Model Train™ TECHNOLOGY

16 Port DCC LED Scene Controller IIa

KEYPAD USER MANUAL

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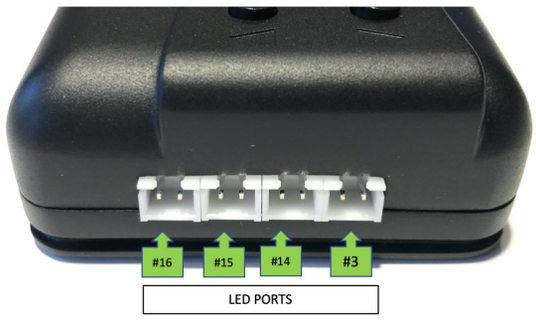
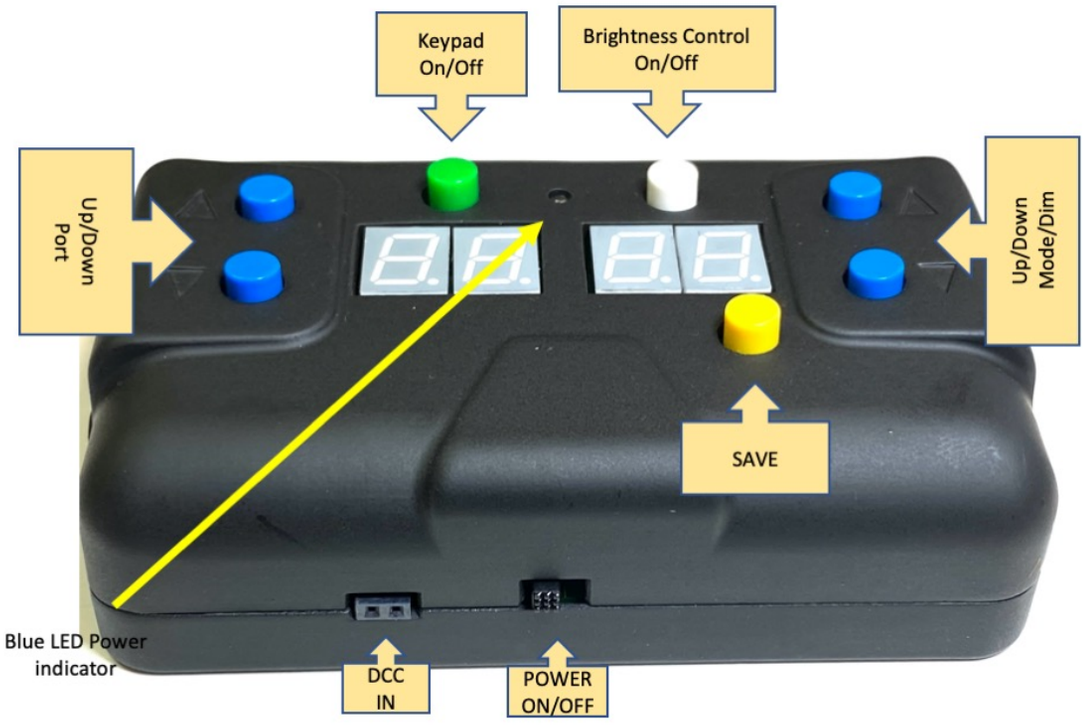
QUICK START

PLUG THE POWER SUPPLY INTO THE POWER SOCKET.

Since this view is the back of the controller the numbers may seem backward but, when viewed from the top of the LSC II the numbers move left to right from 1 to 16, counterclockwise.



PLUG YOUR LEDS INTO ANY OF THE LED 16 LED PORTS IDENTIFIED IN GREEN IN THESE PICTURES.



SLIDE THE POWER ON/OFF SWITCH TO THE RIGHT.

THE DISPLAY WILL SHOW 1111, then 3, then 1234 AND THEN GO BLANK.

THE BLUE POWER LIGHT WILL BE LIT.

