Building L-GIRDER benchwork

This progress photo of our State Line Route N scale project layout shows all phases of model railroad construction, from bare plywood to scenery. Cody Grivno photo

A flexible layout support system for railroads large and small

By David Popp

For as long as there have been model trains, people have been looking for ways to build something to keep those trains off the floor or kitchen table. That "something" is usually called benchwork. There have been a lot of methods for building benchwork over the years, and after constructing more than 30 layouts, I feel as if I've used a good portion of them myself.

The one technique I keep coming back to again and again, however, is called L-girder benchwork. This system for building layouts was invented by former *Model Railroader* Editor Linn Westcott in the 1960s, and it's a simple, sturdy, and flexible way to make a model railroad.

The system uses basic leg assemblies to support pairs of girders separated by spacers. The girders are made from two pieces of dimensional lumber (usually a 1 x 4 and a 1 x 2) to form a beam with a flange on top. Even though it is inverted, the finished girder looks like a capital letter L, giving the system its name.

With the legs and girders assembled, you can add joists and risers just about anywhere you want across the tops of the L-girders to support your roadbed, track, and scenery.

You can easily build the legs, girders, joists, and risers yourself from common building materials. As shown here, I used L-girder benchwork on our State Line Route N scale layout, but you can use the same techniques to make just about any model railroad large or small. It's even under the large, room-filling HO scale MR&T. In fact, that's exactly why I chose it: Our smaller State Line Route layout is made to be expandable. Just split the layout into its two halves, make a few more L-girders and legs, and you can quickly add new sections to your railroad empire. This system works so well, I even used it for my large slot car track at home!

The State Line series

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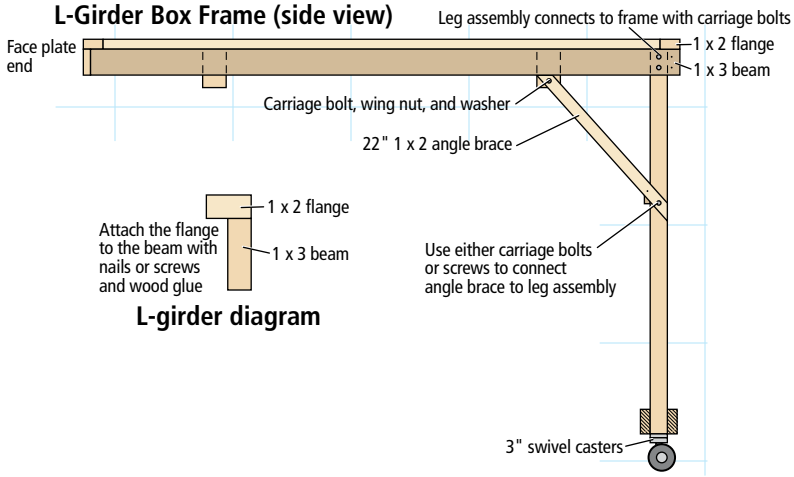
MR&T

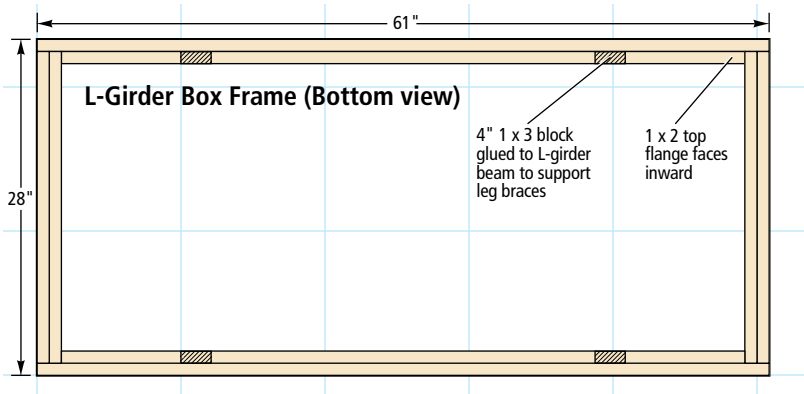
Building L-girders

As shown in the illustration here, L-girders are very easy to make. The size of boards you use for the girders depends upon the length you want the girder to span between leg assemblies. Because the L-girders are glued and nailed together, they are much stronger than each piece used individually. They also are not prone to warping or sagging over time.

