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step-by-step** p.22

August 2017
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50 years and 2 houses

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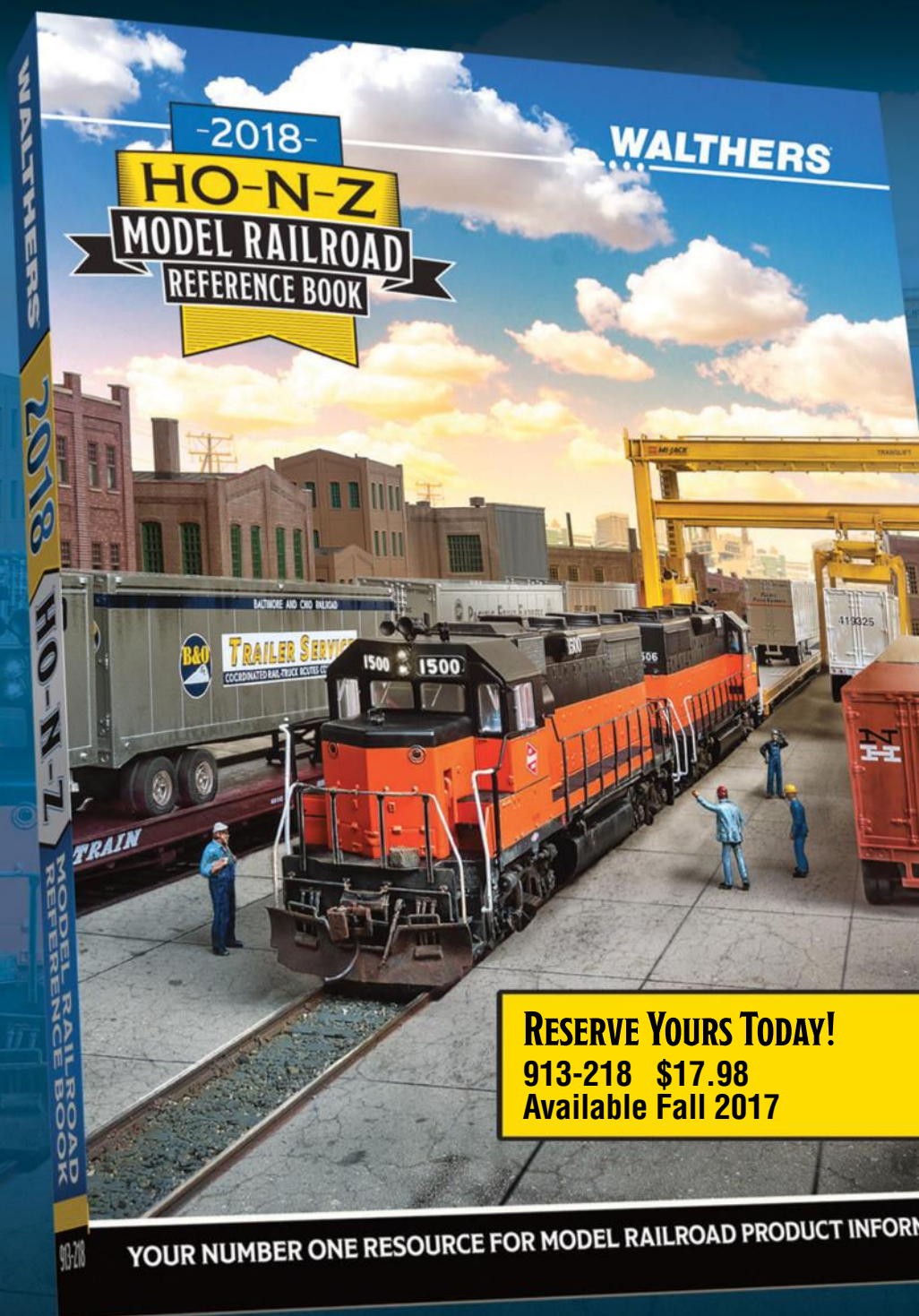


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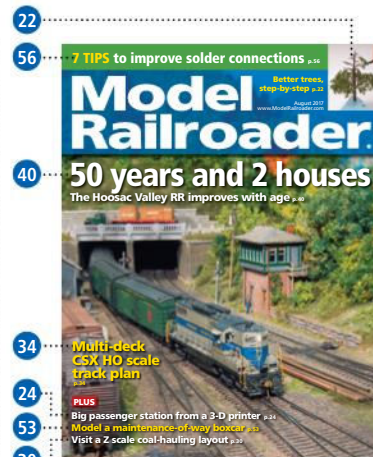
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Mutiple deck design, or 'rinse and repeat'



On the cover: An express train enters Essex Junction on Dick Elwell's Hoosac Valley RR HO scale layout.

Lou Sassi photo



Next issue

In September, visit the Colorado Rockies in HO_{N3} scale, learn how to build a layout in a weekend, use natural rocks and soil for scenery, and more!



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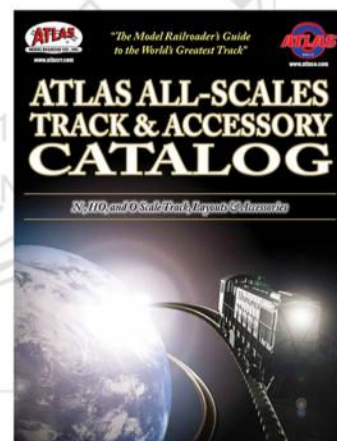
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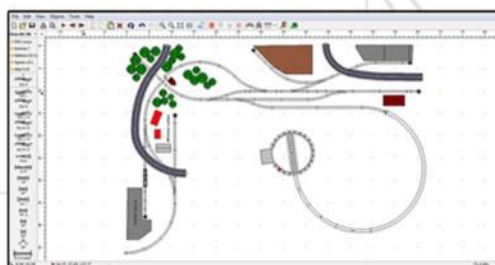


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Layout video: The Hoosac Valley RR

After more than 50 years and a move into a new home, Dick Elwell keeps improving his HO scale Hoosac Valley RR. *Model Railroader* subscribers get an exclusive look at trains running through the detailed scenes on this spectacular model railroad. Click on the Videos tab at www.ModelRailroader.com.

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How to install a decoder

In this free preview from our subscription video service, Model Railroader Video Plus, you'll learn some soldering basics. Watch this demo showing how to wire and solder connections for a DCC decoder installation. Find the video under Online Extras on the MR home page.

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New product review videos

Subscribers have access to more than 1,000 product reviews, including hundreds of product demo videos. This month check out the Athearn HO scale Northern Pacific Challenger and the Bachmann PCC car. Both models feature Digital Command Control (DCC) and realistic sound effects.

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Layout names from a more playful era

A reader recently gave us a copy of the *Official Guide of Model Railroads for 1956*.

What's that? Well, back in the day, the National Model Railroad Association published booklets containing alphabetical listings of home layouts, including the name of each NMRA member and his full address. The idea was to encourage member visits.

The bulk of the 66-page booklet is an alphabetical listing of each pike by its name. We don't often use the word "pike" today, but our predecessors did.

While thumbing through the booklet, I immediately recognized three Californians from old issues of *Model Railroader*: the Gorre & Daphetid RR (John Allen,

Monterey, Calif.) the Alturas & Lone Pine RR (Whit Towers, Los Angeles), and the South Shasta Lines (Godfrey Humann, Gerber, Calif.).

I also noticed in the booklet that there were a lot of fanciful names for model railroads. Sure, some realistic names were used, such as the Boston & Maine RR Portland Division (Edward Herling, Old Orchard Beach, Maine), the Texas & Pacific Ry. Western Division (Ed Albrecht, Portland, Ore.), and the Tidewater & Western RR (Russell Jones, Portsmouth, Va.) But there are plenty of whimsical names.

Many names described the characteristics of each layout, such as the Baulky & Mitey RR (Carl Phillips, Malden,

Mass.), the Jerk, Rattle, Thump & Krash RR (James Maheu, Chicago), the Nickel, Dime & One Bit RR (Edward Letzer, Rochester, N.Y.), and the quite cleverly named Xpensivania RR (Frank Sadlo, Willowdale, Ontario).

There were common themes. Three layouts had "Flat Wheel" in their names, three others used "Hither & Yon(der)," two were called the Noname RR, and two were titled Rock, Rattle & Roll RR (this was, you'll recall, the Elvis Presley era).

Three had an unexpected culinary angle: the Curried Duck RR (Arthur Boyce, London, Ontario); the Cucumber Gap RR (Arthur Miller, Brighton, Mich.), and the Tuna Valley Ry. (Albert Schierer, Bradford, Pa.).

The next two need to be pronounced out loud: the Sfhazze, Loooville & Nawlns RR (Billi Bowen, Denver) and the



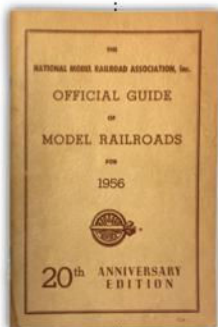
Yew Nork Tencral RR (Ray Nelson Jr., St. Louis).

My favorite? Hard to say, but perhaps it was the modestly named Ho-Kay Line (William and Katherine Mason, Elmhurst, N.Y.).

Yes, it was an HO pike.

This month's cover caption asks about the trees on Dick Elwell's Hoosac Valley RR on page 40. His trees are made from peppergass and wild oregano.

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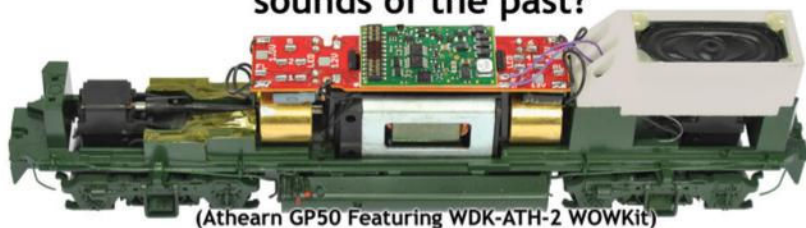
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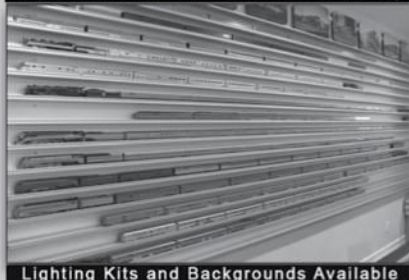
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parts, an operating headlight, and E-Z Mate Mark II couplers. The 85-foot smooth-side coach and observation car (\$79 each) are based on new and existing tooling. Both models have a lighted, detailed interior; clear window glazing; metal wheels; and E-Z Mate Mark II couplers. Bachmann Trains, 215-533-1600, www.bachmanntrains.com

HO scale locomotives

- **National Railway Equipment Genset II diesel locomotive.** New paint schemes: Amtrak, Modesto & Empire Traction, Tacoma Rail (one road number), and Metro Ports/Port of Los Angeles (one number). New numbers: CSX and Indiana Harbor Belt. Two numbers per scheme; also available undecorated. Die-cast metal underframe, ditch lights, and separately applied grab irons. Direct-current model with 8-pin plug for Digital Command Control, \$169.95; with dual-mode ESU LokSound Select Digital Command

Control and sound decoder, \$279.95. Fourth quarter 2017. Trainman Plus series. Atlas Model Railroad Co., 908-687-0880, www.atlasrr.com

- **General Motors Diesel Division SD40-2 diesel locomotive.** New paint scheme: Wellsboro & Corning RR. Two road numbers. Prototype-specific details, factory painted and installed wire grab irons, and illuminated number boxes. Direct-current model, \$199.95; with ESU LokSound Select Digital Command Control and sound, \$299.95. Bowser Manufacturing Co. Inc., 800-327-5126, www.bowser-trains.com

HO scale freight cars

- **Assorted freight cars.** Canadian Pacific and New York, New Haven & Hartford 36-foot double-sheathed boxcars, \$17.98 each. Central Vermont panel-side twin hopper, \$16.98. Great Northern Pullman-Standard 40-foot PS-1 boxcar, \$17.98. Illinois Terminal American Car & Foundry 4,600-cubic-foot-capacity three-bay Center Flow covered hopper, \$18.98. Morrell 40-foot plug-door steel refrigerator car, \$18.98. Norfolk Southern Pullman-Standard 4,750-cubic-foot-capacity three-bay covered hopper, \$19.98. Pennsylvania RR 50-foot riveted-side double-door boxcar, \$17.98. Reading Co. United States Railroad Administration twin hoppers (single car, \$16.98; three-pack, \$49.98). Southern Ry. 50-foot welded-side

plug-door boxcar, \$17.98. Injection-molded plastic kits with plastic wheelsets and Accumate couplers. Accurail, 630-365-6400, www.accurail.com



- **General American Transportation Corp. 2,600-cubic-foot-capacity covered hopper.** Domino Sugar; Atchison, Topeka & Santa Fe; Chicago, South Shore & South Bend; Soo Line; and Southern Pacific. Three road numbers per scheme. Prototype-specific shaker brackets and outlets, wire grab irons and brake piping, and body-mounted McHenry scale couplers. \$48.98. Ready-to-Roll. Athearn Trains, 800-338-4639, www.athearn.com



- **Aluminum coal gondola.** New paint schemes: Burlington Northern; Atchison, Topeka & Santa Fe (fictional scheme); CSX; Detroit Edison; CIT Group; and Pennsylvania Power & Light. Four road numbers per scheme. Injection-molded

Meet the MR staff in Orlando

The National Train Show will be held August 4-6 at the Orange County Convention Center in Orlando, Fla. Meet members of the *Model Railroader* magazine staff, including editor Neil Besougloff, senior editor Dana Kawala, associate editor Cody Grivno, and contributing editor Tony Koester. In addition, Model Railroader Video Plus producer David Popp will be at the show. We look forward to seeing you at the *Model Railroader* booth!



plastic body, weighted underframe, and removable coal load. \$26.95. Trainman line. Atlas Model Railroad Co., 908-687-0880, www.atlasrr.com

- **Milwaukee Road 40-foot ribbed-side brewery spent grain boxcar with roof hatches.** Billboard lettering with "The Milwaukee Road" herald. Six road numbers. Doors painted orange with outline of Miller Brewing Co. logo in white. Etched-metal running boards, metal wheelsets, and Kadee couplers. \$42.95. November/December 2017. InterMountain Railway Co., 303-772-1901, www.intermountain-railway.com

- **Assorted 40-foot freight cars.** Atchison, Topeka & Santa Fe double-door boxcar (reporting marks only) and stockcar and Denver & Rio Grande 40-foot boxcar (silver with "Insulated Cookie Box Bakery Goods" lettering). One road number per scheme. Positionable doors; RP-25 contour metal wheelsets; and separately applied running boards, ladders, and other details. Models equipped with European couplers but include Kadee replacements. \$44.99 each. Fourth quarter 2017. Trix, www.trixtrains.com

- **United States Railroad Administration 40-foot single-sheathed boxcar.** Original (18 road names), modern with radial roof (Chesapeake & Ohio and Norfolk & Western), and modern with Hutchins roof (Baltimore & Ohio, Pennsylvania RR with three door styles, and Western Maryland). One-piece cast-resin body with details, Yarmouth etched bronze sill steps and Carmer uncoupling levers, and decals. Kits do not include trucks and couplers. \$41 each (undecorated, \$40); flat kit (\$38) also available. Westerfield Models LLC, 303-658-9343, www.westerfieldmodels.com

HO scale structures



- **Locomotive maintenance shed.** Factory-painted and assembled structure. Features backlit sign with 30 interchangeable railroad heralds, two exterior lights, interior lighting, trees and shrubs, two workers, and Jack the German shepherd. Lighting requires 4.5-volt power source (sold separately). Measures 6 1/8" x 11 7/8" x 3 1/2". \$49.99 plus shipping (free shipping to your local Menards store). Menards, www.menards.com



- **La Grange, Texas, Missouri-Kansas-Texas depot.** Laser-cut micro-plywood kit with self-adhesive diamond shingles. Measures 9 1/2" x 5" x 2". \$85. Summit USA, www.summit-customcuts.com

HO scale details and accessories

- **Modern electrical gear kit.** Includes parts to build 90 items, including six

HO scale



Electro-Motive Division GP35 diesel locomotive. New to the Walther'sProto lineup is this four-axle road switcher. The HO scale GP35 is lettered for Milwaukee Road; Atchison, Topeka & Santa Fe; Burlington Northern; Chesapeake & Ohio; Erie Lackawanna; and Southern Pacific in four road numbers per scheme (two each in DC and Digital Command Control). The model has a five-pole skew-wound can motor and Proto-Max couplers. Direct-current models retail for **\$199.98**. Versions with a dual-mode SoundTraxx sound decoder list for **\$299.98**. Wm. K. Walther's Inc., 414-527-0770, www.walthers.com

Showcase



1 Timber retaining walls. Chooch sells weathered flexible vinyl walls in three board widths (.075", .115", and .135"). The 3¾" x 12" sheets are **\$12.99 each**. Chooch Enterprises, www.choochenterprises.com

2 Electro-Motive Division GP7 and GP7B. These HO scale Santa Fe units are

offered in two numbers per body style and are priced at **\$189.98 each** (direct current) and **\$289.98** (with dual-mode Tsunami decoder). Athearn, www.athearn.com

3 Association of American Railroads modified 1937 40-foot boxcar. This WaltherMainline HO scale boxcar is decorated for

Lehigh Valley and five other railroads in two numbers per scheme. The HO model sells for **\$24.98**. Wm. K. Walthers Inc., www.walthers.com

4 H&H Feed Mill. This factory painted and weathered structure is part of the Woodland Scenics line. The HO scale feed mill (**\$131.99**) includes a printed

interior and three light-emitting diodes. Woodland, www.woodlandscenics.com

5 Great Northern business car. This N scale heavyweight car is available in two road numbers (**\$76 each**). The car was produced by Micro-Trains and is available from the Lowell Smith Signature Series, www.lowellsmith.net

transformer cabinets, above ground cable access boxes, electrical cabinets with meters, residential electric meters, and gas meters with mounting brackets. \$14.98. Cornerstone Series. Wm. K. Walthers Inc., 414-527-0770, www.walthers.com

• **United States Army World War II-era bulldozer.** Factory assembled, painted, and weathered model. \$49.84 (yellow civilian version, \$43.57). Produced by Artitec, available from Reynauld's Euro Imports, 630-365-6340, www.reynaulds.com

In Memoriam

Chris Comport, 1948-2017

Chris Comport, 68, died May 4 in Wisconsin. Chris wrote several stories for *Model Railroader* and other hobby magazines and was a professional model builder who built client layouts while working with Raildreams Inc. Chris also worked for A.I.M. Products (now part of Monroe Models) and offered his own line of model railroad structures under the name of Russian River Railroad Co. (now part of Scale City Designs).

N scale locomotives

• **2-8-0 Consolidation steam locomotive.** Atchison, Topeka & Santa Fe; Baltimore & Ohio; Canadian Pacific; Denver & Rio Grande Western; New York Central; and Union Pacific. Two road numbers per scheme. Separately applied handrails, bell, whistle, and safety valves; coined metal drive rods; and split, die-cast metal chassis with all-driver electrical pickup. \$149.98. February 2018. AthearnN. Athearn Trains, 800-338-4639, www.athearn.com

N scale freight cars



• **United States Railroad Administration 30'-6" two-bay hopper.** New paint schemes: Baltimore & Ohio; Delaware & Hudson; Interstate RR; Missouri Pacific; Public Service – New Jersey; Westmoreland Coal Co. (single car and two pack); and New York, Ontario & Western (Westmoreland Coal Co. patchout, single car and two pack). Three to six road numbers per scheme.

Die-cast metal slope sheets, hopper bays, and center sill assembly; injection-molded plastic sides, ends, and hopper doors; and Fox Valley Models metal wheelsets. Single car, \$24.98; two-pack, \$49.90; and three-pack, \$74.85. Autumn 2017. Bluford Shops, 618-822-6833, www.bluford-shops.com



• **Assorted freight cars.** Florida East Coast 50-foot plug-door boxcar, \$26.80. Western Pacific 31-foot bay-window caboose, \$36.95. Injection-molded plastic models with plastic wheelsets and Magne-Matic couplers. Micro-Trains Line Co., 541-535-1755, www.micro-trains.com

• **86'-6" double- and quad-door boxcars.** Double-door car: Atchison, Topeka & Santa Fe ("Super Shock Control" slogan); Detroit, Toledo & Ironton; and Norfolk Southern (gray with "The Thoroughbred" slogan; gray doors in

two numbers and oxide doors in one number). Quad-door car: Illinois Central Gulf, Southern Pacific ("Hy Cube Cushion Car" slogan and Union Pacific "Building America" slogan in two numbers), St. Louis Southwestern ("Hy-Cube Cushion Car" slogan), and Washington Central ("Maxi-Cube" slogan). Three road numbers per scheme unless noted. \$31.95. Fourth quarter 2017. Trainworx, 970-874-9747, www.train-worx.com

N scale details and accessories



- **McCormick-Deering International Harvester heavy-duty farm wagon.** Photo-etched brass kit. Includes riveted iron strapping on wagon body, undercarriage axle linkages, and brake rigging. Kit

can be assembled with glue (no soldering required). \$16.95. The N Scale Architect, 607-746-8416, www.thenarch.com

O scale freight cars

- **General American 53'-6" double-sheathed express refrigerator car.** New paint schemes: Canadian National, Great Northern, Northern Pacific, and Pacific Fruit Express. New road numbers: Denver & Rio Grande Western and Railway Express Agency. Four road numbers per scheme; also available undecorated. Sprung, die-cast metal General Steel Castings Commonwealth express car trucks; metal ladders, stirrup steps, and grab irons; and positionable doors and roof hatches. \$89.95. Atlas O, 908-687-9590, www.atlaso.com
- **18-foot cabooses.** On30. Logging version: Painted maintenance-of-way gray, red, and yellow with data only. Offset-cupola caboose: data only, Durango & Silverton, and White Pass & Yukon. New and existing tooling. Metal wheels and E-Z Mate Mark II couplers. \$69. Spectrum line.

Bachmann Trains, 215-533-1600, www.bachmanntrains.com

Z scale locomotives



- **Electro-Motive Division GP38-2 diesel locomotive.** New paint scheme: Illinois Central. Three road numbers (one with Operation Lifesaver logo). Traction tires, optional plows and pilot, and directional light-emitting-diode headlights. Designed for Digitrax and TCS drop-in Digital Command Control decoders. American Z Line, 614-764-1703, www.americanzline.com

Tools

- **Photo etch tool kit.** Includes Model 9180ET scissor with extra tapered blades, Model 450 TweezerNose plier, and



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Duplex Set Includes: DCS210 Advanced Command Station, DT500D Advanced Duplex Throttle, UR92 Universal Panel, PS615 power supply, and a LT1 LocoNet Tester.

2018 WGH on Tour schedule

The World's Greatest Hobby on Tour announced its 2018 schedule. Since 2004, more than 1.5 million people have attended the shows, held annually in different cities throughout the United States.

The 2018 schedule stops include:

- Jan. 6-7, Monroeville, Pa.: Monroeville Convention Center
- Jan. 13-14, Charlotte, N.C.: The Park Expo & Conference Center
- Feb. 3-4, Houston: NRG Park Arena
- March 10-11, Edison, N.J.: New Jersey Expo Center

For more information on the World's Greatest Hobby on Tour, visit www.wghshow.com.

