

# Thank you for your order!

Enjoy your *Model Railroader* Information Station package.

Please remember that this copyrighted material is for your use only. It's unlawful to share or distribute this file to others in any way including e-mailing it, posting it online, or sharing paper copies with others.

Sincerely,

The staff of modelrailroader.com

## Troubleshooting Guide:

*Please note: Packages are color intensive. To save color ink in your printer, change your printer setting to grayscale.*

### **SAVING PACKAGE**

Save the package when you download the PDF. Click on the computer disk icon in Adobe Acrobat, or go to File, Save.

### **MY PRINTER WON'T PRINT THE TEXT CORRECTLY**

Close all other programs/applications and print directly out of the Acrobat Reader program, not your Web browser. Printing problems are caused by not enough free system memory.

### **PAGES ARE NOT PRINTING FULL SIZE**

Set your printer to print 100% and make sure "print to fit" is not checked under printer setup or printer options.

If you have suggestions on how we can improve this product or have topics you'd like to see in future Information Station packages, please contact us at [infostation@trains.com](mailto:infostation@trains.com)

# Tracklaying tips and techniques



# Track



**M**any model railroaders discover a whole range of unfamiliar terms when they begin acquiring the track components to build a layout. Most of these terms match prototype track terminology and are clearly descriptive, while others require some explanation. The list which follows defines the most common track-related terms, including some that are often misused.

**AREA:** The American Railway Engineering Association is the prototype railroad organization which establishes right-of-way material specifications and track construction standards.

**Ballast:** The crushed rock used to hold track in position, spread weight, and provide drainage.

**B&B gang:** A traveling railroad crew that specializes in bridge and building construction, maintenance, and repair.

**Bridge:** A structure which supports a track passing over a depression in the terrain or a stream. A *through bridge* has a floor structure which supports the track between its side beams or trusses, while a *deck bridge* has its supporting structure below track level.

**Bridge guardrail:** A set of heavy timbers or steel rails mounted inside the running rails on a bridge or other structure to keep derailed cars in line.

**Bridge pier:** An intermediate support used between bridge spans.

**Bridge shoe:** An iron or steel casting which transfers the weight of a bridge to its supports. One end is normally a solid mounting while the opposite end allows for expansion or contraction.

**Bumper:** A braced, coupler-height blocking device which keeps cars from rolling off the end of a track.

Smooth-flowing handlaid trackwork has been the hallmark of the Detroit Model Railroad Club's O scale Detroit Union RR for over half a century. This view of Duncan Junction includes several regular turnouts, a crossing, a single-slip switch, and a double-slip switch. Photo by Jim Hediger.

# terminology

An introduction to railroad lingo

By Jim Hediger

Illustrations by Rick Johnson

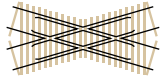
**Bunk, camp, or outfit car:** A passenger or freight car converted into movable living quarters for track workers.

**Clearance:** The space that's required for rolling stock to pass an object or other equipment. *Vertical clearance* is the space between a car roof and an overhead object or structure.

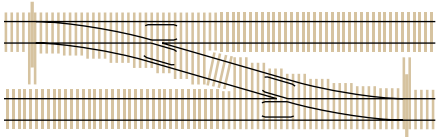
**Clearance point:** The location near a turnout where equipment may safely pass other adjacent equipment.

**Cross level:** A reference comparing the relative heights of the two rails across the track.

**Crossing:** A level intersection between two tracks or between a track and a highway (*above*).



**Crossover:** A pair of facing turnouts which allow a train to pass from one parallel track to the other (*below*).

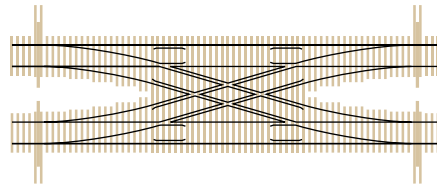


**Cut and fill:** A right-of-way construction method that removes earth or stone above grade and uses it to fill in the gaps below grade.

**Deck:** A bridge floor which may be either *ballasted* or *open* (with the track bolted to the supports).

**Derail:** A safety device that's used on spur tracks to keep cars from rolling out and fouling a main track. It usually has a cast-steel frog which diverts one wheel up and over the rail to stop a car well short of the clearance point. Some derails consist of a single switch point that's normally left open to stop any moving car clear of the main track.

**Double or scissors crossover:** Two pairs of facing turnouts with a crossing in the middle which allow trains to pass from one parallel track to the other (*below*).



**Double-slip switch:** A special condensed track component which combines the functions of four turnouts and a crossing in a short distance (*below*).



**Drawbridge:** A movable bridge that spans a navigable waterway.

**Elevated:** A reference to a high level right-of-way, often constructed on a fill, to provide clearance underneath for another track or a roadway.

**Elevation:** The measured height of a specific location above a base line.

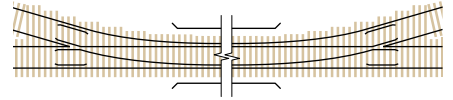
**Expansion joint:** A special slip joint that includes an open space in the center to allow the rails to expand or contract.

**Facing point:** A track turnout or switch that's positioned so its points face oncoming traffic.

**Flangeway:** The space between a running or stock rail and a guardrail for wheel flanges.

**Frog:** The portion of a turnout or crossing where wheels cross the intersection of two rails.

**Gantlet (not gauntlet) track:** A pair of overlapping parallel tracks which share a single roadbed and track structure to pass through a narrow obstruction like a tunnel or bridge (*below*).



**Gap:** A slot cut through the rail to break the electrical path.

**Gauge:** The standard dimensional spacing required between the rails or wheels. *Tight gauge* refers to less than the correct spacing, while *wide gauge* means the rails are too far apart.

**Grade:** The vertical rise or fall of a track in units of height per 100 units of distance, expressed as a percentage. A 2" rise in 100" is a 2 percent grade.

**Grade crossing:** A level intersection between a highway and the track.

**Ground throw:** A low-level manual control device used to operate and lock the switch points and select a route through a turnout.

**Guardrail:** An additional rail placed inside the running rail that engages the back of a wheel flange to help guide its wheelset through a frog.

**Headblocks:** The pair of extended ties beneath the switch points which support a switch stand.

**Industry track:** Any side track where freight cars can be spotted so a railroad customer can load or unload them.

**Insulated joint:** A mechanical rail joint which doesn't pass electricity.

**Joint:** An end-to-end mechanical rail connection using a *rail joiner* to maintain precise alignment.

**Junction:** A location where main lines diverge or cross each other.

## TRACK TIMELINE

**1832**

Wooden ties were introduced on the Camden & Amboy RR

**1893**

The first concrete ties were tested on the Philadelphia & Reading RR

**1921**

Mainline rail weighed an average of 83 pounds per yard (HO code 55)

**1937**

The first 30-mile stretch of continuous welded rail was installed on the Delaware & Hudson RR

**POST WWII**

Heavier rail became necessary to handle the increasing loads and equipment weights

**1956**

Mainline rail weighed an average of 105 pounds per yard (HO code 70)

**1957**

Prestressed concrete ties (reinforced with steel rods) were introduced

**1983**

Mainline rail weighed an average of 117 pounds per yard (HO code 83)

**Lap or three-way switch:** A special track component which combines two overlapping turnouts (*below*).



**Main line or main track:** The principle route used by trains passing a given location along the line.

**Milepost:** A trackside signpost with a number indicating the distance from an established starting point.

**Narrow gauge:** A reference to any railroad built with a track gauge that's less than 56½" standard gauge.

**NMRA:** An abbreviation for the National Model Railroad Association, which is the hobby organization that establishes the basic specifications or *NMRA standards* which ensure compatibility between products made by different manufacturers.

**"On the ground":** A railroad slang term for a derailment.

**Platform:** A loading dock for freight or passengers. A *high platform* is even with the car floor, while a *low platform* may be at any height below floor level.

**Portal:** An entrance to a tunnel or the framing at the ends of a truss bridge.

**Profile:** A scale drawing which shows the grade alignment for a section of main track.

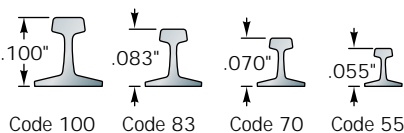
**Puzzle switch:** A slang term referring to the special track components used in extremely congested areas including single- or double-slip switches and three-way switches.

**Radius:** The size of a curve measured from its center point to the curved track center line (circumference of the circle).

