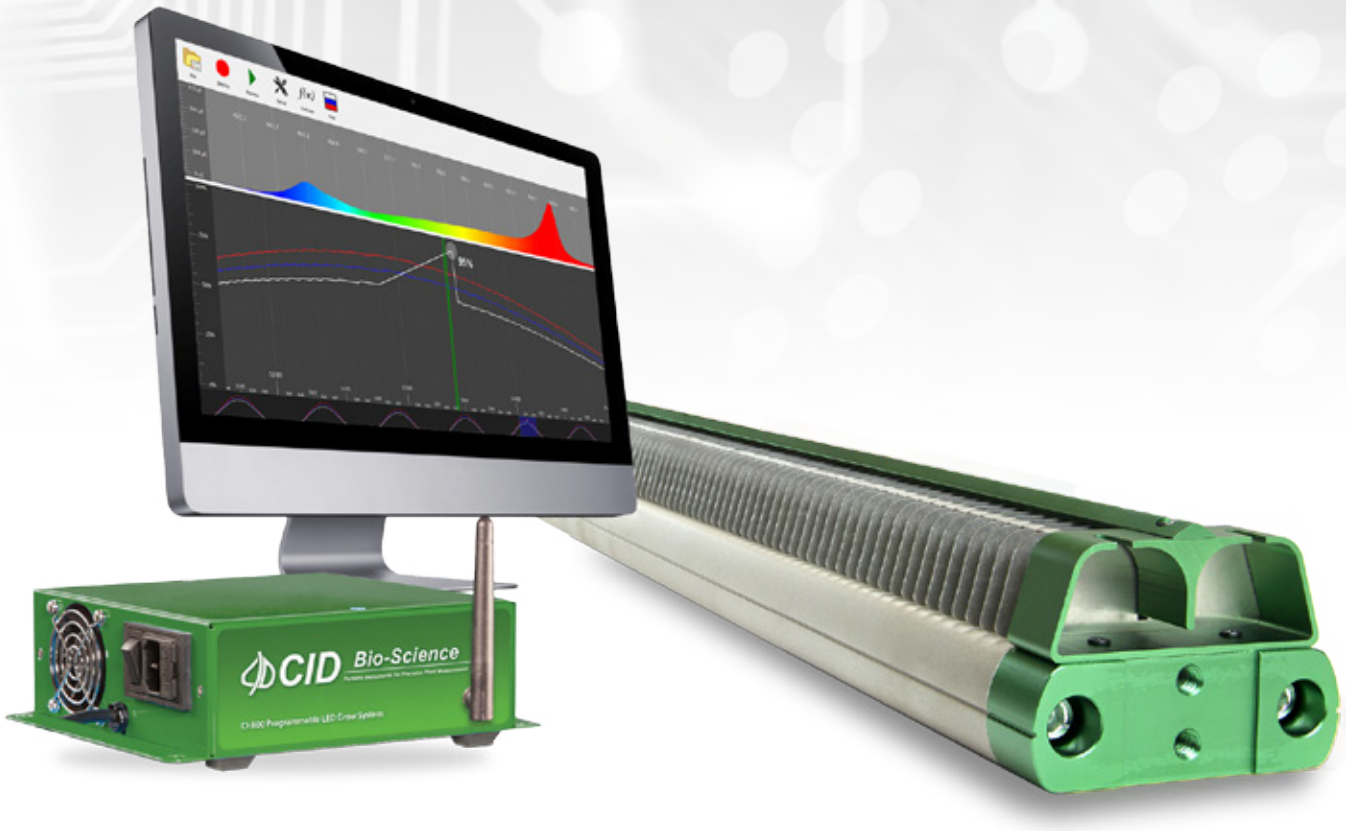
CI-800 Programmable LED Experimentation System



Operation Manual

CID Bio-Science Inc.
Portable Instruments for Precision Plant Measurement

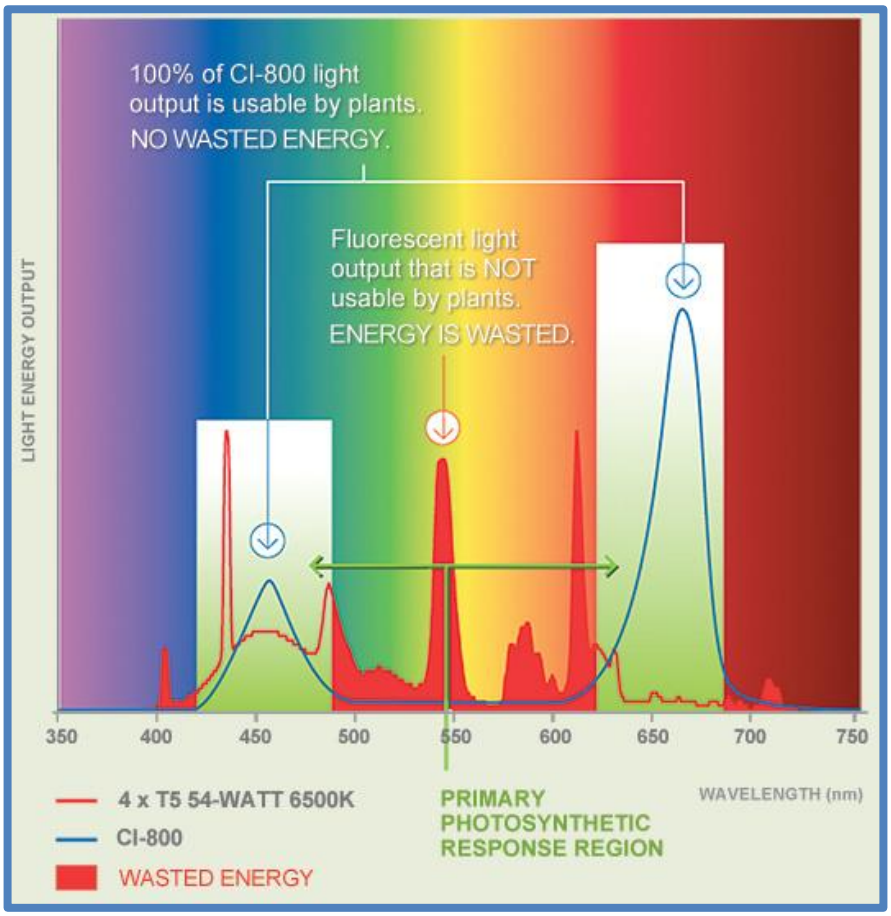
DOCUMENT OVERVIEW

INTRODUCTION

The CI-800 Programmable LED Experimentation System delivers maximum power and precise lighting control for boosting yields. Switch from T8 fluorescents to gain 50% more PAR per Watt and reduce lighting costs, water consumption and fertilizer demand.

Fluorescent lights provide a color spectrum intended for general illumination rather than plant growth. They are strong on blue light, but weak in the critical red region. Conversely, the CI-800 emits targeted portions of the color spectrum to trigger healthy plant responses. In addition to 450-475nm (blue) and 625-660nm (red) wavelengths, the CI-800 delivers spectra throughout the photosynthetically active region 400 to 700nm (white).

Eliminate the hassle of disposing and replacing toxic fluorescent tubes. The mercury-free, water proof, dustproof and RoHS compliant CI-800 system requires no custom configuration and seamlessly operates independently or alongside other lights, lasts up to 10 times longer than fluorescent lights without degradation. The figure below shows that the targeted spectral output of the LEDs in the CI-800 make it more efficient for growth of photosynthetic plants when compared with fluorescent lights.



LEDs are appearing in numerous applications, including shelf-style lighting in Arabidopsis growth rooms, environmental growth chamber retrofits, tissue culture, seedling propagation, large-scale algae cultivation, and even full-cycle plant production in greenhouses.

In response, scientists are conducting factorial experiments to compare LEDs to fluorescents and high pressure sodium (HPS) fixtures. LEDs are also being compared to determine which combinations of bulbs and output levels – usually from blue and red wavebands – produce optimal growth for myriad species. The CI-800 Programmable LED Experimentation System will help researchers advance the field by offering unprecedented control of spectral output, blue:red ratios, and customizable lighting schemes.

The CI-800 provides reliable illumination at all temperatures and will not degrade, unlike fluorescent fixtures. Additionally, fluorescent tubes aren't safe in wet environments like indoor gardens. The IP67-rated CI-800 fixture is waterproof, which can be essential.

The programmable light schedule, in the accompanying LightSnap! software, allows the user to create and deploy schedules of varying light levels (red, blue and white). Each LED is wired to a control box, which is wirelessly set by LightSnap!, using Wi-Fi.

Specifications

Operating Voltage:	90-264 VAC (2.5A max)
Operating Frequency:	50Hz-60Hz
Typical Power Consumption:	200 Watts
Weight:	3.18 kg (fixture), 1.36 kg (controller)
Dimensions:	2-7/8"W x 48-3/4"L x 2-1/2"H
Operating Temperature:	-4° F to 140° F (-20° C to 60° C)
Lifespan:	50,000 hours
High Power Factor:	> 0.95
PAR Output:	350 micromoles/m-2/sec-1 at one foot
Beam Angle:	110 degrees

Features

- Coverage area: 18" x 48" of growing surface at one foot above the plant material (as sole lighting source for high-light requirement plants)
- Enhanced spectral output covering full PAR (400-700nm) promotes photosynthesis
- More power per Watt than any other horticultural lighting fixture
- 5-Watt super-flux LEDs, rated at 50,000 hours with 15-18% drop in spectral intensity over the life of the CI-800
- Fanless fixture design keep LEDs running cool
- Operates safely without high voltage
- Uses 50% less power than T8 fluorescents
- Eligible for energy utility rebates
- RoHS compliant (Restriction of Use of Hazardous Substances)
- Mercury free
- Long lasting
- Individually adjustable red, white and blue intensity allow precise 3-channel spectral control using LightSnap! software
- Includes a wireless software and hardware control system
- View mode (white) for plant inspection
- Smart Volt auto-switching and regulating power supply adjusts to appropriate voltage for international use
- IP67-rated waterproof fixture
- Connect and control multiple LED light bars with one computer

HARDWARE INSTALLATION

Each CI-800 package consists of 6 components:

- LED light bar
- Control box
- A/C power cord for the control box
- CI-800 Operation Manual
- CD with the installation software
- 2 light bar mounting brackets with hardware (4 screws)

To install the hardware:

