LOGIC RAIL™ TECHNOLOGIES

"Sophisticated Model Railroad Electronics"

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Signal Animator (SAD-SBCA)

Tomar semaphore motor, bulb-based & LED-based, common-anode position light signal instructions

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Getting started

Thank you for purchasing a ***Logic Rail Technologies*** product! Please read all instructions prior to installing this board. The Signal Animator provides automatic operation of 3-aspect block signals in a semi-prototypical way. A photocell is used for train detection. Anytime the photocell is covered by any portion of a train the signal will show red/stop. Once the photocell is uncovered the Signal Animator will delay (10 or 30 seconds; see below) and then change the signal to yellow/approach. After another delay the signal will be changed back to green/clear.

These instructions cover the version of the Signal Animator that provides 3-aspect signaling for Tomar semaphore motors, bulb-based signals (including position light signals), and LED-based, common anode (positive) wired position light signals.

You should make all of the connections to the Signal Animator before applying power to it. You can mount the Signal Animator anywhere it is convenient underneath your layout using the four mounting holes provided. The holes will accept #4 screws; do not enlarge the holes as damage to the circuit board can result and your warranty will be voided!

Tomar Semaphore Motor Connections

Connections between the Signal Animator and Tomar Industries' semaphore motors are illustrated below. **Note that the input power range must be 9 - 12V.** The voltage will affect the speed of the turnout motor. You can supply AC or DC power using the AC terminals as shown below.

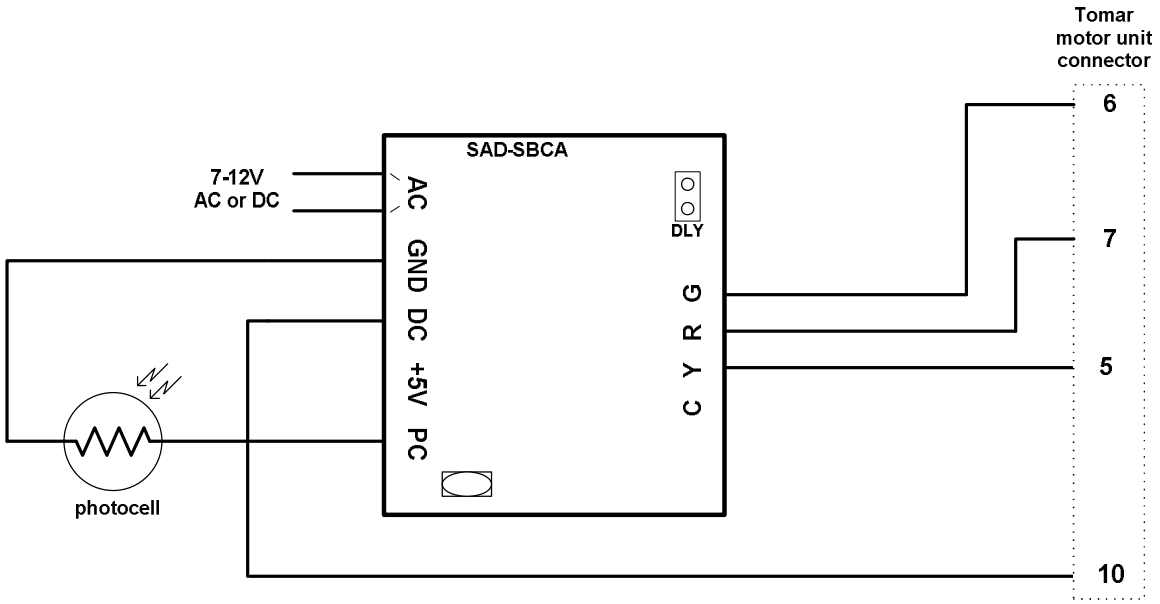


Figure 1 – Tomar semaphore motor connections

3-light Bulb-based Signals (e.g. NJ International)

Wiring for 3-light bulb-based light signals is shown in Figure 2 below. You will need the current limiting resistors if the voltage rating of the bulbs is lower than the input voltage to the Signal Animator. For example, if the input voltage is 16V and the bulbs are rated at 12V (get this information from the manufacturer of the signal) then we would suggest a resistor value of 100 ohms (e.g Radio Shack #RSU 11345519. If the input voltage is equal to or slightly lower than that of the bulbs then no resistors are needed.

