CUSTOM SIGNALS
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O-SCALE SIGNAL AND SIGNAL SYSTEMS FOR THE 21ST CENTURY

Grade Crossing Flasher / Detector

GCF-1

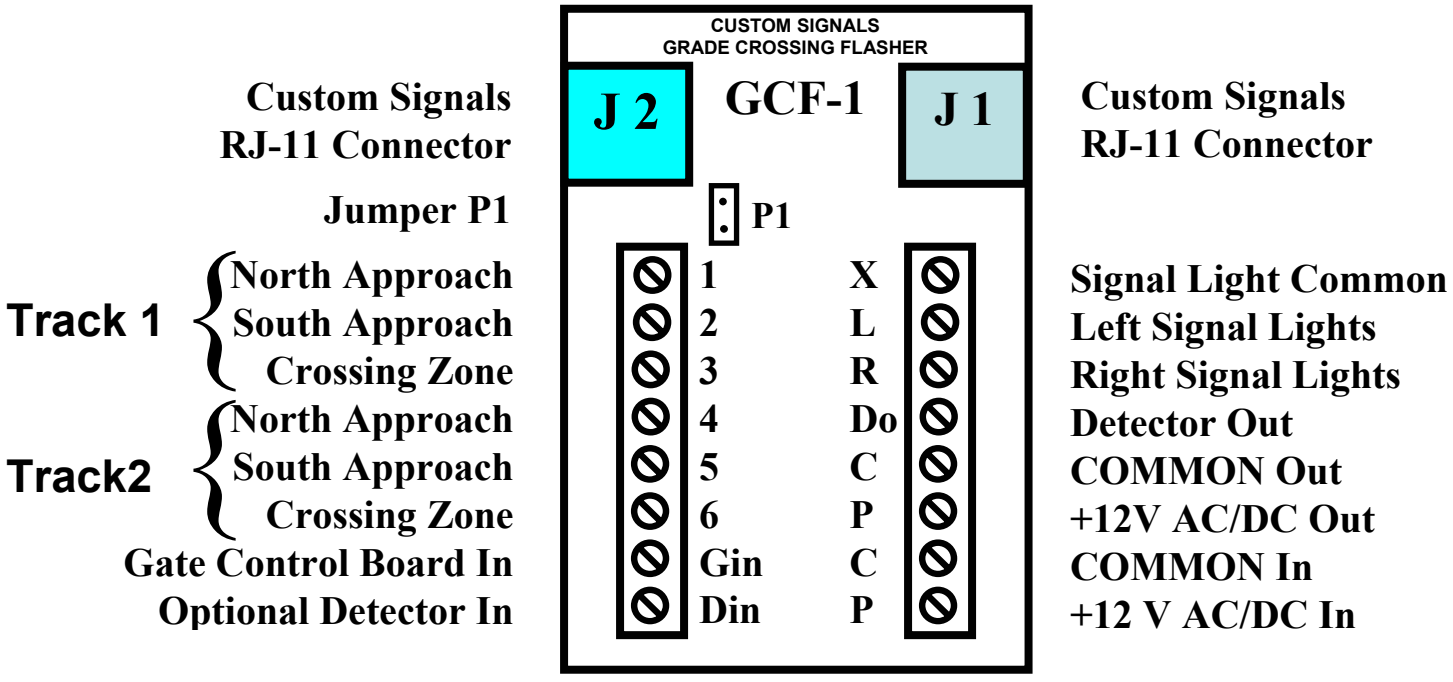
Congratulations on your purchase of the most state of the art grade crossing flasher available today. This flasher will give you these advanced features:

1. A PROTOTYPICAL SLOW FLASH RATE
2. The "RAMP UP" and "RAMP DOWN" effect of the real low voltage signal lights
3. FULL CYCLE SHUT DOWN with no short blink at the end.
4. ADAPTABLE TO ALMOST ANY BRAND of signal on the market today or yesterday.
5. ADAPTABLE to almost any scale.
6. Simple PLUG IN design or easy to use SCREW DOWN TERMINALS.
7. An ADDITIONAL DETECTOR INPUT for multiple track operation
8. A GATE INPUT for use with crossing gates and future boards.
9. BUILT IN BIDIRECTIONAL APPROACH DETECTION for prototypical operation.
10. BUILT IN DETECTION for 3-Rail trains and adaptable to other scales.
11. A DETECTOR OUT for activating other PCBs (printed circuit boards).

