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NJ International, Inc.

# Stand Alone Simple Signal Circuit #8300

## Instructions

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### Getting Started

Thank you for purchasing the NJ International Stand Alone Simple Signal Circuit. Please take a moment to read and familiarize yourself with the following instructions prior to installing this circuit. This kit contains: one Stand Alone Simple Signal Circuit and three LDR's (sensors) with 24" leads. The Stand Alone Simple Signal Circuit is similar to the prototypical behavior of a block occupancy detector. This circuit is suitable for small, modular, and large layouts and will operate with all NJ International Signals or common anode signals.

The Signal Circuit provides automatic operation of two single or dual head signals bi-directional on a single track by providing a cascading effect. For instance; in the absence of any trains the two signal heads will be green until the photocell is covered. If the train is moving East and covers **LDR-1** the Westbound signal will go to red and stay red until the train clears the entire block, this is to alert the opposite traffic the block is occupied. **(If you have multiple circuits connected all the signals facing the opposite side of train movement will turn red as well)**. Once the train reaches **LDR-2** the Eastbound Signal will go from Green "Clear" to Red "Stop" once the train reaches **LDR-3** the signal will change to Yellow or "Approach". After a selectable delay from 5-25 seconds the signal will turn from Yellow "Approach" back to Green "Clear"**(See Function Indicator LED's section below)**. Circuit Operation for a Westbound train is similar with Eastbound signals turning red and staying red when the train covers LDR-3. **(LDR-1 & LDR-3 are used to sense the direction of the train)**. The Signal circuit has a built in 30 second timer (non-adjustable). If the train takes longer than 30 seconds to reach the closest photocell the circuit will assume the train has reversed and exited the block or has diverted to different route/track in between sensors and the signal will return to Green. This only works with one circuit, not daisy chained.

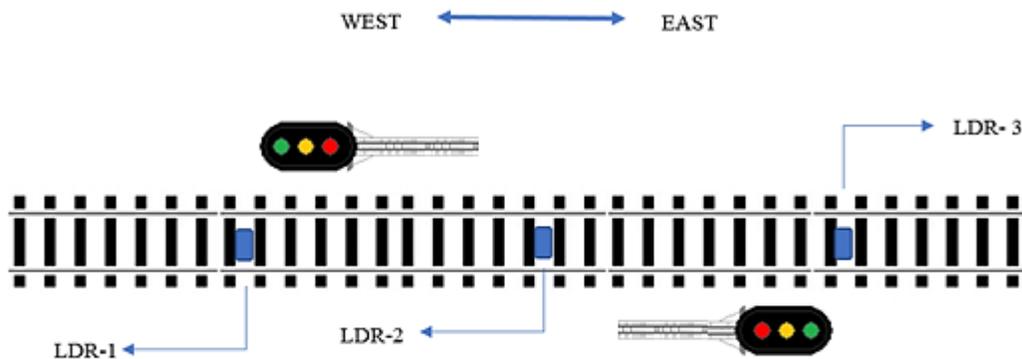


Image 1 – Signal Circuit Wiring  
Single Track (Bi-Directional)

