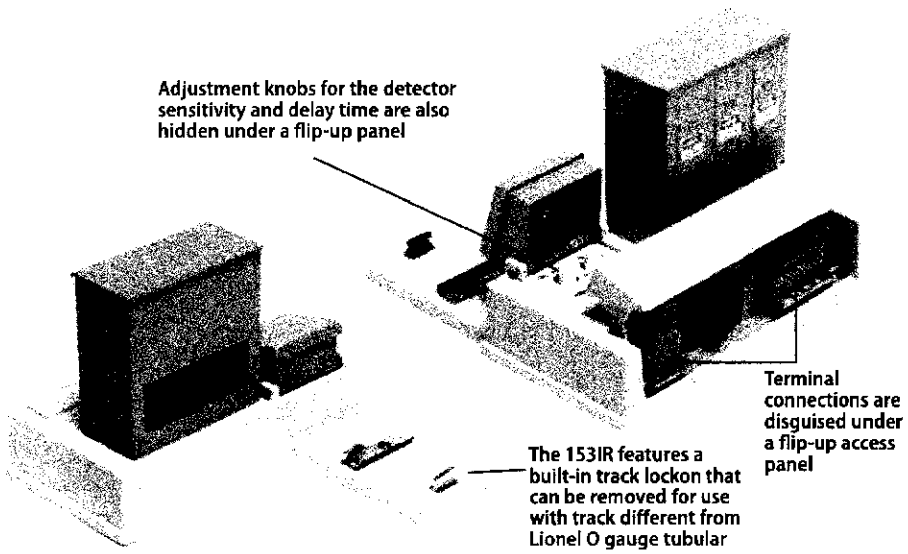
Two trains, one main line, zero collisions

A PAIR OF LIONEL 153IR CONTROLLERS PREVENTS CRASHES ON A SIMPLE DOGBONE TRACK PLAN

by Don Miller • Illustration by Kellie Jaeger



The self-contained electronics in a Lionel 153IR controller makes it easy to introduce hands-free operation on a basic dogbone-style layout.

Since the days when Lionel first used a bimetallic strip to stop and start O gauge trains, operators have dreamt about automatic train control. Trouble is, the wiring often associated with automated operation can be frightening.

With this in mind, I developed a simple track plan and circuit to automatically control two trains using a pair of Lionel no. 14111 "153IR" controllers. The 153IR controller was intended for use with low-current (1-amp maximum) accessories. To avoid topping this limit, I suggest using locomotives with a single, low-draw can-style motor. If you do use this circuit with other locomotives, you'll need to first install a relay between the 153IR and the track power.

The track plan

Looking at the plan, you'll see that I've chosen a dogbone design – that's a common section of track connected by reversing loops at each ends. Two remote-control track switches are the keys to creating these alternating routes, so you'll want to be sure they're in good working condition and operate using an auxiliary (not track) power supply.

For the circuit to work reliably, the two trains must travel in the same direction every time. I use the switch's non-derailing feature to accomplish this operation. By wiring the switch controller terminals together, both track switches will throw simultaneously.

Study the train direction arrows on the plan, and you'll see that Switch 1 (SW1) needs to be wired to Switch 2 (SW2) so that when SW1 aligns to the diverting (curved) path, SW2 also aligns to a curved path. Later, when SW2 aligns to the through (straight) path, SW1 should align to a straight path too.