Model 575 micro-bending plier with forming blades for shaping. High-carbon steel construction with Light-Touch return springs and Xuro-Rubber cushioned hand grips. \$63.50. Xuron Corp., 207-283-1401, www.xuron.com

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Books

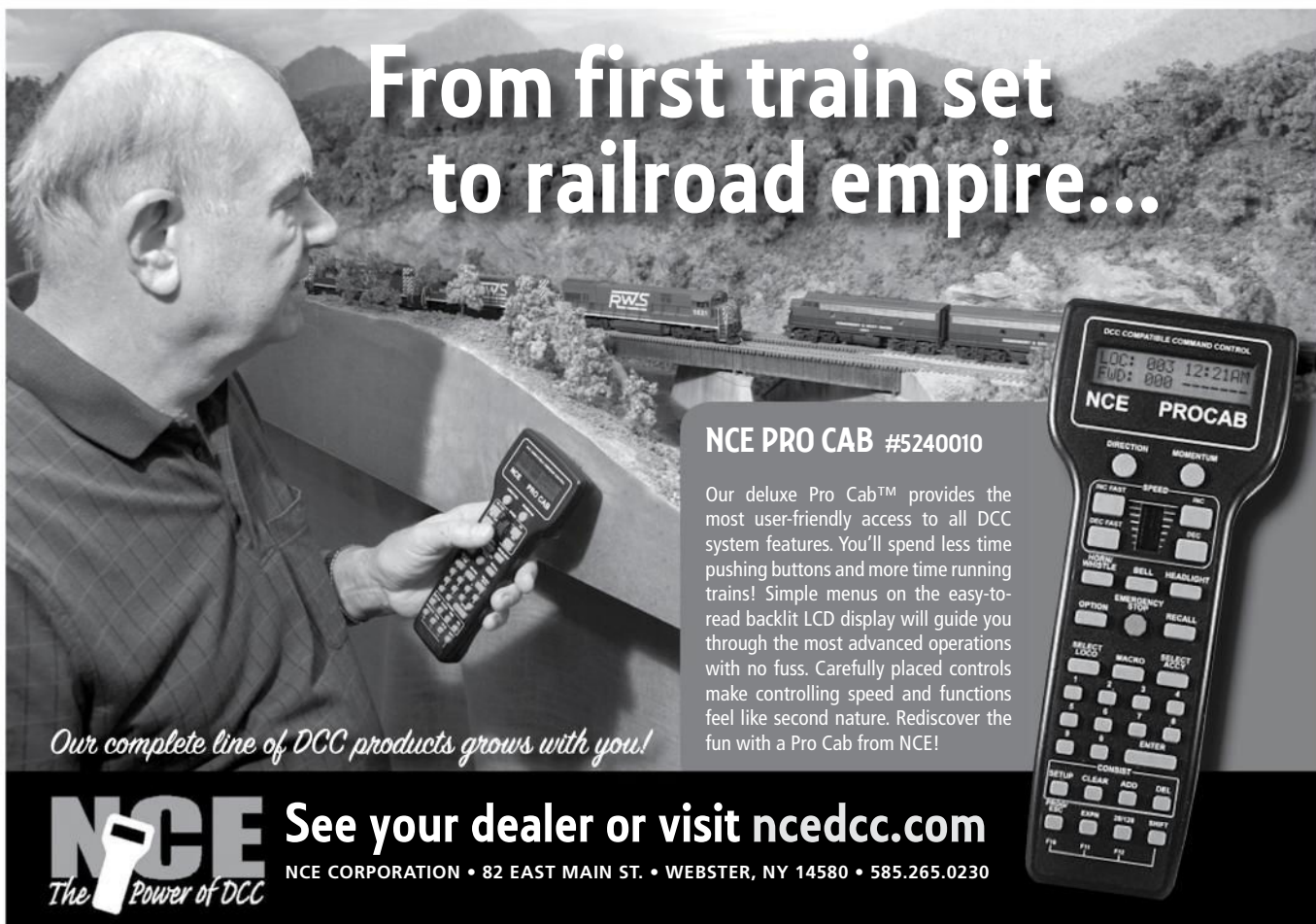
- **Collectible Lionel Classics.** By Roger Carp. Provides detailed information on 100 popular postwar Lionel locomotives (steam, diesel, and electric), motorized units, rolling stock, and accessories. Includes a detailed description of each

collectible, including its history, common variations, and buying advice. Color photo and sidebar highlighting additional product features. Soft cover, 128 pages. \$25.99. Kalmbach Books, 800-533-6644, www.kalmbachhobbystore.com

Decals

- **Assorted decals.** BNSF Ry. 2,970-cubic-foot-capacity covered hopper (O scale \$8.50). New Jersey Transit ALP-46 locomotive (HO scale \$8.25, N \$6.75). Microscale Industries, 714-593-1422, www.microscale.com
- **Assorted decals.** Milwaukee Road 40-foot ribbed-side automobile boxcar, \$5. Nashville, Chattanooga & St. Louis classes FM7, FM8, and FM9 flatcars (completes two cars), \$6. New York Central lot 723-G 70-ton emergency gondola, \$5. Pennsylvania RR class F30A flatcar (completes two cars), \$6. Pennsylvania RR classes X37, X37A, and X37B boxcar and automobile cars (completes three cars), \$9. Speedwitch Media, www.speedwitchmedia.com

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Reader Tony Burgess went way back, using old photos to build this cement mixer truck from a Jordan kit and the scene around it. Tony Burgess photo

Had to have something to move cement

Last year I completed the *Model Railroader* building by Magnusson Models, but backdated it to the previous owner, Tews Lime & Cement Co.

I had to have a truck for the building, so I modified a Jordan vehicle to match one from the same time period. I modified a Woodland Scenics cement mixer, and posed a few figures from a photo. The other details were scratchbuilt.

Tony Burgess, Broken Arrow, Okla.

I read the article in the May issue about the cement company on the Beer Line extension project and asking myself, "Wait a minute, did I miss something? Where the heck did you find those cement trucks?" I've looked everywhere for an era-appropriate truck! And lo and behold you answered my question in June. Great article, and thanks! Can't wait to build a few of my own.

Ron Pugh, Wicomico Church, Va.



the April Fools joke, but I'm 99.9 percent sure that the "Train Clap" took that honor, or could there be two spoofs in this issue?

*Robert Monta,
Rutherfordton, N.C.*

I have to laugh as those silly valve fittings have brought on more questions than any other feature of my layout! To start they have nothing to do with the sound system. Just by coincidence they happen to be located in the same area as the sound components so they show up in photos.

They serve as sort of a stage prop for prototype industrial switching operations for the industry at that location on the layout. Setting and releasing freight car hand brakes is an integral part of railroad operations, so I was looking for a way to replicate that task. The valves represent hand brake wheels on freight cars at the industry. – Lance Mindheim

Consider it corrected

I have to correct information in the May Ask MR column. The Pennsylvania RR's T1 4-4-4-4 steam engines were not articulated, but had rigid frames. With two sets of cylinders, they were best described as duplexes.

Doug Kisala, Fairfield, Calif.

The caption to the tank car on page 18 of the May issue says, "The lack of a hazmat placard tells us it's currently empty." However, cars assigned to hazmat loading will have the same type placard whether the car is loaded or empty.

Jeff Hergert, Boone, Iowa

Calling it 'good enough'

There is a rivet-counter mentality out there and it makes me wonder how many potential modelers are scared away because "good enough" won't be considered good enough. I'm turning 78 and it's my intention to finish this railroad and have some fun before they put me in a box. The May Trains of Thought column has given me the confidence that good enough is OK.

So I'll be forging ahead with my HO transition-period layout and won't even attempt to fill out the paperwork to get a Master Model Railroader certificate to hang on my trophy wall.

Let's keep model railroading a fun hobby!

*Ken Olsen,
Poplar Grove, Ill.*

In Tony Koester's Trains of Thought column for May 2017, he shared advice from Ray Breyer that included the intriguing statement, "Keep in mind that what reality looks like and what a model 'needs' to look like are actually two different things."

I've read articles over the years on the many ways to model and weather structures, rolling stock and scenery, but have never seen the "reality" aspect of the hobby put so eloquently.

Bob Henry, Rothesay, New Brunswick

Opening the valves of interest

Perhaps I'm missing something in Lance Mindheim's article in the April issue, but what are the brass pipe fittings for? Is that to pipe the sound?

I considered the article was part of

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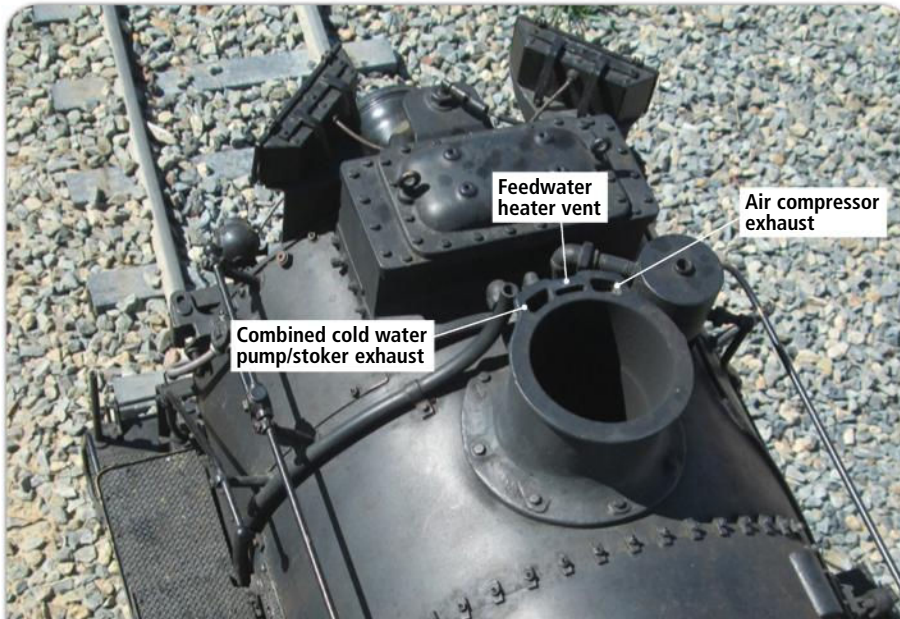
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Three ports occupied the rectangular bump on the front of a Nickel Plate Road class S-2 and S-3 Berkshire, as seen on this 1½" scale live-steam model built by Jim Kreider. Jim Kreider photo

What's on the front of an NKP Berk's stack?

Q My question is hard to express without a picture, but I'll try. I noticed the smokestack of a Nickel Plate Road 2-8-4 Berkshire seems to be a little horseshoe-shaped. Most of it's round, but on the front is a small rectangular bump. I noticed this on my Walther's Berkshire, and at first thought it to be a mistake, but when I looked at the diagram it was the same. What's the purpose of this projection?

Robert Parsons, Charleston, W.Va.

A The Nickel Plate Road's S-2 and S-3 Berkshires were built with three ports in the front of the stack. From the right to the left side were a 2½" air compressor exhaust connection (unused after the advent of the separate air compressor exhaust vapor water separator, seen to the right of the stack in the photo above), a 1¼" feedwater heater vent line, and a 3" connection for a combined cold water pump/stoker exhaust line.

The hot water pump exhaust originally went into the feedwater heater, but was rerouted to the front of the stack sometime late in 1953. The S-3 was built with a stack that had a slightly reconfigured port arrangement in the front, but were eventually converted over to the same stack as on the S-2. – Jim Kreider, former fireman on NKP no. 765 and builder of 1½" scale live-steam Berkshires

A Coincidentally, we have a project railroad coming up that will be just what you asked for. 2018's MR staff project railroad is "Canadian Canyons," based on the Canadian Pacific in British Columbia in N scale. If you can't wait until 2018 to find out about this project, you can follow our progress on Model Railroader Video Plus. The first episode is open to all to watch free. You can find it under Online Extras on our website, www.ModelRailroader.com.

Q In a video I watched recently, Cody applied a weathering mix of India ink and isopropyl alcohol over acrylic paint. My experience is the India ink solution will dissolve or remove acrylic paint. I just did another test with Tamiya and Vallejo paints, and the India ink solution dissolved and removed the paint very quickly. Does MR have a special way of applying India ink over acrylic that works?

Chuck Stewart, Norton Shores, Mich.

A There could be several factors at play here, Chuck. First, was the paint fully dry? Dry times vary between paints. For example, Testor's Model Master and Polly Scale acrylics require 24 hours to fully cure. I've found Tamiya and some lines of Acrylicos Vallejo paint require even more drying time. The best way to know if paint has fully cured is to smell it. If there is a discernible paint odor, give it more time to dry.

Second, was the surface the paint was applied to clean? Skin oils, dust, and other impurities will affect paint adhesion. If the surface is plastic, gently wash it in warm water with dish soap added. Then rinse the plastic with distilled water and let it air dry. From then on, only handle the model while wearing nitrile or powder-free latex gloves.

Third, what concentration of isopropyl alcohol did you use? If you were diluting the India ink with 70 percent isopropyl alcohol, there should have been no problems. However, if you used 91 percent isopropyl alcohol, that could potentially cause the paint to lift. Some modelers use 91 percent isopropyl alcohol to remove paint from factory-decorated locomotives and cars.

If you're still experiencing problems, an alternative to stain would be to apply thinned black paint with an airbrush. I've used both techniques, and they work well. – Cody Grivno, associate editor

Q This is in reference to your answer to Joe Knight's question about wiring a signal mast in the June 2017 "Ask MR." While I agree with your suggestion to use magnet wire for the six "hot" leads to the light-emitting diodes, what about using the brass signal mast as the common, as it's electrically conductive and wires can easily be soldered to it?

David Fiske, Montpelier, Vt.

A Assuming the signal bridge structure is one electrically contiguous piece and the common leads of the LEDs can be easily and unobtrusively soldered to it, your idea would work. The space taken by one wire could make the difference.

Q Canada has two very large railways. Why don't I see layouts showing their rolling stock?

Wilfred Jones, Toronto

Q The elevation markings on many of your track plans have occasionally puzzled me over the years. A case in point is the "Norfolk & Western and Conrail in Willoughby, Ohio" N scale plan in January 2017's issue. The elevation of the two main lines apparently rise from 47" below the Lubrizol chemical plant to 49" and higher beyond the Ohio Rubber site. How does the operator avoid having cars left on the main line run away down the slope while switching industries between these points? Is the train to be unrealistically left far away on the level sections of the layout? How would cars stay in place on the non-level interchange track?

David Bohlender, Victoria, B.C.

A Operators will often park their trains on a nearby stretch of level track; passing sidings are usually situated on level stretches for that very reason. A make-shift option may be to "set the brake" by means of a wire or pin inserted between the ties when needed. For a non-level siding where cars must be frequently spotted, like an interchange, some modelers have installed a switch motor turned sideways so it raises and lowers a wire in the middle of the track to engage a car's axle.

Yet another method is to plant "weeds" of animal hair or synthetic fibers between the ties. (This method looks most plausible on poorly maintained sidings.) These short fibers should be flexible enough for a locomotive to push or pull a car through them unhindered, but still provide enough drag against the axles to keep a parked car in place. I'm sure ingenious modelers have come up with other methods.

Q I'm putting lighting on my HO layout. I'll need between 60 and 80 12V, 50mA lights. Can you recommend a 12V power supply that will handle the lighting requirements?

Leon Carpenter, Holmdel, N.J.

A Practically any power supply you could buy from RadioShack, Micro-Mark, Mouser, or any other electronics supply house would do. If you wire your lights in parallel, the voltage stays the same, but the current requirements add up. (Wiring your bulbs in parallel has the added benefit that if one bulb burns out, the entire string doesn't go dark.)

So to run 12V lights with a 12V power supply, wire them in parallel, and add up the mA to find the amperage needed from your power supply. Most wall-wart-style power supplies put out between 1A and 3A; one that puts out 2A would run up to forty 50mA lights. A 5A adapter made for a laptop computer could power 100 such bulbs. If you have an old DC power pack laying around from a previous layout, that might be an easier and cheaper solution.

Q I'm modeling Conrail in the early-to-mid-1980s. I bought a 40-foot Hy-Cube boxcar in the Union Pacific's Automated Rail Way scheme, car no. 518109. It was built in the '60s. I know the 40-footers were mostly retired by the end of the '70s, but could this be an exception?

Ian Hilderbrand, Siloam Springs, Ark.

A According to the *Official Railway Equipment Register* (R.E.R. Publishing Corp.), there was no Union Pacific car of any kind numbered 518109 between 1965 and 1985. However, a group of similar 40-foot boxcars numbered 518110 to 518129 was built about the same time as your car and lasted well into the '80s. So if you aren't too hung up about the road number being one digit off, the car itself is plausible for your layout's era.

Q I'm looking for a simple software program for making decals. I'm looking at MS Word. The problem is, there are so many versions out there that I don't know which one will fill my needs. Can you help?

Robert Byerly, Loveland, Colo.

A Microsoft Word is, as its name implies, a word-processing program. While you may be happy with making text-only decals at first, if you later decide to add graphic elements to your decals, you may find Word's capabilities in that department frustrating.

Instead, I'd recommend using an image-editing program like Adobe Photoshop Elements, ACDSee, or Corel Paint Shop Pro. These programs' text-editing tools are simplistic compared to Word's, and their learning curve may be steeper, but when you want to draw a herald, compose a billboard, reproduce a vintage sign, or the like, you'll find image editing software is the only way to go. Most of these programs offer downloadable trial versions of their software,

READER TIP



Unused, discarded office storage items helped reader Bennett Robbins turn a closet into an efficient, organized hobby workspace. Bennett Robbins photo

Organizing a closet workbench

I found two old office organizers, the kind that you put up on a wall or in a cubicle, unused in my garage. So I put them to use to organize my workbench, which is in a closet in my layout room. The top tier holds all my sprue cutters, track cutter, pliers, Kadee coupler height adjusters, and scale rules. The lower organizer has the tools I use most frequently, such as files, razor saws, and hobby knives.

Though I also have a few organizers I bought from Micro-Mark, most of the rest came from closeout sales at big-box stores. Do you have items lying around that could be used on your workbench? – *Bennett Robbins, San Diego*

so you can find out which works best for you before buying.

Q At one time it was possible for clubs to announce in your magazine that they were open for new members. Is it still possible? If so, how?

Bill Hupe, secretary, Bremerton (Wash.) Northern Model RR Club

A There's a page on our website for clubs and other groups. You can register there to reach out to new members. Readers can also go there to find a club. Go to <http://trc.trains.com/mrgroups>.

Send questions and tips to associate editor Steven Otte at AskMR@MRmag.com.

When O scale traction was popular

There was a time when traction models were a significant part of our hobby. Some home and club layouts were devoted exclusively to it, as seen in Wm. K. Walther's 67-page 1957 25th anniversary *O scale Reference Manual*.

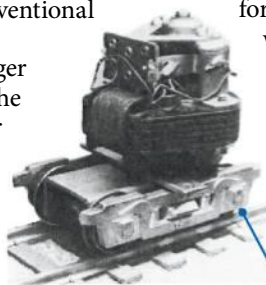
The distribution of pages in the 1957 catalog broke down into: General information, 14 pages; traction, 8 pages; rolling stock (passenger and freight), 20 pages; construction needs, 6 pages; electrical components, 8 pages; tinplate, 3 pages; and car and locomotive details, 7 pages.

In 1957, Walther's no longer sold diesel or steam locomotives, but continued to sell parts and details from the brief postwar period when it manufactured a range of Polydrive steam locomotives.

Modeling traction was easier and less expensive. There were no complex and costly steam or diesel locomotives to build. Traction models required little more than the skills and effort required to build passenger cars. The most expensive models only needed a simple power truck to run. Some could be pulled as trailers.

Traction offered the opportunity to run one car by itself or with several others, or to switch local freight in a town. Easy to build, traction models were (and are) capable of negotiating sharp curves with greater ease in less space than conventional equipment.

Like passenger car models of the 1950s, streetcar and interurban kits were assembled from wood floors



Walther's 1957 *O scale Reference Manual* featured eight pages on traction modeling, including this photo of two modelers checking out the rolling stock on a large layout.

Wm. K. Walther's Inc. photo

and roofs with pressed metal sides and cast ends chosen by the hobbyist. Trucks and couplers were an extra cost, as were trolley poles, pantographs, and outside third-rail pickups.

The cars could operate from overhead catenary, which was also available in the catalog, or outside third-rail, common to O scale for years. Block wiring allowed operation with other scale models on the same layout, each isolated electrically from the other.

Walther's had a wide assortment of models from which an enthusiast could choose. There were 16 different interurban car side sets, including coaches, combines, an observation car, and one for a freight motor. There was enough traction interest within our hobby that sides were available decorated for six old-time roads and nine contemporary commuter lines across the country.

Inevitably, interest in O scale traction began to wane in the late 1950s since the prototype had largely disappeared from daily life. Buses had replaced streetcars, and the few remaining interurbans succumbed as well.

By 1976, a ready-to-run imported brass trolley model was featured on the traction page in Walther's O scale catalog. Note that there was only one page, down from the former eight. The O scale traction market had dwindled dramatically, and it didn't pay for manufacturers to continue producing kits if sales couldn't support production.

That same year, Walther's HO scale catalog maintained four traction pages with a variety of Walther's own models, kits from other companies, and ready-to-run

brass models from Suydam. [See the December 2015 Heritage Fleet column for more about Suydam. – Ed.]

In Walther's 1978 O scale catalog, the one traction page showed assembled cast-resin bodies from Q-Car Co., in stark contrast to Walther's own traditional craftsman models. Not only had ideas advanced as to what constituted a finished model and

materials, but Walther's variety of O scale traction and interurban models that we had known vanished as the company cut back on its own manufacturing in preference to other O scale lines, some ready-to-run.

We seldom see magazine articles about home or club traction-only layouts in any scale any more. **MR**



INEVITABLY, INTEREST IN O SCALE TRACTION BEGAN TO WANE IN THE LATE 1950S SINCE THE PROTOTYPE HAD LARGELY DISAPPEARED FROM DAILY LIFE. - KEITH

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920-42155 #3584 Tsunami Sound & DCC
920-49154 #3537 Standard DC
920-49155 #3563 Standard DC

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- Brass Leslie RSL-3L-R air horn
- Raised numberboards on sides of dynamic brake hatch
- 3000-gallon fuel tank



920-42158 #1505 Tsunami Sound & DCC
920-42159 #1506 Tsunami Sound & DCC
920-49158 #1500 Standard DC – *Sold Out at Walthers*
920-49159 #1503 Standard DC – *Sold Out at Walthers*

Burlington Northern[†]

- Alco AAR trucks
- Working rotary beacon
- Brass Leslie 3F-2R air horn



920-42152 #2580 Tsunami Sound & DCC
920-42153 #2581 Tsunami Sound & DCC
920-49152 #2575 Standard DC
920-49153 #2576 Standard DC

Erie Lackawanna

- Brass Leslie SU-3L-R air horn
- Sinclair antenna
- High headlight
- Standard dynamic brake hatch



920-42156 #2569 Tsunami Sound & DCC
920-42157 #2584 Tsunami Sound & DCC
920-49156 #2563 Standard DC – *Sold Out at Walthers*
920-49157 #2565 Standard DC – *Sold Out at Walthers*

Southern Pacific[†]

- Five-light package with operating upper Gyra-Light, emergency stop signal (DCC only) & lower headlight
- Brass Nathan P-3 air horn
- Cab-mounted bell



920-42160 #6660 Tsunami Sound & DCC
920-42161 #6673 Tsunami Sound & DCC
920-49160 #6665 Standard DC
920-49161 #6676 Standard DC – *Sold Out at Walthers*

Undecorated with Blomberg trucks
920-49162 Standard DC

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Pelle Søbørg explains how he built these feature trees for his HO scale Midwestern layout. Pelle Søbørg photos

Making better-looking foreground trees

Moving the locale for my new HO scale Union Pacific Danville Subdivision layout east from the Mojave Desert to rural Nebraska and Iowa meant that among other new things, I had to deal with trees. My desert-based layouts only had a few trees, so I didn't make a big deal about them. On my new layout, trees play a more prominent role. I wanted to challenge myself to make the most realistic-looking trees possible.

I used Woodland Scenics plastic tree armatures as a starting point. These

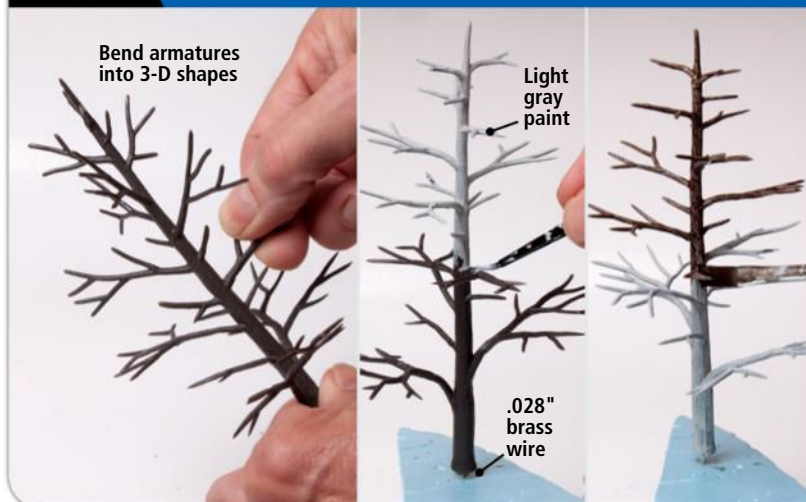
brown plastic castings can easily be bent into a realistic three-dimensional shape. Painting them makes them look more realistic. So far, it's easy enough.

The real challenge starts with the foliage. I wasn't pleased with the results of my first few attempts. Then I found a Noch product called Nature Trees. Scenic Express makes a similar product called SuperTrees. I sprinkled bits of the Nature Tree product with Noch leaves and glued them to the Woodland Scenics tree armature. The result was great.



This is what Pelle used to make a realistic-looking tree.

STEP 1 PREPARING THE TREE ARMATURE



I bent and twisted the Woodland Scenics plastic tree armature into a realistic three-dimensional shape, left. I also cut off the knob on the bottom of the trunk and replaced it with a piece of .028" brass wire for easier mounting on the layout.

I painted the tree armature light gray, center. I started using an airbrush, but I was using lots of paint. I changed strategy and brush-painted the armatures instead.

When the gray paint was dry I gave the armature a brown-gray wash, right, made from Vallejo Model Air no. 71.042 Cam Black Brown thinned with Vallejo no. 71.161 airbrush thinner.

STEP 2 PREPARING THE FOLIAGE

Cut Nature Trees material into small pieces

Apply wash of Vallejo Cam Black Brown paint

White glue thinned with water 1:1

Noch no. 07144 Leaves, Mid Green

I cut the **Noch Nature Trees** material in smaller pieces so I had a selection of branches in various sizes and shapes. Then I gave the Nature Tree bits some of the same wash the armature received. I was careful when I handled the branch pieces – the material is very fragile.

I dipped the top of the Nature Tree bits in white glue thinned 1:1 with water. I added a little dish soap to the glue mixture to make it flow easier around the thin branches.

I sprinkled Noch leaves on the wet glue and set the branches aside to dry for a couple of hours.

STEP 3 PREPPING THE MODEL



Holding rack made from clothespins

Glue Nature Trees branches in place with cyanoacrylate adhesive



I made these racks for holding couplers while I airbrush them, and they turned out to be very useful for holding the branches while they were drying, top left.

When the branches were dry, I glued them to the armature, working from the bottom up, above. I tried Woodland Scenics Hob-e-Tac adhesive, but the branches had a tendency to come loose after a while. On later trees I used cyanoacrylate adhesive (CA) instead and it seems to hold better.

The tree had just the right openness between the leaves, which gave it a very realistic look. This farm scene is a good example of how having a few trees in the foreground makes all the difference, even if the trees in the background aren't as highly detailed.

A big shade tree like the one above took me two days to make, including drying time. I'll start making only foreground trees like this, but as time permits, I'll replace my less realistic trees in the background. While the process is time-consuming, it isn't difficult. I encourage you to give it a try wherever you need detailed trees. **MR**



Model a **LARGE STATION** using **3-D PRINTING**

Exploring the pros and cons of modeling with modern technology

By Bob Kingsnorth • Photos and illustrations by the author





Bob Kingsnorth turned to 3-D printing to model Union Pacific's Kelso, Calif., station in HO scale. The prototype building is shown above.

My adventure in 3-D printing was prompted by necessity, not curiosity or a wish to try a new technique. The signature structure in my HO scale Mojave Desert scene is Union Pacific's Kelso, Calif., station.