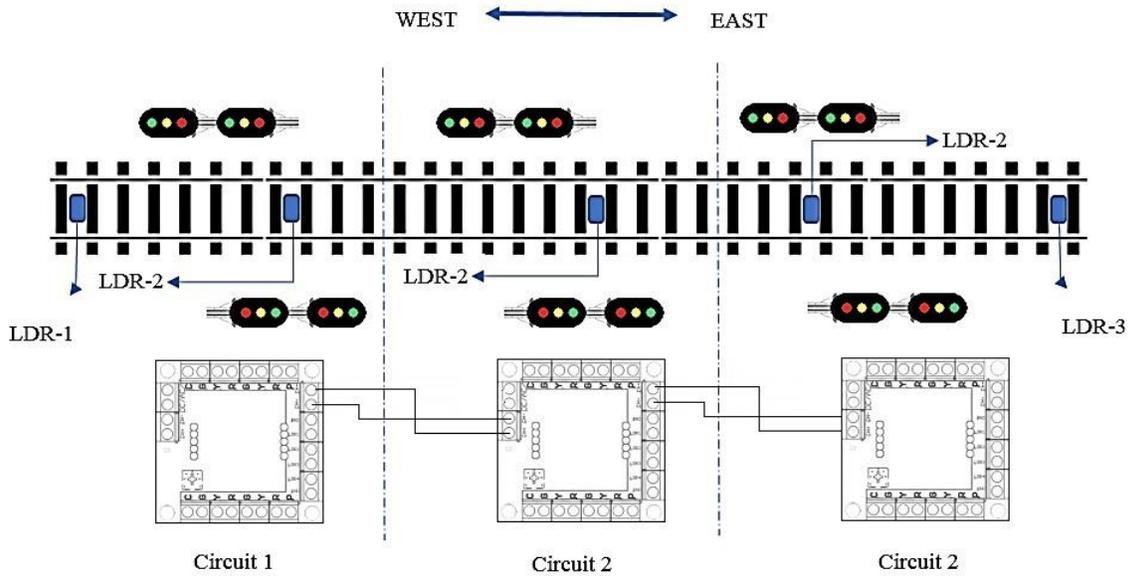


Image 2- Signal Circuit Wiring  
Single Track – Daisy Chained (Bi-Directional)

Terminals labeled **G**, **Y**, **R** & **P** illustrate the wire connections for the negative lead of the LED's on your signal and Terminal **C** illustrates the **Common** or **Positive**. If your signal has two or more common wires please use the same **C** terminal. The second set of terminals also labeled **G**, **Y** & **G** can be used to operate the lower head of your signal. If your signal is only equipped with a single head please use the top terminal connections. Failure to do this will cause your signal to provide you with a false indication/aspect. Terminals labeled **GND** and **LDR 1, 2 & 3** illustrate the photocell (LDR) connections, you can connect any leg of the LDR to either terminal as the sensors are not polarity sensitive. Terminals Labeled **CH-** & **CH+** can be used to connect multiple signal circuits to operate multiple blocks. Each circuit will need to have its own power source, even when being daisy chained.

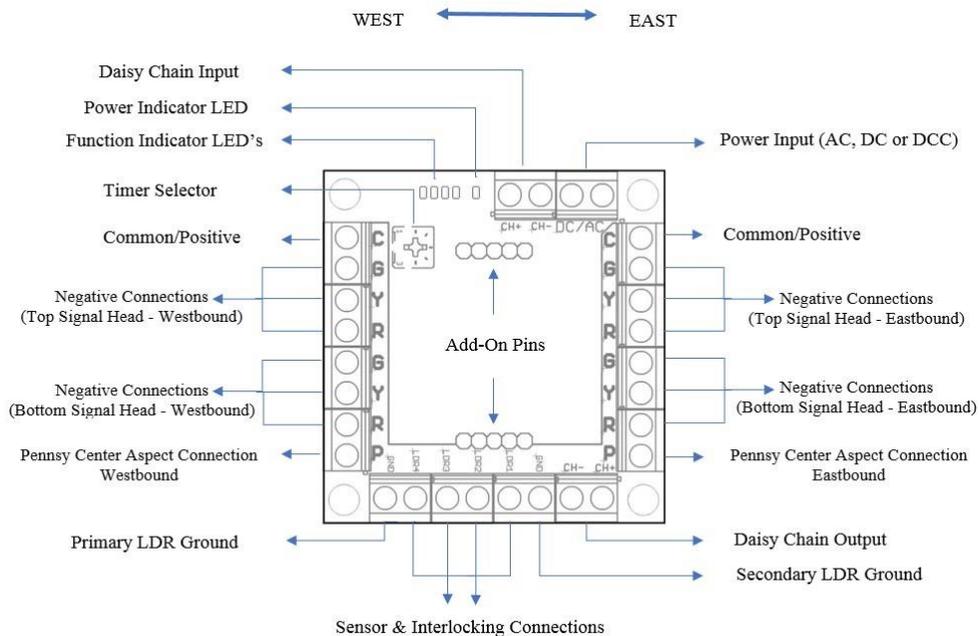
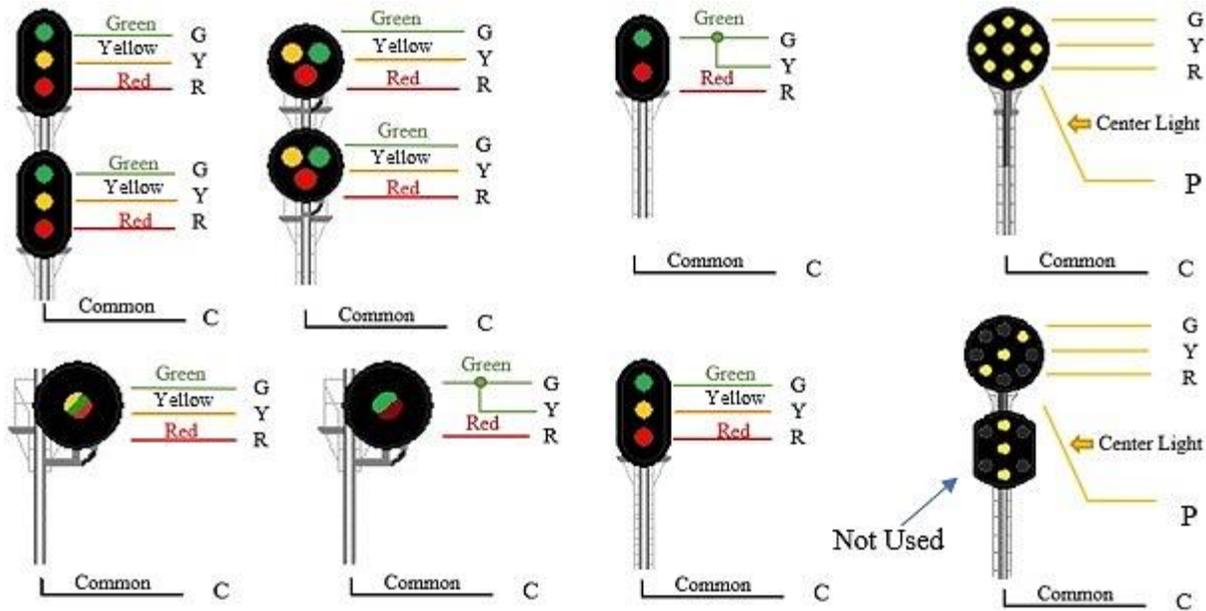


