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Introduction

Benchwork serves as a solid base for your model railroad. Reliable operation on smooth-running track is dependent upon level, sturdy benchwork.

Benchwork scares many people, but this need not be the case. Benchwork is among the most forgiving of all areas of building a model railroad. It's important to give your layout a sound foundation, but for the most part, appearance is secondary since virtually all of your benchwork will eventually be covered by track and scenery.

***Model Railroader* staff built this HO scale layout, based on the Virginian Railway. The select pine benchwork is sturdy, casters on the legs allow it to be rolled across the floor, and its neat appearance nicely complements the layout.**

New edition

This second edition of *Basic Model Railroad Benchwork* takes much of the material from its first edition (published in 2002) and combines it with material from Kalmbach's classic benchwork book, Linn Westcott's *How to Build Model Railroad Benchwork*. It also incorporates drawings, photos, and information from benchwork articles that have appeared in *Model Railroader* magazine.

The wide array of tools available today, including affordable power drills and saws, makes it relatively easy to assemble benchwork for even large layouts in a matter of days. You can get solid results even if you've never done any woodworking before, provided you take your time and follow sound design and construction ideas and methods.

This book provides directions, photos, and drawings for building many styles of benchwork and explains many situations you'll come across. However, it's best to use this as an idea book—depending upon the space you're working with, different methods may be better choices than others.

You should have already established your track plan before designing and building your benchwork. There are many fine track planning and track plan books on the market, along with plans that appear in model railroading magazines. Whether designing your own plan or using (or modifying) a published plan, I highly recommend reading John Armstrong's *Track Planning for Realistic Operation* (Kalmbach Books, 1998).

Whether you're using a published plan, modifying an existing plan, or designing your own, here are a few points to consider:

• Keep all trackwork within arm's reach of the aisle or access area. This varies depending upon your size and reach and the height of the layout (the taller the layout, the shorter your reach becomes). Even scenic elements located more than 30" from the layout's edge will eventually need to be dusted, adjusted, or repaired, and if it's not convenient to reach, it won't get done. Any table wider than 36" should have access from both sides.

• Avoid operating areas, or pits, that are trapped within layouts. Shelf-style walkaround layouts (or stand-alone tables with peninsulas) have become the norm for room-size and larger layouts because they're much easier to work on and operate. After all, how many times do you really want to get on the floor and crawl to an access area to build or run a layout?

• Avoid duckunders and liftout sections whenever possible. They are often an attractive feature when drawing a track plan, and sometimes they are unavoidable, but they can hinder operations.

• Plan for aisles. Make sure all aisles are as wide as possible—at least 24" and preferably 30" to 36". Long, narrow aisles should contain wider areas that allow two operators to comfortably pass each other.

• Avoid hidden (below main level) staging tracks if possible. If you must have hidden track, keep it simple with as few turnouts as possible, and make sure you provide access to clean the track and fix derailments.

• Be creative. This book can only suggest methods for accomplishing your goals. It can't show you exact blueprints for the specific benchwork to fit your space. Use your imagination for tackling unique situations that confront you.

Many modelers ask what the "best" benchwork method is, but the answer is that there simply is no one best way to build benchwork. You can choose open-grid or L-girder, freestanding or attached to the walls, foam shelves, steel-stud benchwork, or a combination of styles—all can work well. Your choices will depend upon the space available, your final track plan, and whether you can attach benchwork to walls. Use the methods you feel will work best in your space and situation and the ones you're most comfortable building.

The key is to have a specific plan for your benchwork, just as you do for your track plan. Prepare a detailed sketch of your benchwork plan. This will help you estimate the materials you'll need and will help reveal any major problems before construction begins.

Turn the page, and we'll start by looking at the various materials you have at your disposal and the tools it will take to do the job.

