>
<tr>
<td></td>
<td>1366x768</td>
<td>60</td>
<td>47.7</td>
</tr>
<tr>
<td></td>
<td>1440x900</td>
<td>60</td>
<td>59.9</td>
</tr>
<tr>
<td>WSXGA+</td>
<td>1680x1050</td>
<td>60</td>
<td>65.3</td>
</tr>
</tbody>
</table>

- **Video signal**

<table>
<thead>
<tr>
<th>Modes</th>
<th>Resolution</th>
<th>V. Frequency [Hz]</th>
<th>H. Frequency [Hz]</th>
</tr>
</thead>
<tbody>
<tr>
<td>480p</td>
<td>640x480</td>
<td>59.94/60</td>
<td>31.5</td>
</tr>
<tr>
<td>480i</td>
<td>720x480(1440x480)</td>
<td>59.94(29.97)</td>
<td>15.7</td>
</tr>
<tr>
<td>576i</td>
<td>720x576(1440x576)</td>
<td>50(25)</td>
<td>15.6</td>
</tr>
<tr>
<td>480p</td>
<td>720x480</td>
<td>59.94</td>
<td>31.5</td>
</tr>
<tr>
<td>576p</td>
<td>720x576</td>
<td>50</td>
<td>31.3</td>
</tr>
<tr>
<td>720p</td>
<td>1280x720</td>
<td>60</td>
<td>45.0</td>
</tr>
<tr>
<td>720p</td>
<td>1280x720</td>
<td>50</td>
<td>37.5</td>
</tr>
<tr>
<td>1080i</td>
<td>1920x1080</td>
<td>60(30)</td>
<td>33.8</td>
</tr>
<tr>
<td>1080i</td>
<td>1920x1080</td>
<td>50(25)</td>
<td>28.1</td>
</tr>
<tr>
<td>1080p</td>
<td>1920x1080</td>
<td>23.98/24</td>
<td>27.0</td>
</tr>
<tr>
<td>1080p</td>
<td>1920x1080</td>
<td>60</td>
<td>67.5</td>
</tr>
<tr>
<td>1080p</td>
<td>1920x1080</td>
<td>50</td>
<td>56.3</td>
</tr>
</tbody>
</table>

- **HDMI 1.4a mandatory 3D timing - Video Signal**

<table>
<thead>
<tr>
<th>Modes</th>
<th>Resolution</th>
<th>V. Frequency [Hz]</th>
<th>H. Frequency [Hz]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame Packing</td>
<td>720p</td>
<td>50</td>
<td>31.5</td>
</tr>
<tr>
<td></td>
<td>720p</td>
<td>59.94/60</td>
<td>15.7</td>
</tr>
<tr>
<td></td>
<td>1080p</td>
<td>23.98/24</td>
<td>15.6</td>
</tr>
<tr>
<td>Side-by-Side(Half)</td>
<td>1080i</td>
<td>50</td>
<td>31.5</td>
</tr>
<tr>
<td></td>
<td>1080i</td>
<td>59.94/60</td>
<td>31.3</td>
</tr>
<tr>
<td>Top and Bottom</td>
<td>720p</td>
<td>50</td>
<td>45.0</td>
</tr>
<tr>
<td></td>
<td>720p</td>
<td>59.94/60</td>
<td>37.5</td>
</tr>
<tr>
<td></td>
<td>1080p</td>
<td>23.98/24</td>
<td>33.8</td>
</tr>
</tbody>
</table>
Appendices

RS232 Protocol Function List

Baud Rate : 9600
Data Bits : 8
Parity: None
Stop Bits: 1
Flow Control : None
UART16550 FIFO: Disable
Projector Return (Pass): P
Projector Return (Fail): F