AND SO, WILL ANY LEDS YOU HAVE PLUGGED IN!

TO CHANGE THE ANIMATION ON PORT#1:

MAKE SURE AN LED IS PLUGGED INTO PORT #1

PRESS AND HOLD THE KEYPAD ON/OFF FOR 1 SECOND.

THE DISPLAY WILL LIGHT AND SHOW: 1 1

PRESS THE RIGHT HAND BLACK UP BUTTON TWICE SO THAT THE RIGHTHAND DISPLAY SHOWS "3".

PRESS THE SAVE KEY ONCE. THE DISPLAY WILL FLASH.

PRESS THE KEYPAD ON/OFF FOR 1 SECOND – TO TURN IT OFF.

PORT #1 LED WILL BE BLINKING.

INTRODUCTION

The LED Scene Controller II (LSC II) is a powerful but simple-to-use LED animation controller. 100 ***Quick Set*** behaviors have been preprogrammed so it's simply a matter of selecting an output port and then assigning a number representing that behavior. There are 16 ports and depending on what type of LED you are using and at what brightness setting you can connect as many as 64 LEDs. Use our 1-to-4 connector to connect up to four LEDs per port.

The LSC II has a 1Amp capacity.

Each pin can operate separately, or multiple pins can be "coordinated" to create other effects. For example, the alternate flashing mode allows any two adjacent pins to, you guessed it, alternate flash. If you set all 16 pins to this mode, you have a marquee lighting effect. This one controller can run the police lights, a crossing gate, multiple random on off ports, a rotating beacon, fade streetlights on and off and show a TV simulation in a building – all at the same time!

Additionally, if you have a DCC Command System for running your trains, you can connect the LSC II and control (turn on and off and configure) any combination of those effects from your hand controller.

A common challenge with using LEDs is deciding what voltage and resistor value to use so as not to burn them out. To solve this the LSC II allows you to control the effective output voltage

by setting the maximum brightness. This allows you to mix and match 3.3v and 12v LED on the same LSC II.

We've enclosed the LSC II inside a sleek case and designed the base of the unit with matching bracket (sold separately) that allows you to snap the unit in place anywhere around your layout.

Here are the special effect categories for reference.

- Adjust each LED for individual "brightness"
- Flickering
- Blinking with individual pin on/off speeds
- Rotating Beacon (simulation)
- MARS simulation
- Fade all, one or groups of pins with up to 18 hour timer.
- Random on/off with adjustable pace (all pins or one pin)
- Step, Chase, Race – each LED on/off in sequence
- Alternate 2-pin Flashing
- TV Simulation (use 2,3 or 4 LEDs)
- Arc Welding
- Lighting

*** Some speed settings apply to all LEDs whereas blinking and brightness settings apply individually to each LED (they can be different). If you have multiple boards with the same DCC address but you program them separately, they will perform based on the board specific configuration.*

You can also configure and control the LSC II from your NMRA® DCC system. That also means you can use jmri (www.jmri.org) or similar control software. Our favorite is Railroad Automation (RRAuto.com) Please see the LSC II DCC Manual.

The LED Scene Controller has a DCC onboard decoder that allows you to both configure and control your lights remotely. There are two types of decoder in the DCC eco-system: Multifunction decoders and Accessory decoders. The LSC II can operate as either of these which gives you great flexibility in how you want to set up your lighting. This means you can set up switch controllers that turn specific lighting effects on and off.

