



Electronics for Model Railroads

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# AR-1

## AUTOMATIC REVERSE CIRCUIT

**GENERAL DESCRIPTION:** The CIRCUITRON **AR-1** is an automatic polarity reverser that is ideally suited for use with point to point layouts, displays, test tracks or reverse loop setups. The **AR-1** can safely switch up to 6 amp loads, making it compatible with virtually all scales. The **AR-1** uses tiny Opto-Sensors mounted between the rails where they are shaded from ambient room light by a piece of rolling stock. The **AR-1** requires a filtered 12 volt DC supply for proper operation. Pushbuttons may be incorporated into the circuit for manual reversing.

**INSTRUCTIONS:** Please refer to the diagrams for labeling and Opto-Sensor locations. The CIRCUITRON **AR-1** can be connected with .110" solderless connectors or by soldering leads directly to the terminals on the printed circuit board.

- 1] Mount the **AR-1** in a convenient location. A section of CIRCUITRON's Printed Circuit Mounting Track [**PCMT**] makes this step simple.
- 2] Install Opto-Sensors at the points you wish to have the polarity reverse following the instructions packed with them.
- 3] Connect one lead from each of the Opto-Sensors together with light gauge (22-24 ga.) wire, and run that wire to the Sensor Drive Terminal [**SD**] on the board.
- 4] Run individual wires from the remaining leads of the two Opto-Sensors to the terminals marked [**S1**] and [**S2**] on the printed circuit board.
- 5] If it is desired to have more than one reversing point per side, such as on a siding or spur track, additional Opto-Sensors may be connected in series up to a maximum of three (3) per side total. (See Figure 2)
- 6] Connect wires from the [**OUT**] terminals at the top of the **AR-1** to the track as shown.
- 7] Connect the [**IN**] terminals to the variable DC output of a throttle or power pack (Track Power).
- 8] If manual reversing capability is desired, connect a momentary pushbutton between [**S1**] and the [-] supply terminal as shown. Do the same with [**S2**] and the [-] supply terminal.
- 9] Connect the [+] and [-] supply terminals to a FILTERED 12 volt DC power supply. The **AR-1** may be powered from the DC accessory terminals on a power pack, but the voltage should be checked with a voltmeter to be certain that it does not exceed 14 volts DC. *WARNING: Excessive voltage may cause relay damage which is not covered by warranty.*
- 10] Making certain that no rolling stock is over either Opto-Sensor and that room lighting is at the level it will be at during operation, rotate the sensitivity control **P1** until indicator lamp **L1** is on. Turn the control back until **L1** just turns off. Rotate the control about 10 degrees further to eliminate excess sensitivity. Follow the same procedure with **P2** and **L2**.
- 11] Roll a train car over the Opto-Sensors and make certain that the corresponding indicator (**L1** or **L2**) lights when the Opto-Sensor is covered. If it does not, repeat step 10.
- 12] Place a train on the track and adjust the throttle for the desired speed. If the train does not reverse when it covers one of the Opto-Sensors, reverse the throttle direction or interchange the connections to the track.

**NOTE:** This completes the hookup and adjustment for standard Point to Point installations. The **AR-1** can also be used to automate Reverse Loop applications. The connections for a double reverse loop are shown in Figure 3. In this case both loops are directly wired to the power pack track output and the **AR-1** reverses the polarity of the connecting section. The connecting section can be any length or configuration. A limitation of this setup is that you *must* enter the loops in the same direction each time. It is possible to automate reverse loops so that entry from either direction is permissible. This will generally require at least two **AR-1**s. Send \$1.00 and request Application Note AN-5400-01 for additional information.

### 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) damage to the device resulting 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.**

