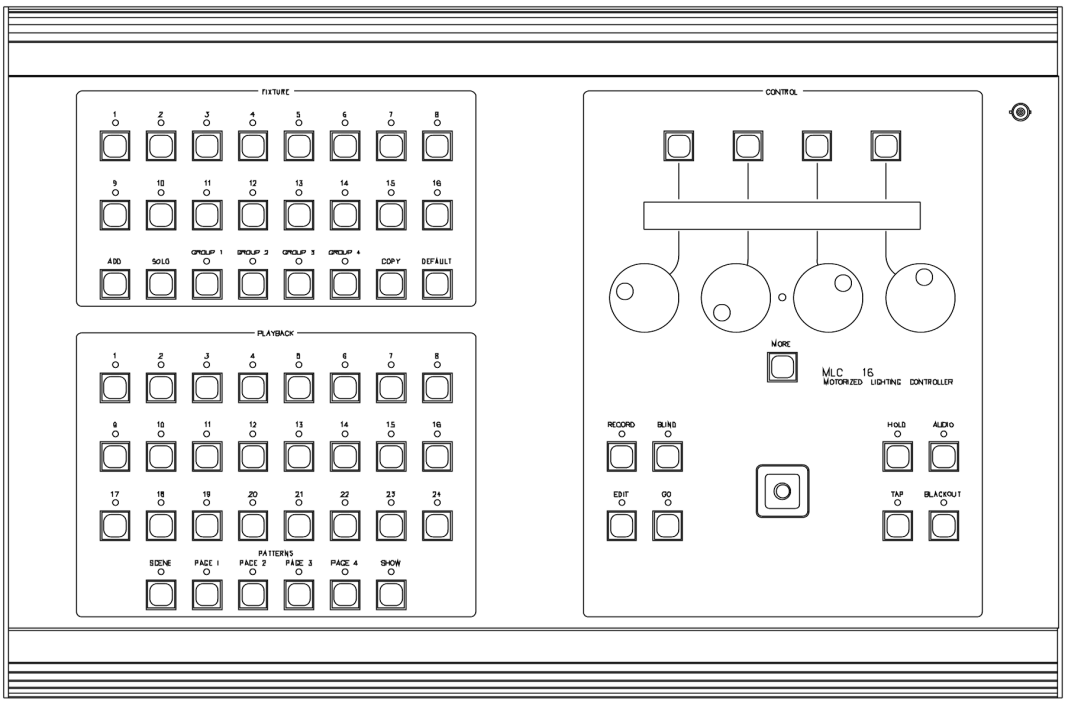
# MLC 16
# MOTORIZED LIGHTING CONTROLLER

Software revision 2.01 and above



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# Overview

With the MLC 16D Motorized Lighting Controller you can control up to 16 different fixtures. You can control any fixture that uses DMX512 as its control signal. A rich Device Definition Language (DDL) enables virtually any fixture personality to be defined. Many popular personalities have already been defined within the console's nonvolatile flash memory. Using either the 3.5" floppy disk drive or the RS-232 port, you can download personalities from the 3.5" floppy disks provided with the console. As new definitions become available, you can download them from our Web site (www.nsicorp.com).

This User Guide contains information about MLC 16D features, and instructions for recording and editing, and configuring the console.

Playback involves three types of memories:

- **Scenes.** Static memories that can be recalled at any time to set the look of the stage or to modify a portion of it.
- **Patterns.** Linked memories that include fade, delay, and hold times. As with a scene, the pattern can control the whole stage or just parts of it. For example, one pattern can control color while another running at the same time can control pan and tilt.
- **Shows.** Patterns linked together to form complex events that can be activated with the press of a single button. Shows can be run through one sequence or loop continuously.

Fixtures, groups, scenes, patterns, and shows can be layered in different combinations to create various looks.

## Fixtures

To activate a fixture press one of the 16 **Fixture Select** buttons; the LED above the button lights green if there is a fixture assigned to that location. When you hold down the button the LCD display shows the name of the fixture personality. Once active, the LCD display shows the traits of the personality assigned to each **Fixture** button, four at a time, along with their current values. To modify a trait, turn the corresponding Modify wheel. Turn the wheel clockwise to increase values, and counterclockwise to decrease values.

Most fixtures have more than four traits. Press the **More** button to show the next set of traits on the LCD display.

**NOTE**

The **More** button only cycles through traits in one direction.

Traits can be assigned to either axis of the joystick; pan and tilt are commonly assigned with this feature. If this is the case, these traits are not displayed on the LCD display and are modified whenever the joystick is operated. The current value of the trait is shown below the trait name. If the value on the channel is not a defined value for that trait, the value is displayed between the greater than and less than signs (< and >). If the fixture has control of the channel the trait

controls, the trait's value will be followed by an asterisk (*). Pressing the **Function** button located above each trait alternates the fixture's control of each individual trait. Pressing and holding the **More** button releases control for all channels controlled by the fixture.

## Groups

Groups allow multiple fixtures, even different models from different manufacturers, to be grouped together using similar traits. Common traits can be controlled simultaneously when the group is activated. With this release of firmware there is no longer a limitation in controlling continuous portions of union traits in a group.

To activate a group press one of the four **Group Select** buttons; the LED above the button lights green if there is a group defined for that location. When you hold down the button the LCD display shows which of the 16 fixtures is assigned to the group. Once active, the LCD display shows the traits of the personality assigned to the **Group** button, four at a time, along with their current values. To modify a trait, turn the corresponding Modify wheel. Turn the wheel clockwise to increase values, and counterclockwise to decrease values.

Traits behave the same as they do with individual fixtures, except that each trait in a group can be controlling one or more channels depending on how many fixtures in the group have the same trait in common. The current value of the trait is shown below the trait name. If the value on the channel is not a defined value for that trait, the value is displayed between the greater than and less than signs (< and >). If the group has control of the channel(s) the trait controls, the trait's value is followed by an asterisk (*). Pressing the **Function** button located above each trait alternates the group's control of each individual trait. Pressing and holding the **More** button releases control for all channels controlled by the group. If any of the values on the channels that the trait controls differ from the assigned value for the trait, or if they are undefined values for the trait and they are unequal, the trait's value is followed by a question mark (?). In all cases the value displayed by the group is the value that group uses as a basis when you modify the value using the Modify wheels. If the value should go to a question mark, you can use the **Function** button above each trait to retake control and assert the trait's value on all channels. Doing this saves you from having to turn the Modify wheels to assert a given trait value on all channels controlled by the trait.

## Scenes

Whenever the **Scene** button LED is on, the 24 **Playback** buttons are in Scene mode. Each Scene is a static memory. You can use scenes to set the look of the entire stage with a single press of a button, or you can selectively choose which fixture traits are recorded into each scene. You can use a scene to modify, for example, the color or gobo of some of the fixtures while another scene, pattern, or show continues to control the rest of the stage.

You can also use scenes to build trait palettes or templates that can be used for pre-focused position memories where pan and tilt can be quickly edited within a pattern or show.

## Patterns

Whenever one of the Pattern page LEDs is on, the 24 **Playback** buttons are in Pattern mode. The **Playback** buttons provide access to 4 pages of patterns, for a total of 96. Patterns allow scenes or looks to be linked together at programmable times, creating complex movements and effects. These static memories and their associated fade, delay, and hold times are called steps. The Real Time Record option allows you to set the fade and hold time between steps in real time.

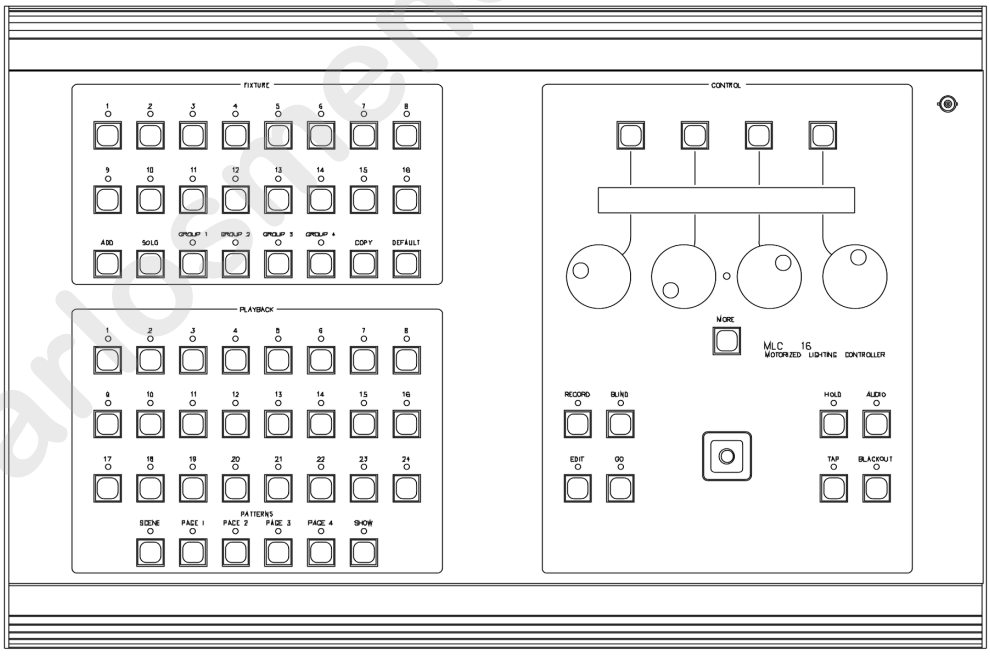
By activating fixtures or groups in the Pattern Record mode, you can record "live" steps in a pattern.

## Shows

Whenever the **Show** button LED is on the 24 **Playback** buttons are in Show mode. Shows allow patterns to be linked in any order, one after another. You can determine how many times each pattern will play back, from 1 to 250 times, and determine how many times the show will play back. A show can play 1 to 250 times, or loop infinitely.

# Console

## Front Panel




- **Fixture buttons (1-16).** Allow you to access fixtures for manual live control.
- **Group buttons (1-4).** Allow you to access a group for manual live control.
- **Add button.** Allows you to access more than one fixture at a time. All fixtures must be the same type. Added fixtures immediately move to the exact settings of the original fixture.

- **Solo button.** Blacks out all fixtures except the one selected. Push the button again to return the blacked out fixtures to their proper intensities.
- **Copy button.** Copies the values of one fixture to another fixture of the same type.
- **Default button.** When a fixture is selected, sets all parameters to the default values assigned to that fixture personality.
- **Playback buttons (1-24).** Allow you to select scenes, patterns, and shows for programming or playback. Use the **Scene**, **Page 1-4** and **Show** buttons to select the mode of the **Playback** buttons.
- **Scene button.** Places the 24 **Playback** buttons in Scene mode, for selecting or programming scenes.
- **Pattern Page buttons (1-4).** Places the 24 **Playback** buttons in Pattern mode, for selecting or programming patterns.
- **Show button.** Places the 24 **Playback** buttons in Show mode, for selecting or programming shows.
- **Function buttons (1-4).** Allow you to select items that appear on the LCD display.
- **Modify wheels.** Allow you to make changes to the items on the LCD display.
- **LCD Contrast adjust.** The small hole located between Modify wheels 2 and 3 allows you to adjust the contrast of the LCD display. Use a small flat-blade screwdriver to carefully make adjustments.
- **More button.** Provides access to additional fixture traits and menu options. Holding down this button deactivates all of a selected fixture's traits.
- **Record button.** Initiates programming of scenes, patterns, and shows.
- **Edit button.** Allows you to edit fixtures, patterns, shows, and Console Setup menus, and exits the menus.
- **Blind button.** Allows you to modify a fixture in the blind, indicated when the Blind LED is on. Changes made to the fixture will not appear on stage until the **Go** button is pressed. The Blind function is not available in playback edit and record modes.
- **Go button.** Advances manually stepped Patterns. If the Blind function is active, tapping the **Go** button transfers any fixture changes made in the blind to the stage.
- **Hold button.** Holds the current look in a pattern or show.
- **Tap Sync button.** Overrides any preprogrammed step times at the rate the button is tapped.
- **Audio Sync button.** Allows audio input to override the preprogrammed step times.
- **Blackout button.** Blacks out all fixtures to their programmed blackout values and exits the menus.
- **Joystick.** Controls the pan and tilt of fixtures.
- **Worklight.** A BNC connector is provided for powering a standard worklight.

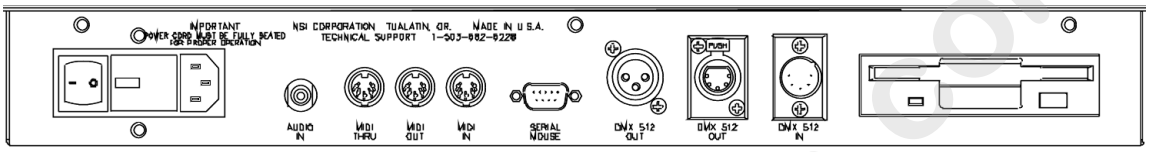
**NOTE**

If you encounter a problem with a front panel control, you can place the console in Panel Test mode, which runs a diagnostic routine for debugging the front panel hardware.

To place the console in Panel Test mode:

1. Turn the console on while pressing Pattern Page 1, Page 2, Page 3, and Page 4 simultaneously.
   *Once active, the test mode sequences the front panel LEDs so you can check for any outages.*
2. Press a button or move the joystick to show its name on the LCD display.
   **Note:** Moving a Modify wheel increases or decreases a corresponding number on the LCD.
3. Turn the console off to clear the Test mode.