1. There is a <CR> after all ASCII commands.
2. 0D is the HEX code for <CR> in ASCII code.

<table>
<thead>
<tr>
<th>SEND to projector</th>
<th>MTU1 Code</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>~XX00 0</td>
<td>TE 30 30 30 30 30 30</td>
<td>Power ON</td>
<td></td>
</tr>
<tr>
<td>~XX00 1</td>
<td>TE 30 30 30 30 30 30</td>
<td>Power OFF</td>
<td></td>
</tr>
<tr>
<td>~XX00 2</td>
<td>TE 30 30 30 30 30 30</td>
<td>Reboot</td>
<td></td>
</tr>
<tr>
<td>~XX01 0</td>
<td>TE 30 30 30 30 30 30</td>
<td>AV Mute(Black)</td>
<td>On</td>
</tr>
<tr>
<td>~XX01 1</td>
<td>TE 30 30 30 30 30 30</td>
<td>Mute</td>
<td>On</td>
</tr>
<tr>
<td>~XX02 0</td>
<td>TE 30 30 30 30 30 30</td>
<td>Freeze</td>
<td>Off</td>
</tr>
<tr>
<td>~XX02 1</td>
<td>TE 30 30 30 30 30 30</td>
<td>Unfreeze</td>
<td></td>
</tr>
<tr>
<td>~XX03 0</td>
<td>TE 30 30 30 30 30 30</td>
<td>Zoom Plus</td>
<td></td>
</tr>
<tr>
<td>~XX03 1</td>
<td>TE 30 30 30 30 30 30</td>
<td>Zoom Minus</td>
<td></td>
</tr>
<tr>
<td>~XX04 0</td>
<td>TE 30 30 30 30 30 30</td>
<td>Direct Source</td>
<td>HDMI</td>
</tr>
<tr>
<td>~XX04 1</td>
<td>TE 30 30 30 30 30 30</td>
<td>VGA 1</td>
<td></td>
</tr>
<tr>
<td>~XX05 1</td>
<td>TE 30 30 30 30 30 30</td>
<td>VGA 2</td>
<td></td>
</tr>
<tr>
<td>~XX06 1</td>
<td>TE 30 30 30 30 30 30</td>
<td>S-Video</td>
<td></td>
</tr>
<tr>
<td>~XX06 2</td>
<td>TE 30 30 30 30 30 30</td>
<td>Black Level</td>
<td>Off</td>
</tr>
<tr>
<td>~XX06 3</td>
<td>TE 30 30 30 30 30 30</td>
<td>Movie</td>
<td></td>
</tr>
<tr>
<td>~XX06 4</td>
<td>TE 30 30 30 30 30 30</td>
<td>Game</td>
<td></td>
</tr>
<tr>
<td>~XX07 1</td>
<td>TE 30 30 30 30 30 30</td>
<td>User</td>
<td></td>
</tr>
<tr>
<td>~XX11 0</td>
<td>TE 30 30 30 30 30 30</td>
<td>Brightness</td>
<td>n = 0 (a=30) ~ 100 (a=31 30 30)</td>
</tr>
<tr>
<td>~XX11 1</td>
<td>TE 30 30 30 30 30 30</td>
<td>Contrast</td>
<td>n = 0 (a=30) ~ 100 (a=31 30 30)</td>
</tr>
<tr>
<td>~XX11 2</td>
<td>TE 30 30 30 30 30 30</td>
<td>Format(aspect ratio)</td>
<td>4:3</td>
</tr>
<tr>
<td>~XX11 3</td>
<td>TE 30 30 30 30 30 30</td>
<td>Sharpness</td>
<td>n = 0 (a=30) ~ 31 (a=33 31)</td>
</tr>
<tr>
<td>~XX12 0</td>
<td>TE 30 30 30 30 30 30</td>
<td>Keystone</td>
<td>n = -15/15</td>
</tr>
<tr>
<td>~XX12 1</td>
<td>TE 30 30 30 30 30 30</td>
<td>Language</td>
<td>English</td>
</tr>
<tr>
<td>~XX12 2</td>
<td>TE 30 30 30 30 30 30</td>
<td>Projection(ceiling M)</td>
<td>Front-Desktop</td>
</tr>
<tr>
<td>~XX12 3</td>
<td>TE 30 30 30 30 30 30</td>
<td>Menu Location</td>
<td>Rear-Desktop</td>
</tr>
<tr>
<td>~XX12 4</td>
<td>TE 30 30 30 30 30 30</td>
<td>Mute</td>
<td>Rear-Ceiling</td>
</tr>
<tr>
<td>~XX12 5</td>
<td>TE 30 30 30 30 30 30</td>
<td>Top Left</td>
<td>Top Left</td>
</tr>
<tr>
<td>~XX12 6</td>
<td>TE 30 30 30 30 30 30</td>
<td>Top Right</td>
<td>Centre</td>
</tr>
<tr>
<td>~XX12 7</td>
<td>TE 30 30 30 30 30 30</td>
<td>Bottom Left</td>
<td>Bottom Left</td>
</tr>
<tr>
<td>~XX13 0</td>
<td>TE 30 30 30 30 30 30</td>
<td>Bottom Right</td>
<td></td>
</tr>
<tr>
<td>~XX13 1</td>
<td>TE 30 30 30 30 30 30</td>
<td>Brightness</td>
<td>n = 0 (a=30) ~ 20 (a=32 30)</td>
</tr>
<tr>
<td>~XX13 2</td>
<td>TE 30 30 30 30 30 30</td>
<td>Contrast</td>
<td>n = 0 (a=30) ~ 120 (a=31 32 30), step=1</td>
</tr>
<tr>
<td>~XX13 3</td>
<td>TE 30 30 30 30 30 30</td>
<td>Format(aspect ratio)</td>
<td></td>
</tr>
<tr>
<td>~XX13 4</td>
<td>TE 30 30 30 30 30 30</td>
<td>Sharpness</td>
<td></td>
</tr>
<tr>
<td>~XX13 5</td>
<td>TE 30 30 30 30 30 30</td>
<td>Keystone</td>
<td></td>
</tr>
<tr>
<td>~XX13 6</td>
<td>TE 30 30 30 30 30 30</td>
<td>Language</td>
<td></td>
</tr>
<tr>
<td>~XX13 7</td>
<td>TE 30 30 30 30 30 30</td>
<td>Projection(ceiling M)</td>
<td></td>
</tr>
<tr>
<td>~XX13 8</td>
<td>TE 30 30 30 30 30 30</td>
<td>Menu Location</td>
<td></td>
</tr>
<tr>
<td>~XX13 9</td>
<td>TE 30 30 30 30 30 30</td>
<td>Mute</td>
<td></td>
</tr>
<tr>
<td>~XX13 10</td>
<td>TE 30 30 30 30 30 30</td>
<td>Top Left</td>
<td></td>
</tr>
<tr>
<td>~XX13 11</td>
<td>TE 30 30 30 30 30 30</td>
<td>Top Right</td>
<td></td>
</tr>
<tr>
<td>~XX13 12</td>
<td>TE 30 30 30 30 30 30</td>
<td>Bottom Left</td>
<td></td>
</tr>
<tr>
<td>~XX13 13</td>
<td>TE 30 30 30 30 30 30</td>
<td>Bottom Right</td>
<td></td>
</tr>
<tr>
<td>~XX13 14</td>
<td>TE 30 30 30 30 30 30</td>
<td>Brightness</td>
<td>n = 0 (a=30) ~ 20 (a=32 30)</td>
</tr>
<tr>
<td>~XX13 15</td>
<td>TE 30 30 30 30 30 30</td>
<td>Contrast</td>
<td>n = 0 (a=30) ~ 120 (a=31 32 30), step=1</td>
</tr>
<tr>
<td>~XX13 16</td>
<td>TE 30 30 30 30 30 30</td>
<td>Format(aspect ratio)</td>
<td></td>
</tr>
<tr>
<td>~XX13 17</td>
<td>TE 30 30 30 30 30 30</td>
<td>Sharpness</td>
<td></td>
</tr>
<tr>
<td>~XX13 18</td>
<td>TE 30 30 30 30 30 30</td>
<td>Keystone</td>
<td></td>
</tr>
<tr>
<td>~XX13 19</td>
<td>TE 30 30 30 30 30 30</td>
<td>Language</td>
<td></td>
</tr>
<tr>
<td>~XX13 20</td>
<td>TE 30 30 30 30 30 30</td>
<td>Projection(ceiling M)</td>
<td></td>
</tr>
<tr>
<td>~XX13 21</td>
<td>TE 30 30 30 30 30 30</td>
<td>Menu Location</td>
<td></td>
</tr>
<tr>
<td>~XX13 22</td>
<td>TE 30 30 30 30 30 30</td>
<td>Mute</td>
<td></td>
</tr>
<tr>
<td>~XX13 23</td>
<td>TE 30 30 30 30 30 30</td>
<td>Top Left</td>
<td></td>
</tr>
<tr>
<td>~XX13 24</td>
<td>TE 30 30 30 30 30 30</td>
<td>Top Right</td>
<td></td>
</tr>
<tr>
<td>~XX13 25</td>
<td>TE 30 30 30 30 30 30</td>
<td>Bottom Left</td>
<td></td>
</tr>
<tr>
<td>~XX13 26</td>
<td>TE 30 30 30 30 30 30</td>
<td>Bottom Right</td>
<td></td>
</tr>
<tr>
<td>~XX13 27</td>
<td>TE 30 30 30 30 30 30</td>
<td>Brightness</td>
<td>n = 0 (a=30) ~ 20 (a=32 30)</td>
</tr>
<tr>
<td>~XX13 28</td>
<td>TE 30 30 30 30 30 30</td>
<td>Contrast</td>
<td>n = 0 (a=30) ~ 120 (a=31 32 30), step=1</td>
</tr>
<tr>
<td>~XX13 29</td>
<td>TE 30 30 30 30 30 30</td>
<td>Format(aspect ratio)</td>
<td></td>
</tr>
<tr>
<td>~XX13 30</td>
<td>TE 30 30 30 30 30 30</td>
<td>Sharpness</td>
<td></td>
</tr>
<tr>
<td>~XX13 31</td>
<td>TE 30 30 30 30 30 30</td>
<td>Keystone</td>
<td></td>
</tr>
<tr>
<td>~XX13 32</td>
<td>TE 30 30 30 30 30 30</td>
<td>Language</td>
<td></td>
</tr>
<tr>
<td>~XX13 33</td>
<td>TE 30 30 30 30 30 30</td>
<td>Projection(ceiling M)</td>
<td></td>
</tr>
<tr>
<td>~XX13 34</td>
<td>TE 30 30 30 30 30 30</td>
<td>Menu Location</td>
<td></td>
</tr>
<tr>
<td>~XX13 35</td>
<td>TE 30 30 30 30 30 30</td>
<td>Mute</td>
<td></td>
</tr>
<tr>
<td>~XX13 36</td>
<td>TE 30 30 30 30 30 30</td>
<td>Top Left</td>
<td></td>
</tr>
<tr>
<td>~XX13 37</td>
<td>TE 30 30 30 30 30 30</td>
<td>Top Right</td>
<td></td>
</tr>
<tr>
<td>~XX13 38</td>
<td>TE 30 30 30 30 30 30</td>
<td>Bottom Left</td>
<td></td>
</tr>
<tr>
<td>~XX13 39</td>
<td>TE 30 30 30 30 30 30</td>
<td>Bottom Right</td>
<td></td>
</tr>
</tbody>
</table>

Note: There is a <CR> after all ASCII commands.
## Appendices

### READ from projector

<table>
<thead>
<tr>
<th>ASCII Code</th>
<th>HEXFH Code</th>
<th>Function</th>
<th>Projector Return</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-XX121 1</td>
<td>7E 30 30 31 32 31 30 31 30 0D</td>
<td>Input Source (curr. src)</td>
<td>OKa</td>
<td>n: 0/2/3/5/4/7 = None / VGA1 / VGA2 / Video / S-Video / HDMI</td>
</tr>
<tr>
<td>-XX122 1</td>
<td>7E 30 30 31 32 32 30 31 30 0D</td>
<td>Software Version</td>
<td>OKdddd</td>
<td>dddd: FW version</td>
</tr>
<tr>
<td>-XX123 1</td>
<td>7E 30 30 31 32 31 30 31 30 0D</td>
<td>Display Mode</td>
<td>OKa</td>
<td>n: 1/2/3/4/5 = Bright/PC/Movie/Game/User</td>
</tr>
<tr>
<td>-XX127 1</td>
<td>7E 30 30 31 32 37 30 31 30 0D</td>
<td>Aspect Ratio</td>
<td>OKa</td>
<td>n: 1/2/3/7 = 4:3 / 16:9 / 36:10 / AUTO</td>
</tr>
<tr>
<td>-XX150 1</td>
<td>7E 30 30 31 35 30 20 31 30 0D</td>
<td>Information</td>
<td>Okabbbbbcdaddc</td>
<td></td>
</tr>
</tbody>
</table>
Ceiling Mount Installation

If you wish to use a third party ceiling mount kit, please ensure the screws which are used to attach a mount to the projector meet the following specifications:

- Screw type: M4*4
- Diameter: 4 mm
- Length: 11 mm

Note:

Damage resulting from incorrect installation will invalidate the warranty.

Unit: mm
Appendices

Optoma Global Offices
For service or support please contact your local office.

USA
3178 Laurelview Ct.
Fremont, CA 94538, USA
www.optomausa.com
888-289-6786
510-897-8601
services@optoma.com

Canada
3178 Laurelview Ct.
Fremont, CA 94538, USA
www.optomausa.com
888-289-6786
510-897-8601
services@optoma.com

Latin America
3178 Laurelview Ct.
Fremont, CA 94538, USA
www.optomausa.com
888-289-6786
510-897-8601
services@optoma.com

Europe
42 Caxton Way, The Watford Business Park
Watford, Hertfordshire,
WD18 8QZ, UK
www.optoma.eu
+44 (0) 1923 691 800
+44 (0) 1923 691 888
service@tsc-europe.com

Benelux BV
Randstad 22-123
1316 BW Almere
The Netherlands
www.optoma.nl
+31 (0) 36 820 0253
+31 (0) 36 548 9052

France
Bâtiment E
81-83 avenue Edouard Vaillant
92100 Boulogne Billancourt, France
+33 1 41 46 12 20
+33 1 41 46 94 35
savoptoma@optoma.fr

Spain
C/ José Hierro,36 Of. 1C
28522 Rivas VaciaMadrid,
Spain
+34 91 499 06 06
+34 91 670 08 32
Appendices

Deutschland
Wiesenstrasse 21 W
D40549 Düsseldorf,
Germany
+49 (0) 211 506 6670
+49 (0) 211 506 66799
info@optoma.de

Scandinavia
Lerpeveien 25
3040 Drammen
Norway
PO.BOX 9515
3038 Drammen
Norway
+47 32 98 89 90
+47 32 98 89 99
info@optoma.no

Korea
WOOMI TECH.CO.,LTD.
4F,Minu Bldg.33-14, Kangnam-Ku,
seoul,135-815, KOREA
+82+2+34430004
+82+2+34430005

Japan
東京都足立区綾瀬3-25-18
株式会社オーエス
コンタクトセンター:0120-380-495
info@os-worldwide.com
www.os-worldwide.com

Taiwan
12F., No.215,Sec. 3, Beixin Rd.,
Xindian Dist., New Taipei City 231,
Taiwan, R.O.C.
www.optoma.com.tw
services@optoma.com.tw
asia.optoma.com

Hong Kong
Unit A, 27/F Dragon Centre,
79 Wing Hong Street,
Cheung Sha Wan,
Kowloon, Hong Kong
+852-2396-8968
+852-2370-1222
www.optoma.com.hk

China
5F, No. 1205, Kaixuan Rd.,
Changning District
Shanghai, 200052, China
+86-21-62947376
+86-21-62947375
www.optoma.com.cn
Appendices

Regulation & Safety Notices
This appendix lists the general notices of your projector.

