Cinematic Dimming Technology

Mappable LED Controller Manual
C.D.T. Map.4

CushLight.com

TABLE OF CONTENTS

1. OVERVIEW

The CDT.Map.4 Pixel Controller is a popular, fully featured board that is suitable for both commercial and hobbyist applications.

1.1. Features

- E1.31 and Artnet over Ethernet input
- 4 Pixel Outputs
- 1024 Pixels per output
- 4096 Pixels per board
- 1 DMX output
- Built in power distribution of 5A per output

1.2. Physical Board

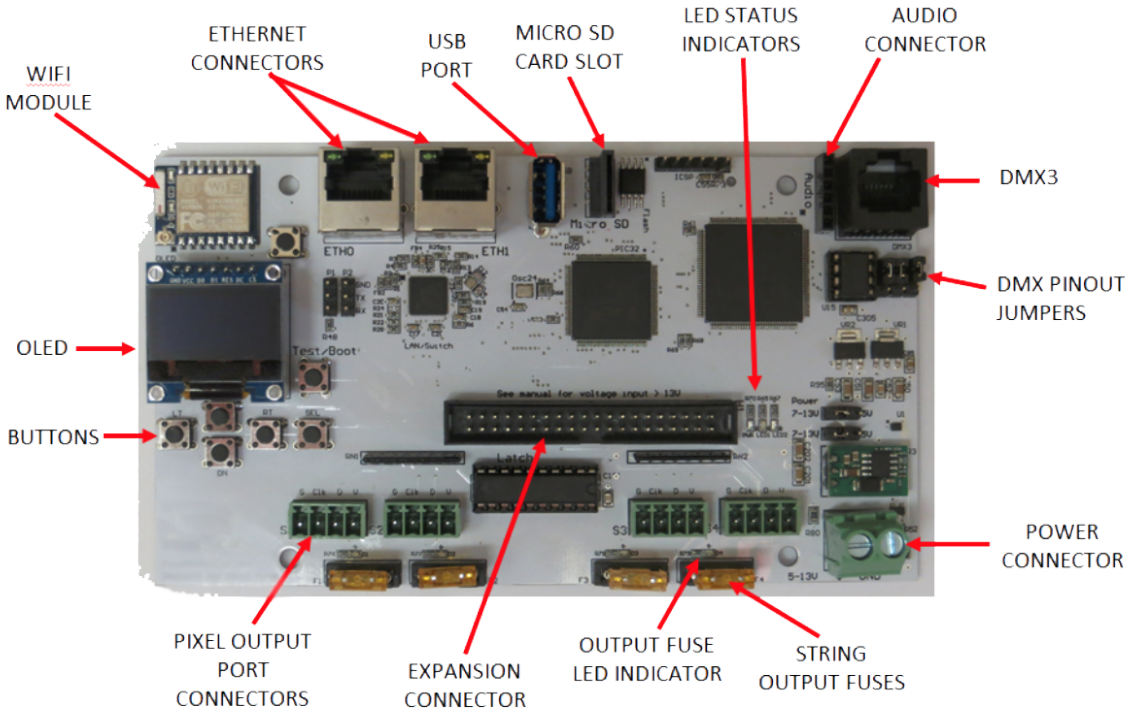


Figure 1-1 - CDT.Map.4 Controller

1.3. On-Board Displays

1.3.1. OLED Display

The OLED is a small screen near the left side of the controller (see Figure 1-1) which displays some controller information and can be used to make some changes to the settings configuration. This is useful to show the controller has booted up, make initial network connection settings, show the status or firmware updates, as well as several other features. See Section 4.1 for more information on the use of the OLED.

1.3.2. LED Status Indicators

There are three LED status indicator lights to the right of the 40 pin expansion connector (See Figures 1-1 and 1-2).

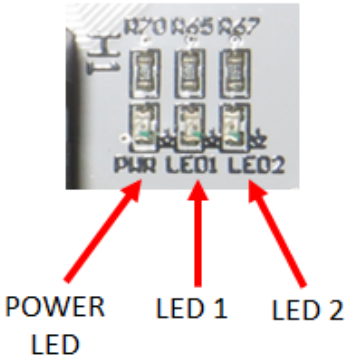


Figure 1-2 - LED Status Indicators

1.3.2.1. Power LED

The left-most LED is the Power Status indicator. This LED will be lit green when power is applied to the controller (see Section 2.1).

1.3.2.2. LED 1

The center LED is LED 1. This LED will be solid green when the controller is in Run Mode (see Sections 4.1.2.2 and 4.2.1.2.1). This LED will flash green when resetting or updating firmware.

1.3.2.3. LED 2

The right-most LED is LED 2. This LED will be solid green when the controller is in Test Mode (see Sections 4.1.2.2 and 4.2.1.2.2). This LED will flash green when resetting or updating firmware.

1.3.3. Fuse Indicator LEDs

Each Pixel Output Port on the controller has a 5 amp fuse associated with it, as shown in Figure 1-3. Above each fuse is a LED which shows the status of the fuse. A green lit LED indicates the fuse is intact and working. A LED which is not lit indicates a blown or missing fuse as shown in Figure 1-4. The status of the fuses can therefore be quickly and easily ascertained without the need for removing the fuse.

Note that the LEDs will illuminate the fuses, especially when looking at the controller in the dark, but the fuses themselves do not have LEDs installed in them. See Section 6 for replacement fuses types.

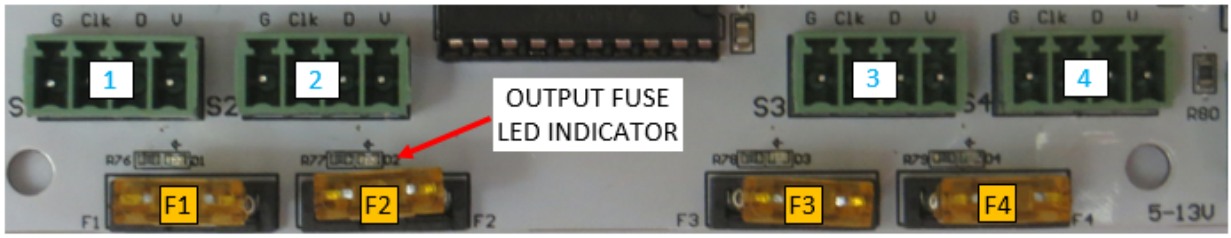


Figure 1-3 - Pixel Output Ports (white) and corresponding fuses (orange)

Figure 1-4 - Fuse Indicator LEDs (LED for Fuse 3 is out due to missing fuse, LED for Fuse 4 is lit indicating it is ok)

2. POWER

Power is needed on the CDT.Map.4 for two purposes: (1) to power the controller itself and (2) to power the pixels which will be attached to the controller. Unlike other Map controllers, the power for both the pixels and the controller functionality are powered by a single Power Connector. There is no option for an external power connection on the CDT.Map.4.

WARNING: Do not connect the CDT.Map.4 directly to a typical household outlet (110V AC Power) as this will damage the controller. A DC power supply is required for operation.

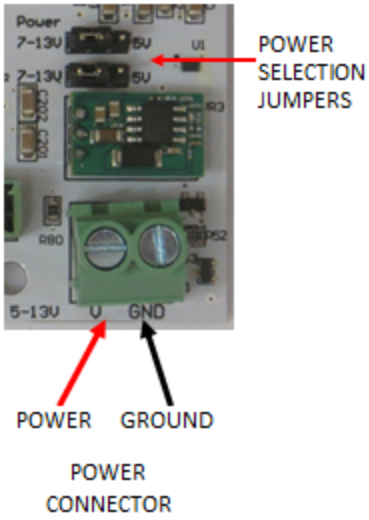


Figure 2-1 - Power Connector and Power Jumpers

2.1. Power Connector

Power input on the Power Connector is sent directly to the pixels and also powers the controller itself. The input power on can be between 5V and 13V DC, and would be selected based on the voltage of your pixels. The wiring to the Power Connector is shown in Figure 2-2. The Power Selection Jumpers must be set for the input voltage being used (see Section 2.2).

For pixels using 13V to 24V DC, see Section 12 for modifications to the controller that are required.

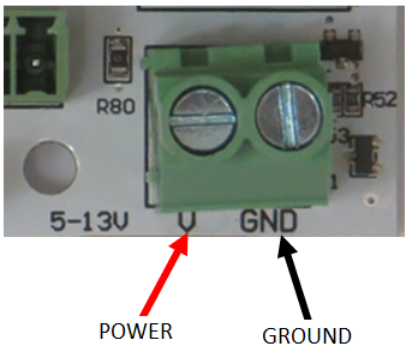


Figure 2-2 - Power Connector Wiring

The power connector is rated for 32 amps maximum current. Care should be taken to connect the proper amount of pixels such that it does not overload the connector. See Section 11 for a chart of the average current consumption of common pixels used in lighting displays.

2.2. Input Power Jumpers

The Input Power Jumpers located on the right side of the board (Figure 2-1), are used to select which voltage, either 5V or 7V to 13V, is being used to power the controller. Both jumpers must be set to the same selection. These jumpers must be set prior to applying power to the controller in order for the board to function and to avoid damage to the controller.

The CDT.Map.4 is shipped with the jumpers configured for using 12V Power. However, it is always recommended that you check the jumpers **before** applying power to the controller.

WARNING: It is possible to damage your board if you set the jumpers incorrectly!

WARNING: Do not remove or install the jumpers while the board is being powered.

- If using 7V to 13V to power the controller, the Input Power Jumpers must be placed on the left and center pins as shown in Figure 2-3. The CDT.Map.4 is shipped with the jumpers in this position.

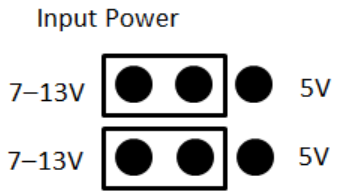


Figure 2-3 - Input Power Jumpers (set for 7V to 13V Input Power)

- If using 5V to power the controller, the Input Power Jumpers must be placed on the center and right pins as shown in Figure 2-4.

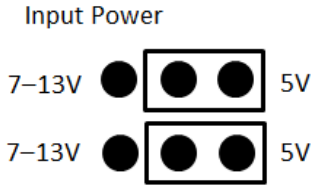


Figure 2-4 - Input Power Jumpers (set for 5V Input Power)

2.3. Real Time Clock (RTC) Battery

There is a Real Time Clock (RTC) which is located below the OLED on the left side of the board. The RTC is used to allow the CDT.Map.4 to function in stand-alone mode. Use of the RTC and stand-alone mode is not currently supported, but will be supported in future versions of the firmware. There is no need to install a battery at this time because of this.

Once enabled, a CR1225 battery (one is shipped with the controller) will be needed for the RTC to function. The battery slot is accessible from the left side of the board. The positive (+) side of the battery (the side with the writing on it) will face up when installed. It is not necessary to remove the OLED as shown in Figure 2-5 to insert or remove the battery. The OLED was removed only to show the components below for this manual.

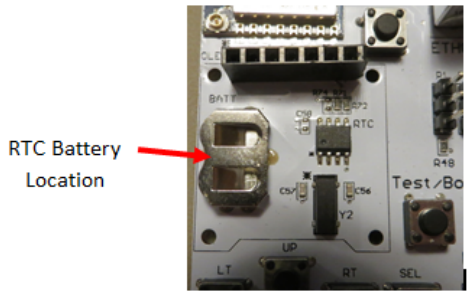


Figure 2-5 - RTC and Battery location

3. DATA

3.1. Inputs

3.1.1. E1.31/Artnet (Ethernet Connectors)

The CDT.Map.4 controller receives E1.31/Artnet data on the Ethernet Connectors on the upper left side of the controller (Figures 1-1 and 3-1). This is what would be connected to the Ethernet port on the device that is controlling your show, which is typically a computer or console.

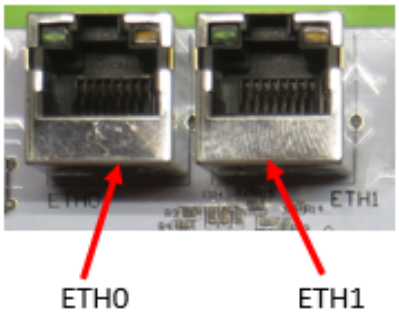


Figure 3-1: Ethernet Connectors

The two ports are connected via a switch so that data is passed on to the next device when the controller is powered. While either of the two Ethernet connectors (ETH0 or ETH1) can be used to receive data, only one of the two should be connected to the device sending the data to the controller. The other is used to to send data to additional E1.31/Artnet controllers, commonly called “daisy-chaining.”

Warning: The jacks for the Ethernet Connector and the Serial output port on the right side of the board are the same size. Plugging Ethernet into this jack may cause damage to the controller or device being plugged into the other end of the cable.

3.1.2. Wifi Module

There is a Wifi Module in the upper left corner of the controller. Use of the Wifi Module is not currently supported, but will be supported in future versions of the firmware.

Figure 3-2: Wifi Module

3.1.3. Micro SD Card Slot

The Micro SD card is currently used to update the firmware on the controller (see Section 5.1).

The Micro SD card is inserted with notches in the card toward the bottom of the CDT.Map.4, or having the writing on the top face of the card to the right side of the CDT.Map.4 (Figure 3-3).

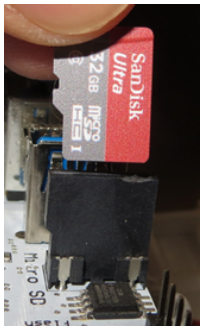


Figure 3-3: Micro SD Card Slot and Orientation

Note that the Micro SD card slot is a friction slot, and is NOT spring loaded. Push the card fully into the slot to load the card. Pull on the card to remove it.

The Micro SD card will also be used in the future as storage for sequence and audio information when the controller is in stand alone mode. This feature is not currently supported, but will be supported in future versions of the firmware.

3.2. Outputs

3.2.1. Pixel Output Ports

There are 4 Pixel Output Ports on the controller, numbered as shown in Figure 1-3, which is where the pixel strings are connected to the controller.

The wiring for the output is as shown in Figure 3-4. All Pixel Output ports use the same wiring configuration.

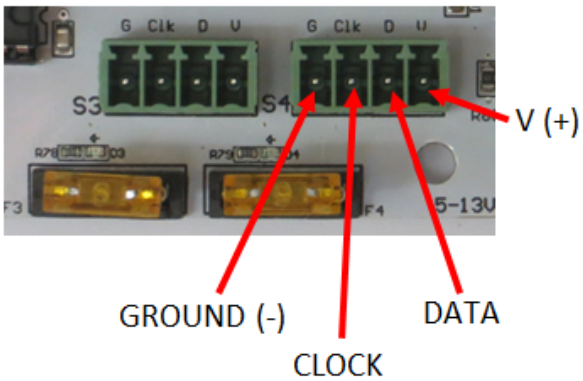


Figure 3-4: Pixel Output Port Wiring

- G is the Ground (-) wire for the pixel string.
- Clock is used for timing on some pixel strings which have 4 wires. Three wire pixels such as WS2811, GECE, TM18XX and TLS3001 use will not use the “Clock” signal, and no wire should be connected here.
- Data is the wire over which the signal telling the pixel what to do is sent.
- V (+) is the voltage to the pixel which provides the power to light the pixel LEDs. The voltage output to the pixels will be the same as that input to the controller through the Power Connector. See Section 2.1 for additional information.

