SanDevices E68X Pixel Controller Version 4 Firmware PRELIMINARY

05/07/2013 minor updates for version 4.014, Test Pattern mode entry now supported
05/06/2013 Updated to reflect addition of Art-Net support in version 4.012

Note: Current version is 4.026 as of 05/23/2013. For the most current documentation on version 4.026 please refer to the E6804 Users Manual. That is also the best source of information for the E6804-specific version of the firmware. The major difference is that the *Erase Config Screen* button has been replaced by the *System Command* button.

Version 4 firmware replaces the old command line interface with a more modern interface that uses HTML form elements including drop-down lists and check boxes. Overall the interface is much more intuitive and the user no longer has to rely on searching the documentation to learn the purpose and/or syntax of various commands.

Accessing the Web Configuration Page

This discussion assumes that the E68x controller is connected via a LAN cable to your LAN, typically to an unused port on your router.

All configuration of the E68x controllers is done via a web configuration page. The web page is displayed by typing the IP address of the controller into a web browser's address bar. In order to access the web page the current controller IP address must be known, and it must lie within the address range of the LAN to which the controller is connected.

The E68x controllers provide a mechanism to display and/or temporarily over-ride the controller's IP address when necessary. This is accomplished by pressing and holding the PROG button on the controller. The procedure is as follows:

Determine the over-ride code you need to use using the table below. Press and hold the PROG button. After a few seconds the red and green LEDs will begin flashing on and off together at a rate of one flash per second. Count the flashes and release the PROG button after the LEDs have flashed the number of times equal to the desired over-ride code. For example, if you want code 5, you would hold the button down until the red and green LEDs come on for the 5th time, and release it before they come on for the 6th time.

Over-Ride Code	Purpose
1	Display current IP address on LEDs, continue until restarted
2	Force a temporary IP address of 2.2.2.2
3	Force a temporary IP address of 10.10.10.10
4	Force a temporary IP address of 169.254.74.73
5	Force a temporary IP address of 192.168.0.206
6	Force a temporary IP address of 192.168.1.206…..

Note: Codes from 5 to 15 all force a temporary IP address of 192.168.x.206, where X is the over-ride code – 5. For example, over-ride code 15 forces a temporary IP address of 192.168.10.206, because 15-5=10.

Over-ride code 1, IP address display

Use over-ride code 1 to determine the IP address of the controller when it is not known. Press and hold the PROG button until the red and green LEDs come on together for the first time, then release (over-ride code 1). The LEDs will

now display the current IP address. For each digit, the green LED will come on, then the red LED will flash a number of times corresponding to the value of that digit. Then the green LED will go off. This process repeats until all 12 digits of the IP address have been displayed, and the entire process repeats continuously until the controller is restarted by pressing the PROG button again, or by pressing the RESET button (all but E6804), or by interrupting power to the controller. For the factory default IP address of 192.168.1.206, you would see the following pattern on the LEDs:

Brief pause with both LEDs off, then green ON, then red flashes 1 time, then green off (1)
Brief pause with both LEDs off, then green on, then red flashes 9 times, then green off (9)
Brief pause with both LEDs off, then green on, then red flashes 2 times, then green off (2)
(slightly longer pause, then next group begins)

Once the current IP address is known (factory default is 192.168.1.206) you must determine if it is within the address range used by your LAN. The following procedure is valid for Windows 7 and assumes that your PC receives its internet via a wired Ethernet connection; other versions of Windows will use a similar procedure:

Press the **WINDOWS** button to open the start menu.

Type **CMD** in the search bar and press **ENTER**.

A black window should open. In the black window type **IPCONFIG /ALL** then press **ENTER**.

Scroll up if necessary to display the first part of the text in the window. Look for an area called "**Ethernet Adapter Local Area Connection**". Within that area look for the **line IPv4 Address**. Generally the number displayed will be: 192.168.x.y, where x will usually be 0 or 1, and y can be any number. The third digit, X in the example, is what you need to know. If X is 0, your LAN uses 192.168.0.n addressing and you would need to use over-ride code 5 (based on the list of over-ride codes above) to force a temporary IP address in the range of your LAN. If your IP address is of the form 2.x.x.x or 10.x.x.x you would use over-ride codes 2 and 3 respectively.