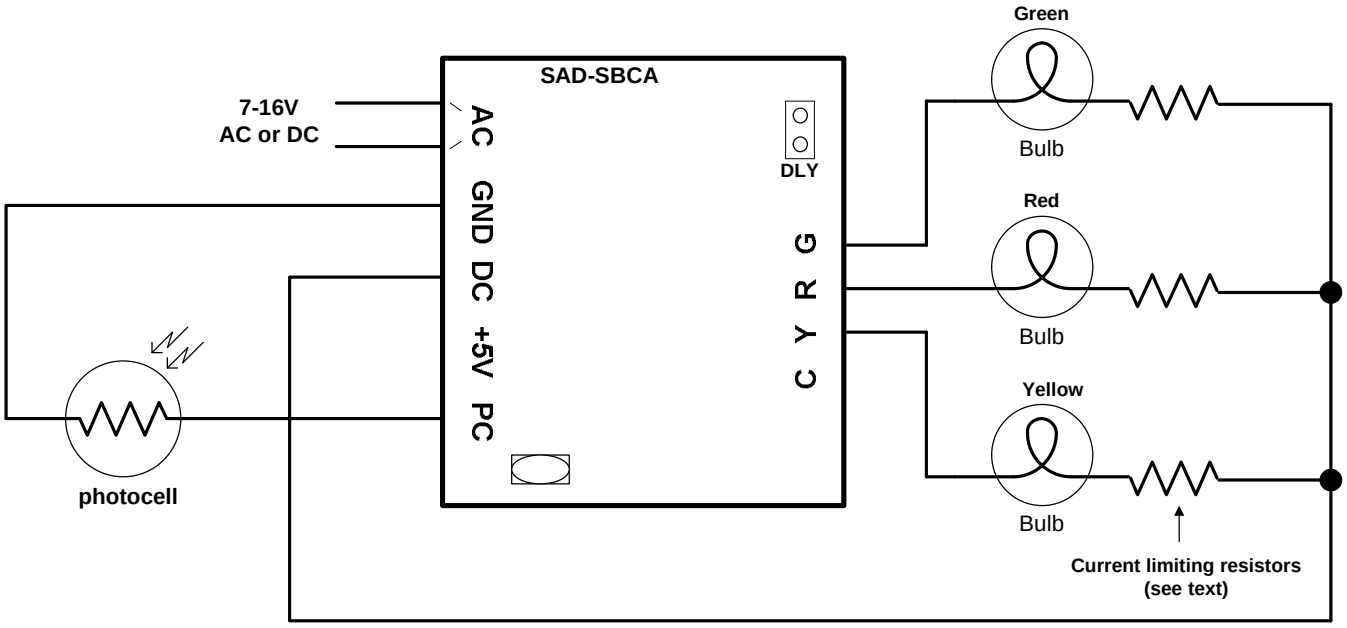


Figure 2 – 3-light bulb-based signals

2-light Bulb-based Signals (e.g. NJ International)

Wiring for 2-light bulb-based light signals is shown in Figure 3. Three diodes (e.g. Radio Shack #276-1101) must be added to the yellow and green outputs as shown. You will need the current limiting resistors if the voltage rating of the bulbs is lower than the input voltage to the Signal Animator. For example, if the input voltage is 16V and the bulbs are rated at 12V (get this information from the manufacturer of the signal) then we would suggest a resistor value of 100 ohms (e.g Radio Shack #RSU 11345519. If the input voltage is equal to or slightly lower than that of the bulbs then no resistors are needed.

