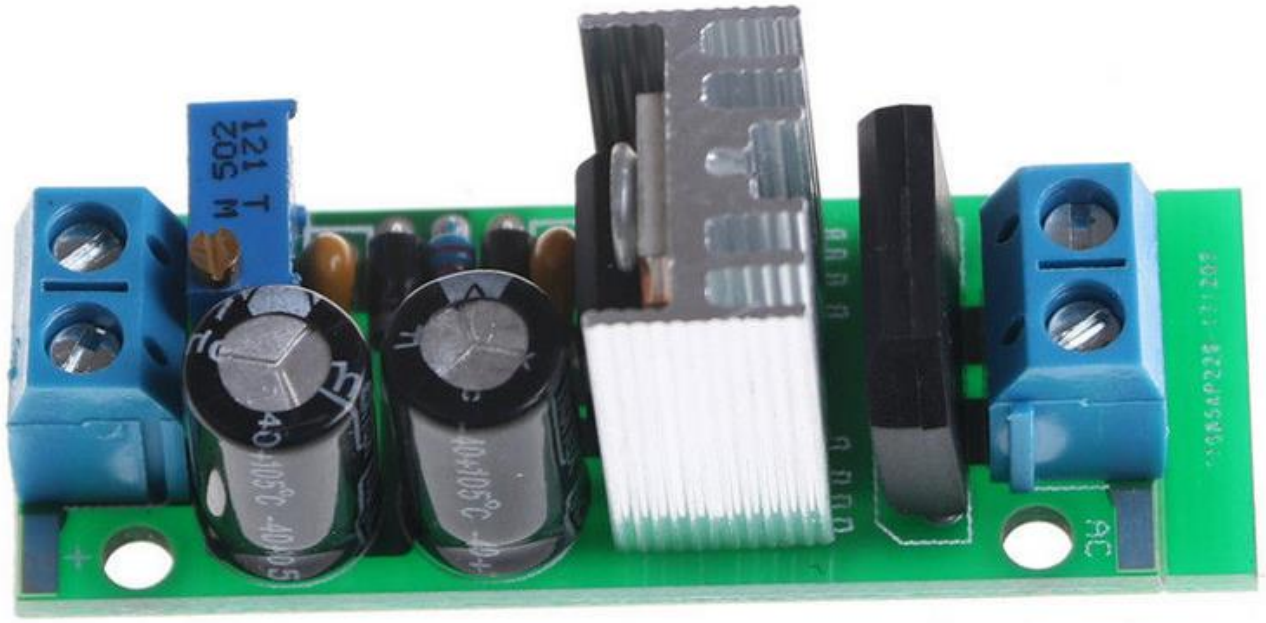
Inexpensive Electronics to Control Signals, presentation by Mark David at April 11, 2019 Maine 3-Railers meeting

Inexpensive electronics can be used to control postwar highway crossing signals (Lionel 154 with alternative blinking) and block signals (Lionel 153 or other types with red and green bulbs, such as the 450 signal bridge), triggered by a insulated rail. This is a nice way to control postwar (or some modern) accessories, rather than using weight activated contactors (145C or 153C), or in the case of the Lionel 154, a 154C track contact. With the 154C track contact, the speed of the train controlled the blinking, and I never liked the way this worked. Below is a description of what I did. See the other pdf for a wiring diagram.

Using tubular track, it is easy to make an insulated rail. Just pry up the tabs holding an outside rail, and then remove it. Take insulators from some junk track, and use them to insulate the removed rail, bending the tabs back down. Solder a wire to the rail, insert insulated track pins in each end, and you have created an insulated control rail at no cost. Several sections of track can be prepared in this way so that a large section (say 30 inches) can be used to control your signal (you only need to solder a wire to one section, and only need insulated pins at the very beginning and end of the control section). The metal wheels and axles of the train engine and cars complete the circuit when they roll over the insulated rail (linking the two outside rails together).

To control a block signal, wire together a bridge rectifier and automotive relay to convert AC to DC and power the relay. One wire of the AC is from 14 volts on your transformer, the other from the insulated rail. The output from the rectifier provides the voltage to the relay to energize it when the train is on the insulated rail. Feed 14 volts AC into the common terminal of the relay, and connect one wire from the block signal bulb connection to the normally closed side (NC) of the relay, and another wire from the block signal to the normally open side (NO) of the relay. When the train reaches the insulated rail, the relay then closes, and current goes to the other bulb on the block signal through the NO connection (when the train is not on the insulated rail the other bulb of the block signal is lit from the NC connection).