FIGURE 1: Point to Point

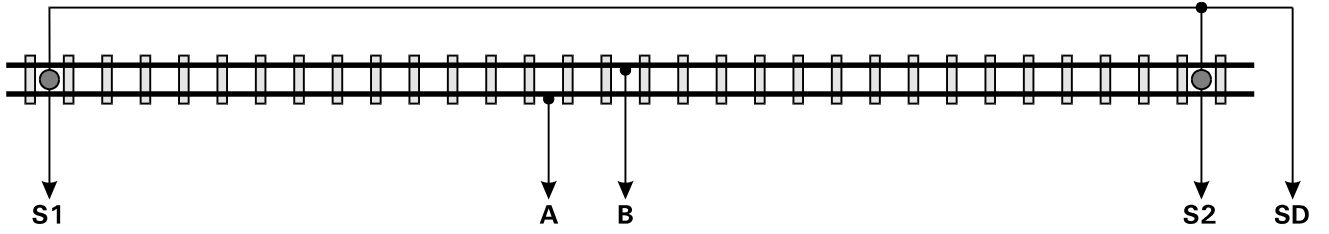


FIGURE 2: Point to Point with Spur

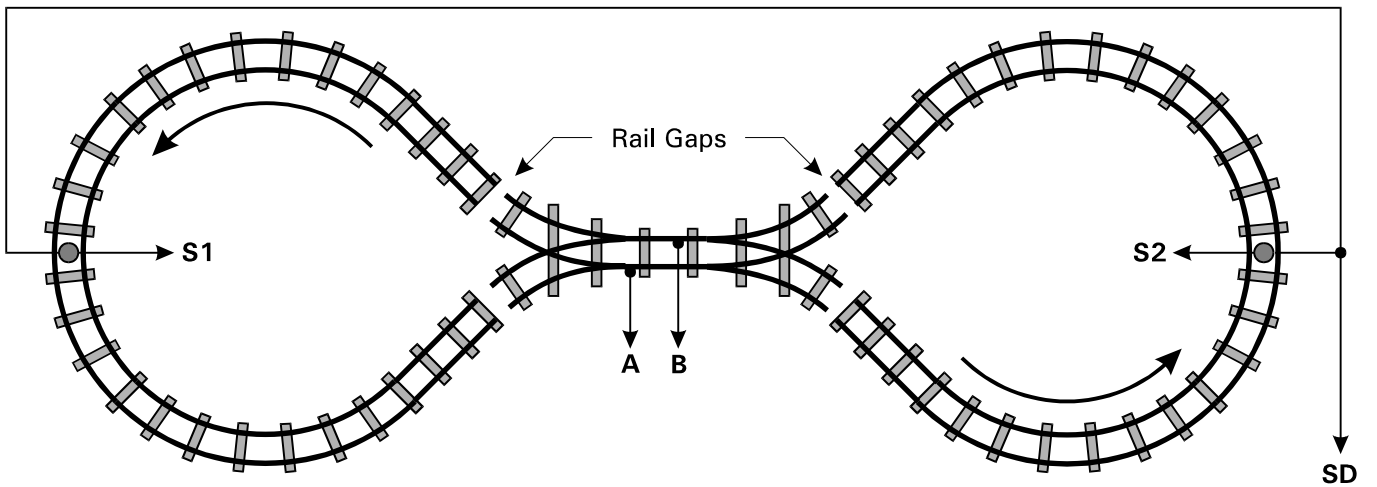
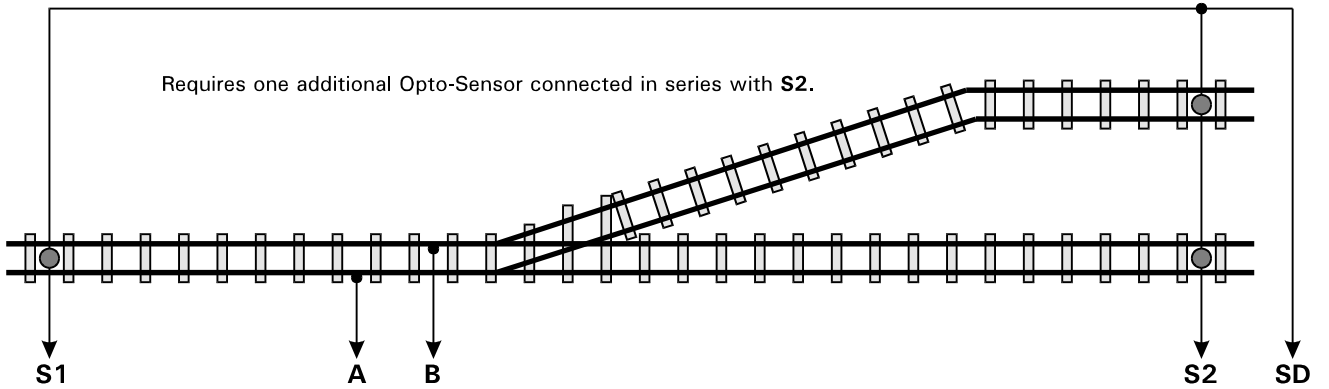


FIGURE 3: Double Reverse Loop with Connecting Section

Rotation through loops is fixed. Outside loops are connected directly to throttle.

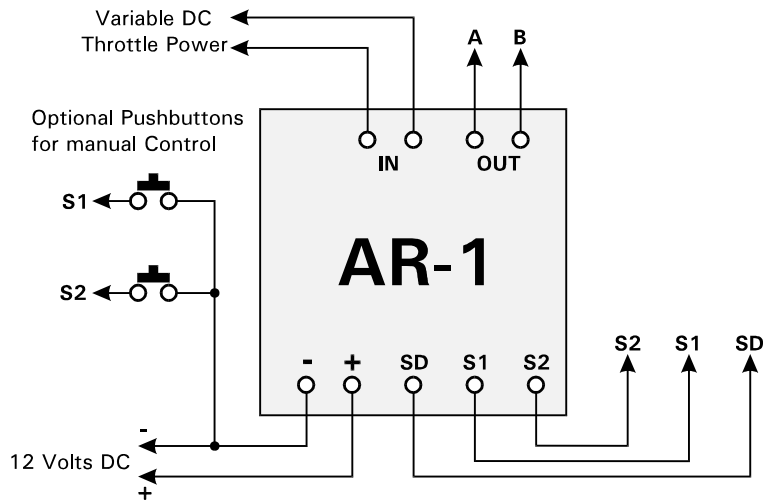


FIGURE 4: Wiring Diagram