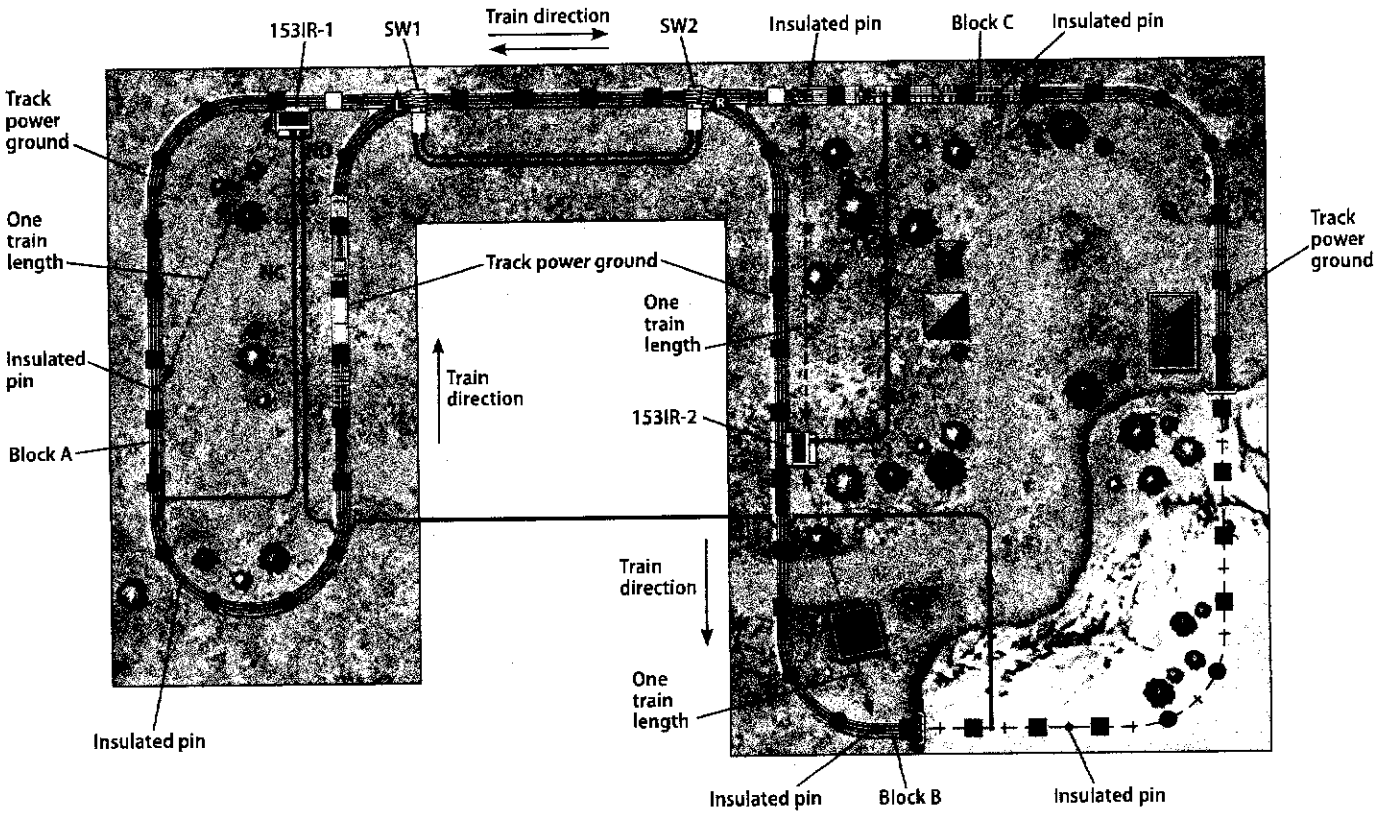
On the track plan you'll see three segments of track isolated by insulated track pins placed in the center rail at both ends. These track segments, Blocks A, B, and C, are the locations where the two trains start and stop under the control of a 153IR device. These blocks must be long enough to accommodate the entire train, but you'll also need some extra length to prevent trains from gliding through. A block made using as few as three pieces of 10-inch-long track will work, but only if trains run slowly.

Next, I considered the placement of these blocks and 153IR devices. The plan shows that the distance between 153IR-1 and Block A must be at least one train length. Similarly, the distance between 153IR-2 and Block B must be at least one train length. It's essential for a train to clear the 153IR before coming to a stop. If a train stops directly in front of a 153IR device, the controller may not operate properly. Also, there must be at least one train length between switch SW2 and 153IR-2 and one train length between Blocks B and C.