The CDT.Map.4 supports a maximum of 1024 pixels per output port. On the CDT.Map.4 this limit is the same with or without an expansion board being used.

Note that the power from the controller alone will likely be insufficient to control 1024 pixels and power injection will likely be necessary. The actual number of pixels that can be powered without power injection varies with a number of factors including distance between the control and the pixels, distance between pixels, intensity or brightness of the pixels, type of pixel, and voltage of the pixels. As a general rule of thumb, approximately 50 of most 5V pixels or 125 of most 12V pixels can be powered directly from the controller at full brightness without power injection. Note that this limitation is due to the power consumption of the lights and microchips in each pixel, not the controller itself.

Each of the Pixel Output ports has a 5A fuse and has a Fuse Indicator LED associated with it. The 5A fuse helps to protect the controller from damage should there be a problem with any strings connected to the port trying to draw too much current. The Fuse Indicator LEDs allow for the status of the fuses to be quickly determined. See Section 1.3.3 for more information.

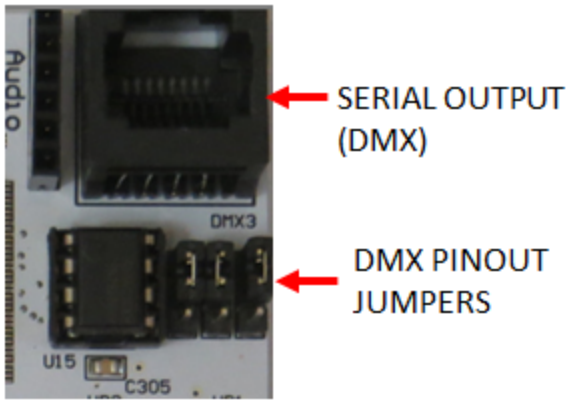
Note that only “Smart” type pixel strings are supported by the CDT.Map.4. “Analog” pixel strings, where all pixels on the string must be the same color, are not supported. Connecting a Analog string to the controller may damage the string or controller.

The connectors for the Pixel Output Ports are 4-Pin, 3.5mm Pitch Screw Terminal Block Connectors, Pluggable Type with straight-pin. 4 connectors are provided with each controller. If additional connectors are needed, see Section 6 of this Manual for a description and link.

3.2.2. Serial Output Port (DMX)

The CDT.Map.4 has one dedicated RS-485 Serial circuit. The circuit is made available to the user via a Serial Output Port (RJ45 connector jack), located at the top right corner of the board. This is typically referred to as the DMX output port or DMX output jack. The jack is labelled as DMX3 (Figure 1-1).

The Serial circuit can be configured to output DMX,



<u>Warning: The jacks for the Ethernet Connector and the serial output ports on the right side of the board are the same size (RJ45). Plugging Ethernet into these jacks may cause damage to the controller or device being plugged into the other end of the cable.</u>

3.2.3. USB Port

The USB port on the board will be used as an audio output source in future versions of the firmware. Use of the USB port is not supported at this time.

Note that the USB port is not intended to be used for data storage at any time. All files will be stored on the Micro SD card.

<u>WARNING</u>: Do *<u>NOT</u>* use the USB port as a power source for any devices except an audio output device. Using the USB port to power other devices may damage the controller or the device.

3.2.4. Audio Connector

In the near future an audio board will be made available to output high quality stereo audio on an analog 3.5mm jack.

4. SETTINGS/CONFIGURATION

The CDT.Map.4 has several settings which will need to be configured in order to make the controller work with your setup. There are two general methods for changing the settings on the controller, the OLED screen on the controller itself and through a web page interface. The basic controller settings can be viewed and changed using either method, however to access to all settings, such as string port settings, the Web Interface needs to be used.

4.1. OLED Access

The OLED is a small screen near the top left side of the controller (see Figure 1-1) which displays some information and can be used to make some changes to the settings configuration using the 5 push buttons below the OLED (see Figure 4-1). This allows for the basic configuration and status updates of the controller to be made without the need for external access via a computer or other device. This is helpful when first setting up the controller to connect to the network or for testing purposes. The controller needs to be powered for the OLED to function, but does not require any network connection.

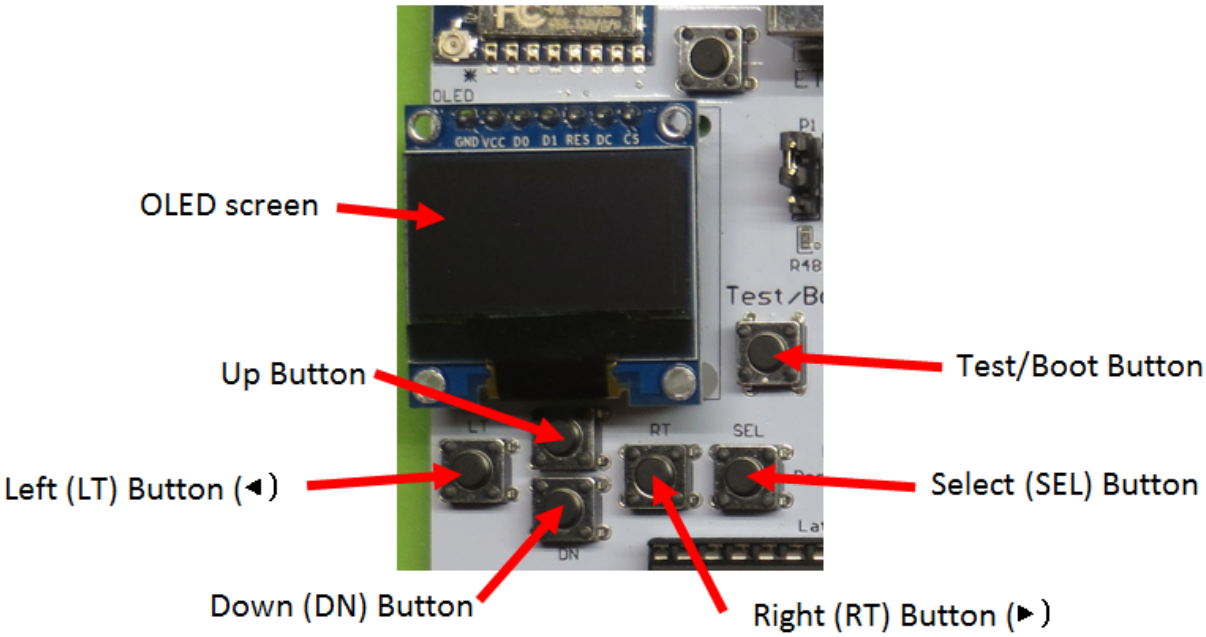


Figure 4-1: OLED Screen and Push Buttons

The OLED operates through a series of menu screens for adjusting the settings. Using the buttons below the OLED will advance between the various menus.

The current firmware provides a screen-saver feature for the OLED. The screen will become blank after about 30 minutes after last button is pushed. This may happen when the controller is being used for extended periods of time, such as in your show. To return to the Startup Screen from the blank screen, press any of the buttons below the OLED screen.

4.1.1. Startup Screen

This is the screen that will appear when the controller is first powered up or when a button is pushed to remove the blank screen. General information about the controller is displayed on this screen.

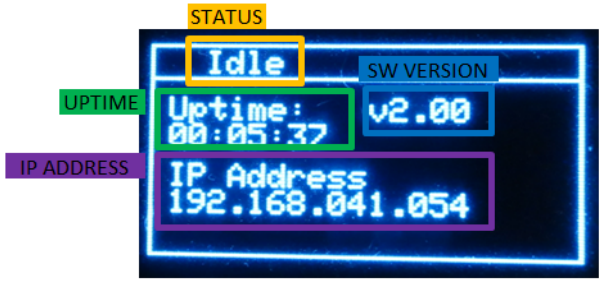


Figure 4-2: OLED Startup Screen - Idle Status

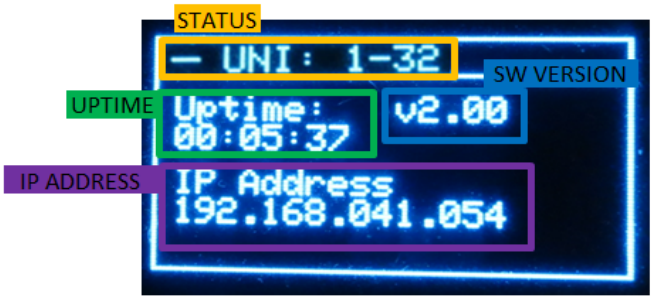


Figure 4-3: OLED Startup Screen - Receiving Data

To return to the Startup Screen from other menus, use the Left Button. Pressing several times may be required depending on the menu currently displayed.

4.1.1.1. Input Status

The top line of the screen indicates the current stats of the controller input.

- “Idle” indicates that there is no input coming into the controller. Note that under the CDT.Map.4 Test mode, this will remain as “Idle”. If testing is being generated by a sequencer, scene recorder, or other similar device, this will change, as the controller is receiving data.
- A spinning line followed by “UNI:” indicates data is being received by the controller. The numbers following the colon (:) are the lowest and highest universes of data being received. These are the controller universes, so will be between 1 and 96.

4.1.1.2. Uptime

The duration of time since the controller has been rebooted or powered up is shown below the “Uptime:” wording.

4.1.1.3. SW Version

To the right of the Uptime, is the SW Version. This is the Firmware Version installed on the controller.

The list of firmware versions with updates included in each can be found following this link:
Current Firmware and Release Notes

To update the controller firmware, see Section 5.

4.1.1.4. IP Address

The Internet Protocol (IP) address of the controller. The IP address is what most sequencing software or show controllers use to identify each light controller. It must be unique to each device on a network or errors will occur.

If the controller is connected to a network, entering the IP address on a web browser’s address bar will show the controller's web page interface which can be use for making any changes to the controller setup rather than using the OLED screen.

To change the IP Address from the OLED screen, see Sections 4.1.2 and 4.1.2.1.3. For additional information on IP Addresses, see Section 4.2.2.4.

4.1.2. Main Menu Screen

To get to the Main Menu screen, from the Startup Screen, press any of the buttons below the OLED. On the main Menu, there are 4 choices which can be selected as follows:

1. Network
2. Test
3. Info
4. E131 Stats

To select a choice, use the up or down buttons to highlight the choice, and then push the Select button.

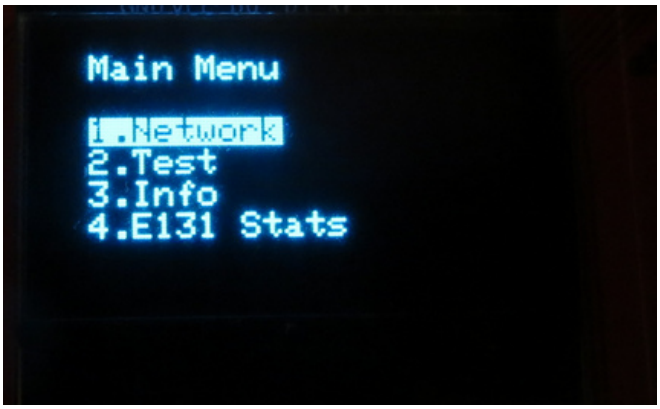


Figure 4-4: OLED Main Menu Screen

4.1.2.1. Network Screen

The network screen (Figure 4-5) displays several, but not all, of the network configuration parameters for the controller. Each of the network configurations shown can be edited directly on the controlled by selecting the desired item using the up/down buttons until highlighted, and then pressing the select button, which will bring up a new screen. For more information on Networking Configuration, see Section 4.2.2.

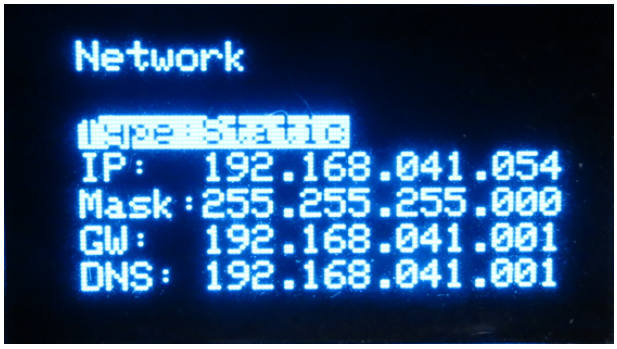


Figure 4-5: OLED Network Screen

If a change was made to any of the Network Configuration Items on their individual screens, the OLED will display **(◂▸ to save)** after the word “Network” at the top of the screen (Figure 4-6). This indicates that pressing the left or right buttons will take you to the Save Network Settings Menu (Figure 4-7). No changes are saved until you prompt the controller to save the changes (See Section 4.1.2.1.1). Edits to all 5 Network Configuration parameters can be made prior to saving settings.

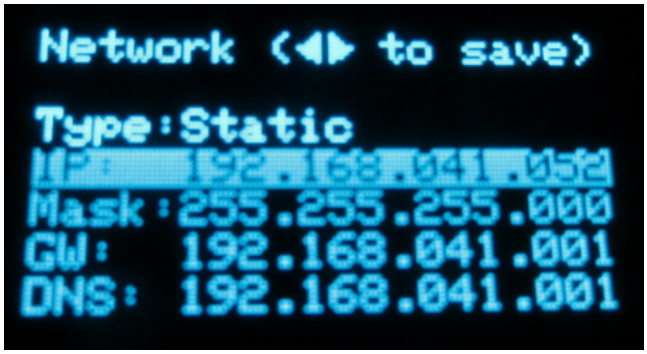


Figure 4-6: OLED Network Screen after changes have been made

4.1.2.1.1. Save Network Settings Menu

This screen appears when the left or right button is pressed after making changes to the Network Screen (Figure 4-6). Use the up and down buttons to highlight the choice and then push the select button to perform the operation.

1. Save and reboot - All changes made on the Network page will be saved to the controller. The controller will reboot so that all changes take effect.

2. Discard Settings - All changes made on the Network page are discarded. The controller will not reboot as no changes will have been made.