**Rail:** A specially shaped rolled steel beam with a wide base that's spiked to the ties to carry the weight and guide trains along the right-of-way (*right*).



**Rail code:** This is a reference to the height of model rail in thousandths of an inch: code 100 measures .100" tall, code 83 is .083" tall, code 70 is .070", and code 55 is .055" (*below*).



**Railhead:** The wide, top portion of a rail that the wheels run on.

**Rail joiner:** A formed sheet metal mechanical connector used to join model rails end to end.

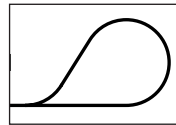
**Rail nipper:** A specially ground pair of modeler's cutting pliers used to make clean, square cuts in soft metal rail.

**Relay:** An electrical switching device commonly used to control polarity, power, and signal circuits.

**Reverse or "S" curve:** A track arrangement where two opposite curves meet at a common point (*right*).



**Reverse loop:** A loop of track that begins and ends at the same turnout to turn trains around (*right*).



**Riser:** A vertical piece in the benchwork which supports a trackboard.

**Roadbed:** Any material used beneath the track to simulate the prototype ballast profile.

**Ruling grade:** The maximum grade which affects train size in a given area.

**Single-slip switch:** A special condensed track component which combines the functions of two turnouts and a crossing in a short distance (*below*).



**Snow shed:** A heavy canopy structure built to carry snow slides over the track.

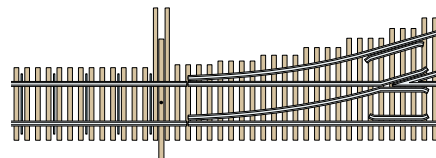
**Spike:** A forged-steel fastener with an offset head that's driven into the ties to secure the rails.

**Spiral curve or easement:** A curve of gradually increasing radius that makes the transition between a fixed-radius curve and a tangent or straight track.

**Spring switch:** A turnout which has its points controlled by a spring-loaded mechanism. Trains can make a trailing move through the switch and then the points return to their normal position.

**Spur or spur track:** Any single-ended track.

**Stub switch:** A pointless turnout which changes its route by gently bending the approach or "fly" rails sideways (*below*).



**Superelevation:** Banking built into a curve by raising the outside rail so trains may operate at higher speeds.

**Switch lock:** A padlock or an interlocking device which secures a switch so its points cannot be moved.

**Switch machine:** A remote control device which moves the switch points to select a route through a turnout.

**Switch rod:** A metal rod that connects switch points to a switch stand or a remote-controlled switch machine.

**Switch stand:** A trackside manual control used to operate the points and select a route through a turnout.

**Tangent:** A straight track.

**Third rail:** An extra rail mounted alongside or between the running rails to supply current for electric locomotives or traction cars.

**Tie:** The structural element which runs at right angles to the track center line to support and hold the rails in gauge. Most ties are hardwood, but some are made of prestressed concrete.

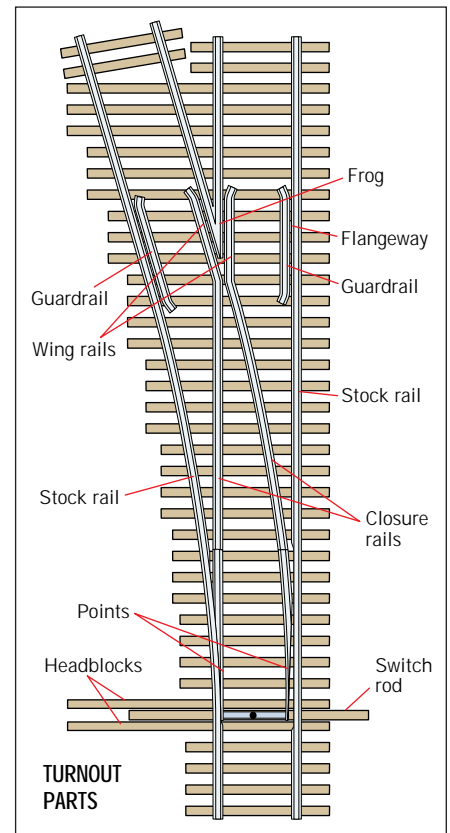
**Tie plate:** A forged-steel plate used between the rail base and the tie top to help spread the load.

**Timber:** Any heavy wood beam that's used in railroad construction.

**Trackboard:** The horizontal wood support beneath model roadbed and track.

**Trailing point:** A reference to a switch with its points facing away from the direction of travel.

**Turnout:** A track component with movable points that's used to select which route a train will follow.



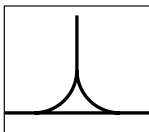
## 10 TRACKLAYING TIPS

- 1 Stagger all of the joints in the track, roadbed, and subroadbed.
- 2 Avoid humps or dips in the track, especially near curves, turnouts, and places where grades begin or end.
- 3 Drive spikes gently, using just enough pressure to seat them without putting a vertical kink in the rail.
- 4 If you're using track nails, drive them gently until they're snug without distorting the plastic ties.
- 5 Carefully align every rail joint and make sure both rails are fully seated in the rail joiners.
- 6 Eliminate any potential bump by removing the ties beneath a rail joint, sanding them thinner, and then replacing them.
- 7 Smooth the top inside corner of all rail joints with a small file until you can slide a fingernail over the joint without feeling any snagging.
- 8 Use a small file to sharpen all switch points to obtain a smooth path for the wheels to follow.
- 9 During installation, solder the wires to the underside of the rails so they'll be hidden by the ballast.
- 10 Use a National Model Railroad Association gauge to check and adjust the spacing of the rails and guardrails in turnouts.

**Turntable:** A revolving bridge structure commonly used to turn locomotives in an engine terminal.

**Wheel stop:** A wedge-shaped device, mounted on the rail heads, which is designed to keep a car from rolling off the end of a track.

**Wye:** A triangular track arrangement which has three turnouts connected at their frog ends to turn trains (*right*).



**Wye switch:** A turnout which diverges equally in both directions.

### ► More on our Web site

Information on preventing derailments can be found at [www.modelrailroader.com](http://www.modelrailroader.com).

# Sectional track

**S**o you opened that train set Christmas morning and couldn't wait to get rolling. Chances are the set came with a circle or oval of track sections. While it's pretty easy to put this stuff together and change it around, here are a few tips for getting top performance from sectional track.

## What it is

Sectional track comes in curves, straights, and turnout (switch) sections in every scale. In HO scale the most common curves are 15", 18", and 22" radius, with 9" and shorter straights. Turnouts are normally no. 4s or 6s.

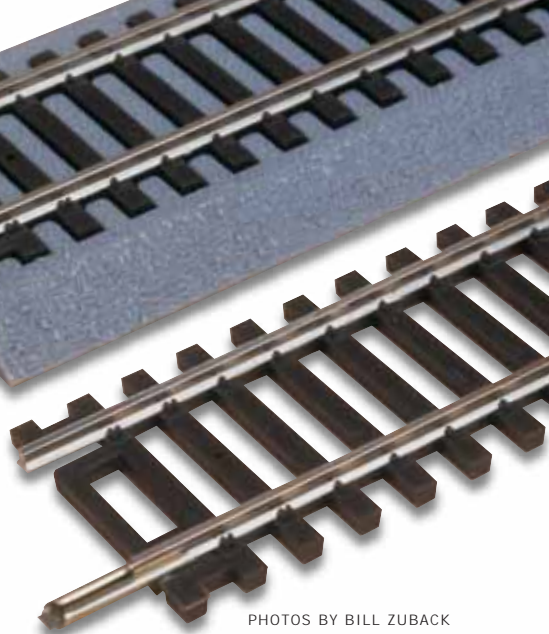
Shorter fitter sections, such as half curves, ¼ straights, and the like are often necessary to complete any layout more complex than an oval and are also

available. Have a selection of them on hand so you don't end up with a gaping hole in the main line.

Most folks start by snapping together a circle or oval of track on the floor. After a while the rail joiners loosen and the track sections work apart, often from the weight of the train. The result is a spectacular derailment, with track and train sailing across the room. While fun at first this quickly wears thin and can play havoc with locomotives and cars.

Also, if you're running your trains on a carpeted floor the carpet fuzz will work its way into the locomotive mechanism and cause operational problems.

To prevent these problems the traditional solution has been nailing the track to a solid surface such as a piece



PHOTOS BY BILL ZUBACK

of plywood. This may not be the best choice as most beginners want to easily change the track arrangement.

Sectional track is now made with plastic roadbed sections (fig. 1). The roadbed sections have interlocking tabs to hold the track securely in place and keep the trains above the floor enough to avoid those dreaded carpet fuzzies.