**FCC notice**

This device has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This device generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this device does cause harmful interference to radio or television reception, which can be determined by turning the device off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

**Notice: Shielded cables**

All connections to other computing devices must be made using shielded cables to maintain compliance with FCC regulations.

**Caution**

Changes or modifications not expressly approved by the manufacturer could void the user’s authority, which is granted by the Federal Communications Commission, to operate this projector.
Appendices

Operation conditions

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference and
2. This device must accept any interference received, including interference that may cause undesired operation.

Notice: Canadian users

This Class B digital apparatus complies with Canadian ICES-003.

Remarque à l’intention des utilisateurs canadiens

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Declaration of Conformity for EU countries

• EMC Directive 2004/108/EC (including amendments)
• Low Voltage Directive 2006/95/EC
• R & TTE Directive 1999/5/EC (if product has RF function)

Disposal instructions

Do not throw this electronic device into the trash when discarding. To minimize pollution and ensure utmost protection of the global environment, please recycle it.
Rosco Guide to Projection Screens

Front and Rear Projection Screens

Choosing Screen Colors

Determining the Size of Your Screen

Using Screen as a Cyclorama

Projection Screens

1194 of 1217
**Front Projection Screens**

Front projection is the use of a source to bounce an image off a surface and back to the viewer.

In this case, the surface should be highly reflective for the audience to get the brightest possible image. On equal-intensity, distance, and the size-of-image basis, a front projection is brighter than a corresponding rear projection. In short, it takes less wattage to project the same image from the front than from the rear. The source is normally hidden from the audience, but must be placed with a clear throw to the surface. If the throw is very long, a source with the appropriate wattage should be chosen.

This method is best for situations where the source is not very strong, as a highly reflective surface will maximize the amount of light being bounced back at the user. A front projected image maintains its intensity, clarity, and contrast through a wide angle of vision, meaning those sitting house right and left can see the image almost as well as those in the center of the audience.

Using a front projection surface has some disadvantages.

First, having a very light colored surface on stage can be distracting. Some designers feel their audiences are left “waiting for the movie to start”. The bright surface may reflect ambient light causing the image to look washed out, if care is not taken in lighting the areas adjacent to the surface. Backlighting and sidelighting actors and scenery becomes very important in this situation in order to keep the actor's shadow off the projection surface. Hiding the source in an extreme lighting position to avoid casting shadows can cause distortion in the image and may require keystone correction.
Rear projection is the use of the source to transmit the image through a screen to the viewer.

In this case, the surface should transmit an image with true optical clarity and brightness. A higher intensity source is necessary as the light rays are forced through the surface of the screen to the viewer. By definition the source is masked to the audience, but space must be left backstage between the source and the surface, in order to prevent the actors and crew from casting shadows on the surface. The darker colors included in the rear projection palette allow the surface to blend inconspicuously into the scenery. Actors can stand in front of the screen without blocking the image. Because the image is usually projected on an angle directly perpendicular to the surface, distortion is not a problem. If the surface is painted, varied and interesting effects can be achieved by projecting them from behind so that they blend with the painted picture. Day to night effects are a perfect example of this.

A rear projection surface also has its disadvantages.

In order to allow the image to pass through it, and because the viewer is usually looking almost directly at the source through the screen, a “hot spot” is often visible at the center of rear projected images. Because of density of the material required to diffuse the image and prevent hot spotting, the image quality falls off sharply when the viewer is seated outside the 60 to 110 degree viewing cone. (see diagram) The actual size of the viewing cone is dependent on the color of the surface chosen, with darker surfaces “falling off” fairly close to the center axis.
Choosing Screen Colors

Screens for Front and Rear Projection

Twin White screen is Rosco's most versatile screen. Its milky white color makes for equally bright images whether front or rear projected. This means that the designer can cross fade between front and rear projection unnoticed. The viewing cone on this screen is almost 180 degrees, giving everyone in the audience an undistorted image. Because the screen is light colored for front projection reflectance, ambient light will affect the image quality, so care should be exercised in lighting around the screen.

Screens for Front Projection Only

Front White projection screen is a highly reflective, opaque material. Front White is best for those situations requiring the brightest images combined with the widest viewing angles. Because the reflectiveness is so high, this screen will pick up any ambient light. Therefore, care must be exercised in the lighting design to minimize bounce light.

Screens for Rear Projection Only

Black projection screens are best used in situations with high quantities of ambient light. The dark grey color comes magically to life with fine detail resolution when back lit with STRONG (bright) image. The color makes the screen inconspicuous within the framework of the set, but its viewing cone is limited to 60 degrees. The direct light transmission is only about 6%, but the excellent contrast between light and dark make for an image that appears substantially brighter. Black is particularly well suited for ballet and opera where the dark surface absorbs the reflections of follow-spots on the floor.

Grey projection screens have many of the advantages of black screens while opening up the viewing angles to accommodate a wider audience. The medium grey color still helps the screen blend into the scenery, and provides true-to-life images, color and clarity. The viewing cone opens up to 120 degrees, and the lighter color means higher light transmission, and therefore, a brighter image.

Light Translucent projection screen is a slightly opaque, very light grey screen with a variety uses. For projection, it is best used in high ambient light situations, particularly in outdoor installations (see care and maintenance instructions), because the extremely high light transmission of the screen allows the image to compete with the bright ambient light. Care should be exercised in avoiding the line of sight between the viewer and the projector, however, due to the hot spot that would be seen because the screen is so translucent. Light translucent screen is an excellent choice for bounce drops and diffusion materials.
You can most easily order your Roscoscreen through your Rosco dealer, usually the same people who supply you with Rosco scenic paint or Roscolux color filters. You need to tell them the type and color of screen you want (Twin White, Front White, Black, Grey or Light Translucent). Screens are priced and sold by the square foot, so you need to know the height and width you wish to work with. Custom Roscoscreens can be welded with either the standard 55” wide goods, or the 86” wide seamless material. Raw goods are available in 55”, 110” seemed, and 86” unseamed width bolts.

Screens are priced in several ways, with current pricing published in Rosco’s Products List and appearing in most theatrical supply dealer catalogs. Separate pricing is available for cut yardage, welded screens with no finishing, and custom made screens.

The custom price includes grommets on 12” centers on any of the fours sides, ties, a 4” pipe pocket, skirt, and edge finishing. Special finishes such as snaps, hook and loop fasteners, and grommets on other than 12” centers need to be custom priced. If your screen is not square or rectangular, you’ll need to supply a drawing.

Timing is always a factor in screens for production. That’s why it’s best to be in touch with your Rosco dealer as early in the process as possible. Your dealer may suggest that you telephone Rosco directly at 1-800-ROSCO NY for delivery details. In many cases we can deliver your screen in as little as 2 weeks.
The cyclorama is a background surface used in theatre, dance, television and film to give the illusion of open sky or horizonless staging. Any time or place can be represented with a change in lighting color or intensity, offering set and lighting designers a highly flexible design tool. While in the United States muslin has been the traditional choice for cyclorama material, in Europe vinyl has been the preferred medium for decades. It’s easy to see why this is so.

Vinyl screens are durable, easy to care for, and can be made up to 40 feet high, with no limit on width. Once a mark gets on a muslin cyc, there is little to be done except spot cleaning. Vinyl screens can be wiped clean with mild detergent, and can be rolled on a batten for permanent storage. A vinyl cyc will provide years of service, provided it is properly cared for.

Vinyl cycloramas are inherently flame retardant. This is important as your screen can last as much as a decade, depending on conditions. The process of flame retarding a large cyc can be daunting for both practical and financial reasons, and is required every 3-5 years in most cities. You will never need to flame proof a vinyl cyclorama.

A muslin cyc cannot be used for rear projection if images. Using a vinyl cyclorama allows designers to take advantage of the current trend in front AND rear projected images in scenery.

Rosco’s Twin White screen is particularly useful as a cyc for theatre, television, and film. The milky white color diffuses light exceptionally well, with no scalloping to give away lighting positions. Beautiful, infinitely varied effects can be achieved by lighting the cyc with lighting instruments positioned at the top and bottom of the screen, behind the cyc.