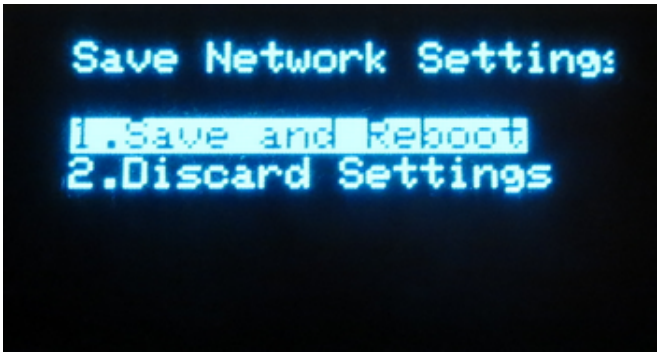


Figure 4-7: OLED Save Network Settings Screen

4.1.2.1.2. Type

This defines the Network type which can be either DHCP or Static. If selected, the Edit Network Type Screen will be brought up (Figure 4-8). The current configuration will be shown with an asterisk (*) before the name. To change the type, select the desired type using the up/down buttons until highlighted, and then press the select button.

Figure 4-8: OLED Edit Network Type Screen

1. DHCP - Also known as Dynamic. When this is selected, the controller IP address and other network configuration information will be automatically assigned by the router that the controller is connected to. If the controller is not connected to a network, it should display 0.0.0.0. If DHCP is selected and there is a network

connection but no DHCP server, then it defaults to 192.168.1.50

When DHCP is selected, the four addresses below it on the network menu screen (Figure 4-5) can not be selected or edited, as they are set by the router.

Selecting DHCP is the same as checking the "Enable DHCP" box on the controller Network page of the Web Interface (See Section 4.2.2.3).

2. Static - When this is selected, the controller IP address and other network configuration information is assigned by the user rather than automatically set by the router. Selecting this is the same as **NOT** checking the "Enable DHCP" box on the controller Network page of the Web Interface (See Section 4.2.2.3)

4.1.2.1.3. IP

The Internet Protocol (IP) address of the controller. If DCHP is selected, the IP address is selected automatically and rather than by the user, and can not be edited here. If Static is selected, the user can input their desired IP address for the controller. (See Section 4.2.2.4 for more information in IP addresses)

Note: The IP address of each controller (or any other device) on the network must be unique.

The IP address can be changed 1 digit at a time. Use the up/down buttons to raise or lower the number which is underlined on the OLED (Figure 4-9). To select a different digit, use the left/right buttons. When all edits are complete, press the select button to return to the Network screen.

Figure 4-9: OLED Edit IP Address Screen

Note: The first digit of each octet (set of three digits between the decimal points) can only be 0, 1, or 2 due to network addressing standards. Numbers 3 through 9 are not possible to select at these locations.

4.1.2.1.4. Mask

This is the Subnet Mask. See section 4.2.2.6 for more information. The Subnet Mask can be edited in the same fashion as the IP address (see Section 4.1.2.1.3).

4.1.2.1.5. GW

This is the Gateway. See section 4.2.2.5 for more information. The Gateway can be edited in the same fashion as the IP address (see Section 4.1.2.1.3).

4.1.2.1.6. DNS

This is the Primary DNS. See section 4.2.2.7 for more information. The Primary DNS can be edited in the same fashion as the IP address (see Section 4.1.2.1.3).

4.1.2.2. Test Menu

The Test Menu lists the available test patterns which may be selected. There are a total of five test patterns available, but only four will be displayed on the screen at any time. The arrow on the right side of the OLED will indicate which button can be pressed to see additional patterns. Note that these patterns will be the same as those found on the Web Interface Page (see Section 4.2.1.2.2 and Figure 4-19)

Figure 4-10: OLED Test Menu Screen

The currently selected test pattern will be preceded by an asterisk (*). To change the test pattern, use the up/down buttons to highlight the choice and then press the select button.

Note that selecting a test pattern does <u>NOT</u> start the test pattern, it only chooses which pattern will be displayed when the test function is selected.

To activate the Test Mode, hold the Test/Boot button (Figure 4-11) for 2-3 seconds until LED 1 is off and LED 2 is on solid (Figure 4-12). To stop the Test Mode, hold Test/Boot button for 2-3 seconds until LED 1 is on solid and LED 2 is off. Note the Power LED will be on solid for both the Run and Test Modes.

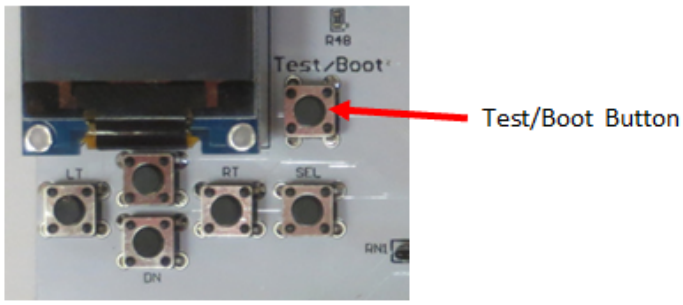


Figure 4-11: Test/Boot Mode Button

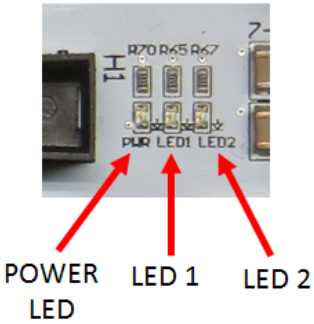


Figure 4-12: Status LEDs

The test Mode can also be activated via the Web Interface (see Section 4.2.1.2.2)

Note that the test pattern will only be output to the string ports and number of pixels which have been set up through the web interface. By default, all string ports are set to 50 pixels. If a string of more than 50 pixels are connected without reconfiguring the string output, only the first 50 pixels will be lit. This is a common error made and results in users thinking they have a partially bad string of pixels. See Section 4.2.4 on how to reconfigure the Pixel Output Ports.

4.1.2.3. Info Menu

This Information Menu provides controller information similar to that shown on the Web Interface Status page (see Section 4.2.1.3). The information shown here is for information only and cannot be edited.

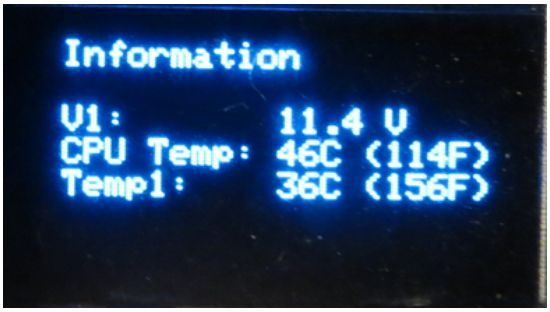


Figure 4-13: OLED Info Menu Screen

1. V1 is the Voltage Input on the V1 Power Connector.

2. CPU Temp is the temperature of the processor on the CDT.Map.4. This is displayed in both degrees Celsius (C) and Fahrenheit (F).

3. Temp1 is the Temperature as measured by the sensor which is located by the Power Connector input (see Figure 4-20). This is displayed in both degrees Celsius (C) and Fahrenheit (F).

4.1.2.4. E1.31 Stats Menu

The right column of this menu displays the number of packets received by the controller for each universe, similar to the web page interface (see Section 4.2.1.4). The universes are identified as the universe set up in your sequencer, which may not be the same as the controller universe number (see Sections 4.2.3.4 and 4.2.3.9). The universe is the number after the U.

Figure 4-14: OLED E1.31 Stats Screen

Only 5 universes are shown on the OLED screen at a time. To see additional universes, use the up/down arrow to highlight the **SEL=Next** text and press the Select Button. There are up to 20 screens of universes which can be displayed.

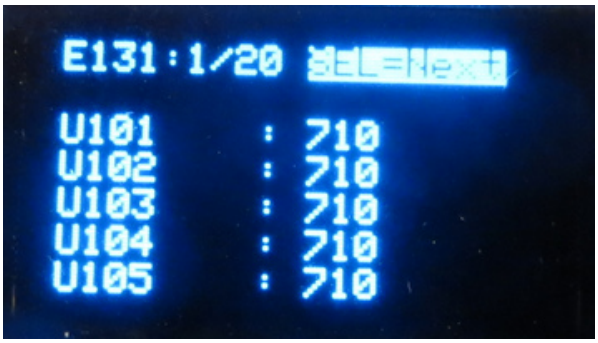


Figure 4-15: OLED E1.31 Stats Screen when receiving data

When no information is being receiver by the controller, the number of packets received will not change. This is typical in idle mode or controller test mode. When information is being received, the numbers will be steadily increasing. This is typical of the controller when running the show, or a test mode in a sequencer (Figure 4-15 is a snapshot of this).

Note that if the number of packets being receiver on a universe is remaining zero or not increasing when all other universe are doing so, there is likely a configuration error with the universe not being defined properly. An example of this is shown in Figure 4-16 on Universe 18. This error may be on either the controller or software and is often due to an error when entering the IP address for the controller.

Figure 4-16: OLED E1.31 Stats Screen with possible problem on Universe 18

Highlighting a universe using the up/down arrow buttons and then pushing select will bring you to a graphical version of the packets being receiver on that universe as shown in Figure 4-17. This can be useful for additional troubleshooting.

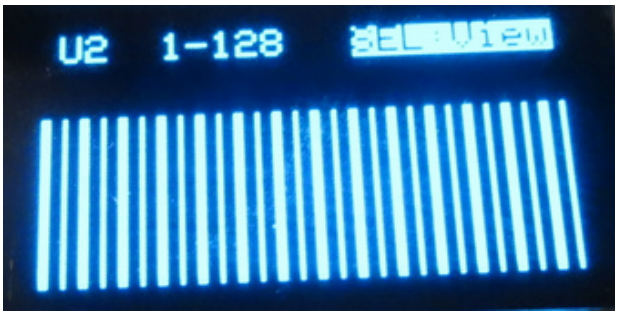


Figure 4-17: OLED E1.31 Graphical Stats Screen for Universe 2 - shown properly working

4.2. Web Interface Access

If the CDT.Map.4 is connected to a network, the controller settings may be viewed and modified via a Web Interface. The Web Interface allows for additional settings to be changed, such as the E1.31 setup, string port assignments, and serial outputs, that cannot be changed via the OLED interface. The Web Interface also allows for remote changes to take place easily rather than having to be at the controller itself.

To access the web page interface, ensure the controller is connected to the network and then enter the IP address of the CDT.Map.4 controller as shown on the OLED screen (Figure 4-2) into the web address bar on a web browser.

To select the different configuration page, select the links below the Cush Light Logo at the top of the page.

For more information on connecting the CDT.Map.4 to a network, see Section 8.

4.2.1. Status Page

The Status Page is the default web interface page which is loaded when entering the IP address of the controller into the web browser. The status of several controller functions are included on this page.

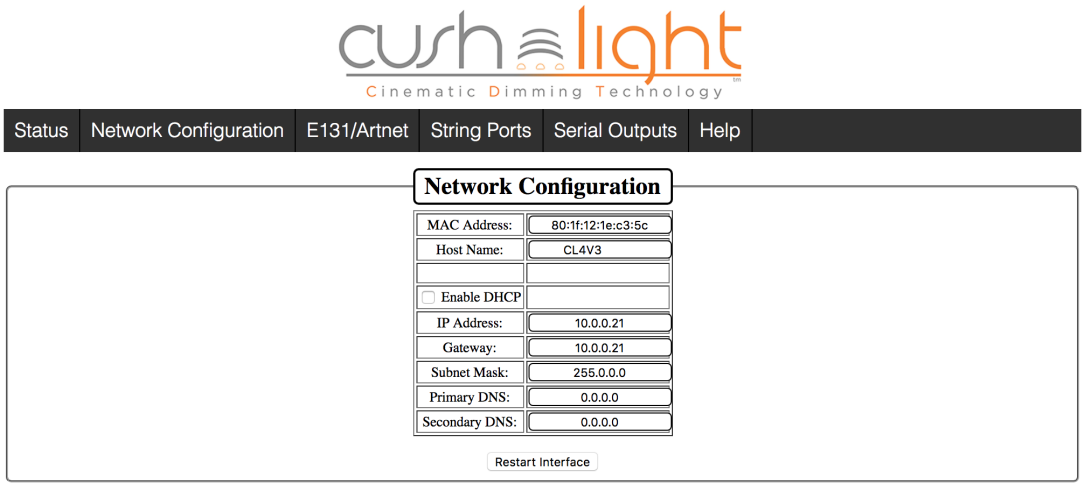


Figure 4-18: Web Status Page

4.2.1.1. Save Settings/Load Settings

The Save Setting and Load Settings links are shown in the upper right corner of the status page.

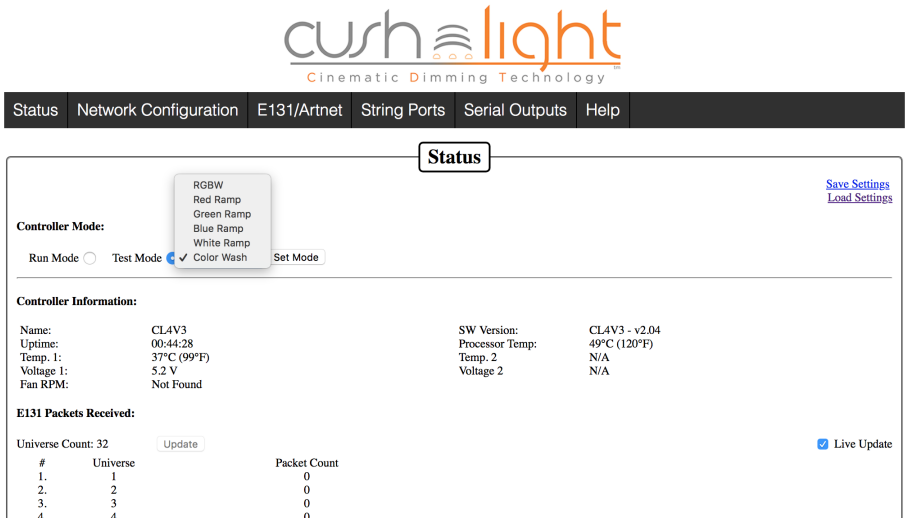


Figure 4-19: Web Status Page

4.2.1.1.1. Save Settings

Clicking on the link will save an XML file which contains the user defined setting for universe, string ports, and serials ports on the CDT.Map.4 controller. This is useful if the controller is being used for multiple displays throughout the year or performing testing. It is also useful as a backup should you run into problems and need to restore your settings. It is recommended that settings be saved prior to starting you show display each season. Should a controller be stolen or damaged due to weather, this will allow a replacement controller to be installed with the same settings as the previous controller with minimal set-up time required.

The XML file is titled “settings.xml” by default and will be saved on the device accessing the CDT.Map.4. **Note the XML file is not stored on the CDT.Map.4, the MicroSD card, or a USB drive connected to the USB port.** Changing the file name to something more descriptive can be done via a file manager or similar program after the file

is saved. If you are using multiple controllers, it is recommended that you include the controller name or location in the filename to help determine which file is for which controller.