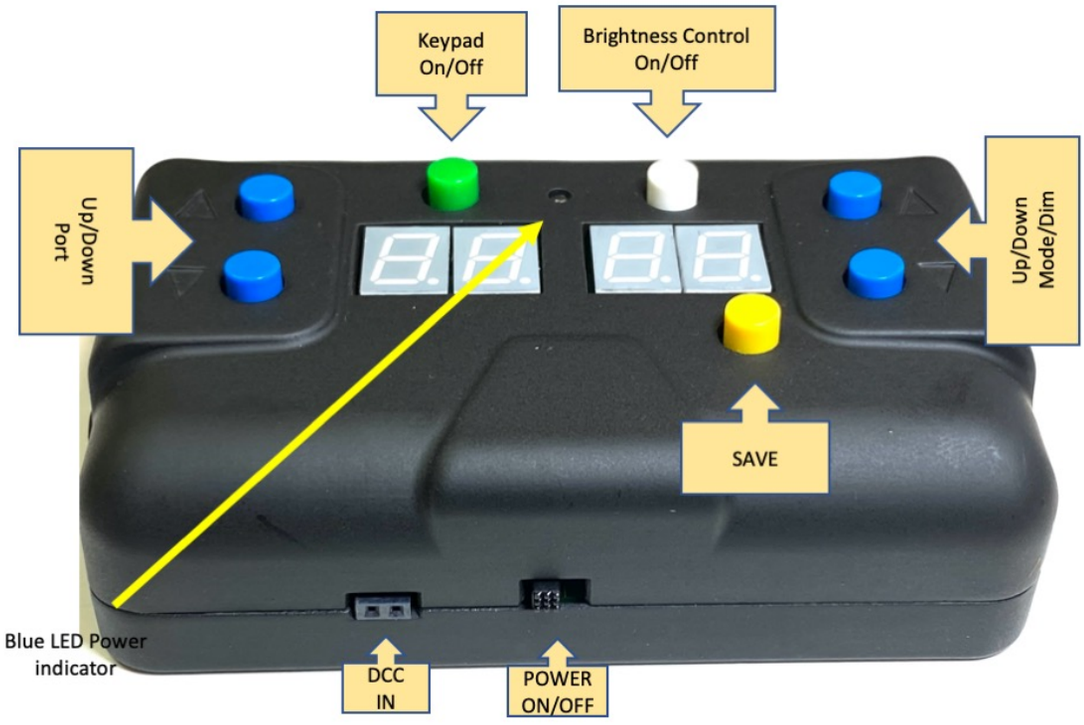
With this newest release of the LSC II-a we have added triggers that can be activated by your DCC system and they work in both Multifunction and Accessory mode. Setting Triggers and Trigger timeouts is discussed at the end of this manual.

OVERVIEW

1. POWERING the LSC II (12-25V DC or AC, 1A)

Note: While our LSCI MICRO board allows you to power the board and LEDs via your DCC system, the LSC II with Keypad requires an external power supply to operate. If you connect DCC as the main power source to the LSC II it will only read the digital signal, which is only a few milliamps, and will not draw current to power the LEDs. This is great for Club setting where keep track and accessory power separate is a requirement.

OPERATIONS



To turn on the LSC II, slide the right-hand slide POWER ON/OFF switch to the RIGHT.

The blue LED on the top of the case will turn on.

The 4-number LEDs may flash or have on odd segment lit but after 2 seconds you will see "1111", then "3" and lastly "1234" on the display and then the numbers will disappear.

"1111" indicates that the LSC II is set for DCC Multifunction decoder operation. "3" is the default DCC address and "1234" indicates that all is working. At that point the LEDs that you plugged in will all turn on depending on what FX setting you set. The default mode for each port is ON and the brightness setting is 20%

If your unit indicates "2222" first, then your LSC II is set to operate as a DCC Accessory switch operation.

If you never plan to use DCC with your LSC II, you can ignore the first two number indications. You can also disable this start up sequence by set FastBoot ON.

The LSC II has two modes. It is either in Animation Mode or Configuration Mode. If you see any red numbers on the top of the LSC II, the LSC II is in Configuration Mode. If they are off and the blue light is on, the LSC II is in Animation Mode.

If the blue light is off, the LSC II power is Off.