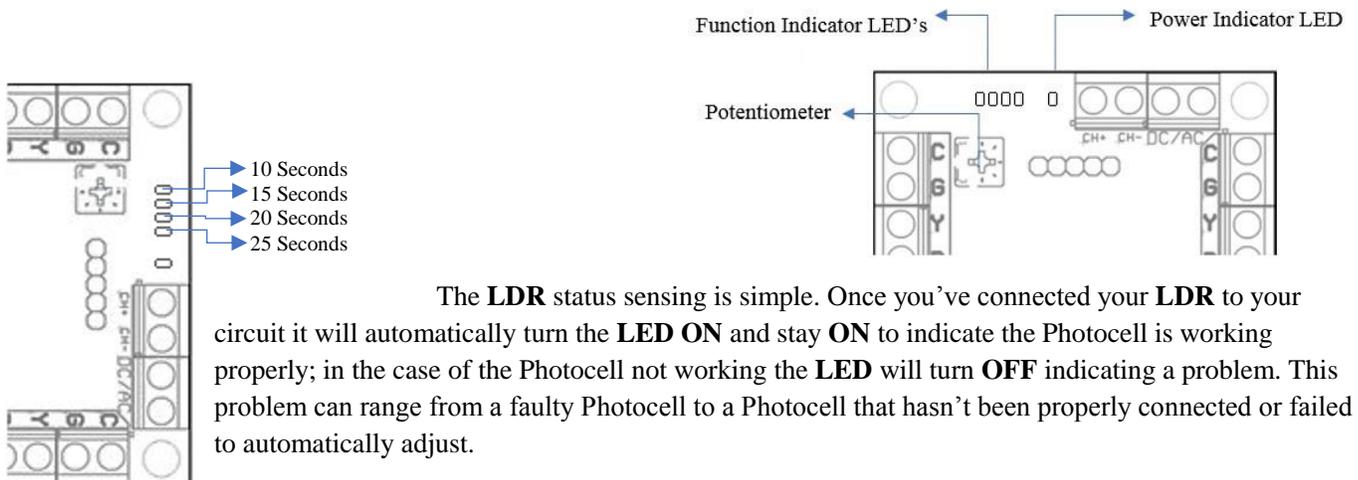
Image 3 – Circuit Terminal Layout

## Signal Connections



## Function Indicator LED's

The signal circuit comes equipped with function indicator **LED's**. The **LED's** indicate two things; the Yellow "Approach" to Green "Clear" delay as well as **LDR** status. When adjusting the yellow to clear delay simply turn the potentiometer clockwise. The **LED's** on your board will turn on as you increase the timer delay. **Each LED indicates a 5 second Delay Increase. This delay is 5 Seconds by Default.** Once you've adjusted to your preferred delay the **LED's** will flash to confirm the timer and return to their original **LDR** status sensing.



