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Electronics for Model Railroads
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AR-1CC

AUTO POLARITY REVERSER

GENERAL DESCRIPTION: The CIRCUITRON **AR-1CC** is an automatic polarity reverser designed for reverse loop applications on Command Control layouts. The **AR-1CC** can safely switch up to 5 amp loads, making it compatible with virtually all scales. The **AR-1CC** uses tiny Opto-Sensors mounted between the rails where they are shaded from ambient room light by the locomotive or a piece of rolling stock. The length of the reversing section the **AR-1CC** is controlling *MUST* be longer than the train length for proper operation (See NOTES section on next page). The **AR-1CC** 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 **AR-1CC** can be connected with .110" x .032" solderless connectors (available from CIRCUITRON) 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 from 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. A section of CIRCUITRON'S **PCMT** can be used for simple, snap-in mounting of the circuit board or you may drill holes in the mounting pads in the corners of the board and mount the **AR-1CC** with screws and standoffs.

1] Mount the **AR-1CC** in a convenient location. A section of CIRCUITRON's Printed Circuit Mounting Track **[PCMT]** makes this step simple.

2] Your reversing section should be double-gapped (both rails) at both ends. Install Opto-Sensors at the gaps following the instructions packed with them. Note that one sensor is mounted on each side of each gap. We recommend a distance no less than 3 inches on either side of the gaps for the sensors.

3] The Opto-Sensors are wired as series pairs at each gap. Connect one lead from each of Opto-Sensors A and B together with light gauge (22-24 ga.) wire. Do the same with Opto-Sensors C and D.

4] Run a wire from the remaining lead on Opto-Sensor B to the terminal marked **[SD]** on the printed circuit board. Run another wire from the remaining lead on Opto-Sensor D to the **[SD]** terminal.

5] Run individual wires from the remaining leads of Opto-Sensors A and C to the terminals marked **[S1]** and **[S2]** on the printed circuit board.

6] Connect wires from the **[OUT]** terminals at the top of the **AR-1CC** to the track in the reversing section as shown. Use 20 gauge wire for short runs (6 feet or less), 18 gauge for long runs.

7] Connect the **[IN]** terminals to the output from your Command Control Power Station or to the the track outside of the reversing section. Use the same wire size as in Step 6 above.

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-1CC** may be powered from the power station output (track) on DCC systems, but a bridge rectifier (available from Circuitron or Radio Shack) will need to be wired between the Command Control Power Station and the **AR-1CC** (see *Figure 2).* In addition, 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 or circuit damage which is not covered by warranty.*

10] Making certain that no rolling stock is over any 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 run it through the reversing section. If you get a short circuit as the train passes across a gap, reverse the connections to the **[OUT]** terminals.

NOTES: The **AR-1** was originally designed for Point to Point layouts, and the **AR-1CC** utilizes the same circuit with an extra pair of Opto-Sensors for Command Control apllications. Due to the design of the circuit, it is mandatory that the entire train clear the sensors at one end of the reversing section ***before*** covering the sensors at the other end. This is not a problem as long as train length is shorter than the reversing section. In some cases, however, layout design requires a very short reversing section, and trains will bridge the sensors at each end. By using a Circuitron **DT-4** along with some additional components, it is possible to modify the input section of the **AR-1CC** so that it will respond properly while the opposite Opto-Sensors remain covered. Send $1.00 and request Application Note AN-5410-01 for additional information.