The GCF-1 was designed for 3-Rail, O-Gauge trains, but should work with almost any grade crossing signals in most scales. Determine what type of signals you have, the type of track you have and follow the corresponding directions carefully.

WARNING: This is a printed circuit board which is susceptible to static electricity. Touch a grounded surface before handling the board.

CONNECTION LAYOUT



DIRECTIONS:

1. SIGNAL CONNECTION

A. CUSTOM SIGNALS GRADE CROSSING SIGNALS. All of the new C.S. signals come with RJ-11 plugs on the ends of the wires. Simply plug these into the corresponding RJ-11 jacks, J1 and J2, and the signals will be connected. If you have more than two signals at any one grade crossing, you will need an ADAP-4, 4 CONDUCTOR, 2 WAY MODULAR ADAPTER for each additional signal. There is a limit of 10 LEDs per RJ-11 jack. See figure A.

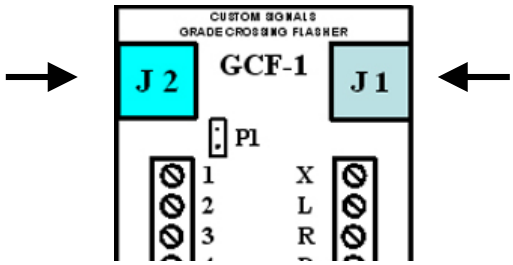


Figure A

B. LED TYPE GRADE CROSSING SIGNALS such as the NJI 3100 series crossing gates, Tomar, Z-Stuff and other anode common signals will need to be connected differently. On the right terminal strip, find the X, R and L terminals. The X is the common connection and the common wire from all the signals must be connected here. If your signals do not have any resistors included, **YOU MUST MAKE THIS CONNECTION THROUGH THE 390 Ohms (Ohm symbol = Ω) CURRENT LIMITING RESISTOR PROVIDED.** The L and R terminals are for the other leads from each signal. Follow the directions that came with your signals for further instructions. See figure B.

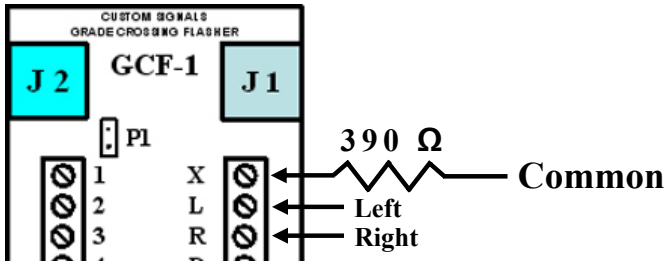


Figure B

C. BULB TYPE GRADE CROSSING SIGNALS. If your signal has 12 volt bulbs, such as the NJI 3090 and the Lionel #153, you will make your connections as in B above WITHOUT the current limiting resistor. Again the X terminal is the common to each bulb and the L and R terminals will be the left and right leads respectively. Follow the directions included with your signals. See figure