## Rear Panel




- **Power switch.** Turns console power on and off.
- **Power in.** Connects to the female end of the supplied AC power cable. The removable cover allows it to be reconfigured for 240 VAC operation.
- **Audio input.** Accepts a line level audio signal to trigger steps in patterns and shows based on the beat of the audio source.
- **MIDI In/Out/Thru.** 5-pin DIN connectors connect to a MIDI sequencer or other MIDI controller.
- **Serial Mouse** RS-232 connector**.** Allows you to connect a Microsoft compatible serial mouse or trackball for controlling fixture pan and tilt traits, or import Fixture Definitions whenever the Fixture Definition Menu is active.
- **DMX512 Output.** DMX512 output using a 3-pin XLR for connecting to equipment using this style of connector.
- **DMX512 Output.** DMX512 output using a 5-pin XLR for connecting to equipment using this style of connector. This output conforms to the USITT standard.
- **DMX512 Input.** Allows you to import DMX512 from another console, combine with MLC 16D outputs, and pass through it.
- **Disk Drive.** Optional 3-1/2" DOS compatible disk drive used to save and load console programming, and transfer programming from one console to another.

## LCD Display

When you turn on power to the console, the LCD display shows the current release version and build number of the software, followed by the MLC 16D Main Screen.


The lower portion of the display shows several values that you can modify from this screen.

- **Fd:** To set the master fade rate for all scenes played back, turn Modify wheel 1. You can set the fade rate from 0 to 99:59.9.

- **Aud:** To adjust the audio gain, turn Modify wheel 3. Use this to fine-tune the console's response from a line level audio signal input active in the Audio mode.
- **GM:** To raise or lower the console's Grand Master level, turn Modify wheel 4. This only controls traits that are assigned to the Grand Master in the fixture's definition. Typically this is used as a master control for all fixture dimmer traits.

**NOTE**

All procedures in this User Guide begin at the MLC 16D Main Screen. You can return to the MLC 16D Main Screen from any of the Record or Edit menus by pressing **Edit** or **Blackout**.

# Installation and Setup

## Power Supply

The MLC 16D requires 120 VAC to operate. To turn the console on:

1. Connect the AC power cable (supplied) to a source of AC power.
2. Press the power switch located next to the power input connector.

## DMX512 Input and Output

Leviton ships the MLC 16D console with two DMX512 output connectors and one DMX512 input connector. One output connector is a standard USITT specified 5-pin female XLR. The other is a 3-pin female XLR connector used by some fixture manufacturers. The input connector is a standard USITT specified 5-pin male XLR.

**NOTE**

Be sure the fixture connector pin-out matches that of the MLC 16D. For example, Martin fixtures use a 3-pin XLR, but reverses pin 2 and 3 from the norm. Pins 2 and 3 of the 3-pin XLR can be swapped internally to support these situations. See the chapter "3-Pin XLR Pin Reversal" for details.

The DMX512 digital signal provides the highest speed, precision, and noise immunity. When connecting DMX512:

- Use cable that is specified as RS-485 or RS-422 compatible (shielded, 1 or 2 twisted pair) and use the largest gauge available (22-18 gauge is good for long runs of 1000 ft).
- Daisy chain the cable only (no star or home runs) and terminate the end of the cable with a 120-ohm resistor. (See the fixture's manual for proper terminating practices).

## Using Audio Input

You can use a line level audio signal from an audio source such as a CD player or mixer to trigger steps in patterns and shows based on the beat of the audio source. When a line source is present (connected with a standard ¼-in. RCA jack) and the **Audio** button LED is on, Audio mode is active and will override hold times programmed in patterns. You can control the audio gain using the Modify wheel 3 and the LCD display. A higher value increases the gain.

## Using the Worklight

A BNC connector is provided for powering a standard worklight. The connector provides 12 VDC at 1A. Since the light is powered by the same supply that provides power to the isolated DMX 512 circuit, the metal portion of the gooseneck and lamp should not be allowed to touch the chassis ground or other metal objects, to prevent DMX 512 interference. The lamp power is protected by an internal fuse that will interrupt power to the lamp while retaining isolated DMX 512 power in case of a lamp short. Consoles equipped with a Revision C or above processor card include a built-in dimmer for varying the worklight intensity. The dimmer control is accessed from the main menu using Modify wheel 1. F1 changes Modify wheel 1 operation from Scene fade **(Fd:)** to Worklight Dimmer **(Wk:)**. The dimmer can be varied from 0 to 100%.

# Configuration

## Enabling Safety Locks

The MLC 16D console allows you to set three safety locks:

- **Record lock.** Disables the **Record** button and prevents recording and editing of scenes, patterns, and shows.
- **Setup lock.** Prevents access to the Setup menus or the RS-232, fixture, and console functions. The default code is *abcd*.
- **Fixture lock.** Prevents access to the Fixture Define functions. The default code is *abcd*.

To enable safety locks:

1. Press the **Edit** button.
2. Press **F4**, above **Setup**.
3. Press **F3**, above **Console**.
4. Press the **More** button 5 times.


5. Press **F4**, above **Edit**.
6. Turn Modify wheel 1, below **Rec** to select **Yes**, enabling the Record lock.
7. Turn Modify wheel 2, below **Setup**, to select **Yes**, enabling the Setup lock.
8. Turn Modify wheel 3, below **Fix**, to select **yes**, enabling the Fixture lock.
9. Turn Modify wheel 4 to alternate between **<Save>** and **<Cancel>**.
10. Press **F4**, above **<Save>** or **<Cancel>**, to enable or cancel changes to the locks.

When any of the safety locks are enabled, you will be prompted to enter the lock code when attempting to access the buttons or functions.

To enter the 4-digit lock code:

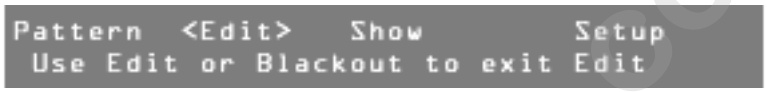
1. Turn Modify wheel 2 to move the cursor.
2. Turn Modify wheel 3 to change the character.
   *Once you have entered the lock code, the lock is released, and the menus and/or functions are immediately available.*

## Assigning Fixtures

The first time you use the MLC 16D, you must assign fixture personalities to the **Select** buttons corresponding to the fixtures you are using.

To assign a fixture from the Device Definition Library (DDL):

1. Press **Edit**.
   *The LCD display shows a menu of Edit commands.*




2. Press **F4**, above **`Setup`**.
3. Press **F2**, above **`Fixture`**.
4. Press **F3**, above **`Assign`**.


5. Turn the Modify wheel 1 to select the fixture location number.
6. Press **F4**, above Select **`<Edit>`**.
7. Turn Modify wheel 2 to select the fixture type.
   **Note:** If the fixture you want to control is not in the onboard library, try to find it in the Device Definition Library (DDL) included with the console (see .6). If the definition is not on the DDL disk, see www.nsicorp.com.
8. Turn Modify wheel 3 to select the control channel number.


9. Press **F4**, above **`Select <Save>`**, to save the assignment.
   *The fixture has been assigned.*
10. When you have made all the necessary assignments, press **Edit** or **Blackout** to exit Edit mode.

**NOTE**

A **`Fixture Overlap Error!`** message means that control channels overlap, or two fixtures are on the same channel, which will cause unexpected behavior. If this happens, calculate what the next available channel is, by adding the number of channels the previous fixture uses to its starting channel. This will be the next available channel for assigning a fixture. Remember to change the starting channel on the fixture also.

To gain live control over a new fixture and verify the assignment, press the **Fixture Select** button corresponding to the location where you assigned the fixture. The LCD should show four of the fixture's traits or attributes. You can also press and hold the **Fixture Select** button to view the fixture name.

## Inverting Traits

You can invert individual continuous traits of an assigned fixture using the Assign Fixture menu. Traits of a fixture assigned to more than one **Fixture** button can operate opposite from each other.

To make changes:

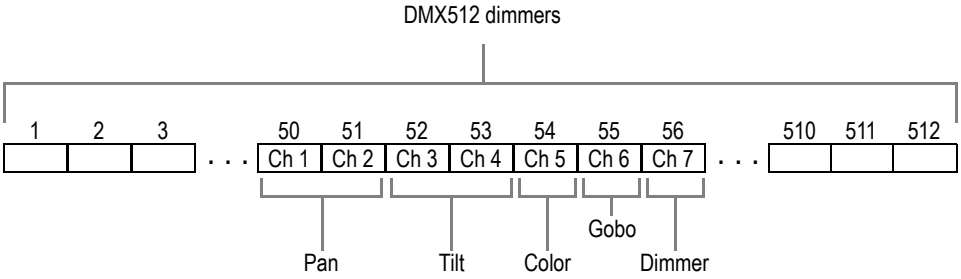
1. Press **Edit**.
2. Press **F4**, above **`Setup`**.
3. Press **F2**, above **`Fixture`**.
4. Press **F3**, above **`Assign`**.
5. Turn Modify wheel 4 to move from **`Edit`** to **`Invert`**.
6. Press **F4**, above **`Select <Invert>`**.
7. Turn Modify wheel 2 to scroll through the fixture traits.


**Note:** Only continuous traits can be inverted. This inversion is in addition to any defined within the fixture definition and will revert any trait that is inverted in the definition. For example, if pan is inverted in the fixture definition and then inverted again at assignment, it will operate as if it was not inverted at all.

8. When the desired trait is shown on the LCD display, press **F4**, above **`Select <Edit>`**.
9. Turn Modify wheel 3 to choose **`Yes`** or **`No`**.
10. Press **F4**, above **`Select <Save>`**, or turn Modify wheel 4 to **`Select <Cancel>`** to cancel the action.
11. When you have inverted all the desired traits, press **Blackout** or **Edit** to exit Setup mode.

## Defining Fixtures

One of the keys to the ease of use of the MLC 16D is the ability to define personalities for fixtures you wish to control. Instead of having to remember that a fixture starts on channel 50, and that the dimmer trait is the seventh channel of the fixture making it channel 56, you simply have to press the assigned **Fixture Select** button and rotate the Modify wheel labeled **`Dimmer`** until the desired value has been reached.



## Creating a New Fixture Definition

Many of the fixtures you use are already defined within the MLC 16D or on the DDL floppy disk provided with the console. If not, or if you want to create a new fixture of multiple fog machines or PAR devices for example, you need to use the Fixture Definition Setup mode. From here you can enter a unique name for the fixture and define the personality traits of each channel.

To enter the name of a new fixture:

1. Press **Edit**.
2. Press **F1**, above **`Setup`**.
3. Press **F2**, above **`Fixture`**.
4. Press **F2**, above **`Define`**.
5. Turn Modify wheel 4 clockwise to select **`New`**.
6. Press **F4**, above **`Select <New>`**.


*You can now enter a name.*

7. Turn Modify wheel 2 to move the cursor.
8. Turn Modify wheel 3 to change the character.
9. Once you have entered the name, press **F4**, above **`Select <Save>`**.
   *You are ready to add personality traits to the fixture you have named.*

To add personality traits to the fixture definition:

1. Turn Modify wheel 2 until the LCD display shows the name of the desired fixture. (If your new name appears, go directly to the next step.)
2. Turn Modify wheel 4 until the LCD display shows **`<Traits>`**.
3. Press F4, above Select **`<Traits>`**.
4. Turn Modify wheel 3 to choose Continuous, Indexed, or Union.


**NOTE**

Continuous traits move continuously from a minimum value to a maximum value. Indexed traits do not move continuously; discrete values are assigned to each index along with a unique label. These are most often used to describe the positions of such things as gobo and color wheels. Unions are made of combinations of both continuous and indexed traits. An example of a union would be a color wheel that uses a continuous range of DMX512 values for spins and then indexed values for fixed color positions. The end union trait is used to flag the end of the union structure. The console fills this in when you select a union trait. For example, if you were to define a color wheel as described above, you would first insert a union trait, then insert continuous and indexed traits as needed.

5. Turn Modify wheel 4 until the LCD display shows **`<Save>`**.
6. Press **F4**, above **`Select <Save>`** to save the type.
   *Now you can assign a label to this trait.*

Several attributes can be assigned to the traits once their type has been determined. The first is a label, which can be up to eight characters long. You can select from a table of predefined labels, or you can create your own, up to 256 possible labels.

To assign a predefined label to the traits:

1. Press **F4**, above **`Select <Edit>`**.


2. Turn Modify wheel 3 to select the desired label.
3. Press F4, above **`Select <Save>`**.

To create a new label for a trait:

1. Turn Modify wheel 4 to select **`New`**.
2. Press **F4**, above **`Select <New>`**.
3. Turn Modify wheel 2 to move the cursor.
4. Turn Modify wheel 3 to change the character.
5. Once you have entered the label name, press **F4**, above **`Select <Save>`**.
   *It will take 5 or 6 seconds to save the new label name.*

Once the label has been selected, you can assign the other attributes of a trait.

### Assigning Additional Attributes to Traits

To assign additional attributes to a trait:

1. Turn Modify wheel 2 to scroll through the attributes.
2. Press **F4** to edit an assignment.
3. Turn Modify wheel 3 to make the desired changes.
4. Press **F4** to save the changes.
5. Continue until you have assigned all attributes for this trait.

