
RAIL SROAD
CROSSING
STOP
ON RED
SIGNAL
17

Chapter One

The Basics

Welcome to the hobby of model railroading—toy train style. Perhaps you're old enough to remember the O gauge trains of the 1940s and '50s. You can still find them. In fact, Lionel trains and track are still in production, and the new trains are compatible with the old trains of the '50s. Oh, the new ones look and run better, but at heart they're still the trains you loved as a child.

Lionel trains—old and new—are available at many hobby shops and train shows held all over the country throughout the year. And there are other manufacturers making Lionel-compatible trains from which to choose.

While you can build the layout in this book (more or less) using Lionel or other equipment, I chose to use the products of M.T.H. Electric Trains. The world of MTH 21st Century "plug-and-play" railroading is an exciting one.

Let's start off with describing what I mean by plug-and-play railroading. MTH Electric trains have taken a whole new approach to model railroading by applying the concepts developed in the world of home computers. That is to say, all it takes to get a computer and its accessories going is to plug it in.

MTH has applied this same concept to O and O27 gauge trains. No longer is it necessary to cut track sections to make a layout fit together, insulate track sections, or understand the basics of electricity to wire a switch or an accessory. You won't have to worry about your children cutting their hands on the edges of the track sections as they try to put them together. Nor will you have to fool with laying roadbed, adding track, and then spending hours adding gravel around the track and over the roadbed to simulate real track.

MTH's new track system even works well on a floor or carpet. With MTH track and accessories you just snap the track sections together, snap in the switches and accessory activation devices, plug in the accessories and the transformer, add a locomotive and some rolling stock, and away you go! It's as simple as that.

Before we delve into the specifics, let's address one key issue. Why large scale trains (as compared to the more popular, but smaller, HO or N scale)? If the trains are for your child (as well as yourself, of course) then O gauge is the way to go. The large size of the trains makes them easy for children to handle, especially when placing the trains on the track, fixing derailments, and coupling and uncoupling rolling stock. MTH's plug-and-play concept makes it especially quick and easy for parents or children to set up the trains and accessories without major wiring. In fact, all the accessories, including the track switches, draw their power right from the track.

Larger scale means the trains can be built stronger, which is a real plus with children. For some reason children just love to make the trains go fast, which means that the locomotives and rolling stock will jump the tracks on many occasions.

Another thing children do often is crash trains, and so the stronger the trains are made, the better they will hold up to abuse. Having strong metal die-cast or ABS-plastic bodies, metal undercarriages, and metal trucks and couplers means that the trains are hefty and are built tough and rugged. In short, O or larger is the way to go where kids are involved.

What are gauge and scale?

With newcomers there is always confusion with respect to gauge and scale, and the differences between O and O27 electric trains. First, let's deal with the terms "gauge" and "scale." Gauge is simply the distance between the rails. As an example, on a real railroad the distance between the rails (gauge) is 4 feet, 8½ inches. The distance between the two outside rails on O gauge track is 1¼ inches.

The term "scale" simply refers to the size relationship between the real thing and a model. In O scale, the model is 1/48 the size of the real thing. (A caveat: These are called "toy" trains, suggesting that they probably will not be perfectly exact-scale models, though many are nearly so.)

Now let's talk about the differences between O and O27. As I mentioned, Lionel and MTH O gauge trains are (roughly) 1/48 scale models. Since a 1/48 scale locomotive and 1/48 scale piece of rolling stock are fairly long, they require wide-diameter curves to negotiate without jumping the track. Certain long locomotives and some large pieces of rolling stock, like passenger cars, need large-diameter curves of 42 inches, 54 inches, even 72 inches. These translate into a pretty big layout, even if you're just setting up an oval.

The housing boom and the baby boom that occurred after World War II created two big challenges for the Lionel Corporation, at that time the leading manufacturer of electric trains. How could they market their trains to the millions of new families that were having children, and how could they redesign their trains to fit into the millions of smaller homes being built? While the marketing end of the challenge is all Lionel history, the technical aspects of the challenge is where we need to focus our discussion.

To solve the space problem the Lionel Corporation created the O27 line of trains. They redesigned their standard O gauge track so that the height of the rails was ⅛ inch lower while keeping the distance between the rails (gauge) the same. They also designed a 27-inch curve, which is a pretty small curve, but one which would easily fit in a small room. Hence the term O27 was adopted. The "O" means that it's O gauge and

the "27" means that it's a 27-inch-diameter curve, or that it's a locomotive or piece of rolling stock designed to run on a 27-inch curve. To get 1/48 scale trains to make a 27-inch curve, Lionel had to reduce the height, length, and width—hence the scale—of its rolling stock and locomotives to negotiate the tighter curves. What this translated into was that the locomotives and rolling stock were smaller than 1/48 scale. In actuality, Lionel produced many different types of O27 locomotives and cars with slightly different scales, all smaller than 1/48 scale, and also slightly different in scale from each other.

Those are the fundamentals of the matter. But to confuse the issue, one year an O gauge locomotive would appear in an "O gauge" set and the next year in an "O27 set," depending on the marketing needs and strategies of Lionel at the time. Many—though not all—pieces can run on both O and O27 track.

Today the scale/gauge issue continues in fact, if not in name. For example, MTH's Premier line is their O gauge, 1/48 scale trains; their RailKing line, the equivalent of Lionel's old O27 trains, is made up of cars and locomotives slightly smaller than 1/48 scale. Keep in mind that if you decide to purchase O27 gauge track, that does not mean that you are limited to just 27-inch diameter curves. Several different diameters are available: 31-inch, 42-inch, 54-inch and 72-inch curves.

I recommend that you visit your local train hobby store to become familiar with the different manufacturers, their product lines, and the available accessories. While you are there, pick up a model railroad magazine that focuses on O gauge railroading. The best two are *Classic Toy Trains* and *O Gauge Model Railroading*. These magazines have numerous articles and advertisements from manufacturers, hobby stores and mail order businesses. In addition, you will acquire their website addresses, which also contain a lot of information.

Track, transformers, and accessories

From the earliest days of electric trains, more than a hundred years ago, the standard track construction for O gauge trains has been thin-metal tube construction for the rails and thin-metal boxes for the ties, three or four per track section. The individual track lengths are attached to each other with metal pin connectors, and the tracks have to be pushed together, which can on occasion lead to cut hands.

Although the tracks are strong, the connector pins loosen and pull out, electrical contact between the track sections is affected, the metal rusts over time, and the tracks look rather unrealistic. In addition, the trains make a lot of noise rolling across the tracks.

To improve the appearance of the track and reduce the noise level model railroaders sometimes place cork roadbed or other sound-deadening materials under the track. To improve the appearance of the track, additional ties can be added using strips of balsa or rubber, and scale gravel is then added around the track and the cork roadbed. All of this translates into a lot of work.

Over the years manufacturers have produced track that has rails made from solid metal. This makes them look more realistic, reduces the chance of cuts, and provides for better electrical contact. While these new track designs solved some of the problems that plagued O gauge track for almost 100 years, the problems of noise, appearance, and special wiring needs still existed. When accessories were added that were activated by a passing train, special care had to be taken to either make or purchase insulated track sections and then add wiring to power the accessory and activate it.

The addition of track switches also required special wiring. While the switches could be powered directly from the tracks, the power draw from the switch motor was so high that it affected the operation of the trains, resulting in the need for an alternate power supply and special wiring.

M.T.H. Electric Trains has solved these problems by integrating roadbed into the track design (called "Real Trax") and using solid metal for the rails. The roadbed is made from thick, high-impact plastic. The individual track sections snap together, and each section has positive electrical clips built into the underside of the track. This innovative track design allows the track to be set up on just about any surface, including rugs, which makes setting up a train set under the Christmas tree a breeze.

MTH also designed an entire array of accessories that draw their power from the track. In addition, the accessories are activated by simply plugging an infrared sensor into the track and connecting the sensor to the accessory. When a train passes the sensor, the infrared switch activates the accessory. After the train passes, the sensor turns off, thereby turning off the accessory. MTH even built in adjustable delay times for the sensor switch and also a distance sensitivity adjustment for the infrared beam.

Track switches are simply snapped into place; three wires run from the turnout directly to the toggle, which throws the turnout. Here again, the switches draw their power directly from the track. One would think that all this power being drawn from the track would impact the operation of the trains. MTH has designed its switches and accessories to draw so little voltage that there is no effect on the operation of the trains at all. Accessories, switches, and infrared sensors can be powered from an optional power supply. The term "plug-and-play" is truly appropriate.

To minimize the issue of having to cut lengths of track to complete a layout, MTH offers several different short track lengths for both straight and curved track. The straight track lengths are 3½, 4¼, 5, and 5½ inches long, and half-length curved track is available in 31- and 42-inch diameters. The standard straight track length is 10 inches, but 30-inch lengths are also available.

Curved tracks make 31-, 42- and 72-inch diameter circles, and while the 72-inch curve is for a large layout, both the 31-inch and the 42-inch curves will fit a variety of configurations for 4 x 8-foot layouts.

Crossover and uncoupling tracks are available, as are adapter tracks, which will allow you to connect your Real Trax to traditional O gauge track. Switches come as left- and right-hand, with diverging routes for 31-, 42- and 72-inch curves. The turnout motors simply unplug and snap in, and you can easily flip the motors from one side of the switch to the other. The switches also have a non-derailing feature so that if a train approaches a switch that is set in the wrong direction, the switch will automatically throw to the correct direction so that the locomotive will not derail.

MTH has also incorporated the plug-and-play concept in their transformer designs. Simply plugging in the electrical leads from the transformer to the track "lock-on" sends power to the track, sensors, and accessories. The standard transformer that comes with each MTH set, the Z-750, provides 75 watts of power—more than enough power to run any locomotive on a 4 x 8-foot layout including switches and track-activated and powered accessories. The Z-750 has bell, horn, and direction buttons, and it can be used to control any manufacturer's locomotive-equipped sound system.

Another nice feature of MTH transformers is that they can also power vintage Lionel locomotives; not all modern transformers can do this.

