
RAIL ROAD CROSSING
STOP ON RED SIGNAL
Telephone Wire
UL

Chapter Four

Adding Accessories to Your Layout

In the previous chapter we positioned the accessories on the train board to ensure that everything fit. Now it is time to start wiring them. I started with the MTH ready-built structures. When you add accessories that do not draw their power from the track, such as lighted structures or streetlights, you need an alternate power source. Several manufacturers make small power supplies that provide power for various accessories. Since I plan to expand the size of my layout in the future, I purchased an MTH Z-4000 transformer. The Z-4000 packs a lot of power, it can run two trains, it is designed to program the sound effects available in locomotives, and it has terminal distribution clips for 10 and 14 volts.

Lighted structures

To get started, mark the locations of the ready-made structures by positioning them and drawing their base outlines onto the train board. I drilled holes in the center of the outline for the wiring so I could pass the wires from the buildings down through the track board and underneath the layout. The undersides of the structures have electrical clips, so all you have to do is strip about ⅛ inch off the ends of the wires and clip them into place. When running the wires beneath the train board, be sure to leave about 6 inches of slack in the wire so that you can lift the structure off the board to get underneath it.

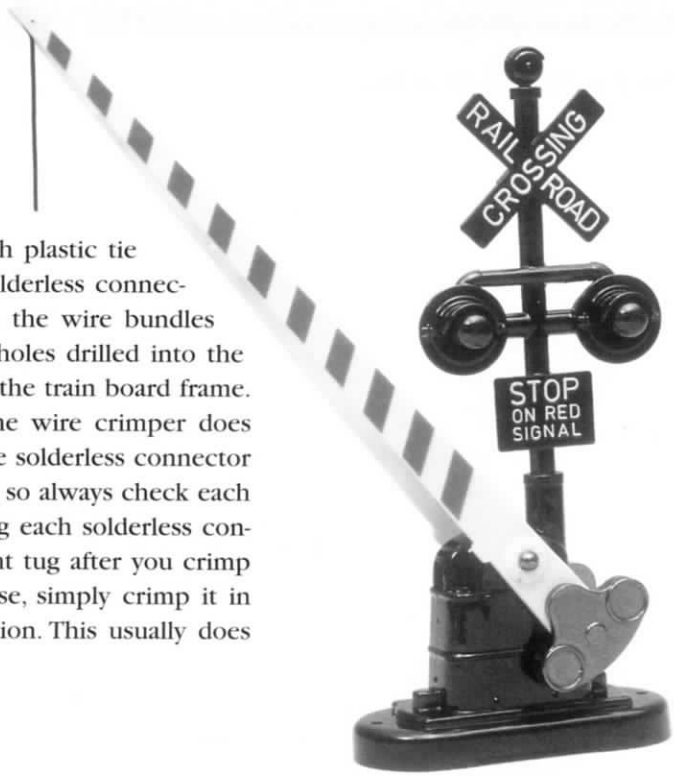
Since I planned to have all the lights for the ready-made structures controlled by one switch, I installed two terminal screw strips under the train board to distribute power to all the structures. To simplify the distribution of power for each strip, I purchased metal clips that attach to the screws and distribute the power to all the terminals that are connected together by the metal clip. I like to use red and black wire for these types of hookups: red is the hot lead and black is the cool lead, or ground.

Measure each length of wire for each structure separately, bundle them with plastic tie strips, add solderless connectors, and run the wire bundles through the holes drilled into the underside of the train board frame. Sometimes the wire crimper does not crimp the solderless connector tight enough, so always check each lead by giving each solderless connector a slight tug after you crimp it. If it is loose, simply crimp it in another location. This usually does the trick.

Once all the structures are wired to the terminal strips, make another two-wire bundle to run from the terminal strip to the switch located on the control board. For the switch I used an Atlas connector block. Each connector block has three switches, and the blocks are designed so you can link them together. This allows you to have as many switches as you want with electrical power distributed automatically throughout all the switches. The power from the transformer is attached to the leads on the left side of the connector block, and there are two screw terminal posts for each switch. I attached the wires from the terminal strips of the structures to the first two screw terminals of the Atlas connector, turned on the transformer, and flipped the switch to check the lights.

Lamp posts

As I mentioned earlier, I chose four different types of lighted lamp posts. I chose single-bulb, cream-colored, die-cast gooseneck lamps for the long track siding; pea green, double-bulb teardrop die-cast street lights for the train station parking lot; and dark green, single-bulb die-cast streetlights for the train station platform. I also added black single-bulb lamps for the streetlights. Some of the die-cast lamps have screw terminal posts with holes drilled into them so that you can either push the wire through the hole or wrap the wire around the terminal post.



I wired up all the lamps the same as the structure lights. I attached two terminal strips to the underside of the train board, added the electrical distribution clips, and then wired the lamps to the terminal strip. To save time and stranded wire, I used standard telephone wire, which you can also buy at Radio Shack. This wire has four leads—red, black, green, and yellow. They are solid copper wire and are encased in flexible plastic insulation. I stripped about 6 inches of insulation from each side of a length of wire, and since I needed only red and black, I cut off the other two. I then proceeded to wire the die-cast lamps just like the structure lights. The die-cast street lamps were all wired together and hooked up to the second switch on the Atlas connector.

The black street lamps with the thin wires attached required an extra step. Since the wires that were attached to the lamps were very thin, they needed a special connector to attach them to the telephone wires I was using. I found the solution at Radio Shack, which sells small splice connectors that are quick and easy to use. To use these splice connectors, cut the ends off the wire, slip the wire ends into the holes on the flat end of the splice connector, and crimp the disk on the face of the connector with a pair of pliers. The disk has thin metal strips on the inside that will cut through the insulation of the wire and create an electrical contact between them. Once the

wires were spliced, I ran them back to another set of terminal strips and then connected the terminal strips to the third switch on the Atlas connector.

Uncoupler

Since I wanted to have an uncoupler at the beginning of the long siding, I removed the length of track attached to the switch and replaced it with an uncoupler. Like the switches, uncouplers come completely wired to their controllers. The uncoupler was too far away to attach the wire directly, so I had to make a four-wire bundle and add a terminal strip to the underside of the train board. (I had to do the same thing with the switch wiring.) Since the wires were already attached to the uncoupler, and three of them were black and one was brown, I attached small lengths of masking tape to the wires and labeled them and the terminal screws they were attached to: 1 through 4.

Then I removed the labeled wires from the screw posts on the uncoupler, attached the uncoupler control to the control panel, and ran the wires from the uncoupler control under the train board to the terminal strip. I used the telephone wire to connect the terminal strip to the uncoupler. As I attached each of the four wires I wrote down which color from the telephone wire was attached to which numbered wire from the controller. I then attached the colored wires to their corresponding locations on the uncoupler. I could have simply attached the controller closer to the uncoupler, but I wanted all the controls to be located at the control panel.

Crossing gates and block signal

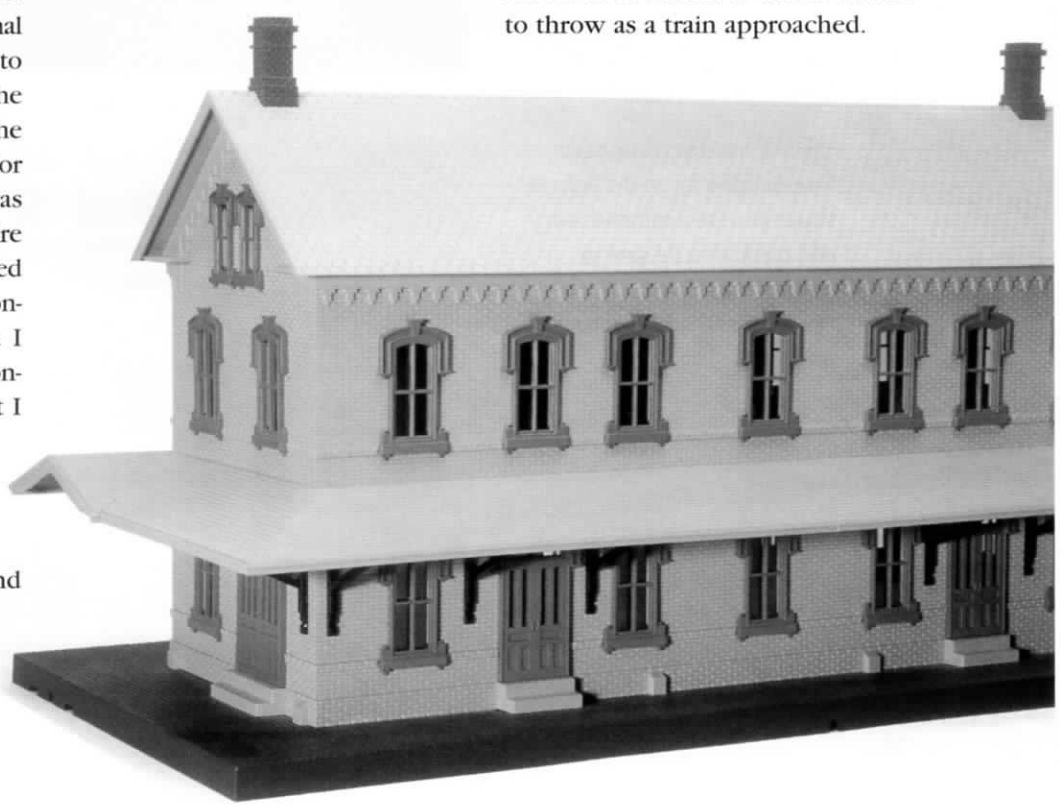
To wire the crossing gates and the block signal, I inserted the three infrared sensors into the track locations where I had removed the pop-out tabs from the track. One was located at the end of the long siding, and two were located at both ends of the reversing loop so that the crossing gates could be activated from a train entering the reversing loop from either direction. Just like the lock-on, the infrared sensors simply plug into the track. Next I drilled holes in the train board for the wires going to the sensors and holes for the two crossing gates and the block signal.