## Getting up and running

Laying sectional track is pretty simple. Line up two pieces and slide them together. Make sure the ends of the rail are lined up properly and fit snugly together with little or no gap (fig. 2). If you're using track with molded roadbed make sure the tabs lock securely between sections.

Two tips: Don't force the pieces. The most common mistake is forcing curve sections tighter than the designed radius. This produces a gap between sections and a kink in the rail that's a sure ticket to derailments (fig. 3).

Another common problem is letting one rail slip up and over the adjoining rail joiner (fig. 4). Make sure the rail is sitting in the joiner before pressing the two sections together.

## Turnouts

Watching a train chase its tail around a circle can get boring. The solution is to purchase some turnouts and additional track sections, which will enable you to vary the train's route.

It's hard to have trouble with sectional turnouts. Perhaps the most important thing is to ensure the switch rod is correctly installed and the points throw freely. Figure 5 shows the basic components of a turnout.

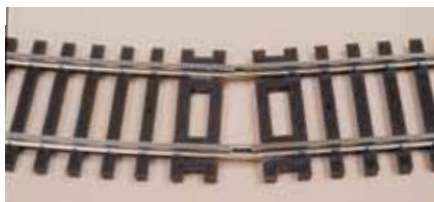
While the standard geometry of sectional track somewhat limits layout design options, for ease and simplicity it simply can't be beat. Good luck! ♣



**Fig. 1 TRACK AND ROADBED.** Most manufacturers offer track with plastic roadbed sections, like this True-Track from Atlas.



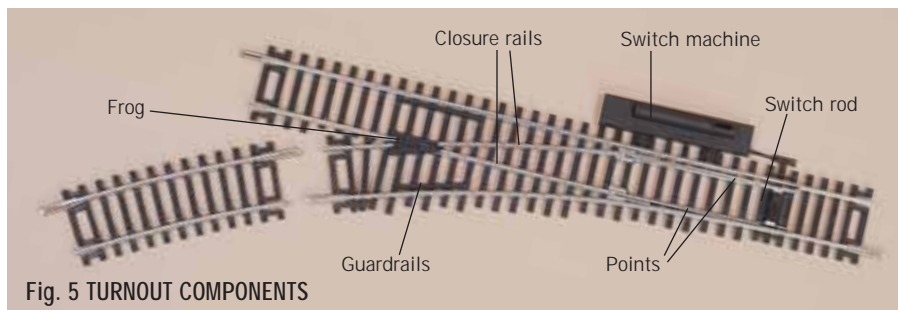
**Fig. 2 PROPER JOINT.** Track sections should fit together easily, without any obvious gaps in the joint between rail sections.



**Fig. 3 FORCING TRACK TO FIT.** This is a common mistake with sectional track. Trains will have a tough time crossing this gap.

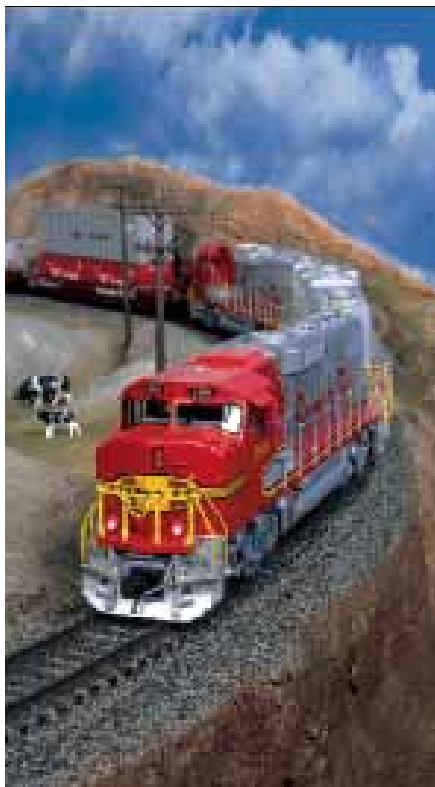


**Fig. 4 HIGH-RIDING RAIL.** Note how one of these rails is sitting over the rail joiner. Make sure both rails are seated properly.



**Fig. 5 TURNOUT COMPONENTS**

# Laying flextrack on curves



GEORGE HALL

Carefully laid flextrack curves add up to operating fun. Here a trio of GP60s lean into the bend on Jack Kenefick's HO railroad.

**G**ood track is the main difference between a layout that's fun to operate and one that gathers dust. Laying straight track is easy, but laying curves with flextrack can be tricky, especially when you need to join two sections of flextrack in the middle of a curve. It's easy to introduce a kink, guaranteeing operating problems. Here are some tracklaying tips that work for me.

## Cutting and fitting flextrack

You need a good set of rail nippers. To avoid damaging the cutting edges use them only for cutting rail. I happen to use Micro Engineering's but other brands are available.



CHRISTINE PAUL

**Fig. 1 CUTTING FLEXTRACK.** Use a heavy-duty rail nipper, like this one from Micro Engineering, to cut the track to length.



CHRISTINE PAUL

**Fig. 2 REMOVING TIES.** Remove a few ties from the end of the track by cutting the web (the plastic piece between ties) with a knife.



CHRISTINE PAUL

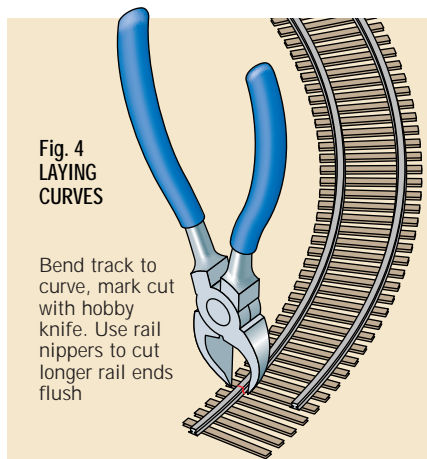
**Fig. 3 FILING RAILS.** File the end and underside of the rail as well as the web so a rail joiner will slip on easily.

To determine where to cut position the track and mark the rail with a knife. Figures 1 through 3 show how to cut the track and file the cut smooth.

## Laying curved track

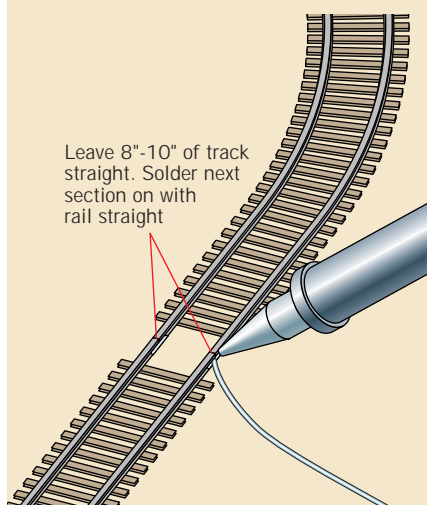
Because the rails start out the same length and the inside of a curve is always shorter than the outside, the inside rail will have to be cut. This isn't all that difficult.

For all but the tightest curves you'll find you need to use more than one piece of track to complete the curve. But if you lay the curved track and then add a second piece on the curve you'll likely end up with a kink.

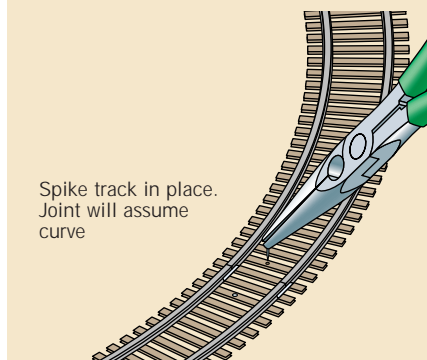


**Fig. 4 LAYING CURVES**

Bend track to curve, mark cut with hobby knife. Use rail nippers to cut longer rail ends flush