4.2.1.1.2. Load Settings

Clicking on the link will open up a dialog box asking for an XML file which contains the settings for the CDT.Map.4. This would be the file saved which was saved in Section 4.2.1.1.1. The current settings on the controller will be overwritten when this is loaded.

4.2.1.2. Controller Mode

The controller can be set between Run Mode and Test Mode, with 5 different build in test patterns. The mode can be selected from this screen or by pressing the Test/Boot button on the controller (Figure 4-11) for 2-3 seconds.

4.2.1.2.1. Run Mode

Toggle on the radio button after “Run Mode” **AND** then click “Set Mode” to set the controller to run a sequence. This is the default state when starting the controller from a powered down state.

4.2.1.2.2. Test Mode

Toggle on the radio button after “Test Mode” **AND** then click “Set Mode” to set the controller to run a test pattern. Test mode sends a test pattern to all Pixel outputs and also DMX/Serial outputs.

The drop down menu allows you to select 5 different test patterns as shown in Figure 4-19.

Note that the test pattern can be selected, but will not be applied unless the “Set Mode” button is pressed.

Note that the test pattern will only be output to the string ports and number of pixels which have been set up through the web interface. By default, all string ports are set to 50 pixels. If a string of more than 50 pixels are connected without reconfiguring the string output, only the first 50 pixels will be lit. This is a common error made and

results in users thinking they have a partially bad string of pixels. See Section 4.2.4 on how to reconfigure the Pixel Output Ports.

Test Mode can also be activated by pressing the Test Button on the controller for 2-3 seconds (see Section 4.1.2.2).

4.2.1.3. Controller Information

This area of the page displays some general information about the controller settings and status (see Figure 4-18)

4.2.1.3.1. Name

The name assigned to the controller. This can be changed on the Network Configuration page (see Section 4.2.2.2). The controller name is displayed here, before the SW Version to the right of this, and on many of the web browser tabs (see Figure 4-18). This is useful for keeping track of which controller you are accessing when making changes, therefore, using unique names for each controller is advantageous.

4.2.1.3.2. SW Version

The current Firmware Version installed on the controller. The version follows the name of the controller as shown in the figures. The firmware version is also shown on the tabs of many of the browser web pages.

The list of firmware versions with updates included in each can be found following this link:
Current Firmware and Release Notes

To update the controller firmware, see Section 5.

4.2.1.3.3. Uptime

The duration of time since the controller has been rebooted or powered up.

4.2.1.3.4. Processor Temp

This is the temperature of the processor, displayed in both celsius and fahrenheit. This is useful for monitoring the status of the controller.

4.2.1.3.5. Temp 1

This is the ambient air temperature measured by the pre-installed temperature sensor, displayed in both celsius and fahrenheit. This is useful in extreme hot or cold temperature applications, as well as when the controller is in an enclosure or there is a large load on the controller generating heat.

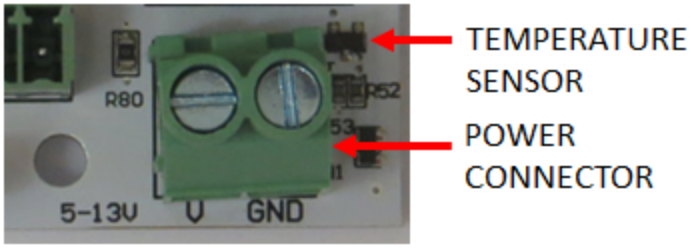


Figure 4-20: Temperature Sensor Location

4.2.1.3.6. Voltage 1

The voltage being applied on the Power Connector. This voltage is the same as that output on the Pixel Output Ports. Voltage can be between 5V and 24V (Note voltages between 13V and 24V can ONLY be used if the CDT.Map.4 is modified per Section 12 of the manual).

4.2.1.4. E1.31 Packets Received

The E1.31 Packets Received information shows the number of packets coming into the controller for each of the defined universes. The column with the # heading is the controller universe number, which will always start at 1 and increment sequentially to the number of universes selected (maximum of 96). The Universe column is the Universe as defined in the sequencer.

The “Packet Count” will only be updated if the “Live Update” box is checked. This is useful for troubleshooting to see if information is coming into the controller as anticipated. Note that this is only valid for E1.31 data, not Artnet.

The E1.31 packets received can also be accessed on the OLED (see Section 4.1.2.4)

In Figure 4-21, all of the packets have identical packet counts for all universes, which indicates that there are no setup problems between the show player (computer or console) and the CDT.Map.4 controller in terms of network configuration.

E131 Packets Received:

Universe Count: 64 Update ☑ Live Update

#	Universe	Packet Count	#	Universe	Packet Count
1.	1	3313	33.	33	3313
2.	2	3313	34.	34	3313
3.	3	3313	35.	35	3313
4.	4	3313	36.	36	3313
5.	5	3313	37.	37	3313
6.	6	3313	38.	38	3313
7.	7	3313	39.	39	3313
8.	8	3313	40.	40	3313
9.	9	3313	41.	41	3313
10.	10	3313	42.	42	3313
11.	11	3313	43.	43	3313
12.	12	3313	44.	44	3313
13.	13	3313	45.	45	3313
14.	14	3313	46.	46	3313
15.	15	3313	47.	47	3313
16.	16	3313	48.	48	3313
17.	17	3313	49.	49	3313
18.	18	3313	50.	50	3313
19.	19	3313	51.	51	3313
20.	20	3313	52.	52	3313
21.	21	3313	53.	53	3313
22.	22	3313	54.	54	3313
23.	23	3313	55.	55	3313
24.	24	3313	56.	56	3313
25.	25	3313	57.	57	3313
26.	26	3313	58.	58	3313
27.	27	3313	59.	59	3313
28.	28	3313	60.	60	3313
29.	29	3313	61.	61	3313
30.	30	3313	62.	62	3313
31.	31	3313	63.	63	3313
32.	32	3313	64.	64	3313

Figure 4-21: E1.31 Packets Received Page - No errors apparent

In Figure 4-22, the packet count for universes 18, and 33 through 64 are not increasing while the remaining universes are increasing together. This may be an indication that there is a setup/configuration error or that data is not being sent by player or sequencer. Errors which commonly occur are differences between the IP address, universe number, or data type (E1.31/Artnet) selected in the software, console, and/or the CDT.Map.4. Verifying the information in all locations is the recommended first step to resolve this problem.

E131 Packets Received:

Universe Count: 64 Update ☑ Live Update

#	Universe	Packet Count	#	Universe	Packet Count
1.	1	604	33.	33	0
2.	2	604	34.	34	0
3.	3	604	35.	35	0
4.	4	604	36.	36	0
5.	5	604	37.	37	0
6.	6	604	38.	38	0
7.	7	604	39.	39	0
8.	8	604	40.	40	0
9.	9	604	41.	41	0
10.	10	604	42.	42	0
11.	11	604	43.	43	0
12.	12	604	44.	44	0
13.	13	604	45.	45	0
14.	14	604	46.	46	0
15.	15	604	47.	47	0
16.	16	604	48.	48	0
17.	17	604	49.	49	0
18.	18	0	50.	50	0
19.	19	604	51.	51	0
20.	20	604	52.	52	0
21.	21	604	53.	53	0
22.	22	604	54.	54	0
23.	23	604	55.	55	0
24.	24	604	56.	56	0
25.	25	604	57.	57	0
26.	26	604	58.	58	0
27.	27	604	59.	59	0
28.	28	604	60.	60	0
29.	29	604	61.	61	0
30.	30	604	62.	62	0
31.	31	604	63.	63	0
32.	32	604	64.	64	0

Figure 4-22: E1.31 Packets Received Page with Potential Problems on Universe 18, and 33-64

Note that the lack of packets received on Universe 18 shown in Figure 4-22 was also shown on the OLED (Figure 4-16), but the photo was taken after more information was transmitted.

4.2.2. Network Configuration

The network configuration page allows for viewing and changing the network connection settings.

Note that changing these settings may prevent access to the controller if not done correctly. If you can not connect to the CDT.Map.4, the settings can be viewed and changed via the OLED (see Section 4.1.2.1)

No changes are saved to the controller until the “Restart Interface” button is pressed. If you do not wish to save the changes, navigate away from this webpage or reload it.

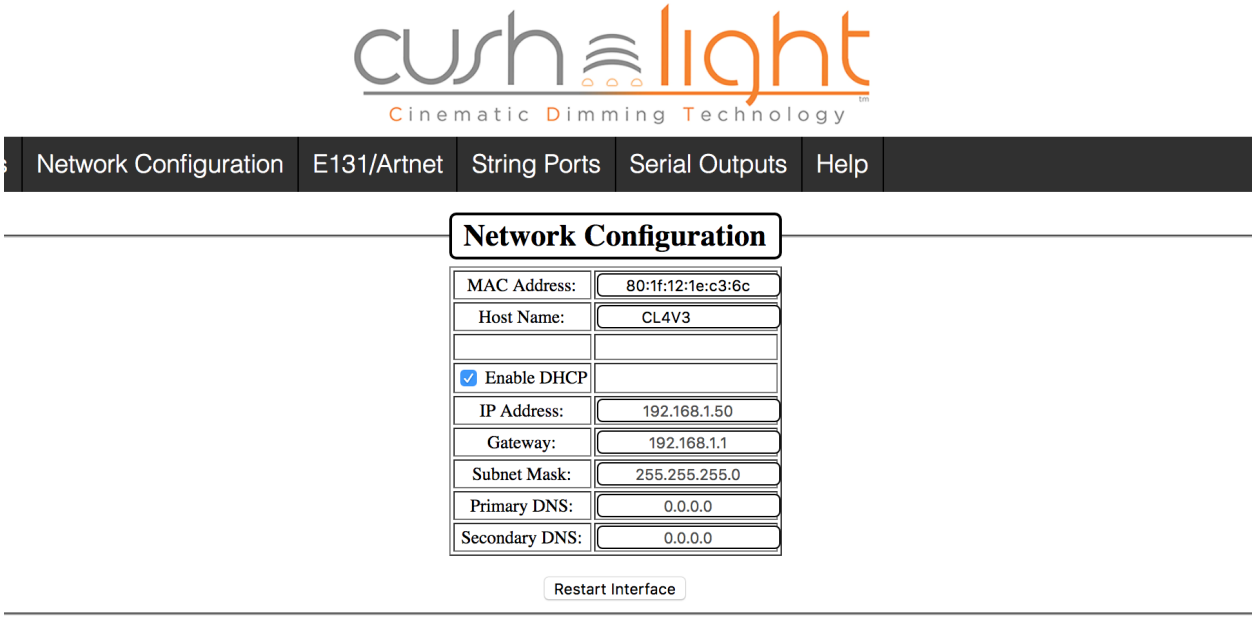


Figure 4-23: Network Configuration Web Interface

4.2.2.1. MAC Address

The Media Access Control address of the controller. This is a unique identifier assigned to network interfaces for communications at the data link layer of a network segment. This is provided mainly for informational purposes. Under most circumstances you will not need to know or use the MAC address.

4.2.2.2. Host Name

The name assigned to the controller by the user. This defaults to CDT.Map.4, but can be changed to something easily identifiable for your use in your show. This is especially useful if you have multiple controllers of the same type (several CDT.Map.4 controllers). The name will be displayed on the status page as well as many of the web browser tabs for easy identification (See Figure 4-18).

4.2.2.3. Enable DHCP (Dynamic Host Configuration Protocol)

When this is selected, the controller IP address and related configuration information will be automatically assigned by the router. This may change over time, so is considered to be Dynamic. The information below this line will not be able to be changed by the user if this is selected.

When not selected, the IP address and other configuration information is “static” and assigned by the user rather than automatically set by the router.

- Connected to Router - If you are connecting the CDT.Map.4 directly to a router this option may be checked or unchecked, based on if you want to use a static (will not change) or dynamic (may change upon reboot) IP address.

4.2.2.4. IP Address

The Internet Protocol (IP) address of the controller. If DCHP is selected, the IP address is selected automatically and rather than by the user. If DCHP is not selected, the user can input their desired IP address for the controller.

The IP address of each controller (or any other device) on the network must be unique.

Entering the IP address on the web browser address bar will show the controller's web page interface for making any changes to the controller setup (Figure 4-18).

The IP address on the web page will match that on the OLED screen on the controller (See Section 4.1.1), and may also be

updated via the push buttons below the screen (See Section 4.1.2.1).

Not that changing the IP address manually may alter how the controller is accessed. If a mistake is made in entering the IP address, the controlled may become inaccessible thru the web interface. If this occurs, the buttons below the OLED screen can be used to select an IP address that is accessible or to choose DHCP.

Note - Changing any of the below items will change how your controller is accessed. As there are many different possible configurations of routers, switches, network configurations, and settings, it is not possible to include all of these within this manual. The manual only covers a basic connection and access.

To determine the "default" settings these items, click on the DCHP and then click "Restart Interface". The values shown on the web page or the OLED will be the default values. These will not change no matter if the IP address is set via DCHP or is set statically. These values will be different however, if connected to a device such as the Scene recorder.

See Section 8 for additional information on connecting to a network.

4.2.2.5. Gateway

This is normally the address of the router or other device that serves to direct data coming into or out of the controller. It is needed to be able to access the webpage interface.

If you are connecting the CDT.Map.4 directly to a router or a switch connected to a router, this is the router's IP address. Common gateway addresses are 192.168.0.1 and 192.168.1.1, but others are possible.

4.2.2.6. Subnet Mask

This is the subnet Mask used by the controller. A value of 255.255.255.0 is typically used for most situations. Other values may be used here, but those circumstances are beyond the scope of this manual.

4.2.2.7. Primary DNS

This is the address that allows the CDT.Map.4 to connect to the web for updates and web configuration access. In general, this is

not needed as the CDT.Map.4 gets all of the information for playing a sequence from either a PC or Scene recorder. This is only needed to be able to access the Help Tab Link on the web page interface.

- Connected to Router - If you are connecting the CDT.Map.4 directly to a router or a switch connected to a router, this is the router's IP address.

- Connected to Scene recorder - If connecting the CDT.Map.4 via a Scene recorder or other similar controller, the gateway address will be that of the Scene recorder ethernet connection.

4.2.2.8. Secondary DNS

This is a backup DNS address should the Primary DNS not be available. This is typically not needed, but can be entered if desired.

4.2.3. E1.31/Artnet

This page is used to setup the configuration of the E1.31 or Artnet universes that are being input to the controller.

