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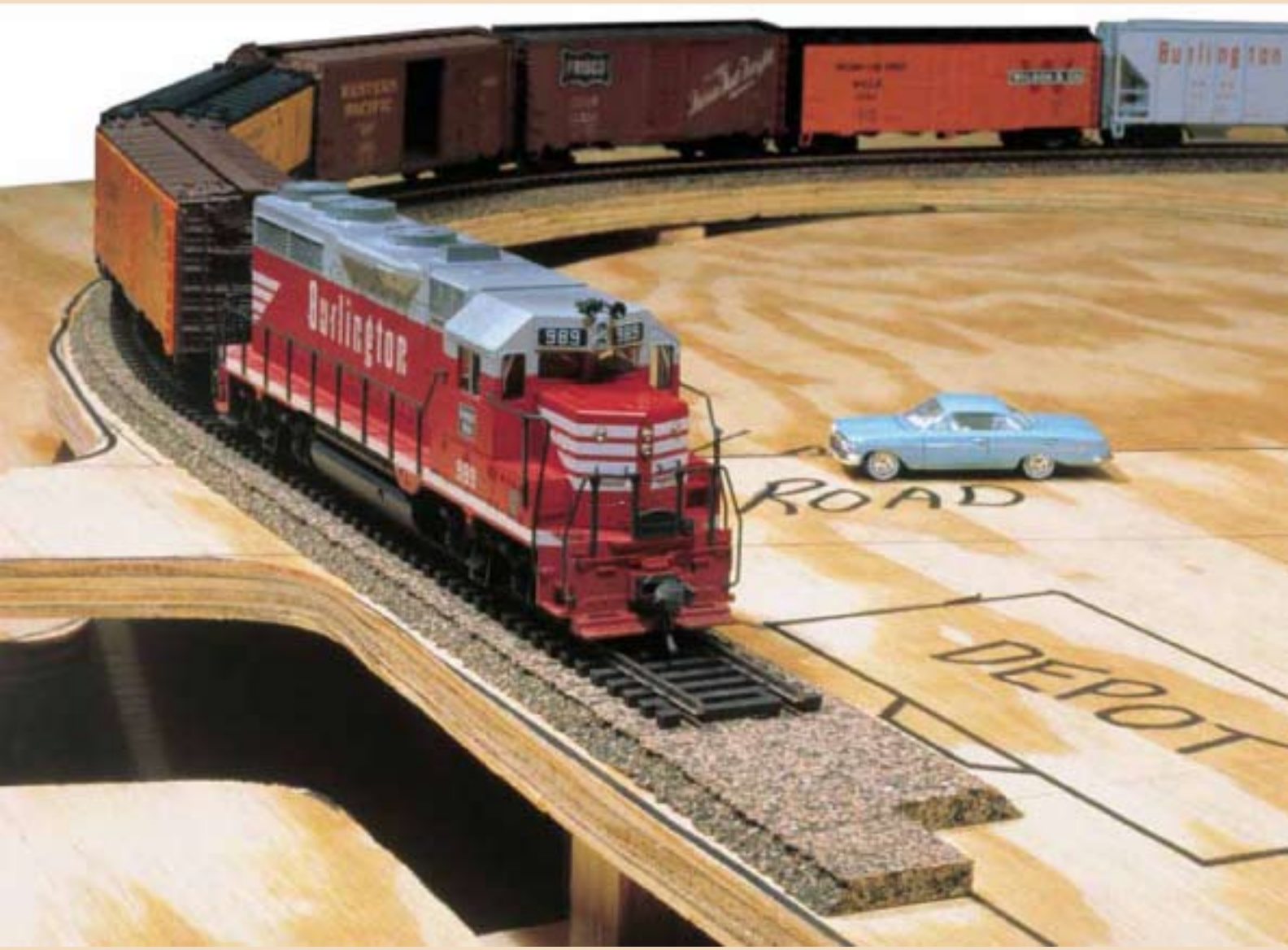
Building benchwork for your model railroad



Back to Basics

By George Sebastian-Coleman

Benchwork

A guide to the skeleton of your layout

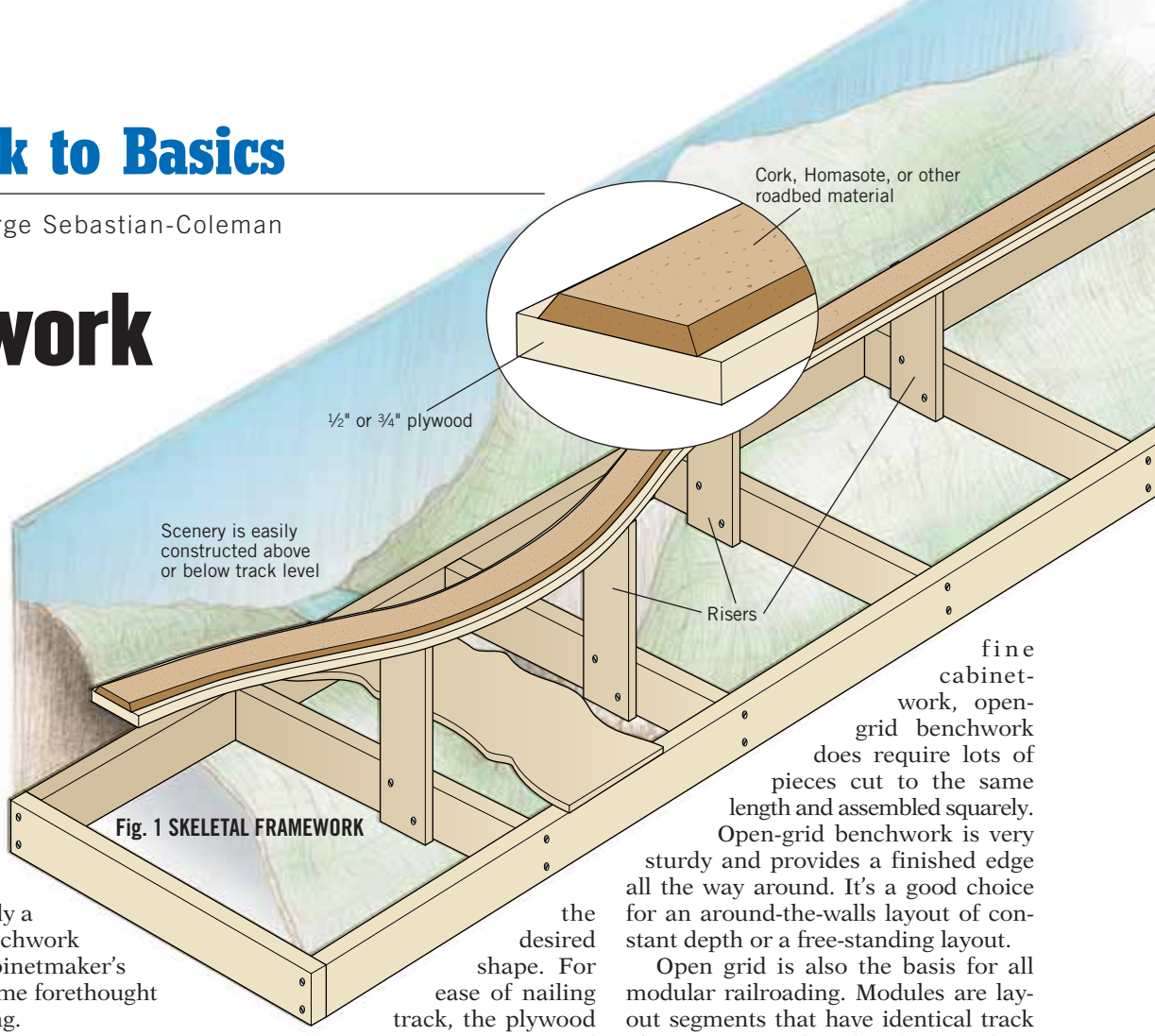


Fig. 1 SKELETAL FRAMEWORK

On a finished layout all you see is the top 1/16" or so. Beauty is only skin deep and in one sense what happens underneath doesn't matter much. But poorly designed benchwork may leave your beauty with sagging skin, or worse yet, unable to stand after only a few years. Good benchwork doesn't require a cabinetmaker's skills; it does require some forethought and practical engineering.

Getting off the ground

Most beginners think in terms of tables – a solid, flat surface on which to mount their track. However, the real world isn't flat, and for the most part even where it is, railroad tracks don't sit flat on the ground. Instead, railroad grades are raised well above ground level, so they drain off water and remain stable. Even when track goes through a cut in a hillside, the cut is deeper than the roadbed, which is still raised up for drainage.

When scenery started to become an expected part of any layout, model builders realized that tabletops were a liability. They began to think of benchwork as the skeleton above which they could construct the roadbed and its surrounding scenery.

The basic concept of skeletal framework is quite simple, as shown in fig. 1. A framework, such as you might build to support a tabletop, is constructed. To the crosspieces you attach risers which support the roadbed. All the open area becomes scenery which may be higher or lower than the roadbed.

For roadbed, most modelers use a saber saw to cut ½" or ¾" plywood to the desired shape. For ease of nailing track, the plywood is sometimes topped with Homasote (call 800-257-9491 for a dealer near you), a paper board into which nails or spikes can be pressed instead of hammered. Homasote also helps to deaden sound. For this final layer many modelers use roadbed that has angled sides to represent the shape of ballast that supports real track. Homa-Bed, a precut Homasote, is available, as are cork, rubber, and foam roadbed strips from a number of manufacturers. These can be used directly on the plywood or on top of the Homasote layer.

There are two basic methods of building the skeletal frame in use today: open-grid and L-girder benchwork. The two are not exclusive and many layouts use a combination of both.

Open grid

If you've ever seen the frame for a house, you have a clear picture of open-grid benchwork. As fig. 2 shows, it's basically a box with a series of crossmembers running perpendicular to its long edges. It can be other shapes, of course, and these may be linked together to build a frame that is free-standing or one which is built along the walls of the room. Though still far from fine cabinetwork, open-grid benchwork does require lots of pieces cut to the same length and assembled squarely. Open-grid benchwork is very sturdy and provides a finished edge all the way around. It's a good choice for an around-the-walls layout of constant depth or a free-standing layout.