To switch between Animation mode and Configuration mode, push and hold button the LEFT TOP Keypad On/Off button for about 1 second and release. Pushing this button toggles back and forth between these two modes. The LSC II will not react to a very quick push. If your push is too long the LSC II will switch back and forth. After a few tries you will get the hang of it.

There are two pairs of "number" LEDs on the top of the LSC II. On the left is the number of the selected Port. When you switch to configuration mode this will always start at "1".

To change the port number, push the Up or Down black buttons on the left side top of the LSC II.

On the right side are the two digits that represent the configured special effects behavior. There are 99 built-in special effect options, plus "0" (zero) which is OFF for that port. See the chart.

To configure a Port to behave with a specific special effect, select the port number on the left and then select the behavior number on the right side.

Press the SAVE button once to save this to the LSC II. The digits will blink indicating a successful save. The setting is saved even when power is turned off or disconnected.

You can change the setting as many times as you want.
Remember to press Save.
To see the behavior, switch back to Animation mode.

ADJUSTING THE LED BRIGHTNESS:

To adjust the brightness of any Port, switch the LSC II into Configuration mode. Press the Right-side button on the top once. You will see decimal points on each displayed digit of the LSC II. The number on the right now indicates the brightness level 0-99% of the port that is selected on the left. Push the black Up and Down buttons on the right side of the LSC II to adjust the brightness up or down.

3.3V and 12V settings

The LSC II is configured so that a 100% brightness setting is ~14VDC. This is a few volts higher than 12V which is maximum for the Woodland Scenic Roomette® products as well as other 12V LEDs. The default brightness of all the ports is set at 10%. This is the MAXIMUM value for 3.3V LEDs with a 25V power source. In this way if you plug in only 3.3V LEDs when you start up you won't have any problems. And then you can adjust them as you need.

It is possible to burn out 3.3V LEDs very quickly by applying excess voltage above the 50% setting. We opted to give you this flexibility so that you can mix and match 3V and 12V LEDs on the same LSC II. Please use this wisely.

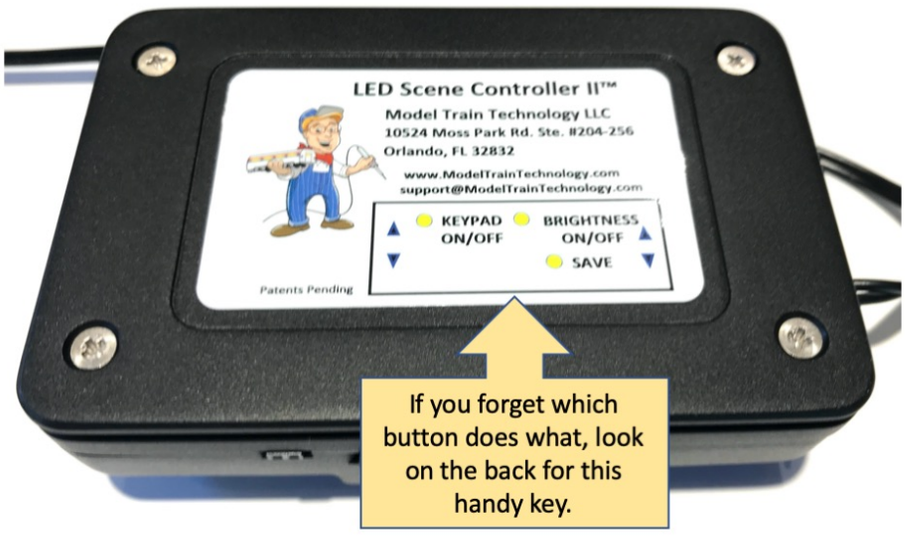
Here are the approximate voltages for different power sources:

Power Adapter Output	Maximum Port voltage output
25vdc (Woodland Scenic)	14.0v
18v	13.9v
12v (for 3.3V LED only)	8.6v

Press the SAVE button to save the new setting. If you don't press Save and you change ports or switch modes, the LSC II will revert to the previously saved setting.