Leave 8"-10" of track straight. Solder next section on with rail straight



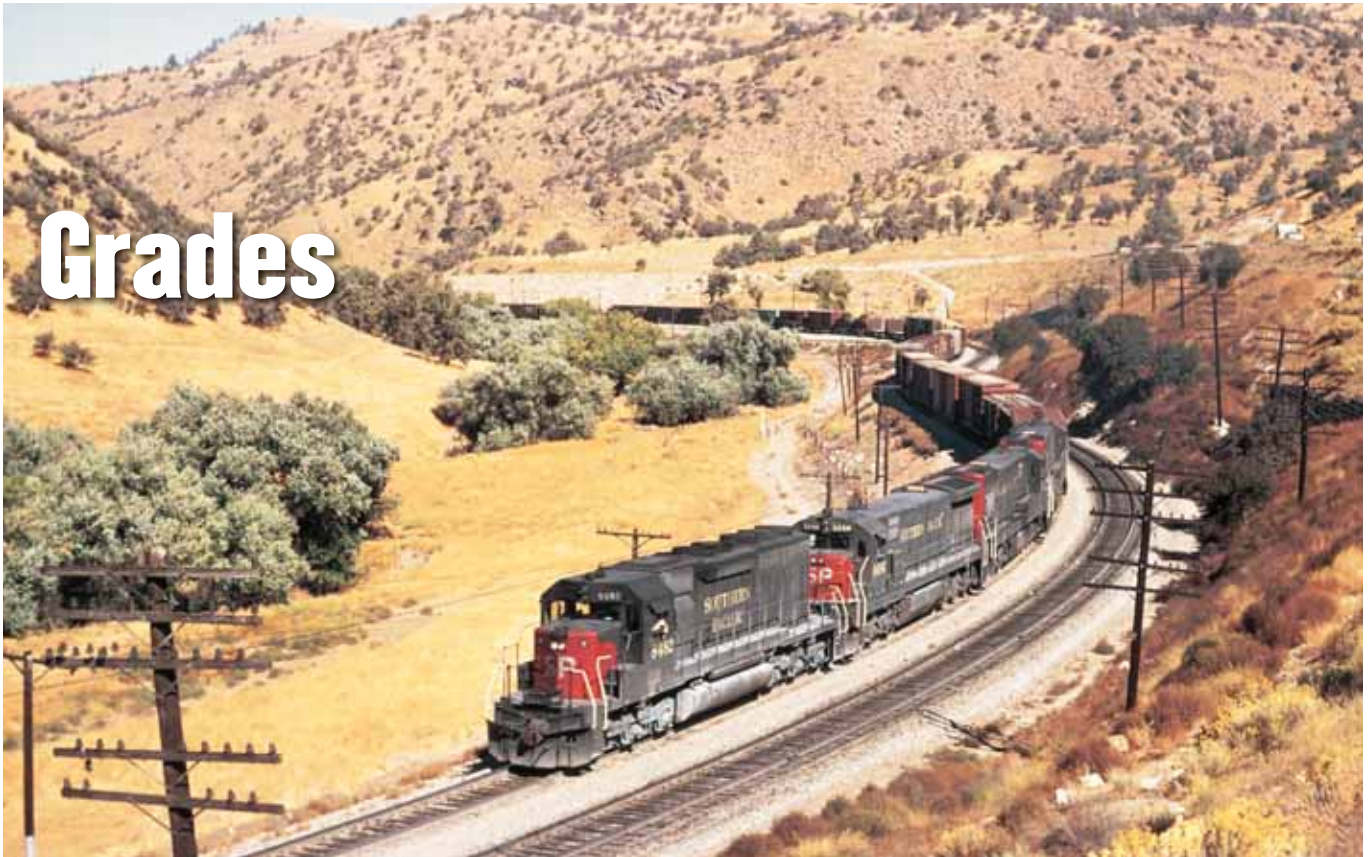
Spike track in place. Joint will assume curve

ILLUSTRATION BY RICK JOHNSON

To prevent that problem start the curve by spiking down a piece of flextrack through the start of the curve, leaving the last 8" to 10" straight (fig. 4). Cut the rail ends flush, file smooth, and join the next section of track.

Solder the joint while the track is still straight. Use rosin-core solder and a clean, hot iron. Heat the rail and touch the solder to the metal. The solder should take only a couple of seconds to flow. After the solder cools bend the track to the desired curve.

Smooth trackwork is critical to enjoying model railroading. Take your time and you'll be surprised at how precise your track can be. ♣



F. L. BECHT

Capturing the image of a train climbing the grade is the goal of many modelers. This is Tehachapi Pass in California, circa 1973.

I've yet to find one thing that confuses more model railroaders than grades. Sure, everyone knows what they are – essentially track going up or downhill. It's translating that to the layout that trips folks up.

### Doing the math

The math for figuring out the percent of grade for a model railroad is almost ridiculously simple. The basic formula is the number of units of rise per 100 units of run (fig. 1). The "unit" can be any measure of distance, though the easiest one for us to use is inches.

For example, a two percent grade climbs 2" for every 100" of travel. By the same token, a track that climbs 1" in 50" of travel or climbs 3" in 150" of travel is also a two percent grade. The length of the run is really immaterial, only the angle of the climb matters.

Don't let the grades get too steep as it's amazing what a slight grade can do to a locomotive's pulling power. Start by figuring on two or 2.5 percent. If you need to go steeper than that go for it but try keeping grades under four percent if at all possible unless you plan to run short trains or geared locomotives.

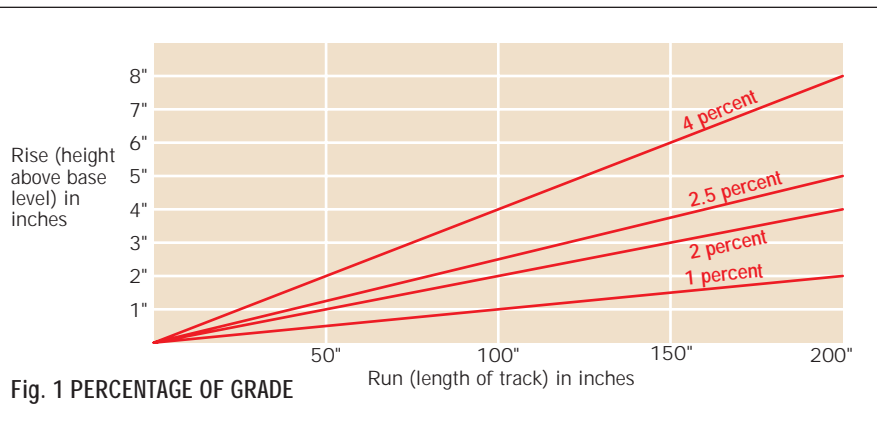


Fig. 1 PERCENTAGE OF GRADE

ILLUSTRATIONS BY RICK JOHNSON

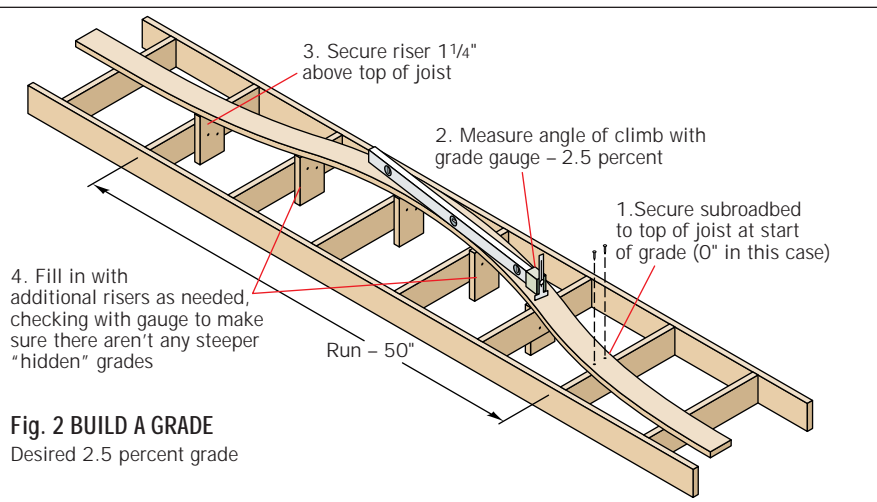


Fig. 2 BUILD A GRADE  
Desired 2.5 percent grade



BILL ZUBACK

The grade gauge from K-Tool Products fits on a standard two- or four-foot level. Set the dial at the desired grade (here, 2.5 percent).

### Making the grade

One way to add a grade to a flat tabletop layout is with the Styrofoam incline subroadbed from Woodland Scenics. These are precut subroadbed sections in two, three, and four percent grades. Glue them to the plywood and you're ready to add roadbed and track.

It's important to make sure the grade you're building matches the one you figured out on paper. The grade gauge (above) from K-Tool Products, is handy for this. It's available through Walthers and most hobby shops. Set the desired grade and place the level on your subroadbed. When the bubble reads level the subroadbed is at the proper angle.