Open grid is also the basis for all modular railroading. Modules are layout segments that have identical track placement at each end and are made to standard dimensions. They may be readily hooked together in any combination to form a large layout. Similarly, it is a good choice for permanent layouts that you may want to move, as you can disassemble it into sections.

L girder

Former MODEL RAILROADER editor Linn Westcott developed L-girder benchwork, fig. 3, in the 1960s. His goal was to develop a system that didn't require great carpentry skills, was economical, and was easy to alter if you decided to rebuild part of your layout. His method has been such a success that it is now simply part of the hobby.

To get maximum strength with the least wood, the long girders are made of 1 x 4 with a piece of 1 x 2 glued and screwed to the top. This provides both vertical and lateral strength (other sizes of lumber can be used depending on the size of the layout).

The flange formed by the 1 x 2 provides a convenient place to attach the joists across the L girders. The risers are also built with a flange so that you can screw them to the roadbed from beneath the layout. By screwing the

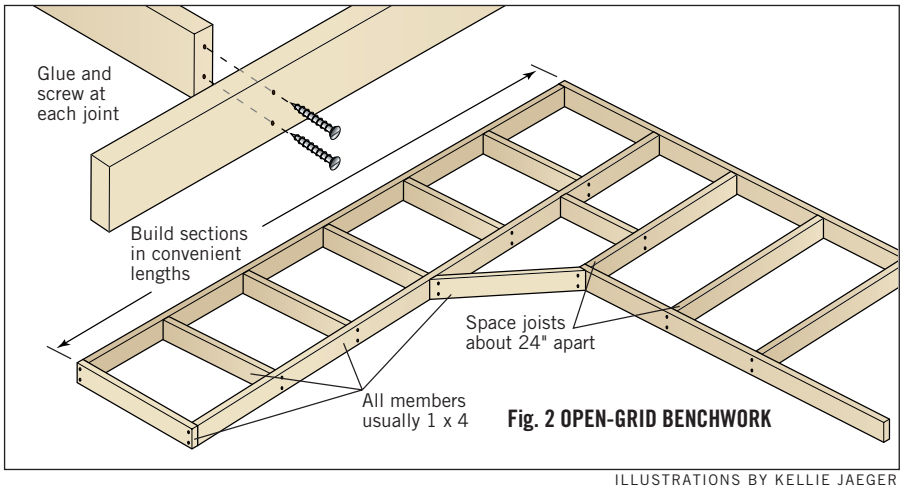


Fig. 2 OPEN-GRID BENCHWORK

ILLUSTRATIONS BY KELLIE JAEGER

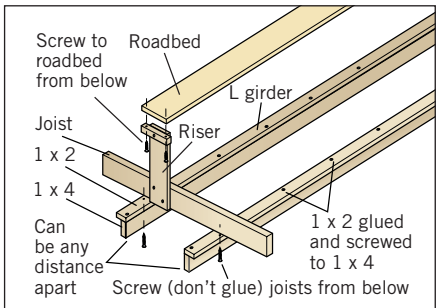


Fig. 3 L-GIRDER BENCHWORK

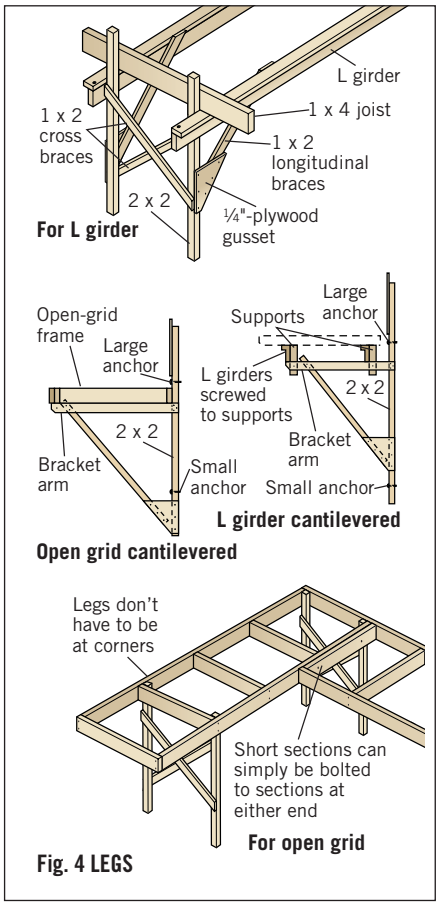


Fig. 4 LEGS

joists and risers from below, it's always possible to take out or move a girder, even once the scenery is in place. This is particularly handy when you discover that the throwbar of a turnout is directly above a riser and you need to mount a switch machine.

Because there are no butt joints, nothing in L-girder construction requires highly accurate measurement and cutting. Once you've built the girders, a single person armed with a half-dozen C-clamps can fill a basement with basic benchwork in a day. It's particularly well suited to free-form layouts whose depth from backdrop to fascia varies frequently.

Legs

Tables and benchwork don't just float in the air. They need support. That usually means some form of legs. As a rule, you normally want as few legs as possible, just to keep the area under the layout uncluttered.

So where do you put them? Chrysler has been bragging about its engineers putting the wheels at the corners of its cars and that's not a bad plan. You may also find that you can eliminate many legs by cantilevering some or all of your layout. Figure 4 shows a variety of ways to support a layout.

Linn Westcott recommended 2 x 2s for legs, and these are also the standard on modular layouts. They are more than sufficient in terms of strength, but for a permanent layout where weight isn't an issue, you may find you can buy 2 x 4s more cheaply.

Whatever size lumber you choose, the invention of T nuts and bolts, fig. 5, has been a blessing to the hobby. These simple devices allow you to quickly level your layout no matter how uneven your floor may be.

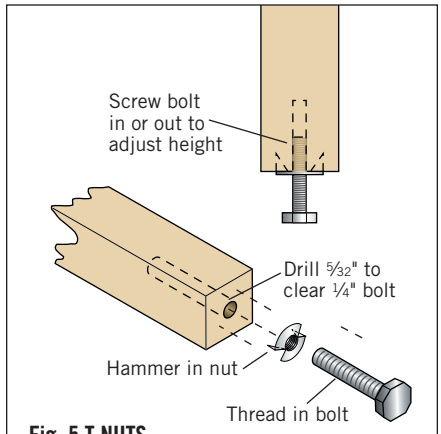


Fig. 5 T NUTS

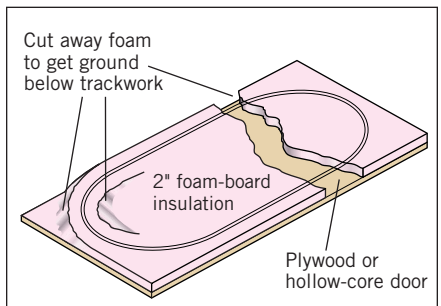


Fig. 6 FOAM ON TABLETOP

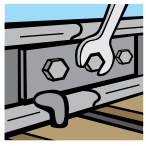
Special cases

The innovation of space-starved modelers is never ending. Layouts have been hung from the rafters by aircraft cable (some even retractable), folded up like Murphy beds, and built into coffee tables. For most of these special cases some variation on open-grid benchwork is usually the answer. Nor must all benchwork be built of wood. Some people now use foam or structural steel.

To come full circle, many modelers have room for only very small layouts, and for these, a tabletop design may still prove the simplest. Whether you use a hollow-core door, a sheet of plywood, or just a bookshelf, you'll still want to get your railroad's main line off the ground.

We've built several project layouts on which the track rests on top of foam insulation board glued to a table top. To provide scenery above and below track level just as on a larger layout, the foam can readily be cut away below track level as shown in fig. 6.

For more information and detailed instructions on building benchwork for almost any situation, pick up *How to build Model Railroad Benchwork* by Linn H. Westcott at your local hobby shop or order direct from Kalmbach.



Workin' on the Railroad

With Lionel Strang

Support your benchwork on brackets

This month I'm going to show you how I built the easy L-shaped brackets that support the benchwork for my HO Allegheny & Lackawanna Southern. I originally designed the A&LS with one item high on my list of wants: the elimination of legs at the edge of the layout. Individual legs require lots of diagonal braces that seem always to be in the way when you're trying to work under the layout.

My approach to layout design is a little different: I concentrate on the design of the benchwork and how it will fit into the available space first and worry about the track plan second. Once I've decided what form the benchwork will take I'll finish the actual track plan.

Bracket design

Before I had installed a single piece of benchwork on my A&LS, I finished the view block walls and the basement perimeter walls using 2 x 4 studs covered with drywall. This gave me all the support I'd need to cantilever the layout from the walls using L-shaped brackets. I soon discovered this method of building model railroad layouts allowed me to get basic benchwork set up very quickly with the entire structure being tied to the wall, making it exceedingly stable.

I constructed the L portion of the brackets with 1 x 4s and the diagonal braces with 1 x 2s. I wanted the brackets to be able to support a reasonable amount of weight, and the wider surface of the 1 x 4s helps spread out the weight of the layout and provide a broad surface for mounting the bracket to the wall.

Several of these layout supports can be constructed in an evening, especially when two people work together. However, I could easily build six to 12 in an evening working alone.

Measurements

In the case of the A&LS, stringers made of 1 x 4s rest on top of the wall brackets. Risers fastened to the stringers support the roadbed. The railhead at its lowest point on the railroad is 42" from the floor or 10" from the top of the wall bracket. There's a 3"-high piece of trim along the base of the wall to give the room a finished look.

Allowing for the thickness of the top piece of the bracket (it's attached to the top of the wall portion), the wall section of the L-shaped bracket is always 28¼" long. On the A&LS most of the benchwork is two feet wide so I made the portion that extends into the room 22" long. See fig. 1. The top can be any length depending on the width of the benchwork, but it's advisable not to make it any longer than the wall side of the bracket.