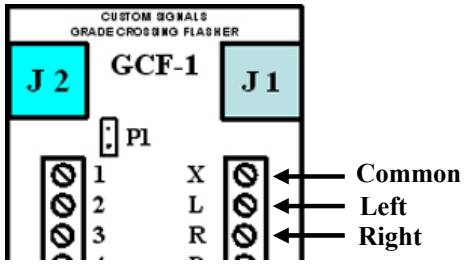


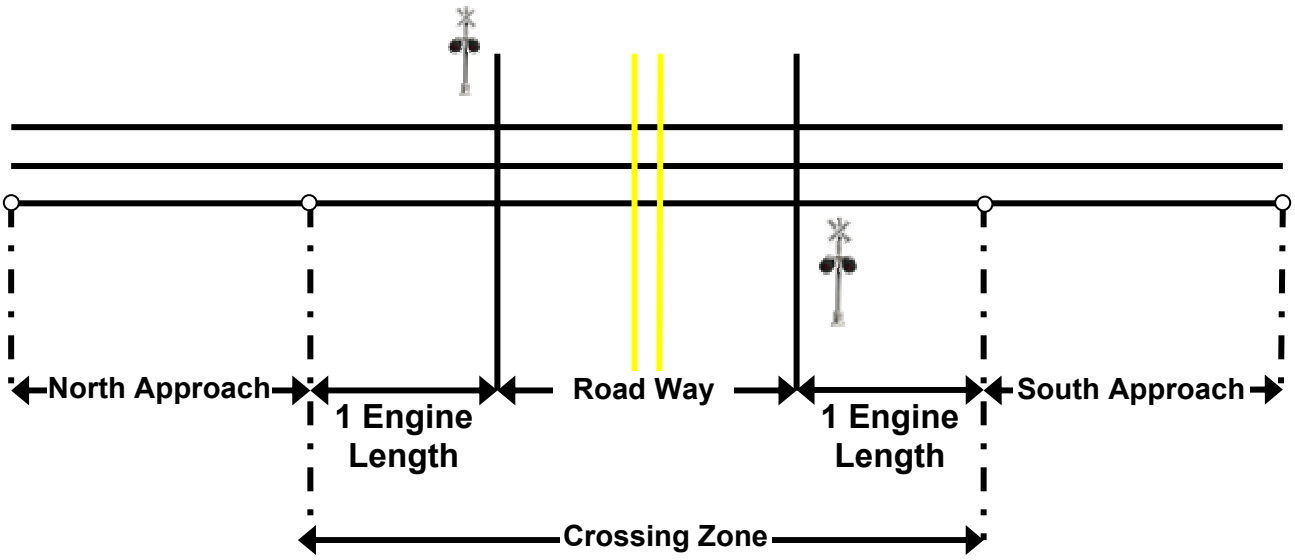
Figure C

2. DETECTION CONNECTION

For a prototypical grade crossing, the signals should go on about 30 seconds before the train reaches the crossing regardless of how fast the train is traveling. This is not usually possible with model railroads, but the GCF-1 will give you a similar effect. Using this unit, you can activate you grade crossing signals or gates with an advanced lead time from either direction and still have them turn off as soon as the train goes by the crossing. Although this unit was designed for 3-Rail insulated track, it can be adapted for other track and scales. Read ALL the installation instructions below.

A. 3-RAIL INSULATED TRACK such as Gargraves, Ross or Atlas. Begin your installation by setting up three zones of insulated rail, the NORTH APPROACH, the CROSSING ZONE and the SOUTH APPROACH. You can do this by cutting one of the outside rails or by removing the connector pins between the tracks. The length of each of your approach zones will depend on the speed of your trains, the size of your layout and the track configuration near the crossing. If you are using gates, the approach zones must be long enough to allow the gates to come down completely. Activate your gates and see how long it takes them to completely lower. Then run your trains at normal speed in each direction and see how far the train has traveled from the crossing in the same amount of time it takes for the gates to completely lower.

This is the minimal distance for the approach zones. Repeat this operation for each direction. If you have more room, try to achieve the 30 second rule even though it may not be possible. The width of the crossing zone in the center should be about one engine length beyond each side of the highway being protected. Cut the rail at the locations chosen. Make sure the common to the transformer is not connected to the insulated rail at any point in any of the three zones.



Make the connections from the insulated sections of track directly to the GCF-1. On the left terminal block, the #1 terminal is for either approach, N or S. The #2 terminal is for the other approach. The # 3 terminal is for the crossing zone. If you have a 2 track grade crossing, the second track should be connected to the #4, #5 and #6 terminals in the same manner. The #4 and #5 are the approach terminals and the #6 is the second crossing terminal. If you have a third track, please use an additional DT-3R detector available from Custom Signals. Do not attempt to connect more than one track to any set of 3 terminals.