## Adjusting Continuous Trait Parameters

You can modify the following parameters for continuous traits:

- **Channel.** Determines which channel of the DMX512 stream should be used for this trait. This is a relative number that is added on to the base address of the fixture once it is assigned to a **Fixture Select** button.

**NOTE**

If fixture 1 is assigned to DMX512 channel 20 and a trait is assigned to channel 1, it will end up being assigned to channel 20, not 21.

- **Size.** Determines whether the trait will use one or two channels of the DMX512 stream. Choices are 8-Bit or 16-Bit. 16-bit is mostly used for pan and tilt of high-resolution fixtures.
- **Invert.** Inverts a continuous trait such as pan so that it moves in the opposite direction as intended.

**NOTE**

Inverting can also be done at assignment time on a per trait basis.

- **X-axis and Y-axis.** Assigns a trait to the X or Y-axis of the joystick. More than one trait of a fixture can be assigned to either axis and a single trait can be assigned to both axes. X is usually horizontal or pan; Y is usually vertical or tilt.
- **B/O (Blackout).** Sets the trait to the assigned Blackout value whenever the **Blackout** button is pressed.
- **BoValue (Blackout Value).** Assigns the value a trait is at when the **Blackout** button is pressed.
- **Master.** Assigns a trait to the Grand Master control.
- **Default.** Assigns a default value to a trait; pressing the **Default** button causes the default value to be applied whenever a fixture is active.
- **Max and Min.** Assigns maximum and minimum values to a continuous trait. This is useful when a device does not use the full range of DMX512 values, or when a continuous trait is part of a union.

## Adjusting Indexed Trait Parameters

Indexed traits are made of index values, which can be changed at any time. Each index can be assigned a specific label just as each trait can be assigned a specific label.

You can modify the following parameters for indexed traits.

- **Channel.** Determines which channel of the DMX512 stream should be used for this trait. This is a relative number that is added on to the base address of the fixture once it is assigned to a **Fixture Select** button.
- **X-axis and Y-axis.** Assigns a trait to the X or Y-axis of the joystick. More than one trait of a fixture can be assigned to either axis and a single trait can be assigned to both axes. X is usually horizontal or pan; Y is usually vertical or tilt.
- **B/O (Blackout).** Sets the trait to the assigned Blackout value whenever the **Blackout** button is pressed.
- **BoValue (Blackout Value).** Assigns the value a trait is at when the **Blackout** button is pressed.
- **Default.** Assigns a default value to a trait; pressing the **Default** button causes the default value to be applied whenever a fixture is active.
- **Indexes (Number of Indexes).** Specifies the number of indexes used by the trait. There are a maximum of 255 indexed values that can be assigned.
- **IL1-ILX (Index Label 1-X).** Assigns a label to the specified index value. Index labels are stored separately from the Table of Trait Labels, providing up to 896 labels to choose from or create.
- **IV1-IVX (Index Value 1-X).** Assigns a value to the specified index value.

## Adjusting Union Trait Parameters

Union traits act as a header for continuous and indexed traits grouped together on the same channel. The end of the group is marked by an end union trait. This trait is automatically inserted when you select and insert a union trait.

You can modify the following parameters for union traits.

- **Channel.** Determines which channel of the DMX512 stream should be used for this trait. This is a relative number that is added on to the base address of the fixture once it is assigned to a **Fixture Select** button.
- **B/O (Blackout).** Sets the trait to the assigned Blackout value whenever the **Blackout** button is pressed.

- **BoValue (Blackout Value).** Assigns the value a trait is at when the **Blackout** button is pressed.
- **Default.** Assigns a default value to a trait; pressing the **Default** button causes the default value to be applied whenever a fixture is active.

### Adding Additional Traits

Once you have set the attributes for your first strait, you need to add the rest of the traits to your fixture definition.

To add additional traits:

1. Turn Modify wheel 4 until the LCD display shows **<Insert>**.
2. Press **F4**, above **Select <Insert>**.
   **Note:** When inserting or deleting fixture traits, be patient; it can take up to several minutes for the console to complete this process.
3. Press **F4**, above **Select <Edit>**.


4. Turn Modify wheel 3 to select a label.
5. Press **F4**, above **Select <Save>**.
6. Continue adding additional traits and assigning their attributes until the fixture is fully defined.

## Assigning and Editing Groups

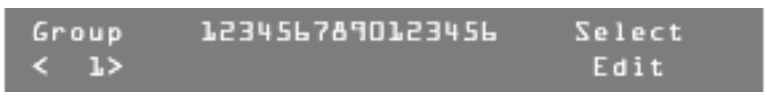
Fixtures that share common traits can be assigned to one of the four **Group Select** buttons. Each **Group Select** button then becomes a kind of virtual fixture combining the common traits and indexed labels of all the assigned fixtures. Whenever a Group is active, the common traits of the fixture can be changed in unison from a single control. With this release of firmware there is no longer a limitation in controlling continuous portions of union traits in a group.

**NOTE**

Trait labels must match exactly. Trait labels and index labels are case sensitive. Use care when defining labels if grouping is to be used.

To create or edit a Group:

1. Press **Edit**.
2. Press **F4**, above **Setup**.
3. Press **F2**, above **Fixture**.
4. Press **F1**, above **Group**.
5. Turn Modify wheel 1 to scroll through the groups.
   *Currently assigned fixtures are shown with an "X" under the number of each fixture.*




6. When the LCD display shows the desired group, press **F4**, above **Select Edit**.

7 Turn Modify wheel 2 to move the cursor to the fixture location.


8 Turn Modify wheel 3 to add **X** or remove **X** as needed for each location.
**Note:** When there is no fixture assigned to a location, the **X** is inactive.

9 Continue until all your fixtures have been assigned.

10 Press **F4**, above **Select <Save>**, or turn Modify wheel 4 to **Select <Cancel>** to cancel the action.

11 Continue assigning fixtures into groups, or press **Blackout** or **Edit** to exit the Group Setup menu.

## Setting the Maximum Dimmers

The MLC 16D can control up to 512 dimmers or control channels. If you are using fewer, you should reduce the Maximum Dimmers setting to the number needed, to prevent the console from sending needless information.

To change the Maximum Dimmers setting:

1 Press **Edit**.

2 Press **F4**, above **Setup**.

3 Press **F3**, above **Console**.

4 Press **F4**, above **Select Edit**.

5 Turn Modify wheel 2, under **Max Dimmers**, to select a value between 48 and 512.


6 Turn Modify wheel 4 to select **<Save>** or **<Cancel>**.

7 Press **F4**, above **<Save>** or **<Cancel>**. The action is saved or cancelled.

8 Press **Blackout** or **Edit** to exit the Console Setup menu.

## Setting the Interbyte Delay

Some fixtures cannot keep up with DMX512 at full speed. This usually appears as a momentary glitch, because the fixture has missed some data and uses incorrect values. Putting additional time between each byte transmitted can usually alleviate this problem.

If you are experiencing intermittent control problems, try varying the interbyte delay. A value of 256 is the maximum delay (about 200 microseconds); 0 indicates no delay.

To set the interbyte delay:

1 Press **Edit**.

2 Press **F4**, above **Setup**.

3 Press **F3**, above **Console**.

4 Press **F4**, above **Select Edit**.

5 Turn Modify wheel 3 under **InterB**, to select the desired value.


**NOTE**

Large values will seriously affect the efficiency of the console, especially with large numbers of output dimmers. Therefore, first try the maximum value to see if the problem is alleviated. If so, reduce the value as low as possible while still achieving the benefits.

6 Turn Modify wheel 4 to select **<Save>** or **<Cancel>**.

7 Press **F4**, above **<Save>** or **<Cancel>**. The action is saved or cancelled.

8 Press the **Blackout** or **Edit** button to exit Console Setup menu.

## Setting and Using the DMX Input Mode

In addition to broadcasting DMX512, the console can receive DMX512 signals. When DMX Input is enabled there are two modes of operation available:

- Pass Thru mode
- 9-Channel mode

### Setting DMX Input to Pass Thru Mode

Pass Thru mode allows the MLC 16D to receive DMX512 signals from other consoles and merge those values with the output of the console. The merging of the signals is coordinated through a "highest takes precedence" arbitration scheme. This means that the signal source with the higher value is used.

For example, if the input signal is 50 and the channel being controlled is an 8-bit continuous channel, the console will only be able to control values between 50 and 255. The effect is what may appear to be a restriction of the range of control on a channel-by-channel basis.

**NOTE**

If the input signal is lost, the input values are retained until the console is rebooted.

To set the DMX Input mode to Pass Thru mode:

1 Press **Edit**.

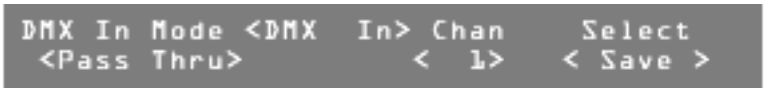
2 Press **F4**, above **Setup**.

3 Press **F3**, above **Console**.

4 Press **More**.

5 Pres **F4**, above **Select Edit**.

6 Turn Modify wheel 2 under **DMX In Mode**, to select **Pass Thru**.




7 Turn Modify wheel 4 to select **<Save>** or **<Cancel>**.

8 Press **F4**, above **<Save>** or **<Cancel>**.
*The action is saved or cancelled.*

9 Press **Blackout** or **Edit** to exit the DMX Input Mode menu.

### Setting DMX Input to 9-Channel Mode

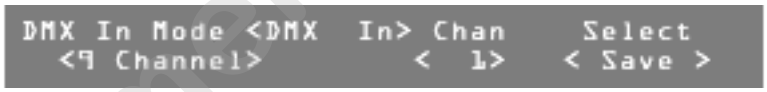
The 9-Channel mode allows nine channels to be used to trigger any scene, pattern, show, or blackout by interpreting the values as a binary code. The starting address for the 9-Channel mode can be adjusted anywhere within the console's 512 control channels. Levels above 50% are considered a logical 1, while levels less than 50% are considered a logical 0.

A zero value causes a blackout to occur. Scenes, patterns, and shows have both on and off commands. The scenes are mapped to values 1-24 (on) and 145-168 (off), patterns to values 25-120 (on) and 170-264 (off), and shows to values 121-144 (on) and 265-288 (off).

For example, to turn on pattern 40 (**Playback** button 16 on Pattern Page 2), the nine channels should form this binary pattern, 000000100 (only the seventh channel of the nine-channel frame is on; the other eight channels are off). The lowest channel number represents the least significant bit of the binary number. The least significant bit of the binary number is the number to the farthest left. (A complete set of tables detailing the channel values for each event can be found in the tables in the Appendix at the end of this manual.)

To set the DMX Input mode to 9-Channel mode:

1. Press **Edit**.
2. Press **F4**, above `Setup`.
3. Press **F3**, above `Console`.
4. Press **More**.
5. Pres **F4**, above `Select Edit`.
6. Turn Modify wheel 2 under `DMX In Mode`, to select `9 Channel`.




7. Turn Modify wheel 3 under `Chan`, to select the starting number for the block of 9 channels used in 9-Channel mode.
8. Turn Modify wheel 4 to select `<Save>` or `<Cancel>`.
9. Press **F4**, above `<Save>` or `<Cancel>`. The action is saved or cancelled.
10. Press **Blackout** or **Edit** to exit the DMX Input Mode menu.

## Setting Mouse Resolution

A Microsoft-compatible serial mouse can be plugged into either serial port to control pan and tilt fixture traits.

To change the mouse resolution:

1. Press **Edit**.
2. Press **F4**, above `Setup`.
3. Press **F3**, above `Console`.
4. Press **More** four times.
5. Pres **F4**, above `Select <Edit>`.
6. Turn Modify wheel 2 under `Resolution`, to select the desired value (from 1 to 64).

7 Turn Modify wheel 4 to select **<Save>** or **<Cancel>**.

8 Press **F4**, above **<Save>** or **<Cancel>**.
*The action is saved or cancelled.*

9 Press **Blackout** or **Edit** to exit the Mouse Resolution menu.

## Entering Channel Test Mode

Channel Test mode allows you to control output channels directly. This is useful when the traits of a fixture are not known or if index values need to be determined.

To change the mouse resolution:

1 Press **Edit**.

2 Press **F4**, above **Setup**.

3 Press **F2**, above **Fixture**.

4 Press **F4**, above **Test**.

5 Press **F1** through **F4**, until you find the DMX output channel of the fixture you want to test.
**Note:** Use **F2** and **F3** to decrease and increase the output channel numbers by 1. Use **F1** and **F4** to decrease and increase the output channel numbers by 10.

6 Turn Modify wheels 1 through 4 to vary the level of the output channels above them.

7 Press **Blackout** or **Edit** to exit the Test mode menu.

## Clearing and Initializing Memory

You can clear all or parts of the console's flash memory.

### Clearing Scenes, Patterns, and Shows

To clear scenes, patterns, and shows:

1 Press **Edit**.

2 Press **F4**, above **Setup**.

3 Press **F3**, above **Console**.

4 Press **More** six times.

5 Press the **Function** button above the desired option.
- Choose **Clear All** to clear all scenes, patterns, and shows.
- Choose **Clear Scene** to clear all scene memory.
- Choose **Clear Pattern** to clear all pattern memory.
- Choose **Clear Show** to clear all show memory.