Construction

I usually cut enough lumber to build a half a dozen brackets at a time. To join the two pieces of 1 x 4 first drill small pilot holes for the screws to avoid splitting the wood. I use yellow carpenter's glue and 2" drywall screws to fasten the 1 x 4s together (fig. 2). Before adding the diagonal braces make sure the inside corner of the bracket is square. If it's not, adjust when adding the diagonal braces.

Mark a line 18" from the inside corner of the bracket on both parts of the L and then cut a piece of 1 x 2 long enough to hang over to both sides of the bracket. Now fasten the 1 x 2 using glue and drywall screws (fig. 3), then simply saw off the ends of the 1 x 2. This avoids having to figure out angles and speeds up the process. As shown in fig. 4, cutting off the ends of the 1 x 2 is effortless with a

Fig. 1 LIONEL'S BENCHWORK BRACKET

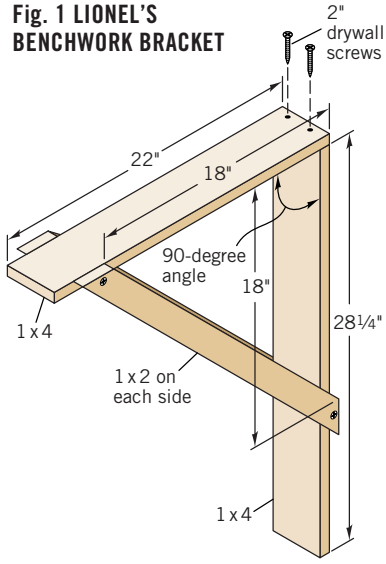


ILLUSTRATION BY RICK JOHNSON

Fig. 2 ASSEMBLE THE L. It's a good idea to use yellow carpenter's glue as well as drywall screws to assemble the supports. To ensure the wood doesn't split when driving in the screws drill a couple of pilot holes with a small drill bit.

Fig. 3 BRACES. Before attaching the diagonal braces it's a good idea to make sure the bracket is square. Although you can build the brackets by yourself, the job will go much faster with two pairs of hands.

Fig. 4 AN EASIER WAY. Rather than trying to cut your angles before attaching the diagonal braces, it's much easier to cut the braces with a sharp hand saw after they are attached.

good-quality hand saw. Pine is a soft wood that a sharp saw will cut easily.

Installation

After drawing a vertical line with a four-foot-long level (fig. 5) I lined up the bracket and anchored it to the wall with 3" coarse-thread drywall screws (fig. 6). If you're concerned that the screws might pull out of the wood you could use lag bolts to ensure the brackets won't budge. The lower wall anchor could be smaller because it doesn't carry the load of the layout; it mostly helps keep the bracket vertical. By using 1 x 4s, the screws or lag bolts are easily accessible between the diagonal supports with a drill or ratchet wrench.

The legs must be fastened to a wall stud or concrete wall. Do not drive your lag bolts or screws only into the drywall. It may seem to work at the time but it won't be long until the layout pulls away from the wall. If you're fastening your brackets to a concrete wall I suggest drilling holes for masonry anchors and lag bolts.

This type of bracket will support a weight far greater than most model railroad layouts. In fact I've actually sat on

Fig. 5 GUIDELINE. A&LS operator Paul Burgess uses a four-foot level to draw a vertical line as a guide for attaching the bracket to the wall.

Fig. 6 ONTO THE WALL. Paul is attaching his brackets with 3" drywall screws into the wall studs. The small trim piece at the base of the bracket serves as a guide for how far from the floor the brackets should be, as Lionel will finish the room off with 3" trim.

my benchwork while installing lights in the train room. If your benchwork grows too wide these wall brackets can be used in conjunction with traditional benchwork legs, and you may find that combining wall brackets in some areas with the more traditional leg assemblies in others best serves your needs.

Better benchwork for

Graduating to a "real" railroad layout and getting trains off of the floor or kitchen table and onto their own area is a major step for a beginning model railroader.

However, you'll soon discover that a flat layout table is quite limiting. Looking around at scenes in real life we quickly observe that even in supposedly flat areas, railroad and highway grades are generally elevated above the surrounding ground, or they cut their way through it.

Raising your right-of-way

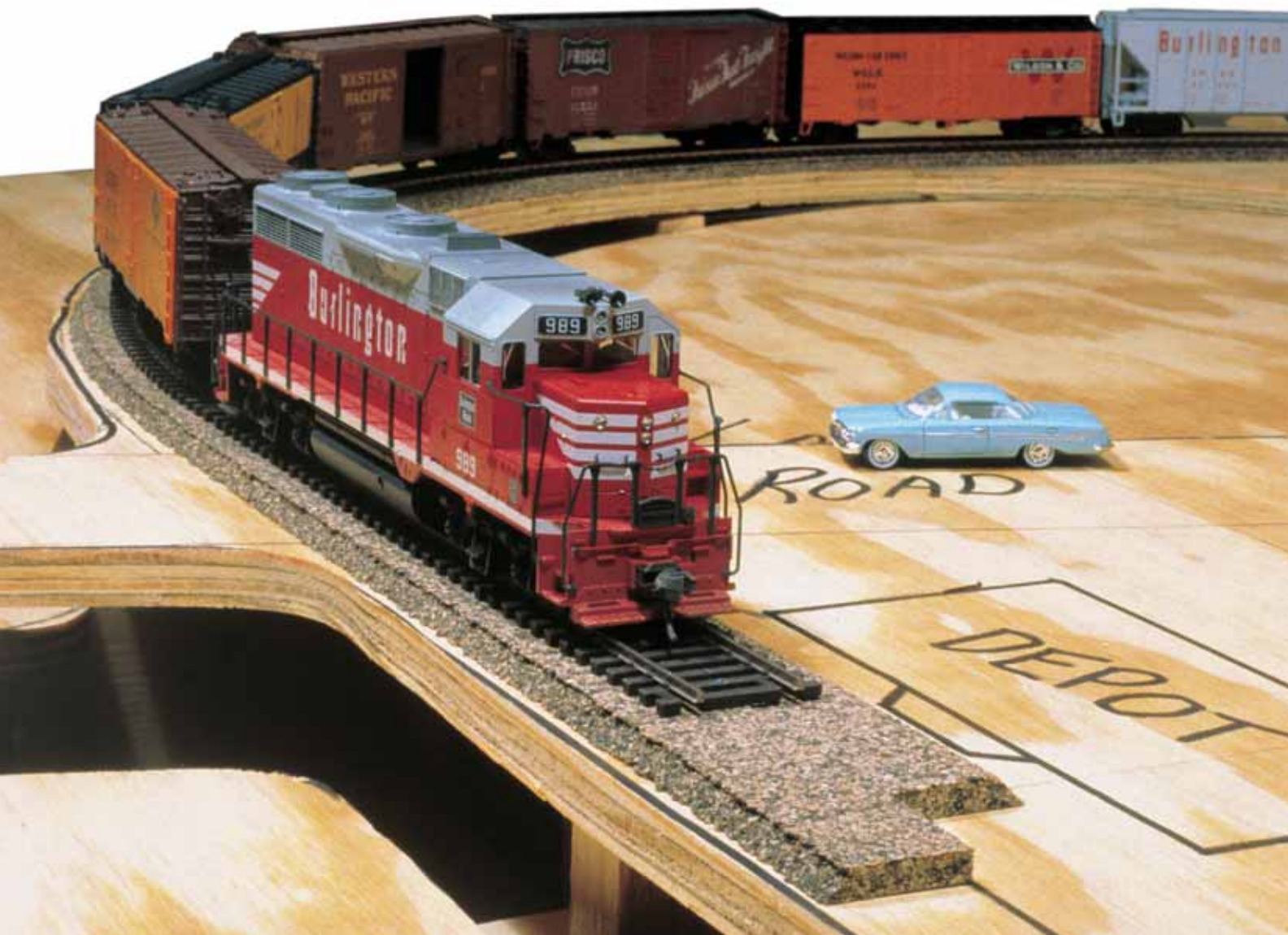
A relatively easy way of achieving this elevation change is to cut the plywood table top in a manner known as cookie-cutter style. As seen below, by cutting along the track, we can elevate or recess the subroadbed and other elements such as roads, rivers, and lakes. The cookie-cutter method gives trackwork a smooth transition from flat areas to grades, and it's easy to leave large, flat areas for towns and industries, greatly expanding the scenic possibilities of a layout.

Experienced modelers know that table layouts have limitations and certainly are not ideal for everyone, but starting with one allows you to experiment with benchwork techniques and scenery methods on a smaller scale. It can also help keep you from feeling overwhelmed by trying to learn everything about model railroading all at once, especially if you're planning to eventually build a basement empire.

For support, you'll need a solid base regardless of whether you choose a flat table or a cookie-cutter top. The benchwork diagram (fig. 1) shows a simple frame that will work well with a cookie-cutter table layout. Although ½" plywood is fine for a solid table, it loses some strength when cut into the narrow strips used by the cookie-cutter method. Therefore, you should use ⅝" or thicker plywood for this method or your subroadbed could sag and warp.

Planning and cutting

Do some planning before you pick up a saber saw and start cutting the plywood. First, settle on a track plan. That big sheet of plywood is great for experimenting. You can start with a published plan or your own design, then add and subtract track to suit your needs.



small layouts

Give your layout a realistic change in elevation

By Jeff Wilson • Photos by the author

Once you've settled on the design, test-fit the track. Turnouts, in particular, tend to take up more room in real life than on paper, so make sure that you've allowed enough space for them by positioning the track on the table first.

When the track has been properly placed, pencil in other details including roads, structures, and scenic elements such as lakes and rivers. Next, decide where you want the track to be elevated. When you're sure of the placement of everything, use a permanent marker to mark the location of the saw cuts as shown in fig. 2.

Use a portable saber saw (jigsaw) to make the cuts. See fig. 3. By placing scraps of lumber under the plywood, you will keep from cutting the table frame, but be sure to check that the blade will clear the frame before you start cutting. Remember to work safely and reposition the plywood when cutting will over-extend your reach.