I've built L-girders up to 16 feet long using a 1 x 4 beam and a 1 x 2 for the flange. For our project railroad, though, I didn't need it to be that big, so I used 1 x 3s for the beams with 1 x 2 flanges.



Illustrations by Kellie Jaeger



L-girder box frame

Because the layout needs to both roll and come apart into two sections, I built a pair of L-girder boxes, one for each half of the layout. The boxes are 61" long by 28" wide. The flanges face into the boxes. I used L-girders for the ends of the box as well, which provides an attachment point for the joists that fan out to form the curved ends of the model railroad.

The legs attach to the L-girder frames with ¼" carriage bolts, wingnuts, and washers. To give each set of the legs stability, I installed a pair of 22" long 1 x 2 angle braces. The braces attach to the box frame at four 4" 1 x 3 blocks glued to the beam 12" from each end, as shown in the diagram.

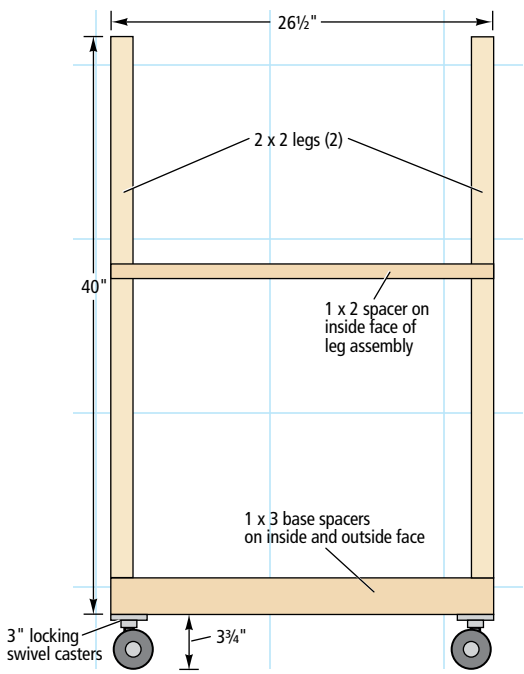
Basic leg assembly

Our basic leg assembly requires two legs, made from 40" long 2 x 2s, a 1 x 2 mid-section spacer, and two 1 x 3 bottom spacers. To fit our layout, the finished leg assemblies are 16½" wide. Because our layout needs to move around a lot, I installed 3" locking casters on the bottom of the legs. If you are building a permanent layout, you can forgo the casters and install furniture leveling feet, found in the hardware section of most home centers. For this layout, I built three leg assemblies.