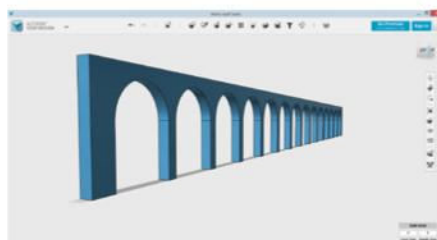
The Spanish-style structure has a front colonnade with 14 arches. I'd initially planned to make the arches from styrene sheet. With photos and measurements in hand, I prepared detailed sketches for the model. However, I realized that the 18"-long styrene front wall was going to be delicate. Laser-cut acrylic would hold up better during the cutting process, but subsequent handling could still be problematic.

However, 3-D printing wouldn't stress the wall during manufacturing. I could also model the ceiling, roof, and floor of the colonnade at the same time, providing significant structural strength. With all of those benefits, I jumped in to the world of 3-D printing.

Learning curve

Based on a friend's recommendation I checked out Shapeways, a 3-D printing vendor (www.shapeways.com). Its website is a valuable source of information on 3-D printing, material choices, and design criteria. The site also provided leads for free and professional 3-D design software. I selected Autodesk 123D Design (www.123dapp.com/design).

With 123D Design, you create and manipulate basic solid shapes in a 3-D environment. There are video tutorials to walk you through the process. Between learning the basic concepts and the software itself, it took me many hours over a two week period to create a plain wall with 14 arches **1**. By the time I finished the other parts of the station, I was able to redraw the plain wall in 12 minutes. [To learn more about 123D Design, see "Software tips" on page 29. – Ed.]



1 First attempt. This basic wall, the starting point for the colonnade, was Bob's first design using Autodesk 123D Design. The free design software includes video tutorials.



2 Adding on. Bob gained confidence with the design software and added more details to the colonnade, such as the cap separating the vertical post from the arch.



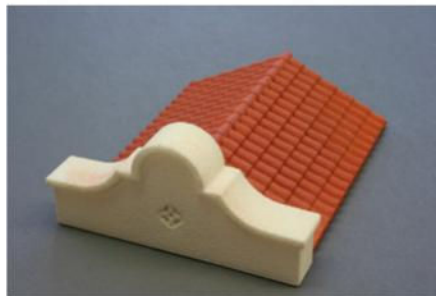
3 Test shot. To confirm his design, Bob had a small portion of the colonnade printed. The sample verified Bob's drawings would yield a printable model and let him see the printing quality.



4 Stepping. The 3-D printing process builds up a model in layers. One of the drawbacks of the printing process is stepping, as seen on the curved portions of this Spanish-style dormer.



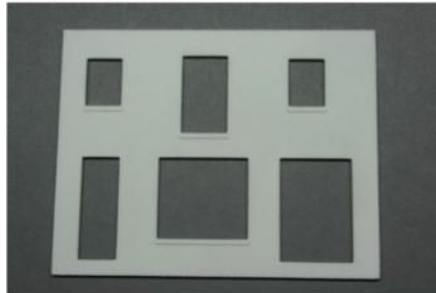
5 Stratification. Bob uses the term stratification to describe the effect caused by the side-to-side movement of the printer head. The effect looks like stratified rock on a vertical surface.



6 Tile sample. Dissatisfied with injection-molded plastic Spanish tile, Bob again turned to 3-D printing to make his own. A painted sample is shown in this photo.



7 A little variety. Bob turned to various sources for doors and windows. From left are a scratchbuilt freight door, a 3-D printed window, a Tichy Train Group window, and a 3-D printed door.



8 Confirmation test. To make sure the door and window openings were accurate, Bob had a wall section 3-D printed. He was then able to test-fit the doors and windows.

3-D printing services

I explored five vendors listed in a Google search for 3-D printing. The list included Sculpteo (www.sculpteo.com), Shapeways (www.shapeways.com), Stratasys (www.stratasys.com), 3D-CAM (www.3d-cam.com), and Xometry (www.xometry.com). There are many other 3-D printing services beyond these.

Almost all the vendors gave instant quotes online. Quotes from Shapeways offered an evaluation of the model's design, such as identifying perilously thin sections or extraneous objects.

I ordered samples from three vendors. I found Xometry printing somewhat superior to the other two, with a slightly better surface finish and less stratification.

For the final printing, I ordered the large items from Xometry and the windows, doors, and awnings from Shapeways. – *Bob Kingsnorth*

Despite the slow start, I'd learned enough to add details, such as the cap separating the vertical post from the arch. As I added the ceiling and roof of the colonnade, I felt I should join the other walls of the colonnade to make a one-piece structure. In the process, I added the corner pillars, caps, half domes, and buttresses at all corners. At this point, the drawing started to look like a real building. The process was becoming addictive. See 2 on the previous page.

Characteristics of 3-D printing

To confirm my ability to design a printable model, and to get a sense of the quality of the printing, I ordered a sample corner of the colonnade structure from Shapeways 3. I had the part printed in strong and flexible nylon [See "Material choices" on the next page. – *Ed.*] I was generally pleased with the result. The nylon surface finish was relatively rough, but acceptable for a stucco structure.

However, there were a few variations that prompted me to order the same sample piece from two other vendors. [See "3-D printing services" at the bottom of this page. – *Ed.*]

My first printed sample highlighted several characteristics of 3-D printing. These observations are relevant for strong and flexible nylon. The same characteristics are applicable in different degrees to any 3-D printed model and material.

Stepping is the effect caused by the layered printing process, typically about .005" thick. It takes about 170 passes of the printer to form a 1"-tall object. Stepping is most evident on curved objects. Fortunately, the stepping on the half dome at the top of the colonnade corners wasn't very obvious because of its small radius. Stepping on the Spanish-style dormers required sanding 4.

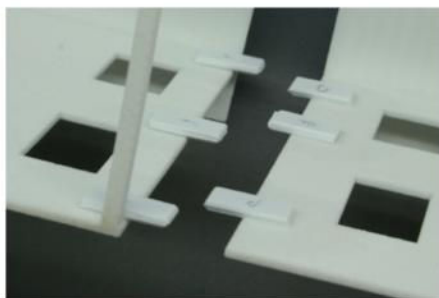
Stratification is the effect caused by the side-to-side movement of the printer head and laser beam 5. This produces a subtle effect like stratified rock on a vertical, flat surface.

The surface finish from all vendors was fairly rough (some more than others), but could be acceptable for the stucco walls of my model. It would be too rough for the side of a steel boxcar. Polishing would be an option, at the risk of potentially damaging small details and rounding square corners. Other materials will produce smoother finishes, but at higher cost and additional size limitations.

Stepping and stratification can be reduced by changing the orientation of



9 Down the middle. Because of the vendor's size limitations, the station and colonnade each had to be printed in two sections. Bob chose to keep the colonnade separate from the core to make painting easier.



10 Positive alignment. Bob added styrene tabs to the inside of the station walls with cyanoacrylate adhesive. The tabs keep the .060"-thick walls in alignment.

the model in the printer. Low slope surfaces and large radius surfaces are especially prone to stepping. Stepping can be minimized by rotating the model in the printer 90 degrees on the roof-ridge axis.

A flat surface run parallel to the base of the printer is exceptionally flat and free of any stratification from all vendors. The degree of stratification in vertical walls will vary by vendor.

Shapeways has recently started a test allowing the customer to specify the orientation. The vendors understand the characteristics of their process, but they don't necessarily understand the important design features of a particular model.

Material choices

Vendors can print models in a variety of materials. The choice will affect the size limitation, quality, and price of the model. I selected strong and flexible nylon because it offered the largest print envelope and the lowest prices. The nylon is strong but can be shaved with a sharp hobby knife and cut with a razor saw.

Shapeways offers a frosted ultra detail plastic at four times the price of the strong and flexible nylon. The detail would allow features as small as .008" ($\frac{3}{4}$ ") in HO scale. The overall size of the model is limited to about 11" in length, although splitting the model is an option.

The Shapeways website lists locomotive shells, rolling stock, and vehicles offered by third-party designers in most popular modeling scales. Shapeways pricing is calculated almost entirely on the cubic centimeters of used material and printer volume. Complexity doesn't affect the price.

The 3-D printing industry continues to evolve with better printers, new materials, and improved processing and prices. 123D Design had two updates while I was designing my model, and I continue to receive updates from vendors regarding material and printing improvements. – *Bob Kingsnorth*

Up on the roof

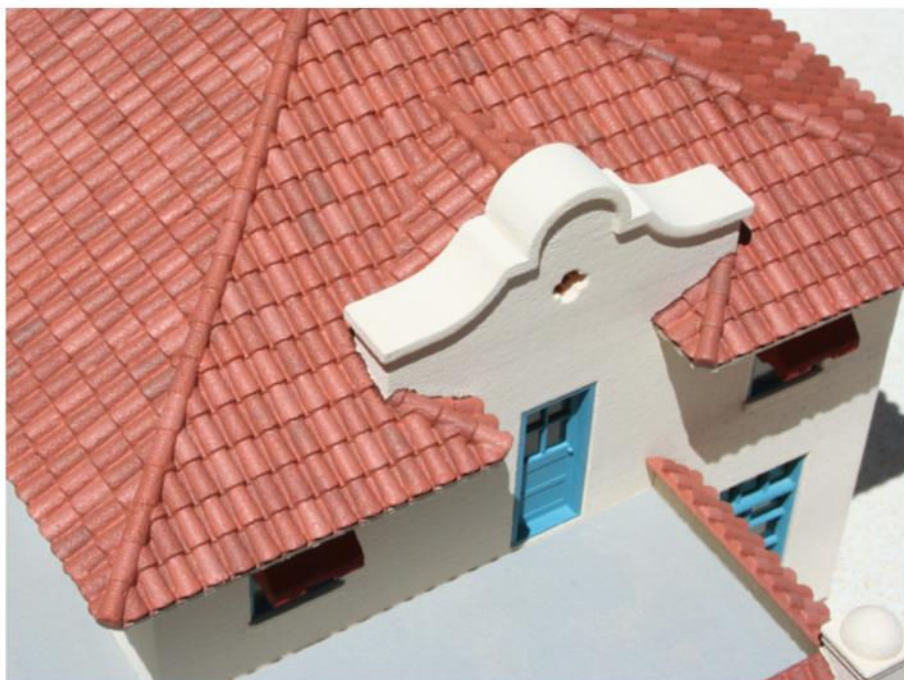
Knowing that my drawings would work, I turned to the Spanish tile roof. The vacuum-formed sheets on the market look, to me, like neat bumps in a row. Could I do better with 3-D printing? I began to model the tiles, starting with a single tile, followed by a series of copy/paste actions to create a string of tiles, and then copy/paste to create a full sheet of tiles. Before launching into the full roof design, I prepared and ordered the roof sample **6** on the previous page.

When I started the roof tile project, I'd intended to build the core structure

using a styrene sheet. But after considering the three dormer faces with their classic Spanish features, I modeled them in 3-D. Then fitting the tile roof sheets around the dormer faces began to weigh on me. In addition, the hip roof with dormers was adding up to a lot of joints. Why not make the entire structure, roof and all, with a single 3-D print? There would be no joints to fit and glue together – or so I thought.

Doors and windows

To make painting easier, I designed separate windows and doors. The upper



11 Spot color. After applying a base coat to the roof, Bob hand-painted individual Spanish tiles lighter and darker. This matches the variegated look of the prototype station's roof, as shown in the prototype photo on page 24.



12 Yes, even the awnings. Bob tried to modify the City Classics injection-molded plastic awnings for the station, but wasn't happy with the results. He had the awnings 3-D printed as well.

Cost of printing

The core structure plus colonnade cost about \$400 from Xometry. Gulp! Admittedly, the station is a large model (5" tall, 6½" wide, and 19½" long). Because of cost, 3-D printing would be appropriate only for the most complex and detailed models that might be difficult to fabricate with traditional techniques.

The windows and doors from Tichy Train Group and Grandt Line cost \$.25 to \$.35 each and are high quality. My windows and doors from Shapeways were about \$2 each, and are a rough but acceptable quality for items not available otherwise. – *Bob Kingsnorth*



13 A big success! Bob's HO scale Kelso, Calif., station measures 5" tall, 19½" wide, and 6½" long. The hours spent learning the design software paid off with a beautiful-looking model.

floor windows and doors are Tichy Train Group and Grandt Line products. I designed the unique lower floor windows and doors and had them 3-D printed. See **7** on page 26.

I ordered samples of the lower doors and windows before committing to the full quantity. The window mullions on the 3-D printed parts are .030" wide, the minimum size recommended by Shapeways, resulting in a rather bulky appearance. Fortunately, the windows are somewhat hidden within the colonnade. The commercial products are much finer.

In addition, I ordered a test wall with window and door openings to verify my dimensions and to test the vendor's ability to accurately print the openings, as seen in **8** on page 26. I designed the openings to the exact dimensions of the doors and windows. Even though the wall, windows, and doors were printed by different vendors, the resulting fit was good.

The moment of truth

After many hours on the computer over a three-month period, I sent the drawings off to the printer. After a week-and-a-half (mainly delivery time), my station arrived.

The vendor's size limitations required me to model the station, which measures 19½" long, in smaller sections. See **9** on the previous page. In addition, I kept the



colonnade separate from the core structure. This made the parts easier to paint.

To keep the structure halves in alignment, I glued styrene tabs to the inside with cyanoacrylate adhesive (CA), as shown in **10** on page 27. After securing the two halves with a rubber band, I carefully applied thin CA to the joint from the outside and spread gap-filling CA on the inside.

I cleaned the parts in water with mild detergent added to remove any residual powder from the printing process. I assembled the parts with CA and epoxy.

I smoothed over the joints using Squadron white putty. I recommend not trying to smooth the rough nylon high surfaces at the joint. Instead, fill the low surface with the putty. After leveling the putty, I used a wire scratch brush pressed repeatedly into the cured putty to replicate the rough nylon surface. I repeated this process after painting to further rough up the putty surface.

After another mild detergent bath, I airbrushed the model with Polly Scale and Model Master acrylic paints. I hand-painted individual tiles to reproduce the prototype's variegated look **11**, opposite.

Then I painted the windows and doors and attached them with gap-filling CA. I secured the glazing with Testor's Clear Parts Cement.

I attempted to shorten City Classics awnings, but wasn't satisfied with the results. I spent 20 minutes at the computer designing new awnings and ordered them from Shapeways **12**. After painting the awnings, I installed them with Aleene's Turbo Tacky Glue.

Software tips

AutoDesk 123D Design has a library of basic geometric shapes for making 3-D designs. Recently, the firm released 123D Catch, which can create a printable design from a series of photos of a complex object.

A deficiency of 123D Design is the inability to simply and accurately identify the XYZ coordinate (width, height, and depth) of a point or a feature in the 3-D drawing. There are two tools that are available, but they aren't adequate to locate an XYZ point on a curve or an internal point on an object. I recommend identifying a key reference point, such as the lower left-hand corner of a building. Then, as window ledges and roof overhangs are added, the reference can be used as a known point within the overall dimensions of the project.

Every object and feature of the final project must be joined into a single unit using the "combine/merge" tool. If this step is skipped, the printing process may consider the objects and features separate items. Grouping objects might be useful during construction, but it's not a substitute for the "combine/merge" tool.

Once the final project is saved, it can be difficult to backtrack. I saved a copy of the file before executing each "combine/merge" step, just in case I needed to backtrack at a later date. While designing this project, I saved over 170 files, representing the progressive steps of the design. – *Bob Kingsnorth*

Scratchbuild or 3-D print?

The real challenge of 3-D printing is designing the model using drafting software. Different software may offer more intuitive approaches, but they will test your patience until you learn the concepts and techniques. However, the learning curve is worth it **13**.

An alternative to the software challenge would be to engage a third-party designer. A search of 3-D printing vendors will also identify third-party designers who offer items for sale and who may be interested in doing design work based on simple sketches, photos,

or published drawings. Paying for a designer will certainly add cost, but 3-D printing does have a place with complex models.

We can also expect prices and quality to improve as 3-D printing becomes more popular. Although scratchbuilding and kitbashing will remain my go-to methods, I have plans for a few unique structures that I'll turn to 3-D printing to complete. **MR**

Bob Kingsnorth lives in Central Point, Ore. He has written several articles for MR including "6 ways to make painting easier" in the May 2016 issue.



① The coal mine is the major source of traffic on Jean-Baptiste Merillot's 7 x 15-foot Z scale Gulf, Illinois & Rocky Mountain RR. Small red and white markers, seen at bottom right by the SCL hopper, indicate the location of magnetic uncouplers.

A Z SCALE PIECE OF THE USA IN FRANCE

Homemade photo-etched and 3-D-printed parts enhance
a coal-hauling layout with handlaid track

By Jean-Baptiste Merillot • Photos by the author



② The signal bridge (non-functional for now) is Jean-Baptiste's design. He drew the plans after studying pictures, then produced parts in photo-etched brass. The parts are detailed down to the .003"-diameter rivets on the sides.



③ CSX SD40-2 no. 8071, in the center of the photo, is sound-equipped. Jean-Baptiste removed the motor and modified the chassis. The decoder is in the powered CSX Geep in front of 8071, and wires run to the speaker in the SD40-2.

I'VE ALWAYS BEEN fascinated by model trains, but I never had any at home growing up. On summer holidays, I visited my cousin, who had an HO scale 4 x 8-foot layout with an oval of track. My cousin and I would spend our days running the trains at full throttle.

The years passed, and my engineering studies, focused on micro-technology, didn't leave me any time to think about building a layout. But in 2009, after I built my house, the idea came back. Fascinated by small things and not having much room, I started drawing track plans for an N scale layout.

I'm not a fan of the local French or European railway equipment, and I love big U.S. diesel locomotives. One day when doing some internet research, I discovered Z scale, which I hadn't heard of before. It was love at first sight.

I started to draw the first track plan for my Z scale layout in early 2010. Initially, the layout was only three sections. Five years later, it included six sections and measured 7 x 15 feet.

The U-shaped layout is in my attic. Unfortunately, the attic has a sloped roof, which restricted the layout's width and height. Most of the track and scenery is about 39" above the floor. There's no hidden staging, and the layout has four visible yards.

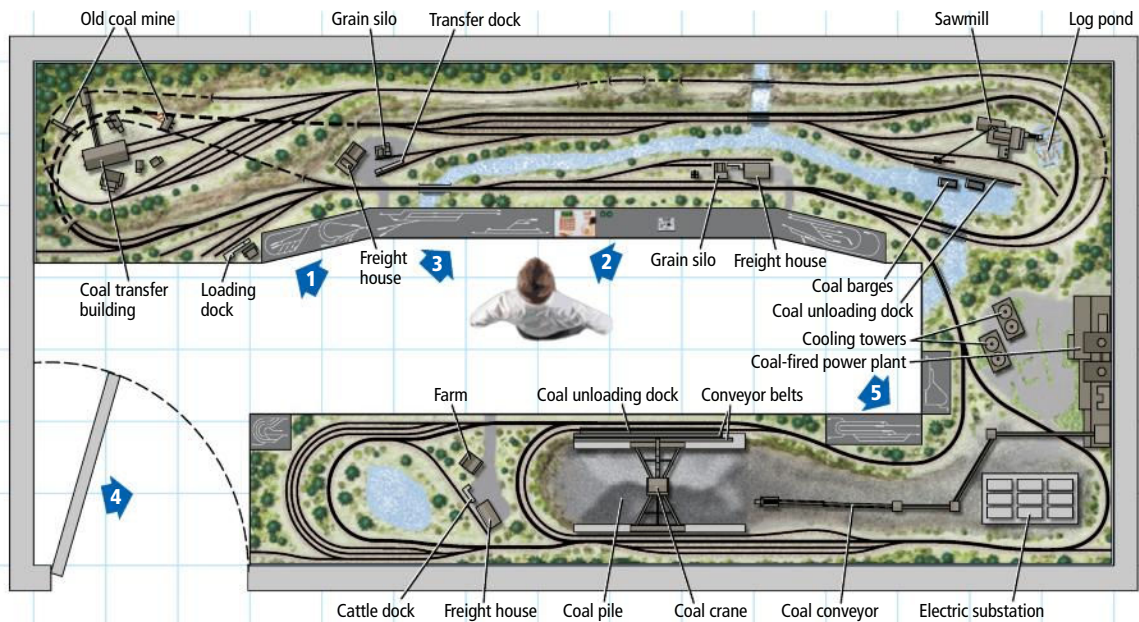
A big challenge

I started building the layout in September 2011. I'd never built a model railroad before. From the beginning, I designed it to be large enough to include everything I wanted, and above all I preferred to handlay the track for

prototypical appearance. I knew about Fast Tracks and its turnout building tools, and I was very happy when I saw the company offered Z scale templates.

My first attempts at turnout building didn't work, but I quickly improved my techniques so the next turnouts worked flawlessly. The final layout has 51 turnouts (all no. 5) and about 190 feet of track, which is roughly 8 scale miles.

Even though the layout is 7 x 15 feet, fairly large for a model railroad in France, I designed it to be taken to model train shows. To accommodate this, the layout is sectional and rests on detachable legs. The open-grid layout sections are made of plywood. When I arrive at a show, I only need about 30 minutes to assemble the support structure, place the sections, connect everything, and be ready to run.



The layout at a glance

Name: Gulf, Illinois & Rocky Mountains RR

Scale: Z (1:220)

Size: 7 x 15 feet

Prototype: none; includes locomotives from Union Pacific, CSX, Canadian National, Canadian Pacific, among others

Locale: Northwestern United States

Era: late 1960s to present

Style: walk-in, U-shaped

Mainline run: 95 feet

Total track: 188 feet

Minimum radius: 8"

Maximum radius: 14"

Minimum turnout: no. 5

Maximum grade: 3.8 percent

Benchwork: open grid supported on detachable legs

Roadbed: cork

Track: handlaid using Micro Engineering code 40 rail on wood ties

Height: 39" to 43"

Scenery: plaster strips over wadded newspaper

Backdrop: photos printed on aluminum

Control: Digitrax Digital Command Control

Gulf, Illinois & Rocky Mountains RR

Z scale (1:220)

Layout size: 7 x 15 feet

Scale of plan: $\frac{3}{8}" = 1'-0"$, 12" grid

Numbered arrows indicate photo locations

Illustration by Jean-Baptiste Merillot and Rick Johnson

Find more plans online in the ModelRailroader.com Track Plan Database.

Building scenery

To make the scenery, I balled up newspaper and soaked it in a 50/50 mix of water and wood glue and placed it on the layout to create the landforms. I covered the newspaper with plaster strips and finished with several coats of thin plaster I applied with a large brush.

Rock faces were cast in molds made from crumpled aluminum foil, then applied to the dampened surface before they cured. Once dry, everything was painted with five washes of different Woodland Scenics Earth Colors. The landforms were then covered with three shades of ground foam.

Digital Command Control

Extending the layout was always a possibility, so I kept that in mind as I designed the wiring for my Digitrax Command Control (DCC) system.

I use a Digitrax Zephyr DSC51 command station, with a UR92CE radio module and several DT402DCE wireless throttles. Operation of this equipment, not well known in France, is a marvel and surprises a lot of people on this side of the Atlantic.



4 An overview of Jean-Baptiste's model railroad. The layout is composed of six sections supported by an independent structure. This allows him to remove the sections and take them to shows with minimal risk of damage.



5 Jean-Baptiste designed and built the power plant's substation. A lot of photo-etched brass was needed to create all the towers, fences, and structures. The transformers were 3-D printed. There's even barbed wire on top of the fences.

Rolling stock

My favorite Z scale equipment is from American Z Line (www.americanzline.com) and Micro-Trains Line Co. (www.micro-trains.com). I have about 20 locomotives and 130 cars. All locomotives are equipped with Digitrax DCC decoders. Because of the locomotives' light weight, power pick-up is sometimes tricky, so I only run them as multiple units. Then, the running characteristics of these small locomotives is amazing.

Despite their few ounces of weight, these locomotives don't balk at pulling dozens of cars up 2 to 3 percent grades. The majority of my freight cars are three-bay hoppers from Full Throttle (www.wdwfullthrottle.com).

The other cars are mostly boxcars and tank cars. I've weathered all my rolling stock, usually using dry pigments, but sometimes with an airbrush.

Adding a coal-fired power plant

The layout's main theme is coal mining. Initially, the mine served only a small unloading dock and barges. I quickly realized that the operating potential was limited. In 2013, I expanded the layout and built a coal-fired power plant on a 20-square-foot area.

Since I'd planned for expansion when I designed the layout, this was fairly easy

to do. I added two new sections for the power plant and a third with a large, curving yard. On the last section, I also added a small pond and a farm for my daughter. Yes, trains are a family affair.

To build the power plant, I researched facilities in the United States. After finding pictures of buildings I liked, I used Google Earth to find their locations and calculate dimensions. These buildings are quite large. Even in Z scale, I had to reduce their sizes by about a third.

I always want to add more details to my layout. Unfortunately, there aren't a lot of Z scale products, and I couldn't find all the items I wanted. Having studied micro-technology and electronics at school, I created my own photo-etched brass parts. In early 2014, I bought a 3-D printer, too. I now combine these two technologies to create all kinds of parts and accessories.

Digital sound locomotive

In 2015 I set myself a new challenge: to add sound to a Z scale locomotive, a Micro-Trains SD40-2. I removed the motor and much of the chassis. Then I installed a Digitrax SFX064D decoder with a capacitor and an 8 x 12mm Zimo sugarcube speaker.

The speaker enclosure was too large, so I printed a new one with my 3-D printer. I couldn't get it all the parts

inside the model's shell, so I installed the decoder in another locomotive to create a set. The speaker-equipped locomotive is placed between its power unit and another engine in a three-unit consist.

This layout has allowed me to incorporate all of these fascinating technologies. It has challenged my abilities, taught me new skills, and led me to make new friends. Not too bad for such small trains. **MR**



Meet Jean-Baptiste Merillot

Jean-Baptiste Merillot was born in Besançon, France, in 1978, and runs his own graphic communication agency.

He shares his passion for Z scale trains with his children Corentin, left, and Clara. You can learn more about Jean-Baptiste's layout on his website, www.ztrain.eu.