Once the plywood is cut, use scraps of 1 x 2s as risers to elevate the roadbed and other elements as fig. 4 shows. Wide areas will need wider risers (1 x 4s work well) or you can use multiple small risers for good support.

Use clamps to hold the risers in place until you're sure that the elevations are correct and any grades are smooth and gradual, then use wood screws to secure the risers. To hold the plywood in position, run another screw down through it into each riser. Countersink these holes so the screw heads are below surface level of the subroadbed.

Make sure the subroadbed is supported well. There should be a riser or support every 18" or so. If necessary additional joists can be added to the table frame as shown in fig. 1.

That's all there is to it. Your roadbed and track (cork and Atlas code 83 sectional track pictured here) now has a smooth subroadbed to follow through your rolling scenery.

Keep the cookie-cutter method in mind, get creative, and put your imagination to work. You'll find that giving your layout changes in elevation greatly improves its realism.

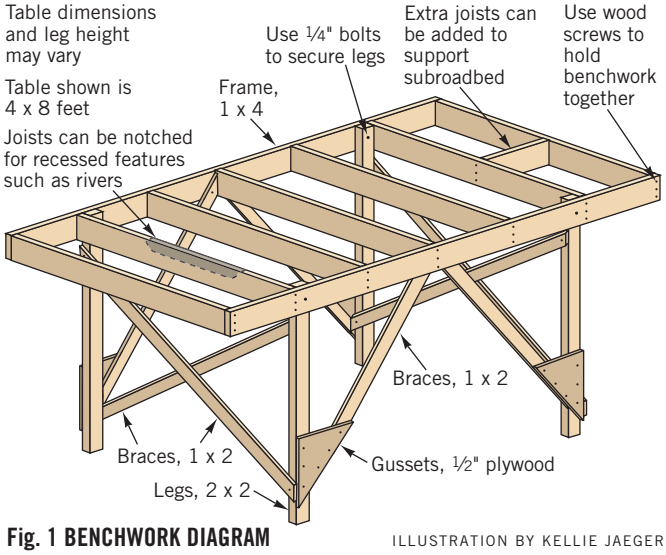


Fig. 1 BENCHWORK DIAGRAM ILLUSTRATION BY KELLIE JAEGER

Fig. 2 SKETCH DETAILS. Along with track center lines you'll need to outline details such as roads, lakes, rivers, parking lots, and structures. Use a marker to draw the cutting lines.

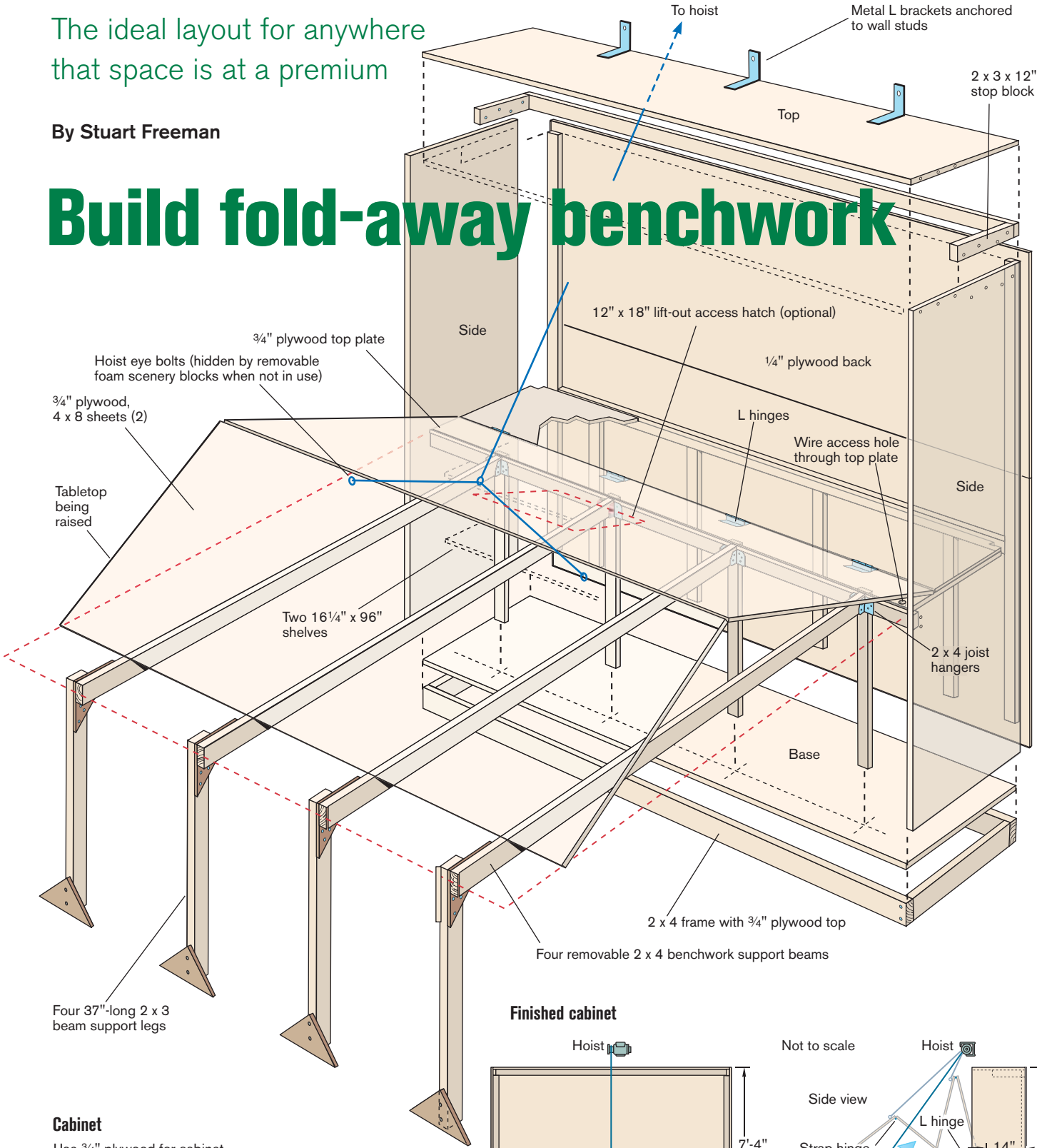
Fig. 3 CUTTING. Use a saber saw (jigsaw) to make the cuts. To avoid cutting through your benchwork, raise the plywood above the benchwork with scrap 2 x 2s or 2 x 4s.

Fig. 4 RISERS. The 1 x 2 risers are in place under the road and railroad subroadbed. The lake area has been dropped down by notching the joists in that area.

The ideal layout for anywhere that space is at a premium

By Stuart Freeman

Build fold-away benchwork



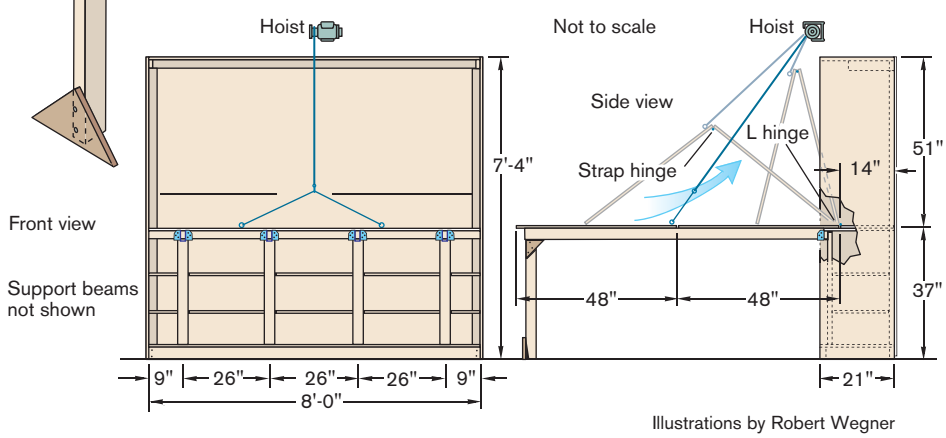
Cabinet

Use ¾" plywood for cabinet sides, top, and bottom

Use 2 x 3s for all interior shelf supports and cabinet corner framing

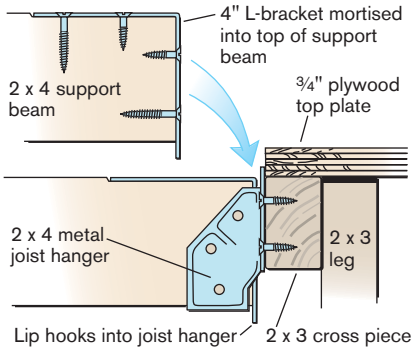
Use 2 x 4s to build the four removable benchwork support beams

Finished cabinet

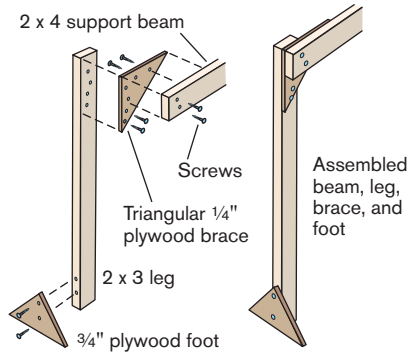


Illustrations by Robert Wegner

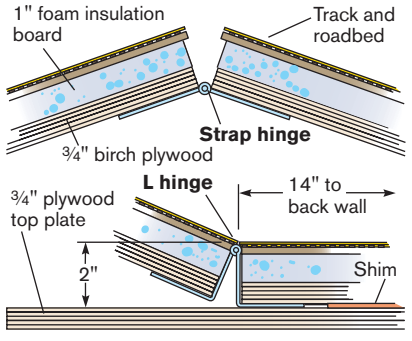
Removable support-beam end



Support-beam legs



Hinges



Many people would like to have a model railroad but don't have space for a permanent layout. As a professional layout builder, I'm asked to solve this dilemma often. Recently, while working with a client with limited space, I designed and built an 8 x 8-foot folding train table for his garage. Though I've made other layouts that can be collapsed and stored, on this particular job I designed a layout that folds up into its own cabinet.

Follow along as I explain how you too can make a folding layout cabinet.