To add grades to a long run I find it's easiest to figure out what the starting and ending point elevations are, relative to the tops of the joists. Then I secure the risers and subroadbed at those heights and fill in the additional risers needed for support (fig. 2). While doing that I check the grade with the gauge, since I don't want any hidden grades (undesired steeper grades within the length of the run) causing problems.

Finally, keep an eye on ceiling height. It's amazing how much elevation you gain with a long grade. If you're not careful you may burst through the ceiling and end up on the living room floor. ☛

# Easy easements

Laying tangent (straight) track is pretty straightforward but those curves can, well, throw you a curve. Equipment that enters a sudden curve is more likely to derail. And even if wheels stay on the rails the sight of a train jolting into a sudden curve can make even the most realistic layout look like a train set.

Your trains will look better and long rolling stock will track more reliably if you add an easement between the straight and curved track. An easement is a gradual transition, or a very broad non-concentric curve, inserted between the tangent track and the circular curve.

Obviously, you can't have a true easement with sectional track, although if possible you might want to insert a broader radius curve, like a 22"-radius section, between the straight track and the 18"-radius sections. Whether you're using flextrack or handlaying your track you'll find easements will keep things running smoother and looking better.

## The "bent stick" method

The prototype uses all kinds of fancy formulas to figure out easements, and you can spend a lot of time adapting those same formulas for model railroad use. But that's hardly necessary. The

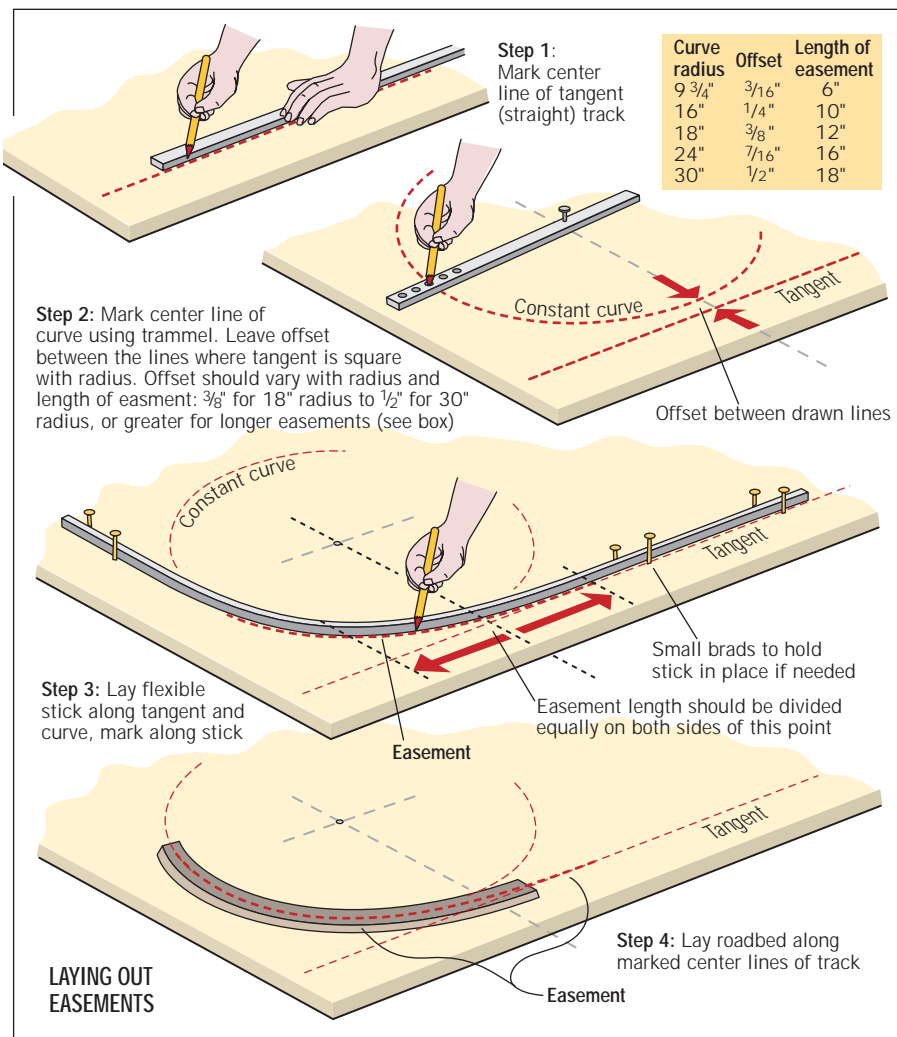
diagrams show how I plot easements using nothing more complex than a pencil and a flexible piece of wood.

Start by drawing the center line of the tangent track directly on the sub-roadbed. To ensure a constant radius curve use a trammel, which is nothing more than a piece of wood (a 1 x 1 works fine) with a hole for a screw or nail at one end and holes big enough to clear a pencil every inch starting with your minimum radius and ending up with the largest practical radius. Or you can use a template made from styrene, Masonite, or cardstock, cut to the desired curve.

Draw a circular curve of the desired radius. Don't connect this line to the center line for the tangent track – instead leave a slight offset, about  $\frac{1}{2}$ " to  $\frac{3}{4}$ ", between the two lines. The offset and length of the easement varies with the curve radius. For an 18"-radius curve the offset is  $\frac{3}{8}$ ", with a 12"-long easement. The offset is  $\frac{1}{2}$ " for a 30"-radius curve, with an 18"-long easement. Mark the point where the tangent is square with the radius and equally divide the length of the easement on both sides of that mark.

Now you're ready to mark the center line of the easement. Use a piece of flexible wood molding. Hold the wood along the center line of the tangent and bend it to match the radius of the curve you already marked. For very large curves you may need to temporarily drive a few small brads along the molding to hold it in place. Once you're satisfied with the alignment trace along the molding with a pencil, creating a nice smooth transition. Remove the molding and lay your roadbed or track in place along the center lines.

This is, admittedly, a simple way to lay curved track with an easement. A detailed explanation of easements, complete with a table showing suggested measurements for various curves, can be found in John Armstrong's *Track Planning for Realistic Operation* (Kalmbach). John also presents convincing arguments for using easements. ♣





JIM FORBES

**W**hen it comes time to lay track for a first layout, many beginning modelers think that laying roadbed is a hassle and are tempted to skip the step and lay track directly on the plywood table or subroadbed.

However, what they fail to realize is that model roadbed serves many important purposes. The first is appearance: Look at a real railroad main line and you'll see how it's elevated above the surrounding ground on roadbed and ballast. Model roadbed allows us to similarly raise the track profile, making the track look more realistic.

Model roadbed also provides a smooth contour for ballast. The sloped shoulders help define the ballast profile.

Other important reasons for using roadbed are that it provides a smooth, level base for track, and it also quiets

operations by insulating the track from the underlying wood base, which otherwise can act like a sounding board.

### Using traditional cork

The most common roadbed material is cork. It's available from many manufacturers such as Busch, Faller, Midwest Products, and others. It's easy to find, relatively inexpensive, and available in scales from N through G.

Cork roadbed comes as a single piece that's perforated down the middle and must be separated (see fig. 1). The samples shown are in HO scale, but installation of other sizes is the same.

Peeling the two halves apart, flipping one half over, and placing the pieces side-by-side provides a beveled edge on each side. The beveled edge helps to recreate the proper ballast profile.

Glue is the best way to install cork. Start by running a bead of white or yellow glue next to the track center line drawn on your subroadbed. Press the cork onto the glue, then use push pins or wire nails to tack the cork in place as shown in fig. 2. Don't drive the nails all the way into the cork – once the glue dries the nails will be pulled out.

Cork often has a burr along the beveled edges that can keep ballast from lying smoothly along the slope. To remove the burr, lightly sand it with a sanding block and coarse sandpaper.

To provide a smooth roadbed, be sure to stagger the cork joints so they don't fall directly above any subroadbed joints. It also helps to stagger the joints on the two halves of the cork.

When laying track on cork, the heads of track nails should be just above the



JEFF WILSON

**Fig. 1 SPLITTING CORK.** Cork strips are perforated at an angle down the middle, and the two halves must be peeled apart. You need to sand the rough edges after laying.



JEFF WILSON

**Fig. 2 GLUING AND TACKING.** Run a bead of white glue along one side of the track center line, press the cork in place, and secure it until the glue dries.



JEFF WILSON

**Fig. 3 ROADBED UNDER TURNOUTS.** Start by laying the outside two pieces of cork following the track center lines. Then cut the inner two pieces to fit and glue them in place.