*A confirmation menu appears for each of the options.*

6 Press **F3**, above **Yes**, to clear or initialize the memory, or press **F4**, above **No**, to return to the Memory menu.


7 Press **Blackout** or **Edit** to exit the Memory menu.

### Clearing and Initializing Fixtures and MIDI

To clear scenes, patterns, and shows:

1. Press **Edit**.
2. Press **F4**, above `Setup`.
3. Press **F3**, above `Console`.
4. Press **More** seven times.
5. Press the **Function** button above the desired option.
   - Choose `Clear Fixtures` to clear the DDL, Trait and Index Label tables, fixture, invert, and grouping assignments.
   - Choose `Init Fixtures` to restore the default DDL, and Trait and Index Label tables. This will also clear all fixture, invert, and grouping assignments.
   - Choose `Clear MIDI` to clear all MIDI assignments.
   - Choose `Init MIDI` to initialize all MIDI assignments to default values.

   *A confirmation menu appears for each of the options.*
6. Press **F3**, above `Yes`, to clear or initialize the memory, or press **F4**, above `No`, to return to the Memory menu.
7. Press **Blackout** or **Edit** to exit the Memory menu.

## Resetting the Console

You can clear the entire console memory and install factory default parameters.

**NOTE**

**Warning!** All programming will be lost along with Fixture Definitions. Use this procedure only if the console is known to have corrupted memory, and clearing memory from the Console Setup menu does not solve the problem.

To reset the console:

1. Turn off power to the console.
2. Hold down the four **Function** buttons above the LCD display.
3. Turn the power switch on while holding the buttons down.
4. Release the buttons once the LCD display shows the `!!Initializing Console!!` message.
   *It will take approximately 20 seconds for the memory to clear and initialize.*

## Disk Setup

Consoles equipped with a disk drive will have an additional disk menu that can be accessed from teh Setup menu. Disk drive utilities include Format, Delete, Load, and Save. All console programming can be saved and loaded from the disk in binary or ASCII format. Since the disk format used is MSDOS compatible, the ASCII formatted files can be useful for offline editing. You can write a fixture's definition with a word processor or text editor, and load it into the console using the disk drive. Scene and pattern step levels are saved in fixture definition form rather than as raw numbers. To change the color of a fixture from blue to red you just need to enter the new label. (The label must match those defined in the fixture's definition.) The console performs the translation as the file is loaded.

Refer to the "ASCII Formatting Guide" on page 36 for an explanation of the syntax of the ASCII formatted files.

## Formatting a Disk

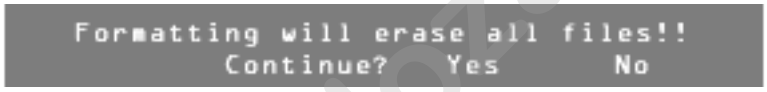
This utility allows you to format a new disk as an MSDOS compatible disk.

**NOTE**

Most disks sold are preformatted and will not require this operation.

To format a disk:

1. Press **Edit**.
2. Press **F4**, above **Setup**.
3. Press **F4**, above **Disk**.
4. Press **F1**, above **Format**.
   *A confirmation menu appears.*
5. Press **F3**, above **Yes**, to format the disk,
   or press **F4**, above **No**, to return to the Disk menu.
   *When formatting is complete, the console returns to the Disk menu.*




6. Press **Blackout** or **Edit** to exit the Disk menu.

## Deleting Files on a Disk

This utility allows you to clean up a disk, deleting individual files.

To delete files on a disk:

1. Press **Edit**.
2. Press **F4**, above **Setup**.
3. Press **F4**, above **Disk**.
4. Press **F2**, above **Delete**.
   *Once the file directory is loaded, the Disk Delete menu appears.*
5. Turn Modify wheel 2 or 3 to move through the list of available files.


6. Turn Modify wheel 4 to select **<Save>** or **<Cancel>**.
7. Press **F4**, above **Select <OK>**, to delete the file,
   or Press **F4**, above **Select <Cancel>**, to return to the Disk menu.
   *If you selected <OK>, a confirmation menu appears to confirm your request.*
8. Turn Modify wheel 4 to select **<Save>** or **<Cancel>**.


9. Press **F4**, above **Select <OK>**, to delete the file,
   or Press **F4**, above **Select <Cancel>**, to return to the Disk menu.
10. Press **Blackout** or **Edit** to exit the Disk menu.

## Loading Files from a Disk

Use this utility to load a file from a disk. Once the directory has been loaded, you can select the file to be loaded.

If an ASCII file contains any Fixture Definitions, a prompt appears to confirm whether the current fixture library should be deleted. If the file contains a new full library you should delete the current fixture library. If you are simply adding a new fixture you should not delete the entire fixture library. The fixture library shipped from the factory is fairly full; there will be limited space available for new Fixture Definitions to be added. The DDL disks provided with this manual contain all the fixtures in the console library plus some additional ones. You can reload the deleted fixtures if they are needed later. Fixture Definitions can also be downloaded from our Web site (www.nsicorp.com).

If the console finds an error with the ASCII file, it will report the error and line number where the error occurred. The only way an error should occur from a file written by the console is if the file refers to fixture definitions or assignments that do not currently exist in the console. If the file was written or modified offline, there is probably a syntax error.

To load a file from a disk:

1. Press **Edit**.
2. Press **F4**, above **`Setup`**.
3. Press **F4**, above **`Disk`**.
4. Press **F3**, above **`Load`**.
   *Once the file directory is loaded, the Disk Load menu appears.*
5. Turn Modify wheel 2 or 3 to move through the list of available files to be loaded.

6. Turn Modify wheel 4 to select **`<Save>`** or **`<Cancel>`**.
7. Press **F4**, above **`Select <OK>`**, to load the file,
   or Press **F4**, above **`Select <Cancel>`**, to return to the Disk menu.
   *If you selected* **`<OK>`***, the file begins loading.*
   **Note:** If the file contains fixture definitions, a menu appears asking whether or not to clear all fixture definitions, Trait and Index Label tables, fixture, invert, and group assignments.
8. Press **F3**, above **`Yes`**, to clear the existing fixture definitions, tables, and assignments,
   or press **F4**, above **`No`**, to continue loading this file without clearing existing fixture definitions, tables, and assignments.

   **Note:** Press **F4** above **`Select <Cancel>`** at any time to stop loading a file.
9. Press **Blackout** or **Edit** to exit the Disk Load menu.

## Saving Files to a Disk

You can save console information to a disk in two primary file formats:

- **ASCII.** Provides easy offline editing. Many types of console programming can be saved in ASCII format: console configurations, fixtures, scenes, patterns, and shows. The All option saves the console configurations, fixtures, scenes, patterns, and shows in a single file.
- **Binary.** Saves an exact image of all 512K bytes of the Flash EPROM memory. When a binary file is loaded all existing programming will be lost.

Refer to the "ASCII Formatting Guide" on page 36 in the Appendix for an explanation of the syntax of the ASCII formatted files.

To save files to a disk:

1. Press **Edit**.
2. Press **F4**, above **`Setup`**.
3. Press **F4**, above **`Disk`**.
4. Press **F4**, above **`Save`**.
   *Once the file directory is loaded, the Disk Save menu appears.*
5. Turn Modify wheel 2 or 3 to move through the list of available files.


6. Turn Modify wheel 1 to select the type of memory to save:
   - **`All`**
   - **`Configs`**
   - **`Fixtures`**
   - **`Scenes`**
   - **`Patterns`**
   - **`Shows`**
   - **`Binary`**.
7. Turn Modify wheel 4 to select **`<Save>`**, **`<New>`**, or **`<Cancel>`**.
8. Press **F4**, above one of the following options:
   - **`Select <Save>`** saves over the selected file
   - **`Select <New>`** creates a new file
   - **`Select <Cancel>`** returns to the Disk menu.

   *If you selected <Save>, a confirmation menu displays to confirm overwriting the selected file.*


9. Turn Modify wheel 4 to select **`<OK>`** or **`<Cancel>`**.
10. Press **F4**, above **`Select <OK>`**, to save over the selected file, or press **F4**, above **`Select <Cancel>`**, to return to the Disk menu.

**NOTE**

If you selected **`<New>`**, a menu appears asking you to fill in a file name for the new file.

To name the new file:

1. Turn Modify wheel 2 to move the cursor.
2. Turn Modify wheel 3 to change the character.
3. Turn Modify wheel 4 to select **<Save>** or **<Cancel>**.
4. Press **F4**, above **Select <OK>**, to save the new file, or press **F4**, above **Select <Cancel>**, to return to the Disk menu.
5. Press **Blackout** or **Edit** to exit the Disk Load menu.

# Programming

## Overview

Once you have assigned your devices and groups, you can record scenes, patterns, and shows.

All programming is stored in non-volatile memory which retains information for at least 10 years even when power is removed.

When recording scenes or patterns you must decide whether to record in All Traits mode or Selective Traits mode.

### All Traits Mode

When using the All Traits mode to record, the console records the full range of available control channels (see "Setting the Maximum Dimmers" on page 14) into that scene or pattern. This is the easiest mode for operating the console. Do not use this recording mode if you plan to record multiple scenes into one pattern step, or if you plan to run multiple scenes or patterns simultaneously.

### Selective Traits Mode

When using the Selective Traits mode to record, only channels that are captured or active are recorded into scenes and patterns. Use this recording mode to layer multiple scenes into a pattern step. You can also use this recording mode to create palettes or templates of individual traits like color or gobo that may be activated while playing back another scene, pattern, or show to capture specific traits.

**NOTE**

Once the Trait Record mode is set to `All` or `Select`, the console stays in that mode until you turn the power off or until the mode is changed. The factory default setting is `All`.

## Recording Scenes

Scenes can be used by themselves as a static look, or as building blocks for creating patterns.

### Recording Scenes in All Traits Mode

To record a scene in All Traits mode:

1. Set the desired look on stage, using the Fixture or Group controls and any previously recorded scenes.
2. Press the **Record** button.
3. Press **F1**, above `Scene`.
4. Turn Modify wheel 1 to select the scene to be recorded.
5. Turn Modify wheel 3 to set a fade time if desired.
   **Note:** This fade time will not override the master fade rate on the MLC 16 Main Screen unless you press and hold **F1** while playing back or activating a scene with a fade time.
6. Turn Modify wheel 4 to select `<All>`.

7 Press **F4**, above `Traits <All>`.
*The scene is recorded.*

When recording a scene in Selective Traits mode, only captured or selected traits are recorded. This is indicated by an asterisk (*) beside the trait value in the Device mode. To deselect or release the capture for all traits, press and hold the **More** button for approximately a second. To deselect or release individual traits, press the **Function** button above the trait on the LCD display. Capture the desired trait by turning the Modify wheel below the trait or moving the joystick.

When recording a scene in Selective Traits mode, and you deselect or deactivate a device by pressing the corresponding **Select** button, it is no longer active or captured and will not be recorded into the scene. Instead you should press the next **Device** button without deactivating the current one. The current **Device** button LED will go out, but it is still active and will be recorded. If you accidentally deselect any devices, you can quickly reactivate the devices in a scene by tapping the **Device Select** button for each device you want in that scene.

### Recording Scenes in Selective Traits Mode

To record a scene in Selective Traits mode:

1 Set the desired look on stage, using the **Device** buttons and any previously recorded scenes.
2 Press the **Record** button.
3 Press **F1**, above `Scene`.
4 Turn Modify wheel 1 to select the scene to be recorded.
5 Turn Modify wheel 3 to select a fade time if desired.
**Note:** This fade time will not override the master fade rate on the MLC 16 Main Screen unless you press and hold **F1** while playing back or activating a scene with a fade time.
6 Turn Modify wheel 4 to select `<Select>`.
7 Press **F4**, above `Traits`.
*The scene is recorded.*

### Scene Record Shortcut

When no fade time is needed, you can quickly record a scene in All Traits or Selective Traits mode:

1 Set the desired look on stage, using the **Device** buttons and any previously recorded scenes.
2 Press the **Record** button.
3 Press the **Scene** button.
4 Press the **Select** button where you want the scene recorded.

## Editing Scenes

To edit individual scenes, you must actually re-record them. However, since the console references scenes by their location number, once you re-record a scene, it is updated into any patterns or shows in which it has been recorded.

**NOTE**

If you will be touring or using the MLC 16 at different venues, you can greatly reduce setup time using the Device Position Edit capability. When creating a pattern or show, record only the pan and tilt traits of a stage

look into their own Selective Traits scene. During setup at a new venue, re-record the new pan and tilt positions into the existing scenes and they will update into your current patterns and shows. You can also record these new positions as new Selective Trait scenes, allowing you to edit them into your pattern scene steps without deleting the old positions.

## Recording Patterns

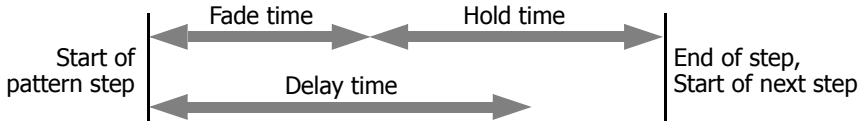
There are two ways to record patterns; from previously recorded scenes, or using manual (live) control of fixtures or groups.