In addition, Twin White has a better video whiteness than muslin cyc yielding cleaner, crisper, brighter images. The 86” width Twin White offers the added benefit of less seams in a large cyc.

In comparison to wide width seamless muslin, vinyl cycloramas are competitively priced. Coupled with their diffusion qualities, durability, flame retardancy, and flexibility, it’s an easy choice.
Keeping the Wrinkles, Creases, and Folds Out of Your Screen

CARE AND MAINTENANCE OF YOUR ROCSCREEN

Screen is often shipped folded in a box for economical transport. Because vinyl has a “memory” (the tendency to retain fold and wrinkles), your screen must be hung as soon as possible after it is received. Please note: if there is ANY possibility the screen has frozen it must remain untouched until the fabric has returned to room temperature. Attempting to handle frozen screen may result in cracked fabric.

Once hung, weighting the bottom will help pull out some of the wrinkles. Do not use a pipe greater than 1-1/2” diameter as this will cause the vinyl to stretch. It is best to use one length of pipe in the pocket as a break will cause wrinkles on the surface radiating from the pipe pocket. Your Roscoscreen will hang out to a smooth, flawless projection surface in up to 48 hours. Focusing lighting instruments on the surface will help speed the process. Please note: Never use a heat gun to warm the vinyl as the intense, concentrated heat will damage the PVC.

Store the screen rolled on a solid core and suspended horizontally. Cover the roll with clean paper or plastic. The vinyl is easily cleaned using a damp cloth and mild detergent.
55” Seamless

55” (139.7 cm) wide. Minimum order is one linear yard.

No. 500 02105 55 Grey
No. 500 02106 55 Twin White
No. 500 02107 55 Black
No. 500 02108 55 Light Translucent
No. 500 02109 55 Front White

110” Screen

Double width continuous rolls of two 55” sections welded together, 110” wide. One linear yard 27 square feet. 110” wide. Minimum order one linear yard.

No. 500 02105 10 Grey
No. 500 02106 10 Twin White
No. 500 02107 10 Black
No. 500 02108 10 Light Translucent
No. 500 02109 10 Front White

86” Seamless

Rosco’s exclusive line of wider seamless projection screens. Now you can have 86” (218.44cm) of quality seamless screen. Minimum order is one linear yard.

No. 500 02105 86 Grey
No. 500 02106 86 Twin White
No. 500 02109 86 Front White

Stretch-N-Hook

This multi-purpose fastener was designed to maintain constant tension between materials such as grommeted projection screens and supporting structures. Minimum order: 12 units.

No. 500 05100 0010 Stretch-N-Hook

Transparent Screen Tape

For temporarily seaming screen yardage together for a production, or for temporary repairs of screen material. Taped seams may spread within two months 2” x 55 yards.

No. 851 05100 4850 Roscoscreen Tape
Little Theatre Use of Fog Request Form

Name: ________________________  Date Submitted:____________
Position: ________________________

Production Title: ________________________
Contact During Production: ________________  Phone: ________________

Squad Effect Approval Date: ________________________

Please list every date, time and reason for fog use.

Strike Date: ________________________

____________________________________________________________________

Internal Use Only
Approvals:
Squad Liaison: ________________________  Date: ________________________
LITTLE THEATRE TERMS OF USE

The Little Theatre is a valued Humanities and Arts Drama/Theatre space where you can work towards your academic goals, exactly as you can in other labs or academics spaces on campus. As with other campus resources, there are rules associated with the use of the space. The following conditions should apply to all of your work done in the Little Theatre.

Liaison

- A Little Theatre Squad member will be assigned to your event and will work as your Liaison. Access, times of use, and equipment use must all be arranged with your Liaison. Be sure to keep your Liaison updated on any major events that occur as the project goes on. If you have any questions, please direct them to your Liaison.
- Your Liaison, or a representative from the Little Theatre Squad, will be present at each production meeting. You must your Liaison informed about your meeting schedule.
- Your Liaison will be checking the space to ensure that it is being respected, and used safely.
- Scenic designs must be submitted to your Liaison prior to beginning scenic work to ensure the plans meet the safety requirements and regulations of the Little Theatre.
- ANY special effects (this includes smoke, fog, water, sugar glass, etc.) or unusual requests MUST be approved by your Liaison. Several special effects have specific protocols that must be followed.
- If there is a problem with the space, or an urgent need related to the space or equipment, contact your Liaison immediately. In the case of emergency related to health, safety, or campus security, contact campus police immediately at 508-831-5555.

General

- The Ghost Light must be turned off when you arrive and illuminated when you depart, for the health and safety of everyone.
- All lighting, sound, and special effects must be completed and presented at Cue-to-Cue prior to the first Tech Rehearsal. Any effect not presented or not finished at this time will not be allowed in the performance.
- For the health and comfort for all who use the theatre, the air conditioning unit (controlled by the panel on the pillar nearest to the booth) must be on AT ALL TIMES in the continuous running position. If it is not functioning, contact your Liaison as soon as possible.
- The live feed system is required to be set up for each performance. Speak with your liaison in order to have the Little Theatre Squad set up the system.
- Speak with your Liaison to schedule a coat of fresh black paint on appropriate areas prior to performances.
- Work lights for rehearsals may be any and/or all of the house lights in the theatre. Only by special arrangement (made with your Liaison) may the theatrical lights be used for anything other than technical rehearsals or performances.
- “Strike” for your event follows the final performance immediately after the audience departs, ending by midnight. No exceptions, no extensions into the next day, and no excuses. A strike report will also need to be filed. Your Liaison will be your Strike Manager.
- If you paint the floor anything other than black, it is your production’s responsibility to repaint it black after your performance. Do not paint the tiled or carpeted floors under any circumstance.
- Programs for the production should be in typeface 11 pt. or larger to allow the audience to read in dim light.
- No food or drink is allowed in the Little Theatre... EVER! (water with a sealable cap or prop food is ok)
- Observe safe practices while using the space. If you are not trained in using a piece of equipment or a tool, refer to a crew head or mentor before attempting to use of equipment or tool. Read and observe all posted safety guideline. If it feels unsafe, stop whatever you are doing and reassess the situation.
- Leave the space better than when you found it. This includes the Little Theatre, Booth, Greenroom(s), Scenic Design Studio, etc.

Updated by Erika A. Stone, Administrator of Theatre Technology on October 6th, 2012

P. 1 of 5
LITTLE THEATRE TERMS OF USE (continued)

Performances

- If your use of the Little Theatre includes a performance of any type, you will need to fill out a performance report to be kept on file in the Resource Library. A performance report must be submitted to the Administrator of Theatre Technology electronically after each performance.
- For every performance a set number of seats should be reserved. B and D term productions: Two for the president and four for the Director of Theatre or Administrator of Theatre Technology. A, C, and E Term productions: two for President.
- If your event is a production of a play of any kind, we will need one copy of the script to be kept on file in the Resource Library. This script must be delivered within the first week of rehearsal. If the script is to be edited or adapted, the final performance script must be made available as soon as final alterations are made.
- If your event is a play of any kind, licensing must be acquired and filed in the licensing binders in the Booth and the Resource Library.

Seating

- The upholstered chairs, both permanent and moveable, provide seating for the audience. These are NOT prop chairs or chairs to sit on during rehearsal, technical work, or other non-performance activities. At all times, the audience chairs must be covered with the supplied tarps. The 45 moveable chairs live in the corner next to the east (long) seating bank and should stay there until the seating is being placed. There are 13 bent wood stage chairs that have been provided for rehearsals and stage use. Use of the permanent seating bank during rehearsals and meetings may be approved as determined by the Stage Manager.
- You must provide at least 99 seats for audience members for your event. There are 67 permanent seats and 45 upholstered moveable chairs for a total of 112. No more than 111 seats may be used without approval from your Liaison, the Administrator of Theatre Technology, and the Director of Theatre.

Doors, Alarms, and Access

- Request for Card Access to the Little Theatre must be submitted to the Administrator of Theatre Technology through your Liaison. Requests must include: name, production position, and student ID#.
- The Producer, Stage Manager, and Production Manager (provided they have a current WPI ID card) will receive full card access allowing entrance to the space as well as control overall door settings. Other card access requests will be approved as the Administrator of Theatre Technology sees fit.
- See attached documentation specific details.

Production Week

- Each production must provide the Director of Theatre with tickets for each performance night: 5 (Thursday), 10 (Friday), 7 (Saturday).
- The Stage Manager must electronically provide an estimated run time to the Director of Theatre and the Administrator of Theatre Technology by no later than Noon on the Monday of production week. Prior to that, read time for the first read-through must be electronically provided within 24 hours of the read-through.
- The Stage Manager must electronically submit a Rehearsal report, including detailed run time, to the Director of Theatre and the Administrator of Theatre Technology immediately following tech rehearsals, dress rehearsals, and preview performances. Performance reports must be submitted immediately following each performance.
- The House Manager must provide a seat count to the Director of Theatre and the Administrator of Theatre Technology by no later than noon on the Monday of production week
- Approval for use of the space permits extended use of technical elements only during final rehearsals and performances during production week. Use of technical elements for anything other than work sessions before cue to cue is only permitted with approval of the Liaison.