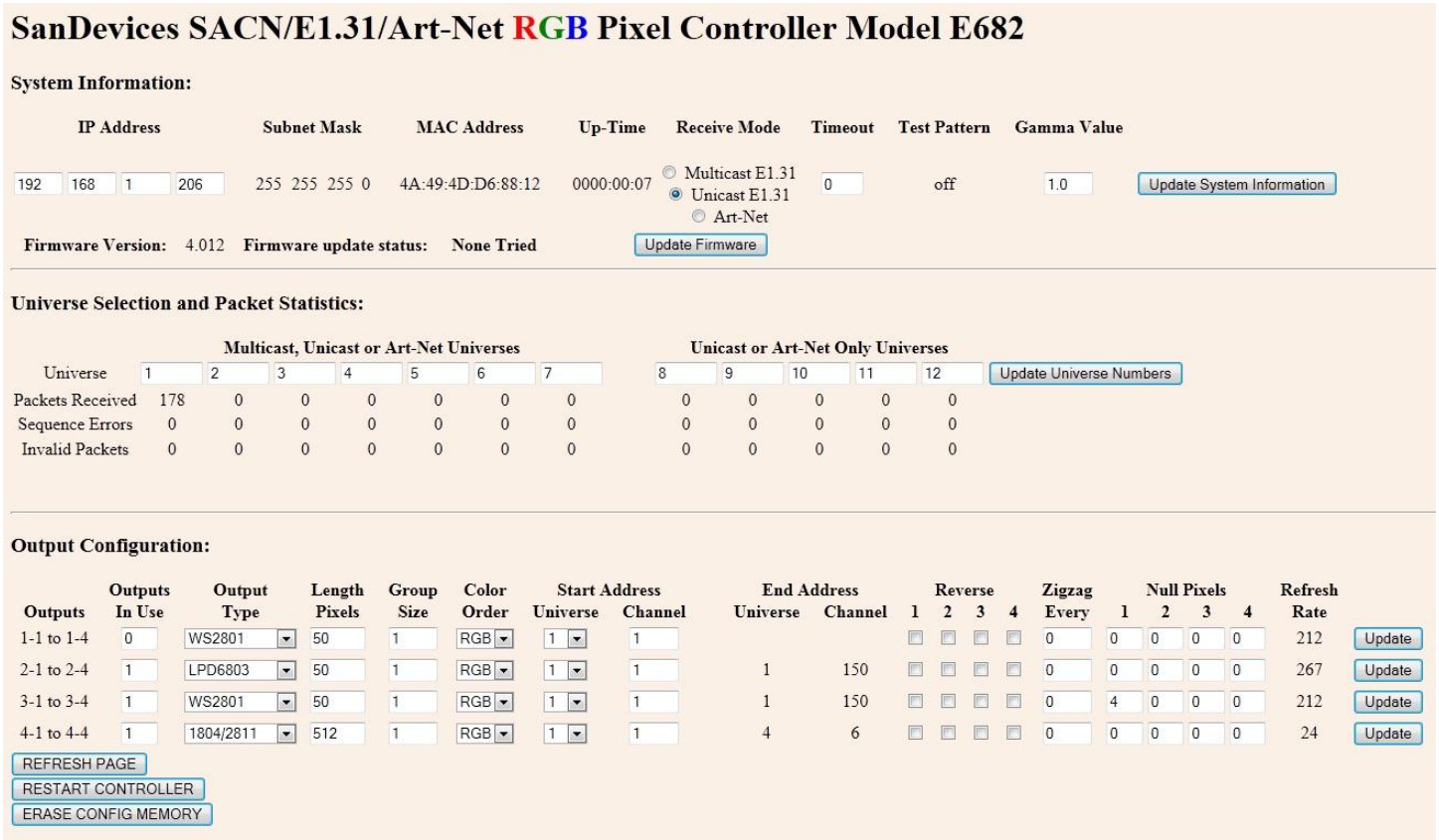
If your LAN uses 2.x.x.x or 10.x.x.x or 192.168.x.x or 169.254.x.x addressing, determine the over-ride code you need from the list above, and use the **PROG** button procedure to enter that over-ride code. Once this is done, you should be able to access the controller's web page by typing the over-ride IP address into your browser's address bar.

Note that for a controller with factory settings, if your LAN uses the 192.168.1.x addresses, no over-ride is necessary.

If you are unable to use the above procedure successfully, there is an alternate method to access the controller page. Unplug your computer's LAN cable from your router and wire it directly to the Ethernet jack on the controller. Reboot the computer and then use over-ride code 4 on the controller. You should then be able to access the controller's page at 169.254.74.73.

Note: The IP address created by the over-ride is temporary. Once you are able to access the controller's web page, change the IP address to an address that is within the range of your LAN, save by clicking **Update System Information**, then restart the controller.

