



Electronics for Model Railroads

211 RocBaar Dr., Romeoville, IL 60446

(815) 886-9010 FAX: (815) 886-9076

EMAIL: info@Circuitron.com

BR-3

DIGITALLY RECORDED GRADE CROSSING BELL

GENERAL DESCRIPTION: The CIRCUITRON **BR-3** utilizes a small sound module with speaker built in developed by our friends at Iowa Scaled Engineering. Small enough to fit within most trackside structures, the module can also be mounted below the layout base with the sound passing through a hole or tube to the layout surface. The digital recording of an actual grade crossing bell faithfully recreates this familiar sound. Unlike some brands of sound recorders that record 15 or 60 seconds of sound, the **BR-3** does not suffer from distracting breaks or pops in the sound output each time it repeats. The sound is continuous and accurate for as long as the circuit is activated. The **BR-3** requires a 8-18 volt AC or DC input (DC preferred) for proper operation (see further info below in the design section) . A control wire (WHITE) is provided coming from the module for easy connection to any CIRCUITRON (or other brand) detection circuit that provides a ground connection when detection occurs. Manual control through the use of a pushbutton or toggle switch is also easily implemented if detection is not desired.

DESIGN: The **BR-3** utilizes a small microprocessor with built in memory to digitally record all the nuances and overtones of an actual railroad grade crossing bell. Only one complete "ding" is recorded and timing circuitry in the processor then loops the sound to produce the continuous ringing sound. The red power input wire has an inline diode to allow operation from AC or DC sources and to protect against accidental reverse polarity. A DC power source is strongly recommended as AC might cause disruption of the processor timing with resultant odd output. Analog output is derived from the microprocessor's digital stream and is applied to the input of an audio amplifier IC. A volume control is included in the input to adjust the output to the level desired. A small high efficiency speaker is contained within the 3D printed enclosure. Acoustics of the small enclosure have been enhanced and optimized to work exceptionally well with the small speaker and the resulting sound pressure levels are adequate even for larger rooms.

HOOKUP INSTRUCTIONS: The **BR-3** wiring harness may be shipped separately in the box and you will first need to insert the harness plug into the socket on the module. Because of the small diameter lead wires on the CIRCUITRON **BR-3**, we recommend that the lead wires be connected to one side of a Euro style terminal block so that connections and changes to layout wiring can be made to the other side of the block rather than directly to the **BR-3** wires.



MOUNTING THE MODULE: The human ear is not particularly good at locating specific sound sources, so the easiest way to mount and conceal the sound module is to simply remove the roof from a nearby trackside structure (depot, interlocking tower, etc.) drill an access hole through the bottom of the structure and supporting layout underneath for the wires. Your ears will "think" the sound is coming from the crossbucks. Be sure to check for (*and avoid!!*) existing wiring in the area where the hole is going. Then drop the **BR-3's** three wires down through the hole and set the square housing on the floor of the model with the electronics and volume control facing UP. A small piece of double sided foam tape on the model floor will secure the module and keep it from vibrating/ buzzing. Most all of the sound will come out of the small square hole in the side of the enclosure. Make sure that side faces the open area in the model. A small amount of reinforcing sound emanates from the other openings between the circuit board and black housing. If at all possible, leave these openings unobstructed for the fullest sound. Most structures have thin enough walls (and probably some gaps) and the sound will likely exit the structure just fine.

In some cases, you may not have any structures near your road crossing.Maybe put some there!! Or don't if you don't want to. The output from the **BR-3** sound module can be directed up through a hole in the layout. This will reduce the output somewhat and the sound will not be quite as "full", but it will still sound just like a crossing bell. Keep the hole around 1/2" diameter and as short as possible for the best sound. In other words, pick a location of minimal layout thickness, if you can. You can disguise the hole on top with a small clump of foliage material. Use an airy, open clump to keep from muffling the sound. Locate the square port on the side of the enclosure directly under the hole opening under the layout and seal the module to the surface with a little caulk.

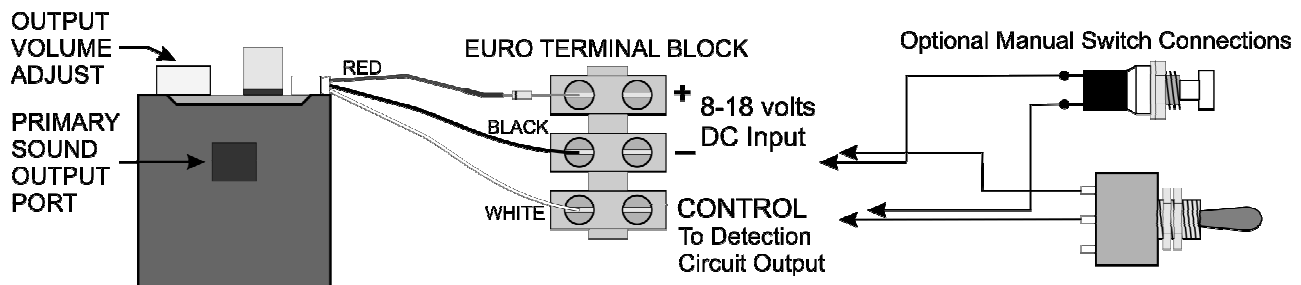
WIRING THE MODULE: As mentioned previously, use of a Euro style terminal block is highly recommended for ease of making connections. Wire the three wires from the **BR-3** module to the terminal block as shown below. Connect a DC power source of 8-18 volts to the terminals for the red and black wires as shown. AC may be used but is not recommended and should not be used if you intend to connect your **BR-3** to DC detection circuits.

- 1) For automatic detection controlled operation, connect the WHITE wire to the detection circuit OUT terminal (for Circuitron products). The WHITE control wire needs to be connected to GROUND (-) to turn the module on, that is, your detection circuit **MUST** supply a ground signal on its output. The detection circuit and the **BR-3** should be powered by the same power supply, or if different supplies must be used, then use only DC and connect the [-] side of both supplies together.

CAUTION: The WHITE wire is limited to a maximum voltage input of 18 volts DC. **DO NOT EXCEED 18 volts or you may damage or destroy the microprocessor. Check your voltage with a meter BEFORE applying the connection to the white wire.**

- 2) For manual operation, connect a pushbutton or switch between the WHITE Control Wire [C] and one side of your manual pushbutton or switch. The other terminal on your pushbutton or switch connects to the Negative (Ground) side of your power source. This is shown as optional below.
- 3) For continuous operation, connect a jumper between the WHITE wire terminal and the BLACK wire terminal.
- 4) Test the operation. A temporary jumper or clip lead may be connected between Black and White to turn the **BR-3** on. Use a small flat blade or Phillips screwdriver to adjust the volume trimmer to the desired level of output. Remember to keep it subtle for best effect.
- 5) If your **BR-3** is on and ringing while your detection is off and your flasher and crossbucks are **NOT** flashing, there is likely a control voltage mismatch which will require that you install a diode on the control terminal of the flasher to prevent current from flowing **INTO** the flasher circuit. Use a 4001-4004 series diode. The banded end of the diode will face **AWAY** from the control terminal connection. Request application note AN-5703-01 or check our website to see if it is available.

TYPICAL HOOKUP CONNECTIONS



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.

CIRCUITRON, INC.