Trackwork at the Hoot Valley complex shows #8 limestone gravel roadbed underlying the #9 limestone ballast. The near track is the mainline and the other is the lumber-yard and engine-service siding. (The mainline runs through the train-storage shed in the background.)

How to build a garden railroad

PROJECT GARDEN RAILWAYS PART FOUR RAILROAD

Part 4: Laying track

by Don Parker | Oberlin, Ohio | Photos by the author except where noted

In my last article I covered the various types of track and turnouts you might choose for your garden railroad. Now it's time to get that track onto your prepared roadbed so you can finally start running trains. I'll describe how I installed flex track on my Hoot 'n' Holler Railroad as an example of one way to lay track.

Bending rail for flex track

To get smooth curves with a uniform radius, you must use a rail bender. Theoretically, code-215 aluminum rail could be bent by hand but it is very difficult to get consistent results that will hold their shape. All code-250 rail, and especially code-332 rail, requires a rail bender. This device consists of three, grooved, steel wheels (made specifically for each size rail), with the center wheel movable on a threaded rod. The rail passes between the outer two idler wheels while the center wheel is positioned and turned to produce the desired-radius curve.

I used a piece of chalk on a string to draw an arc with a four-foot radius on my

garage floor. Then I worked by trial and error to produce a curved rail to match my chalk arc; a pen mark on a piece of masking tape (placed on the knob that adjusts the center wheel of the rail bender) identified the setting to produce a four-foot-radius curve. Other radii were determined or estimated, going up from my four-foot minimum. My rail bender is screwed onto a short piece of 2x4 lumber, making it portable yet sturdy enough to use trackside in adjusting each rail for the specific bend I needed.

Placing tie strips on the rail

After bending the rails for the section of track being laid, I added tie strips to produce the finished track, using a folding card table close to the area under construction. It is best to slide both rails at the same time onto a tie strip. This process goes faster and easier if the tie strip is first placed flat on a firm surface and you thread both rails through the tabbed grooves of each tie on the strip. Working from one end, push the first tie strip to the center of the rails and keep adding strips until you build that half of the track section; then repeat the process from the other end.

This is rather straightforward if you are making straight sections of track. (You may prefer to buy six-foot straight sections already assembled.) However, six-foot rails bent for a curve seldom come out with the inner and outer rail radii appropriately proportioned, especially when a compound curve is involved, such as an "S" curve. Not to worry; the rail is flexible enough that the tie strip's spike tabs will get everything lined up properly, with the correct gauge firmly established.

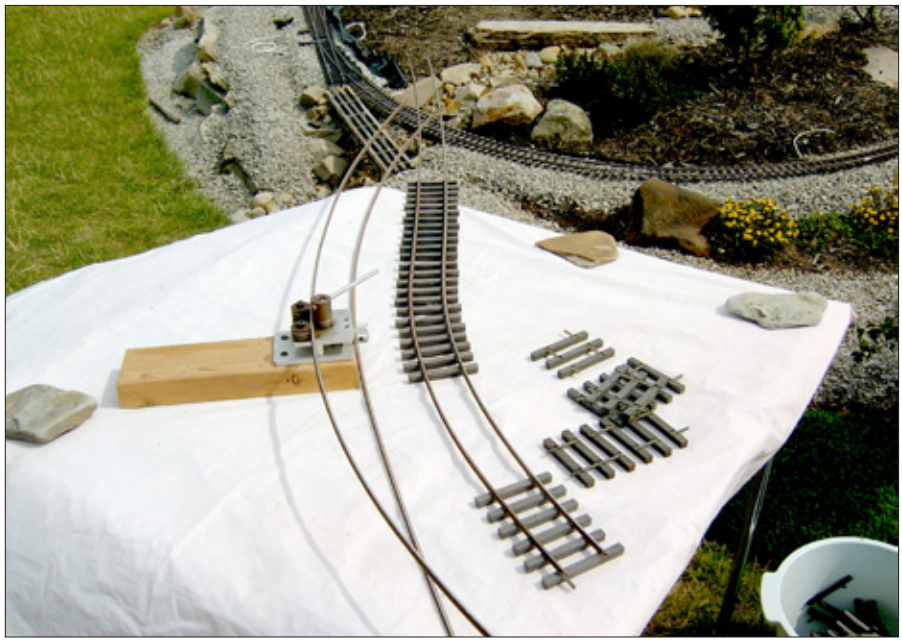
Extra patience is required in threading these curved rails onto the tie strips, as they tend to bind more easily than straight rails. This can become tedious and, for the purpose of keeping it fun (and keeping one's sanity), you should probably intersperse this task with less stressful building projects. You might also choose to do it in a shady spot with a cool drink nearby and, better yet, with a couple of friends to make it a track-laying party.

Cutting and fitting track

As the track laying progresses around curves, the ends of the rails will get further apart, the inner rail advancing and the outer rail falling behind, due to the difference in radii. This doesn't matter too much, as the track will eventually curve the other way and the track ends will get back in sync. When the ends are not lined up, however, putting the final tie strip on the single longer rail of one section while threading the opposite rail of the new section will take a little practice.

When track with disproportionate rail ends abuts a turnout, or other instances where you need the ends to match, you must insert a short piece of rail to fill the gap on the short side (see photo). It is easier to insert a rail to fill a gap in a straight section compared with trying to match a curve with a short piece of rail. Use a razor saw with fine teeth (such as Atlas' Super Saw, which is not recommended for stainless steel) or a rotary cut-off wheel to cut rail.