Updated by Erika A. Stone, Administrator of Theatre Technology on October 6th, 2012
P. 2 of 5
LITTLE THEATRE TERMS OF USE
Little Theatre Card Access System: Details and Instruction

Door and Reader Details

A. Main Entrance
   Glass door that leads to the entryway to the Little Theater and Riley Commons

B. Front of House: East
   Door from Little Theatre performance area to the vestibule near handicap bathroom
   Separated from Entry vestibule by set of double doors

C. Front of House: West
   Door from Little Theatre performance area to entryway with glass door

D. Stage Door
   Double doors from Little Theatre Green Room to walled courtyard adjacent to Institute Rd.

E. Emergency Exit
   Delayed egress door to outside
   On stairs between Little Theatre performance area and Green Room
   Not card access, but monitored through card access system
   Alarm can be silenced by brass key
   Contact Administrator of Theatre Technology to request use of this door

F. Booth
   Control Booth

G. Command Pad
   Reader and keypad located just to right of Stage Door in Green Room

Updated by Erika A. Stone, Administrator of Theatre Technology on October 6th, 2012
P. 3 of 5
LITTLE THEATRE TERMS OF USE

Little Theatre Card Access System: Details and Instruction, continued

To Use Key Pad
1. Present card to card reader
2. Wait for light on reader to turn green
3. Press button on number pad associated with desired mode
4. 

<table>
<thead>
<tr>
<th>Key</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>Closed or Secure Mode</td>
</tr>
<tr>
<td>F2</td>
<td>Small Group</td>
</tr>
<tr>
<td>F3</td>
<td>Pre-Rehearsal</td>
</tr>
<tr>
<td>F4</td>
<td>Rehearsal</td>
</tr>
<tr>
<td>F3 + F4</td>
<td>Performance/Load-In</td>
</tr>
</tbody>
</table>

Modes

<table>
<thead>
<tr>
<th>Modes</th>
<th>Door States</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Main Entrance</td>
</tr>
<tr>
<td>Closed/Secure</td>
<td>L</td>
</tr>
<tr>
<td>Small Group</td>
<td>L</td>
</tr>
<tr>
<td>Pre-Rehearsal</td>
<td>L</td>
</tr>
<tr>
<td>Rehearsal</td>
<td>L</td>
</tr>
<tr>
<td>Performance/Load In</td>
<td>L</td>
</tr>
</tbody>
</table>

*Access to “Card Only” doors is determined by access level granted

Updated by Erika A. Stone, Administrator of Theatre Technology on October 6th, 2012
**LITTLE THEATRE TERMS OF USE**

**Little Theatre Card Access System:** Details and Instruction, continued

**Card Access Request**
To request card access to doors and reader involved with the Little Theatre Card Access System, the following information is required:
- Name
- Position on production or in organization
- ID Number
- Email Address

Information must be submitted to the Production Manager (or producer if no Production Manager exists), who will pass on information to the Administrator of Theatre Technology. Information will then be submitted via an official card access request to Campus Card Access.

**Little Theatre Card Access System: Access Roles**

<table>
<thead>
<tr>
<th>Access Roles</th>
<th>Doors/Reader</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Main Entrance</td>
</tr>
<tr>
<td>Little Theatre Production Crew</td>
<td></td>
</tr>
<tr>
<td>Little Theatre Production Crew - Stage Door</td>
<td></td>
</tr>
<tr>
<td>Little Theatre Production Crew - Crew Head</td>
<td></td>
</tr>
<tr>
<td>Little Theatre Production Crew - Manager</td>
<td></td>
</tr>
<tr>
<td>Little Theatre Squad</td>
<td>X</td>
</tr>
<tr>
<td>Theatre Tech Admin</td>
<td>X X</td>
</tr>
<tr>
<td>Theatre Tech Work-study</td>
<td>X X X X X</td>
</tr>
</tbody>
</table>

**Academic**

| Student Org - Masque - Executive Board   |               |                    |                      |            |       |             |                           |                          |
| Student Org - Masque - Executive Board - Stage Door |               |                    |                      |            |       |             |                           |                          |
| Student Org - Masque - Executive Board - Little Theatre Control Room |               |                    |                      |            |       |             |                           |                          |

*The titles used for roles in the card access system do not directly reflect role on a production.*
The LPX Series Exit is an economical, yet attractive, alternative to metal exits. Its contemporary round corner styling, designer white finish, and consistent family appearance enables it to blend with any decor. The tough injection molded polycarbonate materials resist discoloration due to age and ultraviolet radiation. The structural components are made even stronger with reinforcing ribs throughout. All components, including canopy and chevron directional indicators, are of snap-fit construction to facilitate installation; reliable and labor-saving push-in AC connectors are standard to further improve the installation time. The under 5-minute installation time of the LPX Series Exit makes it the fastest installed exit on the market today. The space efficient housing internally houses the battery and electronics; it also incorporates molded internal wireways to route internal wiring and connections, thus avoiding undesirable shadowing of the exit legend. All Self-Powered LPX Series Exits are available in universal configurations (single and double face) and have universal mounting capability (ceiling, wall, or end).

Universal exits can be field configured as single face or double face.
Snap-fit canopy with captive mounting screws included with all exits.
Exit can be ceiling, wall, or end mounted.
Universal J-box mounting pattern.
Battery:
Sealed Nickel Cadmium.
Maintenance Free, Long Life Full Recharge Time, 24 hrs.
(max.)
Code Compliance
UL 924 Listed
UL 924, Damp Location Listed (Self-Diagnostic Only)
Life Safety NFPA 101
CSA Certified
NECOSHA
Energy Star, D.O.E. (Self-Diagnostic only)
Most State and Local Codes
Suitable for Floor Proximity Installation
Patent Numbers 5,735,489 and 5,678,929

Exit - 1 Year
Battery - 15 year pro-rata (Nickel Cadmium)

AC LED: Long life LED lamps provide uniform diffused illumination
DC: LED DC lamps (Brighter in emergency mode)

SURE-LITE

LPX SERIES

POLYCARBONATE: SELF-POWER EMERGEN LED LAM Exit Light

ORDERING INFORMATION

SAMPLE NUMBER: LPX-70 RBK

<table>
<thead>
<tr>
<th>FAMILY</th>
<th>LPX-Polycarbonate Exit</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODEL</td>
<td>LPX-70 RBK</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LETTER</th>
<th>COLOR</th>
<th>FINISH</th>
<th>ACCESSORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Red</td>
<td>&amp;White</td>
<td>100V-127V</td>
</tr>
<tr>
<td>U</td>
<td>Green</td>
<td>Only</td>
<td>Light Only</td>
</tr>
<tr>
<td>R</td>
<td>Black</td>
<td>Premium</td>
<td>Deep Green</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPTION</th>
<th>DIAGNOSTIC</th>
<th>VOLTAGE</th>
<th>ACCESSORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>Blue</td>
<td>White</td>
<td>100V-127V</td>
</tr>
<tr>
<td>White</td>
<td>Blue</td>
<td>White</td>
<td>100V-127V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ACCESSORIES</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hanging Kit</td>
<td>White</td>
</tr>
<tr>
<td>Pendant Kit</td>
<td>Black</td>
</tr>
<tr>
<td>Canopy Kit</td>
<td>Black</td>
</tr>
<tr>
<td>Polycarbonate</td>
<td>White</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>1000</td>
</tr>
<tr>
<td>Height</td>
<td>500</td>
</tr>
<tr>
<td>Width</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ENERGY DATA</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>120V</td>
<td>30VA</td>
</tr>
<tr>
<td>277V</td>
<td>40VA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TYPICAL DATA</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>120V</td>
<td>10VA</td>
</tr>
<tr>
<td>277V</td>
<td>15VA</td>
</tr>
</tbody>
</table>

COOPER LIGHTING

1209 of 1217
The LPX Series Exits with Heads is an economical, yet attractive, alternative to metal exits. Its contemporary round corner styling, designer white finish, and consistent family appearance enables it to blend with any decor. The tough injection molded polycarbonate materials resist discoloration due to age and ultraviolet radiation. The structural components are made even stronger with reinforcing ribs throughout. All components, including canopy and chevron directional indicators, are of snap-fit construction to facilitate installation; reliable and labor-saving push-in AC connectors are standard to further improve the installation time. The under 5-minute installation time of the LPX Series Exits with Heads makes it the fastest installed exit on the market today. The space efficient housing internally houses the battery and electronics; it also incorporates molded internal wireways to route internal wiring and connections, thus avoiding unsightly shadowing of the exit legend. The LPX Series Exits with Heads is available in universal configurations (single and double face) and have universal mounting capability (ceiling, wall, or end).

ORDERING INFORMATION

SAMPLE NUMBER: LPX-70-RDWK

<table>
<thead>
<tr>
<th>LPX</th>
<th>R</th>
<th>DK</th>
<th>DH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poly carbonate Housing</td>
<td>High Power</td>
<td>Deep Green</td>
<td>Heads. Double Heads</td>
</tr>
<tr>
<td>Factory Option</td>
<td>Multiple Capacity</td>
<td>120/277 VAC</td>
<td>Accessory</td>
</tr>
<tr>
<td>Series</td>
<td>7-Self Powered with LED</td>
<td></td>
<td>COOPER LIGHTING</td>
</tr>
</tbody>
</table>

Universal exits can be field configured as single face or double face. Snap-fit canopy with captive mounting screws included with all exits. Exit can be ceiling, wall, or end mounted. Universal J-box mounting pattern.