Building the cabinet

The finished cabinet measures 7 feet tall, 8 feet wide, and 21" deep. Think of it as a big wardrobe. The upper part houses the layout in its stored position. The lower part has shelves to hold electronics, scenery materials, trains, and other items. The cabinet is deep enough to accommodate low hills, trees, and structures when the layout is retracted.

I built the cabinet out of ¾" plywood, cutting the materials following the construction diagram. If you can, have your local home center or lumberyard rip (sawing lengthwise) the plywood parts for you. I sealed the back of the cabinet with ¼" plywood panels, using it as a backdrop for the layout. To ensure solid construction, use carpenter's wood glue and screws for all joints.

The cabinet is held securely in place by two L brackets screwed to the top of the box and the wall studs. Though I didn't include them, you could easily add ¼" plywood doors to the front of the cabinet to protect the layout.

Benchwork

The supporting benchwork is removable for storage. The legs and support beams, made from 2 x 4s, plug into four joist hangers mounted on the front of the cabinet. The layout is constructed on an 8 x 8-foot flat table made from two 4 x 8 sheets of ¾" birch plywood, a very sturdy material that won't easily flex or warp. Because of the way the layout folds, you can build up the subroadbed and scenery with foam insulation board. See the box below for tips on wiring the layout.

Electric hoist

The real key to making the project work is an electric hoist used to lift the folding tabletop. I used one from Northern Tool that has a 440-pound-lifting capacity. The hoist needs to be bolted securely to the ceiling following the manufacturer's instructions, so this might not be an ideal installation for your living room. It will work well, however, in a garage, basement, or even a spare bedroom.

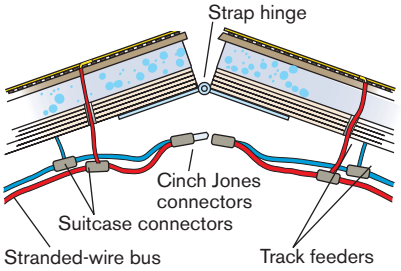
The hoist cable runs through a block and tackle and hooks onto another cable attached to the center of the layout with heavy-duty eyebolts. The finished layout is very heavy, so consult your local hardware store about cable and eyebolt weight ratings.

Because the cable needs to be on top of the layout to work, you can hide the eyebolts with removable pieces of scenery or structures. When the layout is folded up, you can store these pieces on the cabinet shelves.

When using the hoist to raise the layout (running the hoist can be as fun as running the trains), the tabletop slides along the support beams. When the hoist reaches its full height, you can gently push the tabletop the rest of the way into the cabinet until it touches the stop blocks. You can then remove and store the legs, clearing space for your next activity. **MR**

After building a number of layouts for himself, Stuart Freeman started a layout construction business in 1999. Stuart and his wife live in Alta Loma, Calif. Their four-year-old grandson's favorite question when he comes to visit is, "Can I see the train?"

Hinges and wiring

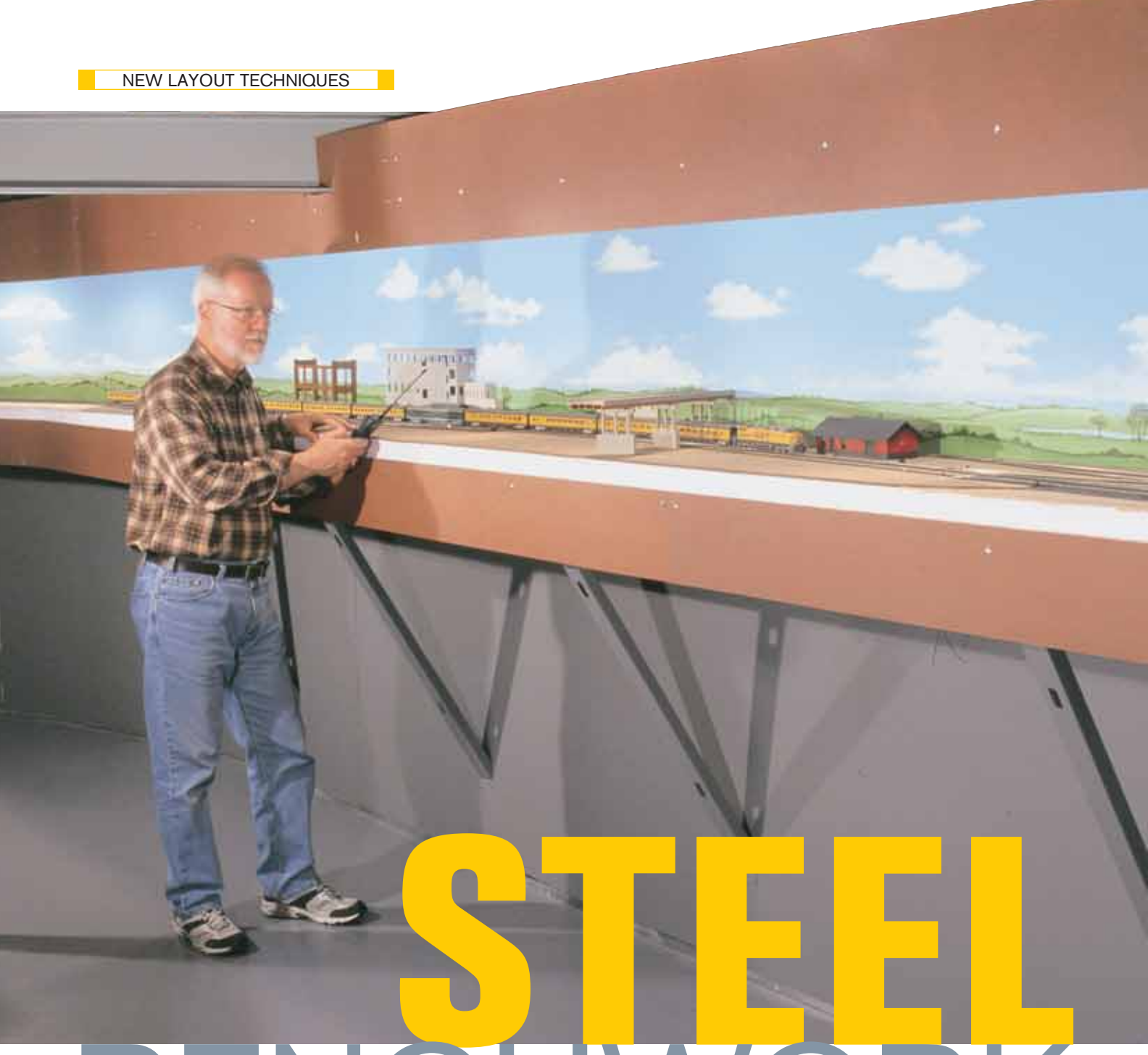


Glue track and roadbed in place over the joint, let dry thoroughly, then cut through with a motor tool

Working the track and wiring around the hinged sections is easier than you might think. To keep the track aligned properly, glue the roadbed and track over the hinge joint as though it weren't there. After the glue has set, cut the rails at the joint with a motor tool. When the layout is opened up, the rails will align properly.

To power the rails on either side of the hinge, solder feeders to all rails and drop them through the tabletop. Connect the feeders to a bus made of stranded wire that bridges the hinge joint. Any layout wiring that crosses the two hinged sections needs to be stranded wire so it can flex when the layout is folded up. (You may want to include terminal strips for the flexible pieces, making them easier to replace when the wire wears out.) Next, cut the bus at the joint and install Cinch Jones connectors.

When you are ready to fold up the layout, simply unplug the electrical connections and fold away. – *David Popp, associate editor*



STEEL BENCHWORK

Building a layout with steel studs in place of traditional wood framing

By Bill Boyd with Art Jones
Photos by David Popp

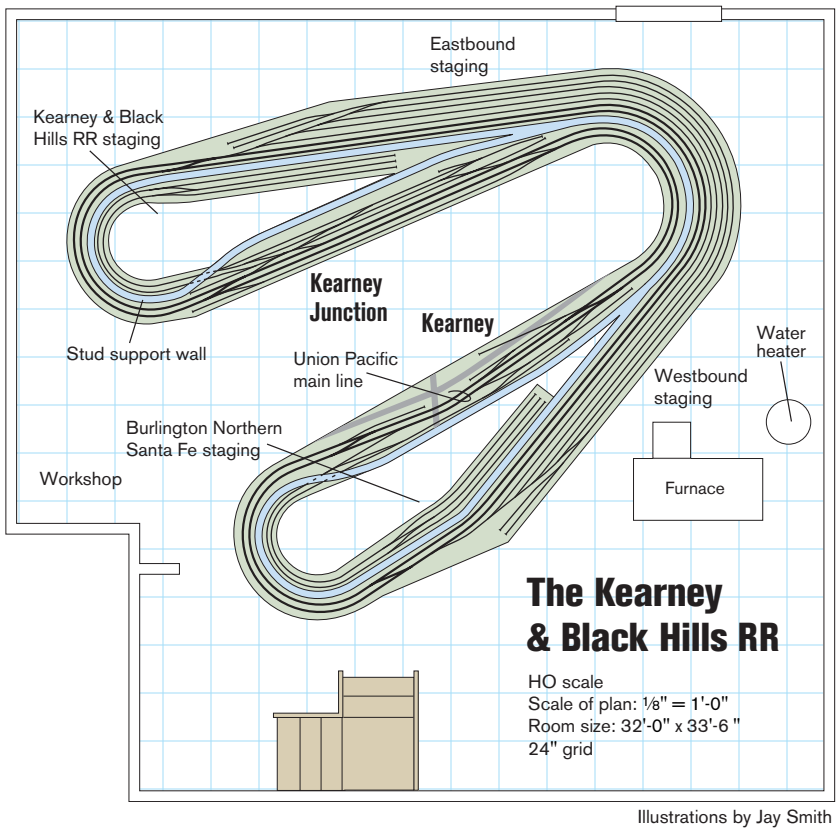
The surprising thing to me is the fact that I hadn't even considered using steel studs for benchwork until it was time to start construction of my HO scale Kearney & Black Hills RR. After seeing how easy the material was to work with, I wouldn't build a railroad any other way

There are many advantages to building a layout using steel studs. Steel is lighter and less expensive than wood, easy to cut with simple hand tools, and assembles quickly using self-tapping screws and a variable-speed drill. And when properly assembled, steel studs make a solid structure that won't warp.