A RAILROAD YOU CAN MODEL



Locomotive no. 362, a General Electric AC4400CW, switches the coal loader on CSX's KD Subdivision in Kentucky on Aug. 11, 2007. Modern coal action like this was one of the main goals of Bob Sprague's HO scale KD Sub track plan. Bryan Pleasant photo

CSX up on Rocky Top

A multideck HO scale
track plan for modern
Appalachian coal railroading

By Bob Sprague



plus, a real location makes it a lot easier to think of names for towns.

So I was delighted, as I researched Eastern Tennessee railroads, to discover the CSX's KD Subdivision. There, on a heavily traveled main line, were all of Brian's requested features laid out one after another. To add to the appeal, the KD Sub runs through good old Rocky Top, where there's "no smoggy smoke" or "telephone bills," as the old song goes.

There were challenges to designing the HO scale KD Sub. Come on up to Rocky Top to see how they were met.

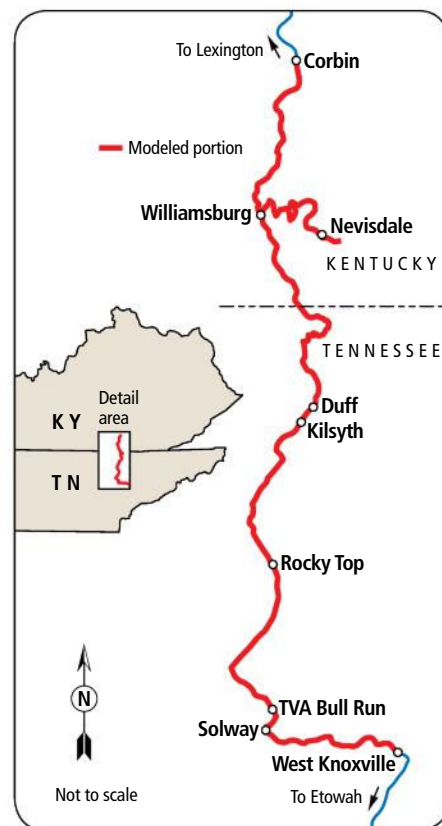
Designing the KD Sub

The space available was a to-be-constructed railroad room filling half of Brian's two-car garage. It would be a highly workable rectangle with no obstructions. Furthermore, the door could be located wherever I wanted on the long wall, and would open outward – very helpful. Brian and I agreed that two decks would be required to get the kind of operation he had in mind, and that his modern diesels would look and run best with a 30" minimum radius.

In many cases, a double-deck layout requires a helix to get trains from one level to another. But helixes are at best a necessary evil, interrupting operation and presenting access and construction difficulties. By leveraging the mountainous locale of the KD Sub, it would be possible to avoid a helix. Instead, a properly stiff 3 percent helper grade would make it possible to gain enough altitude as the layout winds around the room and the central peninsula.

At the same time, bridging across the door was necessary to maintain a consistent direction for the main line. I believe this is very important for operators, especially on a multilevel railroad. It can be quite confusing if a train traveling right-to-left on the lower deck, representing west to east, then reappears on the upper deck moving left-to-right. The KD sub therefore incorporates a swing gate on the lower deck at the door, with a "nod under" carrying the upper deck across the doorway.

I was able to keep the upper deck generally narrower than the lower, helping to improve visibility and access to the scenes below. This should make for fewer crouches and collisions in the relatively generous aisles. Let's take a trip across the KD Sub, explaining some other design features and pointing out how Brian's model follows the prototype with a good deal of fidelity.



Railroad at a glance

Name: KD Subdivision

Owner: CSX (formerly Louisville & Nashville, followed by Seaboard System)

Location: Corbin, Ky., to Etowah, Tenn.

Length (overall): 161 miles (plus 18 mile Nevisdale branch)

Length (modeled portion): 120 miles

Profile: single-track main line

Prominent modeled locations: Corbin, Ky., yard; Gatliff Coal Co., Nevisdale, Ky.; TVA Bull Run power plant, Clinton, Tenn.; Kinder Morgan Southeast Terminals, Knoxville, Tenn.; Gerdau Ameristeel, Knoxville; West Knoxville Yard

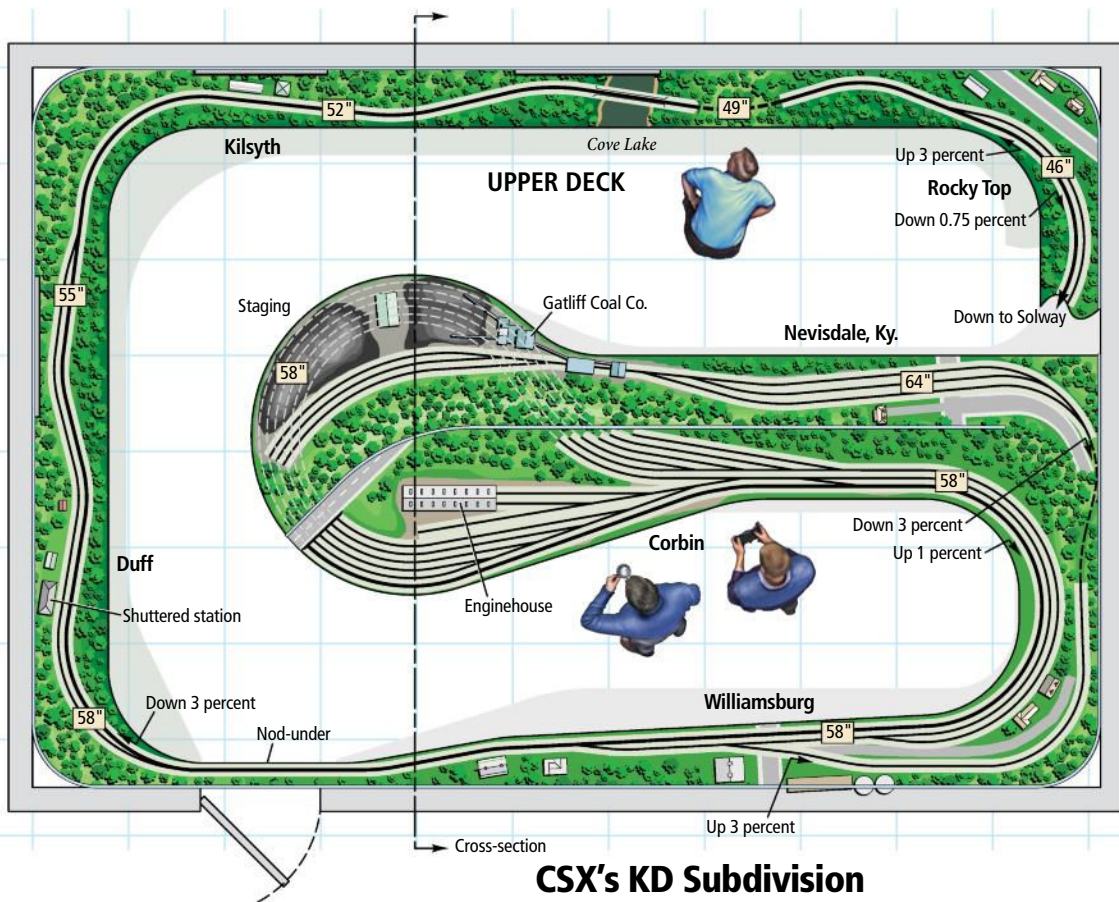
Out of Etowah

The KD Sub was for many years part of the Louisville & Nashville (L&N) RR. By acquiring the Atlanta, Knoxville & Northern RR, which ran from Knoxville, Tenn., through Etowah, Tenn., to Marietta, Ga., the L&N opened a route to bring Kentucky coal directly to Atlanta. The section from Corbin, Ky., all the way to Etowah was known as the Knoxville & Atlanta Division, or K&A, later shortened to the Knoxville Division.

With the upswing in coal traffic in the 1970s, the L&N combined the Etowah-to-Corbin trackage with other

Sometimes in track planning, things just work out right. I wasn't sure that would be the case when my client Brian Moore asked me to design a track plan for his 15'-0" x 22'-3" space. Along with an Eastern Tennessee location, Brian's requirements were a steel mill, an engine terminal, a helper district, a bridge over a river, a power plant with a rotary dumper, a flood loader at a coal mine, and room to run long drags behind modern motive power.

Brian didn't have a particular prototype in mind. But I always like to start track planning with a prototype. There's a degree of realism that comes with replicating a real railroad line, even when latitude is left for additions and subtractions to meet the modeler's preferences;



CSX's KD Subdivision

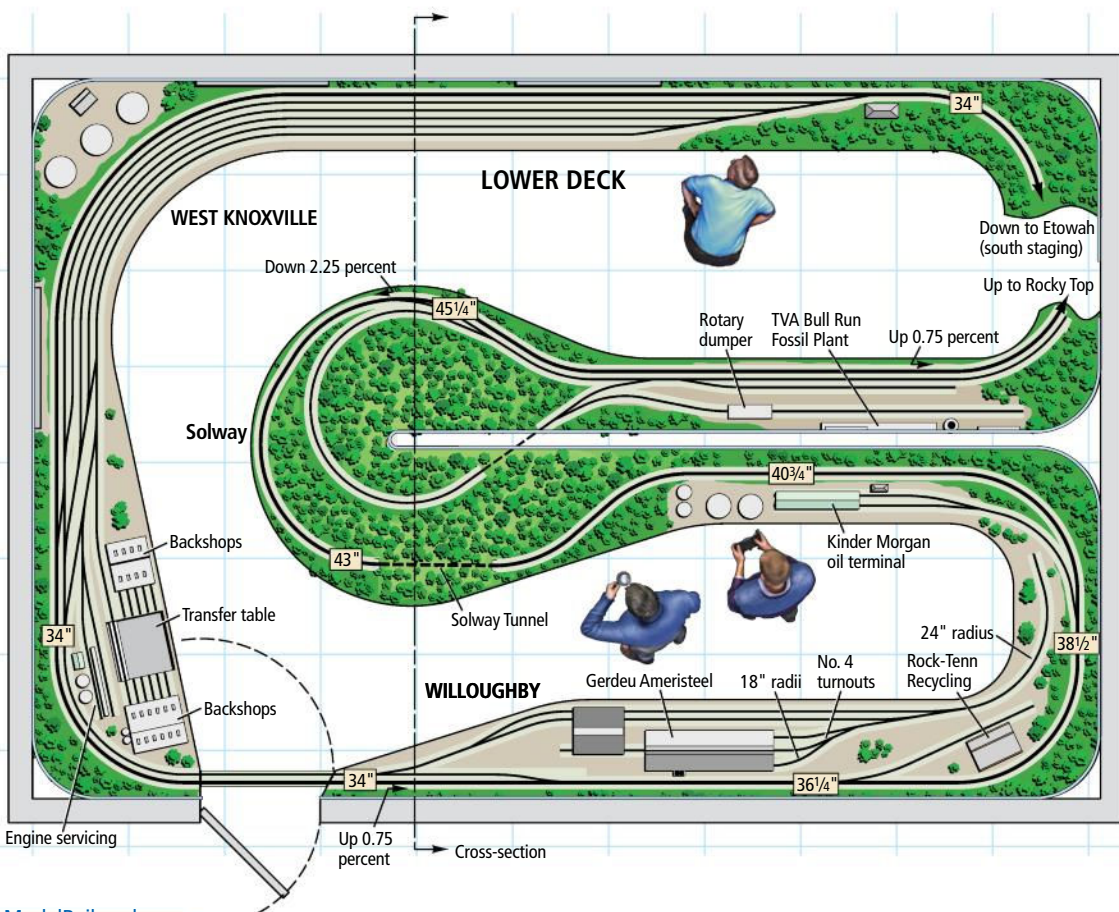
HO scale (1:87.1)

Room size: 15'-0" x 22'-3"

Scale of plan: $\frac{1}{4}$ " = 1'-0", 24" grid

Illustration by Robert W. Sprague

Find more plans online in the
ModelRailroader.com Track Plan Database.



Track plan at a glance

Name: CSX's KD Subdivision

Scale: HO (1:87.1)

Size: 15'-0" x 22'-3"

Prototype: CSX

Locale: Eastern Tennessee and Kentucky

Era: Present day

Style: Multiple-deck walkaround

Mainline run: 168 feet

Minimum radius: 30"

Minimum turnout: no. 6

Maximum grade: 3 percent



Air shimmers above dynamic brakes as no. 4004 leads train Q541 downgrade near Duff Mountain, Tenn., on July 20, 2016. Duff is the crest of the helper district on both CSX's KD Subdivision and on the layout. Paul Clawson photo

divisions reaching as far as Cincinnati. The Knoxville Division became the KD Sub, which redundantly stands for "Knoxville Division Subdivision."

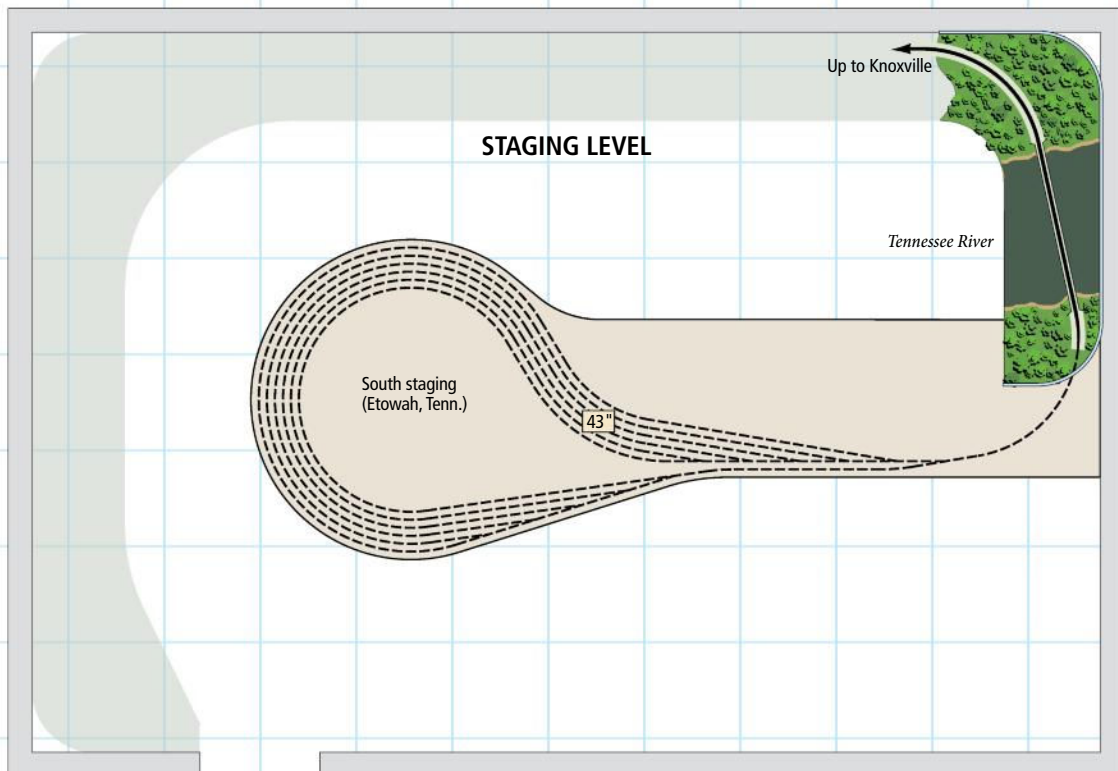
Today's KD Sub is heavily traveled by unit coal and manifest freight trains, so it was important to have ample staging on both ends of the model version. A six-track loop stands in for the southern Etowah-Knoxville portion of the line, with access from the sides of the peninsula and turnouts arranged to be closest to the aisle for maintenance. The tracks emerge via a long bridge over the Tennessee River before bending to the west to enter West Knoxville Yard.

As on the prototype, the yard is on a broad curve. The 48" radius on the

innermost track should still allow reliable coupling. Brian had a transfer table he wanted to use for his engine terminal, which fit neatly next to the swing gate, although one does not exist in this location on the prototype. I would ordinarily put the lowest deck of a two-deck design at about 40" above the floor, but Brian prefers to operate a lower deck sitting down, so we compromised at 34". North of the yard, a 2¼ percent grade begins.

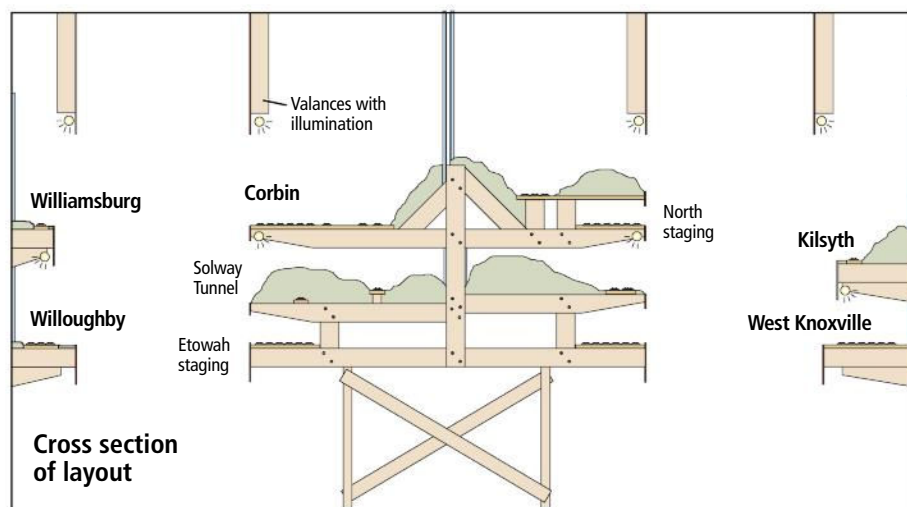
Gerdau Ameristeel has a plant up a short branch in Knoxville, perfectly placed to give Brian his compact steel mill. A little farther along is a Kinder Morgan tank car terminal, and then Solway Tunnel, which cuts through the ridge that gives Oak Ridge its name.

Around the bend is a representation of the Tennessee Valley Authority's huge Bull Run power plant, including a balloon track that fits onto the peninsula. Much of the plant could be represented by flats or photos on the first deck back-drop. Brian originally had imagined the power plant being on the second deck, with unloaded coal somehow flowing downward to a coal mine below it. I couldn't bring myself to have the coal mine in the valley and the power plant





Trains leaving south staging enter the layout by crossing the bridge over the Tennessee River into Knoxville, as in this prototype photo of CSX no. 3140, seen leading a train of empty hoppers on March 21, 2016. Grady McKinley photo



way up on top of the mountain, though. Perhaps Brian can build a conveyor to feed the flood loader up above.

Up to Rocky Top

The grade between Knoxville and the power plant opens up a minimal but sufficient 11" separation between upper and lower decks without a helix. Here, at Rocky Top, is where the heavy helper grade begins. At 3 percent, it's steep enough that helpers will really be needed to move northbound trains up to Duff.

On the prototype, helpers are used in both directions on the climb up Pine Mountain. The uphill grade on the prototype reaches 1.4 percent between Kilsyth and Duff, and building the line

through this rugged section of Tennessee may have contributed to the takeover of the L&N by J.P. Morgan, leading to its eventual absorption into the Family Lines System and today's CSX.

Many branches attach to this section of the KD Sub. We have room for one, which leaves the main at Williamsburg, Ky., and proceeds through the hills to the Gatliff Coal Co. in Nevisdale, located up and over the northern staging loop. It's also above the power plant, should Brian figure out a way to transfer coal from the rotary dumper to the mine.


Corbin, Ky., is a large coal marshaling yard at the northern end of the KD Sub. It has an unusual split design, and I took advantage of that to leave a part of the northern staging out in the open. Trains

can turn on the loop and be parked ready to return down the hill during the next operating session, while most yard switching takes place in West Knoxville.

Building the KD Sub

A multideck design always comes with its share of construction challenges. In the case of the model KD Sub, the trickiest part will be the central peninsula. It's a real "layer cake," with the lowest level devoted to staging, the middle loop in the open with the Bull Run balloon track, the upper level staging representing Corbin Yard, and above that, the coal mine at Nevisdale. Careful provision for the upper levels must begin before the bottom yard is installed.

The around-the-walls segments should be simpler. I would use metal shelf brackets and make sure that the upper level, in particular, is as thin as practical to give maximum headroom to the deck below.

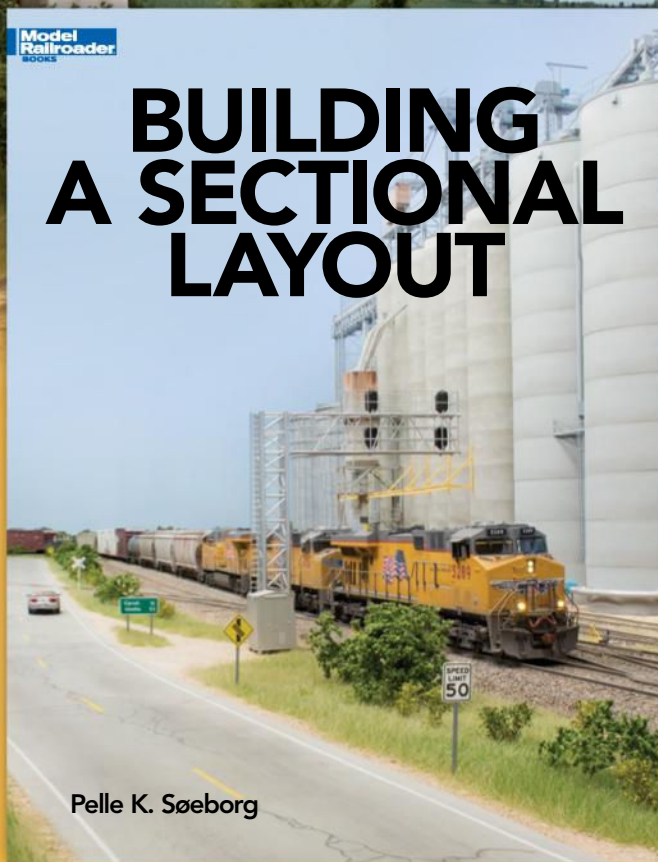
I'm sure Brian is up to the task of building the KD Sub in HO scale, and I look forward to pictures as he begins construction. Soon unit coal and manifest freights should be rolling through his Eastern Tennessee hills and Rocky Top. Now if I could only get that song out of my head. 

Bob Sprague is a professional layout designer (www.bobstrackplans.com) who has contributed many articles to MR.

NEW
from Pelle Søborg

BUILDING A SECTIONAL LAYOUT

Pelle Søborg Shows You How

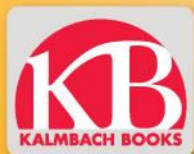


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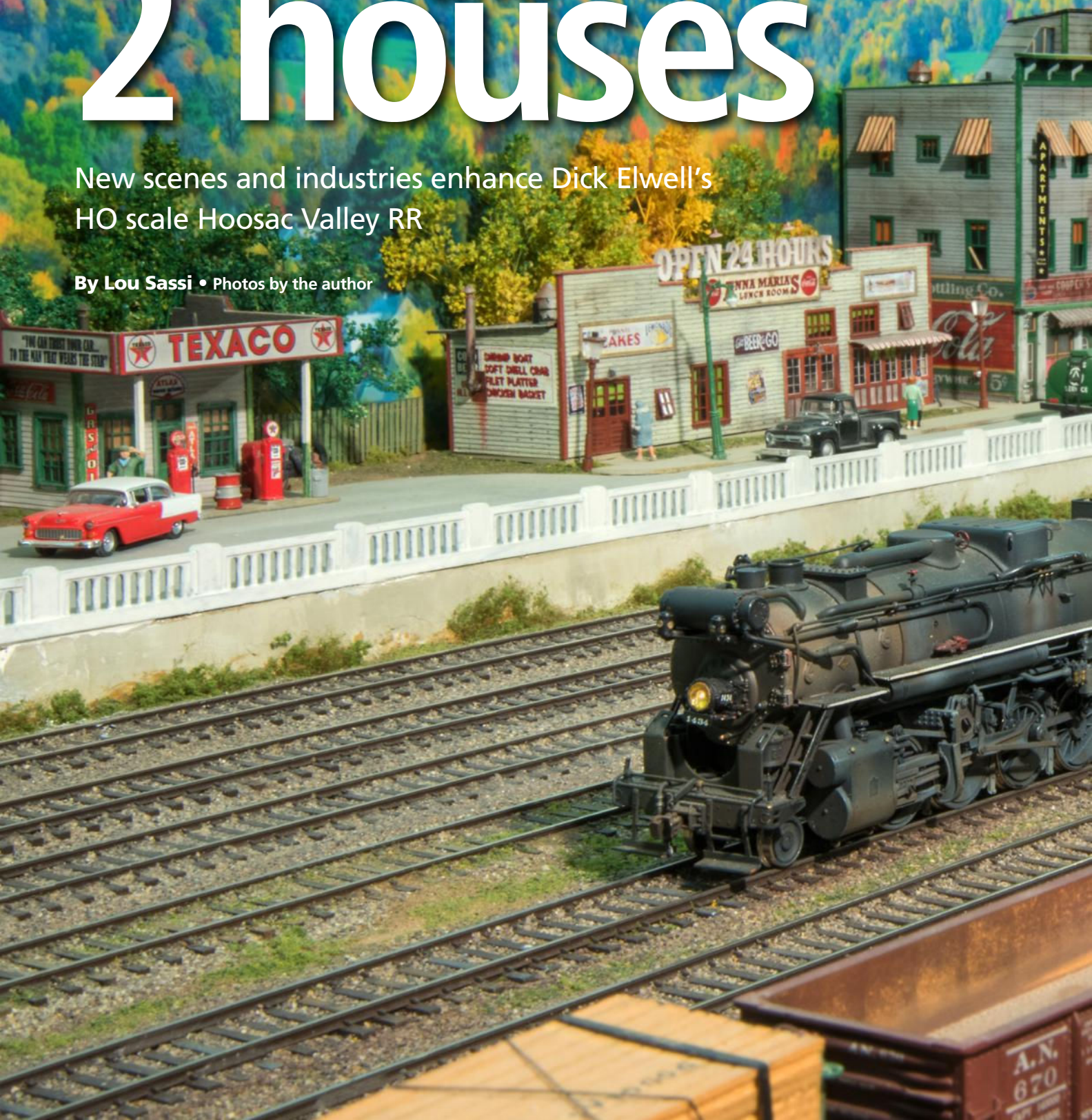


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50 years and 2 houses

New scenes and industries enhance Dick Elwell's
HO scale Hoosac Valley RR

By Lou Sassi • Photos by the author



① Boston & Albany no. 1434, a 2-8-4 Berkshire, leads a freight south through Essex Junction on the HO scale Hoosac Valley RR. Dick Elwell recently added scenery and new industries to this formerly unscenicked staging yard on his 32 x 62-foot layout.