I added a terminal strip to the underside of the train board and made four bundles of wires for the crossing gate hookups. One bundle went from the terminal strip to the crossing gate, and one bundle went to each infrared sensor. I used black and red wires to ensure that I would not cross the polarity of the electrical current coming from the sensors. To wire the crossing gate to the correct terminal screws on the infrared sensors, I simply followed the sensor and crossing gate instructions. The sensors are designed so that you can hook them up together, and each sensor can power several accessories.

Once the crossing gates were hooked up, I tested the sensors and adjusted them. This is important, as the sensors have two adjustments. The first is the range adjustment—which I recommend you set to low so that only the oncoming train will activate the sensor. The range is from approximately 1½ to 14 inches. The other sensor is the delay adjustment, which simply sets the time delay for the accessory.

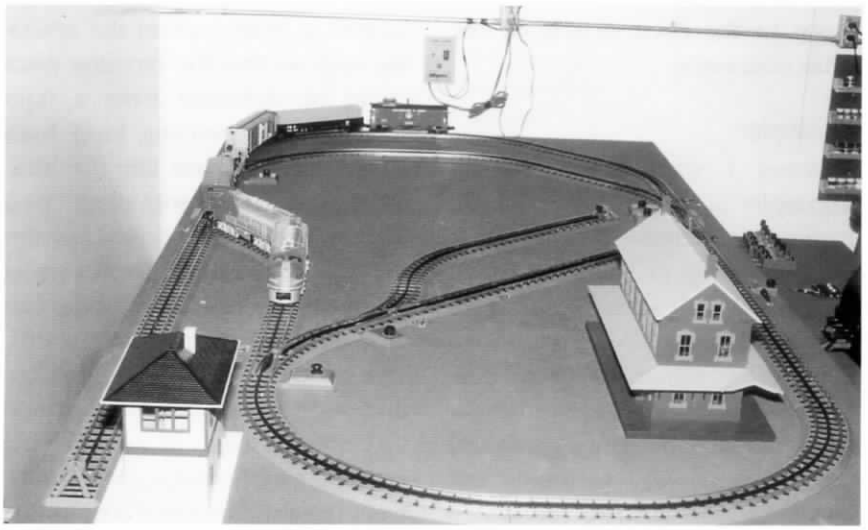
Next I wired the block signal and again set the adjustments on the infrared sensor. The block signal will stay red as long as there are trains occupying the track siding. When the sensor detects that the trains are no longer there, the block signal will temporarily turn to yellow and then to green. The light on the block signal will stay green until the siding is occupied again, at which time it turns red.

The last thing I did was type up some labels for the Atlas connector switches and some reminders for my boys to help them run the trains. I also drew a diagram of the layout, numbered the switches on the diagram, and placed corresponding numbers on the individual switch controllers. This made it easy for all of us to know which switch to throw as a train approached.



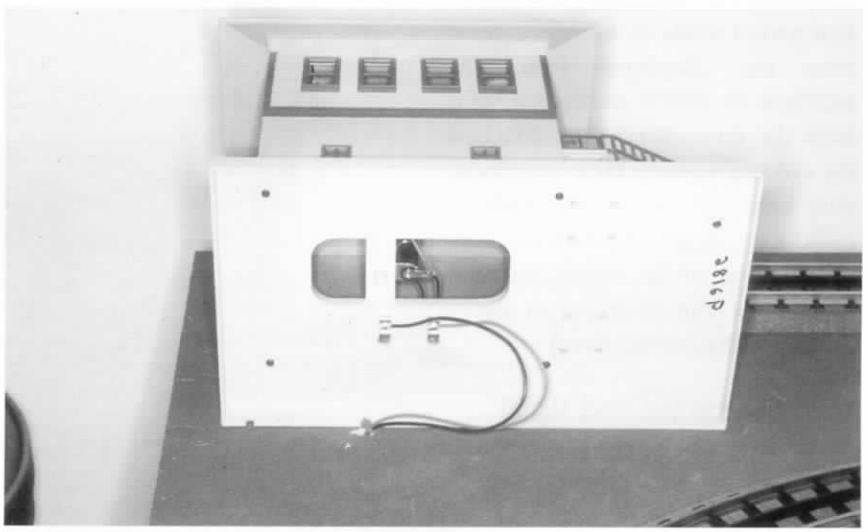
Structure Lighting

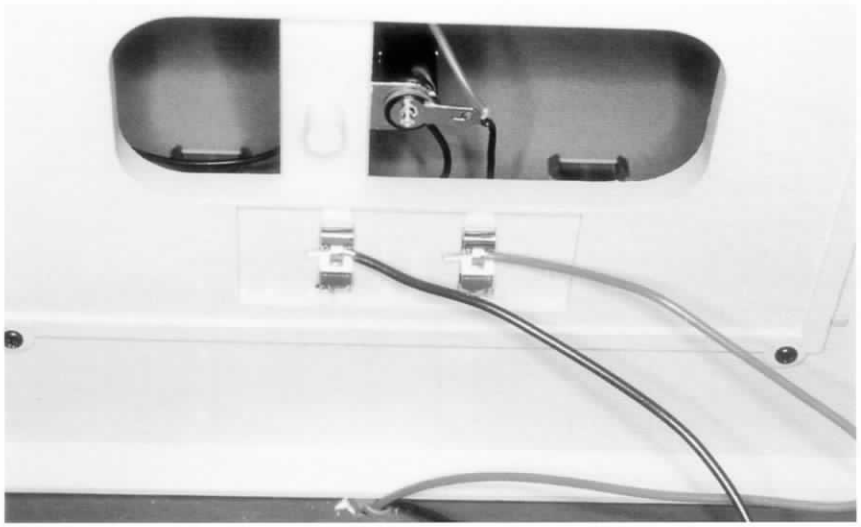
To wire the MTH ready-made structures, position them on the train board and run a pencil around their bases to mark their locations.



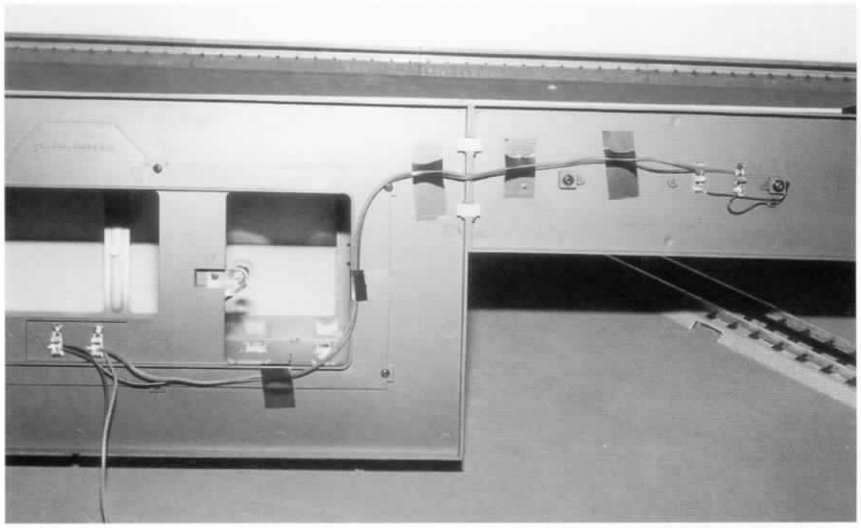
Next, drill holes into the plywood through which you will run the wire for the lighting.

