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BUILD A SIMPLE, STRONG LONG-SPAN BRIDGE p.46



▲ Kato CN Continental train set in N scale p.52

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New materials deliver fast, realistic results p.34

Modeling steam-era narrow gauge p.38

Brooks Stover used new techniques to make his mountain railroad. See page 34.

PLUS

Photo gallery salutes great layouts p.60

Host a virtual operating session p.58

Model a team track loading ramp p.30

**BONUS
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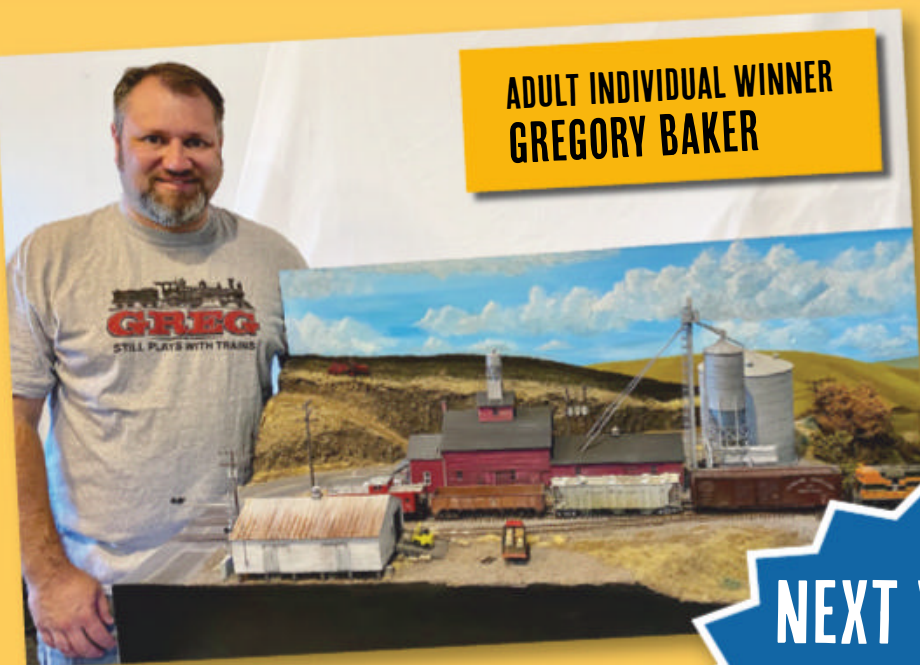
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and watch for more details soon!

Features



30 How to model a concrete team track ramp

Use expansion cement to create this HO scale lineside detail
by Thomas Klimoski



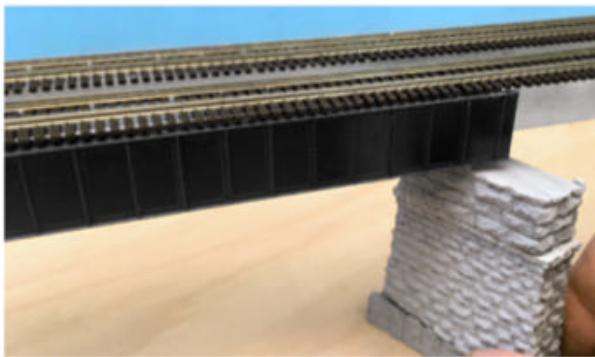
34 Better hardshell scenery

A faster and neater approach to this time-tested technique
by Brooks Stover



38 Narrow gauge through the U.P.

Switching scales led to more modeling opportunities on the On30 Laurium, Mohawk & Brockway
by Larry Burk



46 Build a long-span bridge

These simple construction techniques ensure stability
by Lance Mindheim

In every issue

6 On The Web

The latest features on our website

8 From the Editor

A reader favorite returns

10 News & Products

Hobby industry news

18 Ask MR

When were knuckle couplers instituted?