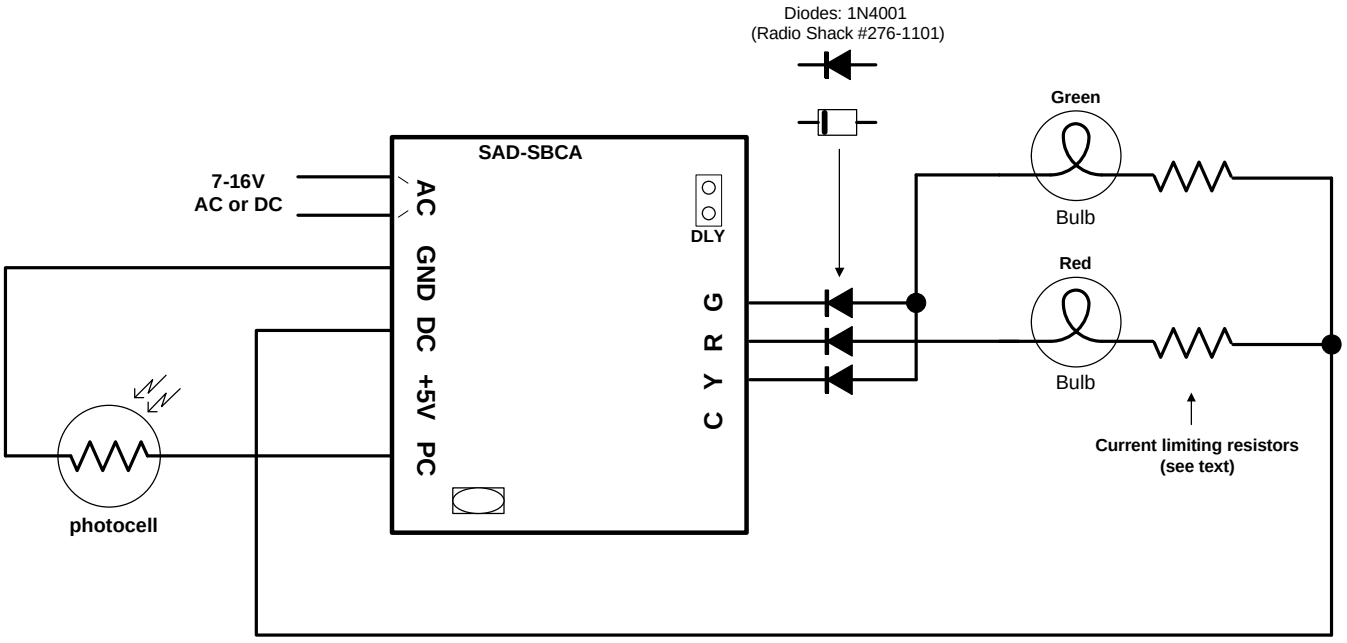


Figure 3 – 2-light bulb-based signals

Bulb-based Position Light Signals (e.g. NJ International)

Wiring for bulb-based position light signals is shown in Figure 4 below. You will need the current limiting resistors if the voltage rating of the bulbs is lower than the input voltage to the Signal Animator. For example, if the input voltage is 16V and the bulbs are rated at 12V (get this information from the manufacturer of the signal) then we would suggest a resistor value of 100 ohms (e.g Radio Shack #RSU 11345519). If the input voltage is equal to or slightly lower than that of the bulbs then no resistors are needed.