To switch out of adjusting the brightness, press the Right-side button once more. The decimal points will disappear, and the number will change to the value representing the special effect setting. Pressing the button again will toggle back and forth between setting the Brightness and setting the special effects Behavior for the port number that is shown on the left.

If you forget what the button does and you have lost this piece of literature, flip the LSC II upside down to see the reference key.

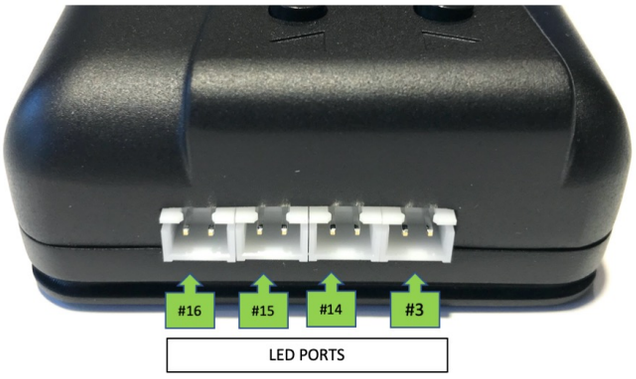


The arrow keys have a “fast” mode. If you hold the key down for 2 seconds, the rate of change roughly doubles.

CONNECTING LEDs

The LSC II has 16 Ports, labeled counterclockwise as viewed from the top of the LSC II. You can use the ports in any order.

Since this view is the back of the controller the numbers may seem backward but, when viewed from the top of the LSC II the numbers move left to right from 1 to 16, counterclockwise.



CONFIGUREING THE LSC II for Special Effects

We suggest you start with some basic setting so you can quickly become familiar with how the LSC II works. Let's start with what we call "singles". Most of the special effects are grouped into TENs with the first digit representing the basic FX. In the chart below, 2 is the number for Flicker. If you set a port to 2 it will Flicker at the default setting. As you will see in the 100 Chart, all the "2" are grouped. So any effect whether 2 or 21 or 25 will Flicker. Likewise, with 3. All effects that begin with 3 will blink.

Try some of the settings below to get the effect (pun intended).

LED Scene Controller II – FX Settings
"Singles"

	Special Effect		Special Effect
0	Port Always OFF	8	Alternate Flashing
1	Port Always ON	9	TV Simulation
2	Flicker	10	Mars
3	Blink	11	none
4	Beacon	12	none
5	*Fade*	13-15	Arc Welding (3 timings)
6	Random	16-18	Lightning (3 Timings)
7	Step		

FEATURE: When you have more than one Port set to a common first value, say all set to 22, when you change ANY Port that has a leading 2, all the ports will change to that same new number. If you change Port 5 from 22 to 24, all pins that were 22 before will now change to 24. This is necessary to keep the integrity of the timing of the flicker behavior. There are some exceptions:

FX that begin with 1 will not change.
FX that begin with 3 (Blink) will not change.
FX that begin with 5 (Fade) will not change
FX that begin with 9 will not change.

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LED Scene Controller II – FX Settings

			0	1	2	3	4	5	6	7	8	9
0 ~ 9	"Singles"		OFF	ON	Flicker	Blink	Beacon	Fade	Random	Step	Flash	TV
11 ~ 18	"Singles"		Mars	Mimic F11	Mimic F12	Welding 1	Welding 2	Welding 3	Lightning 1	Lightning 2	Lightning 3	*TBD*
20 ~ 29	Flicker	Short	40	30	20	10	20	30	40	50	60	100
		Long	80	60	50	40	10	10	20	30	40	50
30 ~ 39	Blink*	On	5	3	1	1	1	5	50	15	10	100
		Off	10	10	10	25	90	50	10	5	100	10
40 ~ 49	Beacon	Speed	40	10	20	30	50	60	70	100	150	255
50 ~ 59	Fade*	Time On	Manual	30	60	300	1200	1800	7200	3000	7200	14.4K
		Time Off	Manual	30	60	120	600	300	600	6000	3600	1800
60 ~ 69	Random	Speed	25	25	25	25	50	50	100	100	100	100
		% On	60	80	40	20	80	40	80	60	40	20
70 ~ 79	Step	Type	CHASE							RACE		
		Delay	10	20	30	60	10	2	3	1	2	3
80 ~ 89	Flash	Speed	15	5	10	20	35	50	100	150	200	255
90 ~ 99			DCC signal Scan delay (sec.) (No Pin Effect)						TV Sim	TV Sim	TV Sim	RELAY
			0	5	10	15	20	60	Game Show	Movies	News	