MTH also designed their large transformer—the Z-4000—to accommodate accessories that do not run off track power, like street and building lights. If you prefer to run all your accessories from a separate power source, the Z-4000 is the way to go. This transformer can run two trains, and it also runs and programs all of the Proto-Sound effects incorporated in MTH or other manufacturers' locomotives (in addition to the horn, bell, and direction buttons). The programming feature is great, as you can set which sound features you want as well as the level of sound. The Z-4000 also has a built-in cooling fan, which is great to have because children, and sometimes adults, forget to turn off the transformer. The fan will keep the transformer cool, and this translates into an extended life. The Z-4000 also has an overload indicator and pop-out fuses just in case.

MTH has many different types of operating accessories that can be activated with an infrared sensor, including crossing gate signals, banjo signals, and semaphores. These accessories have tiny internal motors that operate the working parts. In addition, MTH also markets accessories such as highway flashing signals, railroad block signals, and signal bridges, to name a few, that change light colors or flash. MTH also has many different kinds of illuminated, die-cast street lights to choose from, which are also well built. They also have telephone pole sets, road signs, and high-tension electrical towers that have the same girder construction framing as the real ones. They even offer operating street traffic signal lights.

MTH has several different types of bridges, including their beautiful steel-arch bridge and their massive Hell Gate bridge. You can buy single- and double-wide tunnel portals if you like to build mountains and run your trains through them. MTH also has several different operating buildings, such as their operating gas station, firehouse, and station platform. The gas station has a car that emerges from the garage as the door opens up, and the firehouse has a

beautiful fire engine that rolls out of the open doors. The operating station platform has people that disappear as trains leave the platform. In keeping with the plug-and-play concept, MTH offers their buildings as structures preassembled. You can buy a two-story house, three-story buildings, and even a complete train station. These structures are well built and designed so that you can add interior details and even weather them if you like so that they appear more realistic.

Locomotives and rolling stock

There are three basic types of locomotives: steam, diesel, and electric. Steam locomotives are by far the favorite of most O gauge model railroaders, probably because of all the working siderods and the smoke units. Many variations of wheel and drive combinations are available; their designations are based on a simple principle. All steam locomotives have three numbers associated with them. The first number is the total number of small forward wheels, the second number is the total number of drive wheels, and the third number is the total of small rear wheels. As an example, 4-8-0 would mean that there are 4 forward wheels (on two axles), 8 drive wheels (on four axles), and no rear wheels.

All MTH O gauge steam locomotives are also equipped with a smoke unit, front lights, and a whistle. Diesel and electric locomotives do not have the exterior moving parts steam engines do, but unlike the typical black color of steam locomotives, diesel and electric locomotives are very colorful. In addition, the shapes of diesel and electric locomotives are all different, which adds to their unique appearances. All MTH diesel and electric locomotives are equipped with horns, front lights, and illuminated cab. Several manufacturers have taken advantage of the breakthroughs in digital sound recordings and have incorporated the real sounds of steam, diesel, and electric locomotives into a digital format. MTH's sound system is called Proto-Sound, and all their locomotives are available with this system for an additional charge.

MTH locomotives also have what is commonly referred to as an E-unit. The E-unit is an internal electrical switch that changes from forward to neutral to reverse when transformer power is turned off and on. What this translates into is that if you are moving a locomotive forward and you then bring it to a stop, the E-unit will switch to the neutral position. If you apply transformer power to the locomotive it will not move, but since power has been applied to the track you can throw track switches. When you once again shut down the transformer power, the E-unit will switch to the reverse mode, so that when you power up again the locomotive will go in reverse. While this sequence (traditional and unique to toy trains) sounds odd, it can really be handy, and children seem to master it quickly.

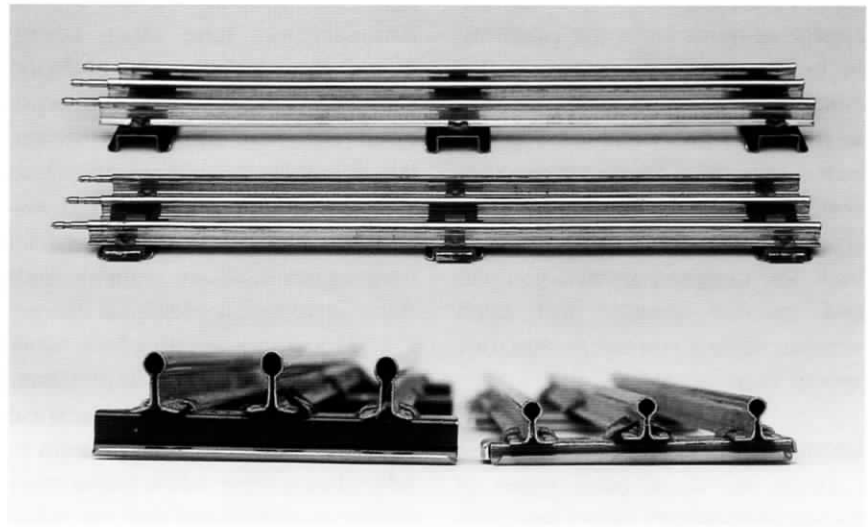
MTH has a complete line of rolling stock and passenger cars in all shapes, colors, and road names. Their passenger trains range from old early-20th-century-style heavyweights to modern designs in several different road names and color schemes. Their rolling stock spans the full range of just about anything that has rolled down the tracks. There are single-, double-, and triple-dome tank cars; hopper cars with and without coal loads; box, stock, and refrigerator cars; flatcars and gondolas with and without loads; crane cars; searchlight cars; and last but not least, cabooses of several different designs and variations. MTH even has snowplow cars. All of MTH's passenger and freight cars are well made and built to last. Their trucks, wheels, and couplers are metal, which is important because they last a lot longer than comparable plastic pieces, they are stronger, and the couplers will not wear out or uncouple when there are too many cars coupled together. Some of their designs even have individual springs on the trucks, which greatly enhance their appearance.

MTH manufactures two separate lines of O gauge trains—Premier and RailKing. The Premier line is true O gauge, 1/48 scale, and highly detailed. The RailKing line is their semi-scale or O27 line. RailKing trains are built to the same rugged construction and engineering standards for quality, strength, and durability as the Premier line except that the level of detail is not as high, and they are, of course, slightly smaller than 1/48 scale.

Now that we have the basics down, let's get started with building a 4 x 8 train board.

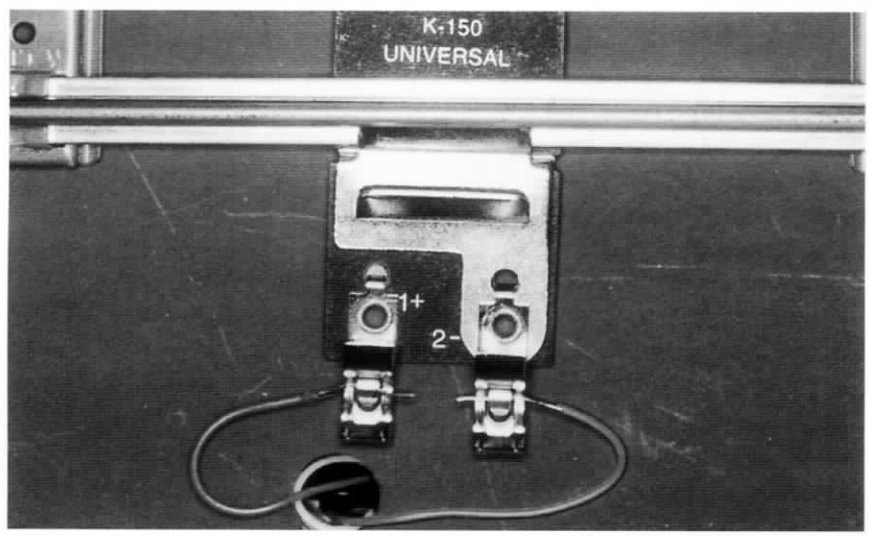
Gauge and Scale

There are several differences between O and O27 gauge trains. The first is that the rail height of O gauge track (on the left) is higher than O27 gauge rail height.



While O gauge trains are 1/48 scale models, O27 gauge trains are often a slightly smaller scale. This can be clearly seen on these two 40-foot boxcars, the larger being O gauge. The O27 gauge is a slightly smaller scale so that the locomotives and rolling stock will run on a 27-inch-diameter curve without jumping the track or derailing.

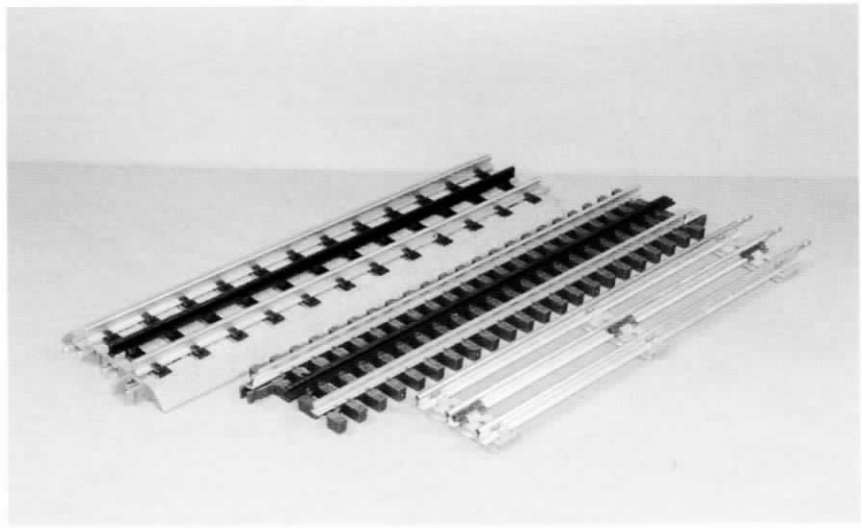
The traditional way to run power to standard O or O27 gauge track is by a simple "lock-on" device.