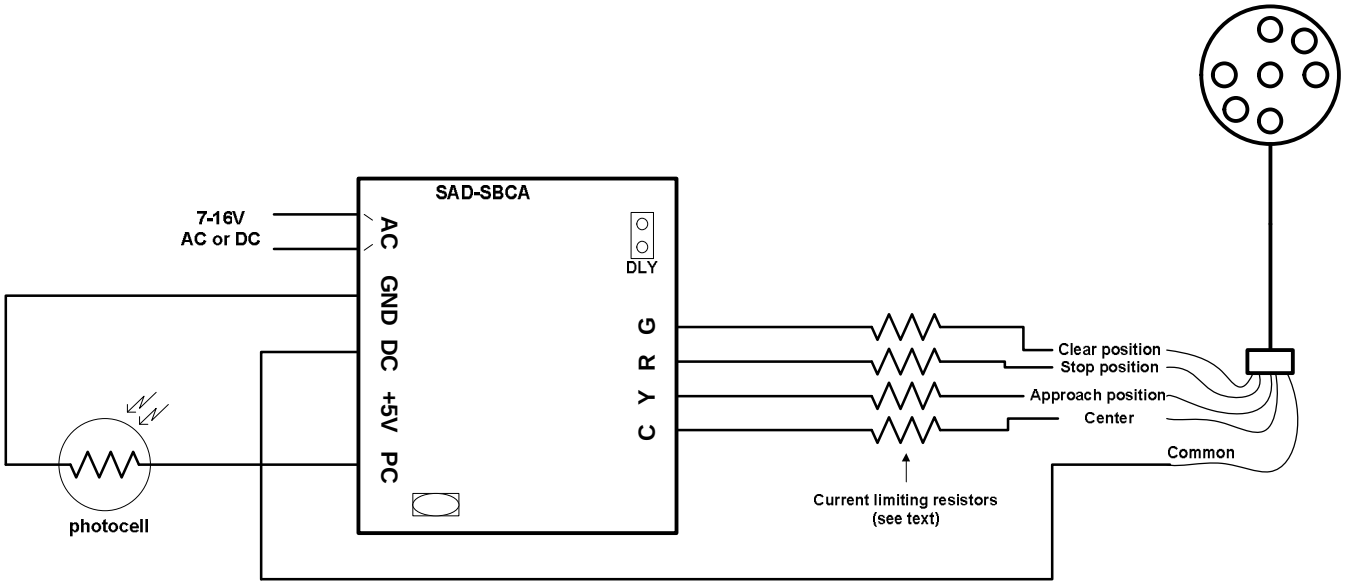


Figure 4 – Bulb-based position light signals

If your signal is an "absolute" type (that means it has two red bulbs for the stop position while all others are yellow) then you will have to cut the exposed lead on the diode D4 shown in Figure 5 on the Signal Animator board. Use a pair of diagonal cutters to make the cut. Be sure that the two cut ends no longer touch each other by separating them slightly. Failure to do so won't cause any damage but it may cause the center yellow bulb to illuminate when the signal is in the stop position.

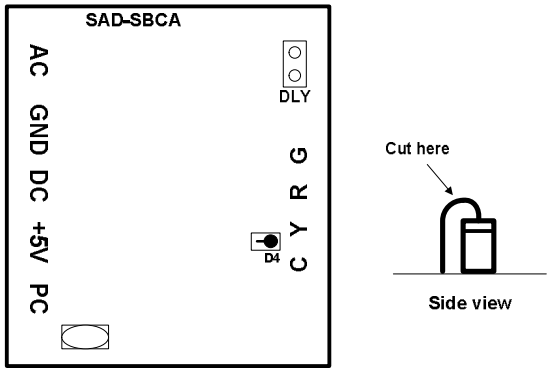


Figure 5 – cutting diode D4 for absolute type signals

LED-based Position Light Signals (common anode wiring)

The position light signal head is shown as a circle on the right-hand side of the drawing in Figure 6 below. Within the signal head are the seven LED "lights"; if you have a B&O style color position light signal then it will not have a center LED. The value of the current limiting resistors depends upon the value of the input voltage to the Signal Animator. For a 16V input voltage we recommend a resistor value of either 390 ohms (e.g. Radio Shack # 271-1114) or 330 ohms (e.g. Radio Shack #271-1113); you should use ½ watt resistors. Use a higher value for the center LED; we recommend a value of 680 ohms (e.g. Radio Shack #271-1117).