You will need to make two wire bundles for all the lighted structures; I recommend red and black wire. Be sure to leave plenty of slack so you can lift the structure or turn it on its side.

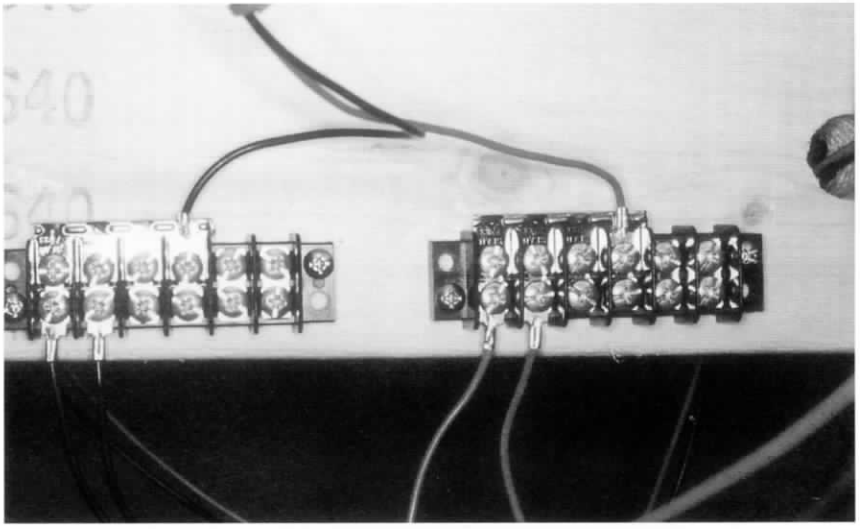




All of the ready-built structures have simple wire clips to hook into. Strip about ⅛ inch off the ends of the wire, twist it (if it's stranded), push the clip back, and insert the wire.

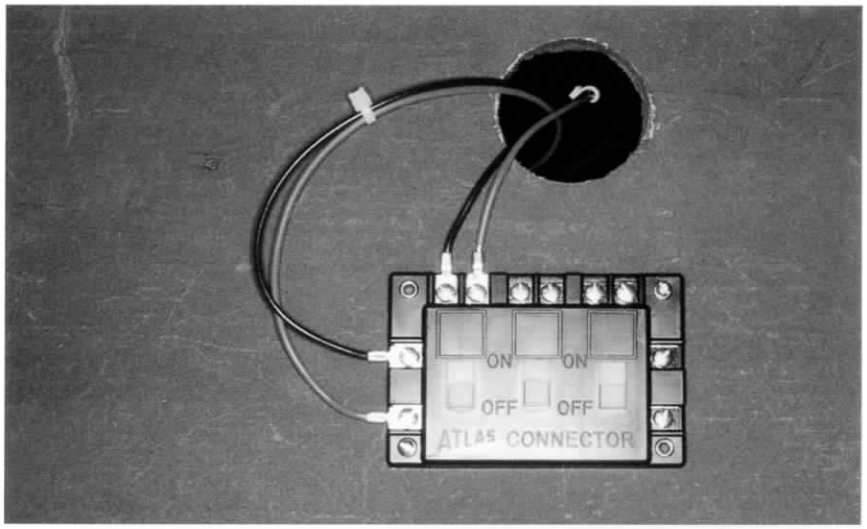


For large structures like MTH's beautiful railroad station, use strips of electrical tape to secure the wiring to the base of the structure.



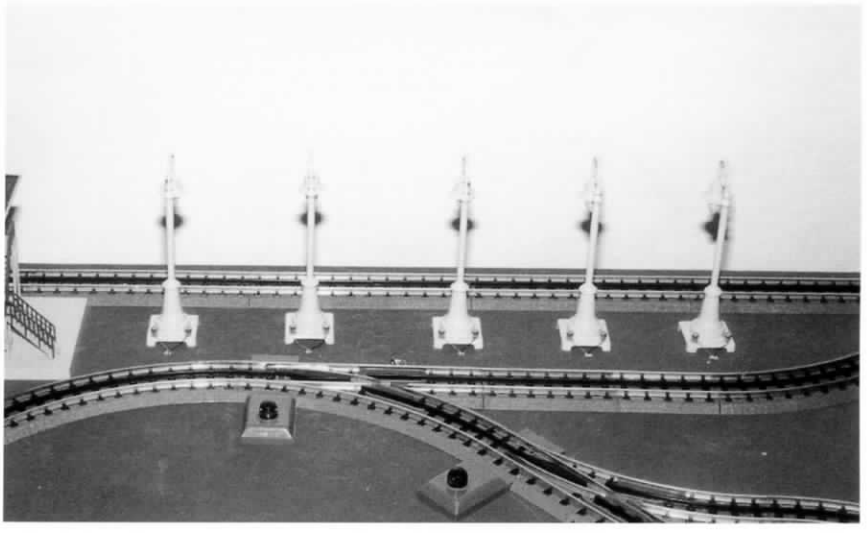
Position terminal strips in a location under the train board so you can minimize the lengths of wire bundles from the terminal strips to the structures. The upper two wires go back to the switch on the control panel. The terminal jumper distributes power to all the screws it is attached to, and the lower wires come from the individual structures.

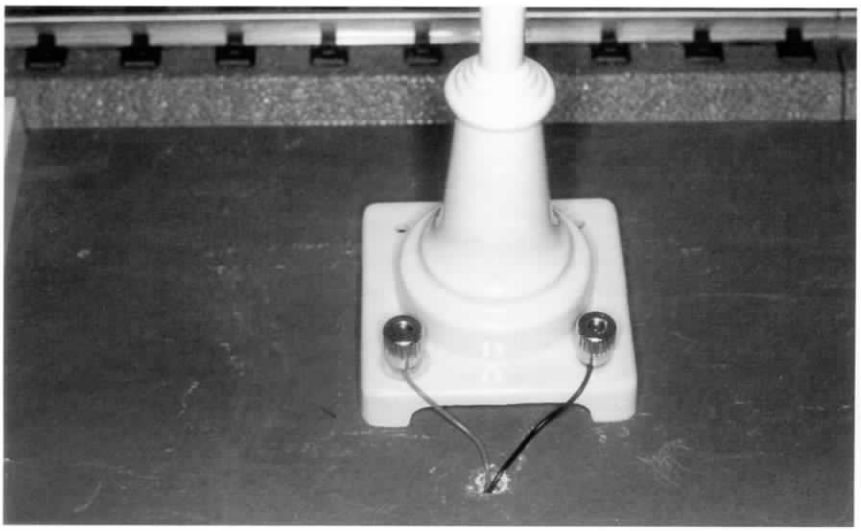
An Atlas connector is nothing more than a set of three switches. The wires on the left side go to the power source, while each switch has two screw posts. The power coming in from the left side is distributed to all the switches so all we need to do is run the two wires from the top of the terminal strips under the train board to these two screw posts.



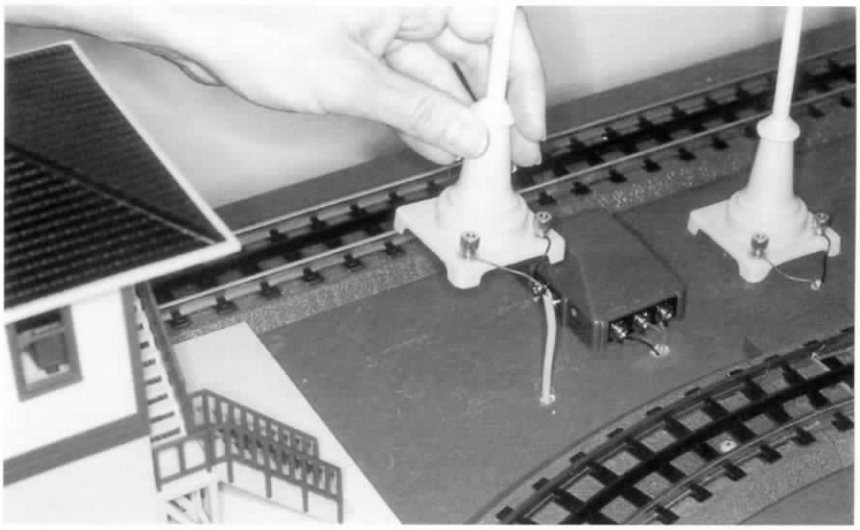
All the MTH ready-made structures are now wired and ready to be tested. Since an external power source is needed for the lights, I replaced the MTH Z-750 transformer with the MTH Z-4000 transformer, which can supply both 10 and 14 volts to run accessories.

Next, I positioned the yard lights along the track siding and then drilled individual holes for the wiring.