** Blink & Fade - unique settings can be configure for each pin, all other setting affect all pins in that MODE.

OTHER NOTES:

- Some FX work with several ports in unison. Step, Chase, Race and TV sim work this way by design. But you can also mix effects on different ports. For example, you might use an Arc Welding FX with a flicker effect on a red LED to simulate the hot metal.

  On one of our displays we have a HO police car that we kit bashed from Woodland Scenic. We connect the headlights, rear lights and the top Red beacon to three different LSC II ports and three different effects.

  Step, Chase and Race require a group of adjacent pins to make sense. The effect will turn each light on in sequence with a small timing gap between them.

- The MARS effect uses the Beacon Timing. Therefore, to set the speed of the MARS effect, set the PORT to the Beacon setting that corresponds to the desired speed. Save it. Then change the Port FX to Mars.

- Fade – Fade timing is by default in 10 second increments. This can be increased or decrease via CV #127. The range is 1-255. The duration of the ON time and OFF time are set via the keypad or CV's. (see the chart). The range is 1 to 255. Thus with 255 set to a port ON and the seconds increment set to 255 you can have a timer that is 65,025 second or 18 hours long! That is extreme but this wide range allows you to set your layout animation to turn the lights on and off to a 24-hour cycle. For example, ON for 12 hours and then OFF for 12 hours, or On for 18 hours and OFF for 6. The LSC II does not have a real time clock (RTC) so it's only counting seconds from when the device is powered and animation is activated. It doesn't know what time of day it is.

- Fade = 50. If you set a port to Fade using the preprogrammed value of 50, it will disable the Fade timer for that pin but set the pin to fade on command. This allows you to have a Fade effect on ports that you control only via DCC. To return the port to an active timer, select either "5" or any other 50's value (like 51) other than "50". Think of the zero of the 50 as "off".

- Welding 1,2 and 3 use different time gaps between activity. 1 is the shortest and 3 is the longest. Combine these on different Ports so that one activity FX is the white-hot arcing and the longer period could be a RED led meant to show the red-Hot arcing.

- Lighting – setting them Mode to 16 follows the value in CV 125 which is a 1-minute delay by default. Lighting 17 divides this by ½ and Lighting18 doubles the value.

- The Step FX turns on and off LEDs in sequence starting at Port 1 (if it is set to a 7 series) through to 16. It will skip Ports that are not set to a 7 series 71-79)

    - The Race sequence repeats by starting at 1

    - The Chase sequence repeats by going backward from 16, then forward at 1, so back and forth.

    - Each LSC II can either Race or Chase but not both simultaneously.

- DCC Signal Scan is the amount of time that the LSC II waits after power on to switch into animation mode if it does not detect a DCC Signal. You can select ANY Port since it affects the entire device, select the value for the delay option and press SAVE. The previous FX behavior for that Port will NOT change.

  To see the effect, you must switch OFF the LSC II. After it's start up cycle you will be able to detect a change in time that it takes to start the animations – assuming you are not connected to DCC. If you are connected to DCC, you must press F5 (Animation ON/OFF) to activate the device animation.