Track

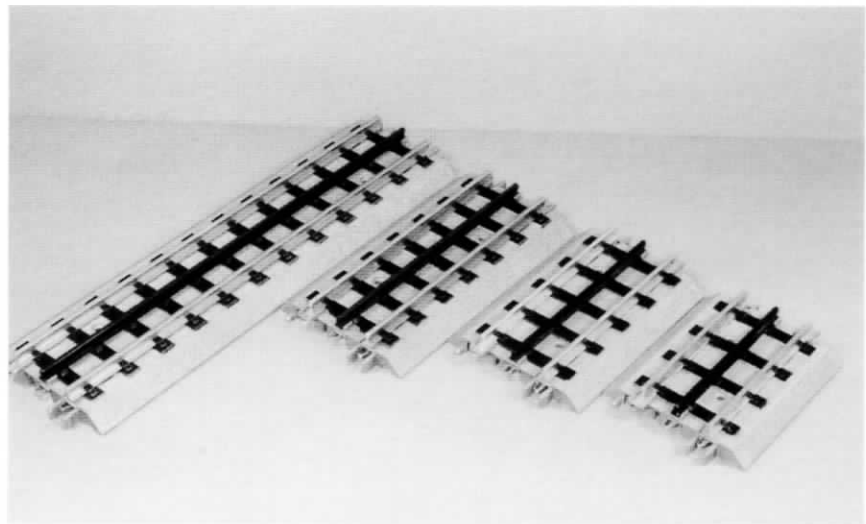
Standard O and O27 gauge track can cause small cuts on your hands, so it's not a bad idea to wear gloves when assembling traditional track.

This is how standard track looks on a train board. To deaden the sound of the trains and to improve the appearance of the track, roadbed is placed under the track, additional ties are inserted under the rails, and scale gravel is spread over the cork roadbed.

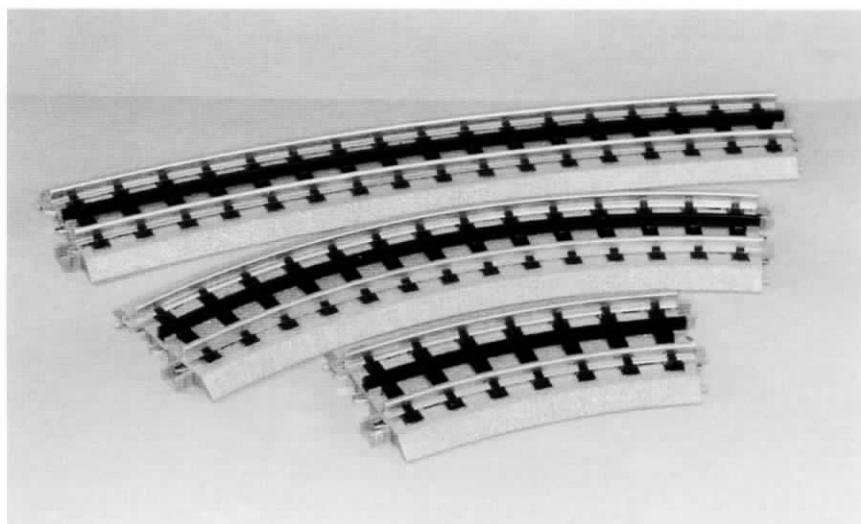


Standard track has been the mainstay for O and O27 gauge for nearly 100 years. Several manufacturers have introduced more scale-like track, but you still needed to lay down roadbed and add gravel. M.T.H. Electric Trains has introduced heavy-duty track (top left), which has the roadbed integrated into the track and can be used on just about any surface, including carpets.

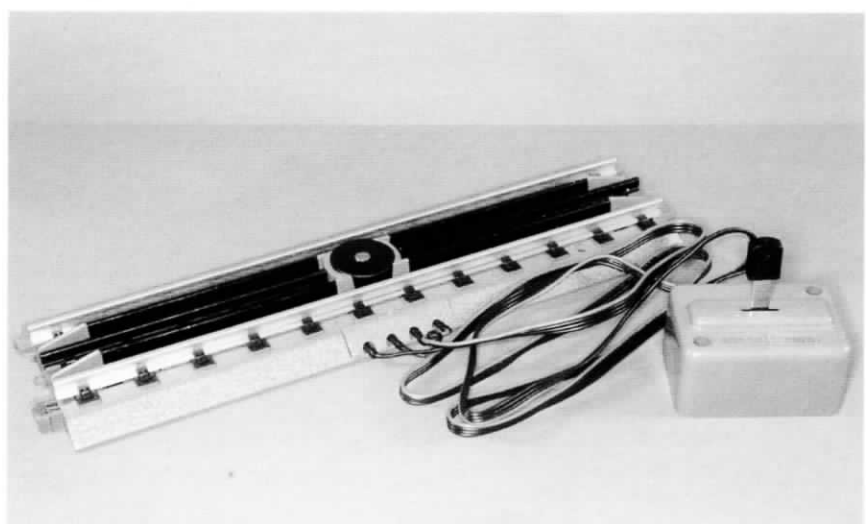
This new 21st-century plug-and-play track system called "Real Trax" is available in several lengths of straight track, including 30-inch lengths. With these ready-made lengths you can build any layout without having to cut it to special lengths. Shown (from left) are the 10-, 5½-, 5-, 4¼- and 3½-inch straight track lengths.

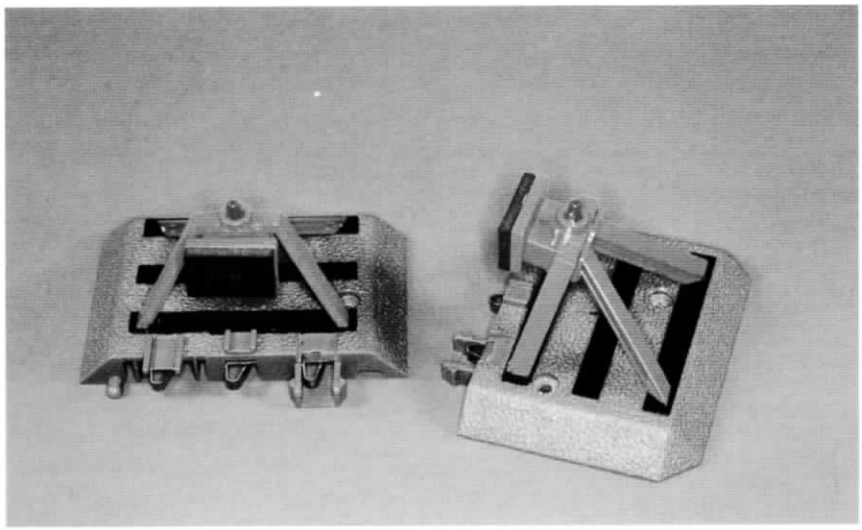


Real Trax also has various-diameter curves. Shown are the 72-, 42-, and 31-inch curves. Also available are 31- and 42-inch half curves.

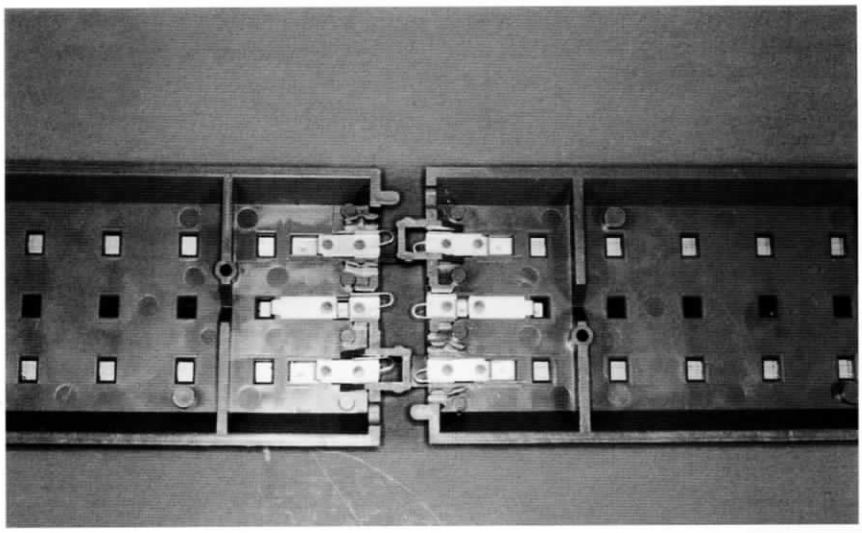


In keeping with the MTH concept of plug-and-play trains, all MTH track accessories, such as the uncoupler, are wired and ready to be plugged in.

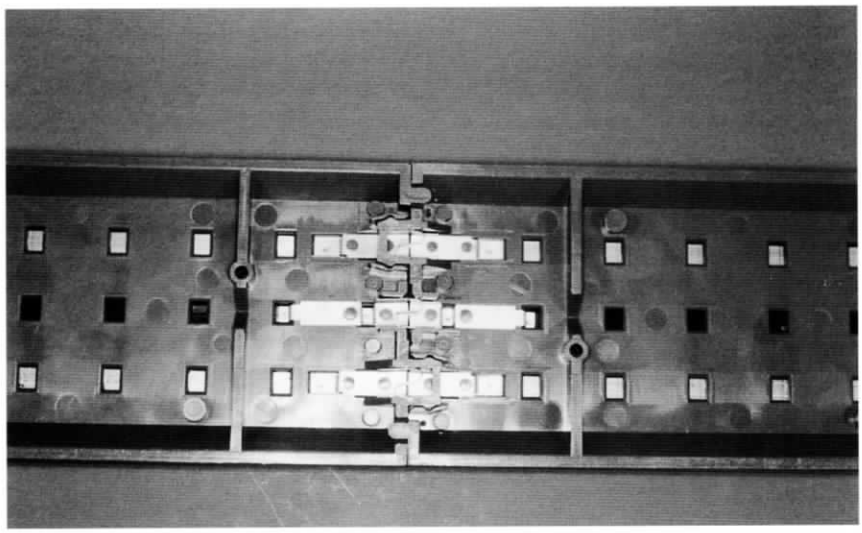




Even the bumpers are designed for plug-and-play. The little lights on the bumpers draw their power from the track.

