

# Installation Instructions

for

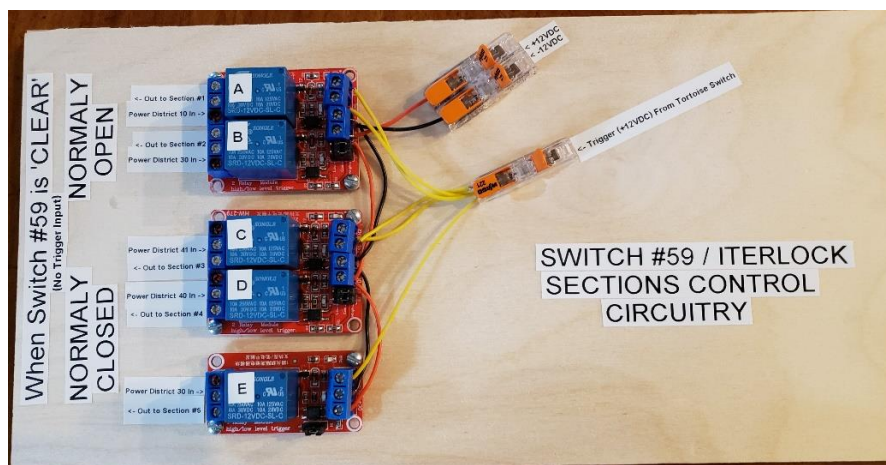
## Controlling the Interlock and Switch 59 Approaches



1. Photo showing Switch #59 (lower right) and the Interlock (upper left).



2. Photo of the Interlock (center), the part of the 'Middle Loop' ('3' & '4') passing through it, and the part of the 'Outer Loop' ('5') approaching switch #59 (to the right, off the picture).



3. Photo of the Circuitry Board for the Switch #59 & Interlock Sections Control

## Step 1 – Installing the Circuitry Board:

1. Install the 'Interlock Control Circuitry' board (photo 3) under the layout in a place that's easy to access, and as close to directly under the 'Interlock' as possible.
2. Connect 12VDC power to the five (5) relays on the Circuitry Board, using the **double orange connectors**:
  - a. Use 28-gauge **RED** wire from the plus (+) side of the power supply terminal to the **upper** orange connector.
  - b. Use 28-gauge **BLACK** wire from the negative (-) side of the power supply terminal to the **lower** orange connector.
3. **With Switch #59 in its 'CLEAR' position:**
  - a. Connect an 28-gauge Red wire from another plus (+) side of the power supply terminal, to the common terminal of the vacant tortoise switch for Switch #59.
  - b. Connect a **Yellow** wire from the **OPEN** terminal of the same tortoise switch to the single orange (trigger input) connector on the 'Interlock Control Circuitry' board.

## Step 2 – Preparing the Track Sections & Wiring Them to the Circuitry Board:

1. **Isolating & Powering Track Section #1:**
  - a. Use the Dremel tool to carefully cut **thin** gaps in the ***Inner rails*** of the three section #1 tracks where they come out of the tunnel under 'Old Glen Carbon'
  - b. Under the layout, disconnect the existing (4) drops from the (now isolated) ***Inner rails*** of section #1, from their connection with the Power District #10 ***Inner rail*** (Brown) BUSS wire.
  - c. Using **18-gauge Brown wire**, connect a new wire from the loose ends of the drop wires (you just disconnected), to the "NO2" ("Out to Section #1") terminal of electronic relay "A" on the Circuitry Board (installed in "Step 1" above).
  - d. Using **18-gauge Brown wire**, connect a new wire from the Power District #10 ***Inner rail*** (Brown) BUSS wire to the "COM2" ("Power District 10 In") terminal of electronic relay "A" on the Circuitry Board.
  - e. Test your work by turning on the layout track power, and using 'Rudolf' (or a voltmeter) to verify that:
    - i. When switch #59 is in its 'CLEAR' state, there is no power to any part of track section #1 (from the cuts you made in step 'a.' above, to the interlock).
    - ii. When switch #59 is in its 'THROWN' state, there is power throughout track section #1.