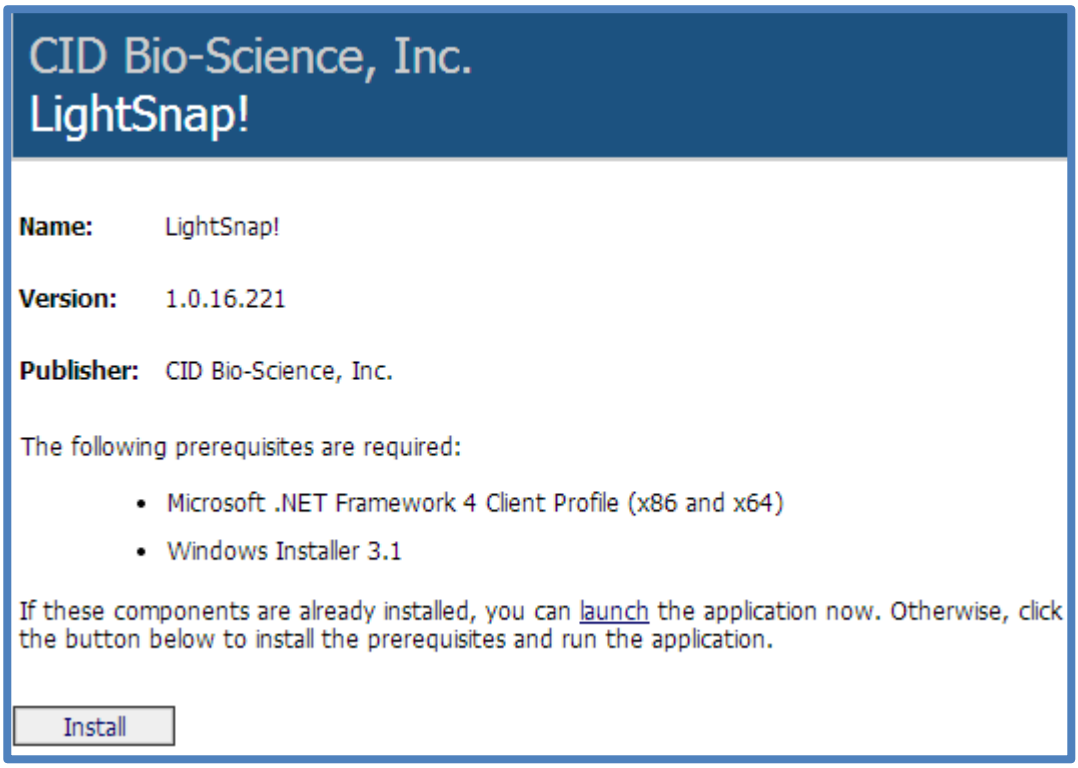
1. Secure the light bar. The uniform lighting coverage at 1 foot above plant material is 18 x 48 inches of growing surface.
2. Plug the control box cable into the light bar.
3. Connect A/C to the control box.
4. Follow the software installation instructions on the following pages.
5. After powering on the control box, please allow up to 30 seconds for the control box to start-up before attempting to connect to it.

SOFTWARE INSTALLATION

LightSnap! software is included with the CI-800 and designed to supply a programmed schedule of light. This software requires a Windows 7 or Windows 8 PC (32bit or 64bit) and a Wi-Fi connection (B/G). The software should be installed on the computer and then the CI-800 should be connected through the Wi-Fi, following the instructions in the next sections.

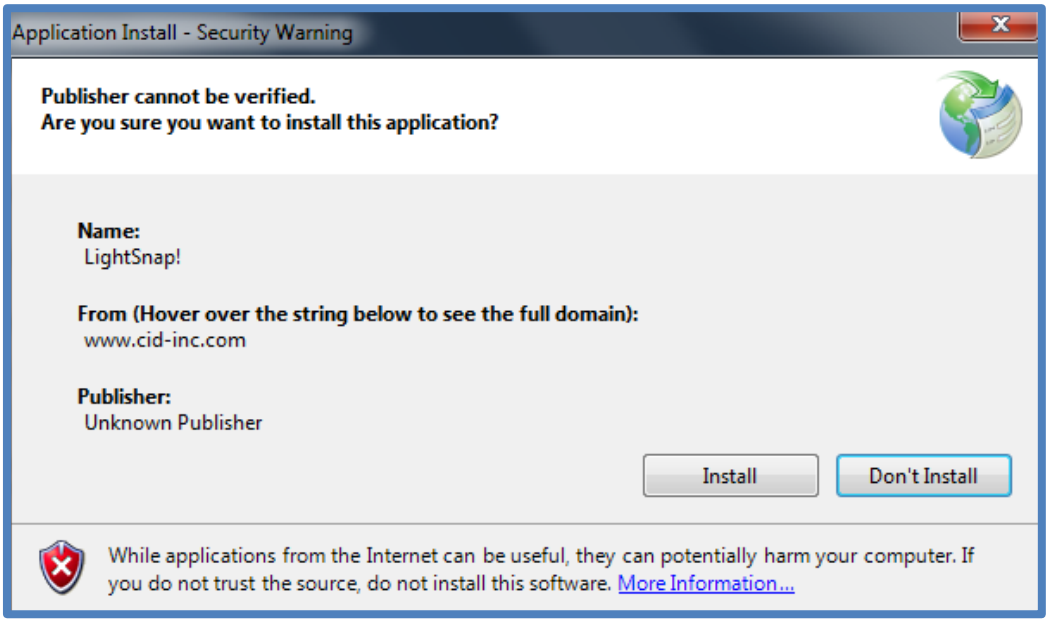
Initial Setup and Installation Procedure

1. Insert the software CD or navigate to http://www.cid-inc.com/Software/CI-800/ and click Install or run Setup.exe.

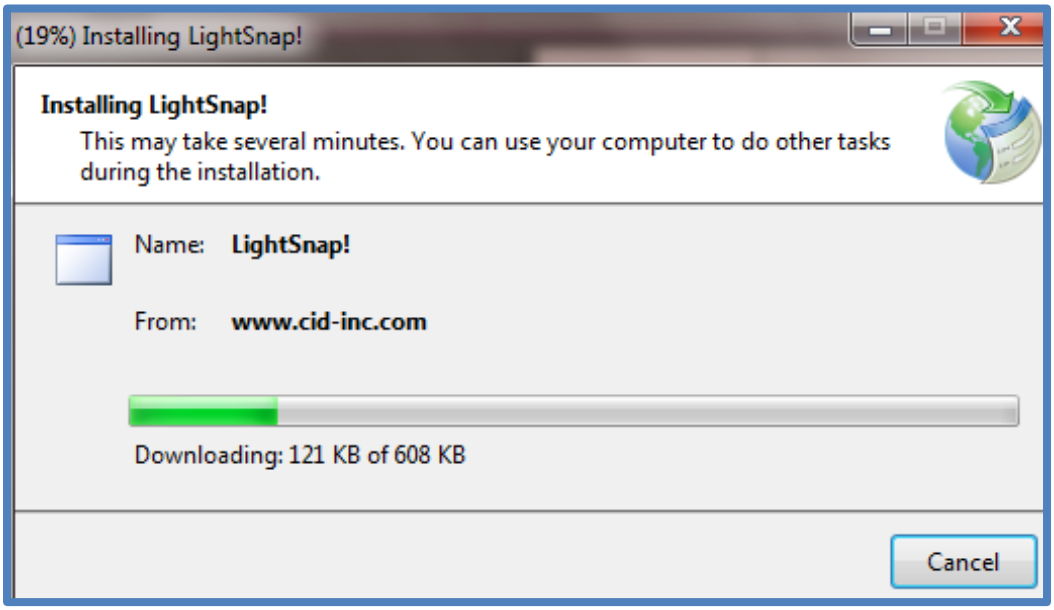


2. A security warning may appear stating that the publisher of the software has not been verified. Choose to "Run" this software.

3. A dialog may appear warning you that this software has not been signed by a Microsoft verified publisher. Select "Install" to continue.



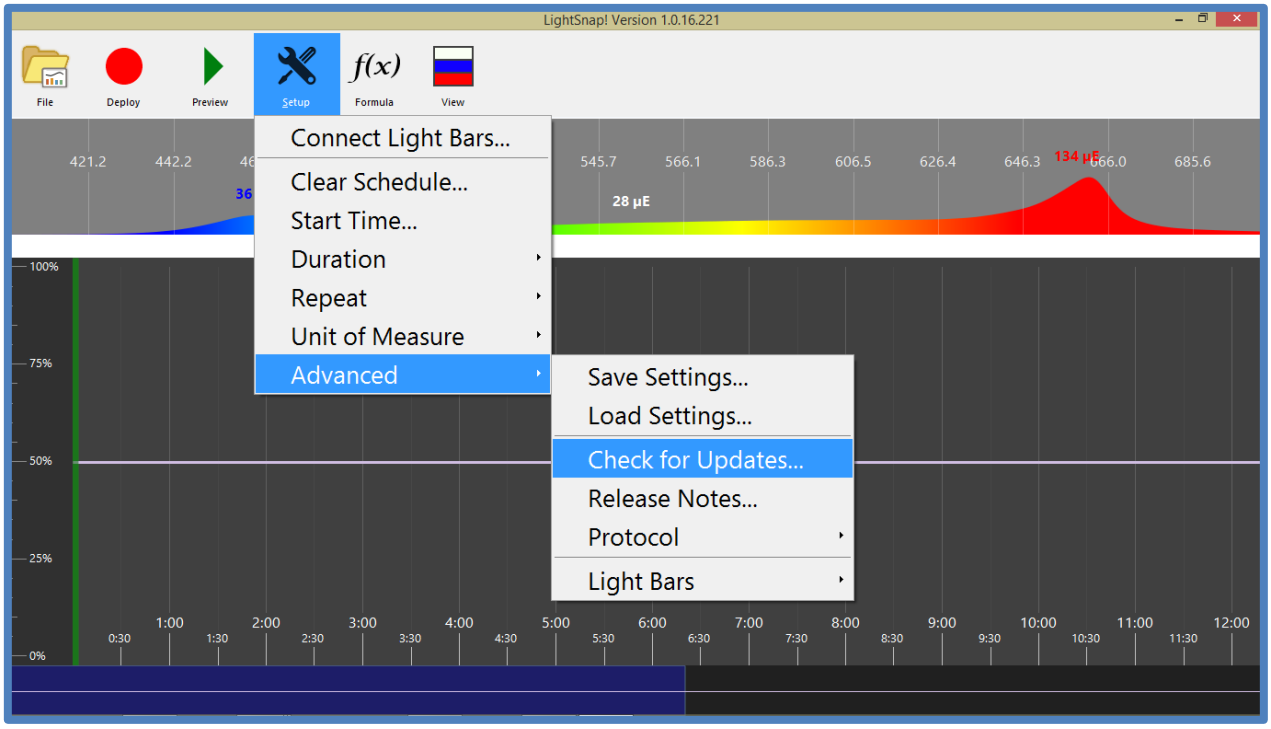
4. If you are installing from the Internet a dialog will appear that tracks the progress of this download.



5. When the installation is complete, the software should automatically open. Or, open the software from the Start menu.

Software Updates

The CI-800 requires the computer's Wi-Fi to connect to the LEDs, so an automatic update feature is not available for the software. When the computer is connected to the internet, you can check for updates by going to: Setup>Advanced>Check for Updates. Also, updates can be downloaded directly from the software section of the CI-800 Product Support webpage (http://www.cid-inc.com/Software/CI-800/). If a newer release is available, download and install the update. You can revert to a previous version of software by using the add/remove programs feature in Windows. The version number of the software is located in the upper left corner of the LightSnap! screen. Please note that LightSnap! does not automatically apply daylight savings time.