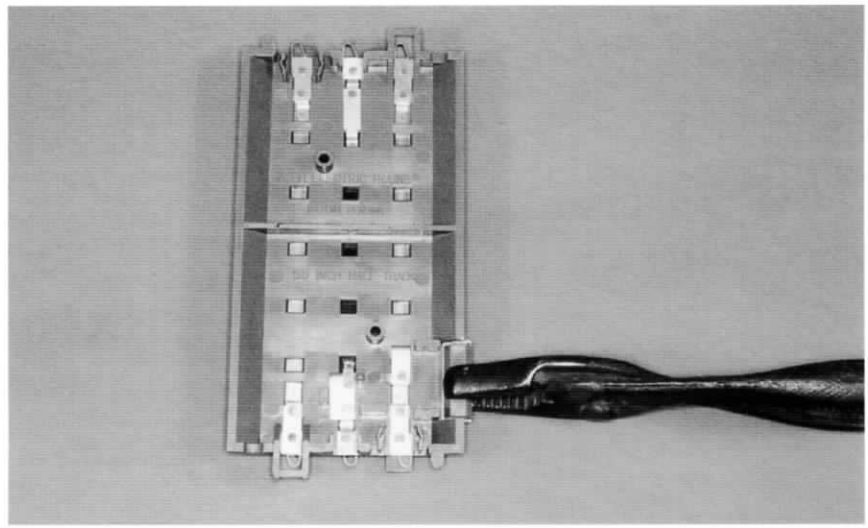


The underside of the Real Trax system has a positive snap-lock system, as well as heavy-duty brass connectors.

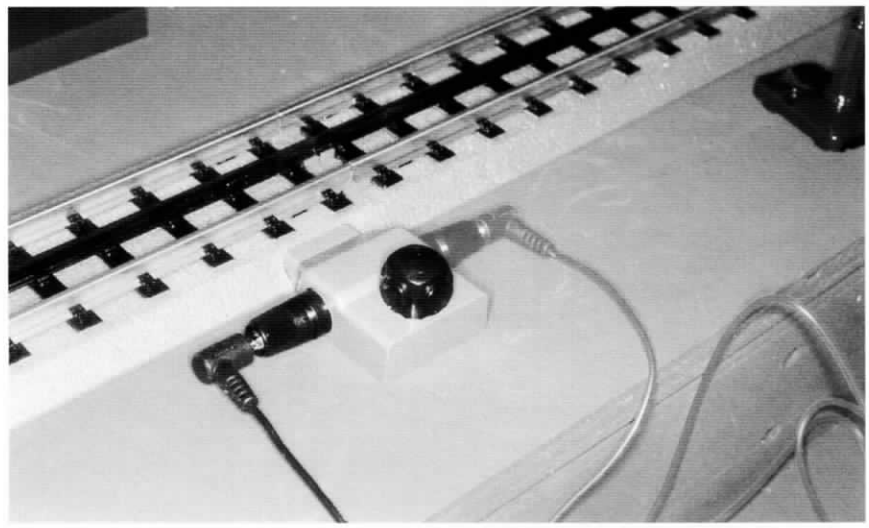


When the track is snapped together, the brass contacts are positively connected so that power is transferred along the individual track sections without the voltage drops that you typically experience with traditional track.

Track accessories can easily be plugged into the ready-made ports on the sides of the Real Trax system by simply snapping off one of the plug port covers. Each track length has at least one port.

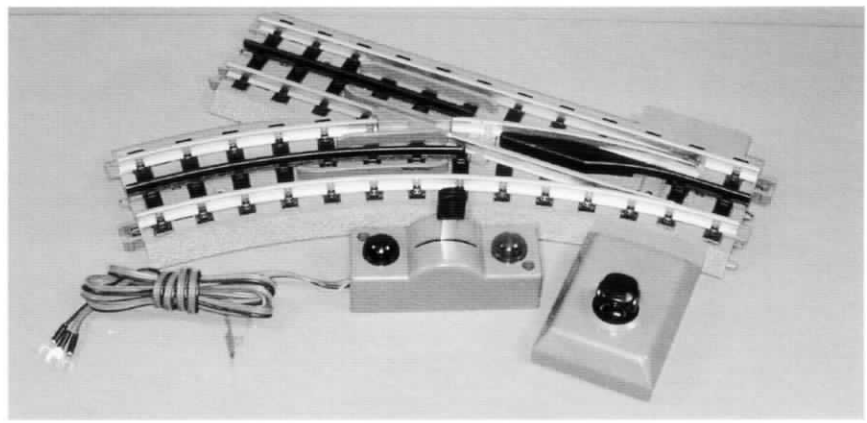


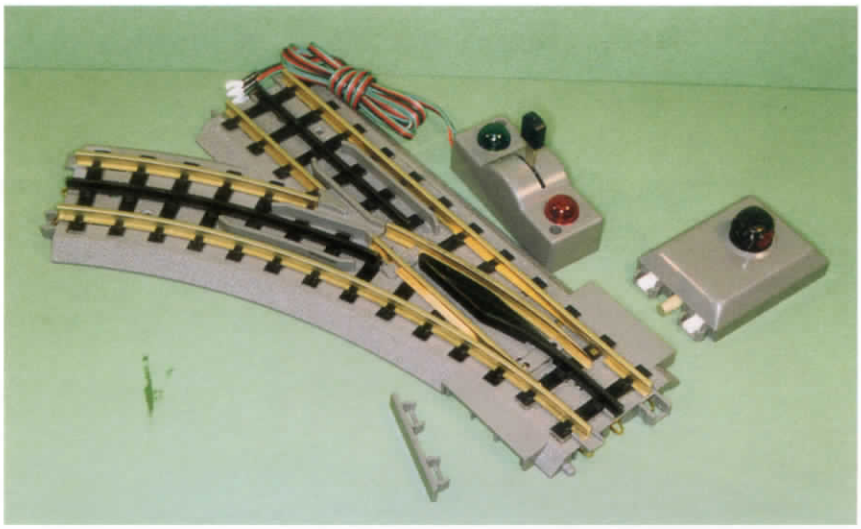
Since the Real Trax system has positive connection between track sections, only one lock-on is necessary, even for a relatively large layout. Traditional track would need several lock-ons to prevent voltage drops along the track.



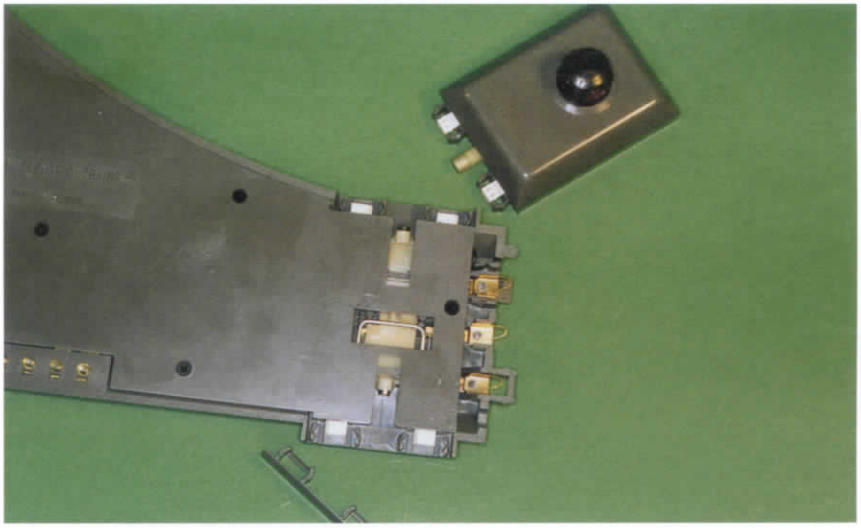
Switches

MTH's switches are beautifully designed and easy to install. The switches are powered from the track.





The motor that flips the track to the other route can be plugged into either side of the switch. There are no screws to mess with. Simply unplug it, pop out the cover on the other side, and then insert the motor pack into the new opening.



Here you can see the clean and simple design of the underside of the switches. There are no wires or screws to mess with, and here again, MTH designed their switches to be plug-and-play.

Transformers and Accessories

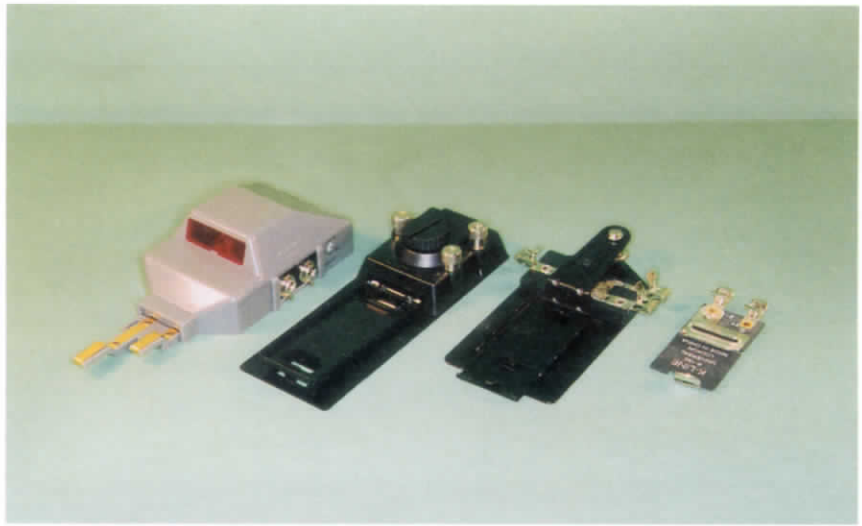
Several manufacturers, including MRC Corporation, make quality transformers for O and O27 gauge trains.

Many an American family has at least one old Lionel steam locomotive stuffed away in a closet that has been passed down from generation to generation. The MTH design engineers know this, as they are all trains lovers and they too have these family treasures.

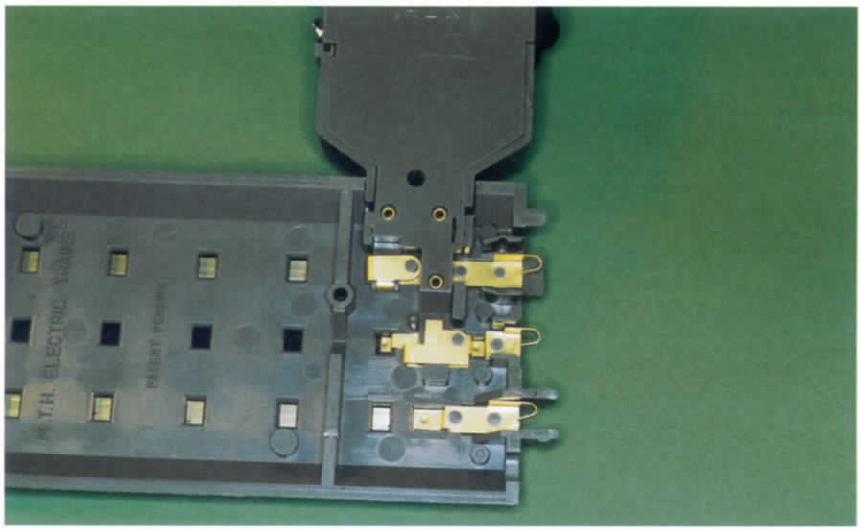
MTH transformers are designed to run all types of modern locomotives, but they are also capable of powering those treasured old Lionel trains. MTH's standard Z-750 transformer provides power to run locomotives as well as accessories that are plugged into the Real Trax system.

