



Electronics for Model Railroads

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# SD-3

## Tri-Color LED Signal Driver

**GENERAL DESCRIPTION:** The CIRCUITRON **SD-3** is designed to drive any type of Bi or Tri Color LED single target signal. The outputs of the **SD-3** can accommodate 2 lead or 3 lead LED types. *NOTE: The **SD-3** will not control multiple LED type signals where red, green and yellow are separate LEDs. A CIRCUITRON **SD-1** is recommended in this case.*

The **SD-3** accepts negative (-) control signals from CIRCUITRON detection circuits such as the **BD-1** and will drive the LED to indicate red, green and yellow aspects. *NOTE: A minimum of 2 blocks of detection (home and following) are required to provide all three aspects from the **SD-3**.* Yellow is achieved by alternately lighting the red and green LED chips at a high frequency. The eye perceives this mix of red and green as yellow. A hue adjustment is provided on the **SD-3** to allow adjusting the yellow color. *NOTE: Certain brands of LEDs produce a more convincing "yellow" than others, and this is due to the type of LED chips used, their location and the amount of diffusion built into the epoxy body. Poor LED design will yield distinct red AND green zones at the front of the LED rather than the appropriate "yellow" mix. Contact the signal manufacturer if this occurs.*

The **SD-3** requires a 10 - 18 volt AC or DC input, however, DC will have to be used if the **SD-3** is connected to a DC output Detection circuit such as the CIRCUITRON **BD-1**.

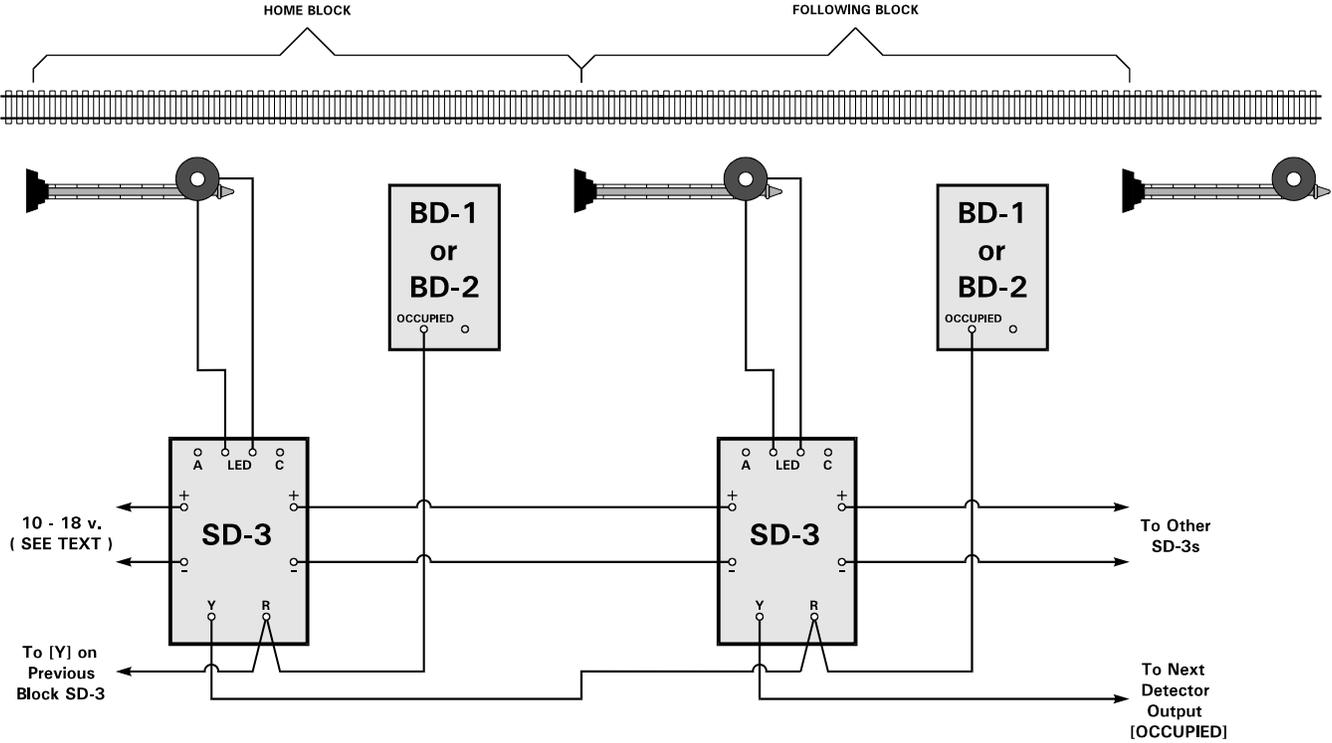
**CIRCUIT DESIGN:** The **SD-3** utilizes a CMOS NOR gate package configured as an astable multivibrator with complimentary outputs direct driving the LED. The astable features full range variable duty cycle which allows complete adjustment of the "yellow" hue. A zener diode & series pass transistor regulate the input voltage to 11 volts to avoid excessive power dissipation in the gate package.

**INSTRUCTIONS:** The **SD-3** can be connected with .110" solderless connectors or by soldering leads directly to the terminals on the printed circuit board. If soldering, use a small pencil-type iron and electronics-grade rosin core 60/40 solder (available at Radio Shack). Use only as much heat as necessary to obtain a good joint and do not wiggle the terminal until the solder has cooled completely.