### Recording Patterns Using Scenes

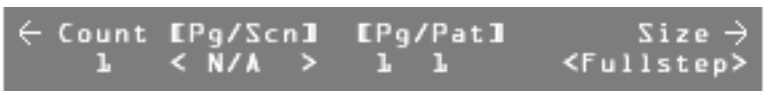
To record a pattern from previously recorded scenes:

1. Press the **Record** button.
   *The LED on the button lights, and you enter Record mode.*
2. Press **F2**, above `Pattern`.


3. Turn Modify wheel 1 to select the pattern number.
4. Turn Modify wheel 4 to select the recording mode, `Select` or `All` traits.
   **Note:** In general, use the same record mode that you have used to record scenes. The same principles apply from Recording Scenes.
5. Press **F4**, above `Traits`.
   **Note:** If the pattern has been previously recorded, the display prompts whether or not to delete the programming. If you select `Yes` or if there is no previous programming, the LCD display prompts for the fade, hold, and delay times of the first step.
6. Turn Modify wheels 1, 2, and 3 to modify the fade, hold, and delay times for this pattern step.
   **Note:** Fade time is the time in which the continuous channels fade from their current positions to the positions of this step. Hold time is the time that the faded channels hold their positions after the fade is complete. After the hold time has timed out, the next step of the pattern will execute. If the hold time has been set to Manual, the LED above the **Go** button will begin to flash. The pattern will wait on this step until the **Go** button is pressed. The delay time starts at the beginning of the step and determines when continuous channels will change. This allows you to delay such things as color wheel movements until later in the step rather than right at the beginning.




7. Press either of the **More** buttons.



8. Turn Modify wheel 4 to select **Fullstep** or **Scnstep**.
   **Note:** In All Traits mode you can only record Fullsteps. In Selective Traits mode each pattern step can have up to ten scenes layered together.
9. Turn Modify wheel 2 to select the desired scene.
   **Note:** In Scene Step mode, turn Modify wheel 1 to select **Count 2**, and enter the next scene; continue until you have entered the desired number of scenes.
10. Press the **More** buttons, then press **F4**, above **Rec**, or press the **Record** button.
    *The step is recorded.*
11. Record more steps, following this procedure.
12. When finished, press the **Blackout** or **Edit** button to exit Record mode.

### Recording Patterns Using Manual Control

To record a pattern using manual (live) control of the device:

1. Press the **Record** button.
   *The LED on the button lights, and you enter Record mode.*
2. Press **F2**, above **Pattern**.
3. Turn Modify wheel 1 to select the pattern to be recorded.
4. Turn Modify wheel 4 to select the recording mode, **Select** or **All** traits.
5. Press **F4**, above **Traits**.
6. Turn Modify wheels 1, 2, and 3 to modify the fade, hold, and delay times.
7. Press any of the **Fixture** or **Group** buttons for the desired device or group.
8. Press the **Select** button for the desired device or group.
   *The LCD display shows the traits, and you have control of the fixture(s).*
   **Note:** In the Selective Traits mode, only those traits captured (indicated by an asterisk beside a trait value when a device is selected) will be recorded. Whenever a device is selected with no pattern or show active, all traits for that device are immediately captured.
9. Set the desired look on stage with all necessary groups and devices.
10. Press the **Record** button.
11. Repeat the previous two steps to record more pattern steps.
12. When finished, press the **Blackout** or **Edit** button to exit Record mode.

## Editing Patterns

You can edit patterns to modify the scenes they contain, as well as fade, hold, and delay times of each step, or insert or remove pattern steps.

To edit a pattern:

1. Press the **Edit** button.
2. Press **F2**, above **Pattern**.
3. Turn Modify wheel 1 to select the pattern to be edited.
4. Press **F4**, above **Select Edit**.
5. Turn Modify wheel 4 to select the pattern step to edit.
6. Turn Modify wheels 1, 2, and 3 to modify the fade, hold, and delay times.


7 Press the **More** button to access the scenes.


8 Turn Modify wheels 1 and 2 to change the desired scenes.
**Note:** After making edits in each step, you must save them before editing another step.

9 Press the **Record** button,
or press the **More** button two times, then **F4**, above `Rec`.
*The changes to the step are saved.*

10 Continue making changes to pattern steps,
or press the **Blackout** or **Edit** button to exit Edit mode.

## Inserting or Deleting Pattern Steps

To insert or delete pattern steps:

1 Press the **Edit** button.

2 Press **F2**, above `Pattern`.

3 Turn Modify wheel 1 to select a pattern.

4 Press **F4**, above `Edit`.

5 Turn Modify wheel 4 to select the step to be deleted, or the place to insert a step.
**Note:** An inserted step will be a copy of the step selected, and will be inserted after it. Once the new step is inserted, you can edit its content.

6 Press the **More** button two times.


7 Press **F2**, above `Insert`, to add a pattern step,
or press **F3**, above `Delete`, to remove a pattern step.

8 Continue to insert and/or delete pattern steps.

9 Press the **Blackout** or **Edit** button to exit Edit mode.

## Using Real Time Record

It can be difficult to know exactly what times will be best when recording a pattern. Using the Real Time Recording mode, you can modify the times of a prerecorded pattern in real time while, for example, the selected music is playing.

To activate the Real Time Recording mode:

1 Press the **Record** button.

2 Press **F2**, above `Pattern`.

3 Turn Modify wheel 1 to select the Pattern number.

4 Turn Modify wheel 4 to select `All` traits or `Select` traits.

5 Press **F2**, above `Real Time`.


6 Press the **Hold** button to start the selected pattern running.
*A timer on the LCD display starts to run.*

7 When it is time to move to the next step, press the **Hold** button again.
*The elapsed time will be used to relatively modify the stored times.*

8 Continue this process until you have gone through all the steps.
*The Real Time Recording mode ends once the last step is complete.*

## Recording Shows

You can link together patterns that have been recorded into the console to form shows. You can record 256 shows.

To record a show:

1 Press the **Record** button.

2 Press **F3**, above **Show**.

3 Turn Modify wheel 1 to select the Show number.

4 Turn Modify wheel 2 to select the number of loops to be played.
**Note:** You can set 1-250 loops, or infinite loops.

5 Turn Modify wheel 4 to select **New**.

6 Press **F4**, above **Select**.


7 Turn Modify wheel 2 to select a pattern for Step 1.

8 Turn Modify wheel 3 to select the number of loops for that pattern.

9 Turn Modify wheel 4 to select **Save**, **Cancel**, or **Exit**.
- Choose **<Save>** to save the current show step.
- Choose **<Cancel>** to return the values to their original state.
- Choose **<Exit>** to return to the previous menu.

10 Press **F4**, above **Select**.
*Repeat steps 7-10 until you have selected all the desired patterns.*

11 Press the **Blackout** button to exit Record mode.

## Editing Shows

To edit a show:

1 Press the **Edit** button.

2 Press **F3**, above **Show**.

3 Turn Modify wheel 1 to select the show to be edited.

4 Turn Modify wheel 4 until the LCD display shows **Edit**, or press **F4** to view the steps in the pattern.

5 Press **F4**, above **Select <Edit>**.


6 Turn Modify wheel 1 to select the show step or pattern to edit.

7 Turn Modify wheel 2 to change the pattern in the step.

8 Turn Modify wheel 3 to increase or decrease the number of loops in this step.

9 Turn Modify wheel 4 to choose an option.
- Choose **<Save>** to save the changes you have made to the current step.
- Choose **<Insert>** to add a step using the current information.
- Choose **<Delete>** to remove the current pattern or show step.
- Choose **<Cancel>** to return the step to its originally recorded pattern.
- Choose **<Exit>** to return to the last menu.

10 Press **F4**, above **Select**.

11 Press the **Blackout** or **Edit** button to exit Edit mode.

# Playback

Once you have completed recording a scene, pattern, or show, you will want to play it back. The basic procedures for playing scenes, patterns, or shows are similar.

## Playing Back a Scene

To activate a scene:

1. Press the **Scene** button.
2. Press the **Select** button for the desired scene.
   **Note:** If information is recorded, the LED on the button lights green indicating that all channels recorded into this Scene are controlled by this memory. If another recorded **Scene** button is pressed, one of two things will happen to any other Scene LEDs that may be currently on; they will go out or turn orange. If an LED goes out, it indicates the scene no longer controls any of the channels recorded into it. If the LED turns orange, the act of activating the new scene has taken control of some but not all of the channels recorded into the scene. This gives the scene section a Last Action takes Precedence operation style.

To reactivate a partially controlled scene (as indicated by an orange LED) press and hold the corresponding **Select** button until the LED turns green, indicating full control. If a device or group is active on the channels that the scene controls, it may activate only partially or possibly not at all.

To release or deactivate a scene, press the corresponding **Select** button or press the **Blackout** button.

## Playing Back a Pattern

To activate a pattern:

1. Press the **Pattern** button.
2. Select the Page number where the pattern is located.
3. Press the **Select** button for the desired pattern.

**NOTE**

The same Last Action takes Precedence operation style is applicable to patterns.

To release or deactivate a pattern, press the corresponding **Select** button or press the **Blackout** button.

## Playing Back a Show

To activate a show:

1. Press the **Show** button.
2. Press the **Select** button for the desired show.

To release or deactivate a show, press the corresponding **Select** button or press the **Blackout** button.

# MIDI

The MLC 16 allows you to use MIDI commands to activate and deactivate the playback of scenes, patterns, and shows.

## Setting the MIDI Channel

All MIDI commands sent and received by the MLC 16D use this channel number. It can be set from 1 to 16.

To set the MIDI channel:

1. Press the **Edit** button.
2. Press **F4**, above `Setup`.
3. Press **F3**, above `Console`.
4. Press the **More** button two times.
5. Press **F4**, above `Select Edit`.
6. Turn Modify wheel 2 to select the desired MIDI channel.
7. Press **F4**, above `Select Save`.
8. Press the **Blackout** or **Edit** button to exit Setup mode.

## Default MIDI Assignments

The default MIDI assignment sends a two command sequence whenever a scene, pattern, or show is deactivated. In the following table, ranges of values are indicated between brackets: { }.

| Effect | Command 1 | Command 2 |
|---|---|---|
| Scene {1...24} On | Program 64 | Program {0...23} |
| Pattern {1...24} On | Program 65 | Program {0...23} |
| Pattern {25...48} On | Program 66 | Program {0...23} |
| Pattern {49...72} On | Program 67 | Program {0...23} |
| Pattern {73...96} On | Program 68 | Program {0...23} |
| Show {1...24} On | Program 69 | Program {0...23} |
| Scene {1...24} Off | Program 70 | Program {0...23} |
| Pattern {1...24} Off | Program 71 | Program {0...23} |
| Pattern {25...48} Off | Program 72 | Program {0...23} |
| Pattern {49...72} Off | Program 73 | Program {0...23} |
| Pattern {73...96} Off | Program 74 | Program {0...23} |
| Show {1...24} Off | Program 75 | Program {0...23} |
| Blackout | Program 114 | None |

**EXAMPLE**

To activate Pattern 15 of Page 4, send **<PC 68><PC 14>**.
*<PC 68> refers to Pattern page 4; <PC 14> activates* **Select** *button 15.*

## Editing Default MIDI Command Sequences

Each scene, pattern, and show, along with the **Blackout** button, can have one or two MIDI command sequences assigned to it. The commands can consist of any combination of Note On, Note Off, Program Change and Control Change commands. There are separate On and Off sequences for each memory, but only one sequence for the **Blackout** button.

To select the item to edit:

1. Press the **Edit** button.
2. Press **F4**, above **Setup**.
3. Press **F3**, above **Console**.
4. Press the **More** button three times.
5. Turn Modify wheel 1 to select the event (scene, pattern, show, or blackout) to edit.
6. Turn Modify wheel 2 clockwise to view the default second command.
7. Once you have selected the item to edit, press **F4**, above **Select Edit**.


8. Turn Modify wheel 1 to change the command name or to select **None** so that no command is used.
   *Three fields are surrounded by brackets; the Command Name, the Commands Number, and the value for Note and Control Change commands.*
9. Turn Modify wheel 2 to change the value of the Commands Number to a value between 0 and 127.
10. Turn Modify wheel 3 to change the value for Note and Control Change commands to a value between 0 and 127.
    **Note:** If you rotate past **127**, **Any** is selected, indicating the value is not used and any value will cause the event to trigger.

# Troubleshooting

If you are having trouble with the MLC 16 and you have not been able to find an answer in this guide or the checklist below, our technical support staff is available Monday through Friday, 8:00 A.M.-5:00 P.M. PST.

NSI Technical Support: 800-864-2502.

## Lockups

As with any software product, lockups can occasionally happen. While we do everything possible to minimize these occurrences, we cannot guarantee they will never happen. Please help us eliminate these problems by reporting them to us.

If your MLC 16 has locked up or the LCD display shows **`Invalid flash memory`**, turn the power off and back on again. If the console does not return to the MLC 16 Main Screen, try bypassing the Device Definition section by holding down the **More** button while turning on power to the console. If this works, you probably have a corrupted device definition. You will need to clear and initialize the devices currently in the memory (see "Clearing and Initializing Memory" on page 17). If the console still does not respond, you will need to reset it (see "Resetting the Console" on page 18). This will erase all memory from the console and return it to the factory default settings. For this reason it is important to have a backup file of all console information.