The **LDR** status sensing is simple. Once you've connected your **LDR** to your circuit it will automatically turn the **LED ON** and stay **ON** to indicate the Photocell is working properly; in the case of the Photocell not working the **LED** will turn **OFF** indicating a problem. This problem can range from a faulty Photocell to a Photocell that hasn't been properly connected or failed to automatically adjust.

## Photocell (LDR) & Timers

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The Photocells should be mounted in the center of the rails. Drill a 1/8" hole in between the ties through the layout table and install the sensor (wires first) from the top of your layout, this hole size is suitable for HO and larger scales; please know when drilling on smaller scale track the drill bit may hit the ties, we recommend you start with a smaller drill diameter and gradually work your way up to the 1/8" drill hole to prevent damaging the ties; in some cases you may need to shave off a little plastic/wood from your ties in order to accommodate the sensor.

We recommend securing the LDR in place by using a small amount of white glue. Don't forget to wipe any excess glue from the sensor head as failure to do so may cause the sensor not to work or to provide a false indication.

Each sensor is provided with 24" leads for ease of installation. In case this isn't enough any stranded wire (**30 GA or thinner**) can be used to extend the reach. The spacing between the photocells depends on how long you want your block to be. Please keep in mind by adding too much wire may cause a slight delay in detection as the input signal must travel a longer distance.

Once power is applied to the Signal Circuit it will automatically start adjusting the LDR's to the current room lighting. Each sensor is adjusted independently. If one of your sensors is on a darker area on your layout it will still operate. For low-light operation, we recommend re-adjusting your LDR's by disconnecting the power to your circuit, waiting 10 seconds before reconnecting it back to power. This will ensure any previous settings have been erased and will allow the sensors to recalibrate to your current room lighting.

The LDR's sensitivity are programmed to eliminate any possibility of a false triggers, such as a shadow. The circuit will **NOT** operate in the dark.

## Power

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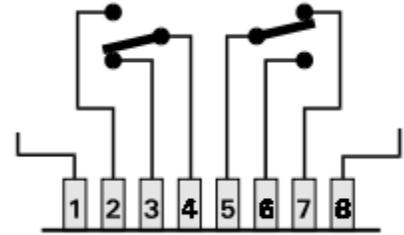
The **Stand Alone Simple Signal Circuit** accepts AC, DC and DCC power (9V- 15V). The Signal Circuit will draw approximately 26mA under a full load. This circuit is designed to operate under any straight DC or AC current provided that the voltage doesn't exceed **15V**. If you are using a power pack transformer we strongly recommend using the fixed AC output terminals. If you are using DCC we recommend using Track Power. Exceeding the Power requirements will cause the circuit components to overheat causing it to fail, and will void the warranty.

Once power is applied to the board the circuit power LED will turn on indicating the circuit is receiving power. At the same time, the circuit will start adjusting the LDR's to the room's lighting. This automatic process eliminates the need to adjust each individual sensor. The Signal Circuit is capable of handling up to Two Dual Head D- Type, G-Type and Search Light Signals as well as Pennsylvania and B&O signals. You should make all connections to the circuit prior to applying power. You can mount this circuit anywhere. We suggest mounting the circuit under the layout using #4 screws. The circuit is equipped with holes for easy mounting. Do not enlarge holes as doing so can cause damage to the circuit and will void your warranty.