An argument for steel

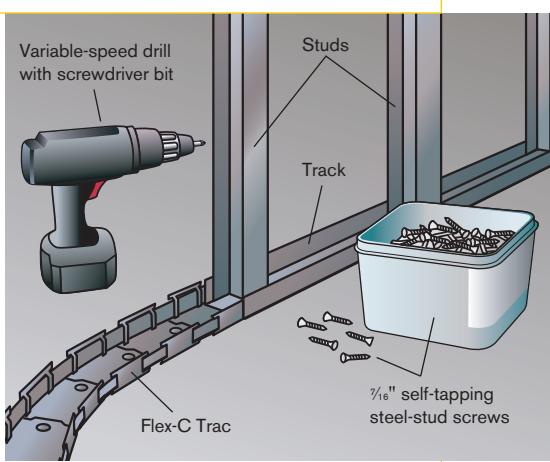
For many years my career as a teacher and my on-the-side touring business left little time for model railroading. However, after retiring from both jobs, I found the time to build a layout – my first. Not having much con-

When looking to build his HO scale Kearney & Black Hills model railroad, author Bill Boyd chose steel studs for a lightweight, low-cost alternative to wood. As a bonus, Bill also discovered just how fast constructing steel benchwork can be.



Illustrations by Jay Smith

The terminology of STEEL



Steel studs and related products can be found at most lumberyards and home and building centers. The following are a few terms you should know when buying steel construction products.

Flex-C Trac – a hinged framing product that can be locked into a curved shape prior to holding vertical studs (steel or wood) in place.

Track – used as the base and top of a frame to hold studs vertical. Tracks are slightly wider than studs so that the studs can fit into them.

Stud – the basic unit for supporting walls or other surfaces. Most come with punched holes for wiring runs.

Self-tapping screws – these 7/16" sheet-metal screws have a drill-style point. They require no pilot hole and can be driven into the metal using a variable-speed drill fitted with a screwdriver bit. Steel-stud drywall screws are also available. – *B.B.*

struction experience, I enlisted the aid of my friend Art Jones who'd built a number of layouts for other people.

My layout is essentially built on both sides of a free-standing dividing wall. After Art reviewed my plans for the center-of-the-room, stand-alone layout shown in the track plan above, he suggested that we frame it with steel studs. With steel, the cost of construction materials was about half of what the project would have required using comparable lumber.

Perhaps the most important factor, however, was speed. Art said the speed with which we could build the steel benchwork would enable me to get trains up and running quickly – a high priority at this point in my life. True to his word, benchwork construction was finished after a month of weekends, and we were operating trains on the layout less than a year from when we'd started.

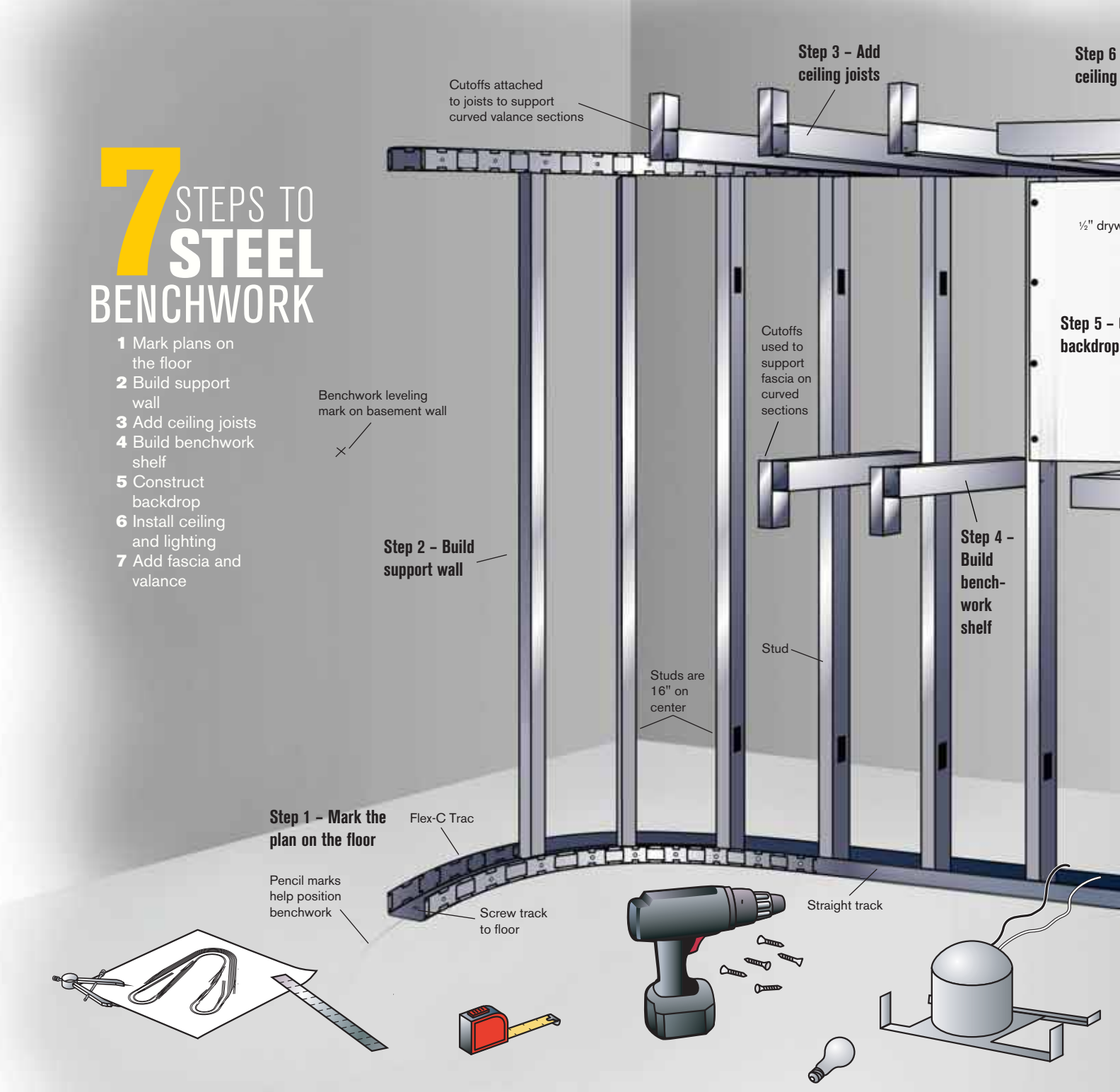
Working with steel

I've broken down the construction technique Art and I used on my K&BH RR into seven steps. An overview of the complete seven-step process is shown in the illustration on page 66.

Before we even moved the steel into the house, Art and I carefully marked the layout's position on the basement floor following my scale drawing. (See illustration step 1.) This included marking the center points for all the main curve radii and reference points for accurately building the curves' surrounding framework. We then established a level benchmark on one of the support posts in the basement (a basement wall

7 STEPS TO STEEL BENCHWORK

1. Mark plans on the floor
2. Build support wall
3. Add ceiling joists
4. Build benchwork shelf
5. Construct backdrop
6. Install ceiling and lighting
7. Add fascia and valance



THE ADVANTAGES OF STEEL OVER WOOD

Knowing nothing about working with steel studs, my initial question to Art was, "Why steel?" He was ready for me with a healthy list of advantages.

WEIGHT Who wants to carry several hundred pounds of lumber through the house and down a narrow basement stairwell? A 10-foot steel stud weighs less than half of what a 10-foot wood 2 x 4 weighs. Because of this, the steel is easier to work with and maneuver during construction.

STABILITY Basements being what they are, humidity changes don't affect steel studs. The steel could eventually rust, but if you have that much moisture, chances are good that you have bigger problems to deal with than the layout.

PRODUCT RELIABILITY Steel studs are always straight when you get them, which isn't the case with wood, especially if the wood is delivered from your local lumberyard sight unseen.