22 Rehab My Railroad **MREXTRA**

Merging old and new benchwork

28 N Scale Insight

Combining a century of experience

50 DCC Corner

LokSound for a Baldwin sharknose



52 Product Reviews **MREXTRA**

Kato N scale CN "Transcontinental" train set, ScaleTrains.com HO scale Thrall/Trinity coil steel car, and more

58 On Operation

Virtual operating sessions

60 Trackside Photos

Great Model Railroads 2021 preview

• Online bonus ModelRailroader.com

73 Index of Advertisers and Cartoon

74 Trains of Thought

How we see things

46

52

34

38

60

58

30

BUILD A SIMPLE, STRONG LONG-SPAN BRIDGE p.46



On the cover: Buffalo Creek & Gauley 2-8-0 no. 4 rolls through scenery Brooks Stover made using his new technique. Brooks Stover photo



Next issue

In December, Gary Hoover shows how to add a chill to your layout. Plus, visit a freelanced Midwestern layout, check in on our Jones Island project, and more!

MREXTRA

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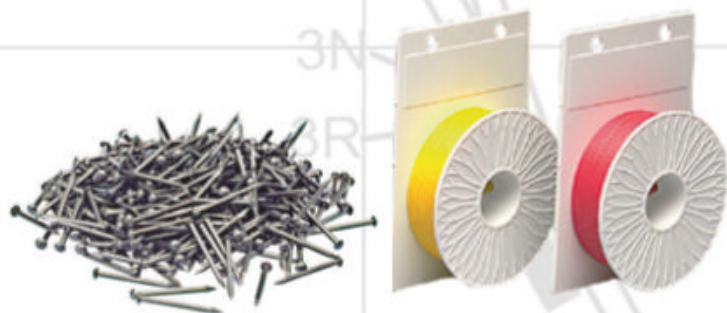
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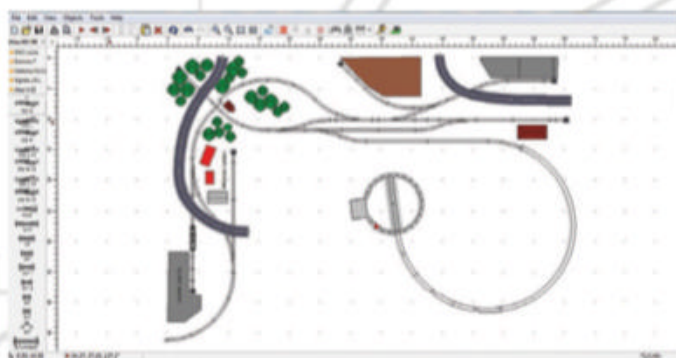