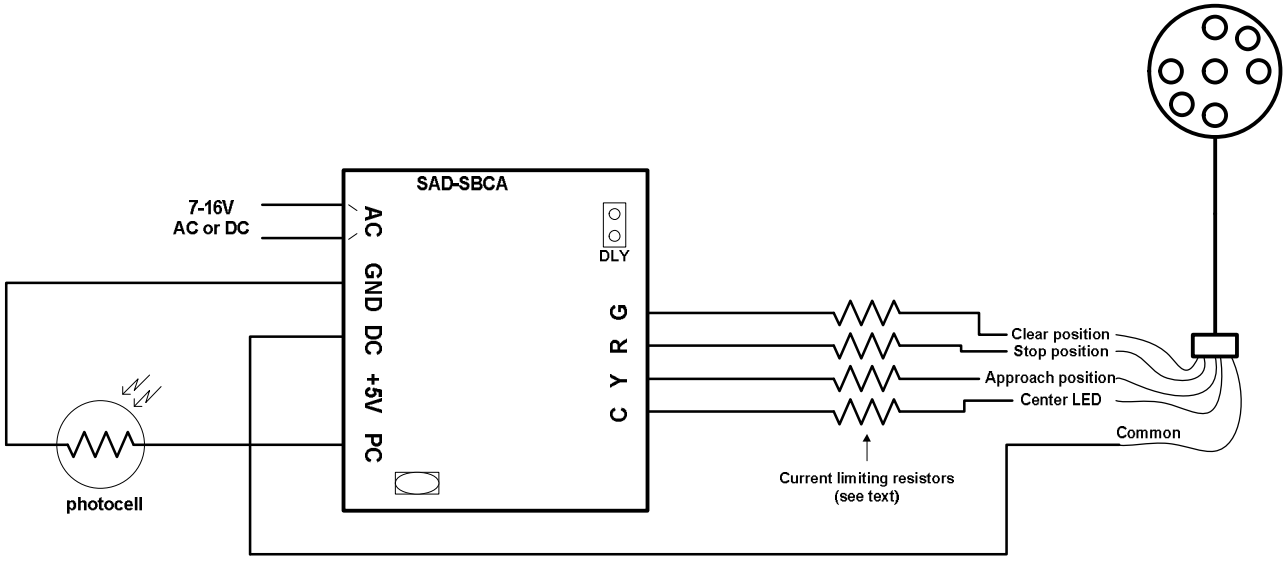


Figure 6 – LED-based position light signals (common anode wiring)

If your signal is an “absolute” type (that means it has two red LEDs for the stop position while all others are yellow) then you will have to cut the exposed lead on the diode D4 shown in Figure 5 above on the Signal Animator board. Use a pair of diagonal cutters to make the cut. Be sure that the two cut ends no longer touch each other by separating them slightly. Failure to do so won’t cause any damage but it may cause the center yellow LED to illuminate when the signal is in the stop position.

The Photocell

The photocell should be mounted between the rails in the general area where you will locate the signal. Drill a 9/64" hole through the ballast, roadbed, and sub-roadbed. For the smaller scales this drilling may end up hitting the ties. Take your time so you don’t mangle them! Figure 7 illustrates the placement of the photocell in between the rails. Insert the leads of the photocell into the hole from the top of your layout. One of the photocell leads has a piece of insulation on it so be sure the two leads don't touch each other (you won't damage anything if they do but the circuit won't work properly!). If the leads do not protrude enough from the underside of your layout then it will be necessary to extend the leads; soldering wires to them is the most common method; make sure you insulate any connections you make to the photocell leads so that they don't short out. Once you have wired the photocell to the Signal Animator and verified its operation you may wish to put a dab of white glue under the photocell to hold it in place; make sure you don't get glue on the top surface of the photocell as this may prevent it from operating properly.