How to Connect to the CI-800 Using Wi-Fi

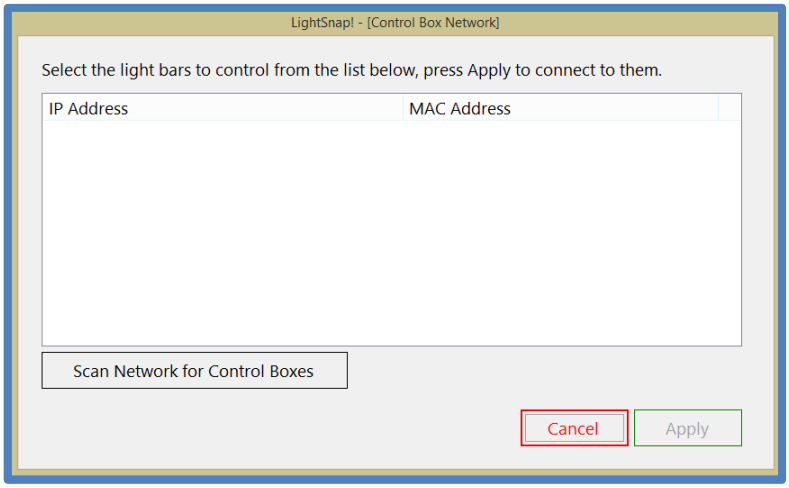
Setting up the network for the CI-800 is similar to setting up a wireless router or connecting to a wireless network. If the wireless network does not connect to the CI-800 after waiting for 1 minute. The connection is complete when the "Deploy" button on the LightSnap! toolbar turns red. The following instructions are for Windows 7:

1. Turn on the CI-800 control box.
    i. When the CI-800 is first powered on, the blue, white and red LEDs and all light up briefly. Then, the white LEDs turn on and stay on until the CI-800 boot is completed. See the next page for more details on indicator light logic.
2. Navigate to Connect to a Network:
    i. Control Panel>Network and Internet>Network and Sharing Center>Connect to a Network
    ii. Click the "Networks" shortcut in the lower right corner of the main screen.
3. Select **CI-800_XXX** and connect. The "XXX" represents three factory-specified numbers, and is unique for each CI-800/control box system.
4. Wait at least 1 minute for the computer to connect to the CI-800.
5. If the computer does not connect to the CI-800_XXX network after 1 minute, turn the control box off/on. If a connection is still not established, reset the control box (page 10).

How to Connect to Multiple Lights

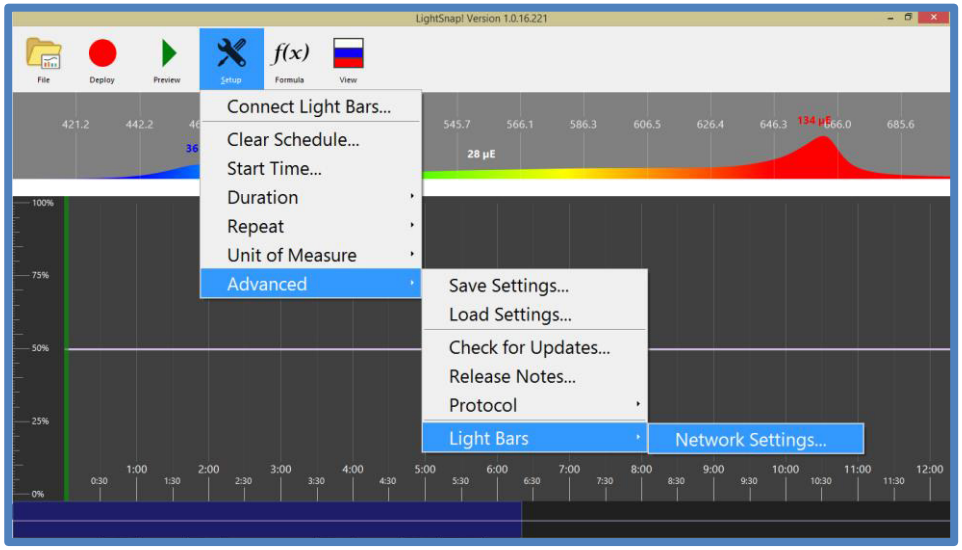
When the CI-800 is initially unboxed and turned on, it will create its own Wi-Fi hotspot or access point called CI800_XXXX (where XXXX are random). Multiple lights can be connected to the same Wi-Fi network. LightSnap! will deploy the same settings and light schedule to each CI-800 on the network.

1. Connect to the first CI-800 from the PC (steps 1-4 above).
2. Open LightSnap! and navigate to Setup>Connect Light Bars.



3. Once connected to a CI-800, navigate to Setup>Advanced>Light Bars>Network Settings.

   i. Enter the information to configure the light bar to connect to your own local Wi-Fi network.



   ii. Navigate to Setup>Connect Light Bars. Scan for light bars to see all the CI-800's connected to the network and be able to control them as if they were a single light bar. If a light bar does not appear in the network, it could already be connected to a different network. Perform a factory reset of the control box to unlink it from the Wi-Fi network.

   Note: The user will need to repeat steps 1-3 for each light bar until all are switched to the local Wi-Fi network. Remember to connect the PC to the same Wi-Fi network, after connecting the light bars to it.

Control Box Factory Reset

The control box of the CI-800 may occasionally require a factory reset. Performing a factory reset will disconnect the control box from a Wi-Fi network. This may be necessary if you are changing Wi-Fi networks or setting up the CI-800 in a new location. Performing a factory reset will completely erase the light schedule that is currently deployed. After a factory reset has been performed, the LED lights will alternate blue, red and white and continually repeat.

To reset the control box:

1. Disconnect your PC from the CI-800 if you are connected via Wi-Fi network.
2. Turn the control box on.
3. Turn the control box off when the White LED turns off (indicating boot has completed.)
4. Repeat this process (steps 2-3) until the Red LED turns on and stays on.
5. The Red LEDs will stay on while the control box is resetting.
6. When the Red light turns off, factory reset is complete.

7. If the factory reset was successful, Blue, Red and White LEDs briefly light up sequentially and repeat.
    - If the factory reset was not successful, all the LEDs will turn off.
    - If this happens, turn the control box off and back on and repeat the factory reset process.
8. Verify that the CI-800 now appears as a network on the computer.

Indicator Light Logic

The CI-800 has several pre-programmed light sequences to indicate the status of the CI-800, such as when the CI-800 is starting up, booting up, if a schedule has been deployed or if a factory reset has been triggered.

When the CI-800 is first powered on:

- Red, White and Blue LEDs and all light up briefly.
- The Red and Blue LEDs turn off. The White LEDs will stay on until the CI-800 boot is completed.

If no schedule has been deployed on the control box:

- Red, White and Blue LEDs briefly light up sequentially and repeat.

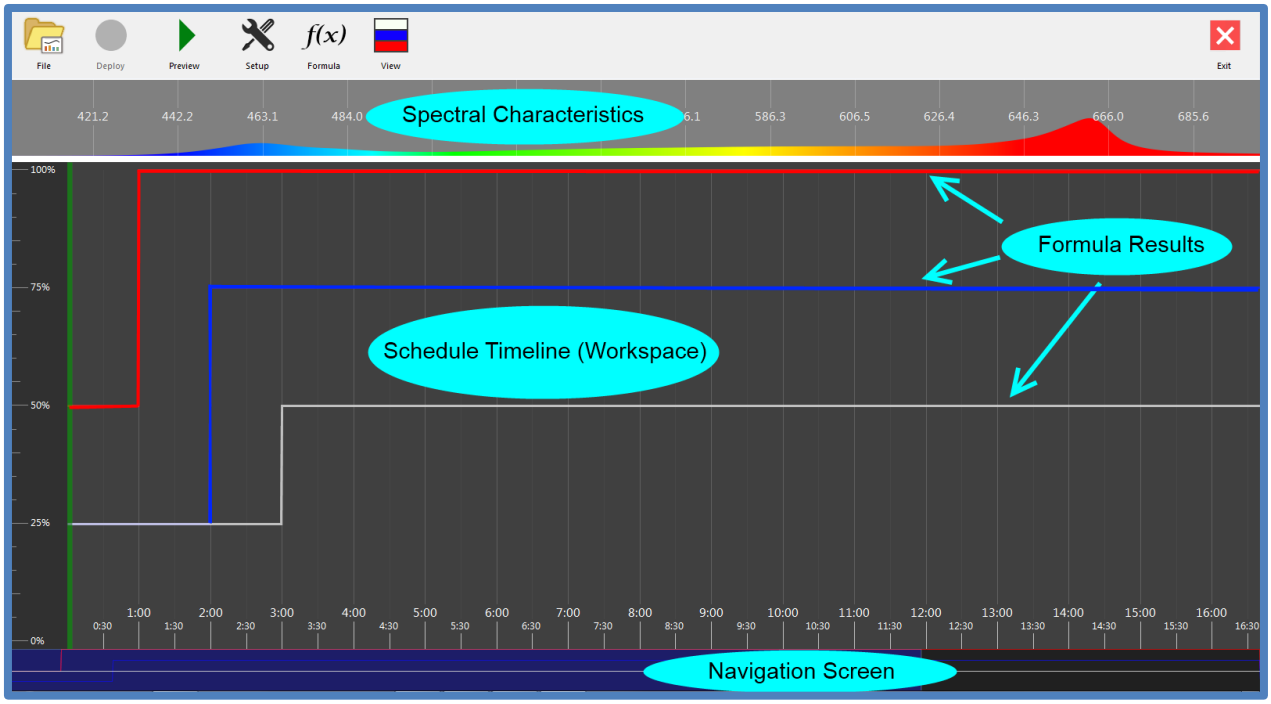
If a factory reset is triggered:

- Red LEDs turn on and stay on until programming has completed.
- If the factory reset was successful, Red, Blue and White LEDs briefly light up sequentially and repeat.
- If the factory reset was not successful, all the LEDs will turn off. If this happens, repeat the factory reset process.

USING LIGHTSNAP!

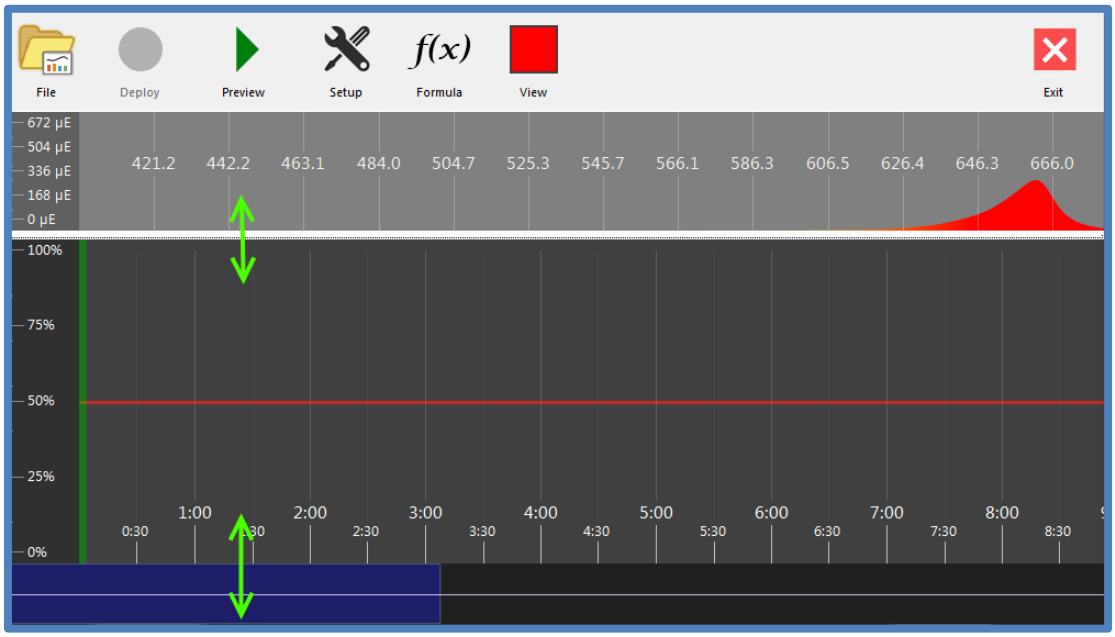
The main screen of LightSnap! is divided into four sections. The top section is the tool bar with a row of icon buttons. Below the tool bar is the section which visually expresses the area of the spectrum currently covered by the CI-800. The main area of the workspace is a zoom-in on a portion of the full light schedule. Here, the user can grab or click on any of the 3 individual light colors and adjust the intensity at a specific time. The "Formula" button opens a pop-up box that allows the user to follow normal solar radiation patterns or enter a formula to adjust the light schedule. The "View" button toggles between the colors. The bottom section of the LightSnap! screen shows the full schedule and is the navigation screen to move to different parts of the schedule. The blue box highlights the portion of the schedule that is currently displayed in the main workspace.