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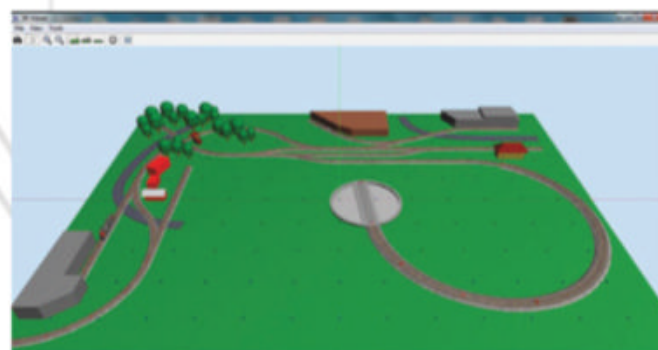
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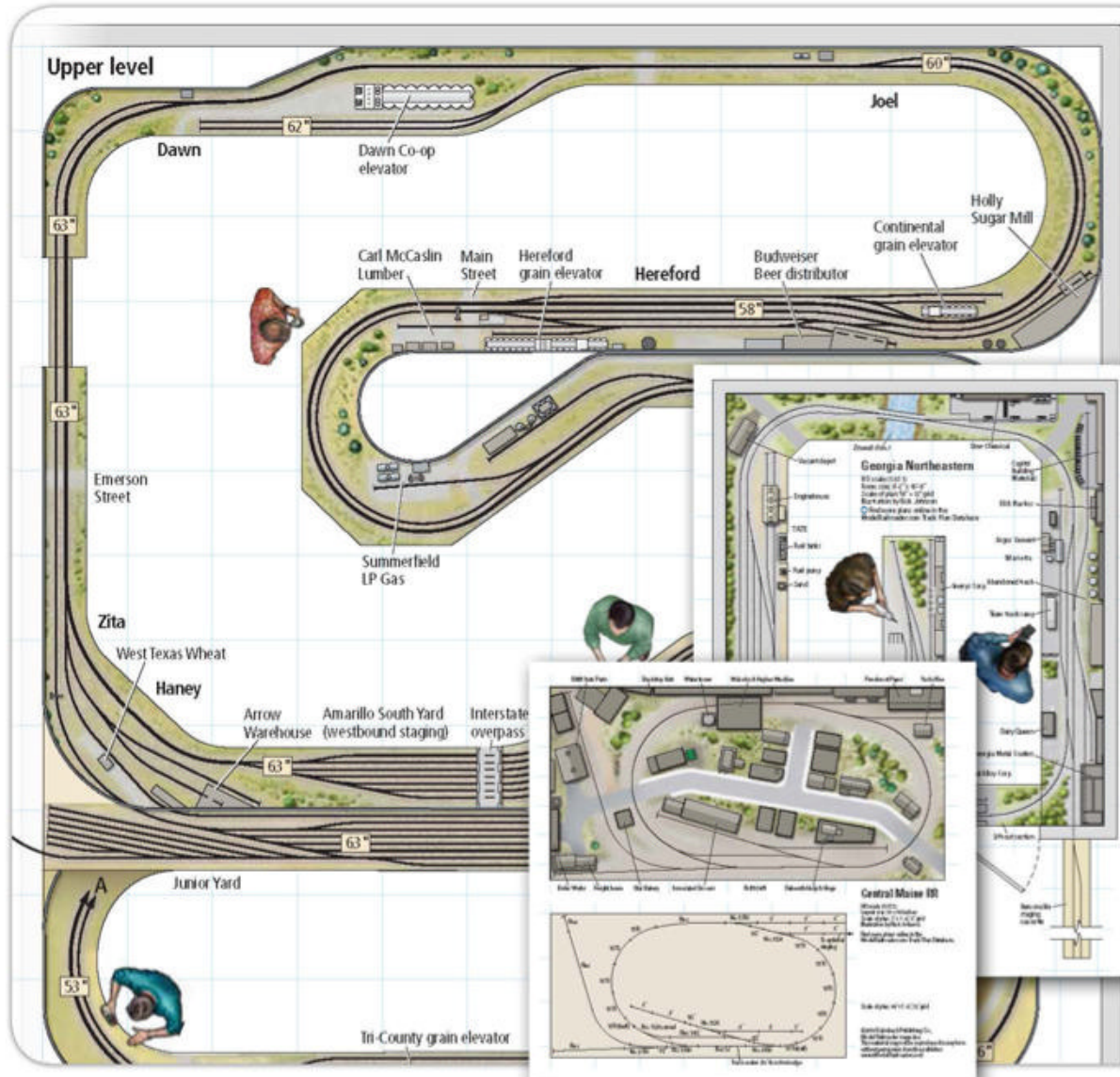
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The Track Plan Database encompasses plans from more than a decade of *Model Railroader* magazine and its special issues. New plans are added each month, so be sure to check back often! Find the online database on the MR home page.

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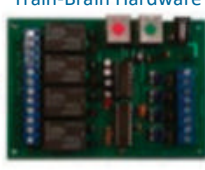
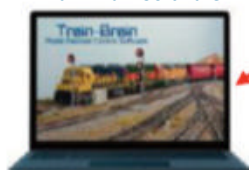
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A reader favorite returns

Three decades ago, *Model Railroader* magazine's then-Editor Andy Sperandio welcomed readers to the premiere issue of a new annual special publication, *Great Model Railroads*. In the introduction, he wrote, "We invite you to join us on visits with hobbyists who are making their dreams come true."

Great Model Railroads was a hit with readers right from the start and has remained a favorite ever since.

The latest edition, edited by Steven Otte of the *Model Railroader* editorial team, is now on sale. Like its predecessors, this 92-page publication features in-depth articles filled with helpful how-to

tips, spectacular photography, and detailed track plans.

Nine layouts are profiled this year, in a range of popular scales, including N, HO, S, On30, and large scale.

Nearly 300 layouts have been featured over the 31 annual editions of *Great Model Railroads*. That's a lot of modelers making a lot of dreams come true!

Many of these layouts were making their first appearance in print. In other instances, we revisited significant model railroads when their builders made major revisions. In most cases, these layouts are the result of many years of painstaking craftsmanship.

When the last touches are in place, the builders invite all of us to step into their train rooms – and be inspired.

For a sneak peek inside *Great Model Railroads 2021*,



check out this month's Trackside Photos section. And don't forget to download all nine computer wallpapers from this special issue.