Wiring the circuit

After installing the track and positioning the 153IR devices, I wired the layout for automatic operation. I used black 18-gauge stranded wire to connect all the outside rails to the ground post (normally labeled "U") of my AC transformer. Except within the established blocks, I used red 18-gauge stranded wire to connect all but the center rails within the previously established blocks to the variable post (normally labeled "A") of my transformer. I added track power and ground connections to the rails of my Lionel tubular track about every six pieces.

Next, I connected the 153IR devices. After reviewing the provided directions, I first connected the built-in lockon to the track and confirmed that it fit tightly over the rails. If the connection to the rails is loose, remove the unit and gently bend the metal clip at the end of the lockon to conform to the rail.



LIONEL O GAUGE TRACK COMPONENTS

Quantity	Description/Number
38 ■	10-inch straight
2 □	8.5-inch custom-cut straight
14 ●	0-31 curve, 45-degree
1 ▲	0-31 modern left-hand switch (14062)
1 ▲	0-31 modern right-hand switch (14063)
2	153IR controller (14111)

Once the 153IR was installed, I set the power selection switch to "Track Power." In this configuration, the device will have power for its own operation and the track blocks.

To complete the connections for 153IR-1, I wired the accessory terminal labeled NC (normally closed) to the center rail of Block A. I also wired the 153IR-1 terminal labeled NO (normally open) to the center rail of Block B. Finally, I connected a wire from the NO terminal of 153IR-2 to the center rail of Block C.

Prior to testing the circuit, I adjusted the setting on both 153IR devices. The adjustment knobs for device "sensitivity" and "time" delay are under the lid of a silver battery box. Ultimately, I wanted to set the sensitivity so the 153IR activates only when a train passes. Also, I wanted the timer set so the device stays on long enough for the locomotive to exit a block, but not so long that the 153IR remains on when the next locomotive enters the block. To start, I set both knobs to a position in the center.

Automate the action

Following a visual inspection of the electrical and track connections, I turned on the power supply and applied about 12 volts to the layout. After locking the directional controls of a small locomotive into forward, I placed it on the rails in Block B. I positioned the locomotive so it would run in the direction indicated by the arrows on the track plan. If your locomotive runs immediately after placing it in Block B, turn down the sensitivity adjustment on 153IR-1.

Next, I carefully placed a car on the track near 153IR-1. I rolled the car in front of 153IR-1; the locomotive moved forward, advanced to Block C, and then stopped. During this test, I kept my hand on the throttle to prevent the locomotive from running too fast or too slowly. If the locomotive doesn't move, adjust the sensitivity of 153IR-1 and try again. If the locomotive doesn't stop in Block C, reduce the sensitivity adjustment of 153IR2 and try again.

With the locomotive now stopped in Block C, I rolled a car in front of 153IR-2. The locomotive started forward, advanced to SW2 to throw both switches, traveled in front of 153IR-1, and stopped in Block A. Again, if the locomotive doesn't start in Block C, adjust the sensitivity of 153IR-2.

The length of time the locomotive remains in Block A varies, based on the timer setting of 153IR-1. You can adjust this stop time to be as long or as short as you like, but it must be long enough for the train stopped in Block B to have time to move out of Block B. After the stop time expired, the locomotive in Block A moved forward, threw both SW1 and SW2, proceeded to Block B, and stopped. Following this successful test, I added two complete trains to the layout.

The key to successful two-train operation was building two trains that ran at about the same speed under the same track voltage. Train speed can be adjusted by adding or subtracting cars.

To ensure that the trains started properly when I reapplied power to the track, I found that they must stop in specific locations on the layout. When turning off the track power, I parked one train in Block C and left the other train in any location except in Block B or the track segment between Blocks B and C.

Finally, I set the scheme into action and allowed the 153IR devices to entertain and amaze my visitors. GTT