## ROADBED ALTERNATIVES

In addition to cork, there are some other manufactured roadbed products available. Each offers unique advantages as a base for laying model railroad track:

AMI – Instant Roadbed – a self-adhesive uncured butyl rubber strip that sticks directly to the sub-roadbed. It can also be shaped to make roads and sidewalks.

California Roadbed Co. – HomaBed – a manufactured Homa-sote product with several contour profiles available. It works well for handlaying track.

Hobby Innovations – VinylBed – a single-piece roadbed made from multi-shaded gray granules of recycled vinyl. It is very flexible and has good sound absorption qualities.

Tru-scale Models – Milled basswood roadbed. It is available with a smooth surface or with pre-gauged ties for handlaying track and comes in straight sections and various radius curves.

Woodland Scenics – Track-Bed – a flexible single-piece sponge-rubber roadbed. It is easy to cut and also available in sheets for making yards. – *Jeff Wilson*

ties. Driving the nails too deeply can buckle the ties and kink the track, shifting it out of alignment.

### Laying roadbed for turnouts

Precut turnout pads are available in various sizes and scales from Midwest and IBL, but it's also easy to cut even complex arrangements yourself.

Start by laying cork strips along the outside of both the straight and diverging routes. Add the inside part of the straight route, using a hobby or utility knife to cut off the beveled edge where it will meet the other cork strip.

Lay the remaining strip of cork in place and draw a cut line with a marker. Cut the cork and lay it in position as shown in fig. 3.

Here, the joints don't have to be perfect, as they'll later be covered by ballast. Simply make sure that the cork is level so it will firmly support the track.

With a little knowledge and practice, you're now well on your way toward providing a smooth roadbed base for your trackwork! ♣



PHOTOS BY JEFF WILSON

# From track plan to benchwork

**Y**ou've managed to find the perfect track plan in a book or magazine, or you've spent hours at the drawing table or computer carefully drafting a track plan. The next step is transferring the track plan to your layout table or benchwork.

If you've never done this before, the first thing you'll probably learn is that – regardless of how carefully you've measured – track will almost always take up more room on the layout than it did on paper. It is important to take your time and be precise, as any miscalculation will hinder tracklaying.

## Tools and tricks

One of the first steps in track planning is drawing a grid on the plywood (or whatever surface your layout top happens to be). As fig. 1 shows, a drywall T-square with a four-foot arm is invaluable for this. A 12" grid is usually sufficient, but for complex plans you might want to add grid lines at the 6" marks as well. It's also important to draw grid

lines on the track plan to match those on your layout surface.

Once the basic grid is drawn on the layout and track plan, the next step is to mark out the radii of curves. Figure 2 shows how to find and mark the center of the radii on the track plan. Transfer



**Fig. 1 GRID ON TABLE.** A drywall T-square with a four-foot arm works well for laying out a grid on the table. A 12" grid is sufficient for most track plans.



**Fig. 2 CURVE CENTERS.** Measure to find the center point of each curve, then mark it on the track plan.



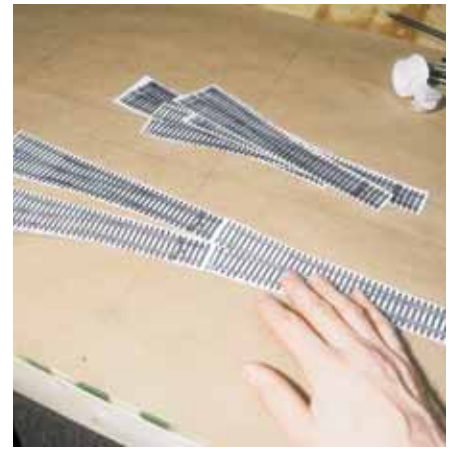
**Fig. 3 CURVE TEMPLATES.** These templates are especially handy for drawing broad curves. They can be made from styrene, hardboard, or thin plywood.

the center point to the layout table, then use a compass to transfer the curve to the table.

You can make a large compass by using an old wood yardstick. Holes in the yardstick at 1" intervals make handy guides for a pencil.

However, some curves are too broad to easily use a yardstick, or the center of the curve may be well off the layout table. In this case curve templates work well (see fig. 3).

My curve templates are about 40" long and made from large pieces of .060" styrene that I had on hand. You can also make them from hardboard (such as Masonite) or thin plywood. Cardboard will work, but it is not as durable as hardboard. I made my



**Fig. 4 LAYING TURNOUTS.** While turnout templates can be trimmed for size, they must be kept in proper alignment. As you use the turnout templates, tape them in place to prevent the track from becoming misaligned.

templates in 2" intervals from 18" to 44", and as the photo shows, there is different radius on each side of the template.

### Planning turnouts

Probably the most difficult part of track planning is leaving enough room for turnouts. They always seem to take up more space than originally figured, and every manufacturer's turnouts vary slightly in size and shape. Because of this, complex trackwork in published plans often doesn't fit the same way on a layout.

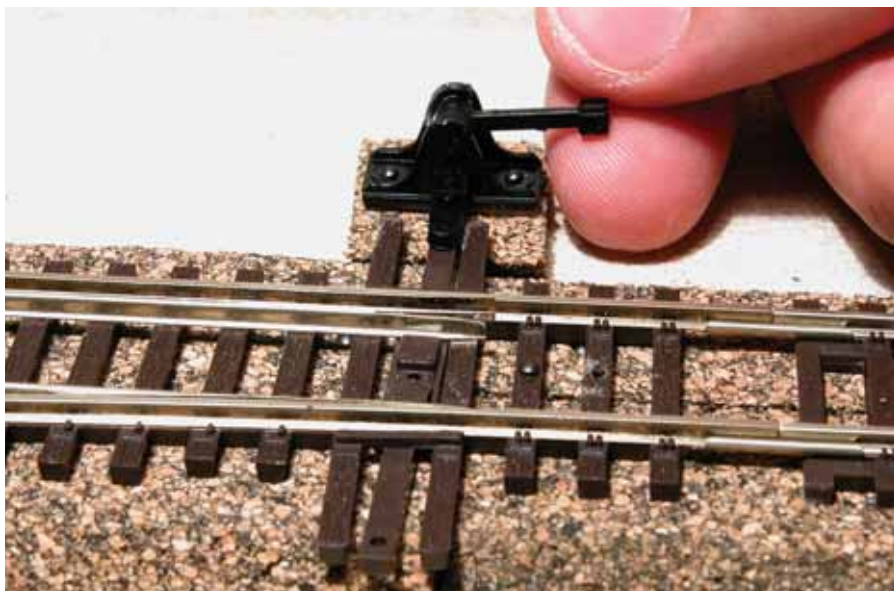
To remove the guesswork, make several paper turnout templates by placing turnouts on a photocopier, then running off as many copies as you need. Be sure to label them with the brand name and size.

As you use templates, tape them in place, as shown in fig. 4. Alignment is the important thing – remember that you can trim turnouts to fit tighter areas as long as you maintain proper alignment and track center spacing.

### From paper to benchwork

Large rolls of newsprint or brown craft (or wrapping) paper work well for laying out full-size plans. You can do this even before starting benchwork by laying the paper on the floor where the layout will go.

Getting your track plan to the benchwork is a fun step in visualizing what your finished layout will look like. Work carefully and take your time, as the process is vital in getting track to fit properly, which will enhance operations and enjoyment. ♣



PHOTOS BY JEFF WILSON



Fig. 1 PROTOTYPE SWITCH STAND. On the real thing, the switch rod connects the points to the switch stand, which is operated by hand.

# Manual switch controls

**T**rack switches – usually called “turnouts” in the modeling world – are the key trackwork component that make running our trains interesting. Part of reliable operation is to make sure that the points, the moveable part of a turnout, always stay put in the direction they’re set. Otherwise a train can end up on the wrong track, or worse yet, derail.

There are many different ways to operate the points. Electric switch motors are popular and work well; however, many modelers use manual controls as they are reliable, inexpensive, and easy to install.

## The prototype and the model

Let’s start with a look at a prototype (real) switch. The points are secured at one end to the switch rod. The switch rod extends under one stock rail to the switch stand as shown in fig. 1. The mechanism holds the points securely against one stock rail or the other, depending on how it’s set.