- iii. If either of these tests fail; go back and fix the problem(s); **then retest**.
- iv. If all is well, **turn off the layout track power** before going to the next step.

## 2. Isolating & Powering Track Section #2:

- a. Use the Dremel tool to carefully cut a **thin** gap in the Inner rail of section #2 at its connection with switch #59.
- b. Under the layout, disconnect the existing drop from the (now isolated) Inner rail of track section #2 from its connection with the Power District #30 Inner rail (Green) BUSS wire.
- c. Using **18-gauge Green** wire, connect a new wire from the loose end of the drop wire (you just disconnected), to the “NO1” (“Out to Section #2”) terminal of electronic relay “B” on the Circuitry Board.
- d. Using **18-gauge Green** wire, connect a new wire from the Power District #30 Inner rail (Green) BUSS wire to the “COM1” (“Power District 30 In”) terminal of electronic relay “B” on the Circuitry Board.
- e. Test your work by turning on the layout track power, and using ‘Rudolf’ (or a voltmeter) to verify that:
  - i. With switch #59 ‘CLEAR’, there **is no power** to any part of track section #2 (from switch #59 to the interlock).
  - ii. With switch #59 ‘THROWN’, there **is power** throughout track section #2.
  - iii. If either of these tests fail; go back and fix the problem(s); **then retest**.
  - iv. If all is well, **turn off the layout track power** before going to the next step.

## 3. Isolating & Powering Track Section #3:

- a. Go back (toward ‘Old Glen Carbon’) about four (4) feet from the interlock in track section #3 and use the Dremel tool to carefully cut a **thin** gap in the Inner rail of the track.
- b. Under the layout, disconnect the existing drop from the (now isolated) Inner rail of track section #3, from its connection with the Power District #41 Inner rail (White) BUSS wire.
- c. Using **18-gauge White** wire, connect a new wire from the loose end of the drop wire (you just disconnected), to the “NC2” (“Out to Section #3”) terminal of electronic relay “C” on the Circuitry Board.
- d. Using **18-gauge White** wire, connect a new wire from the Power District #41 Inner rail (White) BUSS wire to the “COM2” (“Power District 41 In”) terminal of electronic relay “C” on the Circuitry Board.
- e. Test your work by turning on the layout track power, and using ‘Rudolf’ (or a voltmeter) to verify that:

- i. With switch #59 'THROWN', there is no power to any part of track section #3 (from the cut you made in 'a.' above to the to the point where power districts #40 & #41 meet).
- ii. With switch #59 'CLEAR', there is power throughout track section #3.
- iii. If either of these tests fail; go back and fix the problem(s); **then retest.**
- iv. If all is well, **turn off the layout track power** before going to the next step.

#### 4. Isolating & Powering Track Section #4:

- a. Go back about four (4) feet toward 'Peter's Station', from the interlock, in track section #4, and use the Dremel tool to carefully cut a **thin** gap in the Inner rail of the track.
- b. Under the layout, disconnect the existing two (2) drops from the (now isolated) Inner rail of track section #4, from their connection with the Power District #40 Inner rail (White) BUSS wire.
- c. Using **18-gauge White** wire, connect a new wire from the loose ends of the drop wires (you just disconnected), to the "NC1" ("Out to Section #4") terminal of electronic relay "D" on the Circuitry Board.
- d. Using **18-gauge White** wire, connect a new wire from the Power District #40 Inner rail (White) BUSS wire to the "COM1" ("Power District 40 In") terminal of electronic relay "D" on the Circuitry Board.
- e. Test your work by turning on the layout track power, and using 'Rudolf' (or a voltmeter) to verify that:
  - i. With switch #59 'THROWN', there is no power to any part of track section #4 (from the cut you made in 'a.' above to the to the point where power districts #40 & #41 meet).
  - ii. With switch #59 'CLEAR', there is power throughout track section #4.
  - iii. If either of these tests fail; go back and fix the problem(s); **then retest.**
  - iv. If all is well, **turn off the layout track power** before going to the next step.