If you can, try to reproduce the problem by repeating your actions. If you can send us a description of how to repeat the problem we are much more likely to solve the problem quickly.

## Bugs

A bug causes the console to behave strangely, but not lock up. If a function is inconsistent in a particular mode but works fine otherwise, there could be a bug in the software. If you think you have found a bug, please report it to us. We can only fix bugs if our users tell us about them.

## Reporting Problems

When you report a lockup or software bug, please include the following information:

- Your name and contact information
- Date of the report
- Software release number (see below)
- Build number (see below)
- Whether the problem is repeatable (have you been able to consistently reproduce the same result?)
- Description of the problem; the steps involved in producing the problem, or what you were doing when the problem occurred (please provide as much detail as possible)

Please fax reports to 503-404-5601 or send email to pl-webtech@leviton.com.

To find the software release and build numbers:

1. Press the **Edit** button.
2. Press **F4**, above **`Setup`**.

3 Press **F3**, above `Console`.

4 Press the **More** button eight times.

## Software Updates

As we continue to update and enhance the MLC 16, new software is released. Check our Web site (www.nsicorp.com) periodically for possible software updates.

## Troubleshooting Checklist

| | |
|---|---|
| Console will not power up. | • Make sure the power supply is connected to the console.<br>• Make sure the power switch is on. |
| Console seems to function, but devices do not respond. | • Make sure address setting on the device matches the one assigned on the console.<br>• Check for a bad control cable by replacing it.<br>• Make sure the DMX512 pinout configuration is correct for the device being used.<br>• Make sure the last device in the cable link has been terminated with a terminating resistor. |
| Device responds erratically. | • The device may have multiple operating modes and is set to one that is different from the one defined within the MLC 16. To determine which mode to use for the device, see the addendum of currently defined devices (consult the factory or visit the Web site).<br>• Make sure the last device in the cable link has been terminated with a terminating resistor.<br>• An excessively long Interbyte Delay may be set.<br>• You may need a higher grade cable. |
| Control exists over a device, but it does not light. | • The Grand Master may be at minimum. From the MLC 16 Main Screen, turn Modify wheel 4, below `GM:` to adjust the value.<br>• Some Devices need to have its lamp struck after powerup via the DMX512 control signal. "Lamp On" is usually an item found in the device definition. (Press the **Fixture** button for the device to gain manual control, and scroll through the traits on the LCD using the **More** button until `Special` appears. Turn the corresponding Modify wheel until `Lamp On` appears.)<br>• Check the fixture's lamp. |

| | |
|---|---|
| Main LCD menu reads **!Fixture Overlap Error!.** | • **Fixture** button assignments have been made that have resulted in traits from one device to be assigned to the same output channels as traits from another device. Devices almost always control more than one output channel. Therefore, starting channel assignments will not be consecutive channel numbers. See "Assigning Fixtures" on page 8. |
| MLC 16 Main Screen reads **!Group Matching Found No Matching Traits!.** | • A **Group** button has been assigned **Fixture** buttons that have devices assigned that have no common trait labels. For it to be useful, a Group should be assigned so that there is at least one common trait label among all **Fixture** buttons assigned to it. |
| MLC 16 Main Screen reads **!Group Matching Contains No Traits To Display!.** | • A **Group** button has been assigned **Fixture** buttons that have assigned devices that only have either pan, tilt, or both pan and tilt, in common. The joystick or mouse will control those channels. |
| **Scene Select** button LED lights momentarily when button is pressed but then goes out. | • The scene has not been programmed or has been programmed in Select mode with no traits captured. Re-record the Scene. |
| **Pattern Select** button LED will not turn on. | • The pattern has not been programmed.<br>• The LED may be out. Try the Panel Test to verify. |
| Pattern runs for awhile, then turns off. | • The pattern has a step recorded with no trait included. This can result during editing of a pattern if a step is inserted and then not recorded. |

# Appendix

## ASCII Formatting Guide

### Overview

General ASCII formats (standard text files) allow data to be easily read and modified on a computer using a text editor. However, in order for the information to be understood by the console, certain rules must followed. These rules form the syntax that is used by the MLC 16 to describe its programming. By following these rules, you can write your own programming or device definitions offline and load them into the console through the RS-232 port.

The general syntax for ASCII formats is as follows:

- Only one command per line.
- Lines are terminated by a carriage return or a carriage return/line feed combination.
- All commands start with a keyword, which can be prefaced by spaces or tabs.
- Keywords are not case sensitive.
- All keywords, except "End", are followed by a value. The keyword and value are separated by a space(s).
- Any text following a semicolon is ignored. This allows a file created with a text editor to contain comments. Comments are not retained within the console.

### Device Definition Language

The Device Definition Language (DDL) is used to describe an object's personality, which is controlled by the MLC 16. Devices can include intelligent lighting fixtures, fog machines, traditional luminerie/color scroller combinations or simply a series of dimmer channels. Through the use of DDL, the MLC 16 can present the individual attributes or traits of the personality with descriptive labels rather than simple channel numbers as with a standard lighting console.

You can program Device Definitions into the MLC 16 two ways:

- Program it directly on the console using the Device Define utility of the Setup menu.
- Import it into the console through either the disk driver or the RS-232 port. The last line of the file must contain the key word **`End`**. This flags the console that the file is complete; without it the last trait of the definition is lost.

| Keyword | Valid Values | Description | Example |
|---|---|---|---|
| Device | 16-character text string | Defines the name of the device. | `Device Scanner` |
| Trait | 8-character text string | Defines the text label of the trait. | `Trait Pan` |
| Type | Union, EndUnion, Continuous, Indexed | Defines the type of the trait. | `Type Indexed` |

| Keyword | Valid Values | Description | Example |
|---|---|---|---|
| Channel | 1-256 | Defines the channel offset of the trait. | `Channel 8` |
| Size | 8bit, 16bit | Defines the trait as 8 bit or 16 bit. Only used in continuous types. | `Size 8Bit` |
| Invert | Yes, No | Causes the joystick or a wheel to work opposite of normal when controlling the trait. | `Invert Yes` |
| XAxis | Yes, No | Assigns the trait to the horizontal movement of the joystick. | `XAxis Yes` |
| YAxis | Yes, No | Assigns the trait to the horizontal movement of the joystick. | `YAxis No` |
| Black | Yes, No | Assigns the trait to the **Blackout** button. | `Black No` |
| BoValue | 8 bit: 0-255<br>16 bit: 0-65,535 | Defines the value that the **Blackout** button assigns to the trait. | `BoValue 0` |
| Master | Yes, No | Assigns the trait to the Master Wheel. | `Master No` |
| Default | 8 bit: 0-255<br>16 bit: 0-65,535 | Defines the value that the **Default** button assigns to the trait. | `Default 128` |
| Maximum | 8 bit: 0-255<br>16 bit: 0-65,535 | Defines the maximum value of a continuous trait. | `Maximum 255` |
| Minimum | 8 bit: 0-255<br>16 bit: 0-65,535 | Defines the minimum value of a continuous trait. | `Minimum 0` |
| Index | 8-character text string followed by a comma and a value ranging from 0-255 | Defines the text label and its value of an index entry of an indexed type trait. | `Index Red,30` |
| End | None | Defines the end of the file. Only required for RS-232 input files. | |

A new device definition is initiated and named with the `Device` keyword. Keywords on following lines define the traits of that device.

Each trait can be one of four types; continuous, indexed, union, or end union. Use continuous types for traits, such as pan or dimmer, that use the full range of DMX512 values. Use indexed types for traits that only use specific DMX512 values or use a ranges of values that cause no change to the trait. Examples of indexed types include color or gobo wheels.

The last two types, union and end union, form a pair which, used together, frame a sequence of continuous and indexed types. This sequence allows a single trait to take on the characteristics of both continuous and indexed types. A common example of a union structure would be a color wheel that provides a continuous movement range and also a "snap to color" indexed range. Once assigned and activated, the MLC 16D compares the current value of the trait to values defined by the traits within the union/end union structure until a match is found. If no match is found, the actual value is displayed, placed in brackets. Turning the wheel that controls the union trait will sequence through the values of the current trait in the structure. Once the last value is reached and the wheel is rotated again, control is transferred to the next trait in the structure. This passing of control from one trait to trait continues until the end of the structure is reached.

Following is an example of an intelligent device called "Scanner." It has five traits; pan, tilt, color, gobo and dimmer. Pan, tilt and dimmer are continuous examples. Gobo is an indexed type example. Color is defined such that there are four values (0,30,60,90) that position the wheel to specific colors and a range of values (100-255) that continuously moves the wheel through all the colors. By using a union/end union trait type combination, you can maintain all the functionality on one wheel. An indexed type is used within the union/end union structure to define the four color positions with descriptive labels (white, red, blue and yellow), followed by a continuous type that defines the continuous scrolling of the wheel.

| | |
|---|---|
| Device Name | **Device Scanner** |
| Pan | **Trait Pan**<br>**Type Continuous**<br>**Channel 1**<br>**Size 8Bit**<br>**Invert No**<br>**XAxis Yes**<br>**YAxis No**<br>**Black No**<br>**BoValue 0**<br>**Master No**<br>**Default 128**<br>**Maximum 255**<br>**Minimum 0** |
| Tilt | **Trait Tilt**<br>**Type Continuous**<br>**Channel 2**<br>**Size 8Bit**<br>**Invert No**<br>**XAxis No**<br>**YAxis Yes**<br>**Black No**<br>**BoValue 0**<br>**Master No**<br>**Default 128**<br>**Maximum 255**<br>**Minimum 0** |

Color

```
Trait Color
Type Union
Channel 3
Black No
BoValue 0
Default 0
Trait Color
Type Indexed
Index White,0
Index Red,30
Index Blue,60
Index Yellow,90
Trait Clr
Type Continuous
Maximum 255
Minimum 100
Trait Color
Type EndUnion
```

Gobo

```
Trait Gobo
Type Indexed
Channel 4
Black No
BoValue 0
Default 0
Index Open,0
Index Stars,30
Index Circle,60
Index Triangle,90
Index Dot,120
Index Dots,150
```

Dimmer

```
Trait Dimmer
Type Continuous
Channel 5
Size 8Bit
Invert No
XAxis No
YAxis No
Black Yes
BoValue 0
Master Yes
Default 255
Maximum 255
Minimum 0
End
```

The MLC 16 LCD display shows traits in the order they are defined. Traits assigned to either axis of the joystick are not displayed. It is possible to define more than one trait for the same channel. This can be useful if you would like to have pan and tilt on both the LCD and the joystick. Simply define two pan traits and two tilt traits. Set them up exactly the same except that one is assigned to the joystick and one is not.

Following is a diagram of what the LCD display shows if the above definition is assigned and activated with a **Fixture** button with all output channels currently set to zero.


The asterisks indicate that the traits are captured.

If the Color trait had been set to a value that is not defined by the union structure, the console displays the actual value encased in brackets as shown here.


A continuous type within a union/end union structure uses its label as part of the trait's value label. This makes it possible to identify multiple continuous traits within one union/end union trait. Labels should be kept to a maximum of four characters since an offset value is displayed after the label to indicate the position within the range. In this example the top line of the LCD display shows **Color**, the union label. **Clr**, the continuous label, is shown just below the trait label followed by a number starting at 1 and continuously incrementing to 156 (max(255) - min(100) + 1 = 156).

Once Modify wheel 1 has been used to change the color trait to **Yellow**, turning it once more clockwise causes control to be transferred to the continuous portion of the union/end union structure. The display looks like this:

## Device Assignment Formats

| Keyword | Valid Values | Description |
|---|---|---|
| FixAssign | 1-16 followed by a device name, comma and channel offset | Assigns devices to **Fixture** buttons. |
| Group | 1-4 | Establishes Group number for group assigning. |
| GroupFix | 1-16 | Defines a **Fixture** button to a group. |
| MaxDims | 49-512 | Maximum number of dimmers output. |
| InterB | 0-256 | DMX512 interbyte delay. |
| DMX IM Mod | Off, PassThru, 9 channel | DMX512 Input mode. |
| DMX In Ch | 1-504 | Starting channel for 9 channel DMX512 Input. |
| Rlock | Yes, No | Record lock. |
| Slock | Yes, No | Setup lock. |
| Flock | Yes, No | Fixture lock. |
| MidiCh | 1-16 | MIDI channel. |
| MidiScn | 1-24 | Establishes Scene number for MIDI command assigning. |
| MidiPat | 1-96 | Establishes Pattern number for MIDI command assigning. |
| MidiShw | 1-24 | Establishes Scene number for MIDI command assigning. |

| Keyword | Valid Values | Description |
|---|---|---|
| On<br>Off | Non, Noff, CC: followed by a comma, followed by a number 0-127, followed by a comma, followed by a value 0-127 or "Any."<br>PC: followed by a comma, followed by a number 0-127.<br>Non, Noff, CC: followed by a comma, followed by a number 0-127, followed by a comma, followed by a value 0-127<br>PC: followed by a comma, followed by a number 0-127 | Assigns a MIDI On command to a MIDI event.<br>Assigns a MIDI Off command to a MIDI event. |

## Scene Formats

| Keyword | Valid Values | Description |
|---|---|---|
| Scene | 1-24 | Establishes scene number to be programmed. |
| Fade | 0-27:00.0 | Determines the scene fade time. |
| Traits | All, Select | Determines whether all traits or only those referenced are flagged for control. |
| Fixture | 1-16 | Establishes fixture number for which following trait values are to be applied. |
| T: | Trait label followed by a comma, followed by a valid numerical value of label. | Assigns a trait value to a scene channel. |

Following is an example of a Scene file in ASCII format. Assume that the Scanner definition established in the DDL section has been assigned to **Fixture** buttons 1 and 2.

```
Scene 1
Traits All
fixture 1 ;Scanner
T: Pan,150
T: Tilt,30
T: Color,White
T: Gobo,Open
T: Dimmer,255
```

```
fixture 2 ;Scanner
T: Pan,100
T: Tilt,75
T: Color,White
T: Gobo,Open
T: Dimmer,255
Scene 2
Traits All
fixture 1 ;Scanner
T: Pan,200
T: Tilt,187
T: Color,White
T: Gobo,Open
T: Dimmer,255
fixture 2 ;Scanner
T: Pan,120
T: Tilt,25
T: Color,White
T: Gobo,Open
T: Dimmer,255
Scene 9
Traits Select
fixture 1 ;Scanner
T: Color,Red
fixture 2 ;Scanner
T: Color,Red
Scene 10
Traits Select
fixture 1 ;Scanner
T: Color,Blue
device 2 ;Scanner
T: Color,Blue
Scene 11
Traits Select
fixture 1 ;Scanner
T: Color,Yellow
fixture 2 ;Scanner
T: Color,Yellow
```

Scenes 1 and 2 program all traits for the two Scanners. Scenes 9 - 11 program only color and can be used to modify the color of Scene 1 or 2. All other traits remain unchanged. The **`;Scanner`** string after the device number is a comment for reference that is output from the console.