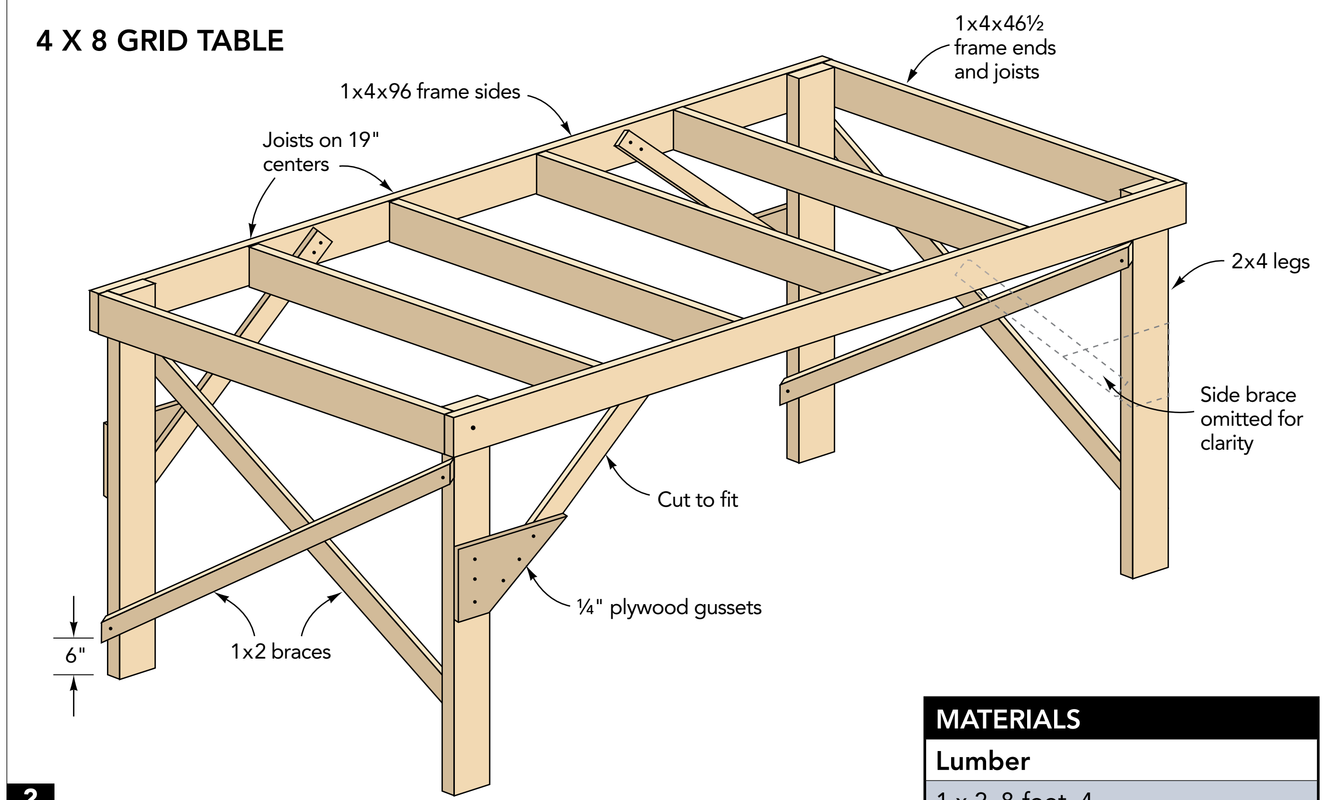
1

Simple tables

Solid bases for freestanding layouts

Many model railroaders start out by building a small table layout. This one features grid-style construction made from plywood, but there are many other benchwork options available.
Jim Forbes

A basic freestanding table is the first layout for many—if not most—model railroaders, **1**. It seems logical: building a table underneath a sheet of plywood or hollow-core door is an easy way to get a layout up and running. Table layouts do have many advantages. They're easy to build, access is generally open all around them, and if your goal is to build a portable layout, a table is the easiest to set up and take down.



2

MATERIALS
Lumber
1 x 2, 8-foot, 4
1 x 4, 8-foot, 5
2 x 4, 8-foot, 2
½" plywood, 4 x 8 feet, 1
¼" plywood, scraps for gussets
Hardware
¼" x 3" carriage bolts, nuts, and washers, 4
No. 8 x 1¾" screws, 54
No. 8 x 1¼" screws, 12
No. 8 x ¾" screws, 12
T nuts with threaded feet, 4

However, table layouts have drawbacks. They take a lot more space than you would think—something not readily apparent when you're looking at a 4 x 8 sheet of plywood. For example, to make a 4 x 8 layout fit in a room and be usable, you'll need at least 2 (and preferably) 3 feet of space around it on all sides. This means that a 4 x 8 layout actually needs about 10 x 14 feet of space.