After powering on the control box, please allow up to 30 seconds for the control box to start-up before attempting to connect to it. During this initial 30 seconds, a schedule cannot be deployed even though the deploy button may be red in the LightSnap! software.

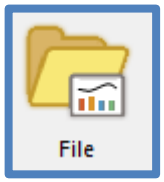


The workspace can be adjusted to include more screen-area for any of the sections. If the section visualizing the spectrum is enlarged, more information appears, such as the y-axis scale in microEinsteins.

- Touch or click on the lines dividing the sections.
- Drag up/down to include more area (illustrated with green arrows in the image below).



- Click on the solid white line to access the red and blue lines hidden behind it. Adjust each of these three lines to the desired levels and durations.



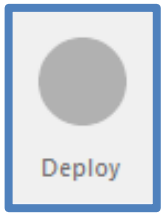
File

The File tool contains two options, both of which will open a directory to browse the computer to save or open files.

1. Import a previously saved .csv LightSnap schedule.
    a. Schedules can be built in a Microsoft Excel spreadsheet and then imported into LightSnap!. NOAA has made available a good model for building schedules in Excel, and the Washington State Department of Ecology has modified the model into a spreadsheet that can be downloaded at:

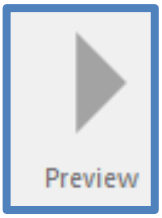
    http://www.ecy.wa.gov/programs/eap/models/solrad.zip

    b. Using this, a researcher could build a schedule in Excel using a more advanced solar model and include parameters such as air pollution and ground altitude.
    c. Please note the three tabs in the excel file: readme, input and output.
2. Export the current light schedule as a .csv (comma separated value) file. This is how to save the light schedule to be opened, or imported, later. It is important to note that the file cannot be downloaded once it has been deployed to the LightSnap! control box, it must be saved as a file on the computer if that particular schedule is to be used at a later time.



Deploy

Click the "Deploy" tool when the light schedule is complete. This will begin the light schedule on the CI-800. If the "Deploy" tool is red, it indicates that there is a wireless connection to the LightSnap! control box, and that the schedule currently running in the LightSnap! program can be uploaded to the LightSnap! control box. If the "Deploy" tool is gray, it is not accessible and the CI-800 is not connected to the computer. Please see the section in this manual for instructions on connecting to the CI-800 via Wi-Fi.



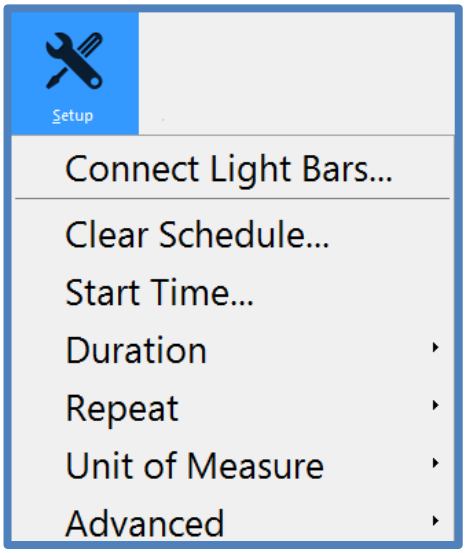
Preview

The "Preview" tool allows the user to preview the schedule currently running in the LightSnap! program at an accelerated rate. It is recommended to preview complicated light schedules before deployment.

Setup

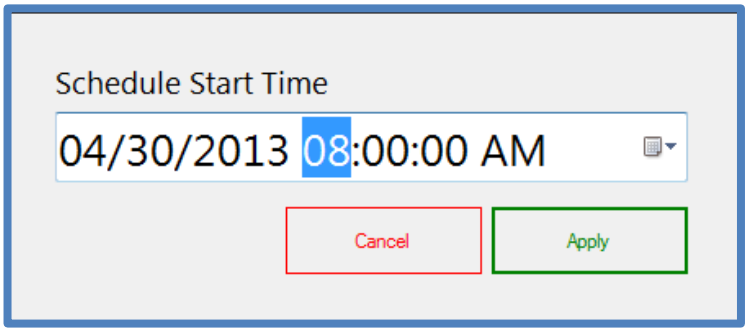
The Setup Menu contains the adjustable parameters for the CI-800, including start time, duration of the schedule, repetition, and the unit of measurement. To connect to multiple light bars, see the previous section in this manual.

- Clicking "Clear Schedule" will clear the currently loaded schedule and set the schedule back to 50% blue, red and white light for the duration of the schedule.



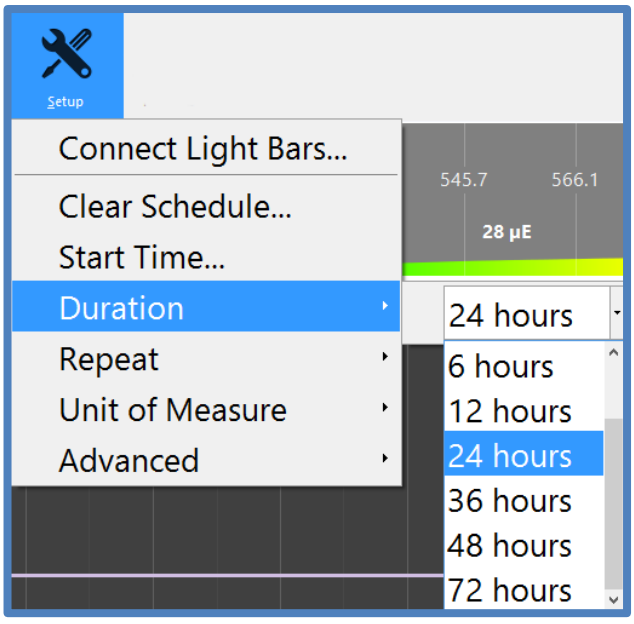
Start Time

The desired day and time that the light schedule is started can be selected by clicking "Start Time." Enter the date, time and AM/PM or click the calendar image to select the day from a calendar. Click "Apply" to save changes or "Cancel" to exit.



Duration

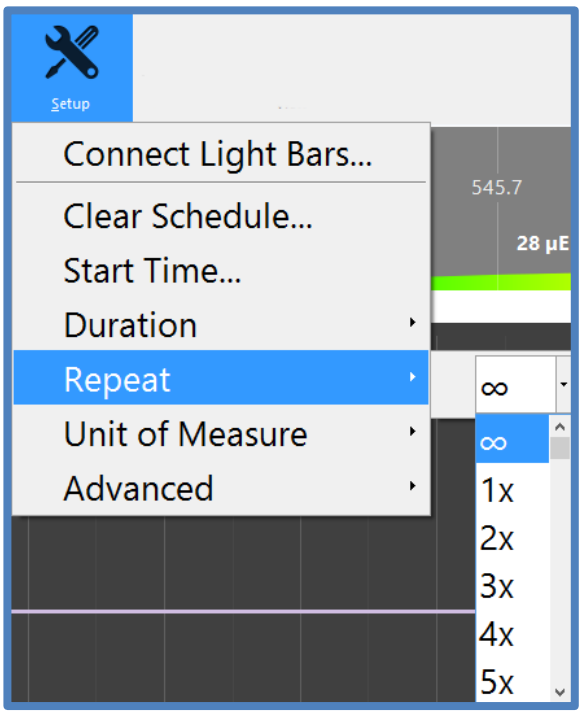
The duration or length of time the schedule lasts can be adjusted from 1 hour to 72 hours. The time scale at the bottom of the workspace will update when a new duration is selected.



Repeat

The light schedule can be set to repeat anywhere from one time to ninety-nine times. The schedule can also be set to deploy continuously or repeat infinitely.

- To have the schedule repeat continuously, select the infinity symbol (highlighted in the figure to the right.)



Unit of Measure

The CI-800 has the ability to report the level or intensity of each color of light (blue, red and white) as 2 different units. These units are percent light intensity and microEinsteins (µE)[1].

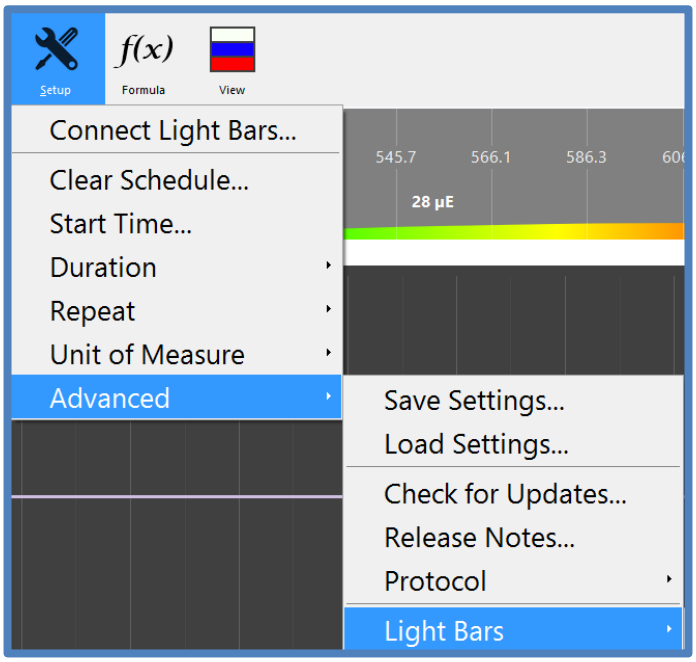
- µE is reported in photons and is a measure of irradiance.

[1] The Einstein is a unit defined as one mole (6.022×10^{23}) of photons, regardless of their frequency. For photons of a given wavelength, Einsteins per square meter is a measure of irradiance. µE: millionth of a mole of photons = 6.02×10^{17} photons

The Einstein is used in studies of photosynthesis since the light requirement for the production of a given quantity of oxygen is a fixed number of photosynthetically active photons. Photosynthetically active radiation (PAR) is usually reported in microEinsteins per second per square meter ($\mu E/m^2/sec$). [Source: Wikipedia.com http://en.wikipedia.org/wiki/Einstein_(unit)]

Advanced

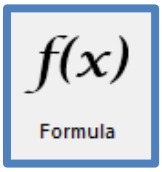
The LightSnap! settings can be saved under the Setup>Advanced menu. This will save the Latitude and Longitude, Start Date and Time, Timezone, Length of Day and the current Expression in the "Formula" tool. Previously saved settings can be loaded into LightSnap! To apply the settings after they are loaded, click the Formula tool and then click "Apply" to update the schedule.