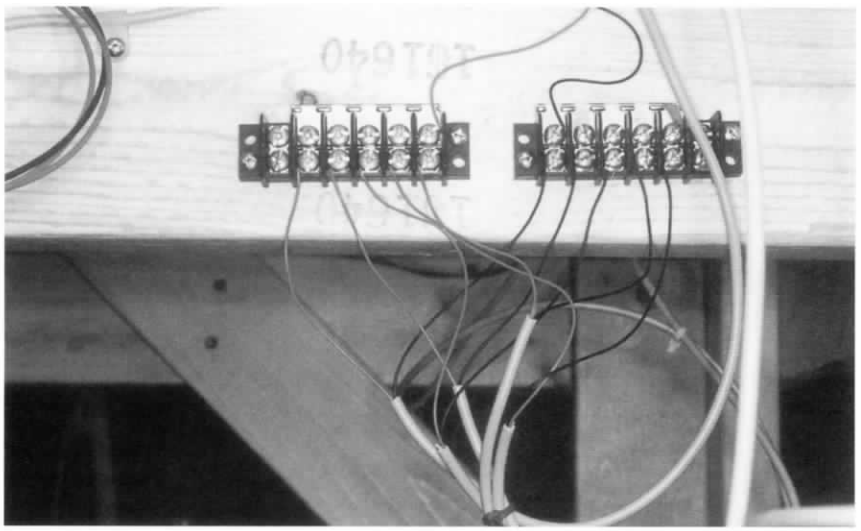




These die-cast metal lights are easy to hook up. I used telephone wire for these applications because it's inexpensive, and the wire is solid which means that you can shape it. Radio Shack sells lengths of this telephone wire, which has four colored wires: red, black, yellow, and green. In most applications I simply use two wires—red (hot) and black (ground).



Be sure to leave some slack in the wiring so you can lift the light fixture up off the train board.

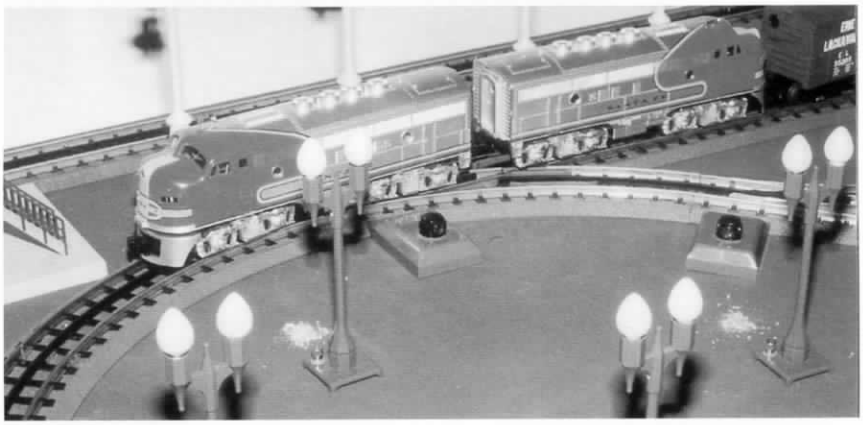


The die-cast yard lights have all been connected to the terminal strips, and power from the Atlas connector has also been attached. I used the second switch on the Atlas connector for the die-cast lights. Notice how the tie strips help keep wire bundles together as well as minimize the messy appearance of large quantities of wires. One last thing to do is flip the switch and test the lights.

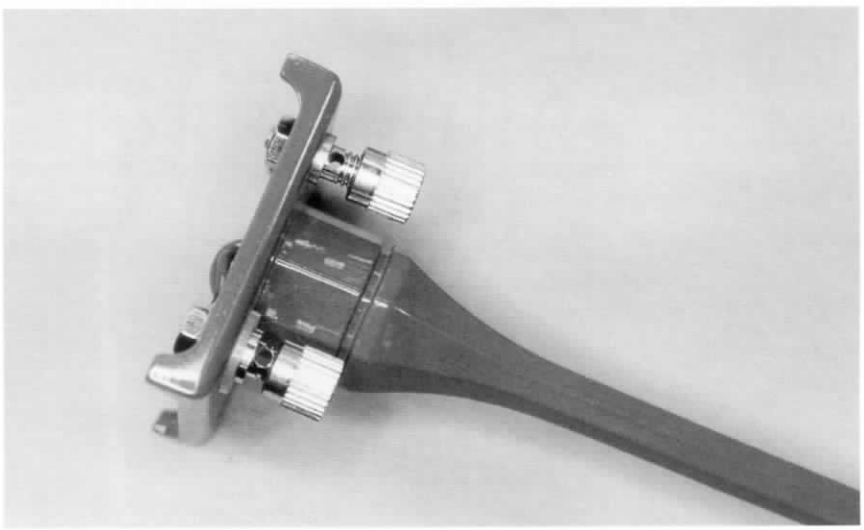
The ready-made MTH structures and the first set of die-cast lamps have been installed and everything is wired. It's time to take a break, turn off the room lights, flip on the house and streetlights, and run some trains.

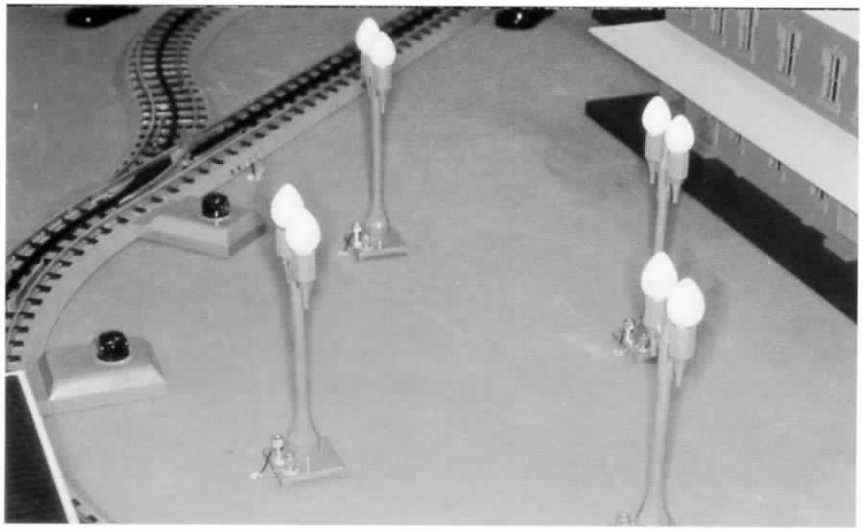
Parking Lot Lights

I positioned the parking lot lights for the train station and drilled holes in the plywood for the wiring. When drilling into the open areas of the plywood, be sure to position the accessories so as to avoid the underside framing. Otherwise you will be drilling through the plywood and a 2 x 4!

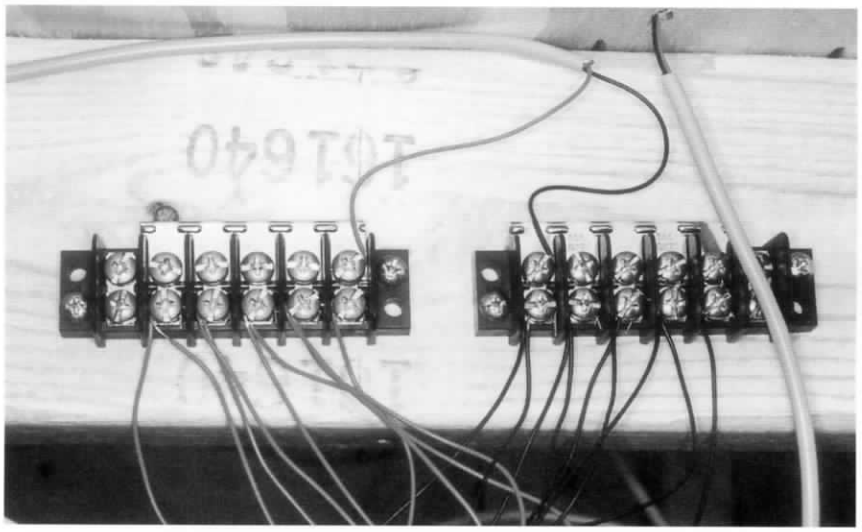


The screw posts on some of the die-cast lights have holes in them, which makes attaching the wires very easy. Also note that one terminal post is insulated from the rest of the accessory.