- TV Simulation works with a White and Blue LED on separate Ports or in Color with a 3 separate Ports connected to an RGB (Red-Green-Blue) LED. The LED type is common Anode. (You can buy the proper RGB LED chip from our store.) The different settings are meant to simulate different types of TV activity. It's not perfect but it is effective, nonetheless. You can mix the FX on each color line if you want. This effect is a Random-on-Random effect so it may be very difficult to track the differences.

- Relay – The LSC II will drive the digital inputs of both 5VDC and 12VDC Relays which use a 5V digital signal. When you select 99 for relay, the LSC II will automatically set the power setting to 27% assume a 18vdc input. Adjust accordingly for different input voltages to get 5vdc output.

USING SWITCHES AND FUNCTION KEYS TO SIMULTATE TRIGGERS

The LSC IIa will let you set triggers so that a port only displays when its trigger is tripped or "active". You can assign any valid switch address within the 16 addresses starting with the first address set for the LSC-IIa. By default, your LSC-IIa is set the address 3. That means that all the switch addresses from 3 to 18 are available to assign to ANY of the LSC-IIa ports. By doing so you can have one or more ports by triggers simultaneously and you can have multiple LSC-IIa on the layout react in parallel.

When trigger #1 is tripped, the trigger will stay activated as long as the switch is Thrown (ON). After the switch is Closed (OFF) the port lights will continue to Animate for 5 seconds and then turn off. The trigger Timeout STARTS after the detector is OFF.

If you LSC-IIa is configured a Multifunction decoder, function keys F11-F26 will operate in the same manner. When the function key is set on,

the trigger is tripped. A port set to respond to triggers will stay on (animating) as long as the function key is set to on.

You can change the duration of the Trigger Timeout as described below.

Trigger Timeout Settings

Trigger Timeout is the amount of time that Animation continues AFTER a detector has stopped detecting – by whatever means you have set up.

When you activate a trigger, the trigger stays on for five seconds by default. Then the trigger shuts. The trigger will stay on until the switch or function key is turn off, and then for five seconds more. You can shorten or lengthen the amount of time that the trigger stays active after the sensor has stopped. The shortest time is immediately, the longest time is 255 seconds (4 ½ minutes).

To change the Trigger Timeout, set the CV values 224-231 to correspond to the port you want it to activate.

RESET

There are a few reasons that you may want to reset the LSC II back the factory defaults. One is that you forgot the DCC Address. Or, you just want to get back to the default settings.

TO RESET THE LSC II, turn on keypad mode. It doesn't matter what the display is showing, just that the display is on.

Then, PRESS AND HOLD the two black UP ARROW buttons. After about 5 seconds, the display will read all ZERO. Release the buttons. Once the reset is complete the display will blink as few times and then return the display showing PORT #1 set to "1".

WRITING CVs WITH THE KEYPAD

If you don't have a DCC system, it is still possible to change CV values in the range of 112 to 191 with the keypad. Check the MASTER CV LIST for the specific value you may want to change.

To enter CV write mode, Press and Hold the two black DOWN ARROW keys (one on the left and one on the right). The display will show a "C" and then the number 112, which is the first CV value that can be configured. Use the up and down keys on the RIGHT side to select the CV you want to change. Then, using the LEFT side Up/Down keys you switch the display to show a dash "-"followed by the current CV value.

Using the right side Up/Down keys select the new value for the CV.

Use the left side arrow keys to switch between CV Address and CV value. Press SAVE to write the new CV value.

To exit the CV mode, press the Keypad On/Off button.

SETTING THE DCC ADDRESS OF THE LSC IIa

1. Press the Green button to enter configuration mode.
2. Press and hold the WHITE button for 8-10 seconds.

The display will flash "8888" and then show the currently assigned address with a blinking decimal point. The ONLY time and place where there are blinking decimal points is in address setting mode.

To change the address, press the RIGHTSIDE blue buttons up and down.

** holding down the up or down button will speed up the changing of the numbers. Holding for more that 50 digits will put the scrolling into hyper speed scrolling. Release to stop.

Press the yellow SAVE button to save the new address.