The Setup>Advanced Menu can be used to check the CI-800 software webpage for any available updates. If an update is available, a prompt will appear to download and install the updated version.

The CI-800 Protocol is the firmware version of the control box. Do not change the protocol settings unless you have been instructed to by a CID Bio-Science technician.

The Setup>Advanced>Light Bars option is described in the section of this manual explaining how to connect multiple lights to the same network (page 9).



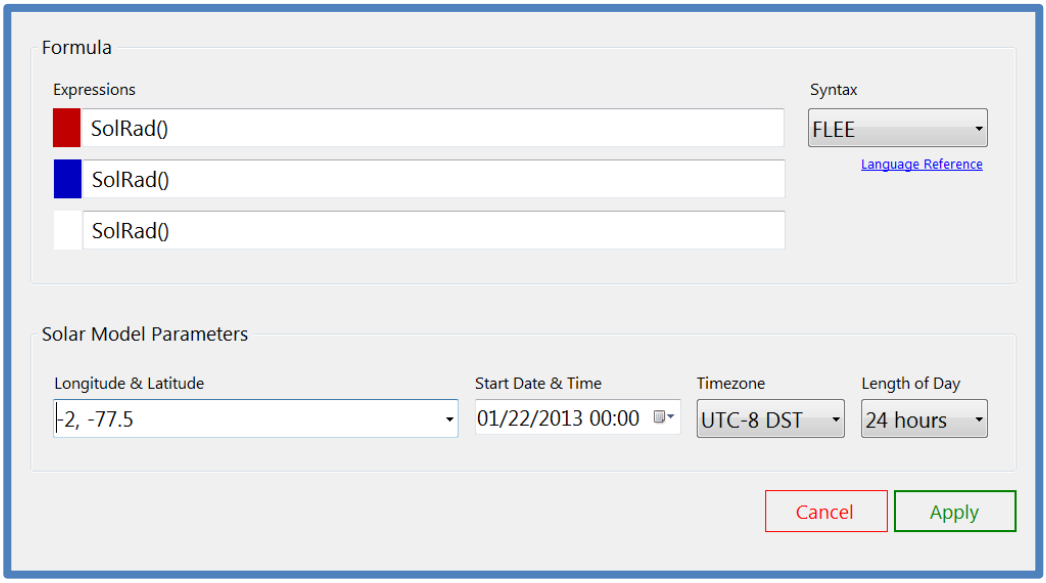
Formula

The Formula tool opens a pop-up box where the user can adjust the various parameters of the CI-800 and enter a formula for the solar radiation levels of red, blue and white. A user can set the desired latitude and longitude and Start Date. Then, LightSnap! will provide a light schedule mimicking typical solar radiation for the specific location, at the selected time of year.

- Set the Formula/Expression for solar radiation of each light (red, blue and white) for the hour or minute.
- Set the Syntax to Microsoft Excel or Flee. This is the logic language used to enter the formula.
- Set the Solar Model Parameters, including:
  - Longitude and latitude
  - Start date and time
  - Time zone
  - Length of day

To replicate the average winter-time solar radiation of central Florida's citrus belt, enter the longitude and latitude of central Florida (28.9269° N, 81.7214° W) and January 1st as the Start Date. Alternatively, there is a drop-down list of countries, with pre-entered longitude and latitude coordinates.

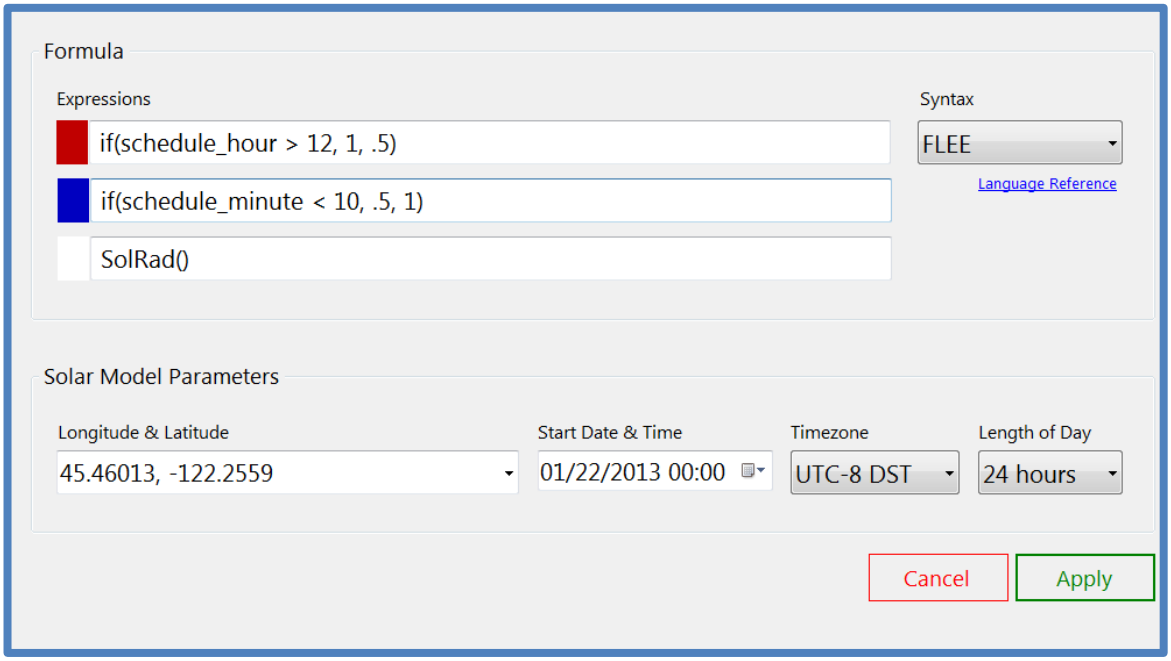
- Type or enter "SolRad()" as the expression, in order to replicate solar radiation for the selected location and time.
- To duplicate light levels from Ecuador in January, select "Ecuador" from the drop down longitude/latitude list and then hit apply.



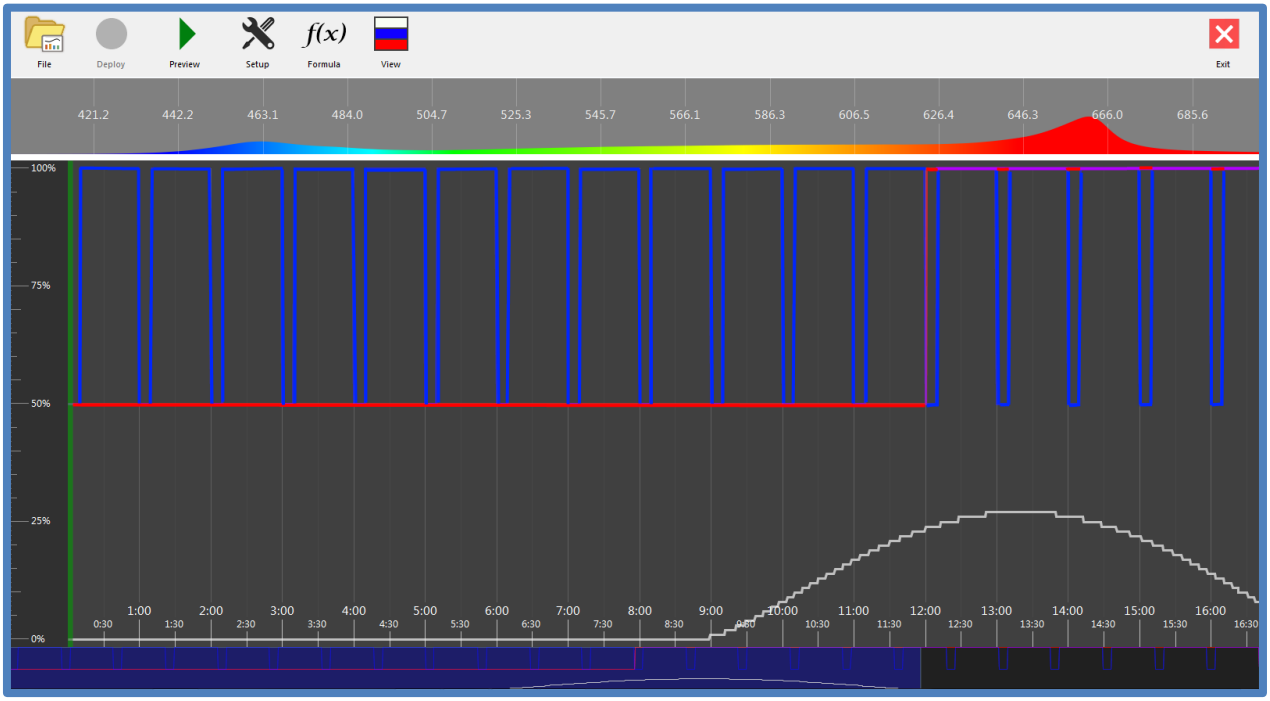
Example Light Schedule Formula

In this example formula, the Syntax is set to **Flee** and the Length of Day is set at **24 hours**.

1. For the Red expression field, a user might enter a formula such as:
   - "if(schedule_hour > 12,1,.5)"
   - This indicates to the system that if the schedule hour is greater than 12 hours into the schedule, then go to 100% red , if it is not yet 12 hours into the schedule, then leave the red at 50%. The percent of light intensity is entered into the formula such as 1 = 100%, .5 = 50%, etc.).
2. For the Blue expression field, a user might enter a formula such as:
   - "if(schedule_minute < 10, .5, 1)"
   - This indicates to the system that if the schedule minute is less than 10, the blue light should be at 50 %. If it is later than 10 minutes into the schedule, the blue should be at 100%. Keep in mind that this will mean that for the first 10 minutes of every hour, the blue light will be at 50% intensity.



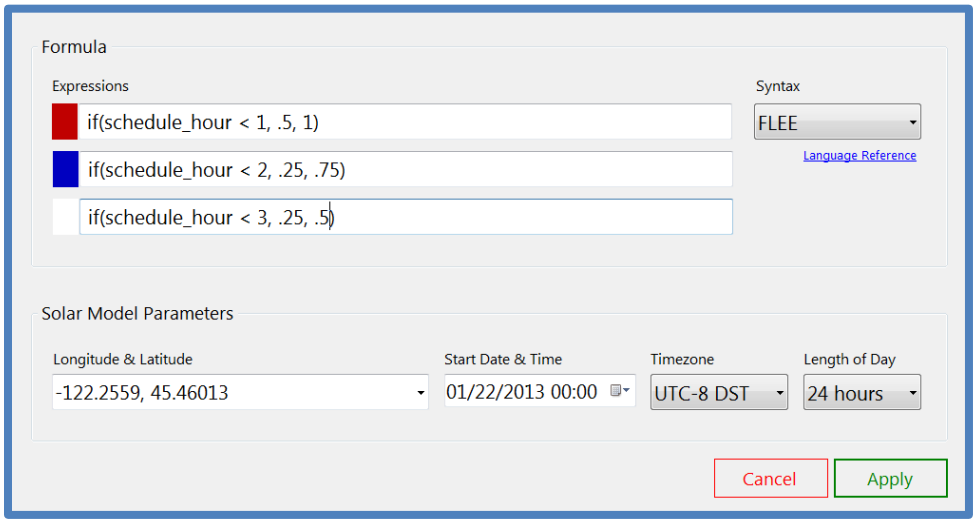
3. Hit “Apply” to apply the changes or select “Cancel” to exit back to the main LightSnap! Screen without saving any changes.
    a. If the formula is applied, the light schedule will update in the workspace.