## Pattern Formats

| Keyword | Valid Values | Description |
|---|---|---|
| Pattern | 1-96 | Establishes Pattern number to be programmed. |
| Step | 1-808 | Establishes Step number to be programmed. |
| StepType | FullStep, ScnStep | Determines if Full Step or Scene Step. |
| Traits | All, Select | Determines whether all traits or only those referenced are flagged for control. |
| Scene | 0-24 | Attaches a scene memory to a pattern step. 0=No Step. |
| Fade | 0-27:00.0 | Determines the pattern step fade time. |
| Hold | 0-27:00.0 | Determines the pattern step hold time. |
| Delay | 0-27:00.0 | Determines the pattern step delay time. |
| Fixture | 1-16 | Establishes fixture number for which following trait values are to be applied. |
| T: | Trait label followed by a comma, followed by a valid numerical value or label. | Assigns a trait value to a pattern step channel. |

Following is an example of a Pattern file in ASCII format. Assume that the Scanner definition established in the DDL section has been assigned to **Fixture** buttons 1 and 2. Step 1 is a full step, step 2 is a full step with a scene (17) attached and step 3 is a scene step.

```
Pattern 1
Step 1
StepType FullStep
Traits All
Fade 1.0
Hold 0
Delay 0
Scene 0
fixture 1 ;Scanner
T: Pan,25
T: Tilt,30
T: Color,Clr 100
T: Gobo,Dots
T: Dimmer,255
fixture 2 ;Scanner
T: Pan,240
```

```
T: Tilt,30
T: Color,Yellow
T: Gobo,Dots
T: Dimmer,255
Step 2
StepType FullStep
Traits All
Fade 1.0
Hold 0
Delay 0
Scene 17
fixture 1 ;Scanner
T: Pan,150
T: Tilt,100
T: Color,Clr 100
T: Gobo,Dots
T: Dimmer,255
fixture 2 ;Scanner
T: Pan,150
T: Tilt,100
T: Color,Yellow
T: Gobo,Dots
T: Dimmer,255
Step 3
StepType ScnStep
Traits All
Fade 1.0
Hold 0
Delay 0
Scene 1
Scene 11
Scene 16
Scene 20
Scene 23
fixture 1 ;Scanner
T: Pan,240
T: Tilt,30
T: Color,Clr 100
T: Gobo,Dots
T: Dimmer,255
fixture 2 ;Scanner
T: Pan,25
T: Tilt,30
T: Color,Yellow
T: Gobo,Dots
T: Dimmer,255
```

## Show Formats

| Keyword | Valid Values | Description |
|---|---|---|
| Show | 1-24 | Establishes Pattern number to be programmed. |
| Loop | 1-250, Infinite | Determines the number of times the show will loop until it extinguishes itself. |
| Step | 1-24 | Establishes Step number to be programmed. |
| PatNum | 1-96 | Determines the Pattern number that will run during a show step. |
| Times | 1-250 | Determines the number of times the pattern will loop within the show step. |

Following is an example of a Show file in ASCII format. This Show has four steps and will loop through them ten times. Step 1 runs Pattern 1 four times, step 2 runs Pattern 2 five times, step 3 runs Pattern 80 two hundred times and step 4 runs Pattern 20 ten times.

```
Pattern 1
Loop 10

Step 1
PatNum 1
Times 4

Step 2
PatNum 2
Times 5

Step 3
PatNum 80
Times 200

Step 4
PatNum 20
Times 10
```

# Tables

### DMX Input Blackout

| | Chan 1 | Chan 2 | Chan 3 | Chan 4 | Chan 5 | Chan 6 | Chan 7 | Chan 8 | Chan 9 |
|---|---|---|---|---|---|---|---|---|---|
| Blackout | | | | | | | | | |

* = channel at full, all others at minimum

## DMX Input Scenes 1-24 On

| | Chan 1 | Chan 2 | Chan 3 | Chan 4 | Chan 5 | Chan 6 | Chan 7 | Chan 8 | Chan 9 |
|---|---|---|---|---|---|---|---|---|---|
| Scene 1 On | * | | | | | | | | |
| Scene 2 On | | * | | | | | | | |
| Scene 3 On | * | * | | | | | | | |
| Scene 4 On | | | * | | | | | | |
| Scene 5 On | * | | * | | | | | | |
| Scene 6 On | | * | * | | | | | | |
| Scene 7 On | * | * | * | | | | | | |
| Scene 8 On | | | | * | | | | | |
| Scene 9 On | * | | | * | | | | | |
| Scene 10 On | | * | | * | | | | | |
| Scene 11 On | * | * | | * | | | | | |
| Scene 12 On | | | * | * | | | | | |
| Scene 13 On | * | | * | * | | | | | |
| Scene 14 On | | * | * | * | | | | | |
| Scene 15 On | * | * | * | * | | | | | |
| Scene 16 On | | | | | * | | | | |
| Scene 17 On | * | | | | * | | | | |
| Scene 18 On | | * | | | * | | | | |
| Scene 19 On | * | * | | | * | | | | |
| Scene 20 On | | | * | | * | | | | |
| Scene 21 On | * | | * | | * | | | | |
| Scene 22 On | | * | * | | * | | | | |
| Scene 23 On | * | * | * | | * | | | | |
| Scene 24 On | | | | * | * | | | | |

* = channel at full, all others at minimum

## DMX Input Scenes 1-24 Off

| | Chan 1 | Chan 2 | Chan 3 | Chan 4 | Chan 5 | Chan 6 | Chan 7 | Chan 8 | Chan 9 |
|---|---|---|---|---|---|---|---|---|---|
| Scene 1 Off | * | | | | * | | | * | |
| Scene 2 Off | | * | | | * | | | * | |
| Scene 3 Off | * | * | | | * | | | * | |
| Scene 4 Off | | | * | | * | | | * | |
| Scene 5 Off | * | | * | | * | | | * | |
| Scene 6 Off | | * | * | | * | | | * | |
| Scene 7 Off | * | * | * | | * | | | * | |
| Scene 8 Off | | | | * | * | | | * | |
| Scene 9 Off | * | | | * | * | | | * | |
| Scene 10 Off | | * | | * | * | | | * | |
| Scene 11 Off | * | * | | * | * | | | * | |
| Scene 12 Off | | | * | * | * | | | * | |
| Scene 13 Off | * | | * | * | * | | | * | |
| Scene 14 Off | | * | * | * | * | | | * | |
| Scene 15 Off | * | * | * | * | * | | | * | |
| Scene 16 Off | | | | | | * | | * | |
| Scene 17 Off | * | | | | | * | | * | |
| Scene 18 Off | | * | | | | * | | * | |
| Scene 19 Off | * | * | | | | * | | * | |
| Scene 20 Off | | | * | | | * | | * | |
| Scene 21 Off | * | | * | | | * | | * | |
| Scene 22 Off | | * | * | | | * | | * | |
| Scene 23 Off | * | * | * | | | * | | * | |
| Scene 24 Off | | | | | | * | | * | |

* = channel at full, all others at minimum

## DMX Input Patterns 1-24 On

| | Chan 1 | Chan 2 | Chan 3 | Chan 4 | Chan 5 | Chan 6 | Chan 7 | Chan 8 | Chan 9 |
|---|---|---|---|---|---|---|---|---|---|
| Pattern 1 On | * | | | * | * | | | | |
| Pattern 2 On | | * | | * | * | | | | |
| Pattern 3 On | * | * | | * | * | | | | |
| Pattern 4 On | | | * | * | * | | | | |
| Pattern 5 On | * | | * | * | * | | | | |
| Pattern 6 On | | * | * | * | * | | | | |
| Pattern 7 On | * | * | * | * | * | | | | |
| Pattern 8 On | | | | | | * | | | |
| Pattern 9 On | * | | | | | * | | | |
| Pattern 10 On | | * | | | | * | | | |
| Pattern 11 On | * | * | | | | * | | | |
| Pattern 12 On | | | * | | | * | | | |
| Pattern 13 On | * | | * | | | * | | | |
| Pattern 14 On | | * | * | | | * | | | |
| Pattern 15 On | * | * | * | | | * | | | |
| Pattern 16 On | | | | * | | * | | | |
| Pattern 17 On | * | | | * | | * | | | |
| Pattern 18 On | | * | | * | | * | | | |
| Pattern 19 On | * | * | | * | | * | | | |
| Pattern 20 On | | | * | * | | * | | | |
| Pattern 21 On | * | | * | * | | * | | | |
| Pattern 22 On | | * | * | * | | * | | | |
| Pattern 23 On | * | * | * | * | | * | | | |
| Pattern 24 On | | | | | * | * | | | |

* = channel at Full, all others at minimum

## DMX Input Patterns 25-48 On

| | Chan 1 | Chan 2 | Chan 3 | Chan 4 | Chan 5 | Chan 6 | Chan 7 | Chan 8 | Chan 9 |
|---|---|---|---|---|---|---|---|---|---|
| Pattern 25 On | * | | | | * | * | | | |
| Pattern 26 On | | * | | | * | * | | | |
| Pattern 27 On | * | * | | | * | * | | | |
| Pattern 28 On | | | * | | * | * | | | |
| Pattern 29 On | * | | * | | * | * | | | |
| Pattern 30 On | | * | * | | * | * | | | |
| Pattern 31 On | * | * | * | | * | * | | | |
| Pattern 32 On | | | | * | * | * | | | |
| Pattern 33 On | * | | | * | * | * | | | |
| Pattern 34 On | | * | | * | * | * | | | |
| Pattern 35 On | * | * | | * | * | * | | | |
| Pattern 36 On | | | * | * | * | * | | | |
| Pattern 37 On | * | | * | * | * | * | | | |
| Pattern 38 On | | * | * | * | * | * | | | |
| Pattern 39 On | * | * | * | * | * | * | | | |
| Pattern 40 On | | | | | | | * | | |
| Pattern 41 On | * | | | | | | * | | |
| Pattern 42 On | | * | | | | | * | | |
| Pattern 43 On | * | * | | | | | * | | |
| Pattern 44 On | | | * | | | | * | | |
| Pattern 45 On | * | | * | | | | * | | |
| Pattern 46 On | | * | * | | | | * | | |
| Pattern 47 On | * | * | * | | | | * | | |
| Pattern 48 On | | | | * | | | * | | |

* = channel at full, all others at minimum

## DMX Input Patterns 49-72 On

| | Chan 1 | Chan 2 | Chan 3 | Chan 4 | Chan 5 | Chan 6 | Chan 7 | Chan 8 | Chan 9 |
|---|---|---|---|---|---|---|---|---|---|
| Pattern 49 On | * | | | * | | | * | | |
| Pattern 50 On | | * | | * | | | * | | |
| Pattern 51 On | * | * | | * | | | * | | |
| Pattern 52 On | | | * | * | | | * | | |
| Pattern 53 On | * | | * | * | | | * | | |
| Pattern 54 On | | * | * | * | | | * | | |
| Pattern 55 On | * | * | * | * | | | * | | |
| Pattern 56 On | | | | | * | | * | | |
| Pattern 57 On | * | | | | * | | * | | |
| Pattern 58 On | | * | | | * | | * | | |
| Pattern 59 On | * | * | | | * | | * | | |
| Pattern 60 On | | | * | | * | | * | | |
| Pattern 61 On | * | | * | | * | | * | | |
| Pattern 62 On | | * | * | | * | | * | | |
| Pattern 63 On | * | * | * | | * | | * | | |
| Pattern 64 On | | | | * | * | | * | | |
| Pattern 65 On | * | | | * | * | | * | | |
| Pattern 66 On | | * | | * | * | | * | | |
| Pattern 67 On | * | * | | * | * | | * | | |
| Pattern 68 On | | | * | * | * | | * | | |
| Pattern 69 On | * | | * | * | * | | * | | |
| Pattern 70 On | | * | * | * | * | | * | | |
| Pattern 71 On | * | * | * | * | * | | * | | |
| Pattern 72 On | | | | | | * | * | | |