MTH's massive Z-4000 transformer is the ultimate in transformer design. It can run two trains at the same time and can be used to program just about any locomotive's digital sound system.

The MTH Z-4000 also has plenty of plugs for accessories requiring either 10 or 14 volts.

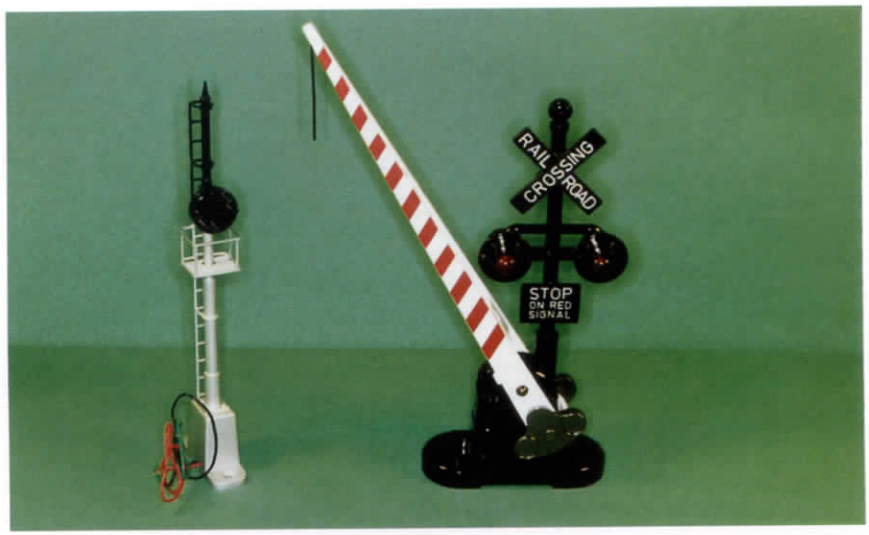


In keeping with their concept of plug-and-play trains, MTH has developed an infrared-sensor activation device (left) for accessories. This simple device plugs into the track and draws its power as well as power for the accessories directly from the track.



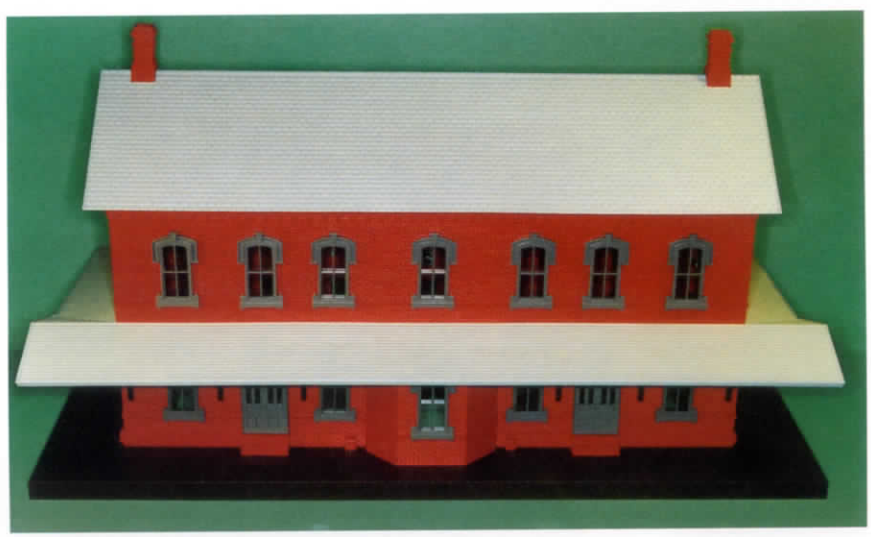
Here you can see the positive brass connectors designed to ensure that any device or accessory plugged into the track system will not experience voltage drop due to poor electrical contact.

MTH has a complete line of sturdy die-cast accessories from which to choose. Two favorites are the operating block signal and the crossing gate.

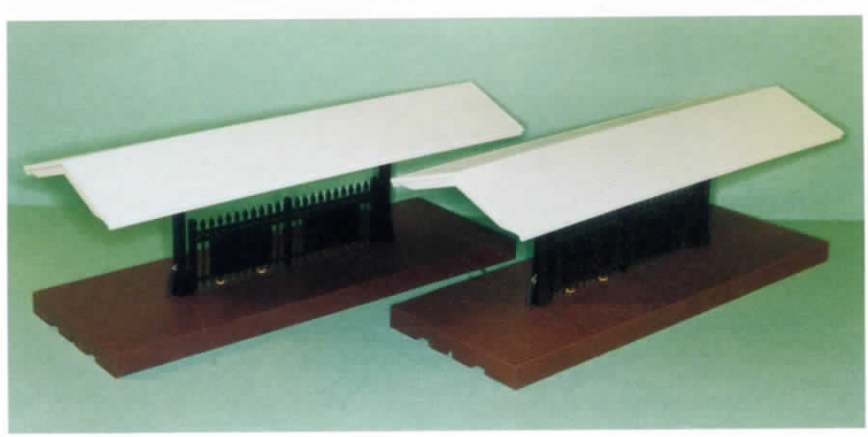


Structures

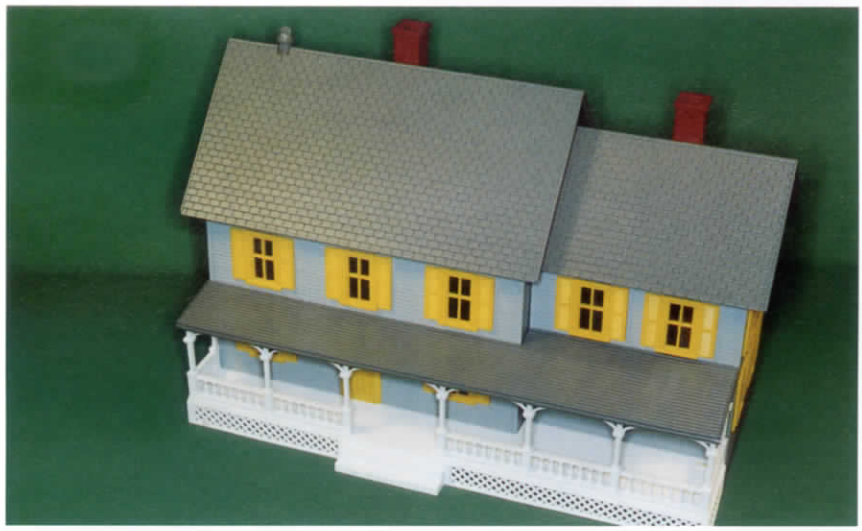
MTH's concept of plug-and-play trains also extends to structures, such as this two-story train station. This lighted structure is sturdily made of heavy plastic.



The ready-made train station above also comes with lighted covered platforms.



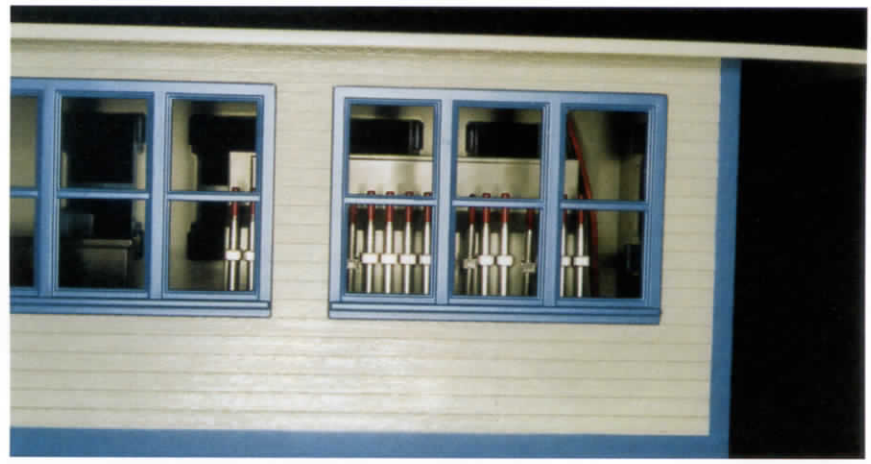
MTH offers several different styles of ready-made houses in a variety of colors.



These colorful and well-made structures are also lighted.

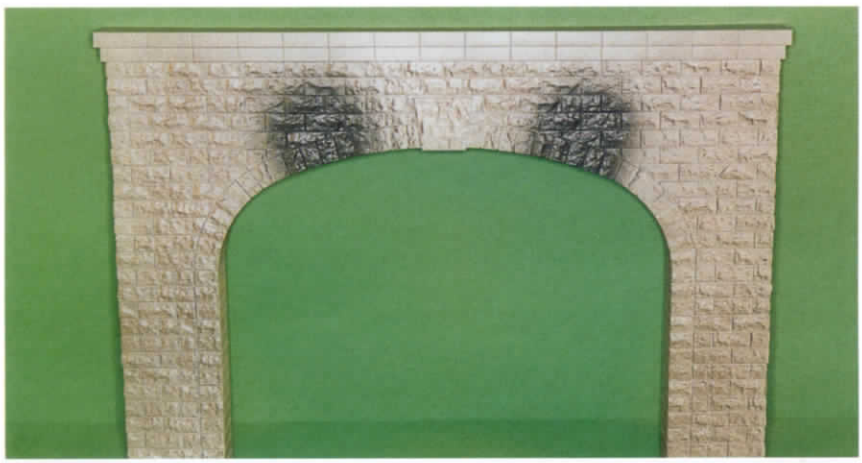
This switch tower is not only lighted, but it also has a detailed interior.