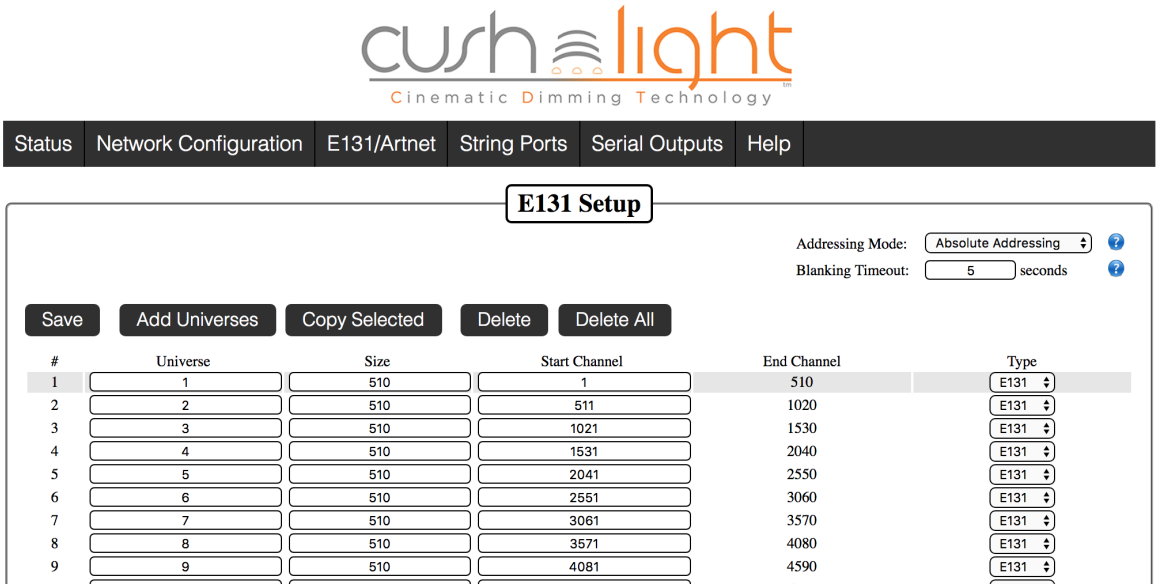


Figure 4-24: E1.31 Setup Page - Absolute Addressing

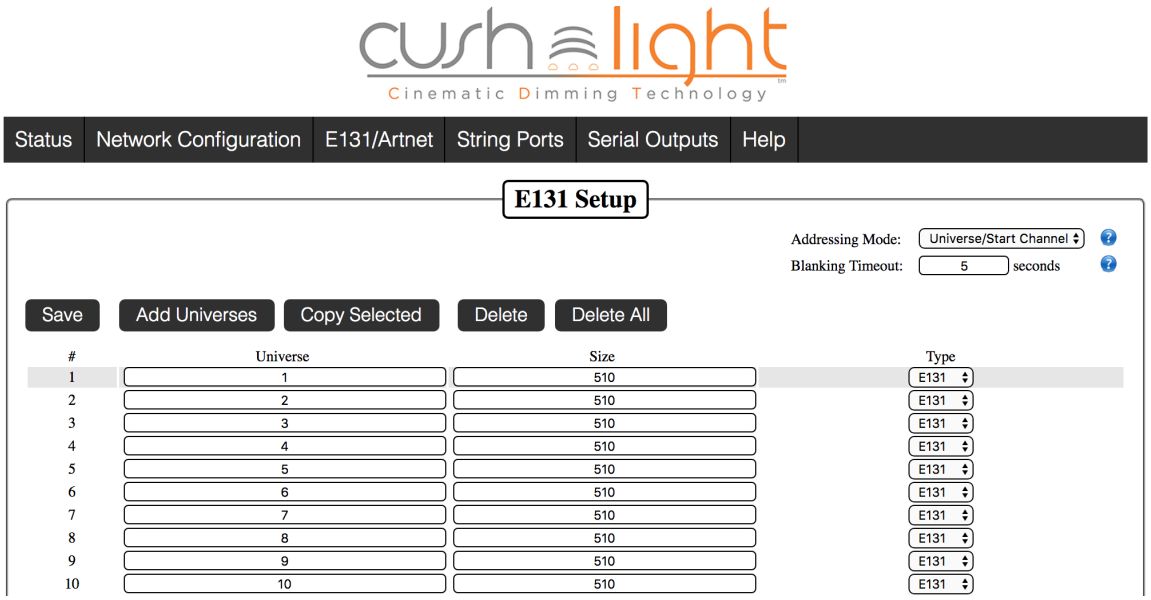


Figure 4-25: E1.31 Setup Page - Universe/Start Channel Addressing

4.2.3.1. Addressing Mode Drop Down

Both Absolute and Universe/Start Channel addressing are supported and can be chosen from the drop down box. The settings are converted by the program if this is changed, so there is no need to convert otherwise.

A basic example of the different addressing modes in presented in Section 7, to illustrate how using the same mode as the sequencer software is beneficial.

The different addressing modes will result in different settings being required or displayed on the various web interface pages.

4.2.3.1.1. Absolute Addressing

This mode is used to map string ports to an absolute address. If your start addresses in your sequencer can be larger than '512' this mode most likely is for you. Some sequencers/players that support this mode are Scene recorder and Xlights.

4.2.3.1.2. Universe/Start Channel

This mode is used to map string ports to a universe and start channel pair. If your start addresses in your sequencer are less than or equal to '512' and you also specify a universe too, this mode is needed.

4.2.3.2. Blanking Timeout

Blanking Timeout is the time in seconds that can elapse before strings that have 'Blank' turned on (on the String Port Tab) will send blanking data to pixels.

4.2.3.3. “Save” Button

Click to save the current setup. Forgetting to hit this is a common mistake.

<u>If you leave the page without pushing this button, changes will NOT be saved. No warning is given that changes will not be saved.</u>

If you do not wish to save changes, navigate away from this web page or hit reload to revert to the previously saved version.

4.2.3.4. “Add Universes” Button

Click this button to add universes to the current setup. This will bring up a pop-up window in which additional information about the universes to be added can be specified. The options are described further below and vary with the Addressing Mode selected.

Note that no existing universes will be overwritten when adding universes.

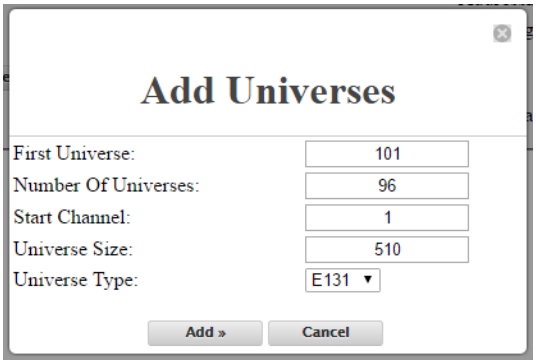


Figure 4-26: Add Universes Window (Absolute Addressing Mode)

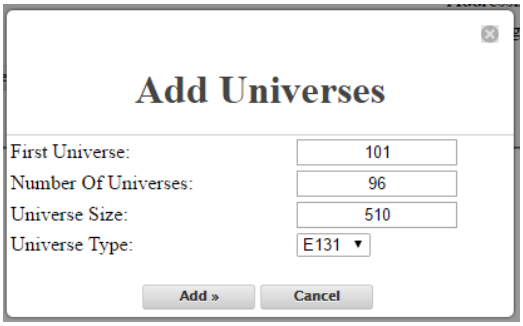


Figure 4-27: Add Universes Window (Universe/Start Channel Mode)

4.2.3.4.1. First Universe

This is used to select the universe number for the first universe to be added to the list. This is the user selected universe number (see Section 4.2.3.9), not the controller universe number (which is under the # symbol). This value can be any value between 1 and 63999.

If multiple universes are being added (see Section 4.2.3.4.2) then all additional universes will be added sequentially starting from this universe value.

Note that the First Universe here should not overlap with any existing universes. There is no check for overlaps on this screen, but once added if there are overlaps they will be indicated by a red highlighted cell once a cell is clicked. These changes will not be saved unless the Save button is clicked.

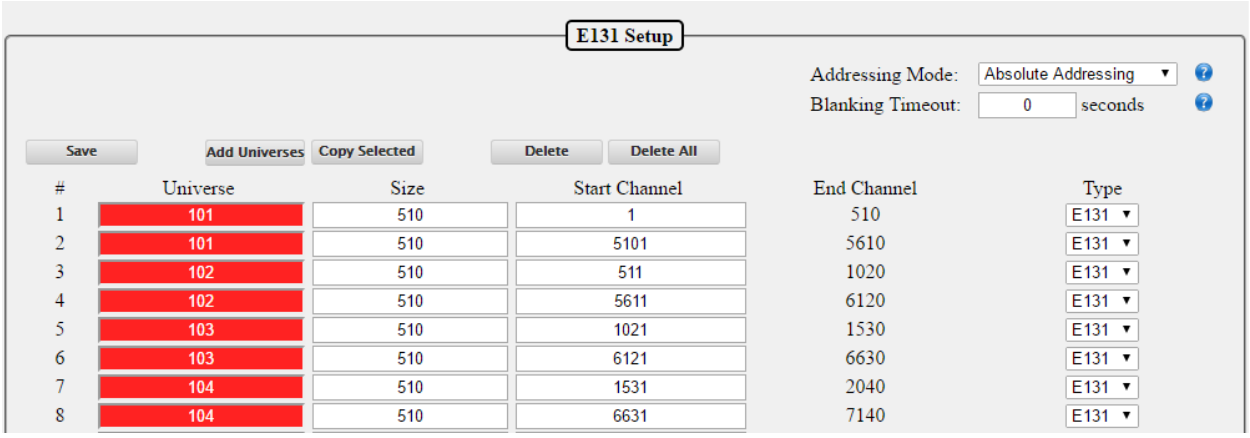


Figure 4-28: Error indicating Overlapping Universe Numbers

4.2.3.4.2. Number of Universes

This specifies the number of universes to be added.

A maximum of 96 universes can be used by the CDT.Map.4. If the number of universes added results in the total number of universes for the CDT.Map.4 to be greater than 96, the added universes will be truncated so that only the first 96 universes will be displayed. In other words, this value cannot be greater than 96 minus the highest controller universe number as displayed under the # sign (See Section 4.2.3.8); anything greater than this value is disregarded.

As indicated in the previous section, there is no check for overlapping universe numbers resulting from the First Universe and number of universes to be added in the pop-up window. However, overlapping universes will be

checked when returning to the E1.31 Setup screen (see Section 4.2.3.4.1)

4.2.3.4.3. Start Channel

In absolute addressing mode, this is the start channel for the first universe to be added.

In universe/start channel mode, this input is not present.

4.2.3.4.4. Universe size

This is used to define the size of all the universes which are to be added. No changes will be made to previously defined universes.

See Section 4.2.3.10 for more information about universe sizes.

4.2.3.4.5. Universe Type

This is used to define the type (E1.31 or Artnet) of all universes to be added. No changes will be made to previously defined universes.

See Section 4.2.3.13 for more information about universe types.

4.2.3.5. “Copy Selected” Button

Makes copies of the currently selected universe based on the currently selected cell. The size of the universe is copied directly, with the universe and start channels being incremented accordingly. When the button is pushed, a pop-up window will appear which asks for the number of copies to be made. The number of copies is limited to a maximum of the number of universes below the selected universe.

4.2.3.6. “Delete” Button

Deletes the currently selected universe based on the currently selected cell. Only 1 universe can be selected and deleted at a time using this button.

4.2.3.7. “Delete All” Button

Deletes all universes. This is useful to returning to a “blank” universe set-up screen, and then re-adding all universes.

4.2.3.8. # Column (Controller Universe)

The column with the # header is the Controller Universe number. A maximum of 96 universes can be used by the CDT.Map.4. These values will always begin at 1, and increase incrementally by 1, up to a maximum of 96. Universes can be added or deleted, but the Controller Universe number cannot be changed.

4.2.3.9. Universe

This is used to define the sequence universe numbers which will be used by universes within this controller. This number should match that entered into your sequencer.

Each universe number on a controller must be unique. For example, you can not have two universes with 101, not matter what size they are. If overlapping universes are detected, the cell will turn red indicating an error (see Figure 4-30).

You do not have to add universes in numerical order but they will be displayed in numerical order after you save.

Universes do not have to be sequential.

4.2.3.10. Size

Number of channels (not the number of nodes or pixels) included in the universe. This has a maximum value of 512. If a value greater than this is entered, the cell will turn red to indicate that this is not possible. If this is not corrected prior to hitting save, the value will be set to the maximum value (512) when save is pressed.

Note that as 512 is not evenly divided by 3 (the number of channels per RGB node), many people will use 510 as the largest value for the universe size. There is no requirement to do this.

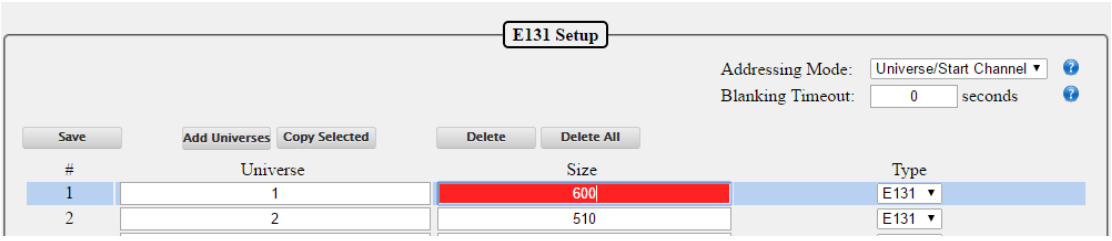


Figure 4-29: E1.31 Setup Page

Error on the size of Universe 1 is highlighted in red.

4.2.3.11. Start Channel

This is only shown in absolute addressing mode, and is the absolute start channel for the selected universe.

If the cell is highlighted in red, this indicates there is an overlapping start channel with another universe.

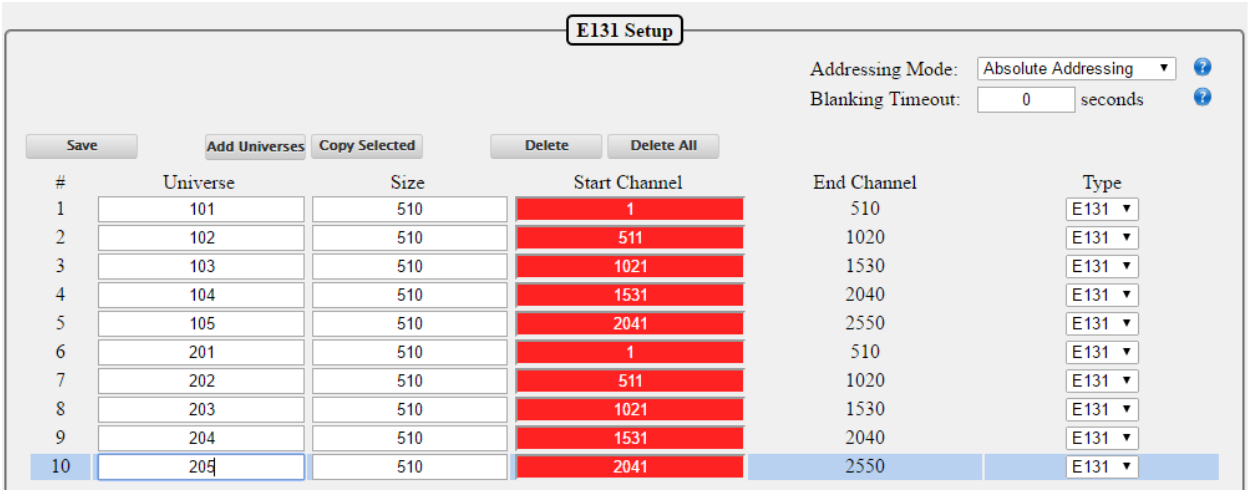


Figure 4-30: E1.31 Setup Page
Overlapping Start Channel indicated

4.2.3.12. End Channel

The end channel is only shown in absolute addressing mode. It is calculated by the program based on the Start Channel and Size.