You can purchase the special publication from your favorite hobby retailer or by visiting our online store, KalmbachHobbyStore.com.



David Popp doubled the size of the On30 Olympia layout. Read about it in *Great Model Railroads 2021*. Bill Zuback photo

Model Railroader

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We welcome contributions from readers, including articles, photographs, and drawings. For more information on submitting material, call us at 262-796-8776 and ask for an MR staff member or e-mail us at mrmag@mrmag.com. Model Railroader assumes no responsibility for the safe return of unsolicited material. We assume unsolicited material is intended for publication by Kalmbach Media unless otherwise noted. We assume letters, questions, news releases, and club news items are contributed gratis.

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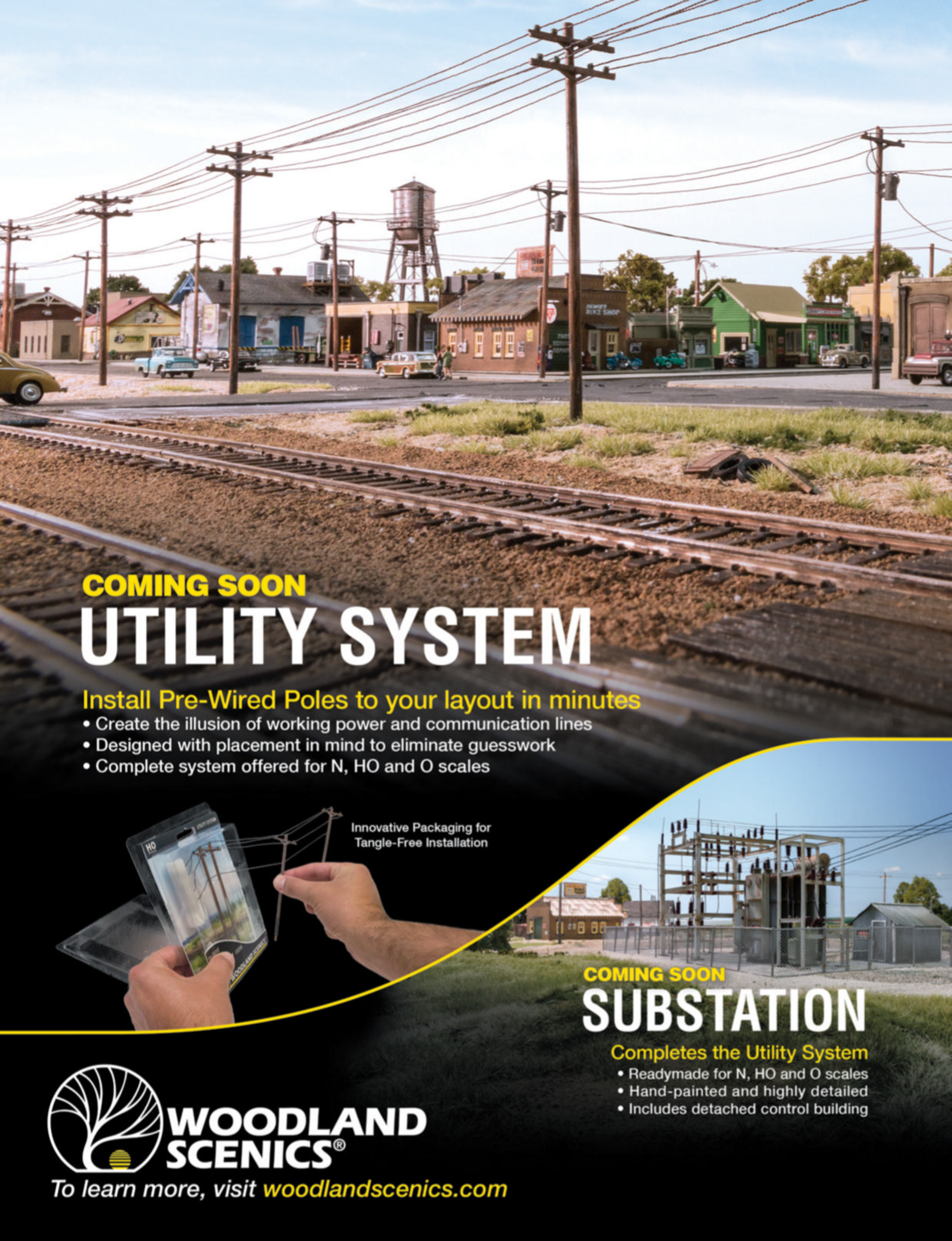
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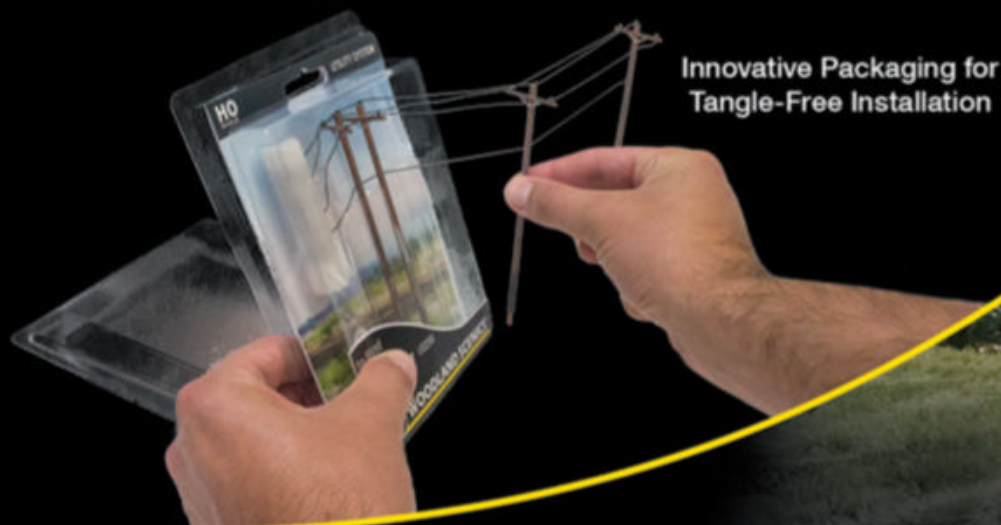
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HO scale