Benchwork lumber list

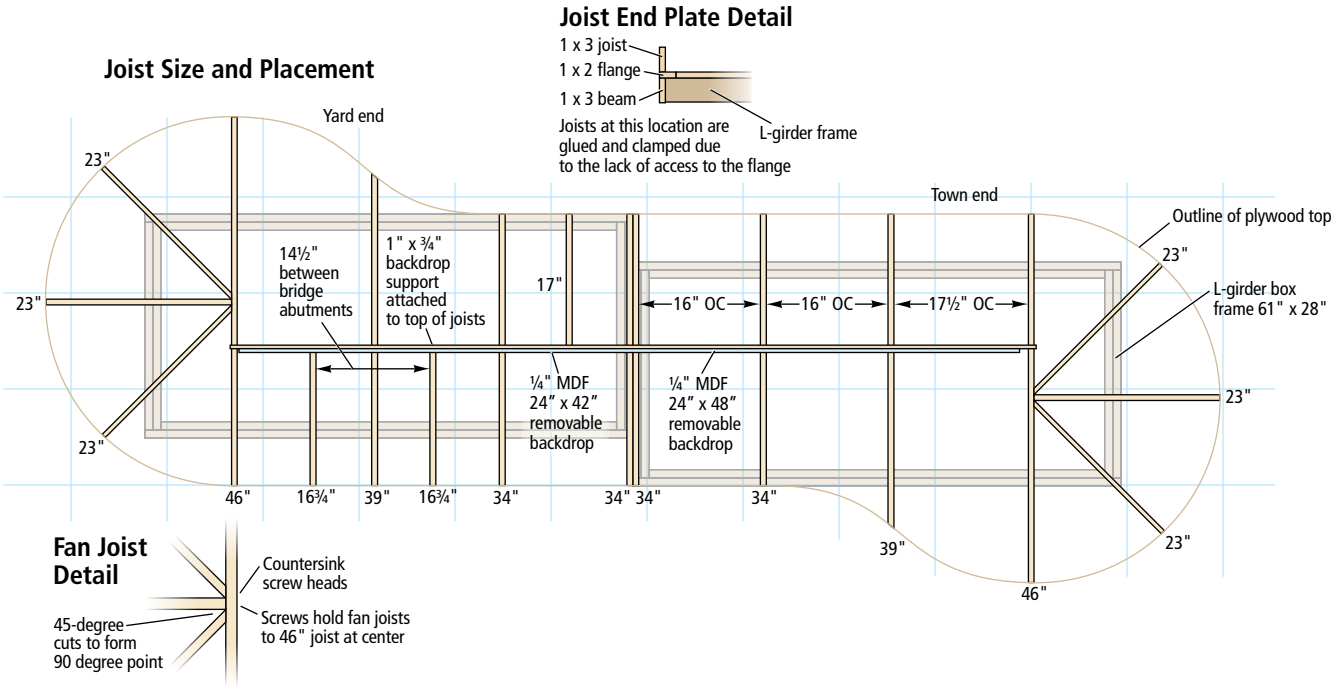
1 x 2 x 8 (9)
1 x 3 x 8 (14)
2 x 2 x 8 (3)
½" plywood 4 x 8 sheet (2)
3/16" tempered hardboard 4 x 8 sheet (1)
¼" MDF 2 x 4 sheet (2)
3" casters (6)

Leg Assembly Diagram



MORE ON THE WEB

Trains.com members can watch video of the construction of our N scale layout, including the benchwork at Trains.com.



Joists

Once you have the L-girder and leg assemblies built, you can add the joists, which will support the risers and plywood top for the model railroad. The diagram shows the location for the 1 x 3 joists on our N scale layout. All joists attach to the frame by running screws up through the flanges on the L-girders.

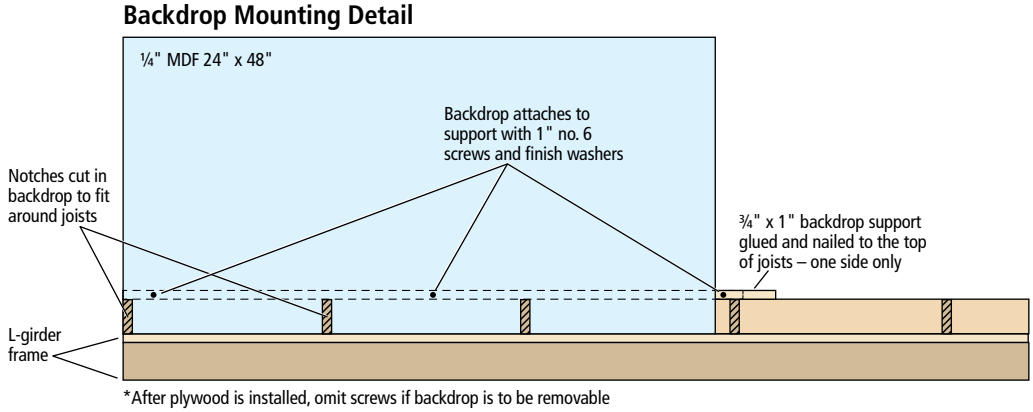
The joists are spaced on center (OC) where noted. However, where the two layout sections connect, the joists are placed flush with the end of the layout (see the joist end-plate detail). The joists that form the curved ends radiate from a center point at 23" along the 46" joist. The two fan joists connecting at 45-degree angles have 90-degree points cut into the connecting end.