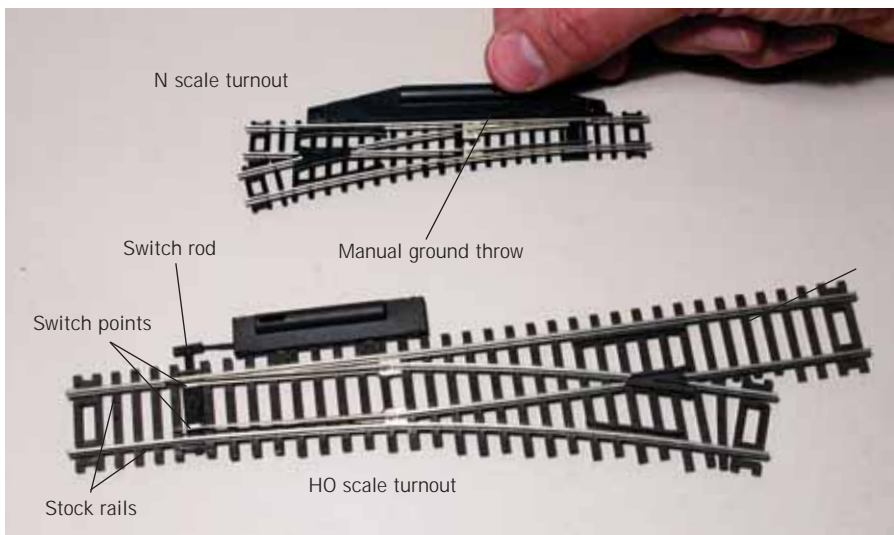
Model switch points operate in similar fashion. Having a manual switch stand or ground throw might not seem necessary at first, but you’ll eventually find it important to have some type of mechanism to hold the points in place.

Without positive locking, the points can creep away from the stock rails and cause a derailment.

## Ground throws

Some model turnouts, like the Atlas HO and N scale turnouts in fig. 2, come with a manual switch controller already attached. These often look the same as above-table electric switch motors but without the wires. Although this type of mechanism works, it’s unsightly and bears little or no resemblance to anything found alongside a real switch. As you gain experience in the hobby you’ll find that for esthetic reasons, it’s best to discard this type of controller and change to a less conspicuous ground throw.

Operating ground throws are made by Caboose Industries, NJ International, Rix, and others. You’ll find them in functional sizes from N through O scales. Although many tend to be a bit oversize compared to a real switch stand, these ground throws look much better than the manual controls in fig. 2, and they operate very well.



◀ Fig. 2 BASIC CONTROLLERS. These Atlas N and HO turnouts come with manual switch machines. Though they work well, the large mechanisms don’t look very prototypical.

### Installing a ground throw

The procedure for installing a ground throw is simple. Start by determining which side of the turnout you want to position the ground throw. Next, check the unit's mounting pin as styles vary among manufacturers. Caboose Industries' throws, such as the no. 202 ground throw (shown in fig. 3 with an Atlas HO turnout), have a pin on the bottom of the operating rod, designed to fit in a hole on the turnout's switch rod. If the switch rod doesn't already have a matching hole, it's easy to drill one to fit the pin.

For good operation, the ground throw must sit at the proper height to match the level of the switch rod. As seen in the prototype photo, real switch stands rest on the turnout head blocks – long ties on either side of the switch rod. You can make extensions for model turnouts out of stripwood or styrene if you like, but in this case I simply added a thin piece of wood to shim the ground throw to the proper height. The shim can be glued in place and hidden when you ballast the track.

To install the ground throw, set the lever of the ground throw so it's at the halfway point and the switch rod is at its midpoint as well, as seen in fig. 4. Next, fasten the ground throw in place with small track nails or spikes. When secure, move the mechanism each way to make sure the points are held tightly in each position.

### The toggle spring method

You can also make a latching device for your turnouts from wire. It's another inexpensive project that's easy to make and quick to install.

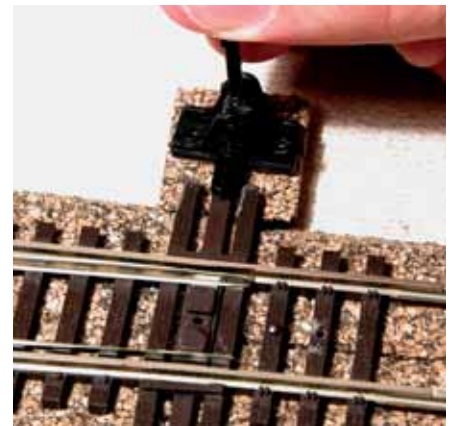
Straighten out a small paper clip, then bend a portion of it into a V-shaped spring as fig. 5 shows. To install the spring, insert its long leg into a hole drilled through a tie near the throw bar. The short leg should then be set into a hole in the center of the throw bar.

For the proper tension, the space at the open end of the V should be slightly longer than the distance between the holes in the throw bar and tie. The paper clip spring provides a toggle action that snaps the points into place when pushed by hand. Once you've installed and tested the spring, paint it black or dark brown so it blends in with the track ties.

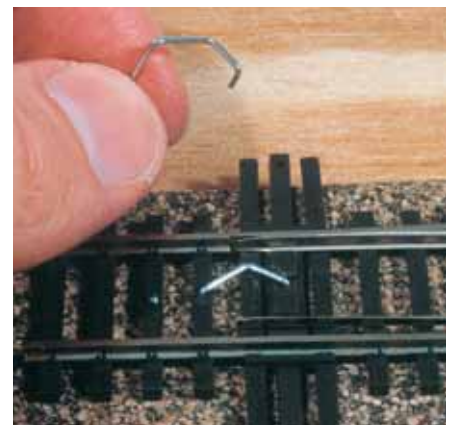
With a little effort, you can quickly have smooth-working turnout controls, which will go a long way toward improving your layout's operation. ♣



**Fig. 3 MOUNTING.** Caboose ground throws have a pin that mounts in a hole on the turnout's switch rod. If a matching hole is needed, it's an easy task to drill one.



**Fig. 4 ALIGNMENT.** Set the ground throw in place with the turnout switch rod and ground throw lever at their halfway points. Secure the ground throw in place with track nails or small screws.



**Fig. 5 TOGGLE SPRING.** A simple spring made from a paper clip works well for controlling turnouts. After installing and testing the spring, paint it black or dark brown to blend in with the track ties.



PHOTOS BY JEFF WILSON

# Grade crossings

**W**e're all familiar with the sight of flashing lights and descending gates as we approach the railroad tracks. These intersections, where railroads and roads cross each other, are known as grade crossings. They are an interesting feature of railroads that can be a focal point on our model railroads.

The most common types of grade crossings on real railroads today (used on most new installations since the late 1960s) are prefabricated rubber-and-concrete crossings made up of panels that are secured to the ties. See fig. 1.

Prior to prefabricated designs, the most commonly used material for crossings was hardwood with planks

bolted in place over the ties. These can be found on all types of roads, from concrete and asphalt highways to gravel country lanes. Although wood crossings are being phased out, you can still find them in service in many locations.

Paved grade crossings are also in common use, with asphalt laid up to and between the rails.

## Modeling grade crossings

You can either model your own grade crossings or use commercial kits. Modelers in HO can choose from rubber crossings from Accurail (no. 117) or Walthers (no. 933-3137) as well as a wood crossing from Blair Line (no. 165);



Fig. 1 PROTOTYPE CROSSING. Prefabricated crossings, like this rubber one, are the most common type in use today.



Fig. 2 KITS. Two HO models available are the Walthers plastic kit for a rubber crossing and the Blair Line timber crossing.

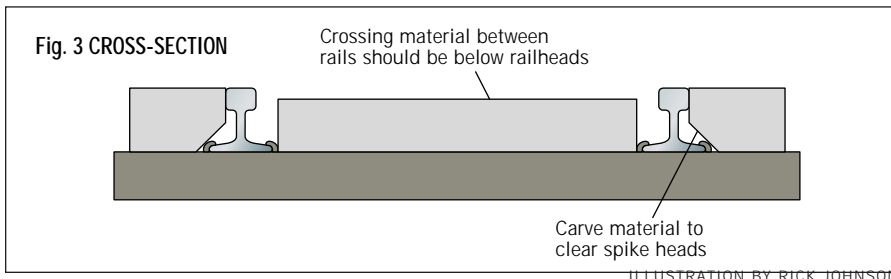


Fig. 4 PAINTING. Paint the ties and insides of the rails the color of the crossing material to



Fig. 5 CUTTING. The Walthers grade crossing can be cut to almost any length needed, so even wide highways aren't a problem.



Fig. 6 CARVING. Carve away any material that interferes with the crossing fitting next to the rail.



Fig. 7 PLACING. After test-fitting the parts, place drops of CA on the ties and set the crossing in place.