* = channel at full, all others at minimum

## DMX Input Patterns 73-96 On

| | Chan 1 | Chan 2 | Chan 3 | Chan 4 | Chan 5 | Chan 6 | Chan 7 | Chan 8 | Chan 9 |
|---|---|---|---|---|---|---|---|---|---|
| Pattern 73 On | * | | | | | * | * | | |
| Pattern 74 On | | * | | | | * | * | | |
| Pattern 75 On | * | * | | | | * | * | | |
| Pattern 76 On | | | * | | | * | * | | |
| Pattern 77 On | * | | * | | | * | * | | |
| Pattern 78 On | | * | * | | | * | * | | |
| Pattern 79 On | * | * | * | | | * | * | | |
| Pattern 80 On | | | | * | | * | * | | |
| Pattern 81 On | * | | | * | | * | * | | |
| Pattern 82 On | | * | | * | | * | * | | |
| Pattern 83 On | * | * | | * | | * | * | | |
| Pattern 84 On | | | * | * | | * | * | | |
| Pattern 85 On | * | | * | * | | * | * | | |
| Pattern 86 On | | * | * | * | | * | * | | |
| Pattern 87 On | * | * | * | * | | * | * | | |
| Pattern 88 On | | | | | * | * | * | | |
| Pattern 89 On | * | | | | * | * | * | | |
| Pattern 90 On | | * | | | * | * | * | | |
| Pattern 91 On | * | * | | | * | * | * | | |
| Pattern 92 On | | | * | | * | * | * | | |
| Pattern 93 On | * | | * | | * | * | * | | |
| Pattern 94 On | | * | * | | * | * | * | | |
| Pattern 95 On | * | * | * | | * | * | * | | |
| Pattern 96 On | | | | * | * | * | * | | |

* = channel at full, all others at minimum

## DMX Input Patterns 1-24 Off

| | Chan 1 | Chan 2 | Chan 3 | Chan 4 | Chan 5 | Chan 6 | Chan 7 | Chan 8 | Chan 9 |
|---|---|---|---|---|---|---|---|---|---|
| Pattern 1 Off | * | | | * | | * | | * | |
| Pattern 2 Off | | * | | * | | * | | * | |
| Pattern 3 Off | * | * | | * | | * | | * | |
| Pattern 4 Off | | | * | * | | * | | * | |
| Pattern 5 Off | * | | * | * | | * | | * | |
| Pattern 6 Off | | * | * | * | | * | | * | |
| Pattern 7 Off | * | * | * | * | | * | | * | |
| Pattern 8 Off | | | | | * | * | | * | |
| Pattern 9 Off | * | | | | * | * | | * | |
| Pattern 10 Off | | * | | | * | * | | * | |
| Pattern 11 Off | * | * | | | * | * | | * | |
| Pattern 12 Off | | | * | | * | * | | * | |
| Pattern 13 Off | * | | * | | * | * | | * | |
| Pattern 14 Off | | * | * | | * | * | | * | |
| Pattern 15 Off | * | * | * | | * | * | | * | |
| Pattern 16 Off | | | | * | * | * | | * | |
| Pattern 17 Off | * | | | * | * | * | | * | |
| Pattern 18 Off | | * | | * | * | * | | * | |
| Pattern 19 Off | * | * | | * | * | * | | * | |
| Pattern 20 Off | | | * | * | * | * | | * | |
| Pattern 21 Off | * | | * | * | * | * | | * | |
| Pattern 22 Off | | * | * | * | * | * | | * | |
| Pattern 23 Off | * | * | * | * | * | * | | * | |
| Pattern 24 Off | | | | | | | * | * | |

* = channel at full, all others at minimum

## DMX Input Patterns 25-48 Off

| | Chan 1 | Chan 2 | Chan 3 | Chan 4 | Chan 5 | Chan 6 | Chan 7 | Chan 8 | Chan 9 |
|---|---|---|---|---|---|---|---|---|---|
| Pattern 25 Off | * | | | | | | * | * | |
| Pattern 26 Off | | * | | | | | * | * | |
| Pattern 27 Off | * | * | | | | | * | * | |
| Pattern 28 Off | | | * | | | | * | * | |
| Pattern 29 Off | * | | * | | | | * | * | |
| Pattern 30 Off | | * | * | | | | * | * | |
| Pattern 31 Off | * | * | * | | | | * | * | |
| Pattern 32 Off | | | | * | | | * | * | |
| Pattern 33 Off | * | | | * | | | * | * | |
| Pattern 34 Off | | * | | * | | | * | * | |
| Pattern 35 Off | * | * | | * | | | * | * | |
| Pattern 36 Off | | | * | * | | | * | * | |
| Pattern 37 Off | * | | * | * | | | * | * | |
| Pattern 38 Off | | * | * | * | | | * | * | |
| Pattern 39 Off | * | * | * | * | | | * | * | |
| Pattern 40 Off | | | | | * | | * | * | |
| Pattern 41 Off | * | | | | * | | * | * | |
| Pattern 42 Off | | * | | | * | | * | * | |
| Pattern 43 Off | * | * | | | * | | * | * | |
| Pattern 44 Off | | | * | | * | | * | * | |
| Pattern 45 Off | * | | * | | * | | * | * | |
| Pattern 46 Off | | * | * | | * | | * | * | |
| Pattern 47 Off | * | * | * | | * | | * | * | |
| Pattern 48 Off | | | | * | * | | * | * | |

* = channel at full, all others at minimum

## DMX Input Patterns 49-72 Off

| | Chan 1 | Chan 2 | Chan 3 | Chan 4 | Chan 5 | Chan 6 | Chan 7 | Chan 8 | Chan 9 |
|---|---|---|---|---|---|---|---|---|---|
| Pattern 49 Off | * | | | * | * | | * | * | |
| Pattern 50 Off | | * | | * | * | | * | * | |
| Pattern 51 Off | * | * | | * | * | | * | * | |
| Pattern 52 Off | | | * | * | * | | * | * | |
| Pattern 53 Off | * | | * | * | * | | * | * | |
| Pattern 54 Off | | * | * | * | * | | * | * | |
| Pattern 55 Off | * | * | * | * | * | | * | * | |
| Pattern 56 Off | | | | | | * | * | * | |
| Pattern 57 Off | * | | | | | * | * | * | |
| Pattern 58 Off | | * | | | | * | * | * | |
| Pattern 59 Off | * | * | | | | * | * | * | |
| Pattern 60 Off | | | * | | | * | * | * | |
| Pattern 61 Off | * | | * | | | * | * | * | |
| Pattern 62 Off | | * | * | | | * | * | * | |
| Pattern 63 Off | * | * | * | | | * | * | * | |
| Pattern 64 Off | | | | * | | * | * | * | |
| Pattern 65 Off | * | | | * | | * | * | * | |
| Pattern 66 Off | | * | | * | | * | * | * | |
| Pattern 67 Off | * | * | | * | | * | * | * | |
| Pattern 68 Off | | | * | * | | * | * | * | |
| Pattern 69 Off | * | | * | * | | * | * | * | |
| Pattern 70 Off | | * | * | * | | * | * | * | |
| Pattern 71 Off | * | * | * | * | | * | * | * | |
| Pattern 72 Off | | | | | * | * | * | * | |

* = channel at full, all others at minimum

## DMX Input Patterns 73-96 Off

| | Chan 1 | Chan 2 | Chan 3 | Chan 4 | Chan 5 | Chan 6 | Chan 7 | Chan 8 | Chan 9 |
|---|---|---|---|---|---|---|---|---|---|
| Pattern 73 Off | * | | | | * | * | * | * | |
| Pattern 74 Off | | * | | | * | * | * | * | |
| Pattern 75 Off | * | * | | | * | * | * | * | |
| Pattern 76 Off | | | * | | * | * | * | * | |
| Pattern 77 Off | * | | * | | * | * | * | * | |
| Pattern 78 Off | | * | * | | * | * | * | * | |
| Pattern 79 Off | * | * | * | | * | * | * | * | |
| Pattern 80 Off | | | | * | * | * | * | * | |
| Pattern 81 Off | * | | | * | * | * | * | * | |
| Pattern 82 Off | | * | | * | * | * | * | * | |
| Pattern 83 Off | * | * | | * | * | * | * | * | |
| Pattern 84 Off | | | * | * | * | * | * | * | |
| Pattern 85 Off | * | | * | * | * | * | * | * | |
| Pattern 86 Off | | * | * | * | * | * | * | * | |
| Pattern 87 Off | * | * | * | * | * | * | * | * | |
| Pattern 88 Off | | | | | | | | | * |
| Pattern 89 Off | * | | | | | | | | * |
| Pattern 90 Off | | * | | | | | | | * |
| Pattern 91 Off | * | * | | | | | | | * |
| Pattern 92 Off | | | * | | | | | | * |
| Pattern 93 Off | * | | * | | | | | | * |
| Pattern 94 Off | | * | * | | | | | | * |
| Pattern 95 Off | * | * | * | | | | | | * |
| Pattern 96 Off | | | | * | | | | | * |

* = channel at full, all others at minimum

## DMX Input Shows 1-24 On

| | Chan 1 | Chan 2 | Chan 3 | Chan 4 | Chan 5 | Chan 6 | Chan 7 | Chan 8 | Chan 9 |
|---|---|---|---|---|---|---|---|---|---|
| Show 1 On | * | | | * | * | * | * | | |
| Show 2 On | | * | | * | * | * | * | | |
| Show 3 On | * | * | | * | * | * | * | | |
| Show 4 On | | | * | * | * | * | * | | |
| Show 5 On | * | | * | * | * | * | * | | |
| Show 6 On | | * | * | * | * | * | * | | |
| Show 7 On | * | * | * | * | * | * | * | | |
| Show 8 On | | | | | | | | * | |
| Show 9 On | * | | | | | | | * | |
| Show 10 On | | * | | | | | | * | |
| Show 11 On | * | * | | | | | | * | |
| Show 12 On | | | * | | | | | * | |
| Show 13 On | * | | * | | | | | * | |
| Show 14 On | | * | * | | | | | * | |
| Show 15 On | * | * | * | | | | | * | |
| Show 16 On | | | | * | | | | * | |
| Show 17 On | * | | | * | | | | * | |
| Show 18 On | | * | | * | | | | * | |
| Show 19 On | * | * | | * | | | | * | |
| Show 20 On | | | * | * | | | | * | |
| Show 21 On | * | | * | * | | | | * | |
| Show 22 On | | * | * | * | | | | * | |
| Show 23 On | * | * | * | * | | | | * | |
| Show 24 On | | | | | * | | | * | |

* = channel at full, all others at minimum

## DMX Input Shows 1-24 Off

| | Chan 1 | Chan 2 | Chan 3 | Chan 4 | Chan 5 | Chan 6 | Chan 7 | Chan 8 | Chan 9 |
|---|---|---|---|---|---|---|---|---|---|
| Show 1 Off | * | | | * | | | | | * |
| Show 2 Off | | * | | * | | | | | * |
| Show 3 Off | * | * | | * | | | | | * |
| Show 4 Off | | | * | * | | | | | * |
| Show 5 Off | * | | * | * | | | | | * |
| Show 6 Off | | * | * | * | | | | | * |
| Show 7 Off | * | * | * | * | | | | | * |
| Show 8 Off | | | | | * | | | | * |
| Show 9 Off | * | | | | * | | | | * |
| Show 10 Off | | * | | | * | | | | * |
| Show 11 Off | * | * | | | * | | | | * |
| Show 12 Off | | | * | | * | | | | * |
| Show 13 Off | * | | * | | * | | | | * |
| Show 14 Off | | * | * | | * | | | | * |
| Show 15 Off | * | * | * | | * | | | | * |
| Show 16 Off | | | | * | * | | | | * |
| Show 17 Off | * | | | * | * | | | | * |
| Show 18 Off | | * | | * | * | | | | * |
| Show 19 Off | * | * | | * | * | | | | * |
| Show 20 Off | | | * | * | * | | | | * |
| Show 21 Off | * | | * | * | * | | | | * |
| Show 22 Off | | * | * | * | * | | | | * |
| Show 23 Off | * | * | * | * | * | | | | * |
| Show 24 Off | | | | | | * | | | * |

* = channel at full, all others at minimum

# Specifications

## Console Specifications

| | |
|---|---|
| Control Channels | 512 (Up to 512 DMX512, In/Out) |
| Maximum fixtures | 16 |
| Maximum groups | 4 |
| Memory scenes | 24 |
| Patterns | 96 (Each with up to 16,923 scene steps or 808 full steps) |
| Shows | 24 (Each with up to 24 steps each) |
| Memory | Non-volatile FEPROM (at least 10 year retention) |
| MIDI | In/Out/Thru |
| Disk Drive | 3 1/2” MSDOS compatible 1.44 MByte HD only |
| Input Power | 85-135 Volts AC; 185-250 Volts AC; 50-60 Hz |
| Input Power Fuses | 250 VAC, 800 MA |
| Approx. Dimensions (H x W x D) | 4" x 24" x 15" |
| Weight (lbs) | 12 |