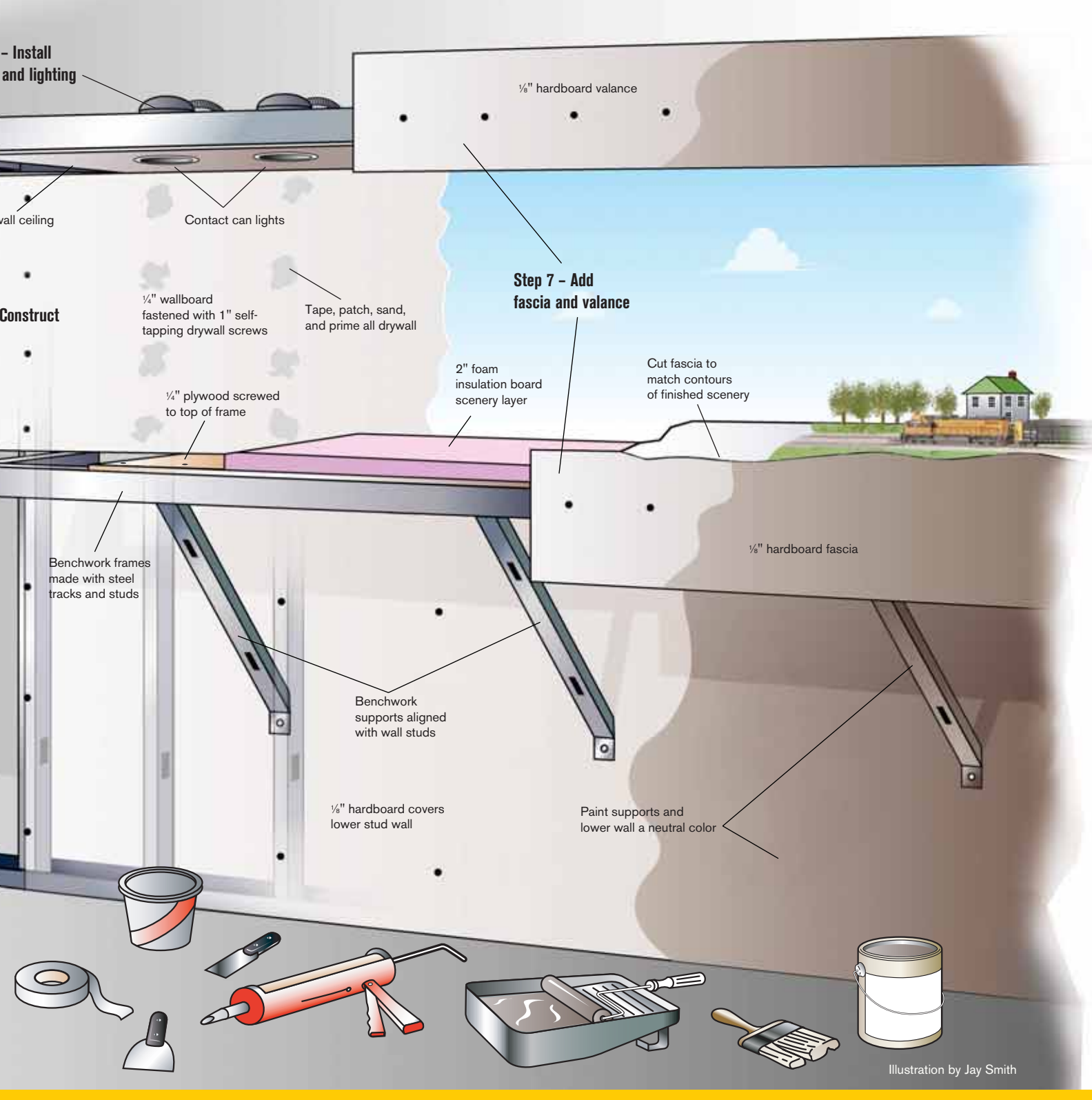


Illustration by Jay Smith

COST At the time we built the layout, the cost of a 10-foot, 25-gauge steel stud was approximately $1.80. This proved to be an enormous advantage, as lumber prices were quite high in 2003 and 2004 due to domestic and foreign lumber demands.

EFFICIENCY We were able to use almost all the cutoffs for braces, angles, and joints and supports for the valance and fascia. There were very few scraps to throw away once construction was complete.

WIRING The studs come pre-punched for wiring runs, eliminating the need for any drilling. You can purchase and install snap-in grommets for these openings if you're concerned about the steel edges damaging wire insulation.

ASSEMBLY No question about it, using self-tapping screws and a variable-speed drill, steel will win a construction race. The 25-gauge steel studs we used aren't made for load-bearing walls but are more than adequate for supporting model railroads. The thin steel is easy to cut with tin snips, speeding up fabrication. We also found that in many cases, we didn't need to make precise cuts; the steel-stud construction technique allowed us a tolerance of as much as ½" when building the main support wall.

Though no single item from the above list makes steel any better than wood, cumulatively they make the case for choosing steel benchwork very clear. – *B.B.*

Building the layout around a self-supporting wall created two small rooms, one in each end lobe. Bill used these for the two branchlines' staging yards.

Tools and supplies

Here are most of the tools and supplies you'll need to get started building benchwork from steel studs.

- Gloves
- Square
- Heavy-duty tin snips
- Variable-speed drill with adjustable torque
- Screwdriver bits
- Self-tapping sheet-metal screws
- Marking pen
- Tape measure
- Level
- Locking pliers
- Clamps
- Jigsaw (for cutting plywood roadbed and hardboard fascia and valance panels)

Also, if you're going to cut a lot of steel studs to the same length, a power saw with a metal-cutting carborundum disk is helpful.

And, be aware that not all self-tapping steel-stud screws are created equal. The first ones we purchased at the local home center weren't sharp enough. We bought better ones at a contractor's building supply house. They were made by Itochu Building Products (IBP), 660 White Plains Rd 5th Floor, Tarrytown, NY 10591. – *B.B.*

would also work) from which all height measurements were made. With that accomplished, we brought in the steel and started building.

We began with the steel support wall, following the markings we drew on the floor. As shown in **step 2**, steel wall systems are framed using a top and bottom track piece that's slightly wider than the studs themselves. These are cut and fit in place first, including the Flex-C sections. [See the sidebar on page 69 for more on working with Flex-C. – *Ed.*] The studs are then inserted into the track, leveled, and screwed in place using 7/16" self-tapping steel-stud screws. To keep everything secure, we bolted the wall sections to the cement floor.

Next, we screwed steel studs to the top track to form ceiling joists, as shown in **step 3**. Since my basement is unfinished, I included a ceiling over the layout, giving the model railroad a finished appearance without having to install a drywall or drop ceiling in the entire basement. These ceiling joists also support the layout lighting and valance.

After the ceiling joists were in place, we sheathed the lower parts of the support wall with ⅛" hardboard. We then added the framework for the layout benchwork, as shown in **step 4**. Essentially, the layout is built on top of a long continuous shelf, framed with steel studs and tracks. Because the layout runs down both sides of the center wall, we were able to cantilever most sections, using the longer cutoffs for supports.

We covered the top of the benchwork with a layer of ¼" plywood, attaching it to the steel with no. 8 x 1" steel-stud drywall screws. Similar to regular drywall screws, these are made for use with steel studs and have (you guessed it) self-tapping points. In addition to providing a support base for the scenery layer, the plywood helps solidify the steel framework and quiets the noise of trains running over the foam.

Later, after installing the ceiling and backdrop, we glued a 2" layer of foam insulation board on top of the plywood as a base for the layout's subroadbed.

Backdrops, ceilings, and fascia

We installed the backdrop next, as shown in **step 5**. Because the backdrop forms a continuous surface along all visible portions of the layout, Art used a special bendable wallboard made by USG. This material is ¼" thick and can be formed into curves when moistened, eliminating the need to cut kerfs in one side as with plywood.

To bend the wallboard, spray both sides of the drywall with a misting bottle and then let the piece soak for a short time. When the drywall is flexible enough to fit the curve, screw it to the studs using 1" steel-stud drywall screws. (Though it worked very well in most locations, bendable drywall does have limits as to how tight a radius it can form, and we did break a piece.)

To save some money, we used the bendable wallboard only on the sections of the layout that needed it. We used ordinary ¼" drywall on all straight portions of the backdrop.

Once the backdrop was in place, Art and I added the ceiling. See **step 6**. The layout ceiling is made from ½" wallboard, screwed to the overhead joists

The benchwork frames are made from steel studs and tracks, topped with ¼" plywood, and screwed to a free-standing wall.

with steel-stud wallboard screws. We chose ½" wallboard over the ¼" material we used on the backdrop because the extra thickness provided the support necessary to hold up the 22 contact can lights that illuminate the scenicked portions of layout.

Contact can lights have a special double-wall design so they maintain a cool surface where they touch surrounding materials. The lights are fitted through holes cut into the drywall.

When we had finished all the drywall work, we taped the joints, filled the screw holes, and primed everything to produce a smooth, finished surface ready for painting.

We made the fascia and valance from ⅛" tempered hardboard, as shown in **step 7**. We attached the hardboard to the straight portions of the benchwork by screwing it to the tracks that capped the ends of the studs with 1" modified truss screws. (These are another type of self-tapping screw, but with a wide head, giving them a more-finished appearance.) For the curved fascia and valance sections, Art and I mounted scrap pieces of steel stud to the ends of the ceiling joists and benchwork shelf, then screwed the hardboard in place.

As shown in the photo on page 64, the fascia is currently set below the base foam layer. We'll raise it later, once we've formed the scenery' topography.

A good track record

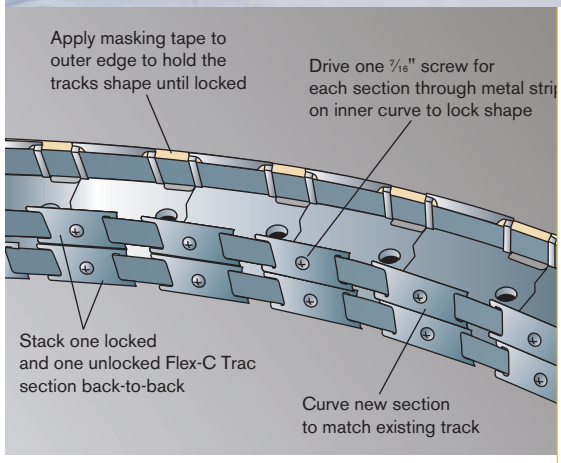
Working with the steel proved to be everything Art had said it would be – fast, lightweight, strong, affordable, and the list goes on. The layout has been up for 18 months without any perceptible expansion or contraction from changes in seasons and basement climate.

Having been through the entire process, I can wholeheartedly recommend the use of steel. When you design your next layout, whether it's a free-standing or around-the-walls plan, consider using steel for your benchwork – after all, the real railroads use it for their trains! **MR**

Working with FLEX-C TRAC

As shown in the right-hand photo, Flex-C Trac (www.flexc.com) is a special steel-stud track used for framing curved wall sections. It's made up of two steel strips and a series of movable small track sections. Once the Flex-C Trac is formed into a desired shape, you lock the position by installing 7/16" steel stud screws at each joint.

Though Flex-C is considerably more expensive than the studs themselves ($2.71 a foot vs. $0.18 a foot), it makes up that cost difference in ease and accuracy. An additional benefit of using Flex-C, unlike cutting curved construction members from a sheet of ¾" plywood, is that there's no waste. Using the following steps, Art and I built matching upper and lower Flex-C Trac curves for the K&BH's three curved wall sections.



Flex-C Trac is a flexible steel-stud construction component that allows you to build curved walls or layout sections.