A common model railroad saying is that a layout is never finished. Back in 1979 when I first met Dick Elwell and visited his HO scale Hoosac Valley (HV) RR, the then-26 x 40-foot layout sure looked finished, with its detailed scenes, scratchbuilt structures, and operating focus. However, the HV has undergone major renovations since Dick started building the layout in 1961, including a move to a new home that required a reconfigured design.

The layout's theme remains the same. The Hoosac Valley RR is a freelanced 1950s bridge line that runs from

Pittsfield, Mass., to Essex Junction, N.Y., passing through an area where Dick has lived his entire life. The HV interchanges with three prototype roads: the New York Central (Boston & Albany); the New York, New Haven & Hartford; and the Delaware & Hudson in Whitehall. The HV main line also interchanges with two other freelanced model railroads: the Adirondack Northern and the Greylock Terminal.

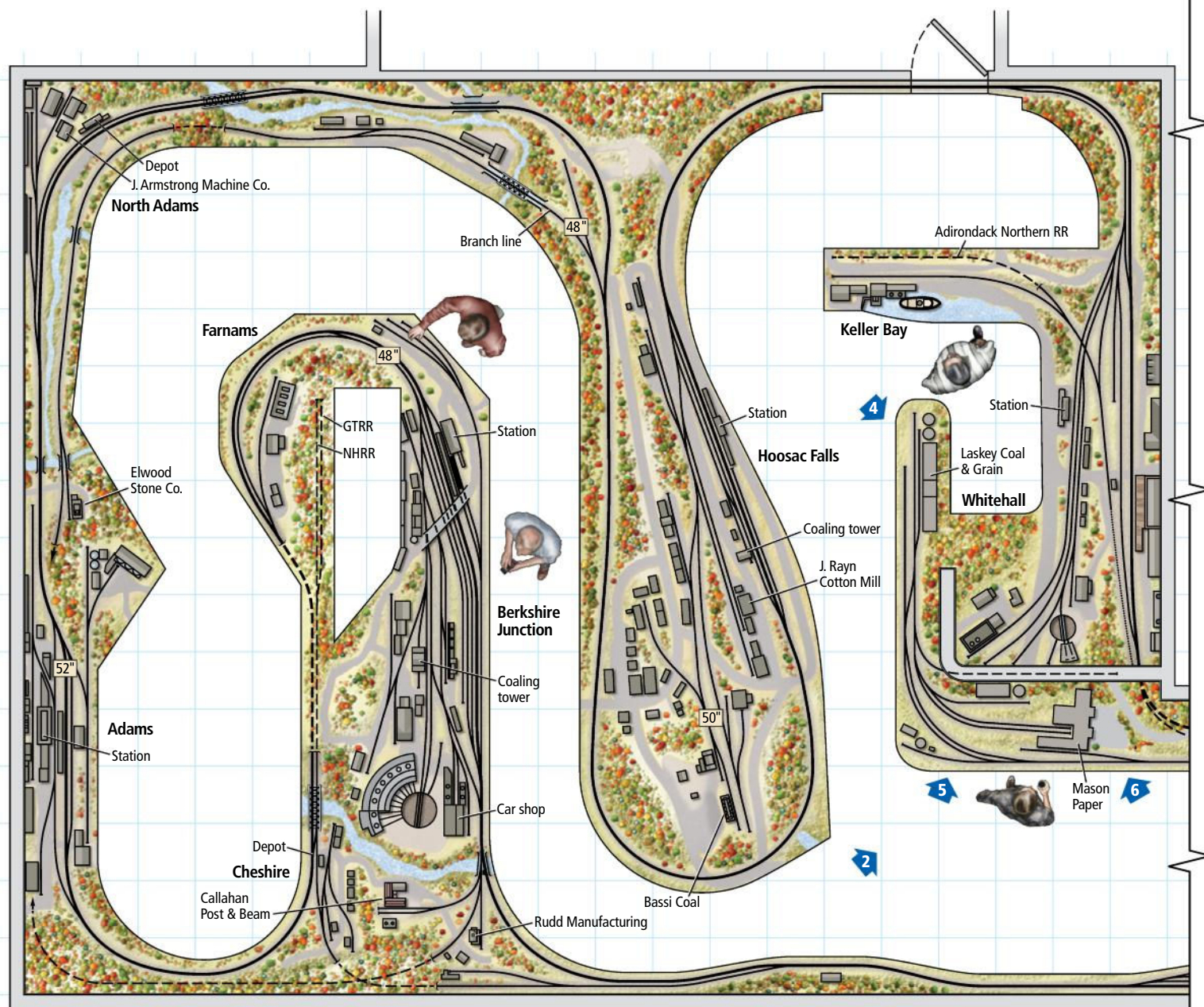
Throughout its lifetime the HV has graced the covers of five model railroad magazines, including the October 1990 issue of *Model Railroader* and the 1996 and 2008 editions of *Great Model Railroads*. It's also been featured in the *Great Model Railroads* video series on

VHS from Allen Keller Productions, a DVD from Scottymason.com Presents, and a segment on the *Tracks Ahead* television show.

During a recent visit, I documented Dick's latest project, expanding and scenicking the Essex Junction staging yard. The new additions and industries mark the latest chapter in the Hoosac Valley's long history.

The evolving HV

The Hoosac Valley that I first visited in 1979 and photographed for the October 1990 MR and *Great Model Railroads* 1996 was built in the basement and former garage of Dick's previous



home. Eventually that layout filled a 26 x 40-foot space.

When Dick started building the layout in the 1960s and '70s he used hand-laid code 100 rail on individually cut wood ties. As better flextrack became available, he made the switch, using both Atlas and Micro Engineering codes 70 and 83 track. He weathered all the rail, which he feels makes the rail's profile look smaller and more realistic.

Dick has used plaster over cardboard strips as a layout scenery base since the 1960s, and that's what covers the oldest sections of the HV. However, since the 1990s, Dick's preferred scenery base material is laminated sheets of extruded-foam insulation board. After using a

rasp to form scenery contours, Dick covers the surface of the foam with real dirt acquired from local fields as well as various ground foam products. He also uses poly fiber clumps to represent brush and other low-lying vegetation.

The trees on the layout are made of either peppergrass or wild oregano. To form a tree, Dick wraps dried sprigs of the plants with floral tape and then paints them in fall colors.

All the ponds, lakes, and rivers on the layout are made from either Castolite or Enviro-Tex Lite resin.

Many of the original structures from the 1970s have been replaced with craftsman wood kits from South River Model Works and Fine Scale Miniatures,

among others. There are also some scratchbuilt structures.

The first HV had a basic signal system. At that time, Dick had also designed and built his own operating centralized-traffic-control panel. By the 1990s, the original signals had been replaced by a more sophisticated system from Shiloh Signals, but the CTC panel remained. In 1996, Dick converted his layout to Digital Command Control (DCC) using an NCE system.

He replaced or re-motored all the original motive power on the layout. Since the 1990s, almost all the locomotives have been converted to DCC and feature onboard sound decoders. He also regularly replaced his rolling stock as more detailed models became available.

However, the biggest change to the layout would come in the early 2000s when Dick and the HV moved to a new home.

One layout, two houses

As beautiful as the original railroad was, Dick wasn't completely happy with it. He felt there was too much hidden track and not enough mainline running. He got his chance to develop an improved Hoosac Valley in 2001 when he had a new, larger home built.

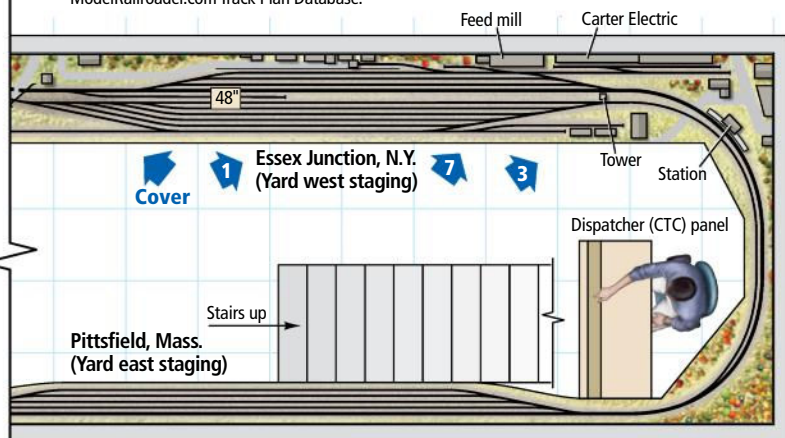
Dick designed the basement with his model railroad in mind. He had the builder use steel I-beams to support the first-floor joists. This eliminated the need



2 The HV's fall scenery now continues through Essex Junction. Dick also lengthened the scene to provide space for Mason Paper and other industries.

Hoosac Valley RR

HO scale (1:87.1)
Scale of plan: $\frac{3}{16}$ " = 1'-0", 24" grid
Layout size: 32 x 62 feet
Numbered arrows indicate photo locations
Illustration by Rick Johnson
+ Find more plans online in the ModelRailroader.com Track Plan Database.



The layout at a glance

Name: Hoosac Valley RR
Scale: HO (1:87.1)
Size: 32 x 62 feet
Prototype: freelanced, inspired by New York Central and Boston & Albany
Locale: Northeast
Era: 1940s to 1960s
Style: walk-in
Mainline run: 365 feet
Minimum radius: 42" (main line)
Minimum turnout: no. 6 (one no. 4 turnout)
Maximum grade: 1.5 percent
Benchwork: L-girder
Height: 48" to 52"
Roadbed: $\frac{1}{4}$ " x $\frac{1}{4}$ " pine lattice
Track: flextrack and handlaid; codes 70, 83, and 100
Scenery: Hydrocal over cardboard strips; extruded-foam insulation board
Backdrop: photos on wall
Control: NCE DCC



for nearly all support columns, providing 32 x 62 feet of open space for the train room.

A side door opens to the stairway down to the basement. Dick also added a half bathroom at the entrance to the basement. This configuration means that visitors can go right to the train room without needing to pass through the upstairs living area, which makes life easier for Dick's wife, Sandy.

Before the house was complete, Dick drew a scale plan of the new basement, then made a photocopy of his *Great Model Railroads* 1996 track plan to the same scale. He cut his track plan into the sections he wanted to keep, then overlaid them on the basement plan in different configurations until he was happy with the result. He also had the builder alter the basement foundation when he found that it would interfere with his revised track plan.

In 2002 the house was finished and ready for the new layout. With the help of his friends, Dick dismantled the old layout. The crew borrowed a flatbed truck and moved the layout sections across town in two nights.

Once the railroad was in its new home, the existing open grids were mounted on new L-girder benchwork. About 90 percent of the original layout was salvaged, including the CTC panel, which is located under the stairs. The revised Hoosac Valley was featured in *Great Model Railroads* 2008.

Essex Junction

The new layout had a 30-inch wide, 23-foot long unscenicked staging yard that represented the HV's two terminals, Essex Junction, N.Y., and Pittsfield, Mass. Dick never liked that this part of the layout remained unscenicked, especially since it's the

3 A Hoosac Valley freight rolls past Essex Junction Station, a South River Model Works craftsman kit. Alco RS-1 no. 1018 is a brass locomotive body on a Kato mechanism.

first thing visitors see when they walk down the stairs into the train room.

Since the layout last appeared in print, Dick has modified the staging area by separating the staging yards. A new unscenicked staging yard to the left of the stairs represents Pittsfield, while Essex Junction is now fully scenicked. Dick lengthened Essex Junction by adding another 44-inch-wide, 8-foot-long section as well as a 24-inch-wide, 13-foot-long L-shaped section that extends to Whitehall.

The 13-foot-long addition features several new structures, including a coal silo, grain elevator, and feed mill. As for the 8-foot section, inspiration struck after Dick and his friend, Bill Duffé, took a tour of a paper mill in Stockbridge, Mass. After the tour, Dick decided to add a paper mill to the new addition.

MORE ON THE WEB

Subscribers can watch a video of trains running on the Hoosac Valley. Click on the link at ModelRailroader.com



Dick used pool table underlayment to give his fascia a clean and finished look. The material was easy to install and keeps the focus on the layout above.

Quick and easy fascia covering

After rearranging layout sections, I needed a way to cover the many splices and other alterations I'd made in the fascia. I needed to do more than simply repaint the surface, and I didn't want to replace all the material. The answer came in the form of pool table underlayment.

This underlayment is a gray material similar in appearance and texture to indoor/outdoor carpeting. I attached the underlayment to the fascia with carpet glue. Then I used a sharp utility knife to follow the contours of the fascia and cut away the excess material.

The finished fascia looks clean and consistent and keeps attention focused on the layout above it. – *Dick Elwell*

Some friends helped Dick with the project, which would incorporate three-dimensional models as well as prototype photos. Mike Confalone shared photos he took of the Groverton Paper Mill in northern New Hampshire that had closed in 2008. Dick and Scott Mason made foam board mock-ups of the three-dimensional structures, which would represent the finishing mill.

Using the mock-ups as a guide, Scott drew scale plans of the mill structures using a CAD program. He then sent the plans to Jim Simmons, who owns Monster Model Works (www.monster-modelworks.com), a firm that specializes in laser-cut wood structure kits. Jim then used the drawings to make laser-cut, brick-textured walls specifically for the project.

With Mike's photos installed as the backdrop for the scene, Dick and Scott finished and installed the mill structures, using parts supplied by Jim. The finished result, Mason Paper, is a signature scene on this part of the layout.



4 Mason Paper no. 10, an Alco S-1, spots a hopper at Laskey Coal & Grain. This industry is also part of Dick's latest layout addition.

5 Sludge left over from the paper-making process is removed via tank car at Mason Paper. The backdrop behind the power plant features prototype photos of a paper mill.



Meet Dick Elwell

Dick Elwell's interest in trains began as a young boy living in the Morning Side section of Pittsfield, Mass., where he would watch 2-8-4 Berkshires running along the Boston & Albany RR.

Dick's first model railroad was a three-rail O gauge layout that he built in his pre-teens. He switched to HO scale in 1956 and started the first HV in 1961. That first rendition was dismantled in 2002 with the majority of it being saved and moved to his and his wife, Sandy's, present home.

Dick worked for New England Telephone Co., retiring in 1991 after 41 years of service. He and Sandy spend their spare time doing volunteer work, playing golf in the summer, and watching their two great-grandchildren play sports.



6 A tour of a paper mill inspired Dick to add one on his layout. Scratchbuilt from laser-cut wood walls, Mason Paper is the largest industry on the new layout section.

Dick continued to add photo backdrops to the rest of the Essex Junction scene. He attached the photos using small pieces of rolled up masking tape.

After revising the trackwork, Dick finished the scenery. Dick's good friend Jim Armstrong, who passed away in 2016, helped build many of the new structures. Two notable structures on the north end of Essex Junction yard include Essex Junction Station, a South River Model Works "Cambridge Crossing" craftsman kit, and Carter Electric, a kit-bashed model using parts from a Walthers Front Street Warehouse kit.

Doug Foscale, owner of Fos Scale Models (www.fosscalemodels.com), supplied other kits used at Essex Junction.

A lasting legacy

It's more than 13 years since the layout has been up and running in its new home. Dick still hosts operating sessions with his regular crew as well as visiting operators. Visitors from as far away as Asia, Australia, and Europe have found Dick and Sandy to be welcoming hosts. After more than the 50 years, the Hoosac Valley RR is better than ever. **MR**

7 Dick used Atlas and Micro Engineering flextrack for the new sections of his layout. This B&A 2-8-2 Mikado, an Overland brass HO scale model, puts the rails to the test as it starts its run in Essex Junction.



Adding onto a **SECOND DECK**

No space for new benchwork? This modeler expanded above his existing layout

By Bob Foltz • Photos by the author



Constructing new benchwork and laying track above an existing layout is a daunting proposition, so my decision to expand the narrow gauge portion of my Santa Fe New Mexico Division layout (June 2011 *Model Railroader*) wasn't one I made lightly. When I planned the railroad, the "Chili Line" was a minor interest, included just to have a bit of narrow gauge.

A couple of factors drove me to undertake this project. First was a growing interest in the narrow gauge Denver & Rio Grande Western RR, which crossed the mountains of New Mexico and my home state of Colorado. Second was the desire to create a few more jobs for my ever-growing operating crew.

As originally built, my D&RGW Chili Line ran only 20 feet or so on a narrow shelf above my standard gauge layout. A steep grade brought trains to the upper-deck town of Santa Fe. By adding a longer run and two more towns, the narrow gauge trains would keep operators busy longer than before.

Undertaking a major construction project over an existing finished railroad isn't something that should be

tackled without considerable forethought and planning. Keeping the new sections light and doing as much construction as possible away from the existing railroad helped make the project manageable. Creating some sort of base (angle brackets mounted to the backdrop, in my case) to support the sections as you test fit them is critical – especially if you're working alone. Spring-loaded clamps that hold things in place while you fiddle with the new sections are also invaluable.

I'm pleased with how the expanded narrow gauge line turned out, and my crew is happy to have three more trains to run that actually do some work along the way. So, if you've been mulling the possibility of undertaking a major construction project over an existing railroad, start drawing up plans. It's not as difficult as you might think.

Bob Foltz is a retired Army officer who in 2009 retired from his second career as the CEO of a small company. He has published more than 25 articles in the model railroading press. Bob and his wife, Linda, have a son, Brian, who is an accomplished On30 modeler.

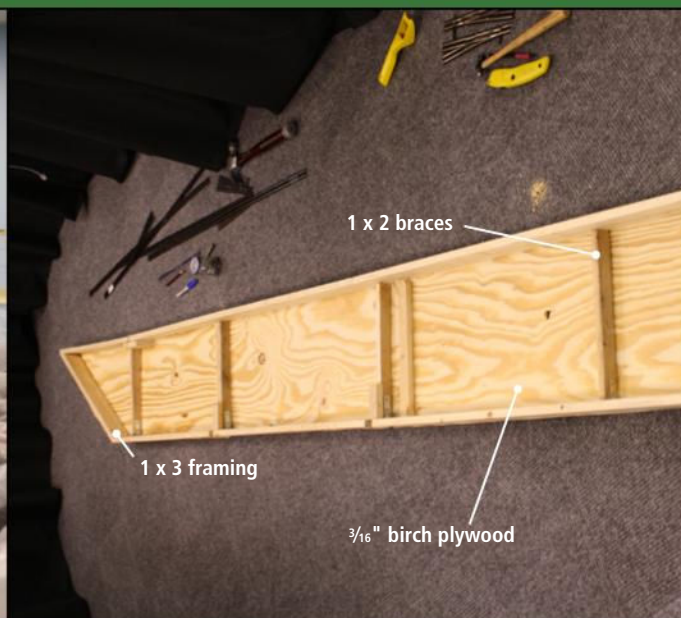
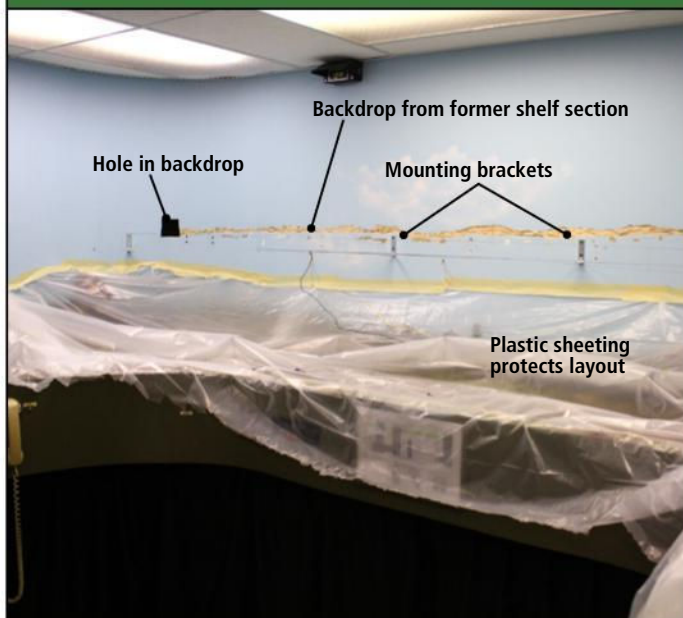


(Above) Bob's original Chili Line was a two-track, scenicked, open staging yard on a narrow shelf above the town of Springer, N.M. He removed it to build the new Chili Line.

(Below) Northbound K-27 no. 461 pulls into Embudo, N.M., with the Antonito-to-Santa Fe turn on Bob Foltz's new extension. Bob expanded the upper deck above his existing layout.



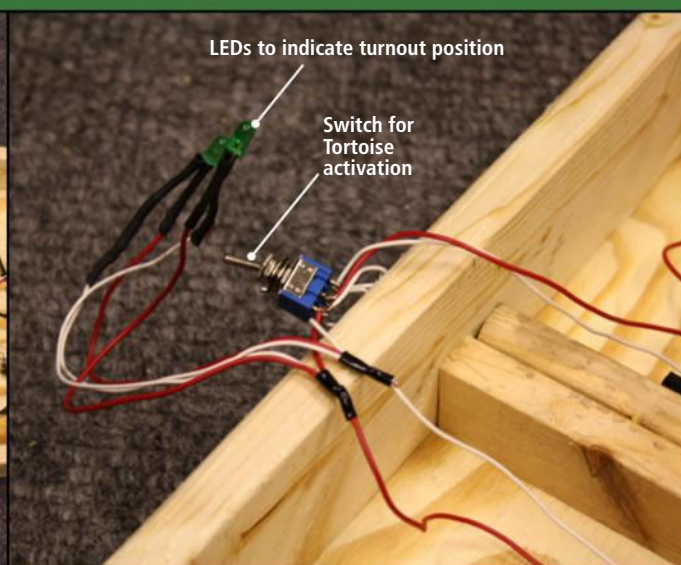
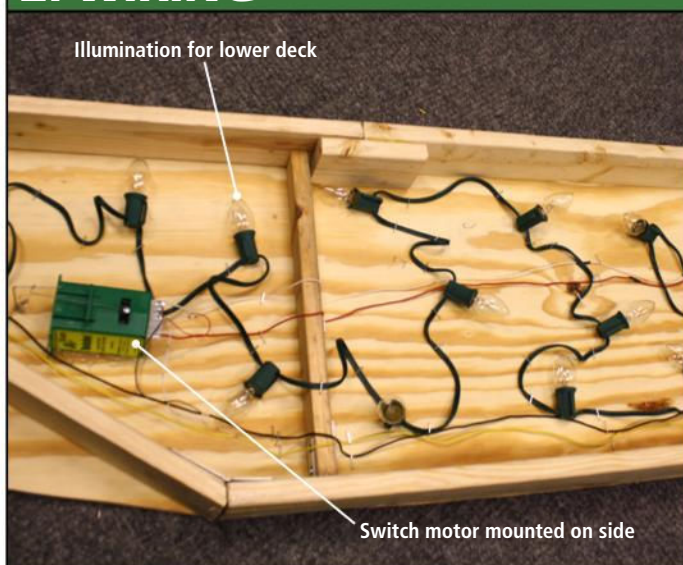
1. PREPARING THE BENCHWORK



I covered the railroad below with plastic before removing the narrow gauge yard above. Angle brackets were installed on the backdrop to support the new benchwork for the town of Espanola, N.M., first stop on the new branch. I also cut a hole through two backdrops on the left to allow the track to pass through to reach the new town of Embudo, N.M., on the other side of a peninsula.

I wanted to keep the new section as light as possible to minimize the support it needed. 1 x 3 lumber made up the perimeter of the frame, with 1 x 2 cross braces and 3/16" birch plywood on top. I originally planned on not using any intermediate supports along the front, so I added a steel U channel (not shown in these photos) behind the front 1 x 3. This added considerable stiffness.

2. WIRING



Most construction, including framing, tracklaying, wiring, and lights for the deck below, was completed while the extension was still on the floor.

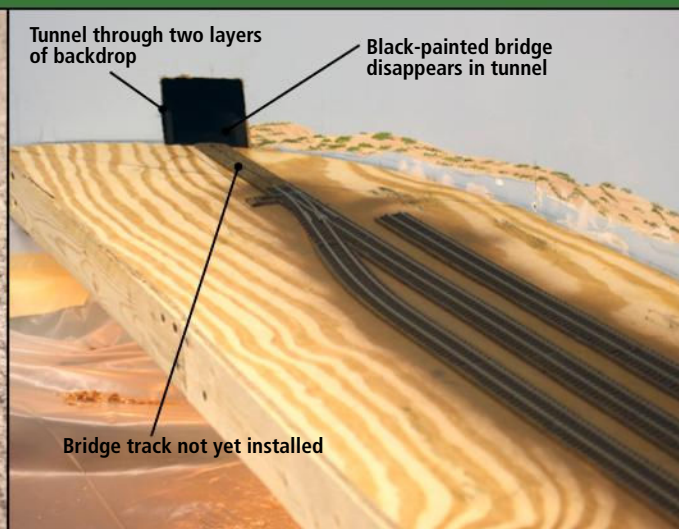
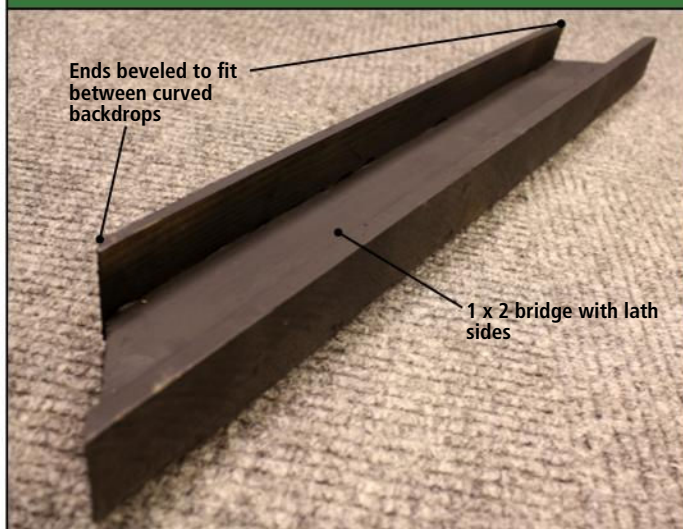
I prefer ground throws for turnout control, but one turnout would be difficult to reach over the existing layout, so I used a Tortoise by Circuitron switch motor at that location. The switch motor was mounted on its side to keep it hidden within the very shallow benchwork.