4.2.3.13. Type

This allows for the selection of each universe based on either E1.31 or Artnet protocol.

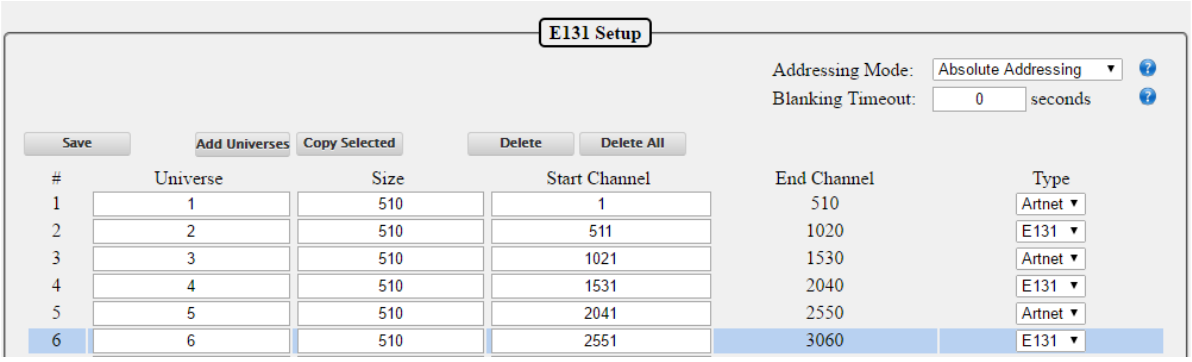
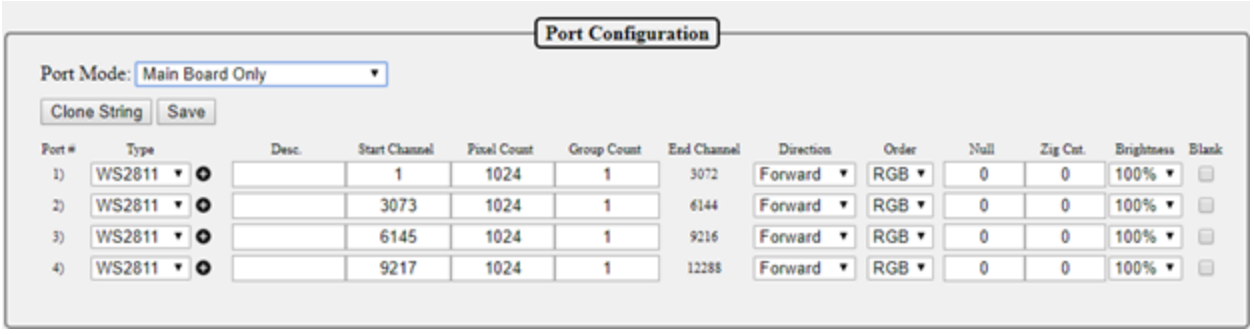


Figure 4-31: E1.31 Setup Page with Artnet Support

4.2.4. String Ports

The configuration of the Pixel Output Ports (also called String Ports) are set via this web page interface. The physical output port numbers are shown in Figure 4-32 which correspond to the Port # shown in the first column in Figure 4-33.

Figure 4-32: String Port Numbering



Port #	Type	Desc.	Start Channel	Pixel Count	Group Count	End Channel	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811		1	1024	1	3072	Forward	RGB	0	0	100%	
2)	WS2811		3073	1024	1	6144	Forward	RGB	0	0	100%	
3)	WS2811		6145	1024	1	9216	Forward	RGB	0	0	100%	
4)	WS2811		9217	1024	1	12288	Forward	RGB	0	0	100%	

Figure 4-33: String Port Configuration Web Page Interface

4.2.4.1. Port Mode

Used to select Main board only or Main board with one or two expansion boards.

- **Main Board Only** will result in 4 output ports. This is used when only the CDT.Map.4 is used, with nothing connected to the 40 Pin Expansion Connector.

- **Main Board w/ One Expansion** will result in 12 output ports. This is used when the 2 port Diff Expo Board is connected to the CDT.Map.4 via the 40 Pin Expansion Connector.

If the number of string does not adjust after making the selection, press the “Save” Button.

Note that the Port Mode is used only to select expansion board connected via the 40-pin connector. Additional controllers connected via the Ethernet connectors or serial output ports are not defined here.

4.2.4.2. “Clone String” Button

Makes copies of the currently selected string. All properties of the selected row for the string are copied directly, with the universe and start channels being incremented accordingly. When the button is pushed, a pop-up window will appear which asks for the number of copies to be made. The rows will be copied to any strings (regular or virtual) below the selected string.

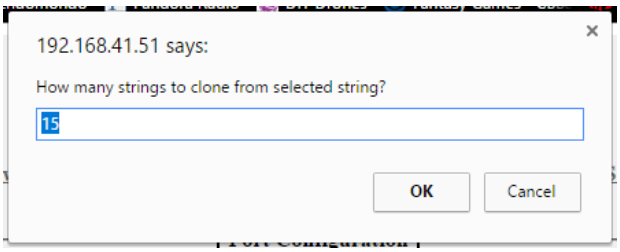


Figure 4-34: String Clone Pop-up Window

4.2.4.3. “Save” Button

Click to save the current setup. Forgetting to hit this is a common mistake.

<u>If you leave the page without pushing this button, changes will NOT be saved. No warning is given that changes will not be saved.</u>

If you do not wish to save changes, navigate away from this web page or hit reload to revert to the previously saved version.

4.2.4.4. Type

Defines the type of RGB string connected to the output port, which can be selected from the drop down menu. Only 1 type of string can be selected per output port, however, each of the ports can

have a different type. The types of strings supported are shown in Table 4-1.

WARNING - The type selection does **NOT** change the voltage that is being output to the string, even though some string types only operate at a certain voltage. Voltage is entirely controlled by that coming into the Power Connectors.

Table 4-1: Pixel Output Types Supported

Type	Strings Types Included
WS2811	WS2811,WS2812,SM16715, SM16716, INK1003, 1903
TM18XX	TM1803,TM1804,TM1809,TM1812
LX1203	LX1203
WS2801	WS2801,WS2803
TLS3001	TLS3001,TLS3002, CY3005
LPD6803	LPD6803
GECE	GE Color Effects (GECE)
LPD8806	LPD880X
APA 102	APA 102

4.2.4.5. Plus Sign (+)

Clicking the plus adds a Virtual String using the same settings as on the currently selected line (with universe and start channels being incremented accordingly)

What is a virtual string?

Virtual strings are a way of dividing up a physical string or multiple strings connected to a single output port, so that it acts as if it were several different strings. This allows you to use non-sequential channel numbers, forward or backward numbering, add null pixels, as well as other options described below. A single CDT.Map.4 can have up to 160 virtual strings, so many variations and combinations are possible.

4.2.4.6. Minus Sign (-)

Clicking the minus removes the Virtual String from this row. Note there is no undo function for this action. If a mistake has been made refreshing the page will bring back all strings deleted since the last save. This is true for all configuration pages.

The minus sign is only present if there are virtual strings set up for a Pixel Output Port. If there are no virtual strings, this will not be shown.

4.2.4.7. Desc.

A user entered description of what the string is used for, which can be up to 30 characters long. It is recommended that only alphanumeric characters are used, as some special characters can cause problems. The descriptions is useful for keeping track of what is connected to each output, especially if you have a large number of controllers or they are used for different displays at different times of the year. This is not required to be filled it.

Figure 4-35: String Port Options

4.2.4.8. Universe (only present in Universe/Start Channel addressing mode)

Used to specify the universe which contains the data to be sent to this port. This must be one of the universes entered on the E1.31 page.

4.2.4.9. Start Channel

Used to specify the starting channel number which contains the data to be sent to this port.

- In absolute mode, this is the absolute channel number.
- In Universe/Start Channel, it is the start channel for the universe defined in the previous column. Start channel will always be less than the size of the Universe defined on the E1.31 tab (512 maximum) for this addressing mode.

4.2.4.10. Pixel Count

The number of pixels (nodes) attached to the output port. The number of pixels can not be greater than 1024. If a value greater than this is entered, the cell will turn red to indicate that this is not possible. If this is not corrected prior to hitting save, the value will be set to the maximum value when save is pressed.

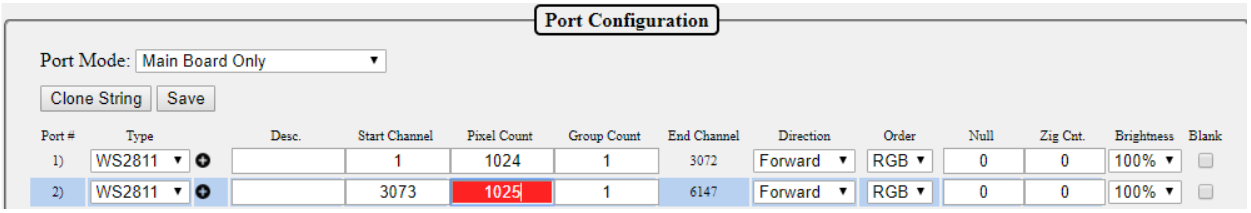


Figure 4-36: String Port Configuration Setup Page
Error on the Pixel Count of Port #2 is highlighted in red.

<u>Note that in most scenarios, the power from the controller alone will be insufficient to light the maximum number of pixel per port and power injection would be necessary.</u> The actual number of pixels that can be powered without power injections varies with a number of factors including distance between the control and the pixels, distance between pixels, intensity or brightness of the pixels, type of pixel, and voltage of the pixels. As a general rule of thumb, approximately 50 of most 5V pixels or 125 of most 12V pixels can be powered directly from the controller without power injection. Note that this limitation is due to the power consumption of the lights and microchips in each pixel, not the controller itself.

4.2.4.11. Group Count

Used to make several adjacent pixels act together as one. This is typical if several nodes are used to make a display element brighter or always act together. Grouped pixels will always show as the same color. Default setting is 1 (single node). Note if the node count is not evenly divisible by the group count, the end channel will have a decimal point.

A typical use for this is when there are several nodes inside a display element or on something such as an arch, where these nodes are always going to be displaying the same color. Grouping them here means that the model in your sequencer only needs to

have a single node defined regardless of how many nodes are actually grouped together.

4.2.4.12. End Channel

This the is last channel to be used on the port. It is calculated by the program based on the data input. Note that 1 pixel (node) uses 3 channels (one each for Red, Green, and Blue). The end channel is equal to the start channel added to three times the number of pixels minus 1.

4.2.4.13. Direction

- Forward - The node closest to the controller uses the start channel input.
- Reverse - The node farthest from the controller uses the start channel input.

4.2.4.14. Order

Defines which color lights up when the first, second, and third channels of a node are turned on, respectively. This can be any combination of R-Red, G-Green, and B-Blue.

4.2.4.15. Null

Used to define the number of nodes which will not light up at the start of the string. These nodes will pass data to the next node but will not light up. This is useful when there is gap between display elements larger than your pixel spacing and you don't want to cut/splice the string between the nodes to accommodate for this.

4.2.4.16. Zig Cnt

This is the number of nodes which will go in the direction chosen, which is then reversed for the same number of nodes. This pattern continues for the total number of pixels. This is a simplified way of including pixels which reverse order at regular intervals, rather than using multiple virtual strings.

This is useful for items such as a mega tree or matrix, where the model in the sequencer was based on all strings being connected on one side, but in the actual display the strings are "folded" and thus reverse direction. If a Zig Count or similar is used in the sequencer, do not set the zig count here as well.

4.2.4.17. Brightness

This is used to reduce the brightness on the string connected to the port by the percentage selected. 100% is full brightness. These are available only in the values present in the drop down box. This is useful for either reducing the brightness of show elements which may be too bright compared to other elements in the show, or to reduce the amount of power being used by a string. In many cases, there will not be a noticeable visual difference between pixel at 90% and 100%, but there will be a 10% reduction in power consumption. This may decrease the number of power supplies required or increase the number of pixels that can be powered from a single port. Even lower brightness values may not be able to be detected visually.

Note that applying this reduction will be on top of any settings in the software used to create the sequence. If the brightness setting is too low, it may not allow for the lights to be seen or ramps/fades may become jumpy, or colors may be off (especially those such as yellows, purples, oranges, etc). Therefore, it is recommended that you visually observe the physical lights as opposed to a preview in the software when applying this setting in order to ensure they are functioning as intended.

4.2.4.18. Blank

If this checkbox is selected, this string will be sent a signal to turn off if no data is received after the number of seconds defined on the E1.31 Configuration or E1.31/Artnet Tab (Section 4.2.3.2). This is useful as some string types will not turn off unless an off signal is received.

4.2.4.19. Examples of Port Configuration

Below are several examples showing different Port Configuration settings. These are shown for both Absolute and Universe/Start Addressing modes. Also shown is a string line showing what the pixel (node) numbering would be, as well as the channel numbering. All examples are for a total of 15 nodes connected on Port 1 of the controller.