Here is a close-up of the tower's interior detail. Once the structure is wired for the interior lights, the detail will be easy to see.

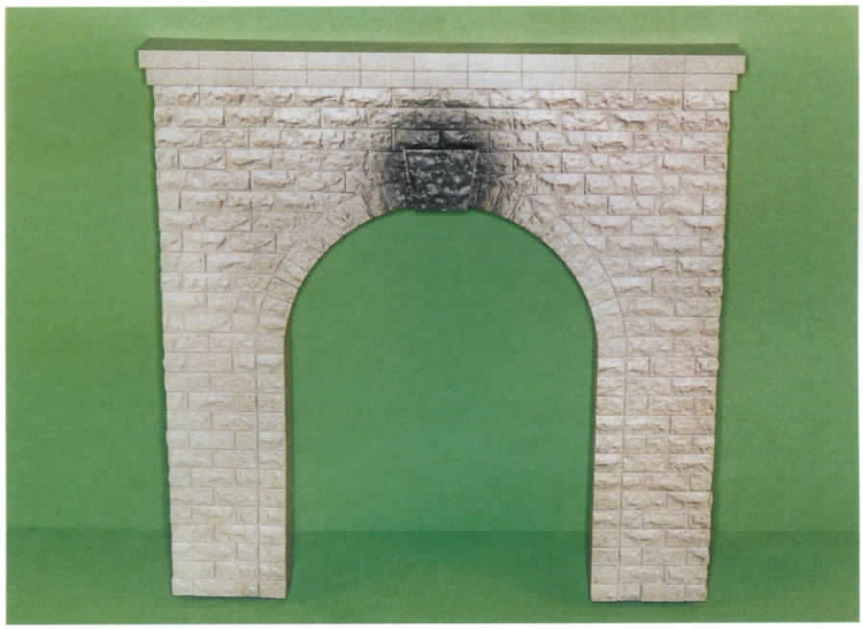


MTH also makes several different styles and colors of die-cast metal lamps and street lights that are easy to hook up.

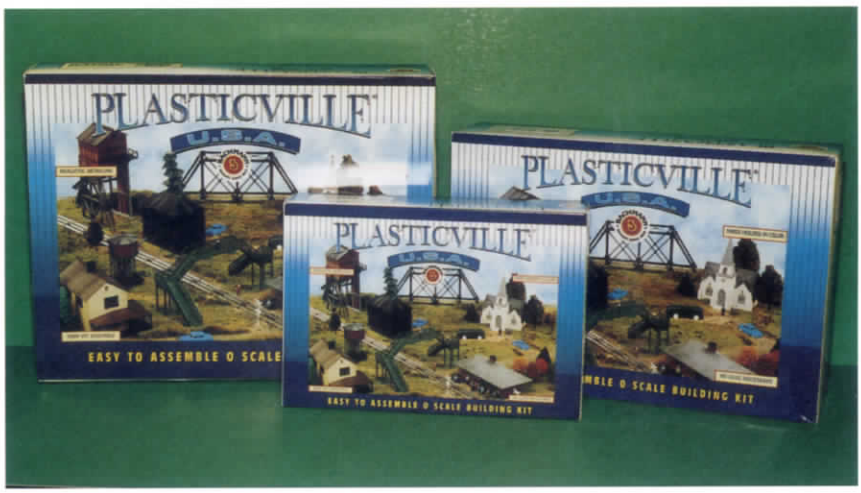
The MTH ready-made girder bridges and piers are well made and highly detailed. Their steel-arch bridge is 30 inches long.



MTH makes both double and single tunnel portals for mountain scenery.



They even include the smoke stains you typically find along the tops of tunnel portals.



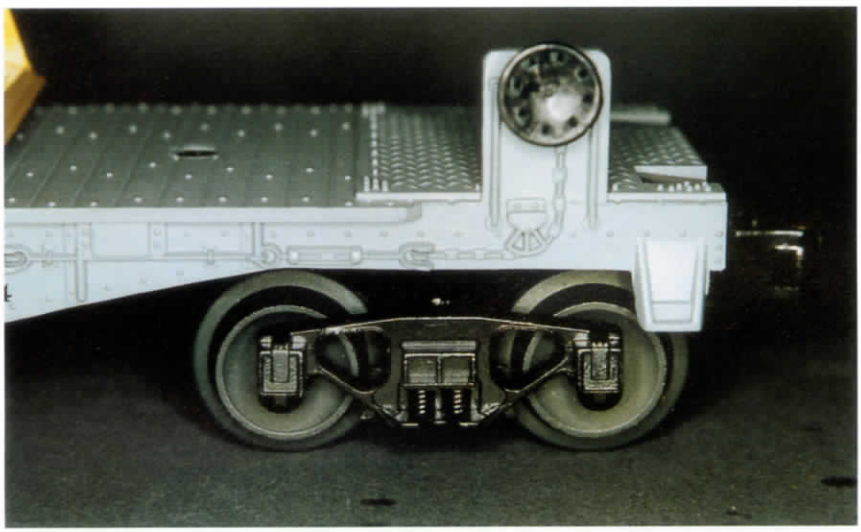
If you want to add structures that are not available from MTH, you can buy easy-to-assemble snap-together structures from several other manufacturers.

Locomotives and Rolling Stock

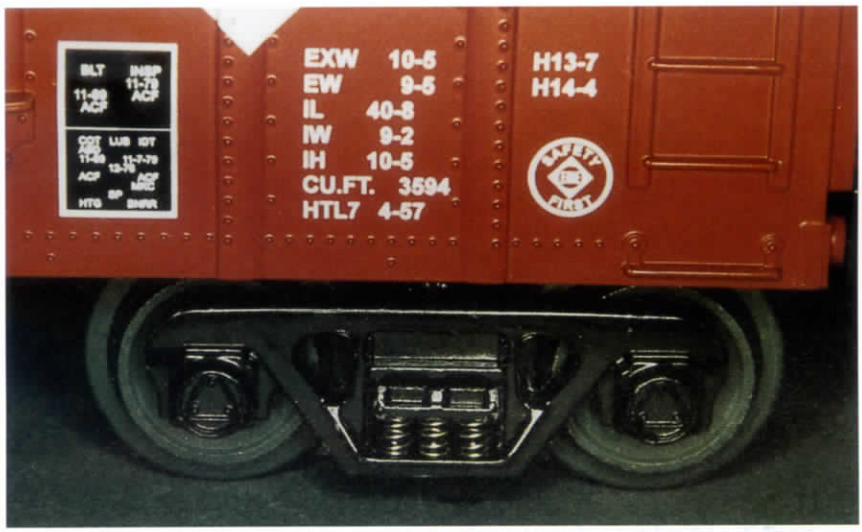
The MTH F-3A diesel locomotive is a popular engine, and it has a great horn. The pulling power of this locomotive is impressive.

Add a dummy A-unit (a B-unit is also available) and you have an impressive-looking setup.

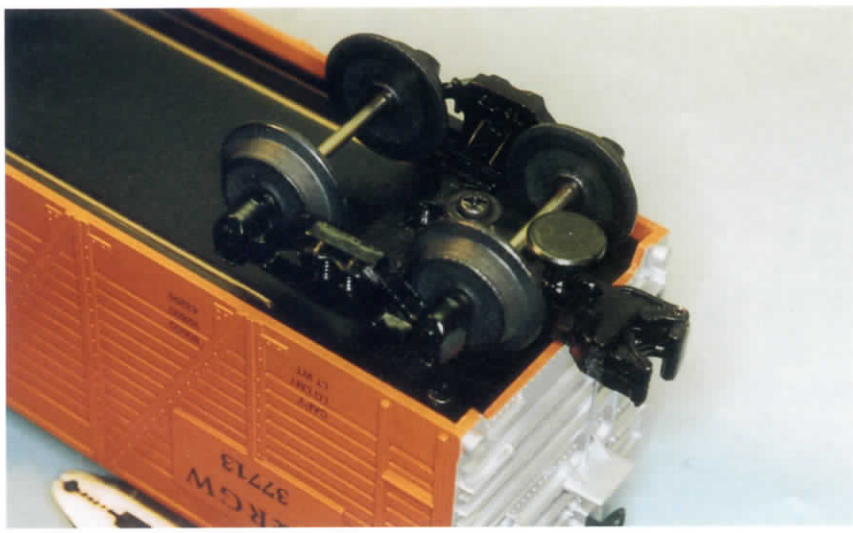
Williams Electric Trains also makes well-built, reasonably priced, and reliable locomotives with great horns and good detail. This Canadian Pacific GP9 diesel locomotive is very colorful.



When buying rolling stock, always check to see that you are getting metal trucks and couplers.

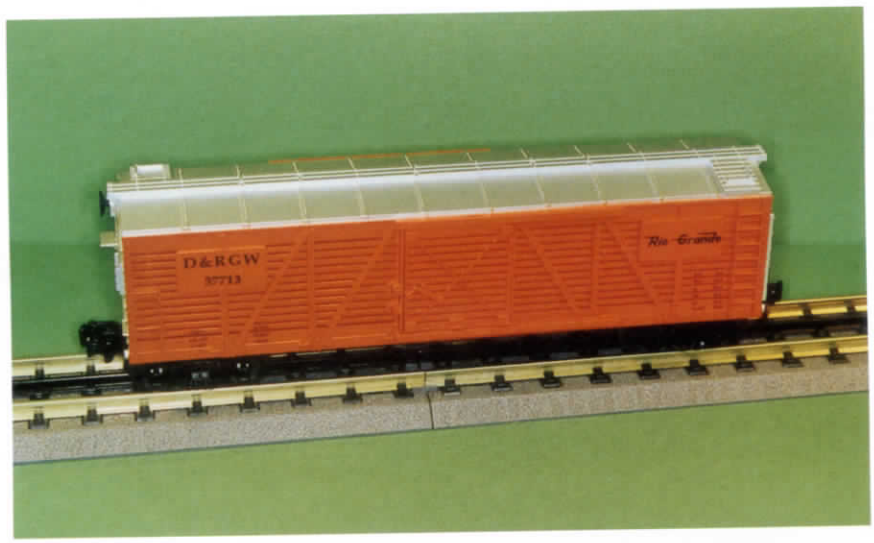


Some trucks actually have springs so that they appear more realistic, like the ones on this boxcar.