Battery
Sealed Lead Calcium
Maintenance Free, Long Life
Full Recharge Time, 24 hours (max.), 48 hours (max.) for LPXH units

UL 924
UL 924, 4 hour rated (LPXH Units)

UL 924
Life Safety NFPA 101
CSA Certified
NECOSHA
Most State and Local Codes

Warranty
Exit - 1 Year
Battery - 5 year pro-rata (Lead Calcium)

Lamp Data
AC LED: Long life LED lamps provide uniform diffused illumination
DC: LED DC lamps (Brighter in emergency mode)
Heads DC: 6V, 5.4W incandescent wedge base lamps

ENERGY DATA
Standby Mode (Fully charged):
Sealed Lead Calcium Battery

LPXH - Red
Input Power: 120V = 4.0W
277V = 2.7W
Input Current (Max): 120V = 0.1A
277V = 0.1A

Power Factor: 120V = X9 23V = 0.8X

LED Exits - Premium Deep Geared
Input Power: 120V = 3.9W
277V = 2.7W
Input Current (Max): 120V = 0.06A
277V = 0.035A
Power Factor: 120V = X1
277V = X1.0
277V = <0.5%

Charge Mode (Discharged Battery):
Sealed Lead Calcium Battery
Input Power consumption is in by approximately 2.7 watts in a charge operating mode for red and 3.4 watts for green units.

1210 of 1217
TYPE:
DESCRIPTION
The CC Series Contractor's Choice Emergency Lighting Unit is the ideal choice when simple installation and a thermostatic housing are demanded, its contemporary round corner styling, designer white finish, and consistent family appearance make it blend in with any decor. The components are injection molded from tough polycarbonate materials which resist discoloration due to age and ultraviolet radiation. The injection molded structural components are reinforced with ribs throughout. The housing and mounting plate employ snap-fit construction; reliable and labor-saving push-in AC connectors further improve the installation time. The under-2-minute installation time of the CC Series Emergency Lighting Unit makes it the fastest installed unit on the market today. Both lighting heads are fully adjustable, insuring that light can be put where it is needed. A variety of battery capacities satisfies a wide range of applications. The CC Series Emergency Lighting Units are ideal complements for use with the CCX Series Contractor's Choice Exit Signs.

CATALOG #: CCX-BK

SPECIFICATION FEATURES
Electronics
Dual Voltage Input 120/277 VAC,60Hz
Line-latching
Solid-state Voltage Limited Charger
Solid-state Switching
Brownout Circuit
Low Voltage Disconnect
Overload/Short Circuit Protection
Test Switch / Power Indicator Light
Push-in AC power connectors facilitate installation
Housing Construction
All components are injection molded, color stable, high impact UL listed, E194-qualified polycarbonate material
Designer while textured finish standard; black finish optional
Components are of snap-fit construction to facilitate under-2-minute installation
Reinforcing ribs throughout to provide maximum strength
Tether straps between housing and mounting plate facilitate installation
Cutouts provided in housing for surface conduit attachment
Suitable for wall or ceiling mount applications
Universal J-box mounting pattern
Keyhole mounting slots
Battery
Sealed Lead Calcium, recombination
Nickel Cadmium Battery (CCXNC)
Maintenance free, long life
Full recharge time 24 hrs. (max.)
Polarized battery terminals
Code Compliance
UL 924
UL Damp Location Listed (CCX; CCXSD only)
Life Safety NFPA 101
CSA Certified
NEO/OSHA Most State and Local Codes
Warranty
1 Year
Battery - 5 year pro-rata
California Nickel Battery - 15 year pro-rata
Head / Lamp Data
Two heads standard
PAR 36 type heads
Clamp-free lens
Fully adjustable lamp housing
High impact polycarbonate
Matches housing finish
Optional square and MR16 heads available

SURE-LITES

CC SERIES
SEAL LE
CALCULATED AT
NICKEL CADMIUM BATTE
RELIABILITY
EMERGENCY LIGHTING

ELECTRICAL RATINGS
Rated Wattage is 1/8 of Rated D.C. Voltage

<table>
<thead>
<tr>
<th>Model</th>
<th>DC Voltage</th>
<th>1/2 Hours</th>
<th>2 Hours</th>
<th>3 Hours</th>
<th>4 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCX</td>
<td>6</td>
<td>10.8</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CCXNC</td>
<td>6</td>
<td>16.4</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CCX</td>
<td>6</td>
<td>18.8</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CC4</td>
<td>6</td>
<td>18</td>
<td>10</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>CC4</td>
<td>6</td>
<td>18</td>
<td>15</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>CC5</td>
<td>6</td>
<td>27</td>
<td>24</td>
<td>18</td>
<td>14</td>
</tr>
<tr>
<td>CC5</td>
<td>6</td>
<td>27</td>
<td>24</td>
<td>18</td>
<td>14</td>
</tr>
<tr>
<td>CC6</td>
<td>6</td>
<td>32</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CC6</td>
<td>6</td>
<td>32</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Lamp Information

<table>
<thead>
<tr>
<th>Type</th>
<th>Wattage</th>
<th>Number</th>
<th>Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incandescent</td>
<td>6.4</td>
<td>29-121</td>
<td>18.5</td>
</tr>
<tr>
<td>Incandescent</td>
<td>8.4</td>
<td>29-121</td>
<td>18.5</td>
</tr>
<tr>
<td>MR16</td>
<td>9</td>
<td>29-145</td>
<td>35.0</td>
</tr>
<tr>
<td>MR16</td>
<td>9</td>
<td>29-145</td>
<td>35.0</td>
</tr>
<tr>
<td>MR16</td>
<td>9</td>
<td>29-145</td>
<td>35.0</td>
</tr>
<tr>
<td>MR16</td>
<td>9</td>
<td>29-145</td>
<td>35.0</td>
</tr>
</tbody>
</table>

TOTALY PREDICTABLE RELIABILITY

ORDERING INFORMATION
SAMPLE NUMBER: CCX/CCXNC

<table>
<thead>
<tr>
<th>Model</th>
<th>Number</th>
<th>Options (sold as unit)</th>
<th>Accessories (sold as unit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCX</td>
<td>BK</td>
<td>Housing Finish (must be specified)</td>
<td>MIK-MR16 Heads (2W Standard CCX, CCXNC; 5W Standard CCX, CCX, and CCX Other lamp types available, Consult Factory)</td>
</tr>
<tr>
<td>CCXNC</td>
<td>BK</td>
<td>White</td>
<td>6 x 10300 (2W Standard CCX, CCXNC; 5W Standard CCX, CCX, and CCX Other lamp types available, Consult Factory)</td>
</tr>
<tr>
<td>CCX</td>
<td>BK</td>
<td>Black</td>
<td>6 x 10300 (2W Standard CCX, CCXNC; 5W Standard CCX, CCX, and CCX Other lamp types available, Consult Factory)</td>
</tr>
<tr>
<td>CCX</td>
<td>BK</td>
<td>1&quot; x 1&quot; Black</td>
<td>6 x 10300 (2W Standard CCX, CCXNC; 5W Standard CCX, CCX, and CCX Other lamp types available, Consult Factory)</td>
</tr>
<tr>
<td>CCX</td>
<td>BK</td>
<td>1&quot; x 1&quot; Black</td>
<td>6 x 10300 (2W Standard CCX, CCXNC; 5W Standard CCX, CCX, and CCX Other lamp types available, Consult Factory)</td>
</tr>
<tr>
<td>CCX</td>
<td>BK</td>
<td>1&quot; x 1&quot; Black</td>
<td>6 x 10300 (2W Standard CCX, CCXNC; 5W Standard CCX, CCX, and CCX Other lamp types available, Consult Factory)</td>
</tr>
<tr>
<td>CCX</td>
<td>BK</td>
<td>1&quot; x 1&quot; Black</td>
<td>6 x 10300 (2W Standard CCX, CCXNC; 5W Standard CCX, CCX, and CCX Other lamp types available, Consult Factory)</td>
</tr>
<tr>
<td>CCX</td>
<td>BK</td>
<td>1&quot; x 1&quot; Black</td>
<td>6 x 10300 (2W Standard CCX, CCXNC; 5W Standard CCX, CCX, and CCX Other lamp types available, Consult Factory)</td>
</tr>
</tbody>
</table>

Nickel Cadmium Battery (CCXNC Only)
Alternative Lamps, No Head / Pole Head, Other Options: Consult Factory

*Nickel Cadmium Battery (CCXNC Only)
**Accessory includes (2W Standard CCX, CCXNC; 5W Standard CCX, CCX, and CCX Other lamp types available, Consult Factory)

ENERGY DATA
Model CCX Input Current (Max.): 120V = 1/8A
277V = 2/8A
Model CC4 Input Current (Max.): 120V = 1/3A
277V = 2/3A
Model CC5 Input Current (Max.): 100V = 1/3A
277V = 2/3A
Model CC6 Input Current (Max.): 100V = 1/3A
277V = 2/3A