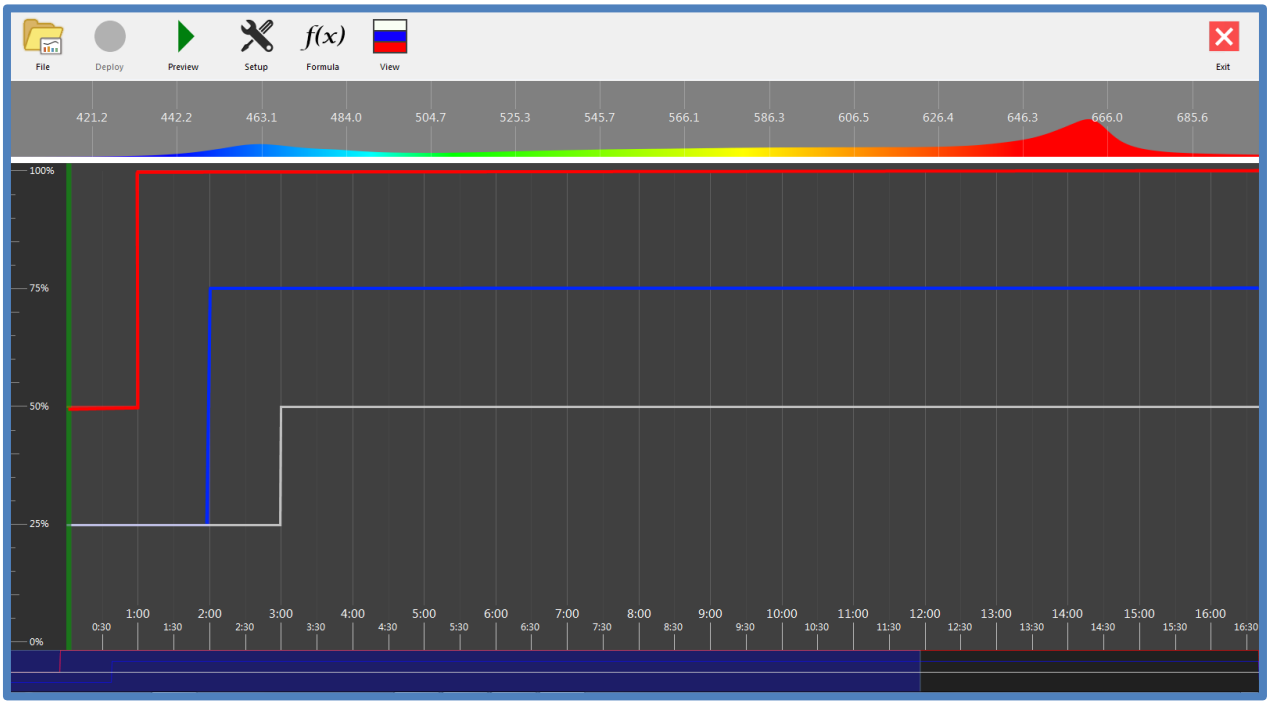
Formulas can also be combined to include multiple commands, such as “if(schedule_hour > 12 and schedule_minute < 10, 1, .5).” This indicates to the system that if it is more than 12 hours into the schedule, and the minute is less than 10, the light should be at 50 %. If it is later than 10 minutes into the hour, the blue will be set at 100%.

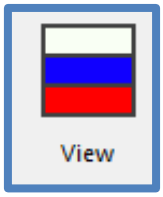
For questions or more information about entering formulas and logic langue, click the “language reference” link underneath the Syntax selection box.

Here is a more realistic example of a light schedule that might be used for growing plants. Here, the user sets the formula so that the red light will be at 50% the first hour and at 100% for the duration of the schedule. Next, the blue is set at be at 25% the first two hours, then 75% for the remainder. Here, the white is set at 25% for the first three hours and then 50 % for the rest of the time.



After hitting "Apply," the schedule timeline should update to appear as below. Hit "Preview" to see an accelerated preview of the light schedule on the CI-800.





View

Hit the "View" tool to toggle between the red, blue, white and combined light schedules. The View icon will update to indicate which light schedule is currently displayed in the workspace.

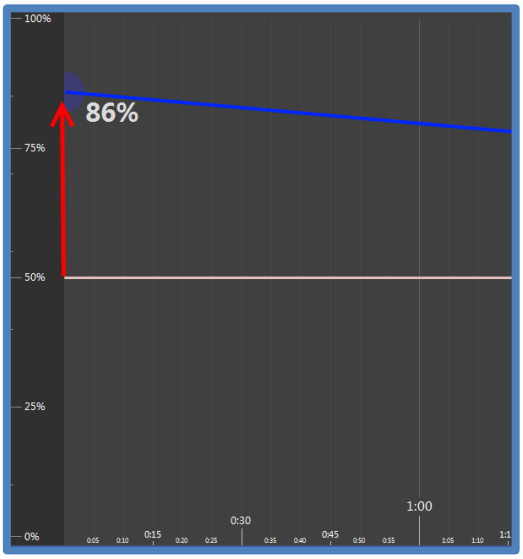
When more than 1 color is at the same intensity, the lines will appear on top of each other. If the combined colors include white; the line will be shown as white. If the combined colors are blue and red only, the line will appear as purple (or a mix of blue and red). Use the "View" button to select the color to adjust by toggling between each color or all 3 combined colors.

SETTING A LIGHT SCHEDULE MANUALLY

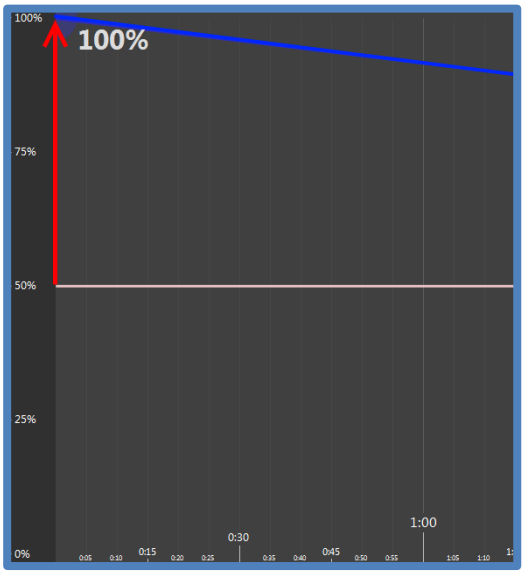
Typically, light schedules are entered into LightSnap! using the formula tool. For instructions to create a light schedule using a logic formula, please see the "Formula" section of this manual. The following instructions involve creating a light schedule manually, by making adjustments directly to the schedule timeline in the LightSnap! workspace.

1. Choose the duration, repetition and unit of measure from the Setup menu. In this procedure, the duration is set to 6 hours, 1x repetition and the unit of measure is percent.

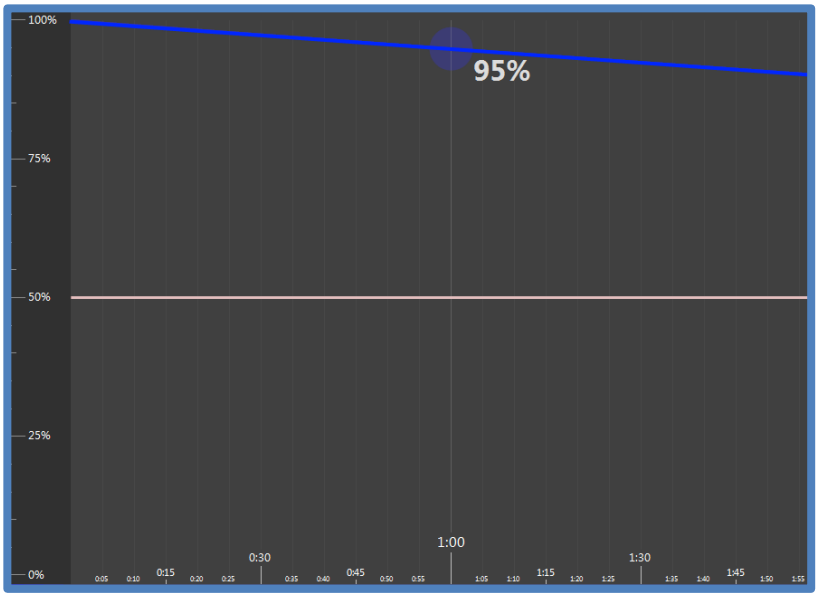
2. Click on the white line, near the 0:00 time on the x-axis and 50% intensity on the y-axis. Here, the red and blue lines are hidden behind the white line. Dragging the blue line upwards (like the red arrow in the picture to the right) will allow you to see the blue intensity and adjust it to desired levels.
    a. When more than 1 color is at the same intensity, the lines will appear on top of each other. Use the "View" button to select the color to adjust by toggling between each color or all 3 combined colors. Intensity changes will be visible on the CI-800 light bar if it is connected.



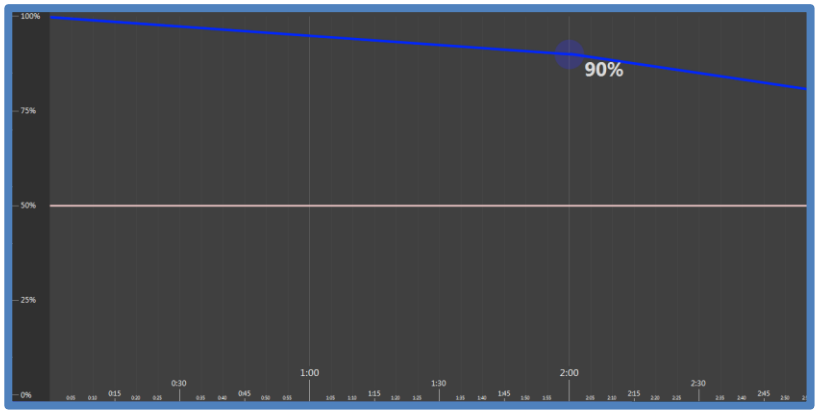
3. Drag the blue light intensity up to 100% at time 0:00.



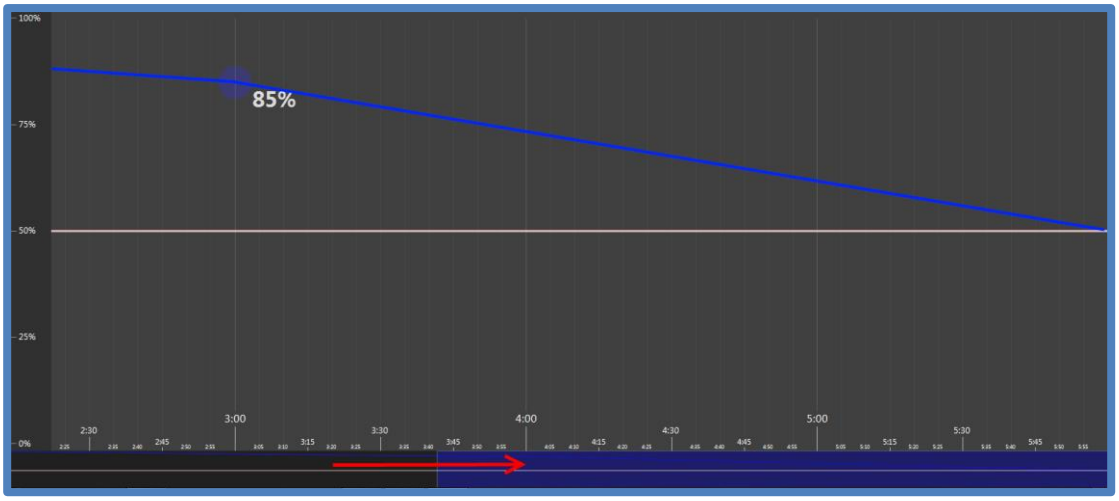
4. Click the blue line near time 1:00. Drag the line and set it at 95% at 1 hour.