Because narrow gauge locomotives are so small and light, powering the turnout frog is essential for reliable

operation. I used single-pole double-throw (SPDT) slide switches linked to the switch rod to control the rest of the turnouts and to change frog polarity.

Since the track is pretty high above the floor (62"), it would be hard for an operator to see how turnouts were set from a distance. I wired light-emitting diodes (LEDs) to the Tortoise motors and the slide switches to indicate the direction a turnout is thrown. These will be mounted later in the fascia so an operator can see the direction the turnout is set at a glance.

3. THROUGH THE WALL



Once the Espanola section was completed, I lifted it temporarily into place to see how things fit. It was light enough that I could handle it without any help. I really appreciated my decision to keep the benchwork light.

I figured the best way to carry the track across the gap through the two backdrops was on a solid wood bridge. The bridge was constructed of a 1 x 2 base with lath attached to the sides as a safety railing. I attached pieces of 1 x 2 to the back of both backdrops to create U-shaped brackets into which I could simply drop the bridge.

I painted the bridge black so it would “disappear” in the shadows once in place. I put off laying track on the bridge until the new sections on both sides were in place, since I wanted the bridge track to extend well beyond the joints in the wood.

After marking the bridge centerline on the new section, I removed it again to install the cork roadbed. I also painted the track and wired it before reinstalling the section. Once both new sections were in place, I laid track across the bridge to tie them together.

4. EMBUDO, N.M.



The benchwork for the town of Embudo was more difficult to construct because of its curved shape. I installed L-brackets on the backdrop as before, then fitted the rear frame members in place. I used a metal splice plate to hold the rear frame pieces together while I bent them to the angle I needed. Once this was established, I installed a short piece of 1 x 2 over the plate to hold the angle.

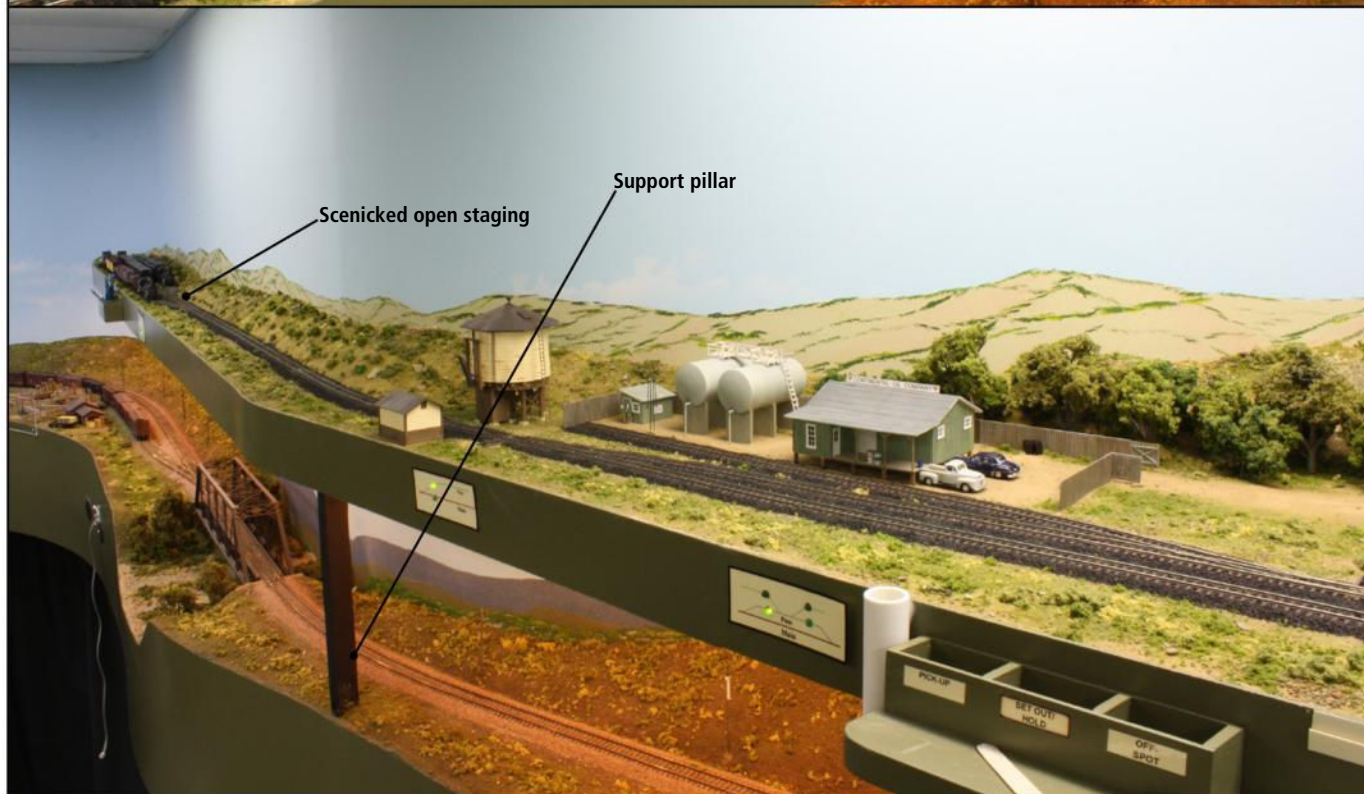
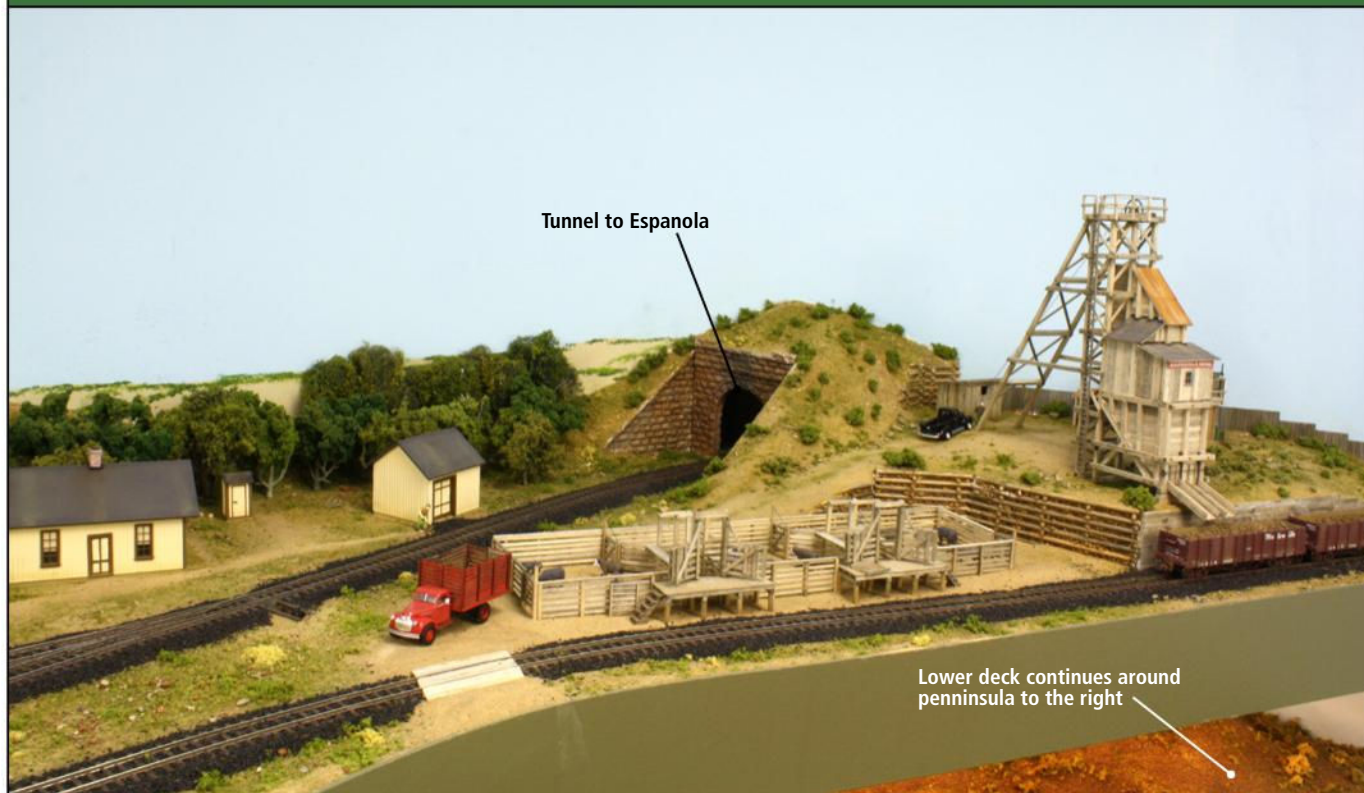
The finished frame was again temporarily held in place to make sure everything fit. Spring clamps come in handy at this point. I cut cardboard templates for the top plywood surface, then removed the frame from the wall so the plywood deck, cork roadbed, track, wiring, and lights could be installed while everything was on the floor, just as I had done with the previous section.

Once the benchwork was finished, the section was lifted into place and screwed to the “L” brackets mounted to the backdrop. The fascia was then installed and finished just like the Espanola section.

I hadn’t installed any support along the front of either section at this point, but I became concerned what would happen if someone leaned all his weight on one of them. I considered tying them into the overhead floor joists, but the supports would then be in the way of any switching.

Since the areas beneath the new sections were “low activity” areas, I opted to add a single support under Espanola and two under Embudo. I painted them black and feel they aren’t too obtrusive. You can see one in the photo on page 52.

5. SCENERY



I added scenery using my traditional cardboard strip support and plaster cloth method, then covered the plaster with sifted dirt and various Woodland Scenics ground foam products.

Although there were no tunnels on the prototype Chili Line, I could come up with no better way of disguising where the track entered the holes in the backdrops. The

track enters the hidden bridge behind the backdrop at the south end of Embudo, heading to Espanola.

At the north end of Embudo, trains run only a short distance to the three-track staging yard representing Antonito, Colo., and the rest of the D&RGW system. Since it's so visible, I followed modeler David Barrow's example and added basic scenery. **MR**



Model a MOW BOXCAR

Learn how to repurpose a freight car
by following the prototype's lead

By **M.R. Snell** • Photos by the author

Kitbashing is one of the most effective techniques in the modeler's arsenal. As our hobby continues to evolve toward a ready-to-run format, some say kitbashing has become a lost art. Yet it often remains the easiest way to create a unique car, locomotive, or structure.

Sometimes, kitbashing can involve no more than making a single, distinctive change to a model. On a recent trip trackside I stumbled across a car ideal for such a project – a maintenance-of-way (MOW) supply car. This obsolete boxcar found new life assigned to a mechanized track gang with only one major change evident to its exterior – the plug door on one side has been replaced with a combination personnel and roll-up door.

Join me as I demonstrate just how easy it can be to re-create a unique car for your roster.

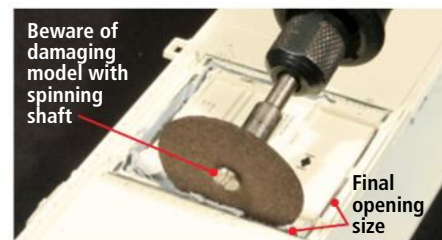
STEP 1. CHOOSING A MODEL AND CUTTING IT UP



First I had to choose an appropriate base model, in this case a Walthers 50-foot FGE insulated boxcar. [The car Matt used, no. 932-4767, is out of production, but Walthers still offers similar models in different paint schemes. Search for "50' FGE Insulated Boxcar" on the Walthers website, or check for the original car at online auction sites or at swap meets. – Ed.] This model isn't an exact match, but it was available factory decorated in the correct scheme, so I didn't have to paint it.



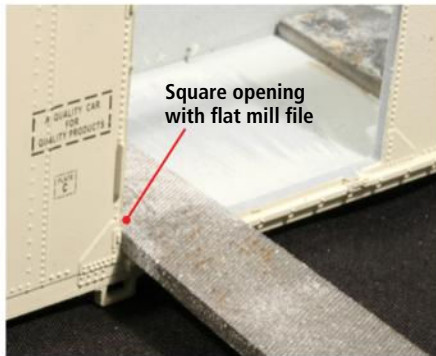
M.R. Snell modeled this maintenance-of-way boxcar, starting with a Walthers model. It was inspired by prototype photos, inset, that Matt took while railfanning. This is a straightforward conversion that lends itself well to a first rolling stock project.



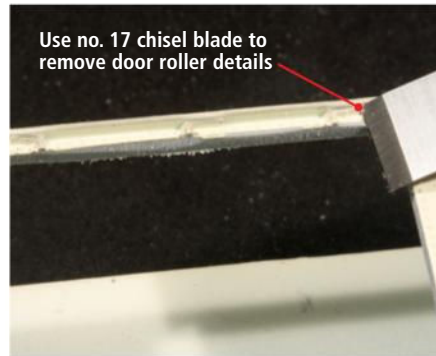
The next step was to remove the molded-on plug door. I used a motor tool with a cutoff wheel to cut through the thick plastic sides of the model. Since the wheels can shatter as they wear, I used eye protection.

A cutoff wheel is quick, but it can melt plastic, so I made a rough cut set back from the planned finished edges. I worked in 30 second intervals of cutting, then broke off the gobs of melted plastic. I used sanding sticks to complete the opening.

STEP 1. CHOOSING A MODEL AND CUTTING IT UP (CONT'D)



After I shaped the opening with sanding sticks of varying grits, I used a flat mill file to square the corners. I finished with an 800 grit sanding stick to remove any rough spots along the door frame, leaving a smooth, square opening.



With cutting complete, I could remove the final two remnants of the plug door, the rollers and locking hasps, that were molded onto the door tracks. A no. 17 chisel blade in a hobby knife shaved these details from the car, leaving the opening ready for rebuilding.

Materials list

ClearSnap

ColorBox Fluid Chalk Inypad, burnt sienna

Evergreen styrene

132 .030" x .040" strip
4525 metal siding, .030" spacing
9015 .015" plain sheet

Micro Engineering

80162 warehouse personnel door

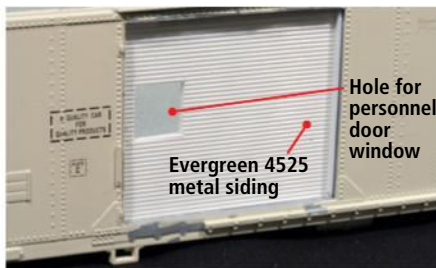
Microscale

90251 white stencil lettering

Wm. K. Walthers Inc.

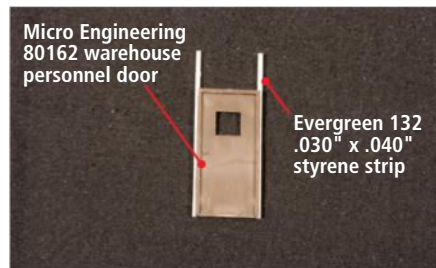
932-4767 FGE 50-foot insulated boxcar
(Discontinued, similar models available)

STEP 2. MAKING CHANGES



After studying the prototype's photo, I determined the easiest way to replicate this door combination would be to construct it in multiple parts that could be joined together. I started with the roll-up door, which was recessed the farthest from the car sides.

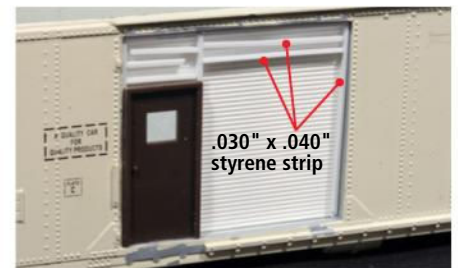
Using this recess to my advantage I cut a length of roll-up door material that extended beyond the large door opening to form a foundation for the additional parts to follow. That gave me an insert assembly that could be removed for painting. After I cut the



door material, I secured it to the interior of the car with masking tape so I could build onto it.

The next step was to add the walk-through door, and Micro Engineering's personnel door provided an exact match for the prototype door. The personnel door was supported by two long posts extending from the bottom to the top of the opening. The right post also formed one support for the roll door. I cut .030" x .040" styrene strip posts to match the interior height of the boxcar opening and cemented them onto the backside of the personnel door frame, extending the molded frame on each side of the door.

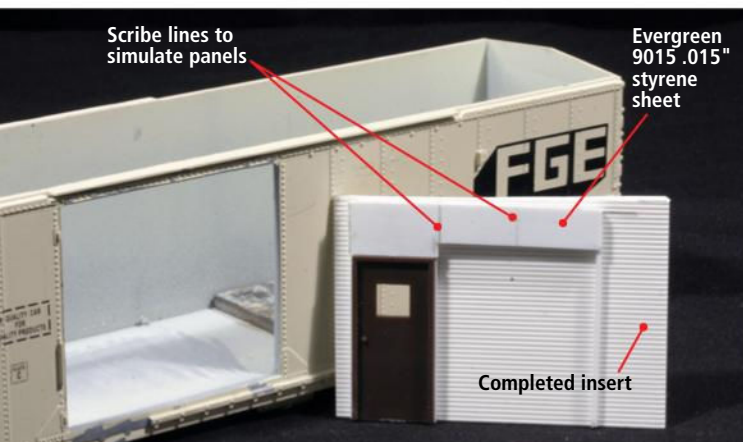
With the personnel door in place against the roll-up door material, I traced the window opening onto the roll-up door and cut it out. Next, I cemented the door



in place on the roll-up door material. The extended upright post on the right side of the door formed the left upright post of the roll door frame.

I added the right upright post of the roll-up door frame using a piece of .030" x .040" styrene strip cut to fit along the right side of the large opening. To complete the frame, I added horizontal strips of .030" x .040" styrene at the top of each new door and at the joint between the insert and the upper edge of the boxcar door frame. Additional small strips placed inside the frames provided support to the .015" styrene sheet that would cover the gaps between the top of the new doors and the plug door opening.

The prototype photos showed three pieces of sheet metal were used to fill the gaps between the top of the new doors and the bottom of the plug door opening. To replicate this I cut a piece of .015" thick styrene sheet to fit the model, then I scored it with a no. 11 blade in a hobby knife and gently sanded it to create the thin lines left by the three sections of sheet metal placed side by side.

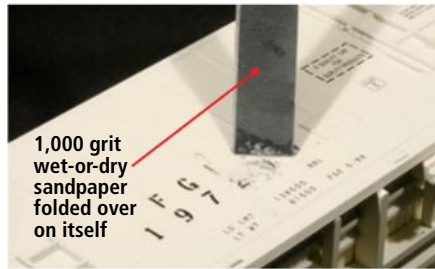


STEP 3. PAINTING AND WEATHERING

I removed the insert for painting, then I used a combination of Floquil Old Silver, UP Harbor Mist Gray, and SP Dark Gray to paint each component to match the photos. I set the insert aside to dry while I worked on weathering the boxcar. You can use other grays and silvers to match these out-of-production paints.

Since I was modeling an old car, I began by distressing the FGER reporting marks and numbers by lightly wet sanding them with 1,000 grit autobody sandpaper, leaving a ghost image similar to what's visible in the prototype photo.

Next, I gave the car a base coat of light weathering using black and brown chalk powders. Then I sealed the powders with an overspray of Testor's Dullcote.



The next step in weathering the car was to add rust – lots of rust. I like ColorBox brand burnt sienna Fluid Chalk Inkpads. While not a chalk at all, they're a pigment-based ink stamp pad that's fairly quick drying and provides an excellent light rust color with the illusion of a slight texture. Like regular chalk-based powders, the colors can be blended and smeared if desired.



I began with a heavy ink coat applied evenly across the roof with cotton balls. Then I added a similar coating to the top edge of each side using a wide brush to represent rust patches where water would've run off the roof.

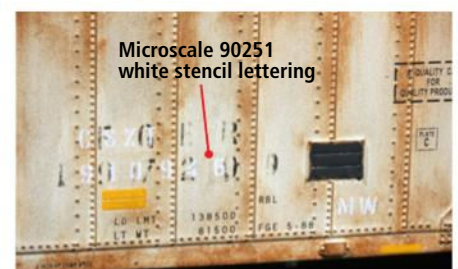
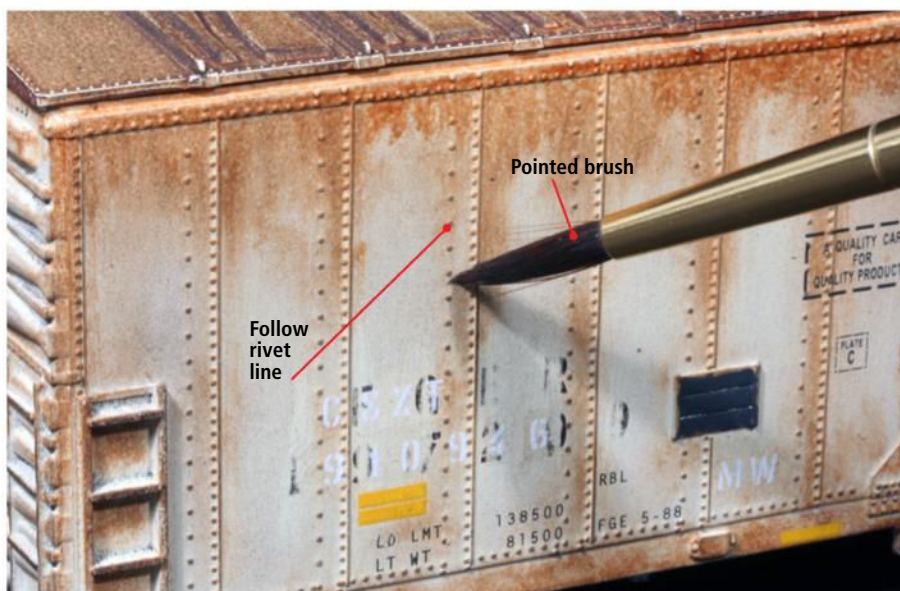
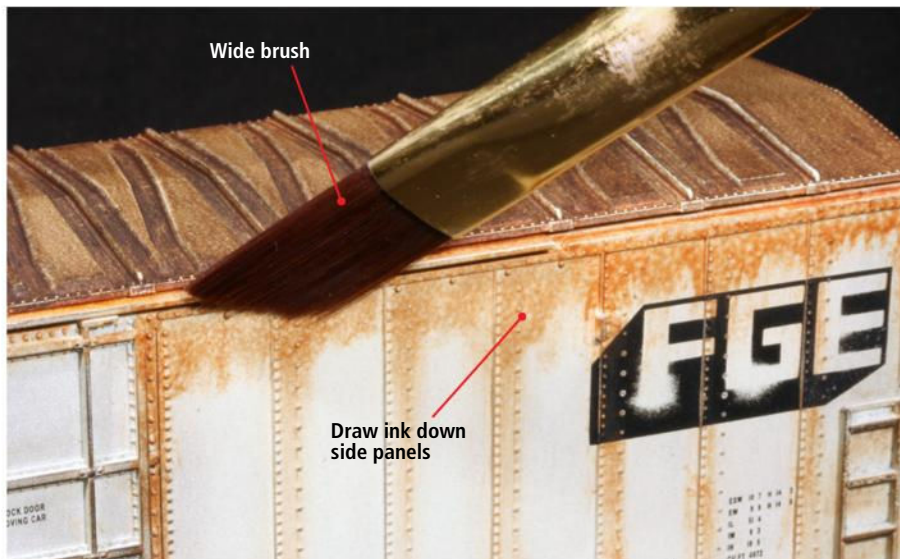
I streaked the ink down each side using a pointed brush, following the rivet lines and allowing it to thin out naturally as the brush was dragged down the side of the car.

Once the streaking was finished, I used some additional rust along the bottom edge and ladders. This was followed by another application of Dullcote to seal and complete the weathering, creating a car whose best days are now in its past.

Following the lead of the prototype, I renumbered the car, applying white Microscale stencil decals atop the light carbody color. While this combination may seem unusual, applying decals to a rough weathered surface is also a contrast to conventional decal practice.

Normally, I apply decals over a gloss surface to reduce the chance of air becoming trapped between the decal and model surface, commonly known as silvering. Since I was working on a rough surface, I applied a thin coat of Microscale Micro Sol to the model, then pressed the decal with a firm brush, simultaneously expelling the air under the decal while conforming the decal to the surface of the model.

Now all that's left is to reinstall the door insert and roof, leaving me with a good looking replica of a unique car that will never be seen in ready-to-run form. **MR**



Seven tips for better solder connections

Soldering is one of the skills every model railroader needs. When building a layout, soldered track feeders, rail joiners, and electrical connections are necessary for reliable Digital Command Control (DCC) operations.

In addition, almost all DCC decoder installations require soldering at some point to add lights, speakers, connectors, and extra functions. Let's take a look at some of the tools that will make your job easier, and I'll give you some tips on their use.

The most obvious tool is a good soldering iron. Fortunately we have a wide array of electronic soldering irons to choose from, but how do you choose? As with most situations, you need to match the tool with the job.

Small electrical components and delicate 28AWG wires call for small, low wattage irons. However, soldering track feeders and rail joiners works best when you can put a lot of heat on the spot and get out before your ties turn into a pile of molten plastic or charred wood. So how big an assortment of soldering irons do you need and which sizes do you need?