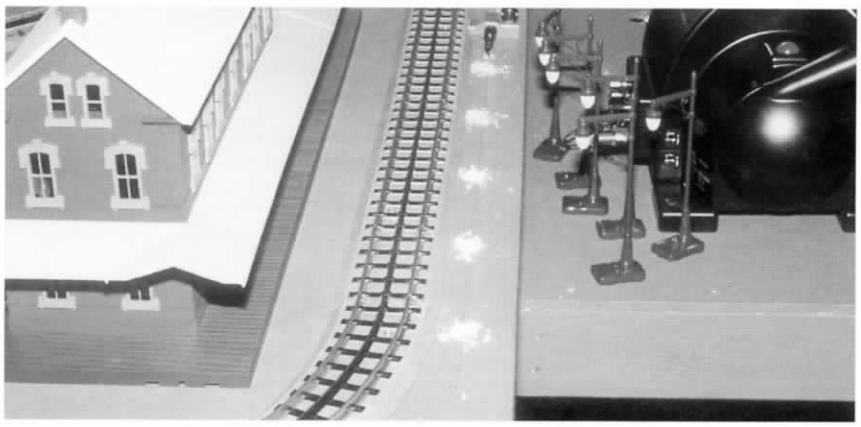


Now that the parking lot lamp posts are wired, it's time to attach the wires to the terminal strips.



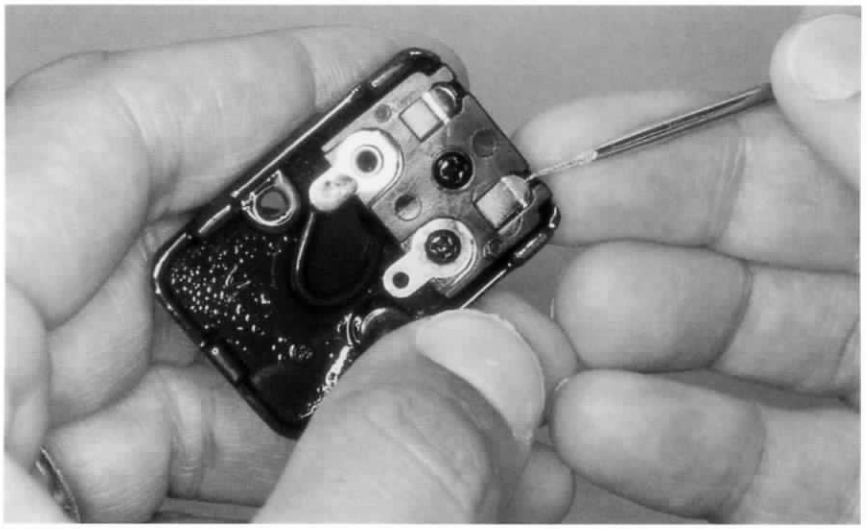
Since I planned to have all the die-cast streetlights controlled by one of the Atlas connector switches, I added these wires to the yard light terminal strips.

Platform Lights

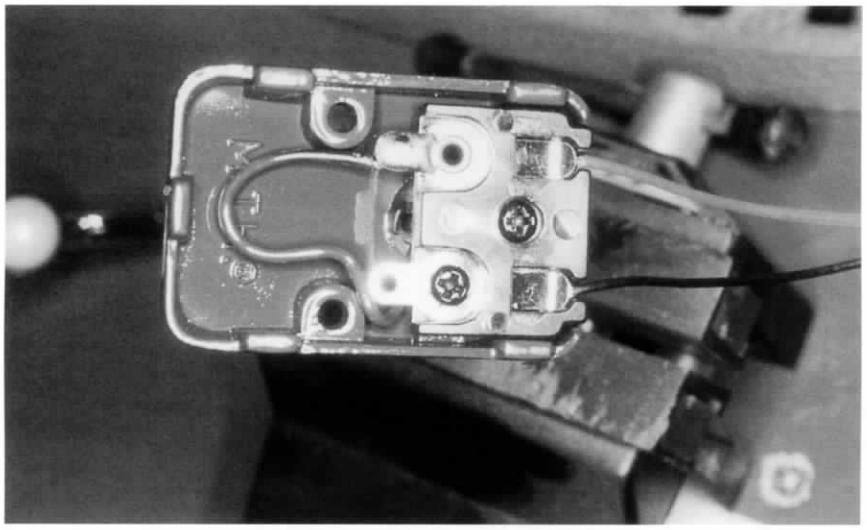


These station platform lights were the next to be installed. Some of the holes had to be drilled through the 2 x 4 framing because of the locations of the lights.

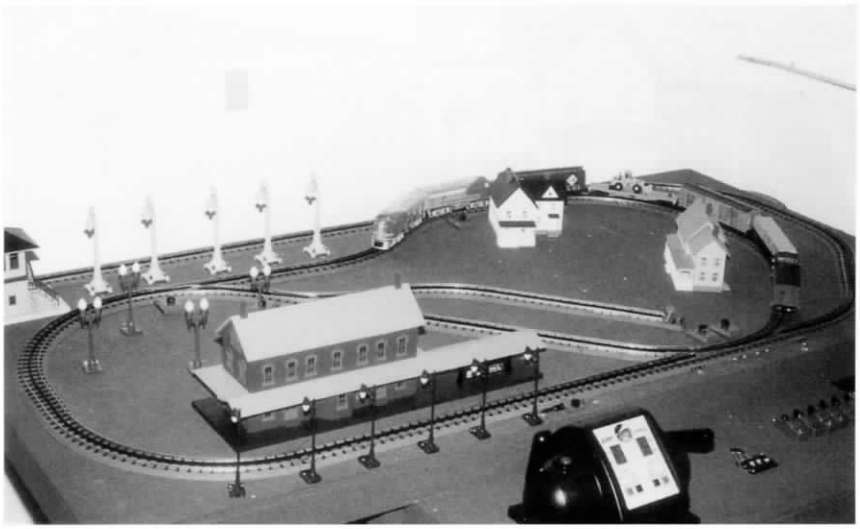
These die-cast station lights have wire clips in place of the screw posts. The clips can be stiff, so use a small screwdriver to loosen the wire clip.



Here the wires have been attached. Note that the insulation on the wire has been removed only far enough to attach to the clip.

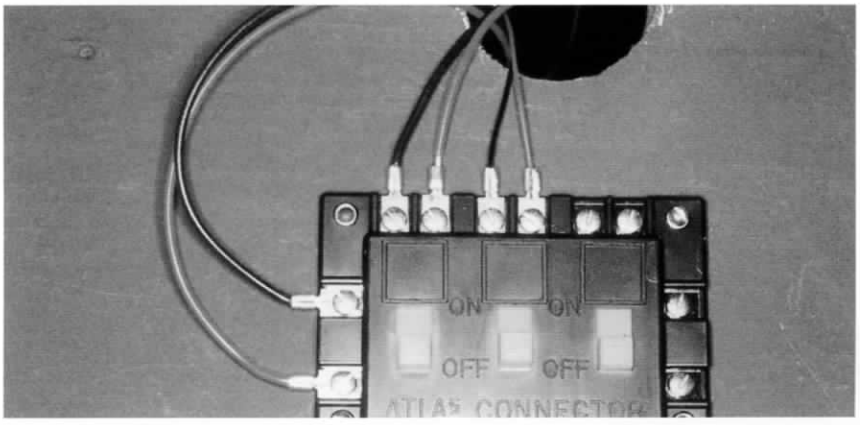


The station lights have now been installed, and it's time to test the entire setup.

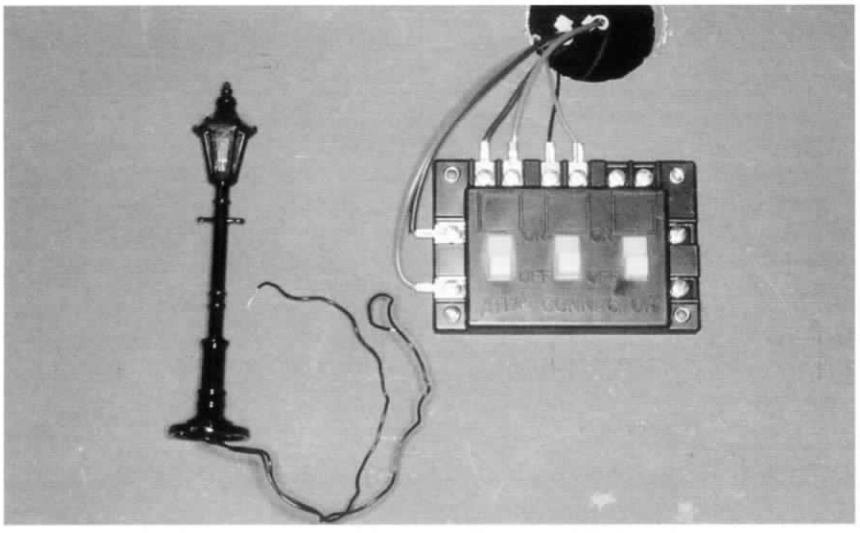


With the addition of so many lights the layout is starting to take shape and look busy. The boys really like running the trains in the dark with all the layout lights on.