## Basic Interlocking

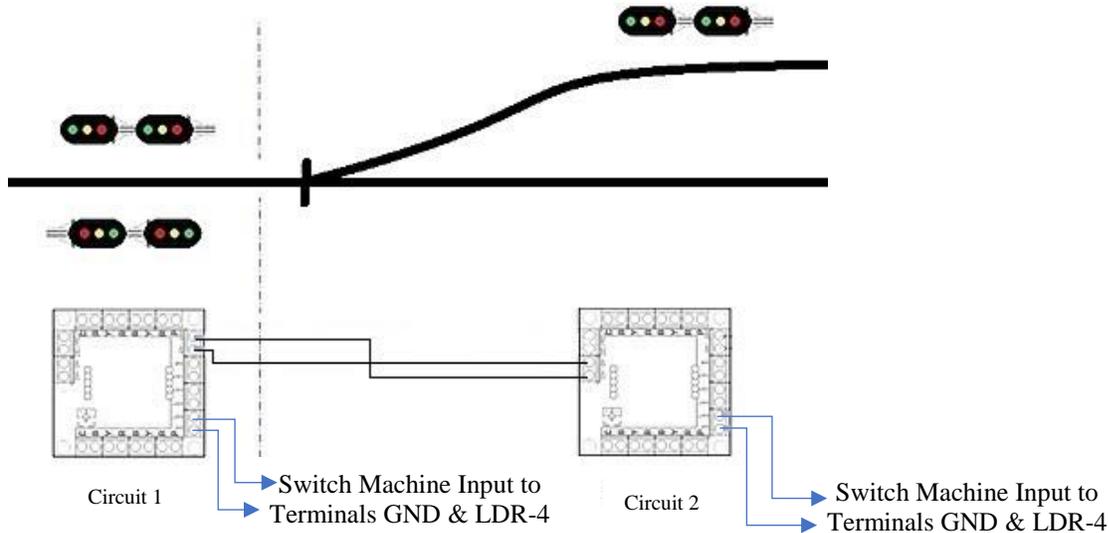
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The Signal Circuit is capable of basic interlocking features with the help of Tortoise™ or Cobalt Switch machines. Connect the auxiliary or LED contacts on your Switch Machine to terminals **GND & LDR-4** on your signal circuit. **If your switch machine has multiple contacts and you're only using one circuit please only use two contacts. For example, contacts 5 goes to LDR-4 & 7 goes to GND or 4 goes to LDR-4 & 2 goes to GND. If you're using multiple Signal Circuits please use one set of contacts per circuit.**



**If you are using Atlas Switch Machines, and use a stationary push button, toggle or Atlas switch controller, connect the Common Positive (+) to the LDR-4 Terminal. Whichever end of your switch leads to your siding, that goes to the GND terminal of the circuit (not exceeding 5V).**

When the switch has been aligned for the siding the lower signal head will display green while the upper head will display red. This aspect is called “Medium Clear” and is commonly used to inform the train there is a switch ahead and needs to slow down until the train clears the switch and can then proceed at normal speed. Once the train has passed the signal the bottom head will return to red. This interlocking feature is only available from the West Bound Terminals. The Signal circuit can always be flipped if your signal is facing Eastbound.



## Daisy Chained / Multiple Circuits

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**When multiple circuits are operating in sequence and a train enters the block it's mandatory for the train to clear or exit the block before another train can enter.** In the unfortunate case of a train decoupling or going into emergency inside the block the signals will maintain their corresponding aspects until the train regains movement and exits the block.

## Warranty

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This Circuit is warranted to be free from defects in workmanship and materials for a period of ninety (90) days from the date of purchase. This warranty covers all defects experienced during normal operation except for the following conditions:

**If current or voltage limitations has been exceeded**

**If product has been modified in any way (e.g. Missing/Additional Components, Soldering)**

**If product has been mishandled or abused.**

Requests for warranty service must contact us first to receive a RMA (Return Merchandise Authorization) at [info@njinternational.com](mailto:info@njinternational.com) Please include a written description of the issue and purchase receipt when returning the product to us.

## Technical Support

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We hope the foregoing instructions are adequate for answering any questions you might have about the installation and operation of this circuit. However, if you still have any questions or problems with your circuit, technical support is available through email at [info@njsignals.com](mailto:info@njsignals.com).

Warning:

This product is not a toy. Keep away from children. It is not suitable for children under the age of 14, as small parts and/or broken parts may present a choking hazard. If swallowed, seek immediate medical help.

This product contains know Chemicals which are known to the state of CA to cause cancer, birth defects, or other reproductive harm.

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