COOPER LIGHTING

1211 of 1217
Recommendations

The purpose of this section is to make recommendations for the future. This will be covered in two different facets. The first is upkeep and the second is continued work. As equipment in the space is updated or removed it is important to keep this resource guide updated. This update can simply be performed by placing the retrieved or scanned documents into the specified folder. The second concept is continued work. I would love to see work in recommendation videos as to how to complete tasks in the space. I would also like to see a continued work to compile more forms and documents into one unified place. I think the possibility of a 100% digital resource library is one that is both achievable and necessary for its sustainability.
Objective:
Degree in Humanities and Arts with a concentration in Drama/Theatre

Education:
Bachelor of Science, Double Major, May 2014
Biomedical Engineering; Humanities & Arts Concentration: Drama/Theatre

Related Projects:
Humanities Practicum, Associate Director of Theatre Technology
Assist the Director in the completion of New Voices 32. Mediate and moderate discussion among staff of productions and departments. Assess and evaluate, with the assistance of squad, the safety of scenic elements. Educate students in theatre technology and be a resource for knowledge

Related Extracurricular:
Masque – Production group for the production of plays in the little theatre
VOX – Production group for the production of musicals
MW REP – Production group that focuses on fast and loose theatre

Honors:
Alpha Psi Omega (Theatre Honor Fraternity), WPI, November 2011 – Present

<table>
<thead>
<tr>
<th>Term</th>
<th>Production</th>
<th>Position</th>
<th>Supervisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>B'09</td>
<td>Crucible</td>
<td>Sound, Lighting, Scenic Crews</td>
<td>Masque/HU&amp;A</td>
</tr>
<tr>
<td>C'10</td>
<td>Any Number Can Die</td>
<td>Master Carpenter</td>
<td>MW Rep</td>
</tr>
<tr>
<td>C'10</td>
<td>Rabbit Hole</td>
<td>Crews</td>
<td>Masque</td>
</tr>
<tr>
<td>D'10</td>
<td>New Voices 28</td>
<td>Assistant Sound Engineer</td>
<td>Masque/HU&amp;A</td>
</tr>
<tr>
<td>A'10</td>
<td>Guys and Dolls</td>
<td>Props Designer and Coordinator</td>
<td>VOX</td>
</tr>
<tr>
<td>B'10</td>
<td>Six Characters in Search of an Author</td>
<td>Various Crews</td>
<td>Masque/HU&amp;A</td>
</tr>
<tr>
<td>C'11</td>
<td>Laramie Project</td>
<td>Assistant Sound</td>
<td>Masque/HU&amp;A</td>
</tr>
<tr>
<td>C'11</td>
<td>American Buffalo</td>
<td>Associate Producer</td>
<td>MW Rep</td>
</tr>
<tr>
<td>C'11</td>
<td>The Vagina Monologues</td>
<td>Producer</td>
<td>SAVE Committee</td>
</tr>
<tr>
<td>D'11</td>
<td>New Voices 29</td>
<td>Executive Producer</td>
<td>Masque/HU&amp;A</td>
</tr>
<tr>
<td>A'11</td>
<td>Into The Woods</td>
<td>Production Manager</td>
<td>VOX</td>
</tr>
<tr>
<td>B'11</td>
<td>Cat on a Hot Tin Roof</td>
<td>Dramaturg</td>
<td>Masque/HU&amp;A</td>
</tr>
<tr>
<td>B'11</td>
<td>The 9th Annual AYO Show in 24 Hours</td>
<td>Lighting Engineer</td>
<td>AYO</td>
</tr>
<tr>
<td>C'12</td>
<td>Edges</td>
<td>Lighting</td>
<td>VOX</td>
</tr>
<tr>
<td>E'12</td>
<td>BOB</td>
<td>Lighting and Sound Crew</td>
<td>Sunburns</td>
</tr>
<tr>
<td>A'12</td>
<td>Pirates of Penzance</td>
<td>Associate Executive Producer</td>
<td>VOX</td>
</tr>
<tr>
<td>B'12</td>
<td>The 10th Annual AYO Show in 24 Hours</td>
<td>Lighting Engineer</td>
<td>AYO</td>
</tr>
<tr>
<td>B'12</td>
<td>Comedy of Errors</td>
<td>Master Electrician</td>
<td>Masque/HU&amp;A</td>
</tr>
<tr>
<td>C'13</td>
<td>Crimes of the Heart</td>
<td>Production Manager</td>
<td>Masque/HU&amp;A</td>
</tr>
<tr>
<td>C'13</td>
<td>Blithe Spirit</td>
<td>Various Crews</td>
<td>MW REP</td>
</tr>
<tr>
<td>D'13</td>
<td>NV 31</td>
<td>Producer</td>
<td>Masque/HU&amp;A</td>
</tr>
<tr>
<td>A'13</td>
<td>Jekyll and Hyde</td>
<td>Technical Director</td>
<td>VOX</td>
</tr>
<tr>
<td>B'13</td>
<td>Inherit the Wind</td>
<td>Production Manager</td>
<td>Masque/HU&amp;A</td>
</tr>
<tr>
<td>C'14</td>
<td>The 39 Steps</td>
<td>Producer</td>
<td>MW Rep</td>
</tr>
<tr>
<td>C'14</td>
<td>boom</td>
<td>Scenic and Lighting Crew</td>
<td>Masque/HU&amp;A</td>
</tr>
<tr>
<td>D'14</td>
<td>New Voices 32</td>
<td>Associate Director of Theatre Technology</td>
<td></td>
</tr>
<tr>
<td>Last Name</td>
<td>First Name</td>
<td>Title</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>----------------</td>
<td>--------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Ainley</td>
<td>Elena</td>
<td>Poems</td>
<td></td>
</tr>
<tr>
<td>Albee</td>
<td>Edward</td>
<td>The Goat, or, Who is Sylvia?</td>
<td></td>
</tr>
<tr>
<td>Anistasi</td>
<td>Tom</td>
<td>Christmas Stories</td>
<td></td>
</tr>
<tr>
<td>Barlow</td>
<td>Patrick</td>
<td>The 39 Steps</td>
<td></td>
</tr>
<tr>
<td>Bebel</td>
<td>Nick, et al.</td>
<td>Feet First</td>
<td></td>
</tr>
<tr>
<td>Bellisario</td>
<td>Sebastian</td>
<td>Golden</td>
<td></td>
</tr>
<tr>
<td>Blodgett</td>
<td>Anika</td>
<td>Dora’s Disclosure</td>
<td></td>
</tr>
<tr>
<td>Brooks</td>
<td>Mel</td>
<td>The Producers</td>
<td></td>
</tr>
<tr>
<td>Brown</td>
<td>Jake Lee, et al.</td>
<td>Deferment</td>
<td></td>
</tr>
<tr>
<td>Burrows</td>
<td>Abe</td>
<td>Guys and Dolls</td>
<td></td>
</tr>
<tr>
<td>Carlson</td>
<td>Tofer</td>
<td>A Prayer for Rain</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The Experiment, or, Let Them Eat Cake</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>A Spy by Any Other Name</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Land of the Living... Living?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>To Thine Spy Self Be True</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Out of Time</td>
<td></td>
</tr>
<tr>
<td>Et al.</td>
<td></td>
<td>The Hundred Years War: The Musical</td>
<td></td>
</tr>
<tr>
<td>Et al.</td>
<td></td>
<td>What The Heck</td>
<td></td>
</tr>
<tr>
<td>Carmichael</td>
<td>Fred</td>
<td>Any Number Can Die</td>
<td></td>
</tr>
<tr>
<td>Castonguay</td>
<td>Amy, et al.</td>
<td>The Promotion of Deputy Pete</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gumdrop Gumshoe</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>That’s The Way The Cookie Crumbles</td>
<td></td>
</tr>
<tr>
<td>Chiacchiaro</td>
<td>Rhiannon</td>
<td>A Lesson on Trolls</td>
<td></td>
</tr>
<tr>
<td>Ciaraldi</td>
<td>Michael</td>
<td>Get Me To the Church on Time</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Home</td>
<td></td>
</tr>
<tr>
<td>Collard</td>
<td>Jeff</td>
<td>Growing Pains</td>
<td></td>
</tr>
<tr>
<td>Connick</td>
<td>Robert</td>
<td>Everybody Poops But You</td>
<td></td>
</tr>
<tr>
<td>Coward</td>
<td>Noel</td>
<td>Blithe Spirit</td>
<td></td>
</tr>
<tr>
<td>Cruz</td>
<td>Nilo</td>
<td>Anna in the Tropics</td>
<td></td>
</tr>
<tr>
<td>Dawson</td>
<td>Elizabeth</td>
<td>Happily Every After</td>
<td></td>
</tr>
<tr>
<td>Desilets</td>
<td>Rick</td>
<td>The Party Train</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mom</td>
<td></td>
</tr>
<tr>
<td>Durrenmatt</td>
<td>Fredrich</td>
<td>The Physicists</td>
<td></td>
</tr>
<tr>
<td>Ensler</td>
<td>Eve</td>
<td>Vagina Monologues</td>
<td></td>
</tr>
<tr>
<td>Faulkner</td>
<td>Megan</td>
<td>A Shot in the Dark</td>
<td></td>
</tr>
<tr>
<td>Fischer</td>
<td>Laura</td>
<td>Jake</td>
<td></td>
</tr>
<tr>
<td>Fletcher</td>
<td>Holly</td>
<td>One Card From Caving In</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The Golden Apple</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The Beacon</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>New England Weather</td>
<td></td>
</tr>
<tr>
<td>Fornes</td>
<td>Maria Irene</td>
<td>Fefu and Her Friends</td>
<td></td>
</tr>
<tr>
<td>Gagliano</td>
<td>Michael</td>
<td>On the Way</td>
<td></td>
</tr>
<tr>
<td>Gershwin</td>
<td>George</td>
<td>Porgy and Bess</td>
<td></td>
</tr>
<tr>
<td>Giapoudzi</td>
<td>Despoina</td>
<td>Red Hair</td>
<td></td>
</tr>
<tr>
<td>Author</td>
<td>First Name</td>
<td>Title</td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>------------</td>
<td>--------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Haehnel</td>
<td>Alan</td>
<td>A Simple Task</td>
<td></td>
</tr>
<tr>
<td>Hammerstein II</td>
<td>Oscar</td>
<td>South Pacific</td>
<td></td>
</tr>
<tr>
<td>Healey</td>
<td>Shannon</td>
<td>Repudiation</td>
<td></td>
</tr>
<tr>
<td>Henley</td>
<td>Beth</td>
<td>Crimes of the Heart</td>
<td></td>
</tr>
<tr>
<td>Holzman</td>
<td>Winnie</td>
<td>Wicked</td>
<td></td>
</tr>
<tr>
<td>Hwang</td>
<td>David Henry</td>
<td>M. Butterfly</td>
<td></td>
</tr>
<tr>
<td>Jacobs</td>
<td>Jim</td>
<td>Grease</td>
<td></td>
</tr>
<tr>
<td>Jones</td>
<td>Ken</td>
<td>The Great Easter Egg Hunt</td>
<td></td>
</tr>
<tr>
<td>Jones</td>
<td>Rolin</td>
<td>Short Stack</td>
<td></td>
</tr>
<tr>
<td>Kaufman</td>
<td>Moises</td>
<td>The Laramie Project</td>
<td></td>
</tr>
<tr>
<td>Kelly</td>
<td>Tim</td>
<td>Phantom of the Op’ry</td>
<td></td>
</tr>
<tr>
<td>Keough</td>
<td>Ryan</td>
<td>Punchline</td>
<td></td>
</tr>
<tr>
<td>King</td>
<td>Louisa</td>
<td>Barbeque Chicken Pizza</td>
<td></td>
</tr>
<tr>
<td>Kopit</td>
<td>Arthur</td>
<td>Wings</td>
<td></td>
</tr>
<tr>
<td>Lee</td>
<td>Robert E.</td>
<td>Inherit the Wind</td>
<td></td>
</tr>
<tr>
<td>Lindsay-Abaire</td>
<td>David</td>
<td>Rabbit Hole</td>
<td></td>
</tr>
<tr>
<td>Madeiros</td>
<td>Nick</td>
<td>All the Truth</td>
<td></td>
</tr>
<tr>
<td>Mamet</td>
<td>David</td>
<td>American Buffalo</td>
<td></td>
</tr>
<tr>
<td>Margulies</td>
<td>Donald</td>
<td>Collected Stories</td>
<td></td>
</tr>
<tr>
<td>Massa</td>
<td>EJ</td>
<td>Scientific Method</td>
<td></td>
</tr>
<tr>
<td>McCluskey</td>
<td>Maeve</td>
<td>The Global Wish Fulfilment Agency</td>
<td></td>
</tr>
<tr>
<td>Medeiros</td>
<td>Nicholas</td>
<td>Quantum Madness</td>
<td></td>
</tr>
<tr>
<td>Miller</td>
<td>Arthur</td>
<td>A View from the Bridge</td>
<td></td>
</tr>
<tr>
<td>Miller</td>
<td>Chealesa Ross</td>
<td>In Times like These, I choose Love</td>
<td></td>
</tr>
<tr>
<td>Murillo</td>
<td>Carlos</td>
<td>Dark Play, Or Stories for Boys</td>
<td></td>
</tr>
<tr>
<td>Murvihill</td>
<td>Dolan</td>
<td>I’ll See you Tomorrow</td>
<td></td>
</tr>
<tr>
<td>Nachtrieb</td>
<td>Peter Sinn</td>
<td>BOB</td>
<td></td>
</tr>
<tr>
<td>Nachtrieb</td>
<td>Hunter</td>
<td>Three Ways From Here</td>
<td></td>
</tr>
<tr>
<td>Reduced Shakespeare Company</td>
<td></td>
<td>The Complete History of America - Abridged</td>
<td></td>
</tr>
<tr>
<td>Ripps</td>
<td>N. Harrison</td>
<td>Searching for Something</td>
<td></td>
</tr>
<tr>
<td>Rock</td>
<td>Alex</td>
<td>Grave Intentions</td>
<td></td>
</tr>
<tr>
<td>Ruhl</td>
<td>Sarah</td>
<td>In the Next Room (of The Vibrator Play)</td>
<td></td>
</tr>
<tr>
<td>Shakespeare</td>
<td>William</td>
<td>The Comedy of Errors</td>
<td></td>
</tr>
<tr>
<td>Shakespeare</td>
<td></td>
<td>Much Ado about Nothing</td>
<td></td>
</tr>
<tr>
<td>Shakespeare</td>
<td></td>
<td>Tempest</td>
<td></td>
</tr>
<tr>
<td>Simpson</td>
<td>Angela</td>
<td>Yellow Jacket</td>
<td></td>
</tr>
<tr>
<td>Simpson</td>
<td></td>
<td>Overkill</td>
<td></td>
</tr>
<tr>
<td>Smith</td>
<td>Andrew</td>
<td>A Promise</td>
<td></td>
</tr>
<tr>
<td>Smith</td>
<td>William Henry</td>
<td>Color the Sky Orange</td>
<td></td>
</tr>
<tr>
<td>Sondheim</td>
<td>Stephen</td>
<td>The Drunkard</td>
<td></td>
</tr>
<tr>
<td>Sondheim</td>
<td>Stephen</td>
<td>Into the Woods</td>
<td></td>
</tr>
<tr>
<td>Sondheim</td>
<td>Stephen</td>
<td>A Funny Thing Happened on the Way to the Forum</td>
<td></td>
</tr>
</tbody>
</table>