1. Mount the circuit board in a convenient location. A section of CIRCUITRON's **PCMT** makes this a simple task, or the mounting pads in the corners of the board may be drilled out and the circuit mounted with screws.
2. If your signal utilizes a 2 lead Light Emitting Diode, merely run two light gauge (22 - 24 ga.) wires from the signal to the two terminals at the top of the **SD-3** board labeled [**LED**]. Make the connections temporary at this time.
3. If your signal utilizes a three lead Light Emitting Diode, the two outside terminals of the LED are wired to the [**LED**] terminals on the **SD-3** as in (2) above. The center lead will connect to either the [**A**] or [**C**] terminal on the **SD-3**, depending on whether the LED is constructed with the anodes or cathodes connected together internally. If your signal instructions do not tell you which design they use, try the common cathode connection, [**C**], first. If you get no light from the LED, switch the wire to the [**A**] terminal.
4. Connect the [**+**] and [**-**] terminals on the **SD-3** to a 10 - 18 volt DC source. Leave your power source OFF during these connections. AC may be used to power the **SD-3**, but if the **SD-3** will be connected to Detection Circuits for automatic operation, then **DC MUST BE USED!** You will notice that the supply terminals, [**+**] and [**-**] are bussed across the board so that multiple **SD-3** installations are easily wired. Merely connect [**+**] to [**+**] and [**-**] to [**-**] for daisy-chained installations.
5. Apply power to the board. The signal LED should light "GREEN". If it comes on "RED", turn power off and interchange the two wires connected to the [**LED**] terminals on the **SD-3**. Firmly attach these two wires at this time. Turn the power back off until all other connections are complete.
6. For automatic operation, connect a wire from the [**R**] terminal on the **SD-3** to the output from a CIRCUITRON detection circuit installed for the **SAME** block that the signal is supposed to protect. This terminal is labelled [**OCCUPIED**] in the case of the **BD-1**. With this connection, the **SD-3** will now display 2 aspect signals (red and green). This block is designated the **HOME** block and will be referred to as such in the diagrams.
7. Connect a wire from the [**Y**] terminal on the **SD-3** to the output from a CIRCUITRON detection circuit installed for the block following the **HOME** block above. This block is designated the **FOLLOWING** block. Refer to *figure 1* for further clarification.
8. Set the yellow hue adjustment trimmer, **P1**, to the midpoint of its rotation.

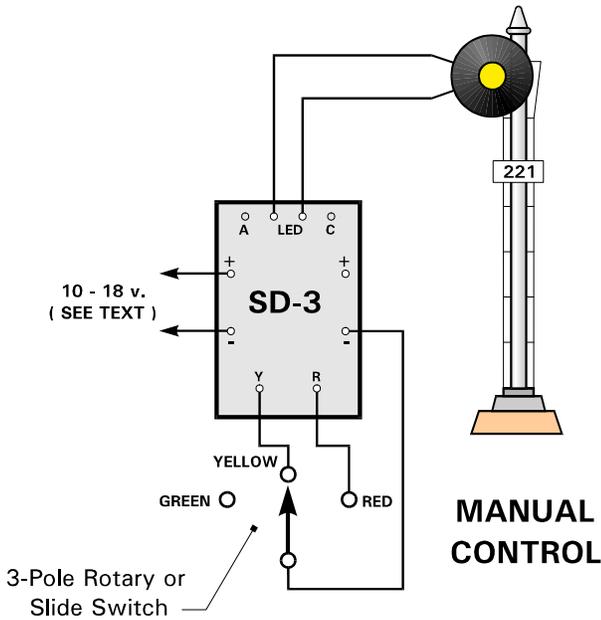
This completes the installation. Run a train through the blocks and note that the signal properly displays all three aspects. Rotate the trimmer to adjust the yellow hue to your liking.

**APPLICATION:**

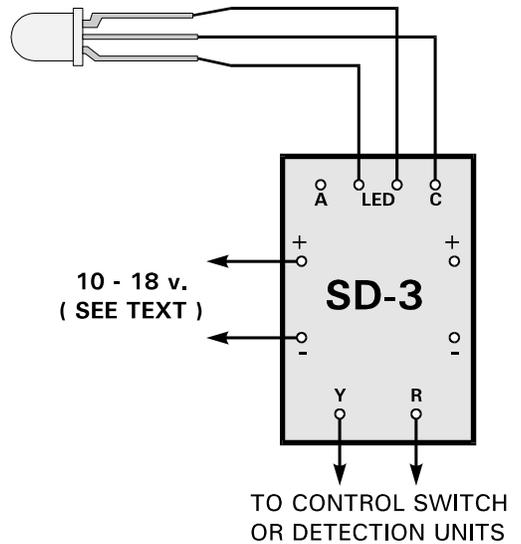


**NOTES:**

1. **BD-1** power supply and Opto-Sensor connections are not shown.
2. Single direction mainline shown. Bi-directional travel requires additional signals & SD-3s for opposite direction.
3. 2 lead LED connections shown above. See diagram below and instructions for 3 lead hookup.



**TYPICAL 3 LEAD LED HOOKUP**



**WARRANTY**

*CIRCUITRON warrants this device against defects in materials and workmanship for a period of one year from the date of purchase. This warranty covers all defects incurred in normal use of the device and does not apply in the following cases:*

- a) if damage to the device results from abuse, mishandling, accident or failure to follow operating instructions.*
- b) if the device has been serviced or modified by other than the CIRCUITRON factory.*

*EXCEPT AS MENTIONED ABOVE, NO OTHER WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED INCLUDING MERCHANTABILITY, ON THE PART OF THE UNDERSIGNED OR ANY OTHER PERSON, FIRM OR CORPORATION, APPLIES TO THIS DEVICE.*