When you have successfully connected to the controller's web server you will see a page similar to this:



The page is divided into 3 main sections: **System Information**, **Universe Selection**, and Output **Configuration**.

System Information

The System Information section allows the user to view and/or change the following system settings:

IP Address: This is the IP address that the controller will have when it is not over-ridden at startup. This IP address is used to access this web page, and is also used as the destination address if using E1.31 Unicast mode or Art-Net (described later). The IP address is entered as 4 separate numeric values. The controllers are shipped with a default address of 192.168.1.206. If you LAN uses 192.168.1.x addressing, you should be able to access the controller simply by entering that IP address into the URL bar of your browser. If your LAN uses a different address range, there is an over-ride mechanism, described earlier in this manual, that allows you to use the PROG button on the controller to force a different IP address at startup. Typically this is used to force an IP address in the range of your LAN, then you can access the web page, and change the IP address so that is within the address range of your LAN. To change the IP address simply click on any of the 4 IP address boxes and enter the desired values. When finished you must click the **Update System Information** button to save your changes. In order for the new IP address to take effect, you must then restart

the controller, by pressing the **RESTART CONTROLLER** button at the lower left. Note that ONLY an IP address change requires a restart, all other changes take effect immediately when the corresponding **UPDATE** button is pressed.

The controller's **Subnet Mask** is displayed next. This is set automatically by the controller based on the IP address.

The controller **MAC Address** and controller **Up-Time** items are display only items, and cannot be changed. **Up-Time** simply shows the elapsed time since the controller was last restarted.

Receive Mode Receive Mode is an item that can be changed by clicking on the appropriate button to change the receive mode from Unicast E1.31 to Multicast E1.31 or Art-Net. At this time Art-Net support is limited to reception of ArtDMX packets directed on the controller's IP address. ArtPollReplys are not supported.

Timeout may be set to any value in the range of 0-99. If non-zero, if incoming E1.31 data stops, all of the controller outputs will be turned off after the selected number of seconds of delay. If set to 0 this feature is disabled.

Test Pattern As of version 4.014 the test pattern selection can be configured by entering a numeric value. A value of 0 disables test patterns, a non-zero value enables a test pattern. **When test patterns are enabled the controller will not display any received data. When test patterns are enabled the web page will take longer to render.**

Test Patterns:
- 1-3 All LEDs lit RED, GREEN, and BLUE respectively
- 4-6 A bright pixel chases from start to end leaving dim pixels behind, RED, GREEN, and BLUE
- 7-10 Not used
- 11-29 A pattern of n RED pixels followed by n GREEN pixels followed by n BLUE pixels that chases through the entire range of pixels, where n is the test pattern number – 10. For example, test pattern 15 is a group of 5 pixels of each color (15-10=5).

Gamma Value may be set to any value in the range of 1.0 (no correction) to 3.0 (maximum correction) in increments of 0.2. The use of this setting is described later.

After making any changes to items in the **System Information** area, you must click the **Update System Information** button for the changes to take effect. With the exception of a change to the IP address, all changes become effective immediately and do not require a restart of the controller.

Universe Selection and Packet Statistics

This area is where you define the list of E1.31 universes that the controller will respond to. The set of universes needed will depend on how your pixels or other devices are defined in the software package that sends out the E1.31 packets. This could be LOR, LightShowPro, Madrix, etc.

Based on the settings that you use to address your pixels in your sequencing software, you will know how many universes, and which universes, need to be received by this controller. Typically the universe numbers are entered in order from lowest to highest. Unused universes may be left at 0. Valid universe numbers are 1-63998. There should be no duplications in the universe numbers used, in other words don't enter any universe number in more than one box. Universe numbers are entered simply by clicking on the appropriate entry box and entering the desired value. When finished, click the **Update Universe Numbers** button to save the changes. Universe number changes become effective immediately. Note that the selections here simply determine which set of incoming universes the controller will receive. In the next section we will assign those universes to control specific pixel strings.

This section of the page contains 3 additional items of information for each universe: **Packets Received, Sequence Errors**, and **Invalid Packets**. These are display-only items. Packets Received lists the total number of packets received for this universe since the controller was restarted. **Sequence Errors** shows the number of packets that were missed, or skipped over. Typically this value will be rather small, but not necessarily 0. For example, he controller will tend to miss some incoming packets when the web page is being updated. **Invalid Packets** indicates the count of packets that were not proper E1.31/SACN packets. This should rarely have a non-zero value.