B. 2-RAIL SCALE TRACK IN OTHER GAUGES such as O-scale, S, HO, N, G, etc. The advanced detection system will also work with other scales, but will require some additional detection devices. Read the directions above for the basic 3-zone installation. For each zone described above, you will need a current sensing detector, infrared detector or an opto-sensor detector. Because of the additional cost of these detectors, the GCF-1 has an option to eliminate the crossing zone for both tracks and just use the two approach zones. To go from 3-zone detection to 2-zone

detection for each track, the jumper "P1" must be connected. Lift the joining block off the one terminal and slip it over both of the terminals on the P1. The GCF-1 will no longer look for the crossing zones (terminals #3 and #6) and will only function with the 2 approach zones (#1, #2, #4 and #5). This will save the cost of additional detectors for the crossing zones. If you choose, you may activate the GCF-1 with only one detector through the "Din" terminal. This will not give you the advanced approach feature, but will save on the cost of additional detectors.

1. CURRENT SENSING DETECTION. For a current sensing detector, I would recommend the CSD-1. The CSD-1 was built for the 21st century system and will be connected directly to the same terminals as described above. Follow the directions with the CSD-1.

2. OPTO-SENSING DETECTION. If you choose, you may use an opto-sensing detector such as the DT-4 from Circuitron. Since the DT-4 has four independent switches, one unit will be sufficient for detecting both tracks with the jumper P1 on the GCF-1 connected. Follow the instructions with the DT-4 for connecting the opto-sensors. Locate the opto-sensors at the beginning of the approach zones. The DT-4 will allow you to connect up to three opto-sensors in series for each or the four zones. You may want to purchase an additional opto-sensor for the end of each of your approach zones for more prototypical operation.

3. INFRARED DETECTION. If you choose, you may use infrared detectors to activate the GCF-1. You will need one detector for each zone you wish to activate. The detector must bring the input to common ground. Check the directions or call the manufacture first.

3. OTHER TERMINALS

A. The "Din" terminal will activate the GCF-1 when connected through a switch to the "-12V common" terminal. This can be used for simple installations or to activate the GCF-1 for other reasons. For example, you may have a third track which is a siding and doesn't need a long approach. In that case, the Din terminal can be connected directly to an insulated rail section on the siding or any of the alternate activators listed above.

B. The "Gin" terminal is for holding the signal lights on when gates are being used. When the train leaves the crossing, the detection is shut off. It will still take time for the gates to go back up and the lights should still flash until the gates are completely up. The "Gin" will keep the lights flashing for an additional time period to allow the gates to return to their normal position. This will be the input for a future gate and bell PCB.

C. The "Do" or Detector Out terminal can be used to activate another PCB. This will be the output for the future gate and bell PCB.

D. The "P" and "C" terminals are for power. Connect your +12V AC or DC power supply to the "P" terminal on the end. The "C" terminal next to it is for the "COMMON" from the power supply. The second set of "P" and "C" terminals are directly connected to the first through the PCB and can be used as a "power out" feed to the next PCB. If you are using the 3-rail, insulated rail detection, the "C" or common terminal on the signal power supply must be connected to the common (the one connected to the common rail) terminal on the train power supply.

   You may use your current AC or DC transformer to power both the GCF-1 and your trains. Although the board will operate on either AC or DC power, I strongly recommend a filtered DC power supply for your complete signal system. You can convert your AC power source to DC and have it filtered by using one of our DC CONVERTER/FILTER packages ($1.95). If you would like a separate small DC power supply, I would buy a small reliable DC transformer, such as an HO transformer from a train show. 1 to 3 AMPS should be plenty of power for most layouts. Then connect the capacitor across the output terminals as illustrated. Check the polarity (+ and –) carefully when installing.