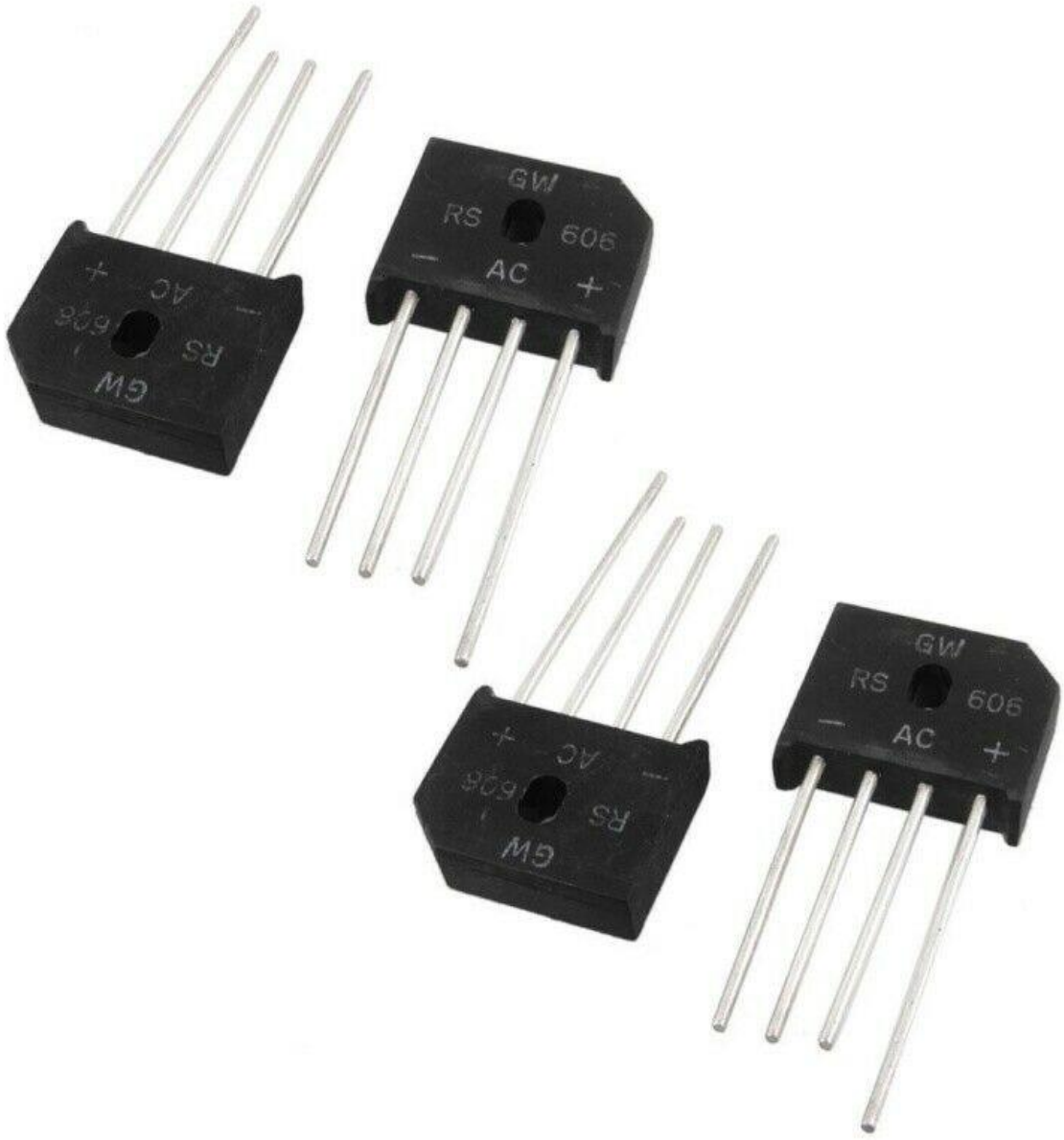
For the highway crossing signal, one wire with 14 volts AC from the transformer and the other from the insulated rail first go to an AC/DC converter. The 12-14 volts DC output then feeds a 12 volt automation delay multifunction self-lock relay cycle timer module. This module has a relay that can control two separate bulbs, with the duration of how long each is on and the time between them lighting easily controlled (through 4 buttons on the front). I used function number 6 and a one second duration for each bulb (see instruction sheet for the timer module for further information).



AC/DC LM317 Linear Regulator Step down rectifier buck power module (on eBay for < $2 with free shipping direct from China)

12V automation delay multifunction self-lock relay cycle timer module PLC (FRM01) (on eBay for < $7 with shipping direct from China)

12V 30/40 Amp 5-Pin SPDT automotive relay with wires and harness socket set (about $12-14 for five on eBay, from US). Note: I found that the wiring diagram for the relays I bought was incorrect.



PCB 6A 600V full wave single phase bridge rectifiers (on eBay for < $2 for four with free shipping direct from China)

Final notes:

1. You can also buy these electronics from Amazon for a little more money is you wish. Just search on the names I gave above.
2. These electronics can also be used to control a wide range of accessories, especially the timer module.
3. The FRM01 timer module likely won't come with any instructions. I found them on the web and have included a copy. There are also many how to YouTube videos on programming them.