#### 5. Isolating & Powering Track Section #5:

##### a. Move the location where Power Districts #30 & #31 Meet:

- i. Go back about four (4) feet (toward 'Old Glen Carbon') from switch #59, in track section #5, and **cut Both Rails** of the track with the Dremel tool.
- ii. Remove the sticker between the rails that indicates the old location where power districts 30 & 31 met, and either glue it between the rails at the new location or; print a new sticker and paste it there.

- iii. Under the layout, disconnect the three **Outer Rail** drops (between Switch #59 and the new point where Power Districts #30 & #31 meet) from the power district #31 (Green) Buss wire; and connect them to the power district #30 (Green) Buss wire.
- b. Wire the inner rail of section #5 for control by electronic relay 'E':**
- i. At the point where Switch #59 joins the track in Section #5, use the Dremel tool to carefully cut a **thin** gap in just the **Inner Rail**.
  - ii. Under the layout:
    1. Disconnect the two (2) **Inner Rail** drops (nearest 'Old Glen Carbon') from their power district #31 (Green) Buss wire.
    2. Then disconnect the **Inner Rail** drop from its power district #30 (Green) Buss wire.
    3. Next, use an **18-gauge Green wire** to connect the loose ends of all three (3) drops (that you just disconnected) to the "NC" ("Out to Section #5") terminal of electronic relay "E" on the Circuitry Board.
    4. Finally, connect a new **18-gauge Green wire** from the Power District #30 **Inner rail** (Green) BUSS wire to the "COM" ("Power District 30 In") terminal of electronic relay "E" on the Circuitry Board.
- c. Test your work by using 'Rudolf' (or a voltmeter) to verify that:**
- i. With switch #59 "THROWN", there is no power to any part of track section #5 (from the new location where power districts 30 & 31 meet, to switch #59).
  - ii. With Switch #59 "CLEAR", there is power throughout track section #5.

### **Step 3 - Final Testing**

1. If all of your tests in sub-steps '1.' through '5.' above indicate all is well, then:
  - a. With switch #59 in its '**CLEAR**' state:
    - i. Run a train back and forth on the Middle Loop, through the Interlock. It should run straight through, without stopping.
    - ii. Run a train back and forth on the Outer Loop, through track section 5. It should run straight through, without stopping.
    - iii. Run a train through the tunnel under 'Old Glen Carbon', toward the interlock. It should stop (or start to coast to a stop) at the point where you cut the track section #1 inner rail. **It should not coast past a point about 2 inches before the interlock!**
  - b. With switch #59 in its '**THROWN**' state:

- i. Run a train through the tunnel under 'Old Glen Carbon' toward switch #59. It should run straight through the interlock, and on through switch #59, without stopping, or causing a short.
- ii. Back the train up through switch #59 and the interlock, into the tunnel under 'Old Glen Carbon'. Again, it should run straight through without stopping, or causing a short.
- iii. Run a train along the 'Middle Loop' (from both directions) through the interlock. It should stop (or start to coast to a stop) at the points where you cut the rail in rail section #3 & #4. **It should not coast past a point about 2 inches before the interlock!**
- iv. Run a train along the 'Outer Loop' toward the 'open' end of switch #59. It should stop (or start to coast to a stop) at the point where you cut the rail in rail section #5. **It should not coast past a point about 1 inch before the edge of switch #59!**

**c. If all goes well, Congratulations! You're Done!**

- d. If not, go back and figure out what you did wrong:
  - i. **AND Correct It!**
  - ii. **THEN run the tests again (until everything works as it should!)**