Important: The first 7 universes can be used for data of any type: Multicast E1.31, Unicast E1.31, or Art-Net. The last 5 universes cannot be used for Multicast E1.31. If you use Multicast E1.31 you must only assign the 1st seven universes to your pixel strings (see Output Configuration, below).

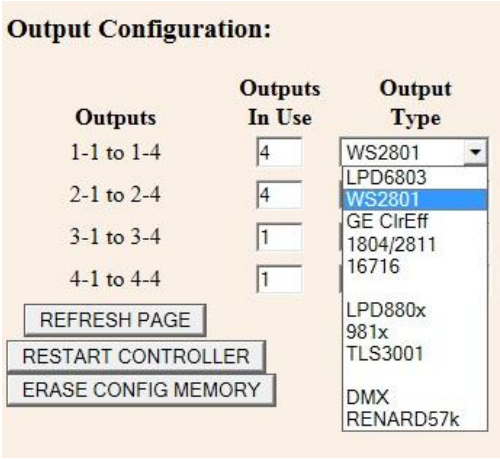
Output Configuration

This is where the individual controller outputs are configured. The outputs are divided into groups of 4 (1-1 thru 1-4, 2-1 thru 2-4, 3-1 thru 3-4, and 4-1 thru 4-4). Note: E6804s have only 4 outputs and they will be labeled as 1 through 4. For controller with 4 outputs per group, most of the configuration choices apply to all of the outputs within the group.

Each output group has its own **Update** button which must be clicked for the changes to be saved and to take effect. Changes take effect immediately when the Update button is clicked, no controller restart is needed.

Outputs In Use sets the number of outputs in this group that are being used. Outputs that are marked as in use will be assigned a range of DMX channels. The value can be 0 (no outputs in use) to 4 (all outputs in use), or any value in between. "In Use" outputs always begin with the -1 output of that group. In other words if you select 3 active outputs for the "2-n" output group, the active outputs will be 2-1, 2-2 and 2-3. For E6804 controllers this is a check box entry, check the box to indicate that the output is in use.

Output Type is a drop-down selection list that allows you to choose the type of pixel (or other device) attached to this group of outputs. As of this time the following pixel types are supported: 6803, 2801, GE Color Effects, 1804/2811, 16716, 880x, 981x and 3001. Non-pixel output types supported are Renard (57.6kbps) and DMX.



Length in Pixels is where you enter the number of pixels that make up each pixel string in this group. If the string lengths vary, use the length of the longest string. For output types **Renard** or **DMX,** the value entered here would be the number of channels of output desired divided by 3, since each 'pixel' uses three channels. As an example, for a full universe of DMX output, you would specify a length of 170. This is equivalent to 510 channels.

Group Size allows pixels to be controlled in groups rather than individually. This feature would typically be used either to reduce the number of channels needed or to simplify programming of the pixels. When the group size is other than 1, instead of pixels being controlled individually, groups of pixels are controlled. For example, with a string length of 50

pixels and a group size of 5, the string would be controlled as 10 groups of 5 pixels and would use 30 channels (10x3) instead of 150 channels (50x3).

Color Order is a drop-down that allows the specific color order of the pixels in this output group to be specified. This can be helpful if the particular pixel strings or strips do not use the standard R->G->B color order. If the pixels do not light with the expected colors because they use a color order other than RGB, changing the color order to the proper sequence (often by trial and error), will correct the problem.

Start Address Each group of outputs that has at least one active output and a length greater than 0 is assigned a sequential block of DMX addresses. The length of this address block is (Outputs in Use) X (Length in Pixels) X 3. Please remember that E6804 controllers have only 1 output per group. If you have 4 active outputs, and are using strings 50 pixels long, then this output group will need 4x50x3 = 600 total channels (each pixel needs 3 channels for the R, G, and B colors). Note that if pixel grouping is used the number of channels needed will be reduced accordingly.

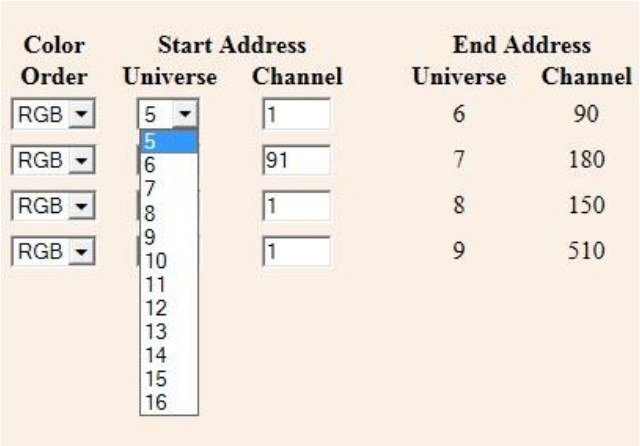
The operator can configure the starting address for each output group. All pixels in that group are then assigned consecutive addresses beginning with the specified start address. The necessary channels may span across one or more universe boundaries. When the end of a universe is reached, channels will be assigned from the next selected universe based on the order of universe selection (see Universe Selection and packet Statistics).