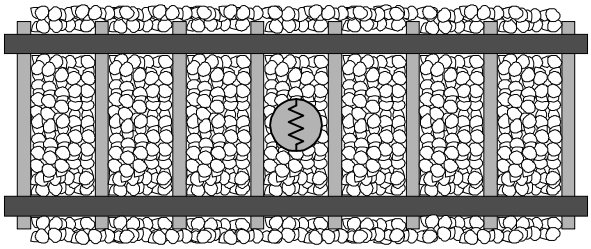


Figure 7 – photocell placement

The photocell requires a light source above it to function properly. On most layouts the room lighting should be sufficient. However, if the photocell is located in an area that doesn't get much overhead lighting or if you have simulated "nighttime" operations then it will be necessary to locate a light source on the layout near the photocell. Street lights and yard lights are common light sources. Locate the light source slightly to the left or right of the photocell and not directly over it; this will allow the Signal Animator to still properly detect a train that has stopped over the photocell with the gap between cars over the photocell. You can adjust the sensitivity of the photocell on the circuit board using a small slotted head screwdriver. Insert the screwdriver in the component labeled "VR1". Turning the screwdriver clockwise will compensate for lower light levels. With nothing blocking the photocell turn the screwdriver counter-clockwise until the signal changes to red/stop. Then slightly turn the screwdriver clockwise. Repeat if necessary.

Signal delay

The signal color change delay can be either 10 seconds or 30 seconds. Choose the value based on your own personal preference. To select 10 seconds the jumper must be installed over both pins on the block "DLY"; for 30 seconds the jumper must only cover one pin (it doesn't matter which one). You can change this as you wish even when the power to the Signal Animator is on. Figure 8 illustrates the two options.

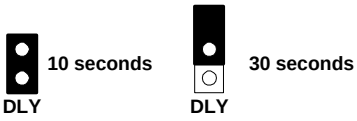


Figure 8 – signal delay

Power

The Signal Animator accepts AC or DC power (7 - 16V); however, if you’re using a semaphore motor then the input power should be no higher than 12V. Power consumption will vary based on the type of signal (bulbs vs. LEDs, 3-light vs. position light) but is typically around 75mA. If you are only using a single Signal Animator then you can use the AC terminals to provide power as previously shown. You can use the accessory terminals on your throttle/power pack. If you are using more than one Signal Animator you can power them all from a single **DC** source as shown in Figure 9 below.

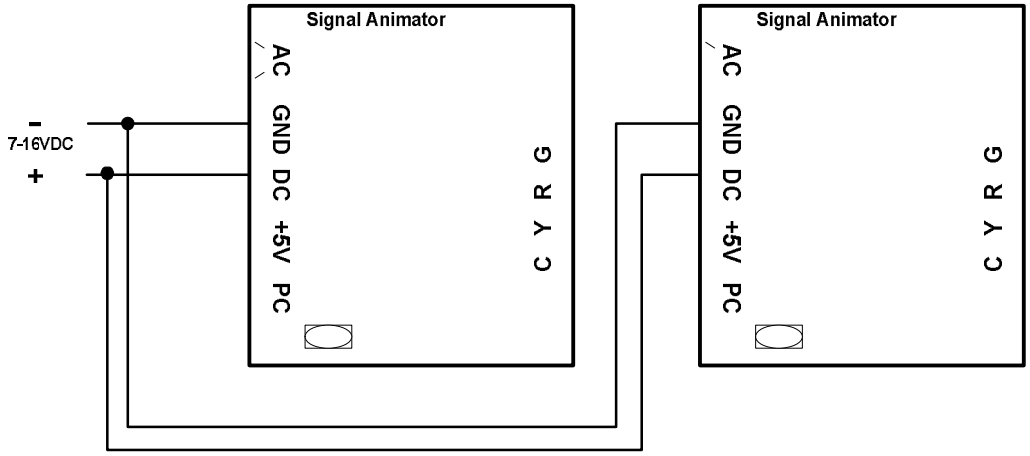


Figure 9 – DC power

Multiple signals

It is possible to use two signal heads with one ***Signal Animator***. This arrangement could be used to mimic a standard block signal arrangement. The signal heads will be wired in parallel with each other and obviously will always show the same indication. An example of this, using 3-light bulb-based signals, is shown in Figure 10 below.