While you can purchase an assortment of irons of different wattages, I prefer a more flexible approach – a soldering station like my Weller WLC100 ①. This reliable tool can be adjusted over a range of 5 to 40 watts, giving a maximum temperature of about 900 degrees F.

In addition, Weller designed the handpiece to accept a variety of tips so you can customize it for the job. I typically use a small pencil tip for delicate work and move up to a larger flat screwdriver tip for rail joiners and other projects requiring a lot of heat ①. The heating element is replaceable and can be purchased separately should you ever burn one out (I've replaced only one in 10 years of heavy use).

Brass tip cleaner

Moist sponge tip cleaner

Pencil tip

Screwdriver tip

Solder varies in composition, with tin and lead in a 60:40 ratio commonly used for most model railroading purposes. However, 63:37 solder is also popular. An important distinction between these two formulations is that 60:40 solder has different temperatures at which it becomes a liquid and a solid, existing as a paste between these two points, whereas 63:37 solder passes from liquid to solid at 361 degrees F.

This is important, since if a 60:40 solder joint is moved while cooling, it might not form a solid connection, whereas the 63:37 solder solidifies immediately.

Hard solders often containing silver are also available and can have melting points near 900 degrees F. These would be used for making turnouts and detailing brass locomotives. Some people also prefer lead-free solders.

You can find solder in strips, bars, and wire rolls of varying diameters; only the latter is suitable for most model railroading jobs. For years I've been using a 1 pound spool of Kester 60:40 rosin core solder with a diameter of .022" ②. The small diameter makes it suitable for any job from soldering small electrical components to rail joiners and track feeders.

Because of the higher cost of solder containing silver (less than an ounce can cost as much as a full pound of 60:40 solder), I purchase silver solder as a small roll in a clear plastic dispenser ②.

① **The right tool for the job.** The Weller WLC100 soldering station can be adjusted over a range of 5 to 40 watts and has a built-in cleaning sponge holder. For the last few years Larry has used the brass turnings in a steel holder for cleaning tips. Pencil and flat screwdriver tips are available.

Flux is an important component of any solder job. It prevents the formation of metal oxides during heating and allows the solder to make a solid, electrically conductive joint.

There are two basic kinds of flux, acidic and non-acidic. Acid fluxes typically contain zinc chloride or other acidic compounds that can leave corrosive residues that are difficult to remove.

These residues can corrode solder joints long after the job is completed and lead to failure months or even years in the future. That's why they should never be used in any electrical work or model railroading in general.

The flux I recommend for model railroading is a non-corrosive rosin flux. Rosin flux is an extract of pine trees dissolved in a solvent such as alcohol. It's available in both liquid and paste formulations and leaves a non-corrosive residue that can be wiped away with alcohol.

I use a rosin paste flux ② from RadioShack. This may be hard to find; however, similar products are available from electrical suppliers and on Amazon.com.

Working with fluxes is pretty straightforward, but you have to get the heat and

MORE ON THE WEB

Registered users can watch a video on soldering decoder connections at ModelRailroader.com



② Choose the best materials. Larry's go-to solder is this 1 pound roll of .022" diameter tin/lead 60:40 rosin core solder. The roll of silver bearing solder in the plastic tube is for special projects. Although the RadioShack rosin flux may be hard to find, similar products are available. The small container holds a mixture of rosin and solder powder for cleaning and tinning the tip in one step.

solder applied before you burn off all the flux. That's why it's important to use a soldering iron big enough to heat the work quickly and evenly without overheating the flux.

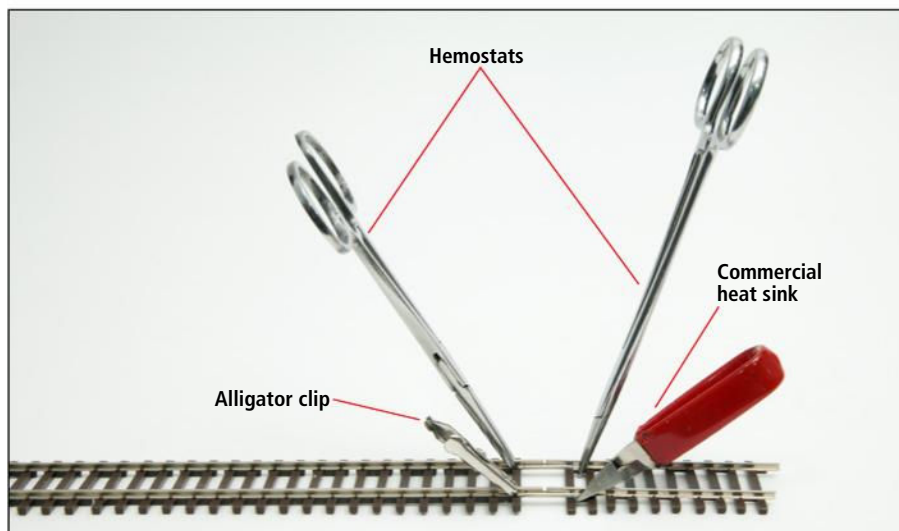
If you burn off the flux, then the metal is likely to oxidize before the solder joint is complete and the joint will be weak and prone to failure. This is one reason many people prefer rosin core solder, with the flux making up 1 to 3 percent of the wire. I also apply a small amount of paste solder on large joints as well.

In order to get a good solder joint, it's important to keep the soldering iron tip clean and tinned. The really important thing to remember is never use sandpaper or any other abrasive to clean the tip.

Soldering iron tips have a copper core covered with iron. If you sand off the iron coating, the tip will be ruined. Weller makes a cleaning bar specifically for cleaning really dirty tips, but if you use the right solder, flux, and regular cleaning, you should never need one.

For years my common cleaning practice was to keep a moist sponge next to the soldering iron and wipe off any excess solder or residue on the sponge between uses. The WLC100 comes with a built-in sponge holder **①**. Keep the sponge moist, not sopping wet, and the tip will come clean with a quick swipe.

More recently, however, I've been using a tip cleaner made of brass turnings in a metal holder **①**. A quick poke of the tip into the brass turnings will



③ Follow the proper procedures. Heat sinks clip onto metal objects being soldered and prevent excess heat from melting or burning ties or damaging sensitive electrical components. Hemostats work well, but alligator clips or commercial heat sinks are smaller and are less likely to get in the way.

remove any excess solder and residues, and you don't have to worry about keeping a sponge moist.

Tinning is the process of applying a small amount of solder to the soldering iron tip. This makes it easier to apply heat quickly to the components being joined. It's a good idea to always tin the tip before turning the soldering iron off. The solder protects the tip from oxidation and will prolong its useful life.

Weller and a number of other companies sell a tip cleaner/tinning paste comprising mainly flux with solder powder in it **②**. By plunging your hot soldering iron tip into the paste, the tip is cleaned and tinned.

Avoiding damage to surrounding materials is another concern when soldering near plastic ties or anything else that can be burned, melted, or distorted. While it's important to quickly apply a lot of heat to a joint, metal components will also conduct that heat to other areas, which can result in damage.


To avoid this problem I always use heat sinks to isolate the area to be soldered. A heat sink can be something as simple as a piece of moist cotton cloth laid over the rails. Excess heat will be consumed by evaporating the water in the cloth, preventing damage elsewhere.

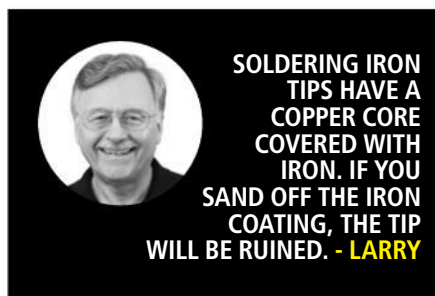
You can also use hemostats clamped on either side of the joint. A couple of small alligator clips or commercial heat sinks will likewise effectively intercept excess heat and are less likely to get in the way while soldering **③**.

For most solder joints, I apply a small amount of paste flux using a small brush and quickly heat the joint with the correct iron tip. I regularly test the joint by touching the end of a piece of solder wire to it.

As soon as the solder melts and starts to flow, I quickly apply as much solder as I feel necessary, then keep the work perfectly still while the solder cools. If you move the work before the solder solidifies, you may get a weak joint.

One sign of a good joint is a shiny surface appearance. A dull appearance indicates a weak joint, but that can be corrected by quickly reheating the solder and holding it perfectly still. A quick scrub with alcohol on a stiff brush afterward will remove any rosin flux residue.

For more on soldering, visit my website at www.dccguy.com or pick up a copy of my book *Wiring Your Model Railroad*, available from Kalmbach Books. 





Athearn HO scale class Z-8 Challenger

A Northern Pacific RR class Z-8 Challenger is available for the first time in HO scale as a ready-to-run plastic model. Produced by Athearn Trains as part of its Genesis series, the model is accurately detailed to match NP and Spokane, Portland & Seattle Ry. prototypes. For Digital Command Control users the 4-6-6-4 comes to life, thanks to a factory-installed sound system.

Our first-run sample features a SoundTraxx Tsunami DCC decoder. According to Athearn, future production runs will be equipped with ESU LokSound Select decoders. Direct-current (non-sound) versions will have 21-pin decoder sockets.

The prototype. American Locomotive Co. (Alco) delivered the first 21 4-6-6-4s to the Northern Pacific in 1936. These were rostered as class Z-6. As with those built for other railroads, the NP Challengers were simple-expansion rather than compound articulated locomotives. With two sets of high-pressure cylinders, the 4-6-6-4s could reach passenger train speeds rather than the lumbering pace of slower, compound "Mallet" articulateds.

In 1941 Alco delivered six more Challengers to NP. Heavier and more powerful than the Z-6s, these were dubbed class Z-7. To deal with the increased traffic caused by World War II, the NP purchased 20 more Challengers dubbed class Z-8 in 1943 and 1944. These were virtually identical to the class Z-7

Challengers. With an engine and tender weight of one million pounds and nearly 107,000 pounds of tractive effort, these class Z-8 Challengers were the most powerful 4-6-6-4s ever built.

Two additional wartime Challengers, added to the NP's 1944 order, went to the Spokane, Portland & Seattle Ry., a jointly owned subsidiary of the NP and Great Northern Ry. These locomotives were identical to the NP class Z-8s, except that they burned oil instead of coal. (Two NP Z-8s, nos. 5140 and 5148, were also converted to oil in the 1950s after they were assigned to the SP&S.)

The class Z-8 Challengers sped through freight, troop trains, and passenger varnish over main lines with undulating saw-tooth profiles. The wartime locomotives primarily served in the Idaho, Rocky Mountain, and Yellowstone divisions.

All the NP and SP&S Challengers were retired by 1957. None are preserved.

The model. The major dimensions of the Athearn model match prototype builder's diagrams. The space between the HO locomotive and tender is about a scale foot wider than on the prototype to help the model negotiate tight curves.

The plastic locomotive features well-defined molded detail, including boiler bands, rivets, and tread texture atop the running boards. Separately applied plastic parts include piping, throttle linkage, whistle, and bell. The handrails along the boiler are made of wire.

The front end of the model captures the look of the prototype, with dual air pumps, a low-mounted headlight, and a solid pilot with a non-operating scale-size drop coupler.

The all-weather cab includes an accurately detailed boiler backhead, crew seats, and glazing in all the windows.

The valve gear and siderods are modeled with blackened metal parts. I appreciated that the eccentric cranks are oriented correctly. Each eccentric tilts forward when its associated main crankpin is at the 6 o'clock position.

The tender is also an accurate model of its NP prototype. Its separate detail



The tender features an operating light-emitting diode backup light and non-operating marker lights.



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Conducted by Dana Kawala

Facts & features

Price: \$629.98 (DCC sound), \$529.98 (DC no sound)

Manufacturer

Athearn Trains
1600 Forbes Way, Suite 120
Long Beach, CA 90810
www.athearn.com

Era: 1943 to 1957

Road names (multiple road numbers available): Northern Pacific; Spokane, Portland & Seattle (with oil tender)

Features

- Electrical pickup on 10 locomotive drivers and forward eight wheels of tender pedestal truck
- Five-pole skew-wound motor with dual brass flywheels
- McHenry operating knuckle coupler on rear of tender (at correct height)
- Metal wheels in gauge
- Minimum radius: 18" (22" or greater recommended)
- SoundTraxx Tsunami decoder (DCC version, 1st run); ESU LokSound decoder (DCC version, 2nd run)
- Traction tires
- Weight: 2 pounds, 2.2 ounces (locomotive and tender); 1 pound, 9.1 ounces (locomotive only)

parts include piping, handrails, and non-working marker lights with red lenses.

All the lettering on the locomotive and tender is correctly placed. The fonts also match those of the prototype.

Mechanism. On a prototype Challenger, the front engine pivots while the rear engine is fixed. On the model, both engines pivot to allow it to negotiate tight-radius curves. The Athearn Challenger will round an 18" curve, but looks much better on broader curves.

The dual-flywheel can motor sits in the middle of a die-cast metal chassis. Worm shafts connect the motor to the second axle on the first engine and the third axle of the rear engine. The metal siderods transfer power to the other driver axles.

The drivers on the third axle of the rear engine have traction tires. The other drivers and eight wheels on the tender's pedestal truck pick up track power.

The Challenger didn't have any power loss issues, even when running through yard ladders or crossovers, when I tested it on our staff layout, the Milwaukee, Racine & Troy. On our hill climb test, the Challenger hauled an impressive 33 HO freight cars up a 3 percent grade.

The SoundTraxx Tsunami decoder and two round speakers are housed in the tender. A wiring harness runs from the locomotive to an 8-pin socket on the front of the tender. The locomotive drawbar easily connects to the tender by simply snapping in place.

Operation. During DCC testing the locomotive featured the smooth

performance and realistic sounds that are a hallmark of SoundTraxx Tsunami decoders. During testing the model accelerated smoothly from 4 scale mph to a prototypical top speed of 72 scale mph. Setting the decoder to 128 speed steps lowered the starting speed to 2 scale mph.

A printed quick start DCC guide with all the default configuration variable settings is included with the model. More extensive programming guides are available as free downloads on the Athearn website and at www.soundtraxx.com.

I easily changed the locomotive's address, adjusted the volume levels of individual effects, and added acceleration and deceleration momentum. I also set up the train brake, which let me use a function button to stop the train independently of the throttle setting.

The decoder's Digital Dynamic Exhaust varies the intensity of the exhaust sounds according to the motor load and throttle setting. For example, the chuffs get noticeably louder and deeper when the locomotive starts out with a train.

At most speeds the exhaust sounded the correct four chuffs per wheel revolution with the two engines occasionally going out of sync, which realistically simulates one engine slipping more than the other. There isn't a mechanical cam, but the audio synchronization can be fine-tuned using CV116. The randomness of the engines going out of sync can also be adjusted.

Unlike earlier Athearn releases that used incandescent bulbs, the Challenger features light-emitting diodes (LEDs) for the number boxes, backup light, and dimmable headlight. Out of the box, the headlight and backup light operate according to the locomotive's direction of travel, but both can be programmed for manual independent control.

Although the decoder is dual-mode, I can't recommend the Tsunami-equipped Challenger for DC operation. The model didn't start moving smoothly until I applied 9.5 volts to the rails. At that point it was already traveling at 27 scale mph. By 12 volts it was at its

PERFORMANCE TESTS

DRAWBAR PULL 4 ounces
56 HO scale freight cars

SCALE SPEED (DC)

VOLTS	SCALE MPH
9.5 (start)	27
10	45
11	51
12	73

SCALE SPEED (DCC)

SPEED STEP	SCALE MPH
1	4
7	24
14	45
28	72

top speed of 73 scale mph. I tried to lower the starting speed by using a DCC system to lower the analog starting voltage (CV63), but this had no effect. A DC (no sound) version is also available.

Whichever version you choose, the Athearn Genesis class Z-8 Challenger has a detail level comparable to a brass model and a smooth mechanism with powerful pulling capabilities. It's a must-have locomotive for fans of big NP steam. — Dana Kawala, senior editor

MORE ON THE WEB

Subscribers can watch a video of the Tsunami-equipped NP class Z-8 Challenger 4-6-6-4 in action at ModelRailroader.com



Bachmann Sound Value HO scale PCC trolley

President's Conference Committee

(PCC) streetcars were an attempt to build the first standardized streetcar. The cars, built just before and after World War II, got new life in the 1970s and '80s when they were rebuilt for continued service with modern propulsion systems.

So it is with Bachmann's PCC model. First introduced in the 1980s, the model is back with a new drivetrain that sets the body at the correct ride height, plus a Digital Command Control (DCC) SoundTraxx Sound Value decoder that also operates on direct current (DC).

The President's Conference Committee was a group of traction company presidents that wanted to find ways to save money as the demand for streetcar service waned in the 1920s and '30s. Streetcars were essentially custom built for each company to meet local conditions, driving up costs.

There was little hope that a standard design could be developed. But the committee eventually created a standard set of parts that could be used to build streetcars for most any situation, and at a savings compared to the custom-built cars that preceded them.

Differences in PCC cars involve the side window arrangement – prewar cars had tall, wide windows, while postwar cars had shorter, narrower windows with small “standee” windows above them. The rear windows also had different shapes. Windshields were angled back at 12 degrees in the original specification, but motormen complained of glare from interior lights, so the postwar design offered a 30-degree slope.

Two builders, Pullman-Standard and the St. Louis Car Co., produced PCC cars. Production began in 1936, with the Brooklyn & Queens Transit Co. receiving the first car. The final cars were sold

to the San Francisco Municipal Ry. in 1952. Many of the cars are still in service after extensive overhauls.

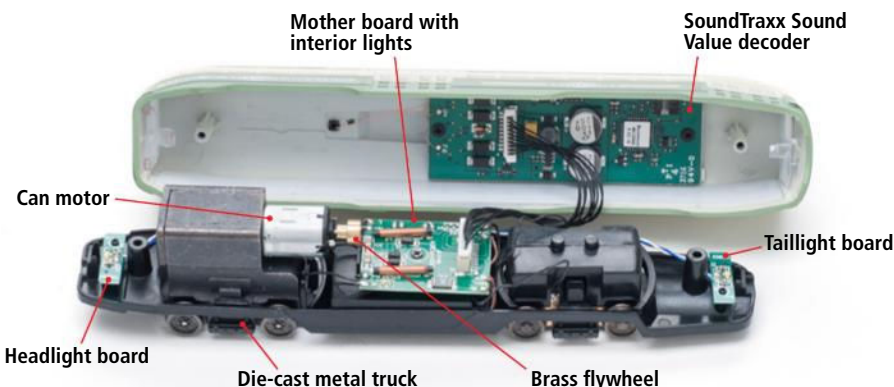
Bachmann's model is of a postwar car built for the Philadelphia Transit Co. (PTC) in 1948. The car is a standard 46 feet long with two sets of doors on the curb side and the later 30-degree slope on the windshield. The model has the correct tall rear windows of the last order for new PCC cars delivered to PTC.

Although this model's body shell tooling has been around for a while, the guts of the trolley are all new. Bachmann has rectified the high-water look of its original model, resulting in a model that sits within scale inches of the correct 10'-2 $\frac{7}{8}$ " height above the rail head.

The model's overall length is slightly short; cars with 30-degree windshields were 46'-5 $\frac{3}{8}$ " long to accommodate the windshield slope, but the model scales to 46 feet long. All other dimensions match drawings in *PCC Cars of the United States; A Book of Plans-Variations of an American Classic* by Joseph S. Zen-Ruffinen (East Penn Traction Club, 2009).

Removing the chassis is a simple process; two screws on the bottom hold it to the shell. A plastic frame carries three circuit boards and a downward-facing speaker mounted between the trucks.

The front truck is plastic and has brass wipers to collect current from the blackened, turned-metal wheels. The rear truck is die-cast metal and carries a small can motor with an even smaller brass flywheel.



Everything under the shell of Bachmann's PCC streetcar is new, including a die-cast metal power truck, SoundTraxx Sound Value DCC decoder, and interior lighting.

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Facts & features

Price: \$225

Manufacturer

Bachmann Industries Inc.
1400 E. Erie Ave.
Philadelphia, PA 19124
www.bachmanntrains.com

Era: 1945 to 2001, as decorated

Paint schemes: San Diego, Allegheny
Transit, Chicago, NJ Transit, Pacific
Electric, Philadelphia Transit Co.

Features

- Can motor with brass flywheel
- Die-cast power truck
- Enhanced details on wheels and truck brakes
- Illuminated interior
- Metal wheels, in gauge
- New chassis with lower ride height
- Operating headlight
- Simulated sparking on trolley pole
- SoundTraxx Sound Value decoder
- Weight: 4.3 ounces

PERFORMANCE TESTS

DRAWBAR PULL not applicable

SCALE SPEED (DC)

VOLTS	SCALE MPH
6 (start)	3.5
8	39
10	57
12	71

SCALE SPEED (DCC)

SPEED STEP	SCALE MPH
1	4.6
7	26
14	50
28	63

The SoundTraxx Sound Value decoder is mounted in the roof of the body shell, connected to a printed-circuit (PC) board on the frame with a 10-pin connector. The PC board in the middle of the frame has surface-mount light-emitting diodes (LEDs) for interior light. Small PC boards at the ends of the frame have surface-mount LEDs for headlights and taillights.

Another micro LED is concealed in the end of the trolley pole to simulate sparks between the pole and overhead trolley wire. The trolley pole isn't designed to collect current, doesn't swivel, and can't be lowered.

The body shell is a one-piece casting. The windows are fitted with translucent plastic sheets that feature silhouettes of passengers and a motorman in the style of Lionel O gauge passenger cars. The thickness of the body shell is apparent because the translucent plastic is fitted to the inside of the shell.

Our sample depicts the San Diego Metropolitan Transit System's restored PCC car no. 529. The paint is evenly applied, with sharp separations between colors. The paint scheme has been modified slightly to accommodate the differences between the model's Philadelphia prototype and San Diego's refurbished PCC car, which operates with a pantograph, among other differences.

I started testing in DC. The lights and sound came on steadily at 5V, and the car started moving at 6V at 3.5 scale mph. Top speed in DC was 71 scale mph, much faster than any streetcar was likely to go. In DC, the motor-generator sounds began at startup, and the bell rang twice before the car moved forward and three times before it moved in reverse. As per the prototype, there is no horn or whistle. The LED on the trolley pole illuminated randomly and was accompanied by a sparking sound.

In DCC, the trolley started moving in speed step 1 at 4.6 scale mph. The

instruction sheet didn't include information about the trolley's functions, so I looked on the Bachmann website and found a short video where I learned how to use the function buttons.

MORE ON THE WEB

Subscribers can watch a video of the sound-equipped Bachmann PCC streetcar in action at ModelRailroader.com

Function 1 rings the bell. Function 2 is the stop-request bell. Function 3 simulates the sound of the doors opening and closing. Function 4 triggers the sound of the trolley pole being raised and the random spark generator and sounds. Function 5 starts the motor-generator sounds, and Function 8 is the mute.

To see how well the PCC car could negotiate curves, I pinned some flextrack to extruded-foam insulation board and found it could make a 10"-radius curve.

Bachmann has greatly improved one of its early traction models with its new drivetrain. The SoundTraxx Sound Value decoder adds pleasing features to the mix. This is a fun model that could add a spark to an HO scale traction layout. —
Eric White, associate editor



Accurail HO scale 36-foot double-sheathed boxcar kit

As the 40-foot steel boxcar was in the steam-to-diesel transition era, the 36-foot double-sheathed boxcar was the workhorse freight car from the 1910s to the 1930s. Accurail's new HO scale kit is an easy-to-build model of this common boxcar and includes a newly detailed fish-belly underframe. Different end and center sill combinations are also listed on the Accurail website.

By the 1910s, American freight car builders began using cast-steel underframes instead of the wood underframes with metal truss rods used on earlier cars. Most of the cars at this time still had wooden bodies. On single-sheathed cars, the wood or steel frame was visible over the layer of wood. On double-sheathed cars, the framework is sandwiched between interior and exterior layers of wood. Many of the wood-sheathed cars received steel ends and roofs during their careers.

The model. The Accurail model is based on boxcar designs of the early 1910s. The model matches the major dimensions of its prototype given in an official New York Central freight car diagram book as well as in the 1916 *Car Builder's Dictionary* (Simmons-Boardman).

Our review sample came painted and decorated for NYC no. 257783, built in 1912 and rebuilt in 1922. According to the *Official Railway Equipment Register*, the car remained on the NYC roster through

1949. I couldn't find a prototype photo of this car number, but the model's lettering matches that found in photos of other NYC 36-foot boxcars in the 1920s.

The one-piece plastic carbody features well-defined molded detail, including the seams on the steel roof and the corrugations on the steel ends. Separate plastic parts include a see-through brake platform and a running board with simulated wood grain.

The car correctly models KC brake gear, including the combined reservoir and brake cylinder. On later AB brakes, these parts were separate. KC brakes were outlawed in the 1950s.

The kit. Assembly is straightforward but more involved than other Accurail boxcars. It's important to follow the sequence outlined in the included

instruction sheet. A free PDF download on the Accurail website features more tips and step-by-step photos.

The center sill assembly must be completed before attaching the sills to the underframe. For example, the brake rods and levers are a separate assembly, and must be threaded through the two fish-belly center sills. The separate crossbearers and brake cylinder/reservoir fit into slots on the center sills.

I used nippers to cut the wire brake staff to fit, attached it to the plastic brake wheel with cyanoacrylate adhesive (CA), and then painted the hand-brake

Facts & features

Price: \$17.98

Manufacturer

Accurail Inc.

P.O. Box 278

Elburn, IL 60119

www.accurail.com

Era: 1910s to early 1950s

Road names: New York Central; Boston & Albany; Canadian Pacific; Cleveland, Cincinnati, Chicago & St. Louis (New York Central Lines); Louisville & Nashville; Michigan Central (NYC); Missouri-Kansas-Texas; Missouri Pacific; Nickel Plate Road; and Savannah & Atlanta. Data only and undecorated versions also available.

assembly with Model Master Boxcar Red. Once this dried I threaded the brake staff through the hole in the brake platform and secured it with CA.