Streetlights



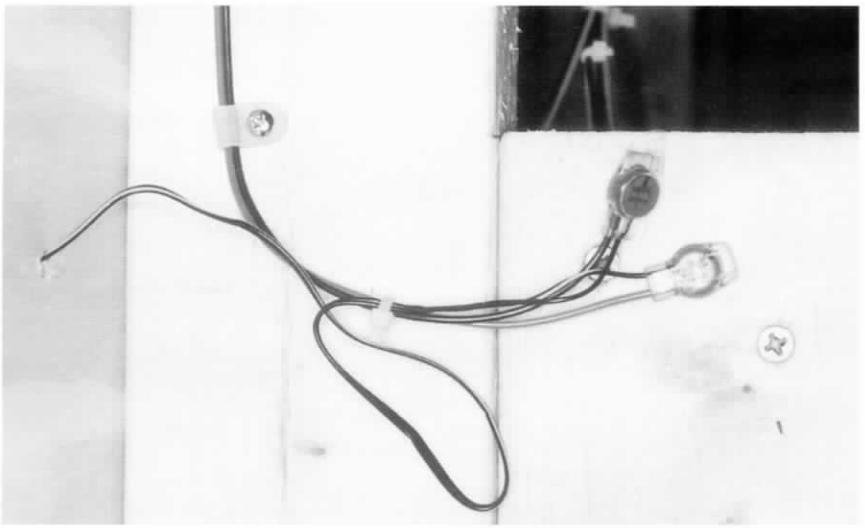
Because one more switch was left on the Atlas connector, I decided to add some small streetlights to the area where the houses are.



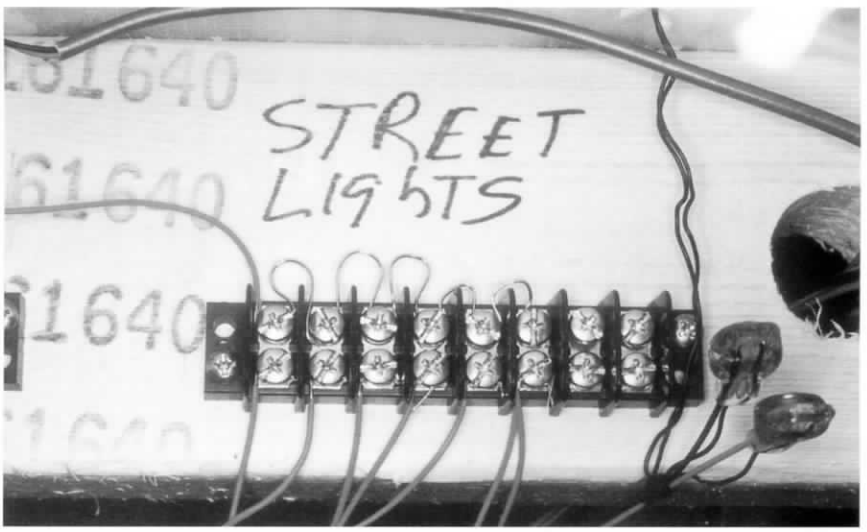
The wires attached to these small lamps are also stripped. I tested the lights by touching the wires to the screw posts on the left side of the Atlas connector.

I positioned the streetlights along the edges of where I planned to have the street and then drilled the holes for the wires.

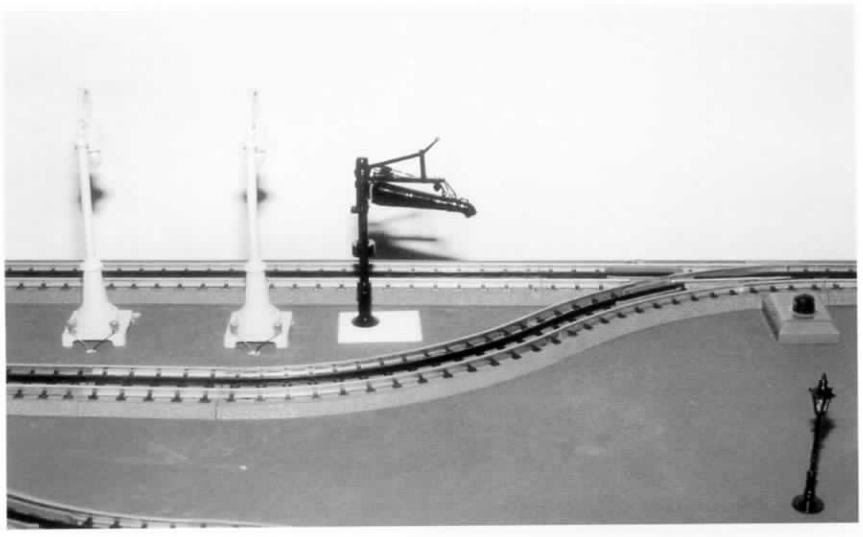
Since the streetlight wires are very thin, I spliced them with special connectors available from Radio Shack. Just insert the wires (no need to strip them) into the connector and then use a pair of pliers to close the disk that splices through the wire and electrically connects them together.



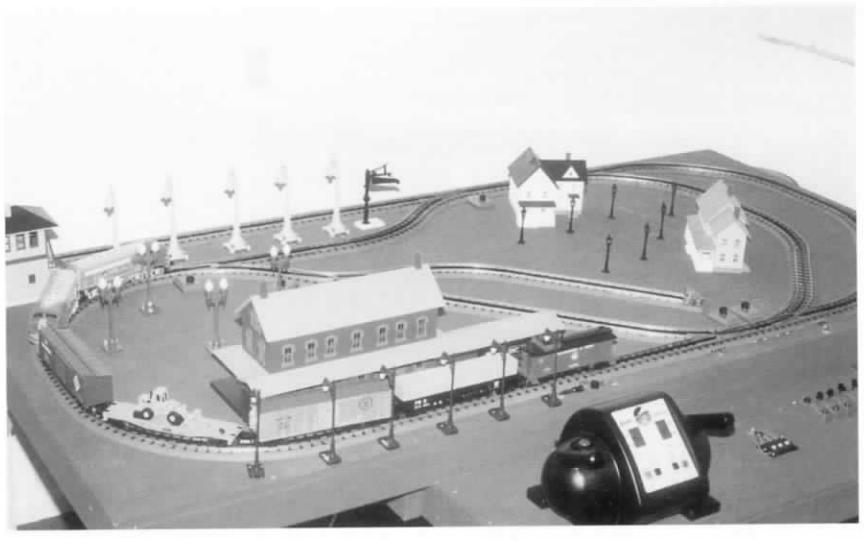
I ran out of terminal jumpers! No problem. I stripped a length of solid wire and then jumpered it to all the terminal strip screws. I connected the streetlights to the third Atlas connector switch, and then labeled all terminal strips to make it easier to troubleshoot any electrical problems.



The streetlights look like they don't belong, but once the street is painted they will look right at home.



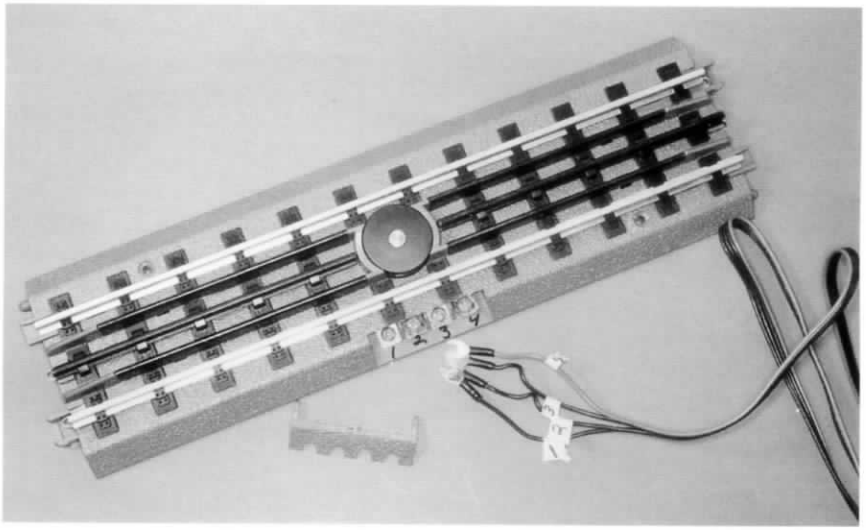
Since I planned to also run a steam engine on this layout, I added a die-cast metal water column. No wiring necessary—hooray!