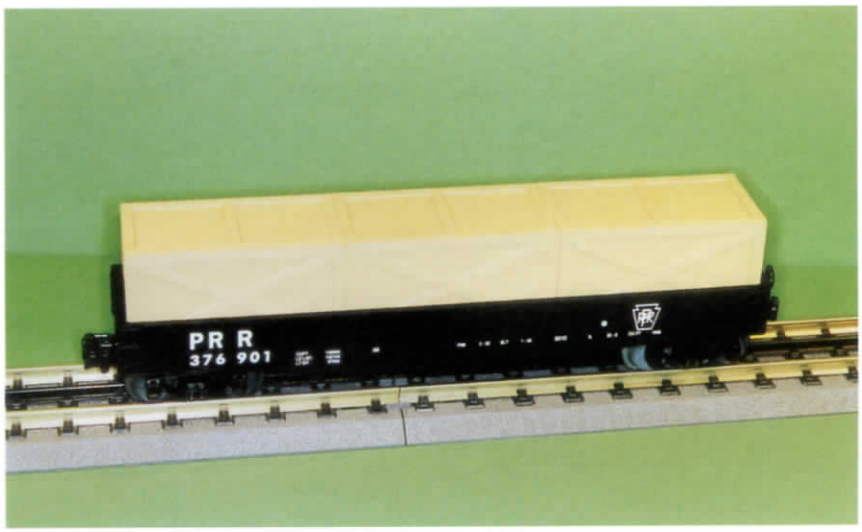
The disks located on the bottoms of the couplers are for uncoupling. When the disk is located over an uncoupler track and the uncoupler is activated, the disk is drawn down, which opens the coupler.

Stock cars are my favorite type of rolling stock. They are available in many different colors and road names.



Boxcars can be either single-door or double-door.

The color combinations and road names available are almost endless.

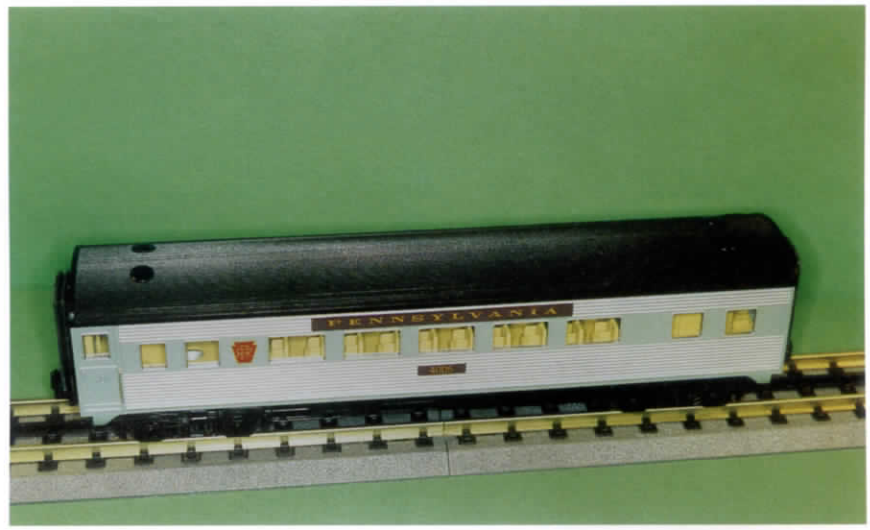


Children love gondolas, because they can load them up with all kinds of neat stuff.

Flatcars are also favorites, especially ones that come with die-cast metal accessories like automobiles, trucks, and road equipment.

Passenger cars are also popular. All MTH cars have diaphragms between cars, undercarriage and interior detail, and lighted interiors.

While passenger cars of the same type may look alike, once they are painted differently with different road names added, they take on a special appearance.



My favorite type of passenger cars are Pennsylvania Tuscan "Madison" cars.

These early-20th-century-style cars look great rolling down the track with a steam locomotive pulling them along.

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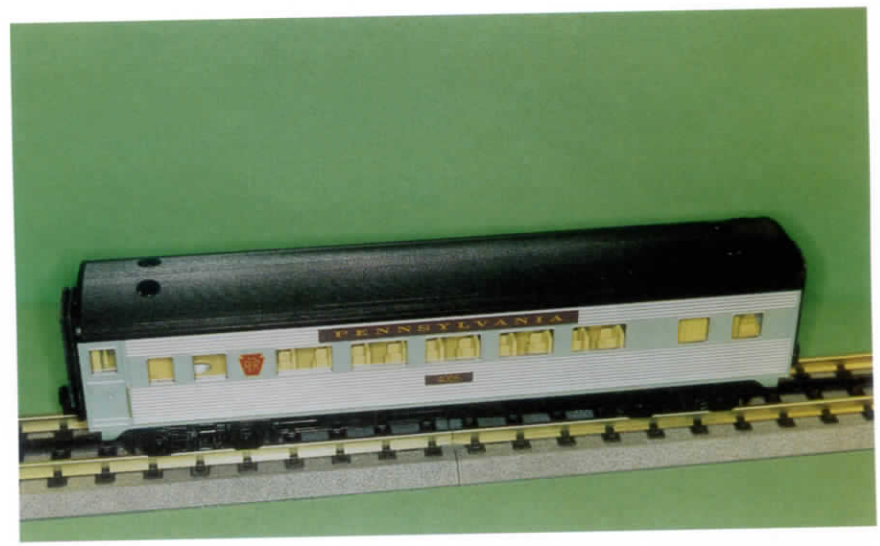

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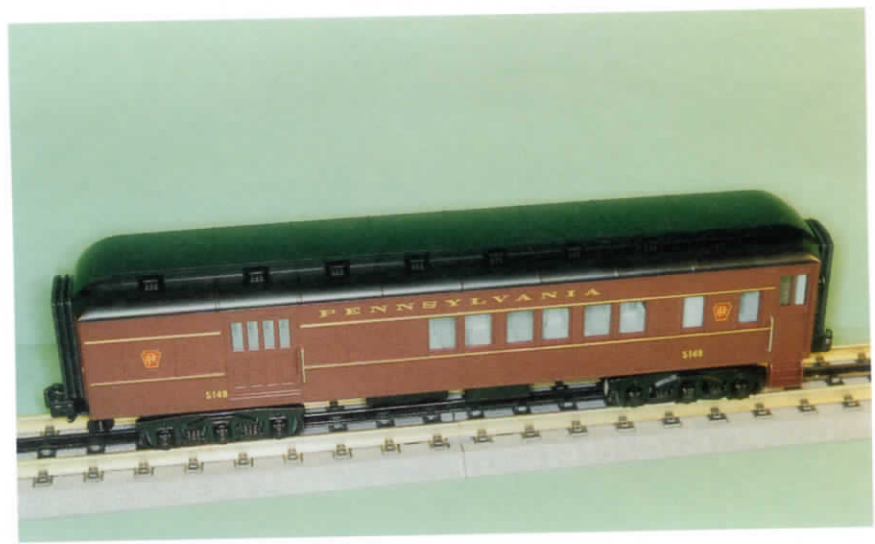
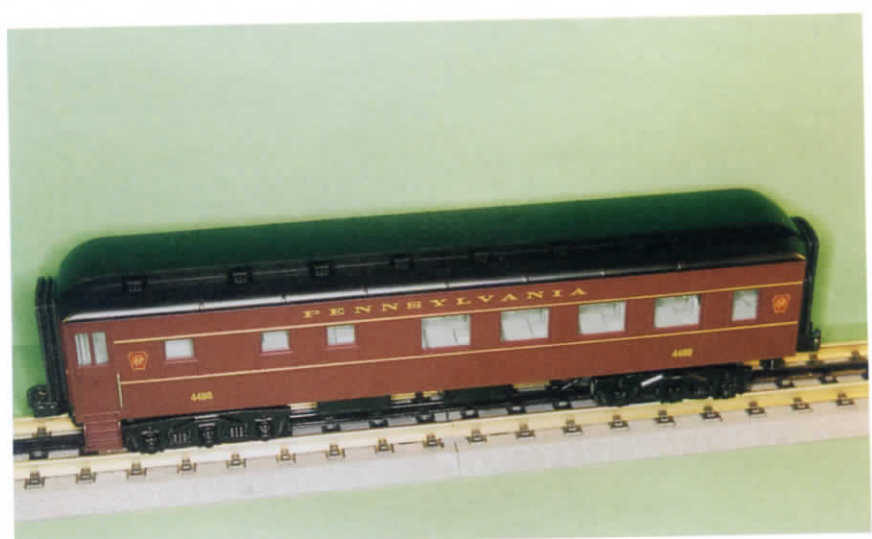


These early-20th-century-style cars look great rolling down the track with a steam locomotive pulling them along.



MTH pays special attention to the interior detailing of its passenger car line.

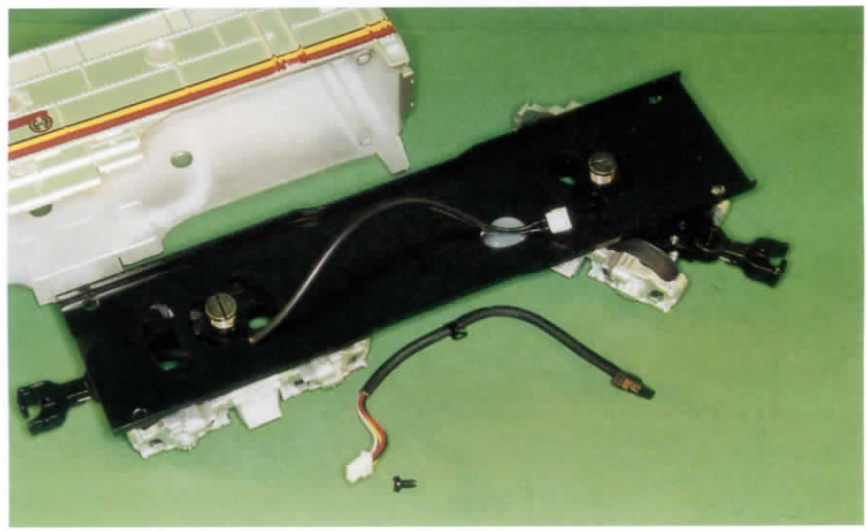
No train layout would be complete without a caboose. MTH cabooses are highly detailed, well built, and lighted so you can see the interior detail.