1. Port Configuration Example 1 - 15 RGB nodes in forward order.

Absolute Mode:

Port #	Type	Start Channel	Pixel Count	Group Count	End Channel	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811	1	15	1	45	Forward	RGB	0	0	100%	

Universe/Start Mode:

Port #	Type	Universe	Start Chnl	Pixel Cnt	Group Cnt	End Univ	End Chnl	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811	1	1	15	1	1	45	Forward	RGB	0	0	100%	

Node	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Channels	1	4	7	10	13	16	19	22	25	28	31	34	37	40	43
	2	5	8	11	14	17	20	23	26	29	32	35	38	41	44
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45

2. Port Configuration Example 2 - 15 RGB nodes in reverse order.

Absolute Mode:

Port #	Type	Start Channel	Pixel Count	Group Count	End Channel	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811	1	15	1	45	Reversed	RGB	0	0	100%	

Universe/Start Mode:

Port #	Type	Universe	Start Chnl	Pixel Cnt	Group Cnt	End Univ	End Chnl	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811	1	1	15	1	1	45	Reversed	RGB	0	0	100%	

Node	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Channels	43	40	37	34	31	28	25	22	19	16	13	10	7	4	1
	44	41	38	35	32	29	26	23	20	17	14	11	8	5	2
	45	42	39	36	33	30	27	24	21	18	15	12	9	6	3

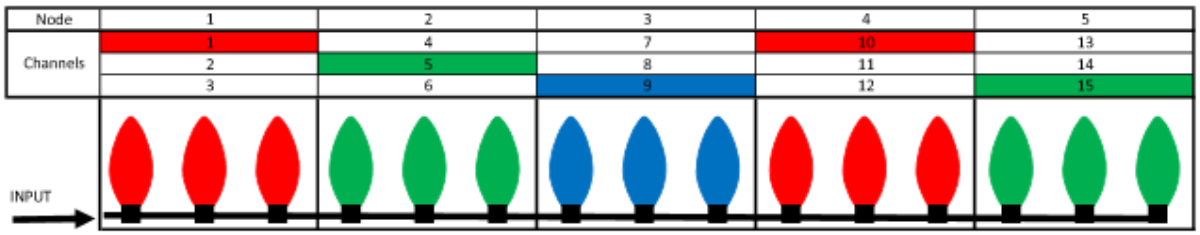
3. Port Configuration Example 3 - 15 RGB nodes in forward order with groups of 3 nodes (5 groups total).

Absolute Mode:

Port #	Type	Start Channel	Pixel Count	Group Count	End Channel	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811	1	15	3	15	Forward	RGB	0	0	100%	

Universe/Start Mode:

Port #	Type	Universe	Start Chnl	Pixel Cnt	Group Cnt	End Univ	End Chnl	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811	1	1	15	3	1	15	Forward	RGB	0	0	100%	



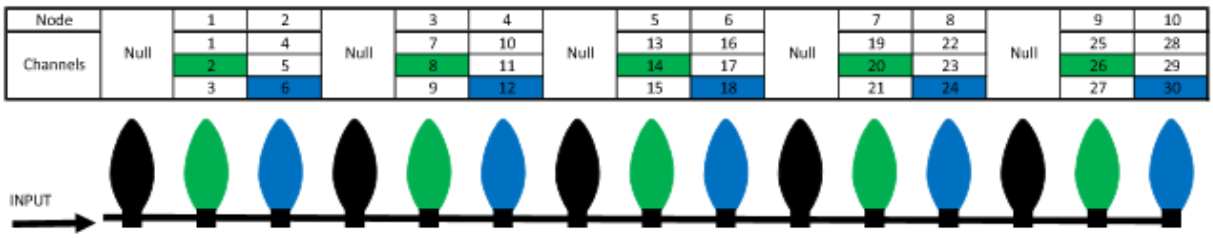
4. Port Configuration Example 4 - 15 RGB nodes in forward order with null 5 null pixels (every third node).

Absolute Mode:

Port #	Type	Start Channel	Pixel Count	Group Count	End Channel	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811	1	2	1	6	Forward	RGB	1	0	100%	
		7	2	1	12	Forward	RGB	1	0	100%	
		13	2	1	18	Forward	RGB	1	0	100%	
		19	2	1	24	Forward	RGB	1	0	100%	
		25	2	1	30	Forward	RGB	1	0	100%	

Universe/Start Mode:

Port #	Type	Universe	Start Chnl	Pixel Cnt	Group Cnt	End Univ	End Chnl	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811	1	1	2	1	1	6	Forward	RGB	1	0	100%	
		1	7	2	1	1	12	Forward	RGB	1	0	100%	
		1	13	2	1	1	18	Forward	RGB	1	0	100%	
		1	19	2	1	1	24	Forward	RGB	1	0	100%	
		1	25	2	1	1	30	Forward	RGB	1	0	100%	



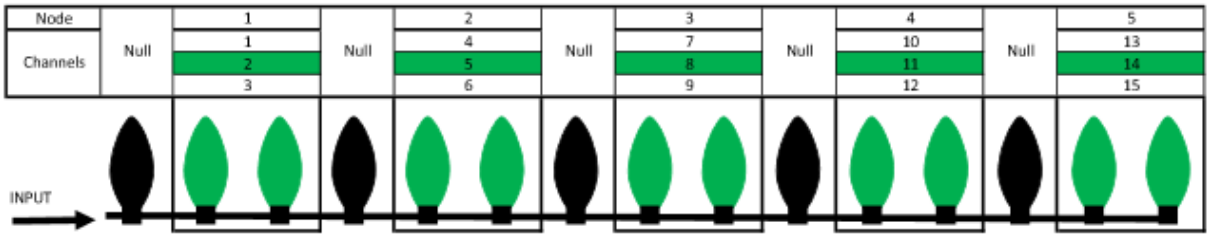
5. Port Configuration Example 5 - Same as 4 above, but grouping adjacent non-null pixels.

Absolute Mode:

Port #	Type	Start Channel	Pixel Count	Group Count	End Channel	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811	1	2	2	3	Forward	RGB	1	0	100%	
		4	2	2	6	Forward	RGB	1	0	100%	
		7	2	2	9	Forward	RGB	1	0	100%	
		10	2	2	12	Forward	RGB	1	0	100%	
		13	2	2	15	Forward	RGB	1	0	100%	

Universe/Start Mode:

Port #	Type	Universe	Start Chnl	Pixel Cnt	Group Cnt	End Univ	End Chnl	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811	1	1	2	2	1	3	Forward	RGB	1	0	100%	
		1	4	2	2	1	6	Forward	RGB	1	0	100%	
		1	7	2	2	1	9	Forward	RGB	1	0	100%	
		1	10	2	2	1	12	Forward	RGB	1	0	100%	
		1	13	2	2	1	15	Forward	RGB	1	0	100%	



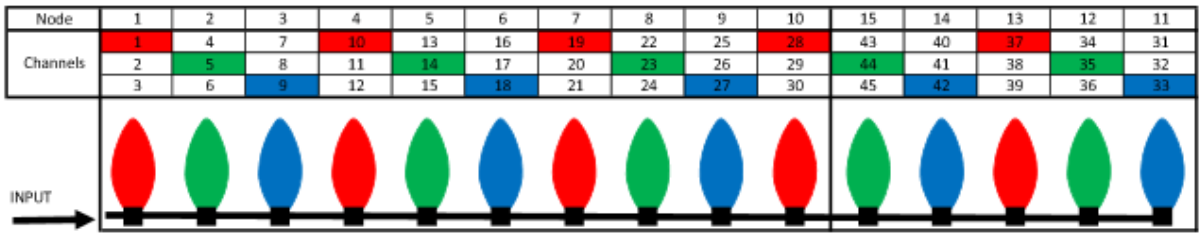
6. Port Configuration Example 6 - 15 RGB nodes - first 10 nodes in forward order, next 5 nodes in reverse order.

Absolute Mode:

Port #	Type	Start Channel	Pixel Count	Group Count	End Channel	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811	1	10	1	30	Forward	RGB	0	0	100%	
		31	5	1	45	Reversed	RGB	0	0	100%	

Universe/Start Mode:

Port #	Type	Universe	Start Chnl	Pixel Cnt	Group Cnt	End Univ	End Chnl	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811	1	1	10	1	1	30	Forward	RGB	0	0	100%	
		1	31	5	1	1	45	Reversed	RGB	0	0	100%	



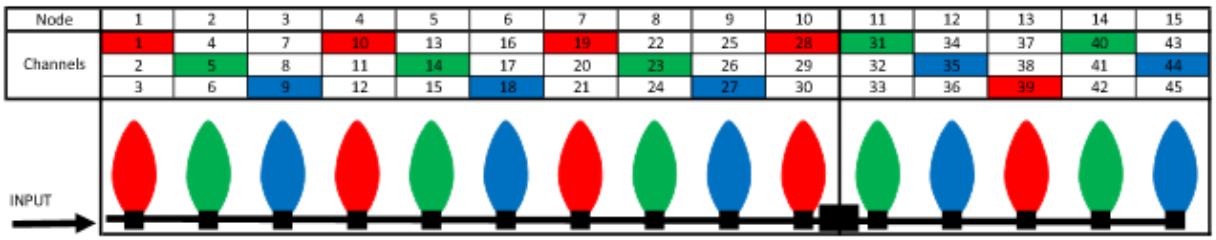
7. Port Configuration Example 7 - 15 nodes in forward order - first 10 nodes are RGB, next 5 nodes are GBR.

Absolute Mode:

Port #	Type	Start Channel	Pixel Count	Group Count	End Channel	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811	1	10	1	30	Forward	RGB	0	0	100%	
		31	5	1	45	Forward	GBR	0	0	100%	

Universe/Start Mode:

Port #	Type	Universe	Start Chnl	Pixel Cnt	Group Cnt	End Univ	End Chnl	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811	1	1	10	1	1	30	Forward	RGB	0	0	100%	
		1	31	5	1	1	45	Forward	GBR	0	0	100%	



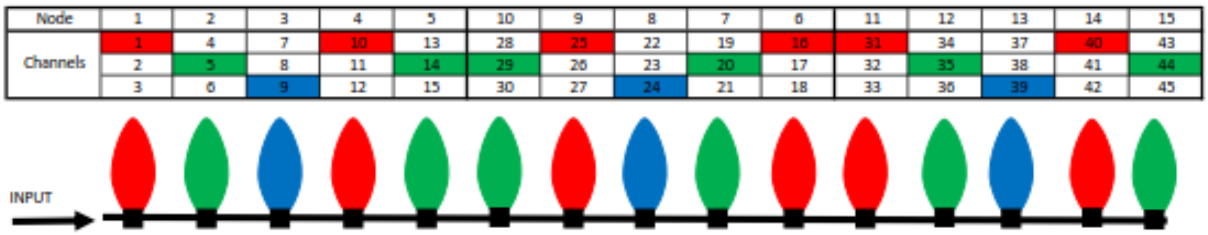
8. Port Configuration Example 8 - 15 nodes in with a Zig Count of 5 and Forward Direction.

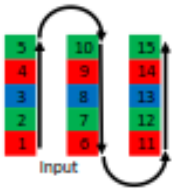
Absolute Mode:

Port #	Type	Start Channel	Pixel Count	Group Count	End Channel	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811	1	15	1	45	Forward	RGB	0	5	100%	

Universe/Start Mode:

Port #	Type	Universe	Start Chnl	Pixel Cnt	Group Cnt	End Univ	End Chnl	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811	1	1	15	1	1	45	Forward	RGB	0	5	100%	





Sting shown as would be on a Matrix

4.2.5. Help

If the controller has access to the internet, it will direct you to this user manual.

4.3. Reset CDT.Map.4 back to factory defaults

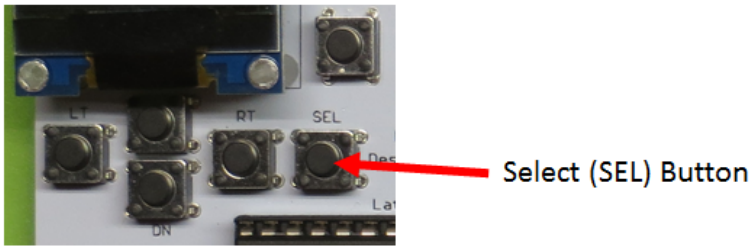


Figure 5-7: Button for Reset of CDT.Map.4

This process is used to reset all settings set by the user on the controller. This does not reset the firmware.

Perform the following steps:

1. Power off your controller and wait at least 20 seconds before proceeding.
2. Hold down the “Select” button. Keep holding it down while applying power to the controller.
3. Keep holding down the “Select Button” until you see Status LED1 and LED2 rapidly blink together and the OLED Display will display “Resetting Controller”
4. Release the “Select Button”, the controller will reboot with the default settings.

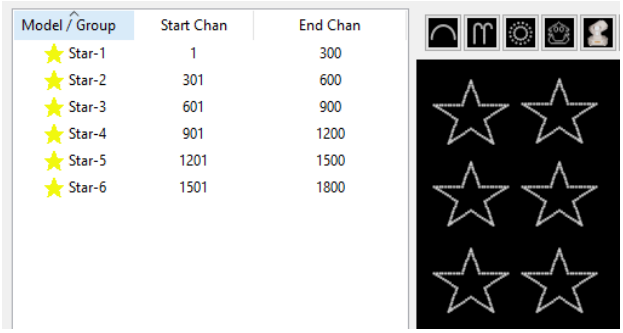
5. ADDRESSING MODE EXAMPLE

This example shows the two different ways (absolute and universe/state channel) of addressing channels for models. Each has benefits and drawbacks to them, and users will have their own preferences. The purpose of this example is to show how the CDT.Map.4 can be used to mimic the sequencer settings, so that the user does not have to do manual calculations to determine universe or channel numbering. No matter which method is used, it is recommended that the method used in the sequencer is also used for the controller to simplify your set-up.

Keep in mind that the Addressing Mode can be changed at any time on the CDT.Map.4. This will change the way the information is displayed, but not any of the data entered for either.

5.1. Absolute Channel Addressing Example

This setup is for 6 stars, each using 100 pixels which is equal to 300 channels. In this case, absolute addressing is used when creating the models in xLights as shown below. Each star is shown as being connected to its own output port on the CDT.Map.4 with a Diff Expo board and 1 Differential Receiver board being used.



Model / Group	Start Chan	End Chan
Star-1	1	300
Star-2	301	600
Star-3	601	900
Star-4	901	1200
Star-5	1201	1500
Star-6	1501	1800

Figure 7-1: xLights Model with Absolute Channel Addressing

To enter this into the CDT.Map.4 with Absolute Channel Addressing, the start channels would be entered very similar to as entered into the sequencer, as shown in Figure 7-2.

Port Configuration

Port Mode: Main Board w/One Expansion

Clone String | Save

Port #	Type	Desc.	Start Channel	Pixel Count	Group Count	End Channel	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811	Star-1	1	100	1	300	Forward	RGB	0	0	100%	
2)	WS2811	Star-2	301	100	1	600	Forward	RGB	0	0	100%	
3)	WS2811	Star-3	601	100	1	900	Forward	RGB	0	0	100%	
4)	WS2811	Star-4	901	100	1	1200	Forward	RGB	0	0	100%	
5)	WS2811	Star-5	1201	100	1	1500	Forward	RGB	0	0	100%	
6)	WS2811	Star-6	1501	100	1	1800	Forward	RGB	0	0	100%	

Figure 7-2: CDT.Map.4 String Port Settings with Absolute Channel Addressing for both models and controller

If Universe/Start Channel were to be used on the CDT.Map.4, careful attention and calculations would be needed in order to verify the correct values are being used for the universe and start channels, as shown in Figure 7-3.