N scale modelers don't yet have prefab rubber crossings, but timber models are available from Blair Line (no. 65) and Cal Freight (no. 1185).

Figure 2 shows two HO crossings: the Walthers rubber crossing, made of unpainted injection-molded styrene, and the Blair Line timber crossing, made from stained wood.

Whether using a kit or making a crossing on your own, it's important that the crossing materials not interfere with operation. See fig. 3. The material on the outside of the rails should butt firmly against the rails but shouldn't be any taller than the railheads. Keep the material between the rails below railhead level to avoid snagging uncoupling pins or otherwise interfering with operations.

It's easiest to add grade crossings before you have ballasted the track, but you can add crossings over ballasted

track as well – just make sure no stray pieces of ballast interfere with the crossing materials.

Paint the ties and insides of the rails to match the crossing materials. See fig. 4. This helps disguise the fact that modeled flangeways must be noticeably wider than those on real crossings.

The Walthers crossing is made for a very wide street, but the pieces can be cut to any length to match the width of the road material. See fig. 5. I cut mine to 23 feet to match my styrene highway, then painted it black.

The wood crossing requires some prep work as well. Carve away enough wood from the bottoms of the outside pieces (entire length) on the side where the timbers meet the rail. See fig. 6. If you don't do this, the track spikes will keep the pieces from butting firmly against the rails. The Walthers crossing is molded to fit over the ties.

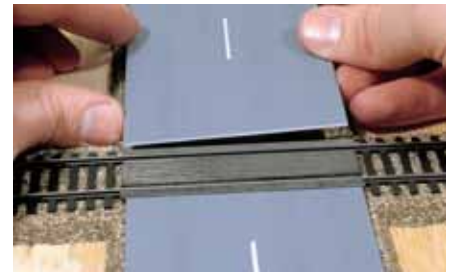


Fig. 8 ROAD. Add the road material so that it is flush with, but not higher than, the top



Fig. 9 ASPHALT CROSSING. You can make an asphalt crossing by simply continuing the road material across the rails.

Test-fit each piece to make sure it fits properly. Add drops of medium or thick cyanoacrylate adhesive to the ties, then press the pieces in place as in fig. 7.

Once the crossing is in place, test it by running a locomotive and car through it to make sure that nothing catches. A National Model Railroad Association standards gauge is handy for checking the flangeway widths to make sure they are correct.

Now you can add the road material. I cut my roads from pieces of .060" sheet styrene, painted them gray, and weathered them with black chalks, as shown in fig. 8.

You can also make your own asphalt crossing. To do this, run the road material (styrene in fig. 9) up to the outside of the rails, then cut a thin piece to fit between the spikes and the rails. This is also the easiest method to use for curved grade crossings, as the road material can be cut to match the curve of the track.

You can also make wood crossings using scale stripwood. Curved crossings are made by cutting the stripwood in six- or eight-foot lengths and placing them end-to-end at a slight angle.

Finish the scene by adding ballast and scenery materials. You'll appreciate the added realism that these grade crossings bring to a layout. ♣



PHOTOS BY JEFF WILSON

# Cleaning track

**W**hen it comes to nuisances that interfere with running trains, dirty track is probably the number one offender. Running trains is the goal – not nudging stalled engines. By cleaning track regularly, you can keep your trains running smoothly.

Dirty track is caused by a combination of dirt and dust that accumulates on railheads. In addition, an oxide forms on both brass and nickel-silver rail over time. The oxide on brass rail inhibits electrical contact, but the oxide on nickel-silver rail is conductive. For this reason I recommend using nickel-silver rail.

An important factor in keeping track clean is eliminating sources of dust and dirt. Among the best ways to do this is to put your layout in a finished room. If you have a layout in a basement or attic, install a ceiling (solid or suspended) in the entire room or just over the layout to minimize the amount of dust and dirt that gets on the rails and scenery.

You'll also want to isolate the layout from sources of dust, such as workshops. Keeping windows closed also helps, as open windows let in a great deal of dust. Smoking also results in grime on the track, so if you must smoke, do it away from your layout.

**Fig. 1 TRACK CLEANING TOOLS.** Many products are made for cleaning track, including (clockwise from lower right) the Roco no. 10002 cleaning block, Walthers Bright Boy (no. 949-521), Centerline track cleaning car, Life-Like no. 1415 track cleaning fluid, and Aztec track cleaning car.

## Methods of cleaning track

Cleaners fall into two broad categories: track cleaning cars, which are designed to do the work for you; and products that require you to do the cleaning work.

In general, I've found that when starting with extremely dirty track – such as newly laid or painted track, or a layout that hasn't been run in several months – the only way to get track truly clean is with elbow grease and an abrasive cleaning block such as the Walthers Bright Boy or Roco cleaning block seen in fig. 1.

Rub the block along the rails, as shown in fig. 2, being careful not to bump into nearby details. Also use care around turnouts and other complex track areas, but make sure the points, frog, and other rails in these areas are thoroughly clean.

Follow this with a cloth, wiping the rails to remove any residue left behind from the cleaning block. Going over the

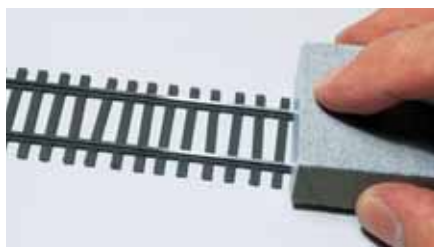


Fig. 2 ABRASIVE CLEANERS. Abrasive cleaners, such as the Roco cleaning block, are effective for extremely dirty track.

track with a vacuum to suck up stray dust, dirt, and ballast is also helpful.

Don't use sandpaper or emery paper to clean track. The abrasives in these are harsher and leave small grooves in the railheads, which accumulate dirt, dust, and oxidation. The net result is impaired electrical contact.

Liquid track cleaners are another option. With these, you brush the cleaner on, then wipe the rails with a cloth. Some products are made specifically for cleaning track, such as the Life-Like track cleaner in fig. 1. Other fluids that work well are Goo Gone and TV tuner cleaner.

### Keeping it clean

Once you have the track clean, the best way to keep it clean is to run trains frequently. Although I have no scientific proof, I've found – and I've talked to other modelers who agree – that metal wheelsets and track tend to polish each other, much in the way that well-used wheels and rail stay shiny in real life.

Track cleaning cars also keep track clean. There are two main types: those that use a wet pad and those that use a dry abrasive wheel (some use both).

The Centerline car in fig. 1 uses a cloth wrapped around a heavy brass roller. The cloth is moistened with track cleaning fluid and the car pushed or pulled around the layout. Some modelers use these in pairs, with the lead one wet and the trailing one dry. They are available in scales from N to G.

The Aztec car in fig. 1 uses a pair of abrasive wheels to clear grime off the tracks. The wheels are set at a slight angle to the rails to increase the drag. Versions of these cars are available in both HO and N scales.

You can make your own inexpensive track cleaning car using a small piece of Masonite hardboard, as fig. 3 shows. A pair of galvanized roofing nails glued with epoxy to the Masonite fit through holes drilled in the floor of a boxcar. The weight of the pad is enough to hold it to the rails, so it polishes the rails as the car moves along.

Because the pads aren't permanently attached to the car, you can remove them at any time. These pads won't clean the track if it's especially dirty, but they help maintain track already cleaned. The pads have to be sanded clean before each cleaning (or operating) session, otherwise they end up just spreading dirt.

Model railroading is the most fun when you don't have to worry about operational problems, and keeping your track clean will make that possible. ♣



TWO PHOTOS BY JIM FORBES



Fig. 3 MASONITE CARS. Simple – and effective – cleaning cars can be made by gluing a pad of Masonite hardboard to a couple of nails. Drill holes in the floor of the car to clear the nails. The pads can be sanded clean when they become dirty.

# Model Railroader— the world's most popular model railroading magazine!

In every issue, *Model Railroader* encourages your creativity and your love of trains. You'll get page after page of expert advice and inspiration to help you become a better, more accomplished model railroader. You'll discover tips to make building your layout easier, step-by-step modeling projects, product reviews, and you'll see inspiring full-color photos of the best model railroads in the world!



## Subscribe today!

Order online at [www.modelrailroader.com/promo](http://www.modelrailroader.com/promo)

Enter code: I4BM or call 800-533-6644

Monday-Friday, 8:30am-5:00pm Central Time.  
Please have your credit card ready.  
Outside the U.S. and Canada, call 262-796-8776 x661

**Model  
Railroader**