1215 of 1217
<table>
<thead>
<tr>
<th>Name</th>
<th>Character</th>
<th>Show</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sullivan</td>
<td>Arthur</td>
<td>Pirates of Penzance</td>
</tr>
<tr>
<td>Teatum</td>
<td>Samuel</td>
<td>War Stories</td>
</tr>
<tr>
<td>Various</td>
<td></td>
<td>Wheres there's Smoke There's Fire</td>
</tr>
<tr>
<td>Various</td>
<td></td>
<td>HINDSIGHT!</td>
</tr>
<tr>
<td>Vessella</td>
<td>Steven</td>
<td>The Change</td>
</tr>
<tr>
<td>Webber</td>
<td>Andrew Lloyd</td>
<td>Phantom of the Opera</td>
</tr>
<tr>
<td>Whitty</td>
<td>Jeff</td>
<td>Avenue Q</td>
</tr>
<tr>
<td>Wildhorn</td>
<td>Frank</td>
<td>Jekyll &amp; Hyde</td>
</tr>
<tr>
<td>Williams</td>
<td>Tennessee</td>
<td>Cat on a Hot Tin Roof</td>
</tr>
<tr>
<td>Wilson</td>
<td>August</td>
<td>Radio Gulf</td>
</tr>
<tr>
<td>Wright</td>
<td>Doug</td>
<td>I am my Own Wife</td>
</tr>
<tr>
<td>Yorkey</td>
<td>Brian</td>
<td>Next to Normal</td>
</tr>
<tr>
<td>Zacarias</td>
<td>Karen</td>
<td>Legacy of Light</td>
</tr>
<tr>
<td>Category</td>
<td>Hours to Learn</td>
<td>Hours to Mastery</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Scenic</td>
<td>60</td>
<td>N/A</td>
</tr>
<tr>
<td>Lighting</td>
<td>150</td>
<td>200</td>
</tr>
<tr>
<td>Sound</td>
<td>40</td>
<td>120</td>
</tr>
<tr>
<td>Projection</td>
<td>50</td>
<td>N/A</td>
</tr>
<tr>
<td>Props</td>
<td>90</td>
<td>N/A</td>
</tr>
<tr>
<td>Publicity</td>
<td>60</td>
<td>N/A</td>
</tr>
<tr>
<td>Safety</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>Producing</td>
<td>200</td>
<td>300</td>
</tr>
</tbody>
</table>

Total: 1615
References

On Campus Resources:

WPI Humanities and Arts Drama Theatre Resource Library
WPI Humanities and Arts Drama Theatre Website
WPI Humanities and Arts Drama Theatre Projects

Off Campus Resources:

Altman Lighting - http://www.altmanltg.com/
Apple Incorporated - https://www.Apple.com
Barbizon Lighting Company - http://www.barbizon.com/
Behringer - http://www.behringer.com/EN/
City Theatrical - http://www.citytheatrical.com/home
Electronic Theatre Controls - http://www.etcconnect.com/
JB Lighting - http://www.jblighting.com/
Optoma - http://www.optomausa.com/
Production Intercom
QSC - http://qsc.com/
Shure - http://www.shure.com/