Track plans for table layouts can be rather limited. Curves must be necessarily tight to keep the track on the table, so it's tough to run large locomotives, passenger cars, and long rolling stock. It's difficult to add dramatic scenic elements, such as a large bridge, a turntable with a roundhouse, or a mountain, because large individual elements tend to dominate the layout and do not allow room for much else.

This doesn't mean you shouldn't build a table—just be sure to look at all of the alternatives, such as shelf designs, before beginning construction.

If you decide to go with a table, there are several designs to choose from. Grid tables (sometimes also called butt-joint tables) are ideal if you're looking for a simple square or rectangular layout. Another option is L-girder benchwork, which is especially well suited fo a layout with curved sides or if you need a table longer than 12 or 14 feet (see Chapter 3 for details). We'll also look at plywood framework and tables made from hollow-core doors.

Frame table

Let's start with a simple grid-style table made from dimensional lumber, **2**. Tables like this are sturdy, easy to build, offer good access for undertable wiring and switch machines, and provide floor space for storage.

A frame of 1 x 4s is more than solid enough to support scenery and trains in any scale. The table shown is designed for a 4 x 8-foot sheet of plywood. For smaller tables, use 1 x 3 lumber and 2 x 2 legs or choose one of the designs shown on pages 26 and 29.

You can see several types of benchwork joints in figure **3**. The key with any butt-joint assembly, as with this table, is that the ends of the 1 x 4 joists, ends, and sides should be square. To do so, use a miter saw to make all of the cuts.

Assemble the framing to support the table, starting with the outer 1 x 4s. Drill countersunk pilot holes at the ends of each side 1 x 4, **4**. Add glue to the end of an end piece, **5**, and then use a cordless drill or driver to screw the side piece in place, **6**. I used 1¾" wood screws, but drywall screws will work as well. Repeat this process until you have the outer frame assembled.

Before adding the crosspieces (joists), check your track plan for any recessed areas. It's possible to do modifications later, but it's easier to adjust the interior framing now, if possible. Also, try to avoid having turnouts directly above joists, as the joists will interfere with undertable switch machines or mechanisms.

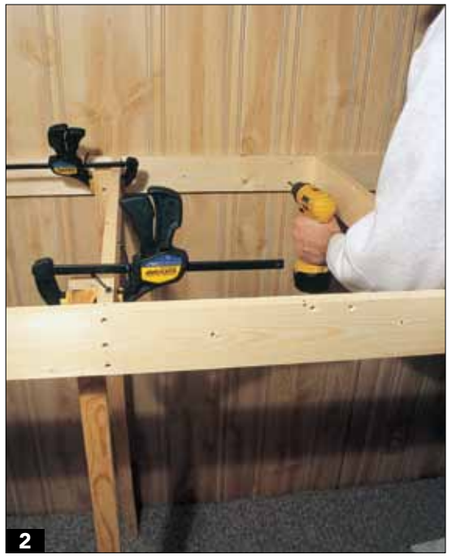
Mark the center of each joist along each side, **7**. When adding joists, make sure that each is vertical by clamping a try square in place as a guide, **8**. Glue and screw the ends of each. You can see the completed top frame in photo **9**.

Wall-mounted benchwork

Create more storage space with a shelf-style layout

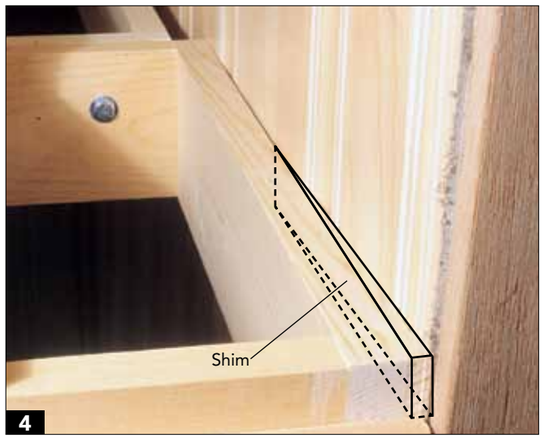
Wall-mounted benchwork is versatile, saves on materials, and provides open space under the layout.