Although the ladders and other handgrabs are molded into the body, the stirrup steps at the corners of the frame are separately applied parts made of flexible plastic to resist breaking. These parts fit in slots between the frame and carbody.

I attached the included steel weight (not shown in the photo) to the interior car floor with Walther's Goo. The finished car weighs 3.1 ounces, which is .46 ounce too light, according to National Model Railroad Association (NMRA) Recommended Practice 20.1.

Trucks and couplers. The plastic truck sideframes accurately model Andrews-style cast-steel trucks that were produced from the 1910s through the 1930s. The plastic wheels are scale 33" diameter, which is correct for the prototype. All wheels were correctly gauged.

The included Kadee-compatible Accumate couplers consist of two plastic pieces that form the coupler knuckle and shank when put together. A plastic coupler centering spring is integrated into these castings. On the finished model, both couplers rode at the proper height per NMRA S-2.

I also test-fit a pair of Kadee no. 158 metal whisker couplers (not included) into the draft gear boxes. These couplers also rode at the proper height.

This kit is a rewarding one-evening project. The 36-foot boxcar is sure to fill a hole in many HO scale steam-era fleets. — Dana Kawala, senior editor



QUICKLOOK

Micro-Trains N scale 70-foot TTX Husky-Stack car

Price: \$27.90

Manufacturer

Micro-Trains Line Co.
351 Rogue River Pkwy.
Talent, OR 97540
www.micro-trains.com

Era: 1991 to present (2008 to present as decorated)

Comments: Micro-Trains Line's new N scale 70-foot Husky Stack features a one-piece die-cast metal body, see-through walkways, and separately applied plastic ladders and brake gear.

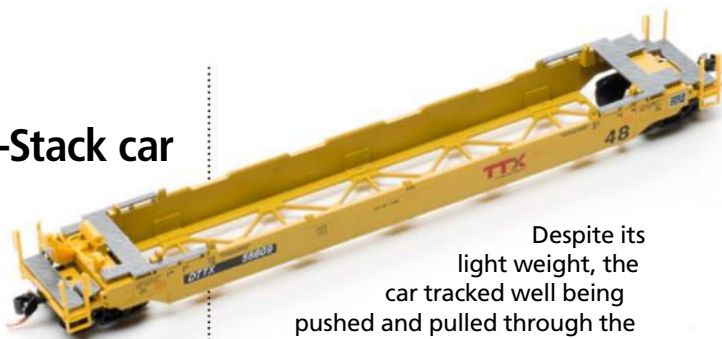
Originally named the Well Runner by its developer, TTX Co., the 70-foot stand-alone well car – better known as the Husky-Stack – is a common sight on modern-day railroads. Built by Thrall and Gunderson to TTX specs, they were designed to carry 48-foot intermodal containers on jobs for which there weren't enough containers going to

the same place to warrant a three- or five-unit drawbar-connected well car.

Our review sample was smoothly and evenly painted TTX Yellow and lettered with the modern TTX logo, indicating a car repainted after 2008. All the printing on the car was crisp, clear, and legible under extreme magnification.

All the dimensions I checked on the model matched those on a diagram published in the July 1992 *Railroad Model Craftsman*. Markings and detail placement matched prototype photos of other cars built in the same batch.

The car weighed 0.7 ounce, just over half the National Model Railroad Association's RP-20.1 recommendation of 1.3 ounces for a car of this length. Adding a container or two would help.



Despite its light weight, the car tracked well being pushed and pulled through the 10" radius curves and no. 6 turnouts and crossovers of our N scale Salt Lake Route project layout. The plastic wheelsets were in gauge and the Magne-Matic couplers were body-mounted at the correct height.

The car is made to carry 48-foot containers. Though the prototype can accommodate 20-, 40-, and 53-foot containers, as well as 28- and 53-foot trailers, the model's well is made to hold only a 48-foot container. A 40-footer or two 20-footers will fit, but they'll slide around.

Micro-Trains Line's new Husky-Stack well car will do a fine job toting intermodal traffic around your modern-day layout. – *Steven Otte, associate editor*

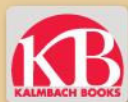
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QUICKLOOK

Menards HO scale Red Owl grocery store

Price: \$69.99 plus shipping (free shipping to local Menards store)

Manufacturer

Menards
5106 Menard Dr.
Eau Claire, WI 54703
www.menards.com

Era: 1955 to 1988

Comments: Home-improvement chain Menards entered the HO scale structure market in 2016 and has rapidly grown its line of factory-assembled models to a dozen in just one year. The company's latest release is a Red Owl store.

Red Owl was a Midwestern chain of grocery stores that operated from 1922 to 1988. At its peak there were more than 400 stores in Iowa, Michigan, Minnesota, the Dakotas, and Wisconsin.

The Menards Red Owl was inspired by a store that once operated at the corner of South Hastings Way and

Fenwick Avenue in Eau Claire, Wis. The store opened in December 1955.

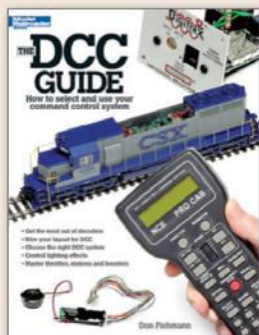
The HO scale Red Owl measures 4 $\frac{3}{4}$ " x 9 $\frac{5}{8}$ " x 3 $\frac{3}{8}$ ". The laser-cut tempered-hardboard building has a printed interior with three figures pushing shopping carts and a checkout counter with the Red Owl logo. Outside, there are three more figures, a coin-operated children's horse ride, a trash can, and Jack the German shepherd.

The back of the building has two truck docks with weather bellows and a door to the office. The sides feature period advertisements and wall-mount light-emitting diodes (LEDs).

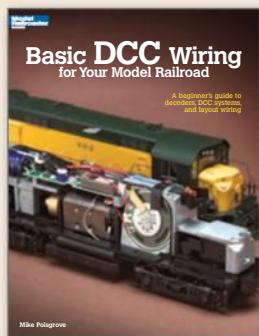
The building has more than 25 LEDs, so it really stands out when illuminated. In addition, there are three motorized

vents on the roof and a Red Owl sign that can be constantly illuminated or flash in blinking patterns. A separate 4.5V power source is required to operate the lights and vents. There are two jacks, one on the right side of the building and another concealed inside. The control switch for the sign is next to the jack on the right side of the building.

If you're in the market for a ready-to-install grocery store for your HO scale model railroad, you'll want to check out the Red Owl store from Menards. — *Cody Grivno, associate editor*



#12417 • \$19.95



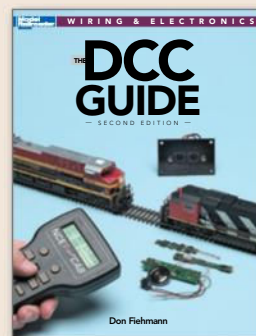
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Dispatching with track warrants

Recently, we put some fundamental dispatching principles to work on an imaginary West Feliciana RR layout, a single-track line with only one train a day. [See the May 2017 On Operation. – Ed.] What happens when the WFRR adds a second train? Plowing both trains into each other head-on may be what we enjoyed as 12-year-olds, but it's not the outcome we want as adult modelers.

Give the railroad a Woodville Job running the line's length and a Mill Job serving a paper mill at Laurel Hill (HILL on the timetable at right). Both the Woodville and Mill jobs originate at St. Francisville (FRAN), the Woodville crew on duty at 0800 (8 a.m. in 24-hour time) and the Mill crew at 1200. Dispatching the line with contemporary track warrant procedures based on the General Code of Operating Rules (GCOR) brings safe and prototypical operation.

Track warrants, like train orders and Form D's, are numbered in sequential order. Typical of regionals and short lines today, the dispatcher (DS) works from a distant office and communicates with crews by radio. He's likely to have responsibility for several roads, so we'll assign a 500 prefix to track warrants for the West Feliciana.

Today's motive power for the Woodville job is engine 8147. Its radio blares and the conductor readies a blank track warrant form. The dispatcher dictates track warrant 500-001, addressed to

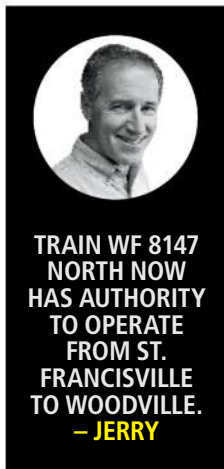
WF 8147 North: "X BOX 2 PROCEED FROM FRAN TO WOOD ON MAIN TRACK. ONE BOX MARKED, BOX 2." After the conductor repeats the warrant by reading back identical words, the dispatcher makes 0805 the time OK. The conductor repeats the time and DS makes the warrant effective with the words, "That is correct."

Train WF 8147 North now has track warrant authority to operate from St. Francisville to Woodville. No other trains may use the main track between these limits until the train clears them. The Woodville job departs St. Francisville at 0930.

The Mill Job needs its own track warrant to proceed. However, 500-001 has given WF 8147 North exclusive right to the main track between St. Francisville and Woodville. The dispatcher can't overlap authority, allowing two trains to occupy the same track.

A choice he has is waiting until WF 8147 North arrives at Woodville and its entire train is north of mile post 26.6. Crews must report when clear of their limits. The conductor would radio that WF 8147 North cleared Woodville, fulfilling 500-001.

Another would have had DS include box 17 on 500-001 when he issued it: "X BOX 17 REPORT CLEAR AT HILL." We'll assume he did so. The Woodville Job's conductor thumbs the mic key and radios, "WF 8147 North clear at Hill." DS acknowledges and records the time, 1139.



TRACK WARRANT			
NO: 500-001		AUGUST 6, 2017	
TO: WF 8147 NORTH			
1.	<input type="checkbox"/>	TRACK WARRANT NO. _____	IS VOID.
2.	<input checked="" type="checkbox"/>	PROCEED FROM <u>FRAN</u> TO <u>WOOD</u> ON <u>MAIN</u>	TRACK.
3.	<input type="checkbox"/>	PROCEED FROM _____ TO _____ ON _____	TRACK.
4.	<input type="checkbox"/>	WORK BETWEEN _____ AND _____ ON _____	TRACK.
5.	<input type="checkbox"/>	NOT IN EFFECT UNTIL _____	
6.	<input type="checkbox"/>	THIS AUTHORITY EXPIRES AT _____	
7.	<input type="checkbox"/>	NOT IN EFFECT UNTIL AFTER ARRIVAL OF _____ AT _____	
8.	<input type="checkbox"/>	HOLD MAIN TRACK AT LAST NAMED POINT.	
9.	<input type="checkbox"/>	DO NOT FOUL LIMITS AHEAD OF _____	
10.	<input type="checkbox"/>	CLEAR MAIN TRACK AT LAST NAMED POINT.	
11.	<input type="checkbox"/>	BETWEEN _____ AND _____ MAKE ALL MOVEMENTS AT RESTRICTED SPEED. LIMITS OCCUPIED BY TRAIN.	
12.	<input type="checkbox"/>	BETWEEN _____ AND _____ MAKE ALL MOVEMENTS AT RESTRICTED SPEED. LIMITS OCCUPIED BY MEN OR EQUIPMENT.	
13.	<input type="checkbox"/>	DO NOT EXCEED _____ MPH BETWEEN _____ AND _____	
14.	<input type="checkbox"/>	DO NOT EXCEED _____ MPH BETWEEN _____ AND _____	
15.	<input type="checkbox"/>	FLAG PROTECTION NOT REQUIRED AGAINST FOLLOWING TRAINS ON THE SAME TRACK.	
16.	<input type="checkbox"/>	TRACK BULLETINS IN EFFECT _____	
17.	<input checked="" type="checkbox"/>	OTHER SPECIFIC INSTRUCTIONS: <u>REPORT CLEAR AT HILL</u>	
OK 0805 (TIME)		DISPATCHER <u>HJK</u>	
LIMITS REPORTED CLEAR AT _____			
(Mark the box for each item instructed.)			

The Woodville job needs this track warrant to begin its run. Note that box 2 and box 17 are marked.

Now, DS is clear to issue 500-002 to WF 7822 North: "X BOX 2 PROCEED FROM FRAN TO HILL ON MAIN TRACK. ONE BOX MARKED, BOX 2." The conductor's repeat produces an OK at 1215, and the Mill Job is clear to depart immediately.

All these times occur very precisely. The dispatcher must know that WF 8147 North has cleared Laurel Hill before he dictates and OK's warrant 500-002.

Soon, the Woodville Job radios the dispatcher for authority to return to St. Francisville. Train WF 7822 North has right between Fran and Hill, so DS limits the Woodville job with warrant 500-003, addressing WF 8147 South: "X BOX 2 PROCEED FROM WAKE TO HILL. X BOX 8 HOLD MAIN TRACK AT LAST NAMED POINT. TWO BOXES MARKED, BOX 2 BOX 8," OK'd at 1329.

This limitation is crucial. Neither WF 7822 North nor

WEST FELICIANA RR		
N ▲		▼ S
MILEPOST	STATION	
28.0	END OF TRACK	YARD LIMITS
26.6	WOOD	
22.6	ASH	
15.0	HILL	TWC
10.9	WAKE	
1.5	FRAN	
0.0	CN JCT.	YARD LIMITS
ADDITIONAL TRACKS: 14.9 MILL SPUR		

WF 8147 South may proceed past Laurel Hill. By rule, WF 7822 North is required to clear the main track when it reaches the end of its warrant authority at Laurel Hill. So DS has created a series of moves for the two trains that protect them from colliding with one another. He'll use the same logic to issue additional track warrants for both jobs to complete their runs and return to St. Francisville.

While GCOR gives other ways to arrange and authorize these movements, those just described are common and easy to apply on any single track, unsignaled layout. Try implementing track warrants on yours. **MR**





The sun is setting on Magoun Pier, but the work to load and unload the freight cars and cargo boats must go on. Greg Shinnie of Baden, Ont., built the HO scale module and photographed it under natural light. The large terminal building is kitbashed from three Wm. K. Walthers kits. Greg also wired it for lighting and installed a Fantasonics Dream Player to provide ambient sounds for the module.

A Deutsche Bundesbahn class V60

switcher moves in to pull the passenger cars and attach them to a train waiting at the station. Thorsten Ströver of Detmold, Germany, photographed the action on his O scale (1:45) Leopoldstal model railroad. The engine is from Lenz, as are the cars. Thorsten weathered them with PanPastels.



Puffer Bridge Lines no. 716, an Electro-Motive Division GP35, stops at Jeffries Point Stave & Heading so the engineer can ask the dock worker where he wants the car spotted. The action takes place on the HO scale layout belonging to Seth Puffer of Monticello, Minn. The factory is built from a Fine Scale Miniatures kit. Seth custom-painted and detailed the Kato Geep. He also took the photo.



Union Pacific FEF-3 (4-8-4) number 838 splits the signals as it crosses Terror Creek's deck girder bridge. Paul Brenneke of Golden, Colo., photographed the action on his N scale Grand Road layout. The engine is a Kato model owned and modified by Paul's friend Dean Dickerhoof.

Send us your photos

Trackside Photos is a showcase for the work of *Model Railroader* readers. Send your photos (digital images 5 megapixels or larger) to: *Model Railroader*, Trackside Photos, P.O. Box 1612, Waukesha, WI 53187-1612; or upload them to <http://fileupload.kalmbach.com/Submission/contribute>. For a copy of our photo submission guidelines, contact associate editor Steven Otte at sotte@mrmmag.com.

MORE ON THE WEB

Greg Shinnie's photo on page 66 is this month's free computer wallpaper. Download it from ModelRailroader.com



video
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This should be a
great series!

Thanks!

— DEAN PURCELL



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CLOSING DATES: Jan 2017 closes Oct. 21, Feb. closes Nov. 14, March closes Dec. 21, April closes Jan. 24, May closes Feb. 21, June closes Mar. 21, July closes Apr. 24, Aug. closes May 19, Sept. closes June 19, Oct. closes July 24, Nov. closes Aug. 21, Dec. closes Sept. 26.

Note to Readers:

Schedule of Events

AR, JACKSONVILLE: Train Show, Jacksonville Community Center, Municipal Drive, August 26-27, 10:00am - 4:00pm. Vendors, Clinics, Contests. Admission \$7.00, 12 and under free w/adult. Contact Rail & Sprue Hobbies, 1200 John Harden Drive, Jacksonville, AR, 72076. 501-982-6836, or railandsprue@aol.com

AZ, PRESCOTT AREA: Beat the Heat Model Trains Swap Meet. Liberty Traditional School, 3300 N. Lake Valley Rd., Prescott Valley, Saturday, August 12, 2017, 9:00am-1:00pm. Adults \$5.00, children 12 and under free. Presented by: The Central Arizona Model Railroad Club. Contact: Dick Gage, 802-272-1352

CA, SAN CARLOS: European Train Enthusiasts (<http://www.ete.org>) EUROWEST at Hiller Aviation Museum, San Carlos Airport, 601 Skyway Road, Zip: 94070, July 22-23, 2017, Saturday 10:00am-5:00pm and Sunday 10:00am-4:00pm. Layouts, clinics, vendors, raffle. Admission (<http://www.hiller.org>) includes Air Museum, free parking. Contact Jens Ullmann: eurowest@ete.org

CO, PUEBLO: Colorado Rail Fair, Pueblo Union Station, August 5-6, 2017, 9:00am-4:00pm. Admission: \$5.00, children free w/adult. Operating layouts, sales tables, railroad museum and more. Train rides conducted by NARCOA and the Pueblo Railway Foundation. Contact: John Denny, 719-547-7990, loncowboy@centurylink.net

FL, ORLANDO: NMRA 2017 Orlando National Convention. Rosen Plaza Hotel, 9700 International Drive, Zip: 32819, July 30 - August 5, 2017, 8:00am-11:00pm each day. Admission: See website, www.nmra2017orlando.org Contact: Gilbert Thomas, 8119 Woodvine Circle, Lakeland, FL 33810, 863-412-3090, E-mail: Thomas_12399@msn.com

FL, PINELLAS PARK: Regal Railways Presents a Toy Train, Collectible and Hobby Show/Sale, Lopez Hall, 7177 58th St. North, Saturday, August 26, 2017, 9:00am-2:00pm. Adults \$5.00. Vendors, videos & operating layout. Serving lunch items. Contact Joe: 727-244-1341 or visit www.regalrailways.com for more information.

GA, ATLANTA: 53rd ATLANTA MODEL TRAIN & RAILROADIANA SHOW. Infinite Energy Center, 6400 Sugarloaf Parkway, Duluth, GA 30097, Saturday, August 26, 2017, 9 AM to 4 PM. Adults: \$9.00 (Under 12 free). Operating layouts. Miller, 3106 N Rochester St., Arlington, VA 22213, 703-536-2954. E-mail: rrrshows@aol.com

IL, KANKAKEE: Kankakee Model Railroad Club Train Show. Gov. Small Memorial Park Civic Center, 803 South 8th Ave. Sunday, October 22, 2017, 9:30am-3:00pm. Admission: \$3.00, under 5 free, 8' tables \$15.00 and 6' tables \$12.00. Operating layout. Contact lrv at 815-465-2420 or daswoodwerkhaus@yahoo.com for more information.

KS, KANSAS CITY AREA: Turkey Creek Division Train Show Swap Meet. Shawnee Mission High School cafeteria 7201 Johnson Dr., Overland Park, KS, Saturday, July 29, 2017, 8:00am-3:00pm. Admission \$6.00, under 12 free. Layouts starts 3:30pm-8:30pm. Vendors and Registrants contact Larry Alfred, captalfred@gmail.com 913-782-6584. Go to: www.tc-nmra.org for forms.

MI, WYOMING (GRAND RAPIDS): Grand River Valley Railroad Club Fall Train Show. Saturday, October 14, 2017. Home School Building, 5625 Burlingame Avenue SW, 10:00am-3:00pm. Adults \$5.00, 12 and under free. 210 vendor and display tables. Food. Free parking. Door prizes. Vendor tables \$16.00 each. Contact Ken Skopp, 616-667-9680, kwsokopp@gmail.com. www.grandrivervalleyrrc.org.

NC, RALEIGH: 33rd Annual Neuse River Valley Model Railroad Club Model Train Show. November 4-5, 2017, 9:00am-5:00pm both days. Free Parking. Admission \$9.00, \$1.00 off coupon available at nrvcub.net Children 12 and under free. Vendors wanted. Contact George Lasley glasley@bellsouth.net

TX, TEMPLE: 35th Annual Temple Model Train Show. Frank Mayborn Convention Center, 3303 North 3rd St. September 16-17, 2017, Saturday 10:00am-5:00pm and Sunday 10:00am-4:00pm. Adults \$7.00, Children 12 and under Free. Discounts for Seniors, Active Duty Military and their dependents. Centra Mod, Inc., PO Box 1264, Temple, TX 76703

VA, VIRGINIA BEACH: Tidewater Division 28th Annual Train Show/Sale September 30 & October 1, 10:00AM-4:00PM Virginia Beach Convention Center, 1000 19th St. Zip: 23451. Admission \$9.00, under 12/ Scouts Free. 150+Tables, Layouts. Locomotives, Equipment, Supplies/Tools, Books, Memorabilia Train Doctors, Contact Bill Miller 757-409-3623, Ktsdad1934@cox.net Flyer: <http://nmra-mer-tidewater.org>

WA, CHEHALIS: Lewis County Model Railroad Club, Annual Fall Railroad Swap Meet and Show. Southwest Washington Fair Grounds, Blue Pavilion Building, 2555 N. National Ave., Zip: 98532. October 14-15, 2017, Saturday 10:00am-4:00pm and Sunday 10:00am-3:00pm. Admission \$5.00, Free parking. Contact information: Ted, 360-985-7788 or TedsTrains@LewisCounty.com

WI, LA CROSSE: Rail Fair, Copeland Park, Rose & Clinton Streets. July 22, 2017, 10:00am-4:00pm. Admission \$5.00, under 12 free. Railroad Show, Sale & Exhibition. Model Toy & Antique Trains & Memorabilia, Railroad Exhibits & Displays. Information: 4000 Foundation, PO Box 3411, La Crosse, WI 54602, 608-781-9383

WI, MILWAUKEE: Trainfest, at Wisconsin State Fair Park. 9am to 5pm Nov. 11&12. WISE Div. NMRA. Exhibitors include operating layouts, major manufacturers, modeling clinics, and hobby vendors. Admission information and tickets available at www.trainfest.com Contact us at info@trainfest.com

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Multiple deck design, or 'rinse and repeat'

My clinic on multi-deck

model railroad design, construction, and operation continues to be well attended at National Model Railroad Association and railroad prototype modelers meets. That means it's either a very popular topic, or pretty poorly understood, and probably both.

As the proud owner of a basement-size double-deck (and in a few places triple-deck) railroad – see the December 2014 MR – let me review some of the pluses and minuses of embarking on such a venture.

There is still no universal solvent. One size does not fit all. What's an ideal – or at least reasonable – solution to a given layout-design goal for me may not suit your needs, space, abilities, or objectives at all.

That said, model railroaders tend to be imperialistic. More is often deemed better. So let's address size first. Indeed, a multi-deck railroad provides at least twice as much railroad for the footprint. That's the good news. It's also the bad news.

At some point during the construction of a multi-deck railroad, it will become evident that you're actually building two model railroads, one atop the other. That translates to twice as much benchwork, subroadbed, roadbed, track, scenery materials, structures, wiring, lighting – you get the picture.

OK, maybe not structures; one reason to build a multi-deck railroad is to put more space between population centers. As Gerry Leone said in *Model Railroad Planning 2017*, "spaces between places" are important to achieve realism and a sense of going somewhere else.



A multi-deck model railroad is, in essence, two or more railroads built one atop the other. The gains are obvious, but there are challenges to overcome along the way. Tony Koester photo

And your roster requirements don't automatically double, either. Again, the objective is to obtain running room between places where trains can meet and pass. This may allow another train or two to occupy the main line at any given time, but it's not going to greatly escalate your equipment needs.

Multi-deck railroads are like watches that have stopped running: The watches are on time twice a day, and a multi-deck railroad is set at the absolutely perfect elevation for everyone at one specific location. The rest of the time, the watches are useless, and at other locations the railroad is too low or too high.

The late track-planning guru, John Armstrong, loathed wide aisles, thereby usurping space for the railroad. (He was also pencil-thin.) In other words, he compromised this to get that. At some point, he conceived the idea of adding another deck to double the prospects of a given room size, and *Model Railroader* editor Linn Westcott liked the idea.

Model Railroader's Jim Hediger then took the ball and ran with it, his HO Ohio Southern RR being the result. He was thus among the earliest pioneers who gained more railroad by "rinsing and repeating" – building the railroad once at one elevation, and then again at another. He compromised ideal layout height to get more railroad.

Like so many others who have followed, including me, he discovered that the advantages outweighed the shortcomings. And consider: Even if he had built the railroad at a single elevation he deemed ideal, other crew members who are shorter or taller than Jim might have preferred a different elevation.

No two ways about it: Building a multi-deck railroad will challenge your ingenuity. Lighting the lower one, for

example, is not a easy task, even with light-emitting diodes (LEDs). The upper deck must be supported with a thin but strong structure; every inch of thickness is less clearance between decks, or an inch added to the upper deck's height or taken from the lower deck's elevation.

Then again, it can't be that hard, as I did it with no prior experience. Inexpensive L-shaped metal brackets do a fine job of supporting ¾" plywood on 16" centers. Birch

plywood will support under-cabinet fluorescent or LEDs behind a hardboard fascia or valance.



As long as you keep in mind that building a multi-deck layout is in essence the same as building two layouts, and budget resources accordingly, I think you'll agree that the gains trump any potential losses. **MR**

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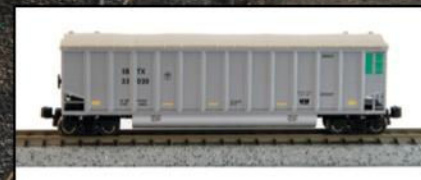
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