FIGURE 1: Wiring Diagram

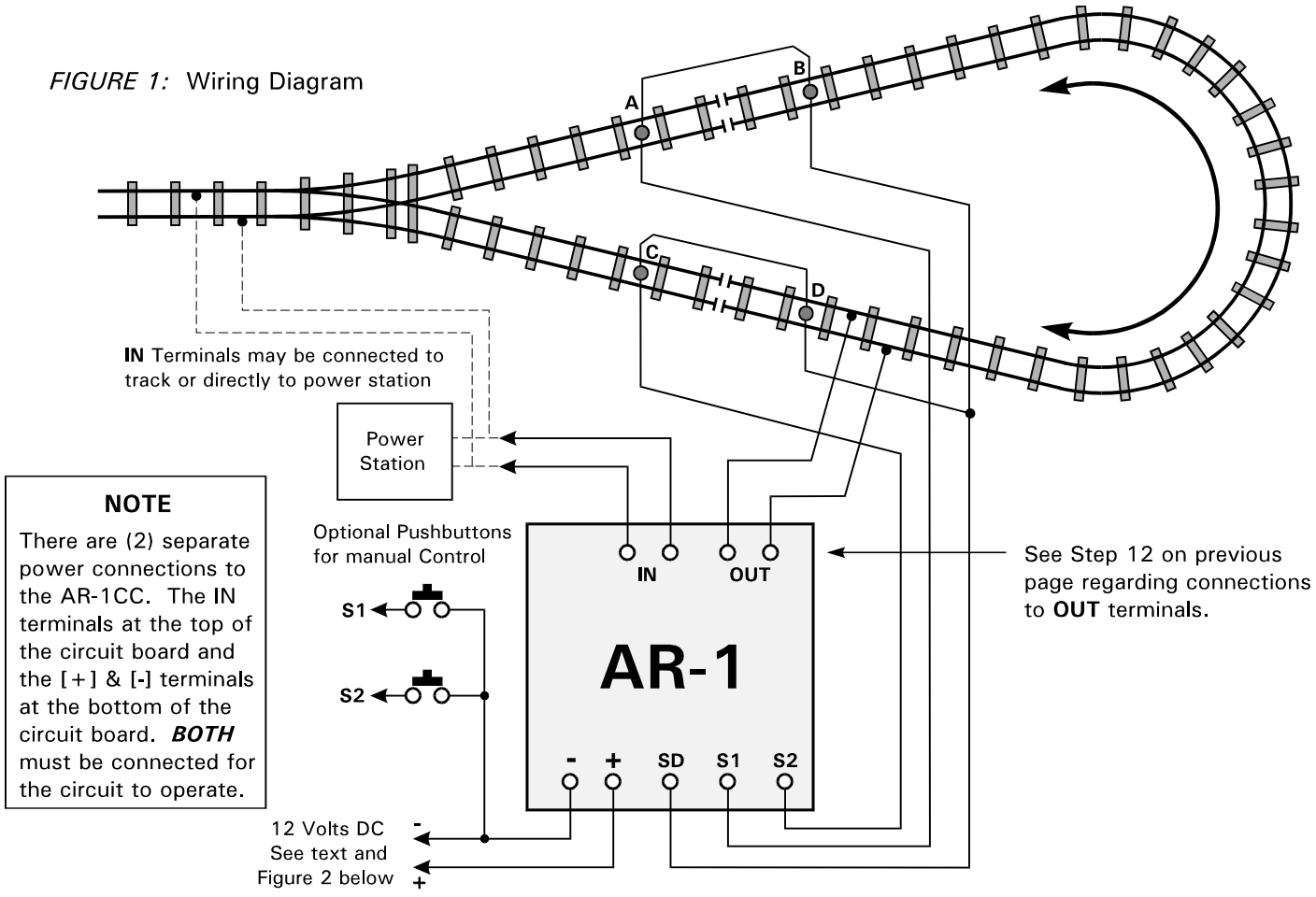
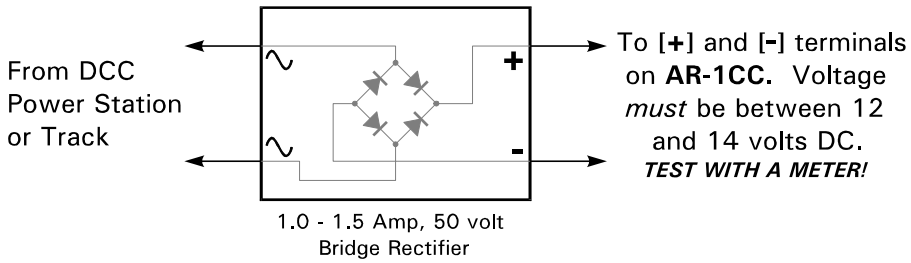


FIGURE 2: Powering the **AR1-CC** circuit board from the DCC output



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.

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