Port Configuration

Port Mode: Main Board w/One Expansion

Clone String | Save

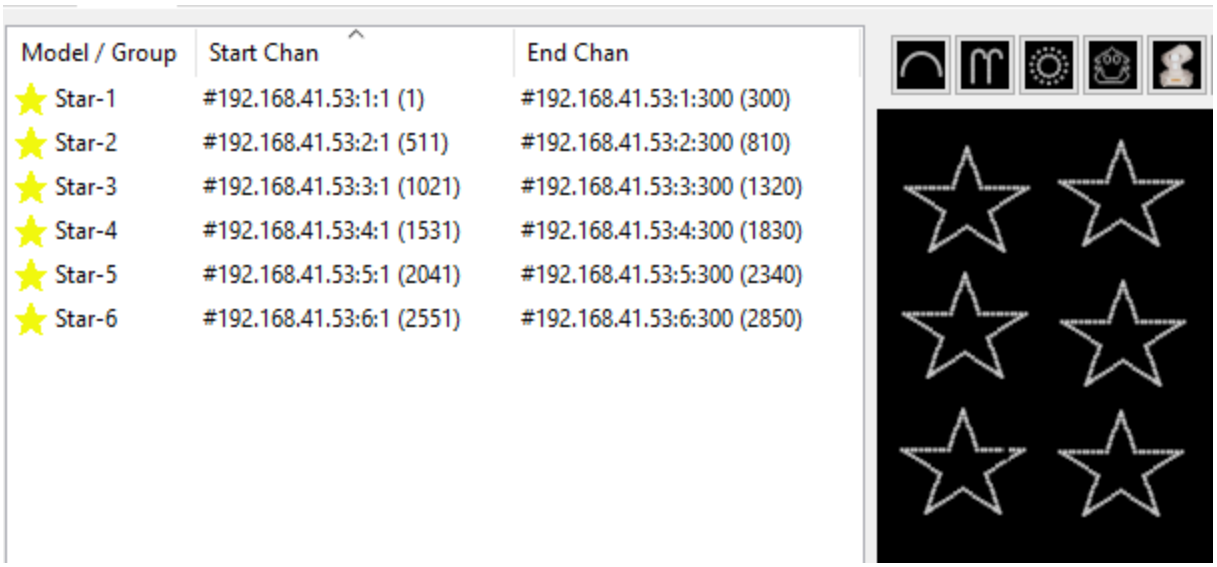
Port #	Type	Desc.	Universe	Start Chnl	Pixel Cnt	Group Cnt	End Univ	End Chnl	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811	Star-1	1	1	100	1	1	300	Forward	RGB	0	0	100%	
2)	WS2811	Star-2	1	301	100	1	2	90	Forward	RGB	0	0	100%	
3)	WS2811	Star-3	2	91	100	1	2	390	Forward	RGB	0	0	100%	
4)	WS2811	Star-4	2	391	100	1	3	180	Forward	RGB	0	0	100%	
5)	WS2811	Star-5	3	181	100	1	3	480	Forward	RGB	0	0	100%	
6)	WS2811	Star-6	3	481	100	1	4	270	Forward	RGB	0	0	100%	

Figure 7-3: CDT.Map.4 String Port Settings with Universe/Start Channel Addressing for controller and Absolute for models.

The first two ports are easily defined above, as they both start on the first universe. Port #3 started part way through Universe 2, which means it does not have an intuitive start channel number.

5.2. Universe/Start Channel Example

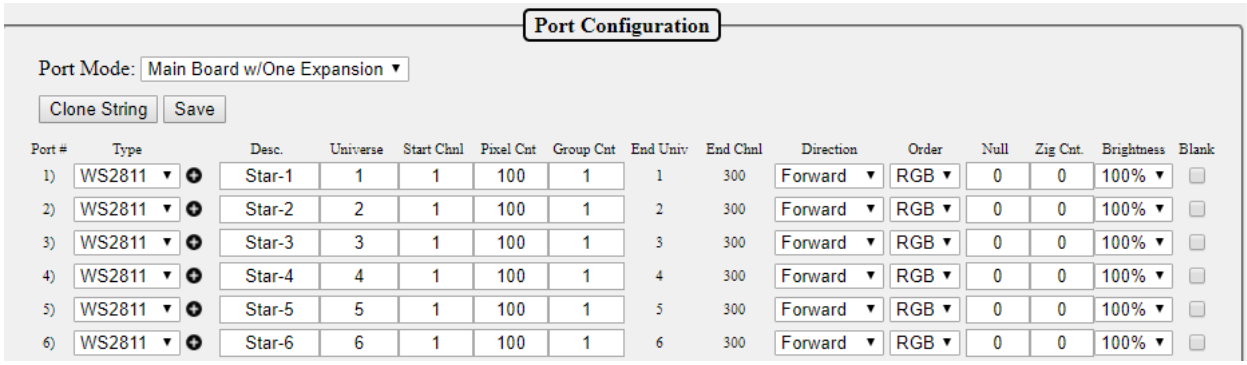
This setup is for 6 stars, each using 100 pixels (same as in the previous example). In this case however, each star is set to be on it's own universe, starting a channel 1 on that universe. Each star is also shown as being connected to its own output port on the controller.



Model / Group	Start Chan	End Chan
Star-1	#192.168.41.53:1:1 (1)	#192.168.41.53:1:300 (300)
Star-2	#192.168.41.53:2:1 (511)	#192.168.41.53:2:300 (810)
Star-3	#192.168.41.53:3:1 (1021)	#192.168.41.53:3:300 (1320)
Star-4	#192.168.41.53:4:1 (1531)	#192.168.41.53:4:300 (1830)
Star-5	#192.168.41.53:5:1 (2041)	#192.168.41.53:5:300 (2340)
Star-6	#192.168.41.53:6:1 (2551)	#192.168.41.53:6:300 (2850)

Figure 7-4: xLights Model with Universe/Start Channel Addressing

To enter this into the CDT.Map.4 with Universe/Start Channel Addressing, this information would be entered very similar to as entered into the sequencer, as shown in Figure 7-5.



Port Configuration

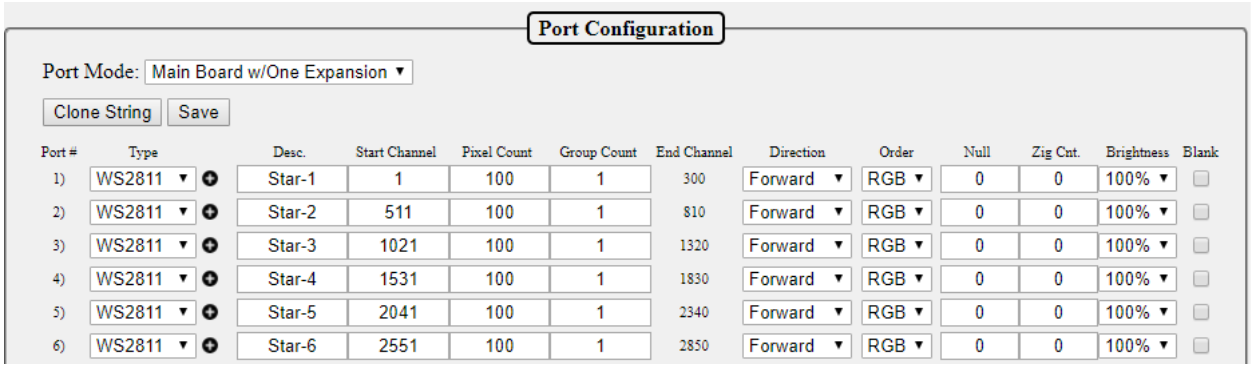
Port Mode: Main Board w/One Expansion

Clone String | Save

Port #	Type	Desc.	Universe	Start Chnl	Pixel Cnt	Group Cnt	End Univ	End Chnl	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811	Star-1	1	1	100	1	1	300	Forward	RGB	0	0	100%	
2)	WS2811	Star-2	2	1	100	1	2	300	Forward	RGB	0	0	100%	
3)	WS2811	Star-3	3	1	100	1	3	300	Forward	RGB	0	0	100%	
4)	WS2811	Star-4	4	1	100	1	4	300	Forward	RGB	0	0	100%	
5)	WS2811	Star-5	5	1	100	1	5	300	Forward	RGB	0	0	100%	
6)	WS2811	Star-6	6	1	100	1	6	300	Forward	RGB	0	0	100%	

Figure 7-5: CDT.Map.4 String Port Settings with Universe/Start Channel Addressing for both models and controller

If Absolute addressing were to be used on the CDT.Map.4, careful attention and calculations would be needed in order to verify the correct values are being used for the start channels, as shown in Figure 7-6.



Port Configuration

Port Mode: Main Board w/One Expansion

Clone String | Save

Port #	Type	Desc.	Start Channel	Pixel Count	Group Count	End Channel	Direction	Order	Null	Zig Cnt.	Brightness	Blank
1)	WS2811	Star-1	1	100	1	300	Forward	RGB	0	0	100%	
2)	WS2811	Star-2	511	100	1	810	Forward	RGB	0	0	100%	
3)	WS2811	Star-3	1021	100	1	1320	Forward	RGB	0	0	100%	
4)	WS2811	Star-4	1531	100	1	1830	Forward	RGB	0	0	100%	
5)	WS2811	Star-5	2041	100	1	2340	Forward	RGB	0	0	100%	
6)	WS2811	Star-6	2551	100	1	2850	Forward	RGB	0	0	100%	

Figure 7-6: CDT.Map.4 String Port Settings with Absolute Addressing for controller and Universe/Start Channel for models.

As the universes have been all been defined as 510 channel in this case, all start channels increment by 510 from the previous start channel. While this is relatively simple to calculate, it does require knowledge of the number of channels per universe to determine, whereas if Universe/Start Channel is used this does not need to be known.

6. NETWORK CONNECTION

The CDT.Map.4 must be connected to a network in order to fully configure the controller. There are two common methods for connecting the controller to a network both for configuring the controller and running a show.

6.1. Connect to Router

This is the easiest method and recommended for first time users or those not familiar with network configurations. In this method, the CDT.Map.4 is connected to your router (or a switch connected to the router) using a Cat5/5e/6 patch cable via one of the Ethernet Ports (Figure 3-1). Your computer or other device used to access the controller web interface must also be connected to that same router. The computer or other device connection to the router can be done either wired or wirelessly.

Prior to connecting the controller to the router, it is recommended that the Network Type is set to DHCP (See section 4.1.2.1.2) to ensure there are no IP address conflicts between the CDT.Map.4 and other devices on the network. This will automatically set the IP address for the controller, as well as the other network parameters. If you are sure there are no IP address conflicts and are familiar with setting the other network parameters, using a Static IP address can also be done.

The CDT.Map.4 can web interface can they be accessed by typing the controller's IP address (Figure 4-2) into a web browser on your computer or other device. The CDT.Map.4 can also be controlled via your sequencing software using this IP address.

BASIC TERMINOLOGY

A **channel** is the smallest controllable element. A channel will control either the Red, Green, or Blue intensity.

A **pixel** or **node** is a combination of Red, Green, and Blue channels in any order. This can be, but is not necessarily, the same as the number of LEDs. Some strings will use multiple LEDs in a single pixel. All LEDs that act together based on the hardwiring of the lights are considered a single pixel. Each pixel consists of 3 channels.

A **string** is a group of pixels connected on a single output. All pixels connected together are considered to be on the same string whether or not they are on the same physical string or multiple physical strings connected together. Therefore two physical strings of 50 pixels connected together is considered the same as a single string of 100 pixels.

A **universe** is a contiguous group of channels. This group of channels is identified by a Universe Number between 1 and 63999. The maximum number of channels in any universe is 512.

Universe = 512 channels (maximum)

Each Pixel Output Port is limited to: 6 full universes
= 6 strings of 512 channels
= 6 strings of 170.67 pixels*
= 1024 pixels

The CDT.Map.4 controller is limited to 96 universes = 16 ports of 6 universes = 16,384 pixels

* Note that it is physically impossible to have a fractional pixel on a string. Therefore, some users will limit their universe size to 170 pixels = 510 channels, so that pixels are not split between universes. The CDT.Map.4 can be used with either 6 full universes of 512 channel per port or 6 truncated universes of 510 channels per port.

TYPICAL PIXEL POWER USAGE

Typical amount of current and power used by typical pixels types.

IC Type	Form Factor	Voltage	LEDs/m	Length	Number of LEDs	Total Current	Total Power (Watts)
WS2812b	Strip	5v	30	5m	150	8.32A	41.6
WS2812b	Strip	5v	60	5m	300	16.65A	83.25
WS2811	Strip	12v	30	5m	150	2.77A	33.24
Ink1003	Strip	12v	30	5m	150	3.47A	41.64
WS2811	String	5v	n/a	varies	50	2.77A	13.85
WS2811	String	12v	n/a	varies	50	2.77A	33.24

7. TROUBLESHOOTING/GETTING HELP

7.1. Frequent Problems

- My Screen is Blank
  - Try pressing one of the buttons below the OLED screen. The screen saving mode may be active.
  - Reset controller to factory defaults using “Factory Reset” procedure.
- My CDT.Map.4 won’t power on
  - Check power connections, jumpers and power supply. See Section 2.2 for further information on how to power the CDT.Map.4.
  - Email or call technical support
- None of my pixels light up
  - Make sure the controller is powered on.
  - Check pixel output connections to verify wire order and check if they are loose.
  - Try using test mode to help rule out PC/sequencer problems.
- Only the first part of my lights turn on in regular or test modes.
  - Make sure the string port has the correct number of pixels (nodes) defined for that channel.
  - Make sure there is no damage to the wires between the working and non-working nodes.
- My pixels are flickering
  - Plug the flickering string of pixels directly into the CDT.Map.4, removing any other power injection and test that it works correctly, ruling out the CDT.Map.4 as a source of the problem.
  - If driving pixels from a sequencer(s). Make sure you are not driving from two sources, such as both xLights and Scene recorder are both outputting.
- One of my outputs doesn’t work
  - Check the fuse indicator LED on the output port. If the LED is not lit, the fuse is either missing or blown. Replace the fuse.
  - Check to make sure the pixel connector is firmly installed into the jack, and that all wires are connected to the pixel connector.
  - Check to make sure there is no damage to the wires connected to the output.

    - If pigtails are being used, make sure the lights are connected to the pigtails, and there is contact between the pigtail and the lights (pins at the connection may be damaged or corroded)
    - Try plugging lights from a working output in the non-working output to determine if it is a problem with the lights or the output.
- Can’t connect to the web interface
    - Check to make sure all cables are connected and the controller has power.
    - Verify you are using the IP address shown on the OLED to access the web interface.
    - If you have the controller for a static IP, change to DHCP, restart and see if you can connect. If so, there is an error is you network settings.