Repair

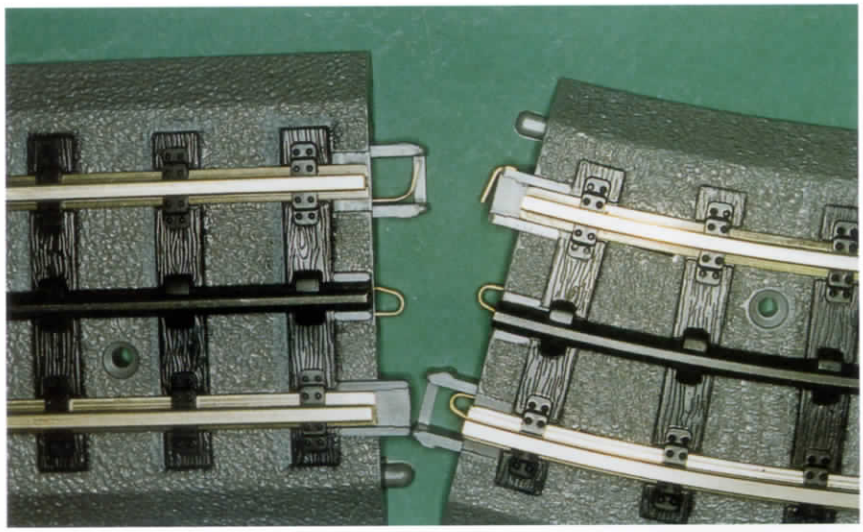
Simple modifications and maintenance will keep your MTH trains running for a lifetime. The B-unit for the F3 locomotive set has an external wire for the optional digital sound system. Since our locomotive has only a horn, we removed the external wire.

The first step in modifying the B-unit was to open it up and unplug the internal wiring.

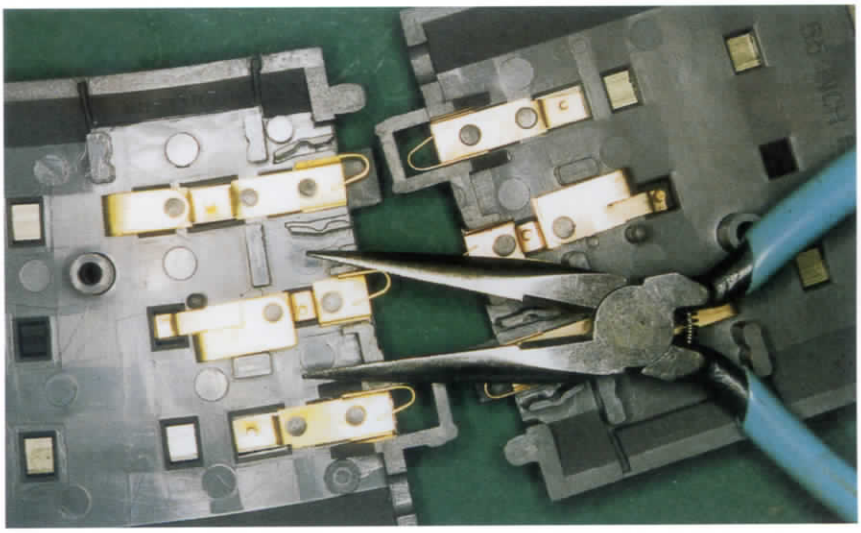
Next, we removed the wiring harness screw from the truck and pulled out the wire.



Now the B-unit looks better. We stored the wire and screw in a zip-lock bag and put the bag inside the B-unit's box so that we can reinstall it later.

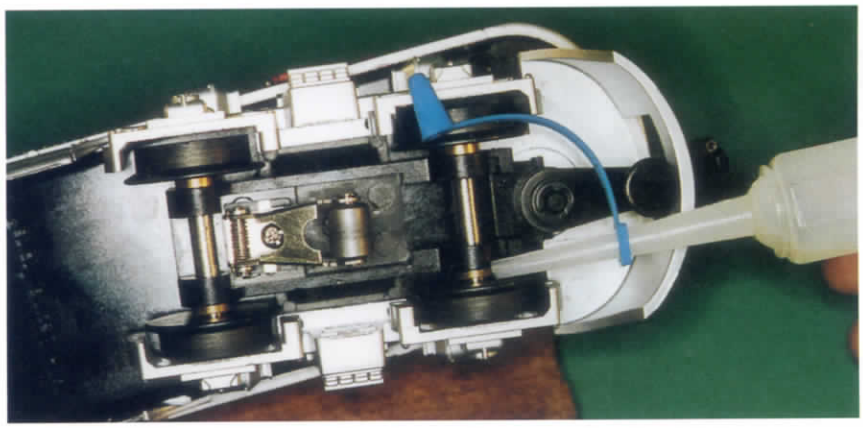


Sometimes the brass contacts on track sections clip to one another and get deformed when you pull the track sections apart.



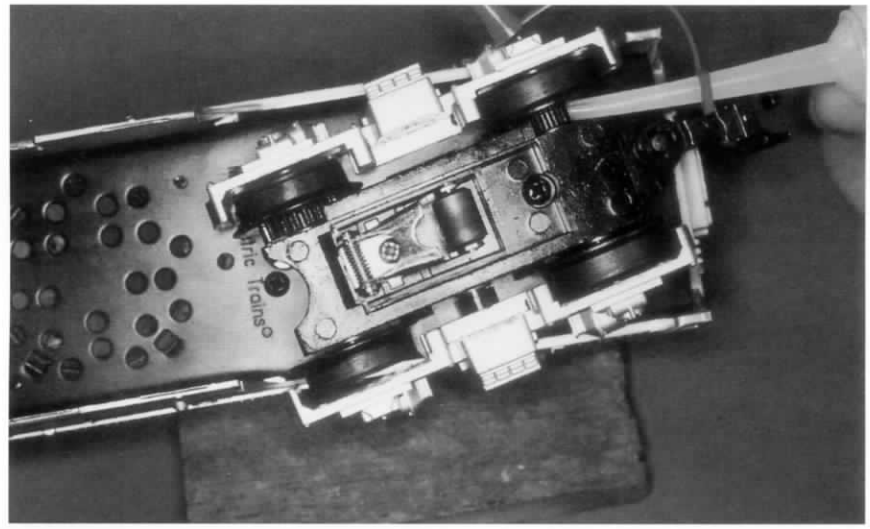
The simple fix is to use a set of needle-nose pliers to bend the brass contact back into shape.

Maintenance

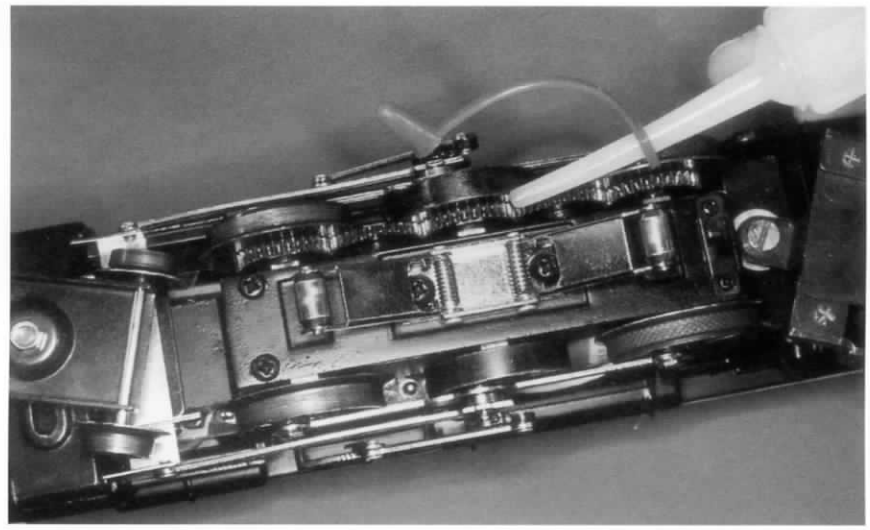


Diesel locomotive axles should be lubricated so the contact points between the wheel ends and the trucks will not wear out. While you should purchase train-lubricating oil, a light sewing-machine oil will do.

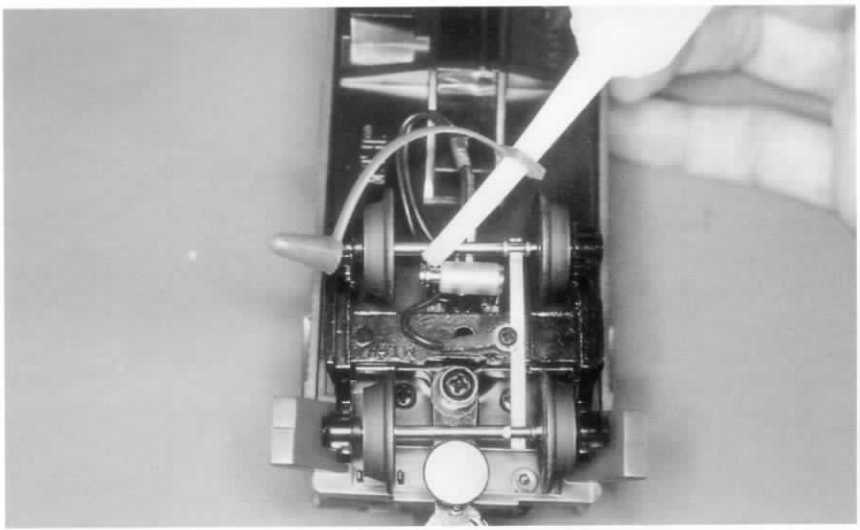
Lubricating the gears is an absolute must for all diesel locomotives. Small quantities applied to each gear work best.



Steam locomotives have more gears than do diesels, and they require more lubricant and more-frequent applications.



When lubricating the gears on a steam locomotive, do not forget to lubricate the bearings of the running gear and the drive rods.



One last tip on lubricating is to add a drop of oil to the axles of the pickup rollers of lighted freight and passenger cars.