If you are using Multi-Function decoder mode, remember to change the loco address on your DCC Hand controller to the new address you assigned. For Accessory mode it doesn't matter.

In Accessory mode the address of the ***LSC IIa*** is always the first Trigger.

FAST BOOT: CV50

When the ***LSC IIa*** starts up it displays three sets of numbers. First it shows which decoder type it is set to, then the DCC address and then 1234 to show all is working.

You can disable this and speed up the boot up process by setting CV50 = 1.

1 is Fast Boot on, no display, 0 (zero) is OFF (shows the display).

DECODER TYPE: CV47 (1=MF, 0 = Accessory)

In the DCC universe there are two types of decoders: Multi-Function Decoders and Accessory Decoders.

A multifunction decoder is what you use in your engines. It responds to a single DCC address. Additionally, there is a speed control and function keys. Typically, the function keys turn on the headlights and sound the horn. The ***LSC IIa*** uses these same capabilities to respond to your commands via your DCC hand controller. You can turn on all the lights, only one light, flash all lights and put the ***LSC IIa*** into animation mode.

An Accessory decoder has a single "master" address and then can have any number of sub address. Some Accessory decoders only have one address. Some have 4. The ***LSC IIa*** has eight – one for each Trigger. Unlike the Multifunction decoder that can do many things for one DCC address, the accessory decoder can really do only one. It's either Thrown or Closed for any given address. On or Off. But that's fine. We'll use eight sequential addresses to trigger each of the eight Trigger ports.

When the ***LSC IIa*** boots up with power it has to pick one or the other mode to operate in. When you change the Decoder Type CV47, when you switch back to Animate mode the display will show the active type either 1111 or 2222. This only appears if you change the decoder type.

Set CV47 = 1 for Multi- Function Operation
(1111 will display on boot up)

Set CV47 = 0 for Accessory Decoder operation
(2222 will display on boot up)

Reading the Product, Assembly and software Edition numbers:

Press and hold the lower left arrow key and the upper right arrow key for 5 seconds. The display will blank and then the Product type number, Assembly number and Software version (Edition) number will appear. After 10 seconds the keypad will revert to normal mode.

Software Updates and new functionality.

We are constantly receiving feedback from customers about new features and we add them as we can and seem appropriate. That means that your LSC II will have "old" software a week after we ship. Therefore, here is our upgrade policy:

We will upgrade your software on the LSC II for two year FREE of charge, less shipping. Simply send us the device and we will return it with the latest and greatest. Order the upgrade shipping kit on our website and then send the device to the address listed. In the future you will be able to update the software from your computer.

We use open source software and adhere to the GNU licenses.

We have Patents Pending for our products.

ONE YEAR MANUFACTURER WARRANTY: We warrants this product to be free from defects in workmanship and materials, under normal residential use and conditions, for a period of one (1) year for the original invoice date. Shipping and handling fees are to be paid for by the customer.

LIMITATION OF LIABILITY. UNDER NO CIRCUMSTANCE SHALL COMPANY OR ITS AFFILIATES, PARTNERS, SUPPLIERS OR LICENSORS BE LIABLE FOR ANY INDIRECT , INCIDENTAL, CONSEQUENCIAL, SPECIAL OR EXEMPLARY DAMAGES ARRISING OUT OF OR IN CONNECTION WITH YOUR USE, OR INABILITY TO USE THE PRODUCT, WHETHER OR NOT THE DAMAGES WERE FORESEEABLE AND WHETHER OR NOT COMPANY WAS ADVISED OF THE POSSIBLITY OF SUCH DAMAGES. WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, COMPANY'S AGGREGATE LIABILITY TO YOU SHALL NOT EXCEED THE AMOUNT OF THE PRODUCT. THE FOREGOING LIMITATION WILL APPLY EVEN IF THE ABOVE STATED REMEDY FAILS OF ITS ESSENTIAL PURPOSE.

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Version 2.0 LSC IIa