Typically the selected universes will be assigned sequentially. For the first controller the starting universe will typically be Universe 1. If using Multicast for example, the first controller would typically be configured for universes 1 through 7.

If a different group of universes is selected, this will affect how channel addresses are assigned. For example, assume that the first 5 selected universes (from left to right) are 1, 3, 5, 7, and 9. If we define output group 1 as having 4 active outputs, each 50 pixels, then this group needs 600 total channels. Assume that we start this group at Universe 1 Channel 1. Since there are only 510 useable channels per universe, the last 90 channels will be assigned from Universe 3, since Universe 3 follows Universe 1 in the universe selection list.

The selection of the start address for an output group is done by entering the starting Universe (from a drop down list which will only show the list of selected universes), and a starting channel, a numeric entry from 1 through 508.

Although not specifically required, it's best to start every output group on a channel number of 1 or 1 plus a multiple of 3 (4, 7, 10…508). The example below reflects the selected universe group consisting of universes 5 through 16, as shown in the first illustration.



You can see in this example, that a starting address of Universe 5 Channel 1 produced an ending address of Universe 6 (the next universe in line) channel 90. This is because the output group needs 600 total channels, 510 from Universe 5 and 90 from Universe 6. The ending channel is calculated automatically by the controller, only the starting address can be entered.

Note: Start Address and End Address values are NOT displayed for any output group that has NO active outputs, or has a length of 0.

Reverse The Reverse check-boxes allow you to indicate that the associated string is 'backwards', in other words the first pixel to light will actually be the last pixel of the string. An example where this feature would be useful is a roofline, where the controller is mounted at the mid-point, with one pixel string (say #1) running to the left and another (say #2) to the right. Without the reverse feature, if you began lighting pixels in order, you would actually be lighting pixels beginning at the center of the roof, working left to the left end, then jumping back to the center and then working to the right. By selecting the check-box to indicate that the first string is reversed the pixel sequence will be as it should be, from left to right with no jumps. Any or all strings in an output group may be marked as being reversed. E6804 controllers will only display one reverse check-box since there is only one output per group.

Zigzag The Zigzag feature is another feature that can simplify the pixel programming by allowing the pixel addresses to flow in a more logical order. As an example, say you have a matrix of 200 pixels arranged in 20 columns of 10 pixels. If you start at the bottom left you would string pixels 1-10 from bottom to top in the first column, and then pixels 11-20 from top to bottom in the 2nd column, and so on. When done, if you lit pixels in order from the lowest address to the highest, you would see a pattern that started at the lower left and zig-zagged up and down across the matrix. When programming the pixels, it's often easier if the pixels light in a more natural order. In this example, we would use the zigzag feature to tell the controller that the pixels reverse direction every 10 pixels.

Null Pixels Null pixels are pixels which are ignored by the controller and never lit. The most common use of null pixels is to allow a longer length of wiring between the controller and the start of as pixel string. Because the pixel control signals aren't designed to travel over long distances, it may not be possible to use wire ruins longer than about 20 feet. If the particular installation requires a longer wire run than normal, this can often be accomplished by inserting one or more extra pixels in the wire run between the controller and the pixel string. Each of these pixels will regenerate the control signals, enabling them to be run for another 20 feet or so. As an example, if we needed to have a 100 foot wire run between the controller and a pixel string, we might use 4 null pixels, one at 20 feet, 40 feet, 60 feet, and 80 feet. Even though the total run was 100 feet the maximum distance between pixels is only 20 feet because of the null pixels.

Another use for null pixels is when you don't need the full length of your string. Say you have a 50-pixel string but only need 48 pixels lit. If it's more convenient to have the unused pixels at the start of the string rather than at the end, set the string length to 48 at set null pixels to 2. E6804 controllers have only one null pixel entry per group.

Refresh Rate This is a displayed value that shows the approximate refresh rate of the pixels in this group. It is affected by pixel type and string length.