5. Set the blue intensity to 90% at time 2:00.

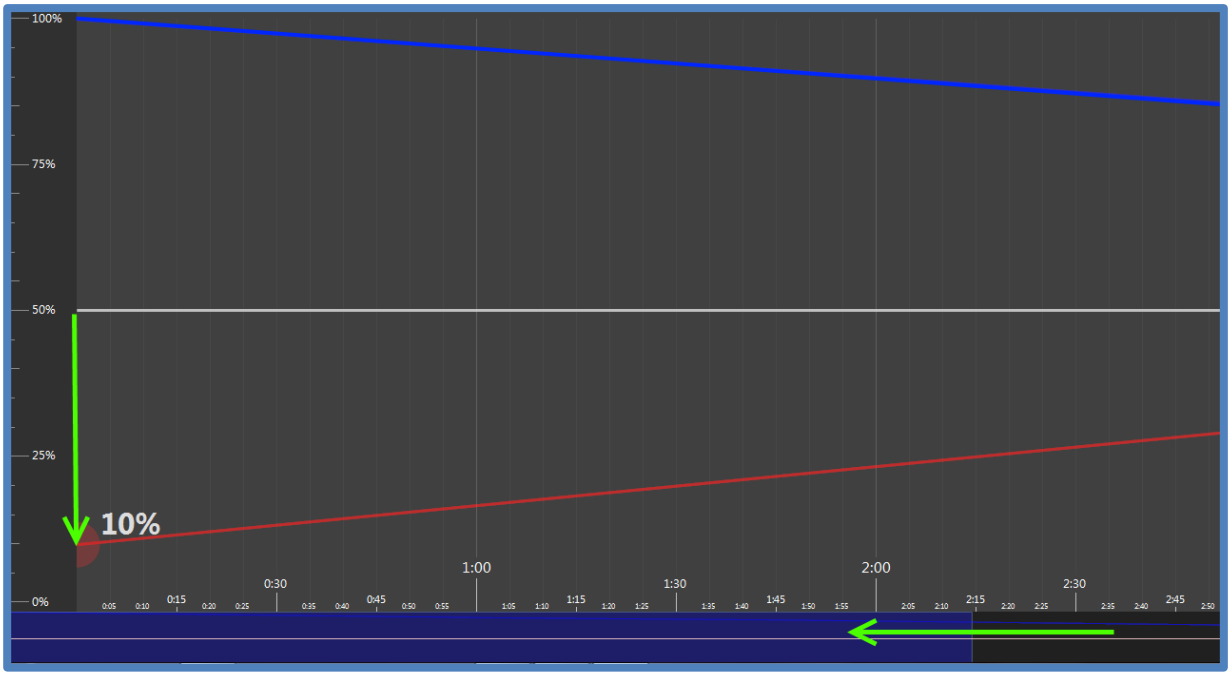


6. Slide the Navigation Screen at the bottom section to the right to view the rest of the duration of the schedule. Then, set the blue to 85% at time 3:00.

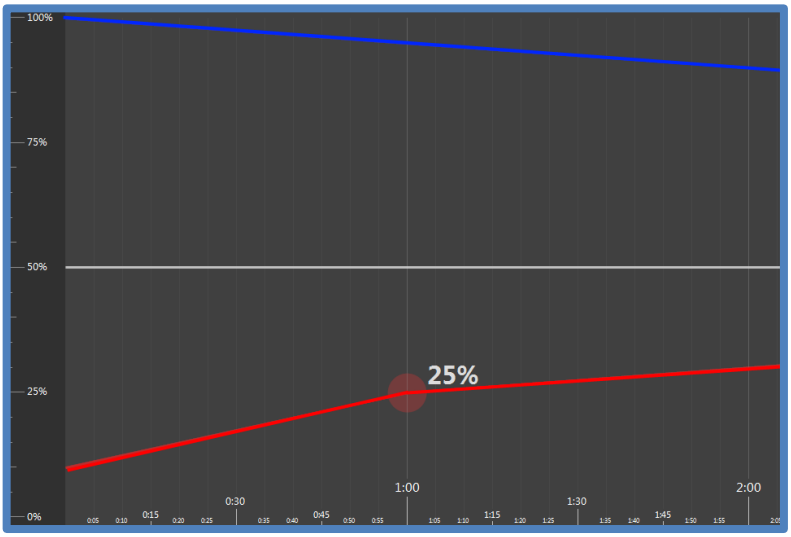


7. Continue to set the blue light to decrease by 5% every hour by moving the blue line to 80% at time 4:00, 75% at time 5:00 and 70% at time 6:00 (end of the schedule). The result should be a gently sloping line, decreasing slowly over the length of the schedule.

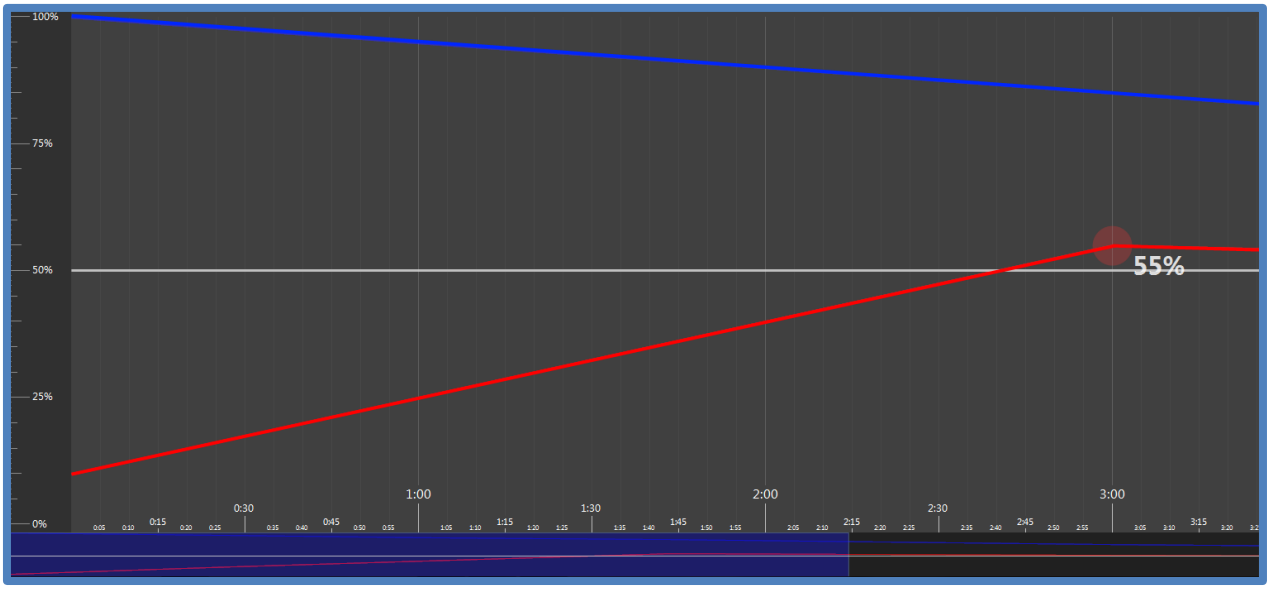
8. Drag the Navigation Screen back to the left to bring the beginning of the schedule back into view in the workspace. Then, click on the hidden red line (behind the white line) and move the intensity at time 0:00 to 10%. Or, click the View button to show the red line and adjust.



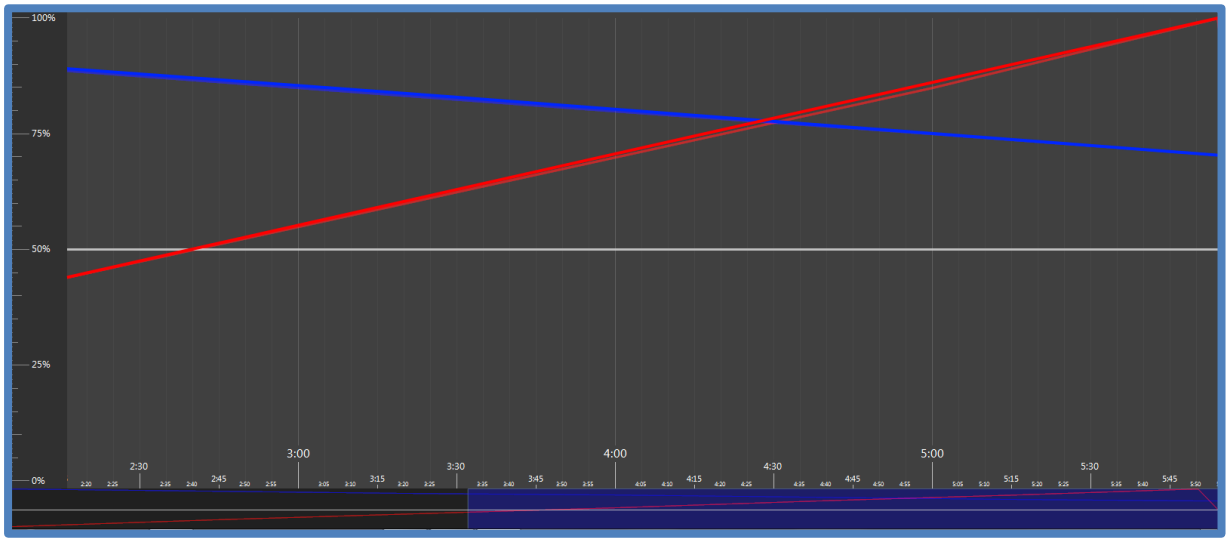
9. Set the red light to 25% intensity at time 1:00.