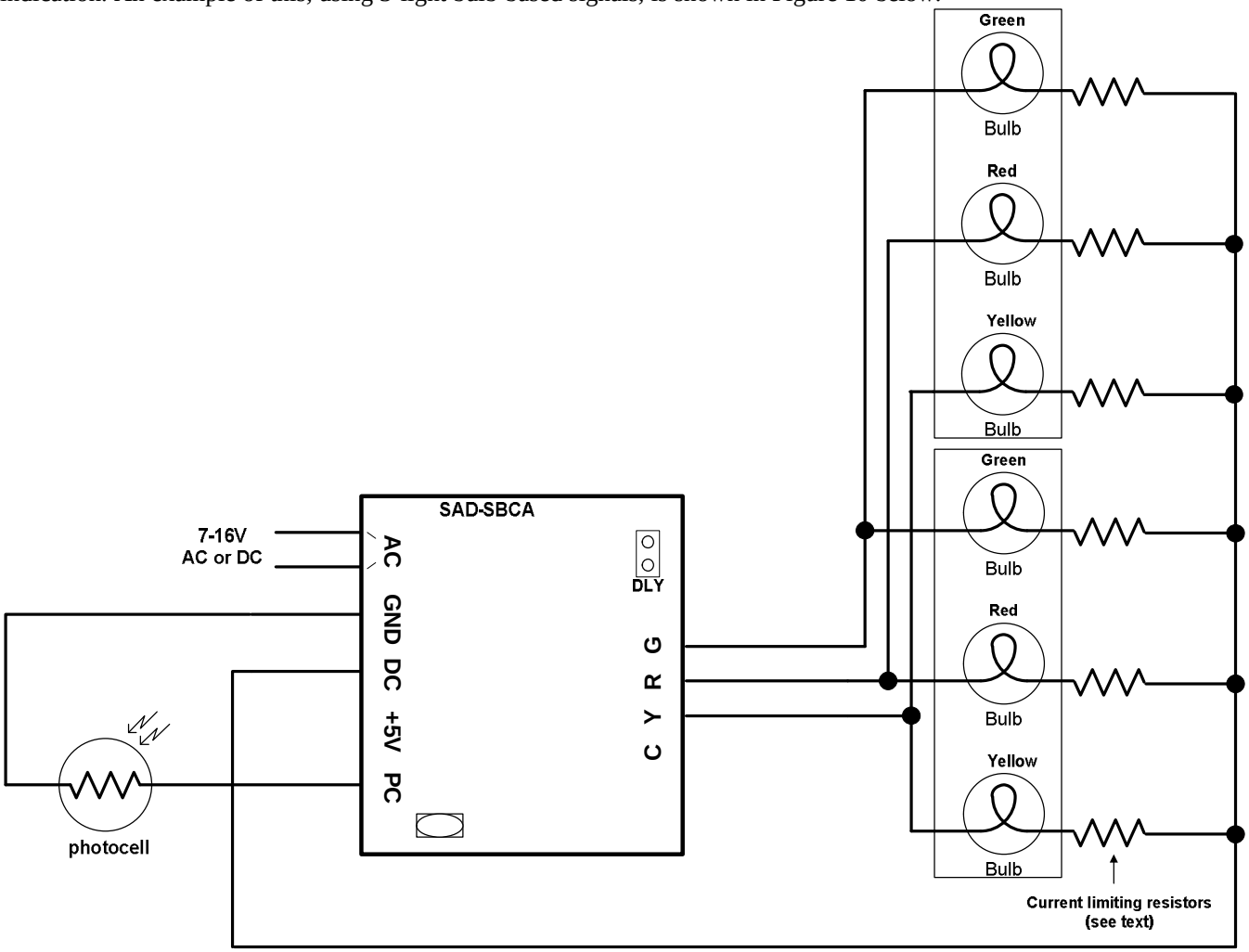


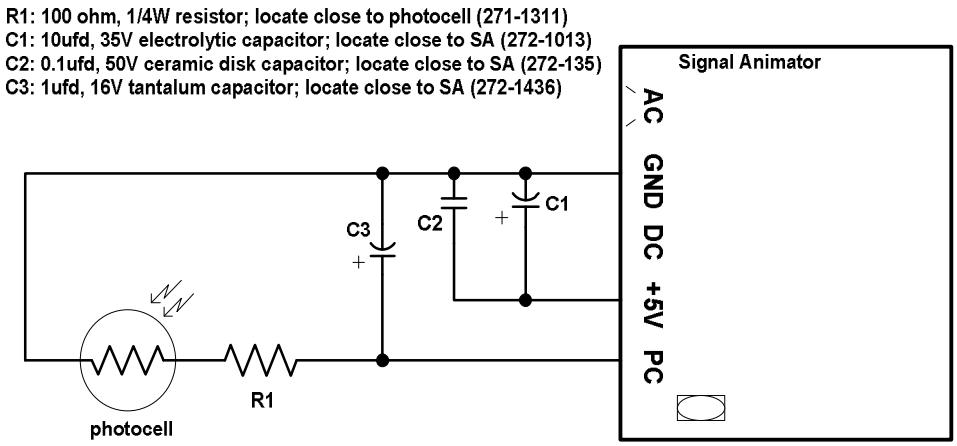
Figure 10 – Multiple signals

Multiple photocells

An additional photocell (available from us at a cost of $2.00) can be used in order to increase the zone of detection. Wire the two photocells in series (i.e. connect one lead from photocell #1 to the GND terminal, connect the other lead from photocell #1 to one lead of photocell #2, connect the remaining lead of photocell #2 to the PC terminal). When either photocell is covered the signal will show red/stop; once BOTH photocells are uncovered the ***Signal Animator*** will begin its delay in order to turn the signal yellow/approach.

Minimizing electrical noise effects from other sources that may cause false triggering

Switch machines, switch motors and electrical uncouplers are notorious for generating electrical noise when they are energized. Such noise can be inadvertently coupled onto the ***Signal Animator's*** photocell connections which can then lead to false triggering of the signal circuit. The first remedy to try is to make sure that wiring for those devices is kept apart from the photocell wiring. This may not always be practical (especially if you're interlocking the signal head(s) with turnout position as described in the beginning of this document). If that's the case, adding decoupling/filter components to the ***Signal Animator*** circuit will usually eliminate the false triggering. The drawing below illustrates what needs to be done. Note that capacitors C1 and C3 are polarized so make sure you connect them correctly; C2 has no polarity. Also, pay attention to the component location as outlined below in the parts list. The numbers in parentheses are Radio Shack part numbers.



It may also be necessary to add filtering to the power source for the "offending" item. For example, if you are using switch motors powered by a DC (unipolar or bipolar) power source you may need to add filter capacitors to that power source. We suggest a 0.1ufd/50V ceramic disk capacitor (such as C2 above) in parallel with a 100ufd/35V electrolytic capacitor (similar to C1 above, but obviously a higher value). Connect them similar to the way C1 & C2 are connected above (i.e. positive lead to positive power output; negative lead to the negative power output or ground).