First, form the Flex-C to fit the curve in the benchwork, and then clamp the ends to hold the shape securely. Next, apply masking tape along the side of the outer curve to keep things from moving while installing the locking screws on the inside curve. The 7/16" screws hold the Flex-C in place by cutting through the steel strip in the inside of the track. You need to install screws only on one side for the track to retain its shape. Wait until you've made the matching curve before attaching the track to the floor.

Next, turn over the first curved section so that the flat base is face up, then lay a second strip of Flex-C on top, as shown in the illustration above. Shape the new piece to match the curve of the first, then install the screws to lock its shape.

Finally, set the bottom curve in place and fasten it to the floor (and the upper track to the ceiling if building a traditional wall). Next cut and place the studs one at a time, fastening them to the top and bottom using self-tapping screws.

Due to the free-standing design of my layout, we installed three studs in the bottom track first (one at each end and one approximately in the middle), then added the upper curve to create a stable starting point. It helps to have one or more people hold things for you until the top track can be screwed in place. – *B.B.*

Bill Boyd is a retired educator and tour company owner. He grew up in the town of Kearney, Neb., and models a modern version of the Kearney & Black Hills RR, a local short line that was purchased by the Union Pacific in the late 1800s. Though active in the hobby a long time, this is Bill's first layout.

Art Jones is a maintenance engineer specializing in remodeling apartment complexes. He models the Baltimore & Ohio in the transition era.

Frame your layout

How to add a valance and fascia before starting on the scenery

By Pelle Søeborg • Photos by the author

Looking back on the construction of my HO scale Tehachapi layout (featured in the March 1998 *Model Railroader*), I realized that I was an expert in doing things the hard way.

For example, I didn't start painting the backdrop until all the scenery was finished. In some areas the backdrop was more than three feet from the front of the layout and was impossible to reach without damaging scenery. And the layout was almost complete before I finally installed the light fixtures over it, another poor decision that resulted in layout damage.

I know I'm not alone in my rush to start laying track and making scenery, because for many model railroaders that's the fun part of the hobby. But for me, skipping ahead in the layout process – taking steps out of order – resulted in nothing but hassles.

When I started my new layout, I promised myself that I'd plan more carefully. After spending a summer constructing a 10 x 20-foot train building in my backyard, I realized I had to do things in the right order, including adding a valance and fascia before placing delicate scenic items.

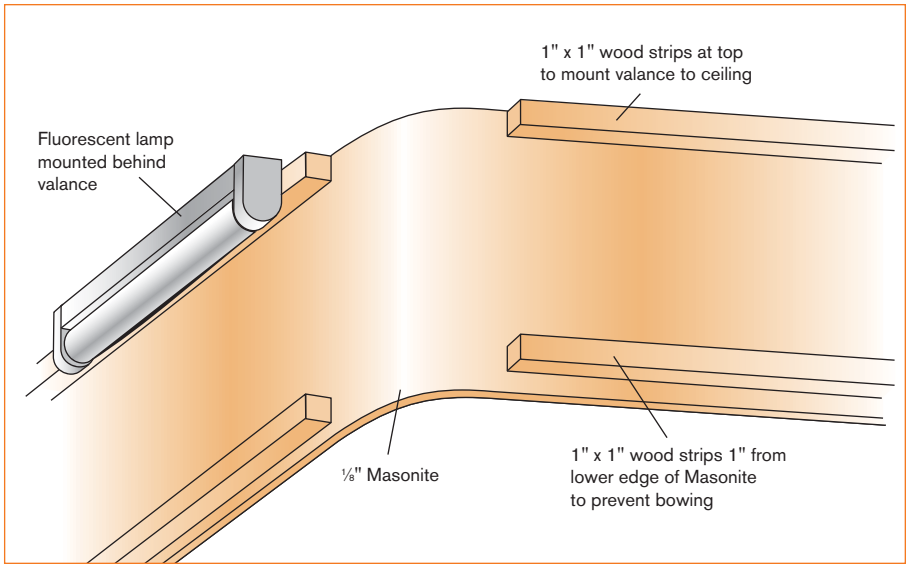
Making a valance

One of the first things I wanted for my new layout was a valance, as shown in fig. 1. A valance is a light shield used to hide the layout's overhead lighting from the viewer. When combined with a fascia (a border along the front edge of the layout), the valance offers a picture-frame-like view of the layout.

I started valance construction having already designed my track plan and knowing exactly the shape of my layout. This allowed me to install the fluorescent lights without having to climb on top of the layout. There was no doubt that it would be much more difficult to

Pelle Søeborg built his layout within the frame of both valance and fascia. These borders above and below clearly define his striking HO scale Union Pacific layout.

Fig. 1. Top of the frame. The valance, or the top part of the "picture frame," is made from ⅛" Masonite and curves to match the projected contours of the layout.



Illustrations by Jay Smith

Fig. 2. Back of the valance. Pelle first attached 1" x 1" wooden strips to the ceiling and then attached the valance to these. Strips along the bottom prevent bowing.

Fig. 3 Let there be light. The fluorescent lamps are visible to the right of the valance. Pelle arranged his train room so the only lights are shining directly onto the layout scenes, drawing attention to the finished model railroad.

install the lighting and valance after I had completed the layout.

I began by using chalk to draw the contours of the layout onto the ceiling. Next I mounted 1" x 1" wooden strips to the ceiling; these would serve as places to attach the valance material.

I cut the pieces for the valance from ⅛" Masonite sheets. The sloped ceiling in my train room made this task a little difficult. I wanted the distance from the floor to the bottom of the valance to be the same on every part of the layout. The difference in the distance from the floor to the ceiling from one side of the room to the other was 15". It took a lot of calculating to figure out the exact shape of the valance pieces. This may not be an issue with your layout.

I used screws to attach the valance to the wooden strips on the ceiling, as shown in fig. 2, which worked well. The only difficulty was that the Masonite

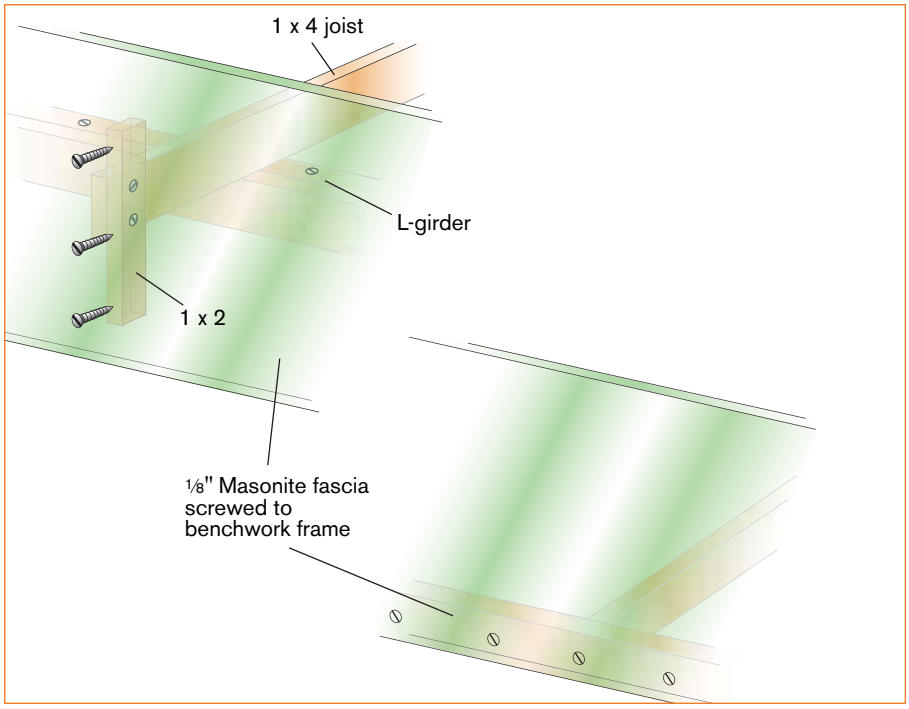


Fig. 4. Adding fascia to the benchwork. Pelle screwed 20" Masonite strips into the front edge of the benchwork (both L-girder and open-grid benchwork shown).

Fig. 5 Preparing for contours. Pelle envisioned the contour of his layout's landscape and drew it in pencil on the ⅛" Masonite. You can see a little of the already installed valance in the upper right-hand corner of the photograph.

Fig. 6 Completing the frame. Pelle used a jigsaw to cut the fascia on the pencil lines representing the scenic contours. With the valance, lighting, benchwork, and fascia in place, Pelle could finally move on to the modeling part of the hobby.

tended to bulge. I solved that problem by gluing wood strips to the back of the Masonite approximately 1" from its lower edge.

Then I installed the fluorescent lamps behind the valance – a relatively simple task since there was no layout to get in the way.

With the valance and lamps in place, as shown in fig. 3, at last I was ready to start building the benchwork for the layout. As a bonus, I now had excellent light to work by.

Building the fascia

I built the benchwork within the boundaries set by the valance overhead and my original track plan, and then I installed the subroadbed. Finally, all of the structure was in place, and it was time to install the fascia.

In addition to making the layout look finished, fascia serves other purposes. The smooth, rounded corners allow you and your visitors to move about the layout without bumping into sharp edges and corners. Fascia also makes it easier to mount control panels and throttle plug-ins on your layout.

As with the valance, I used ⅛" Masonite for the fascia. I cut some 20" strips from Masonite sheets and used screws to attach them to the front edge of the benchwork. See fig. 4.

Then I drew what I visualized to be the future contour of the scenery (as shown in fig. 5) on the fascia. You'll need to use your imagination to determine how the landforms behind the fascia will look. Remember that no natural terrain, not even a flat-looking desert, is completely level.

I made sure there were variations in the height and depth of my scenery by drawing the contours so the highest points were above track level and the lowest points were at least several inches below track level.

Finally, I used a jigsaw to cut out the scenery contours I had marked on the fascia. See the contoured fascia in fig. 6.

Worth the effort

With the valance and fascia in place, my job as a model railroad carpenter had finally ended. For me, this kind of construction isn't the most enjoyable part of model railroading, but I'm confident that in the end it's worth the effort. The layout will look much more appealing with a nice valance and a smooth fascia that define the edges and frame the scenes. **MR**

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