Mounting benchwork directly to walls offers many advantages over freestanding layouts. Wall mounting allows you to get rid of many, and sometimes all, legs, and it frees the space under a layout for storage. Wall-mounted layouts are solid and they look neat, as they allow a layout to naturally conform to the shape of the space available. You can wall-mount benchwork in a finished room as well as on a poured-concrete or concrete block wall. The keys to either are anchoring the benchwork firmly.



Clamp temporary legs in place to hold the frame at the proper height, drill pilot holes in the frame, and drive screws into the wall studs.

The first frame section is securely mounted to two walls in a corner.



If the wall corners aren't quite square, you may have to add a shim or two behind one side of the frame.

Clamp the second frame to the first. Make sure both are level and that the tops of the frames align.

The complexity of wall-mounted or shelf benchwork depends on your layout design. A narrow shelf featuring a level prairie railroad can be as simple as adding commercial shelf brackets under a board; a wide shelf with many hills and valleys will need more substantial framing.

You can design wall-mounted benchwork based on table, L-girder, or open-grid (butt-joint) styles as well as mixing styles. You can also combine wall-mounted and freestanding benchwork depending upon your available space.

Open-grid

An open-grid style framework can be secured directly to a finished stud wall, **1**. The layout shown is 30" wide and features 1 x 4 framing, much like the freestanding layout shown in Chapter 4. This is a good way to mount a frame from 24" to 36" wide.

Start by assembling the framework to the desired size. As with a freestanding open-grid layout, the goal is to design the layout in a series of rectangles and boxes. Once the frames are built, anchor the wall side of each frame directly to the wall, **2**.

Mounting screws must go into studs, not merely into drywall or paneling. Select screws long enough that at least 1½" of each extends into the stud. In the benchwork shown, the screws needed to pass through the ¾" benchwork frame, ¼" paneling, and ½" drywall. I used 3" stainless-steel deck screws with square-drive heads. At first glance, they look like silver drywall screws, but deck screws are much stronger than standard wood screws and have coarse threads that hold extremely well.