I used brass rail clamps to firmly fasten rails together (the brass darkens nicely to match the weathering paint on my aluminum rails). I started with Hillman's Rail-Clamps but later switched to Split-Jaw



A card table provides a flat work surface at a comfortable height to thread rails onto tie strips. On the left, a rail bender is forming a rail with a four-foot-radius curve.

A section of rail is being inserted between the track and a turnout to fill the gap in the outside rail produced by a long curve. Two Split-Jaw Rail Clamps and a ball end, Allen-headed screwdriver are in the middle.

Adding ballast (#9 crushed limestone) over the #8 limestone roadbed. A can and an old dishwashing brush facilitate the process.

JOYCE PARKER

Occasionally, after a heavy rainstorm or before an open house, a quick top dressing of ballast will freshen up the trackwork.

Rail Clamps, which I find easier to position and tighten. Both of these clamps employ tiny threaded machine screws with Allen heads. An "L" shaped Allen wrench is supplied with the clamps. However, I would urge you to invest in a ball end, Allen-tip screwdriver made for these screws. When you are crouched in an awkward position trying to get two rails to line up in the 39th clamp of the day, while working at the same time to tighten two small screws, you'll thank me for the suggestion. The ends of rails can be made to abut tightly in a rail clamp by tapping the other end of the rail being added with a non-metal mallet or piece of wood before completely tightening the screws.

Making smooth transitions

One of the things that can make even the most detailed model train look toy-like is jerky motion in the train's progress. When this occurs at the start of a curve, it is likely due to poor alignment between the straight track and the curve. I covered this in my previous articles (April and June issues) but it deserves repeating.

Make sure the radius line of the curved track lies at 90° to the straight section. Double check this after the track is secured in place, by getting down and sighting along the track; a mismatched junction will be obvious and produce what I call a "kink" in the track. Where curves with different radii meet, or where two tracks that curve in opposite directions meet, make sure that the radius line of each curve lies at 90° to the tangent of the other curve. And, for the smoothest operation, I would recommend having a straight section of track—at least the length of one rail car—between opposite-direction ("S") curves. If you plan to run higher-speed trains (as in mainline operation), I'd suggest including a transition section (using a curve with a greater radius) leading into each curved section.

Clearances

To be sure that trains operating on adjacent tracks will clear each other, allow 5½" clearance between straight tracks and 6½" clearance on curves (measuring from the center of each track). Also, be sure to allow sufficient clearance between trains and trackside structures or landscape features: 2⅜" for straight tracks and 3½" for curved tracks (again measuring from the center of the track).

Adding ballast to track

After you are satisfied that all trackwork is completed, it's time to add ballast. This is not only for prototypical good looks, but it helps to hold the track in place when relying on the "floating" method. Ballast also allows for final adjustment of grades and grade transitions as well as appropriate superelevation on curves.

I use #9 crushed limestone for ballast but there are many other crushed rocks, or "fines," that will work as well. I sprinkled ballast liberally between the rails and

Other parts of this series

April: Vision and planning
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December: Accessories, structures, and lighting

along both sides of the track and then worked it down between the ties with an old, stiff dishwashing brush that had just the right width of bristles. Little stones need to be kept from piling up on the inside of the rail and kept out of switch points, frogs, and guard rails. The brush works well 95% of the time, but an occasional tiny stone gets wedged in a tight spot and requires the use of a sturdy pointed object to dislodge it. It is worth double and triple checking every turnout to find any of these wedged, wayward stones that will easily derail even the heaviest locomotive.

A number of garden railroaders put some form of bonding material on the ballast to hold it in place. There are drawbacks to this: it takes some skill to get it right, it is harder to repair when chunks come out, and the track is not truly "floating"—rail expansion can push the track out of the ballast or crack the bonded ballast. This method works best for track anchored to solid sub-roadbed members and in frost-free areas.

For the occasional ballast stone that gets stuck in a tight spot, a pointed tool (such as this weeding tool) will help dislodge it.

This shot of Flat Rock illustrates important places for careful measurement of clearances: between adjacent straight tracks and on curves, and from trackside structures (see text for specific numbers).

Track maintenance

I currently have no need for track cleaning, since I run trains with battery power and radio control but I'm quite aware of the need for clean track surfaces when running with track power. In fact, my choice of battery power was a direct result of countless hours of tedious track cleaning on the two HO layouts I had earlier in my life. So, suffice it to say, plan on cleaning track and do it regularly if you are going to use track power (depending on the type of rail you have, as I pointed out in my last article in this series).

If you live in an area that has freezing winter temperatures, there will be some track maintenance in the spring. Frost heave may move ballast and roadbed gravel around, at the least, and can alter track elevation and cause rails to separate at connections (rail joiners and even rail clamps). It would be good practice to make sure your track elevation is consistent as you add new ballast in the spring. If there are excessive dips in the track, push the base roadbed gravel up to level the track before adding the final ballast. Heavy rainstorms may also rearrange the ballast and you might need to add a little top dressing of ballast in these instances. Inspect every rail joint during your spring maintenance to make sure there have been no disconnects or loosening of clamps.

If you have trees or large shrubs nearby, you will need to do a "debris patrol" before each run. This may also be necessary if you have pets that occasionally run across the railroad. Don't forget to check every turnout for wayward ballast rocks or other debris that wind or rain can move into potentially disastrous spots. While you are checking turnouts, make sure the point motors have not lost power (disconnected air lines or electrical snafus).

In the final installment of this series I'll cover the placement and care of buildings, wiring them for lighting, using figures and accessories, train storage, and ideas for a functional control panel.

INFORMATION STATION

Learn more about handlaying track. Go to **GardenRailways.com** and click on the "Downloads" tab under "Shop."