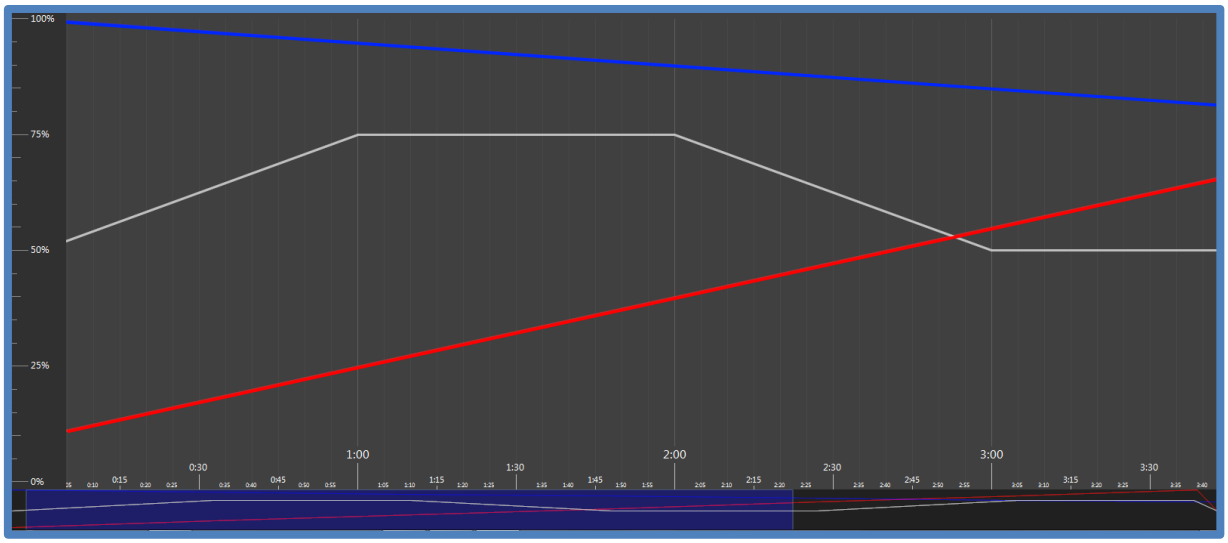
10. Continue to set the red light to increase by 15% every 1 hour by setting the red line to 40% at time 2:00, 55% at time 3:00, etc.



11. Move the Navigation Screen to bring the rest of the schedule into view and continue to adjust the red line (70% at time 4:00, 85% at time 5:00 and 100% at time 6:00).



12. Adjust the level of the white light to increase from 50% at time 0:00 to 75% at time 1:00. Have the white light remain at 75% intensity for 1 hour before decreasing to 50% and holding for an hour.



13. Click “File” and Export the light schedule to save it.

14. Click “Preview” or “Deploy” to see the light schedule in action.

15. Open the saved .csv light schedule in Microsoft Excel or another spreadsheet program to review the light intensity. An example exported file is shown to the right.

	A	B	C	D
1	Minute	Blue	Red	White
2	0.00:00	30.00%	30.00%	30.00%
3	0.00:01	30.00%	30.00%	30.00%
4	0.00:02	30.00%	30.00%	30.00%
5	0.00:03	30.00%	30.00%	30.00%
6	0.00:04	30.00%	30.00%	30.00%
7	0.00:05	30.00%	30.00%	30.00%
8	0.00:06	30.00%	30.00%	30.00%
9	0.00:07	30.00%	30.00%	30.00%
10	0.00:08	31.00%	31.00%	31.00%
11	0.00:09	31.00%	31.00%	31.00%
12	0.00:10	31.00%	31.00%	31.00%
13	0.00:11	31.00%	31.00%	31.00%
14	0.00:12	31.00%	31.00%	31.00%
15	0.00:13	31.00%	31.00%	31.00%
16	0.00:14	31.00%	31.00%	31.00%
17	0.00:15	31.00%	31.00%	31.00%
18	0.00:16	31.00%	31.00%	31.00%
19	0.00:17	31.00%	31.00%	31.00%
20	0.00:18	32.00%	32.00%	32.00%
21	0.00:19	32.00%	32.00%	32.00%
22	0.00:20	32.00%	32.00%	32.00%
23	0.00:21	32.00%	32.00%	32.00%
24	0.00:22	32.00%	32.00%	32.00%
25	0.00:23	32.00%	32.00%	32.00%
26	0.00:24	32.00%	32.00%	32.00%
27	0.00:25	32.00%	32.00%	32.00%
28	0.00:26	33.00%	33.00%	33.00%
29	0.00:27	33.00%	33.00%	33.00%
30	0.00:28	33.00%	33.00%	33.00%
31	0.00:29	33.00%	33.00%	33.00%
32	0.00:30	33.00%	33.00%	33.00%
33	0.00:31	33.00%	33.00%	33.00%
34	0.00:32	33.00%	33.00%	33.00%
35	0.00:33	33.00%	33.00%	33.00%
36	0.00:34	33.00%	33.00%	33.00%
37	0.00:35	33.00%	33.00%	33.00%
38	0.00:36	34.00%	34.00%	34.00%
39	0.00:37	34.00%	34.00%	34.00%

LIGHT RECIPES

As the new generation of high-output LEDs is being rapidly adopted, researchers are supplying commercial horticulture with information on using LEDs. They are also using the unique features of LEDs for basic research. Currently a lot of research is being carried out that is concerned with light recipes. A light recipe is developed by finding the combination of lighting colors and intensities that give optimal plant growth. Sample light recipes can be found in published literature. Please note that LightSnap! does not automatically apply daylight savings time.

TROUBLESHOOTING

Technical Support

If you have a question about the CI-800 features and functions, first look in the CI-800 Operation Manual. If you cannot find the answer, you can access troubleshooting information and the CI-800 Product Support Forum at:

http://cid-inc.com/product-support-information

Questions can also be directed to a Technical Support Representative located in your country. CID Bio-Science, Inc. is committed to provide customers with high quality, timely technical support. Technical support representatives are to answer your technical questions by phone or by e-mail at:

support@cid-inc.com.

CID Bio-Science, Inc.'s contact information:

CID Bio-Science, Inc.
1554 NE 3rd Ave
Camas, WA 98607 USA

Phone: 800-767-0119 (U.S. and Canada)
360-833-8835
Fax: 360-833-1914

Internet: http://www.cid-inc.com
E-mail: support@cid-inc.com

Customer Service

Customer Service Representatives answer questions about specifications and pricing, and sell all of the CID Bio-Science, Inc. products. Customers sometimes find that they need CID Bio-Science, Inc. to upgrade, recalibrate or repair their system. In order for CID Bio-Science, Inc. to offer these services, the customer must first contact us and obtain a Return Merchandise Authorization (RMA) number. Please contact a customer service representative for specific instructions when returning a product.

Frequently Asked Questions

1. How do I reset the CI-800 control box?
    - If you cannot see the CI-800 in your wireless connections:
        - make sure the antennae is connected to the control box and pointing upwards
        - try turning the control box off and then back on
        - try turning your PC's WiFi off and back on
    - Does the light come on immediately? Do you see the CI-800 in the wireless networks? If yes, connect and open LightSnap!
    - If no, you may need to do a hard or factory reset of the control box. To execute this:
        - Disconnect your PC from the CI-800 if you are connected via Wi-Fi.
        - Turn the device on.
        - Turn the device off when the White LED turns off (indicating boot has completed.)
        - Repeat this process until the Red LED turns on and stays on.
        - The Red LEDs will stay on while the device is resetting.
        - When the Red light turns off, factory reset is complete.
        - If the factory reset was successful, Blue, Red and White LEDs briefly light up sequentially and repeat.
        - If the factory reset was not successful, all the LEDs will turn off. If this happens, turn the control box off and back on to repeat the factory reset process.
    - Now, the CI-800 should appear in the networks.

2. What is the red-to-far-red ratio?
    - The CI-800 has no output in the far red spectral region.

3. What is the uniform lighting coverage for the CI-800?
    - The uniform lighting coverage at 1 foot above plant material is 18 x 48 inches of growing surface.

4. What is the equivalent for fluorescent tubes?
    - The fluorescent tube for equivalent for the CI-800 is: Six -T5 fluorescents or Fourteen - T8 fluorescents.

5. What is the PAR output of the CI-800?
    - The PAR output of the CI-800 is 350 µmol/m^2/s with the LED 1 foot above the plant canopy.

6. What is the light intensity and lifespan of the CI-800?
    - Each CI-800 LED has a 5-Watt intensity rated at 50,000 hours of life with a 15-18% drop in spectral intensity over the life of the CI-800.
7. What is the beam or light angle of the CI-800?
    - The LED beam angle is 110 degrees.
8. Does LightSnap take daylight savings into account?
    - No, LightSnap and the CI-800 do not automatically apply corrections for daylight savings.
9. How long is the cable from the control box to the LEDs and from the control box to the wall plug?
    - Both cables are approximately 3-4 meters long.

CID BIO-SCIENCE, INC. HARDWARE WARRANTY

Important: Please Read!

Seller's Warranty and Liability: Seller warrants new equipment of its own manufacturing against defective workmanship and materials for a period of one year, of a single shift operation, from date of receipt of equipment - ***the results of ordinary wear and tear, neglect, misuse, accident and excessive deterioration due to corrosion from any cause is not to be considered a defect.*** Any defect must be called to the attention of CID Bio-Science, Inc., Camas, Washington, USA, in writing, within 90 days after receipt of the unit.

Seller's liability for defective parts is limited to the repair or replacement of any part of the instrument without charge, if CID Bio-Science, Inc.'s examination discloses that part to have been defective in material or workmanship, and in no event shall exceed the furnishing of replacement parts F.O.B. the factory where originally manufactured. No equipment may be repaired or altered by anyone not authorized by CID Bio-Science, Inc.

Material and equipment covered hereby, which is not manufactured by Seller, is to be covered only by the warranty of its manufacturer. Seller shall not be liable to the Buyer for loss, damage, or injury to persons (including death), or to property or things, whatsoever, including, but without limitation, products processed by the use of the equipment; or for damages of any kind or nature (including, but without limitation, loss of anticipated profits), occasioned by or arising out of installation, operation, use, misuse, nonuse, repair, or replacement of said material and equipment, or out of the use of any method or process for which the same may be employed. The purchaser is to pack, ship, or deliver the instrument to CID Bio-Science, Inc., in Camas, Washington, USA, within 30 days after CID Bio-Science, Inc. has received written notice of the defect at the customer's expense. No other arrangements may be made unless otherwise approved in writing by CID Bio-Science, Inc.

The use of this equipment constitutes Buyer's acceptance of the terms set forth in this warranty. There are no understandings, representations, or warranties of any kind, express, implied, statutory, or otherwise ***(including, but without limitation, the implied warranties of merchantability and fitness for a particular purpose)***, not expressly set forth herein.

CI-800 PRODUCTION TEST CHECK SHEET

SERIAL NUMBER:

SOFTWARE/FIRMWARE VERSION:
RUN STROBE PROGRAM WITH SOFTWARE/CONTROLLER:
CHECK LED BULBS:

COMMENTS:_____

_____

_____

WARRANTY REGISTRATION CARD

1554 NE 3rd Ave, Camas, WA 98607, USA
Phone: (360) 833-8835 Fax: (360) 833-1914 e-mail: sales@cid-inc.com Web: www.cid-inc.com

PRODUCT REGISTRATION CARD

Please complete and return this form to CID within 30 days to validate your Warranty on Parts and Labor.

Registration Information:

Your Name:_____ Title:_____

Company/University:_____

Address:_____

City:_____ State:_____ Zip:_____

Country:_____Email_____

Phone:_____ Fax:_____

CID Serial Number(s):_____

Purchase Date:_____ Purchase Price:_____

FOLD ON DOTTED LINE

Your opinions will help improve our service. Please answer the following questions.

1. What was the basis of your product selection?

□ Representative Recommendation
□ Product Features
□ Technical Specifications
□ Warranty
□ Other _____
□ Price
□ Product Design
□ Brand Name
□ Service

2. What other competing brands did you consider? _____

3. Where did you first learn of this product?

□ Advertisement in _____
□ Friend/Colleague
□ Other _____
□ Representative
□ Exhibit

4. Who selected this product?

□ I did
□ University Department
□ Other _____
□ Research Group
□ Purchasing

5. Comments/Suggestions:

_____

_____

_____