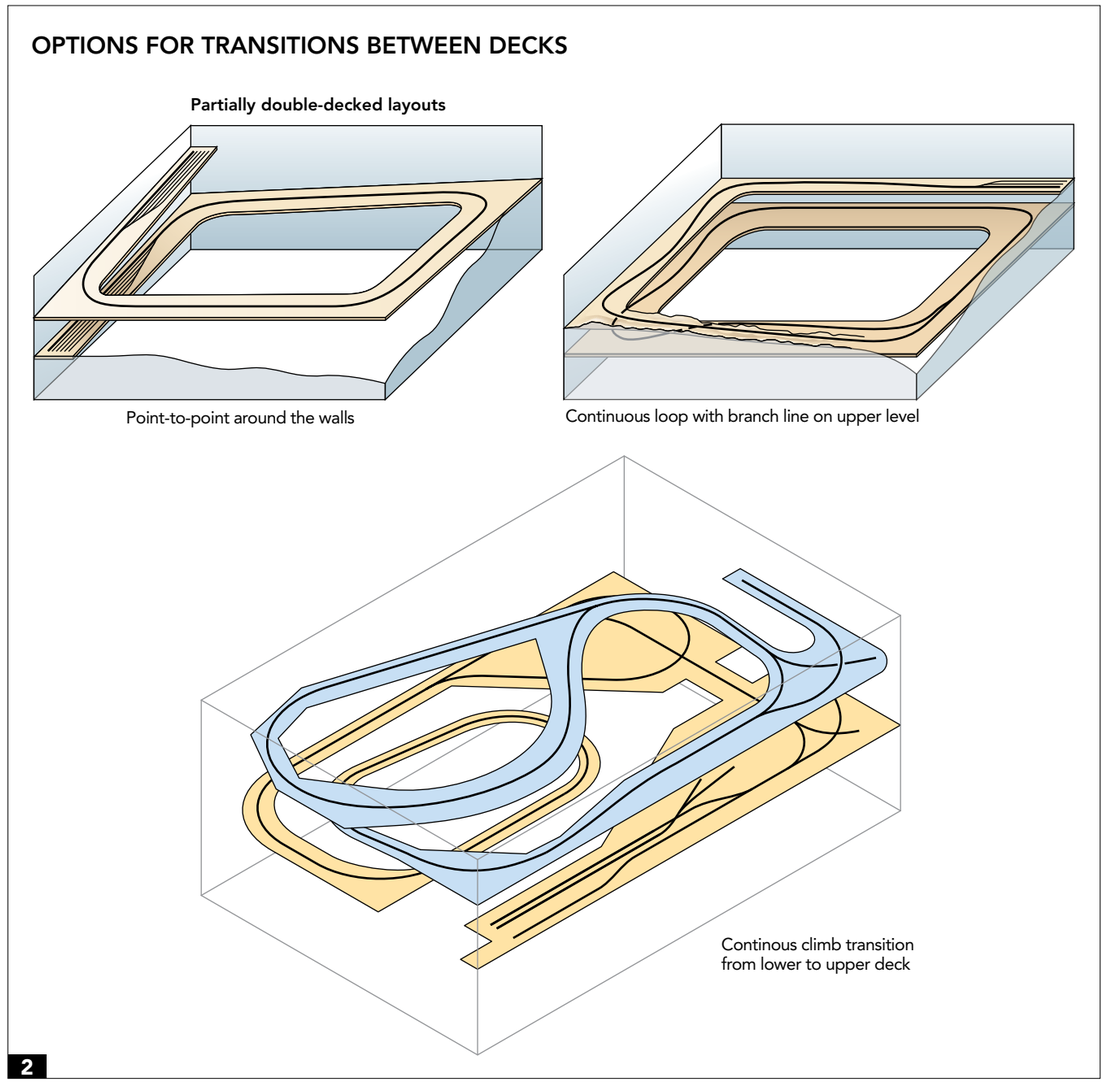
1

Multi-deck benchwork

Expand your layout without expanding your basement

Adding a second deck can be a good way to extend the length of your railroad without taking up more floor space. This is Bob Foltz's 1951-era Santa Fe layout. *Bob Foltz*

Probably the biggest reason modelers choose multiple-deck layouts is to get more railroading out of a given space. Adding a second deck can dramatically increase the layout area, and in some cases, makes it possible to nearly double the length of a main line, **1**. We'll look at several basic multiple-deck layouts, but for a more thorough look, see Tony Koester's book *Designing and Building Multi-Deck Layouts* (Kalmbach Books, 2008).



2

Although some layouts are completely double-decked, a much more common method is to double-deck only part of a railroad. The extra deck (upper or lower) can be a branch line, staging area, industry, or separate railroad. In the case of staging, the second deck is often hidden from sight on a lower level.

Before planning an extensive multiple-deck layout, consider the disadvantages to double-deck layouts. The first is increased construction complexity. Viewing angles are also a concern—adding a second level often means that neither level ends up at the optimum viewing height. There's also a limited height to each deck. This isn't much of a problem if you're modeling the prairie, but it can be quite limiting if you're modeling a mountain railroad or a large city with tall buildings.

Some modelers have even gone to a third deck, but the logistics—such as deck heights and access—make it a construction and design challenge. It's certainly possible, but you need to look at the benefits vs. the headaches when doing so.

The biggest challenge tends to be getting trains to the second level, **2**. One method with a point-to-point layout is to start it along one wall and then have it gradually climb as it circles the room. The line becomes the upper deck when it completes the circuit. Another way to reach the second level is to climb on scenery until it reaches the height of the upper deck, **3**.

Helixes—where track rises on a stacked loop from level to level—have long been used to move trains among decks, but they require a tremendous amount of space and can be difficult to build. We'll look at them in more detail in a bit.

A good rule of thumb is to keep the shelf of the upper deck at or less than