Union Pacific 4-8-8-4 steam locomotive no. 4014. This famous steam locomotive is now part of the HO scale Trix product range. Union Pacific no. 4014 has a digital sound decoder with the speaker in the tender; separate, factory-applied details; UP 4014 logo on the cab floor; RP-25 contour

wheels; Kadee couplers; eight powered axles; traction tires; articulated running gear; Boxpok drivers; spring-loaded middle driving axles; and engineer and fireman figures. The model (\$999.99) includes a wooden case. Produced by Trix, available from Märklin Inc., 573-365-9521, marklin.com

HO scale locomotives



- **Alco RS-11 diesel locomotive.** Burlington Northern (Cascade Green and Northern Pacific patchout); Central Vermont (green with “wet noodle” herald); Delaware & Hudson (gray, yellow, and blue “lightning stripe” scheme); Maine Central (Pine Green); Duluth, Winnipeg & Pacific (as-delivered green-and-gold scheme); Portland Terminal (Pine Green, conditional release); New York Central (black); Nickel Plate Road (black and yellow); Northern Pacific (as-delivered scheme); and Seaboard Air Line (as-delivered scheme). Redesigned chassis and body for easy shell removal; illuminated number boxes, headlights, class lights, and cab control stand lighting; metal handrails with plastic stanchions; road-name-specific corner steps; factory-installed grab irons; and five-pole skew-wound motor with dual flywheels. Conditional release needs to reach minimum order threshold to be manufactured. Direct-current model, \$225; with

dual-mode ESU sound decoder, \$335. Scheduled for release in 2021. Rapido Trains, 905-474-3314, rapidotrains.com

HO scale freight cars

- **Pullman-Standard 40-foot PS-1 boxcar.** Chesapeake & Ohio (Boxcar

Red with black roof and ends, “C&O for Progress” herald, and “Chesapeake & Ohio” lettering). One road number. Separate, factory-applied ladders and grab irons; positionable doors; metal wheels; and Kadee scale couplers. \$39.95. Kadee Quality Products Co., 541-826-3883, kadee.com

LGB painting raffle

LGB (Märklin), 1406 Creek Trail Dr., Ste. 100, Jefferson City, MO 65109 is holding a raffle to celebrate the release of its large scale Atchison, Topeka & Santa Fe Electro-Motive Division F7A and F7B diesels (Sept. 2020 MR, p. 20). LGB will raffle an original James R. Mann watercolor of the Santa Fe *Super Chief*. The locomotive in his painting will have the same road number as LGB model no. 20581. One entry card will be included with the purchase of each engine (nos. 20581, 20583, or 20582). Entries will be accepted until Jan. 10, 2021. The drawing will be held in Germany at the 2021 International Toy Fair. Visit lgb.com for more information.