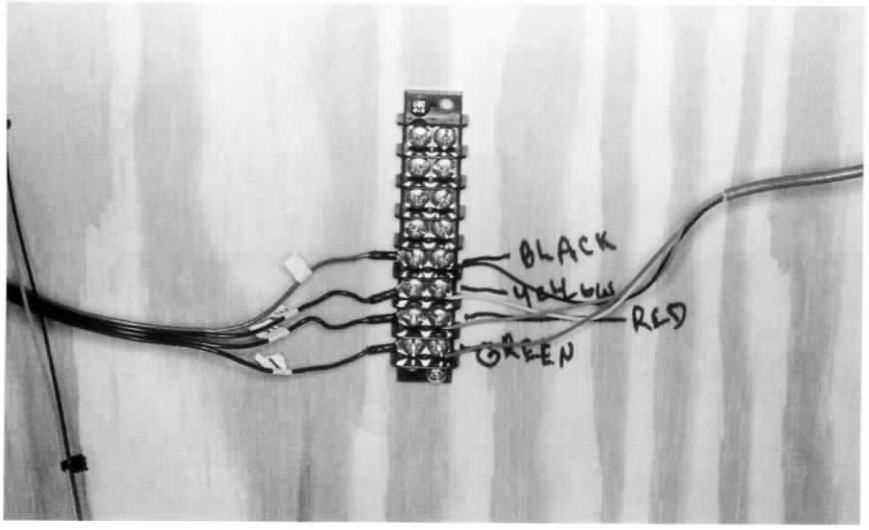
With the addition of accessories, the layout is starting to look busy and interesting.

Uncoupling Section

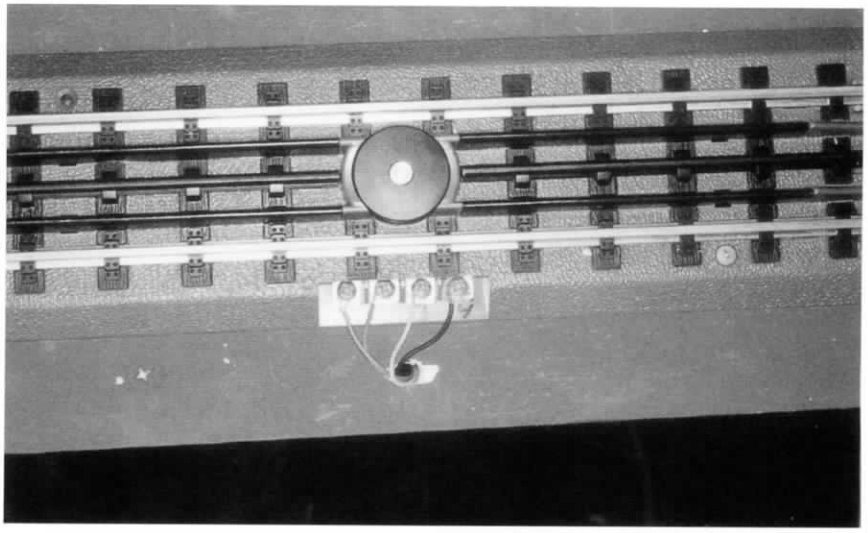
MTH supplies everything you need to hook up an uncoupler. If you want the controller to be located on the control panel, you'll have to make an additional bundle of wires just like you did for some of the switches. The first step is to add small strips of masking tape to the wires, label them, and then remove them from the uncoupler's screw posts.



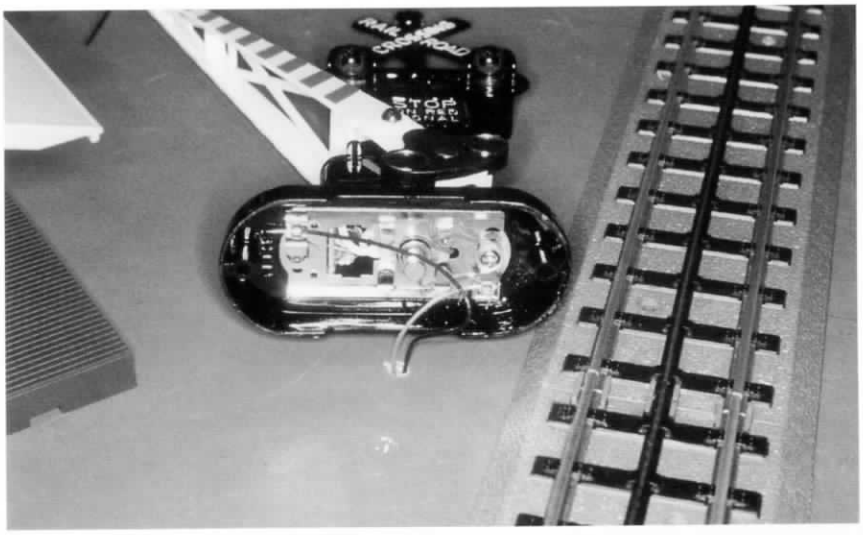
I positioned a terminal strip under the train board and then attached the labeled wires. Then I attached the telephone wire to the terminal strip and labeled each color (which I then wrote down) so that each label (1 through 4) had a corresponding colored wire.



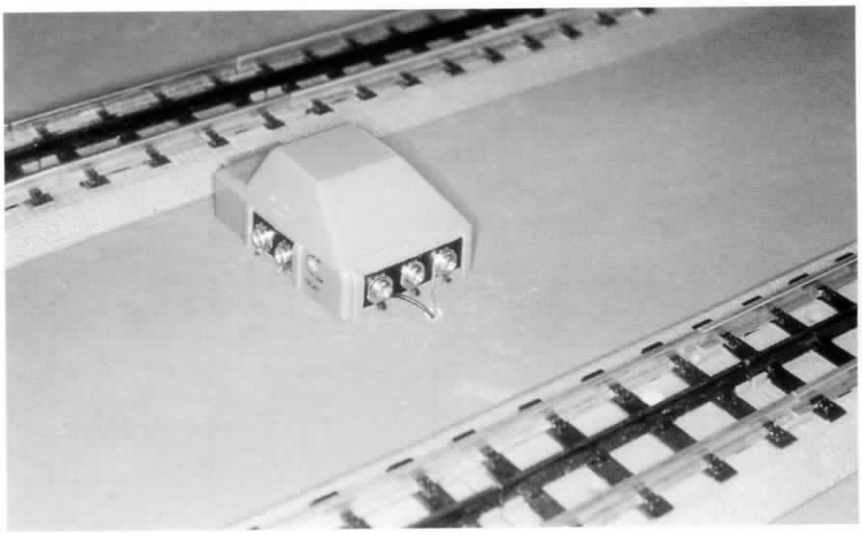
Next, I attached the colored wires to the corresponding screw post on the uncoupler.



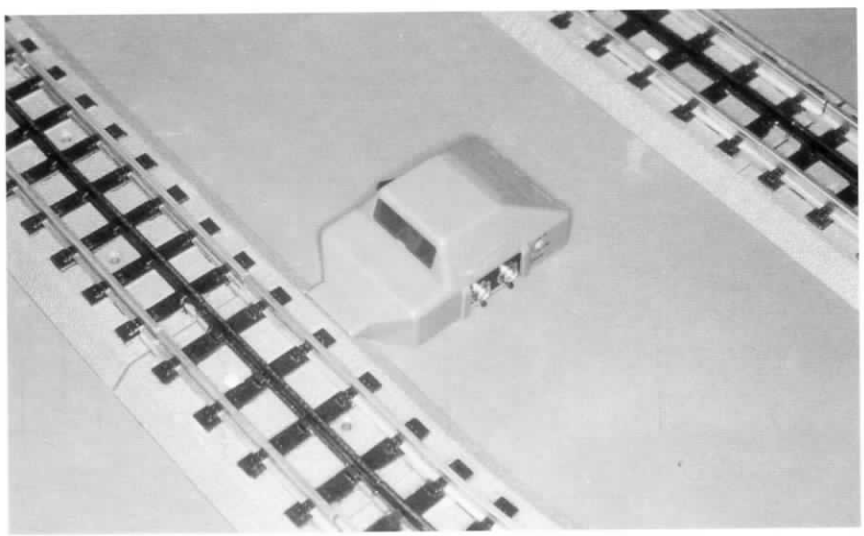
Crossing Gates and Sensors



The crossing gate signals had quick-attachment wire clips that make wiring them quick and easy.



Next, I plugged in the infrared sensors at the far ends of the track so that the crossing gate signals would be activated by a train approaching from either direction. The crossing gate signal is a simple two-wire hookup to the common and "NO" screw terminals of the sensor.