Note that there are three short joists used on the yard end of the layout. The two 16¾" joists support the river, while the 17" joist on the opposite side is for the start of the grade up to the bridge and down to the yard.

Backdrop panels

To make the layout seem much larger, I installed two removable backdrop panels down the center line of the layout. The backdrops are made from sheets of ¼" MDF. The town end panel measures 24" x 48". The yard end panel is 24" x 42".

The backdrop panels are notched to fit around the joists, and they attach with screws to a 1" x ¾" center supporting spine that runs along the top of the joist. When cutting the plywood top pieces, don't forget to cut the ¼" slot for the backdrop sections.

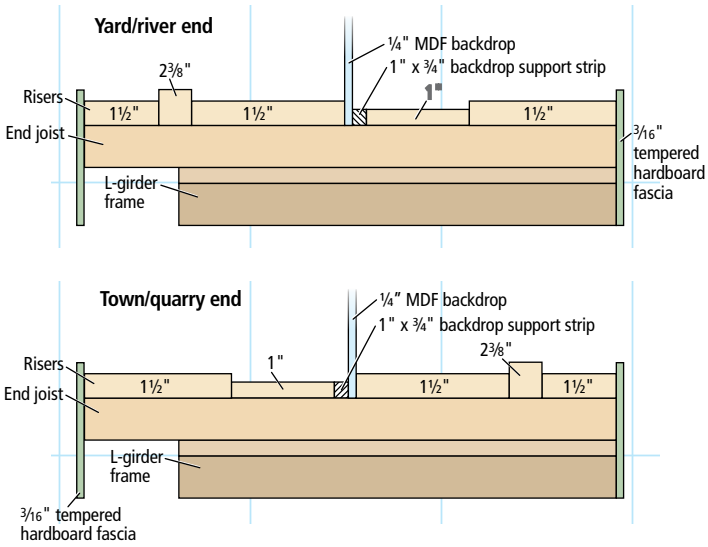


Plywood top

I used ½" plywood for the subroadbed on the layout, as well as to support all non-track areas. The diagram shown provides a basic idea of the cuts necessary to get the top to the layout. Again, don't forget the ¼" slit that needs to be cut for the backdrop.

You'll notice that the two sheets of plywood shown have and extra 46" half-circle cut from each. This circle fits underneath the fan joists to support the fascia (3/16" tempered hardboard), as it is bent to conform to the tight 23" radius curve at each end of the layout. The plywood is notched to fit around the L-girder frame and is screwed to the bottom side of the fan joists.

Layout Face Plates With All Risers Installed



Risers

Thanks to the joist system, L-girder benchwork makes elevating sections of the layout easy. You can elevate the track by attaching risers to the joists, sliding them up and down until the track is at the correct height, then attaching the riser with screws to lock it in place.

Another option, and the one I used for our layout, was to cut support blocks of various thicknesses, then glue those to the tops of the risers to elevate the track. Once the glue set up, I installed the plywood top, using screws to lock it to the risers.

You can use the elevation markings on the plywood cutting diagram as a guide. Anything attached directly to the top of the joists, such as the river and the creek, has an elevation of 0". I've included a diagram showing the elevation blocks I installed at the face plates where the two sections of the layout join up, as this area covers nearly all of the main elevations I used on the railroad.

With the plywood installed, we're ready for next month's installment in the series – laying track and installing the Digital Command Control system. MR

Plywood Cutting Diagram