Finally, if noise problems still exist you may need to use coaxial cable for the photocell connections. Connect the shield of such a cable to GND terminal on the ***Signal Animator*** and connect the center wire to the PC terminal.

Other Applications

Please contact us if you are interested in knowing how to interlock your signal (i.e. force it to the stop aspect) with the position of a turnout or if you are interested in controlling a dual head signal with two ***Signal Animators***.

Warranty

This product is warranted to be free from defects in materials or workmanship for a period of one year from the date of purchase. ***Logic Rail Technologies*** reserves the right to repair or replace a defective product. The product must be returned to ***Logic Rail Technologies*** in satisfactory condition. This warranty covers all defects incurred during normal use of this product. This warranty is void under the following conditions:

1) If damage to the product results from mishandling or abuse.
2) If the product has been altered in any way (e.g. soldering).
3) If the current or voltage limitations of the product have been exceeded.

Requests for warranty service must include a dated proof of purchase, a written description of the problem, and return shipping and handling ($5.00 inside U.S./$8.00 outside U.S. - U.S. funds only). Except as written above, no other warranty or guarantee, either expressed or implied by any other person, firm or corporation, applies to this product.

Technical Support

We hope the preceding instructions are sufficient for answering any questions you might have about the installation of this product. However, technical support is available should you need it. We would ask that you first contact your place of purchase for assistance. If you still need further assistance then please do not hesitate to contact us. You can reach us via phone, fax, mail and email; our contact information can be found on the top of page 1.