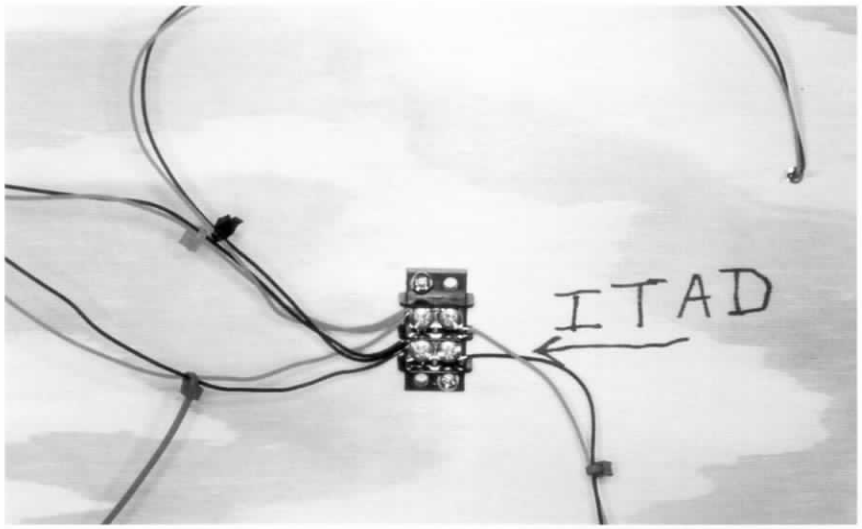


The two infrared beams emit from the red plate of the sensor, so it's important to protect the surface of this plate.

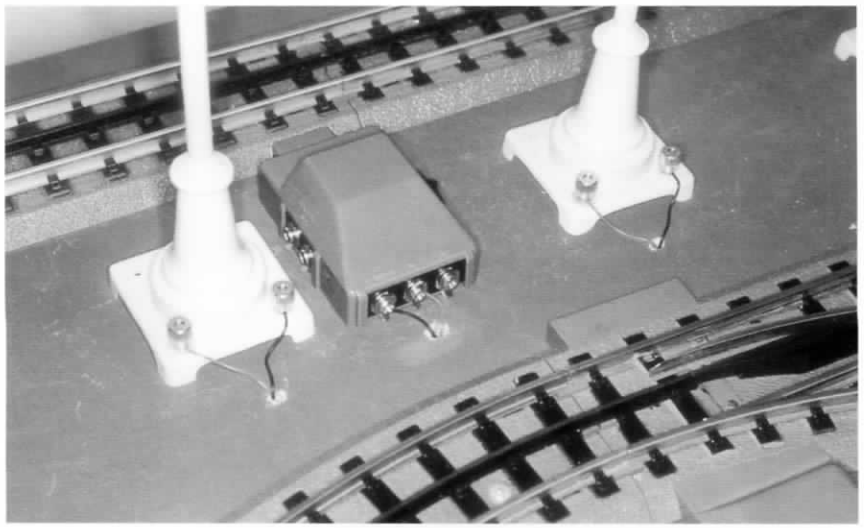
You can adjust the range of the sensor from as close as 1½ inches to as far away as about 14 inches.

You can also adjust the delay time on the sensor. The delay time determines how long the accessory will remain activated.

Both crossing gate signals have now been positioned and the wires that are dangling under the train board need to be hooked up.



Since the infrared sensors draw their power from the track, there is no need to add an additional power source. You can even hook these sensors together so that you can activate an accessory from separate locations. Here two wires come from each sensor and from each crossing gate signal. To keep from mixing up the polarity of the sensors and the accessories, I used red and black wire.

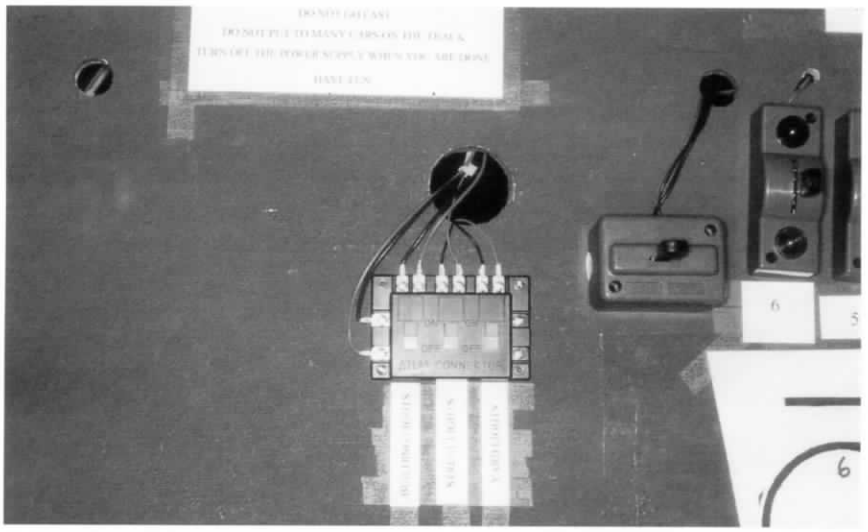


This infrared sensor has a three-wire hookup to the block signal for the siding. Accessory hookups will use the common screw post and either or both of the "NC" and "NO" screw posts.

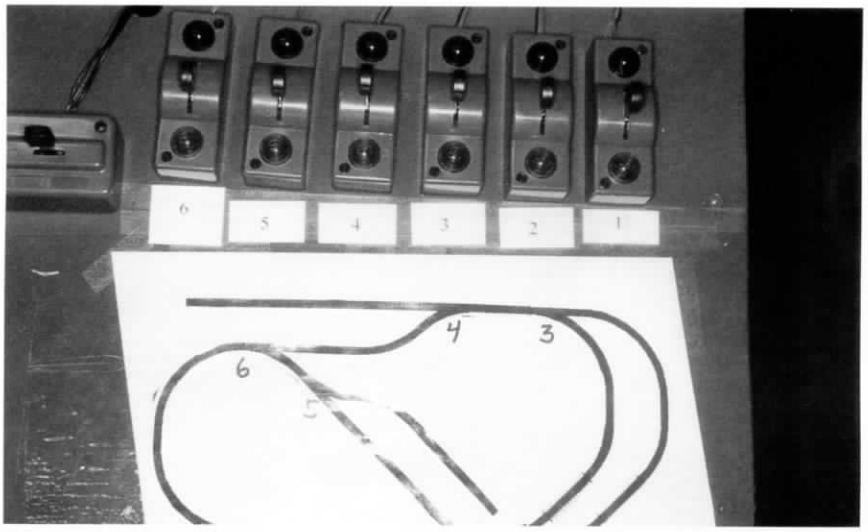
Now that all the accessories are installed and wired, it's time to run some trains to test the block signal and the crossing gate.

Control Panel and Testing

To help my boys runs the trains, I added labels to the Atlas connector switches. I also added some simple reminders on train operation.

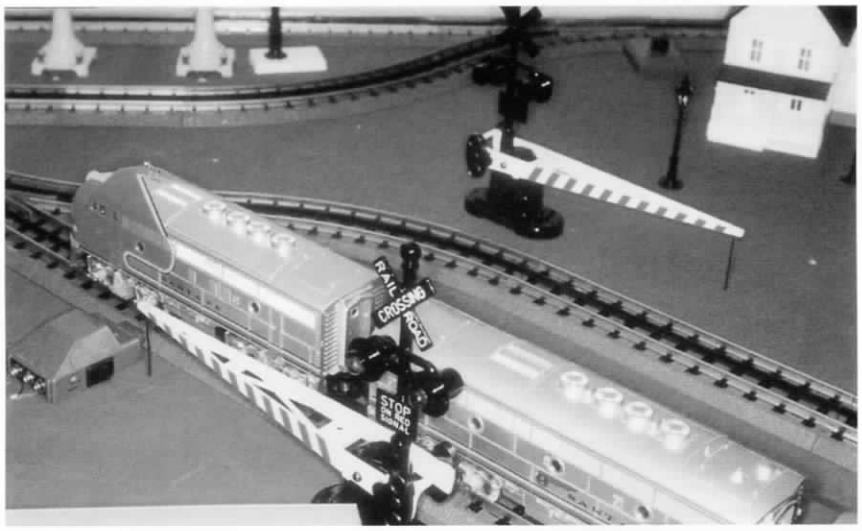


To help us with all the switch locations, I labeled the switch controllers and also added a simple layout diagram with the corresponding labels on the switches.



This is the eye-level view that a typical 6- to 10-year-old sees. This view looks pretty neat as the locomotive passes the switch tower.

Although this view is pretty mundane, once the scenery is added it will appear very different.



The infrared sensors worked well on the first test run, although it took a few minutes to get the range and delay adjustments set correctly.

Now that everything is working and the boys have gotten the knack of running the locomotive and throwing the switches, they couldn't be happier. Thomas is at the throttle while Gregory is "king of the switch controls."