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- **Greenville 86-foot high-cube double-plug-door boxcar.** Southern Pacific (original 1969 red-and-gray scheme); Canadian Pacific (original 1971 scheme with CPAA reporting marks); Conrail (1992+ "Quality" scheme); Detroit, Toledo & Ironton (original 1971 baby blue scheme); New York Central (original 1965 Jade Green, six road numbers); and Southern Ry. (original 1977 scheme). Four numbers per scheme unless noted; also available undecorated in seven versions. Body shells with or without overlapping side panels, prototype-specific brake stands and trucks, 33" or 36" metal wheels as appropriate, and Kadee scale couplers. \$52.95. Tangent Scale Models, 828-279-6106, tangentscalemodels.com



- **Thrall 56-foot All-Door boxcar.** Canadian Forest Products Ltd. (yellow); British Columbia Ry. (green); Georgia Pacific (blue); Lignum Forest Products (orange); Minnesota, Dakota & Western (white with Boise Cascade lettering); Potlatch (green and black with Duluth & Northeastern reporting marks); U.S.

Plywood (green and white); and Weyerhaeuser (green). Three road numbers per scheme. Etched end platforms with crossover handrail; separate, factory-applied grab irons, ladders, latch bars, door handles, and brake wheel; 33" metal wheelsets; and Proto-max metal couplers. \$49.98. Walther's Proto. Wm. K. Walther's Inc., 414-527-0770, walther's.com

N scale freight cars

- **FMC 50-foot combination-door boxcar.** British Columbia Ry. (dark green with dogwood herald), Canadian National (brown with "wet noodle" herald); Railbox (early and late schemes in

Conducted by Cody Grivno

six road numbers [three single cars and one three-pack] and three factory-weathered single cars); and Minnesota, Dakota & Western (green with white pine tree herald). Three numbers per scheme unless noted. Screw-mounted roller-bearing trucks, machined metal wheels, and body-mounted McHerny couplers. Single car, \$26.98; three-pack, \$76.98. July 2021. AthearnN. Athearn Trains, 800-338-4639, athearn.com

- **Gunderson Maxi-I five-unit articulated well car.** New road numbers: BNSF Ry. (Oxide Red with post-2005 herald and 10 magenta Ocean Network Express intermodal containers), Maersk (blue with 10 Maersk intermodal containers), and TTX (yellow with new logo and 10 gray Ocean Network Express intermodal containers). Metal wheels and Kato knuckle couplers. \$150. Price is estimate and subject to change upon release. January-March 2021. Kato USA Inc., 847-781-9500, katousa.com

N scale structures



- **C&H Brick & Block Co.** Laser-cut micro-plywood kit with internal support system, window glazing, drying-setting shed, mixing-molding (pug) mill, material distribution plant, and five newly

Atlas acquires HO, N tooling from True Line Trains

Atlas Model Railroad Co. announced that it purchased certain molds and tooling from True Line Trains.

Among the HO tooling acquired include the Fairbanks-Morse C-Liner and Montreal Locomotive Works RS-18 diesel locomotives, slab-side covered hopper, 50-foot newsprint boxcar, Fowler stockcar, bulkhead flatcar, Canadian National and Canadian Pacific cabooses, and Association of American Railroads 40-foot boxcar.

In N scale, Atlas acquired the Alco C-424 and Electro-Motive Division GP9 diesel locomotive tooling.

"True Line Trains made some great models over the years that we are excited to now produce under the Atlas name," said Paul Graf, CEO of Atlas, in a press release. "They will fit right in with the other high quality model railroad products we make in HO and N scale."

For more information, visit atlasrr.com.

N scale



New York Central 4-6-4

Hudson steam locomotive.

Bachmann offers this N scale model in NYC's as-delivered Roman lettering and later Gothic lettering schemes in two road numbers per scheme. The Sound Value line model (\$439) has a dual-mode SoundTraxx Econami sound decoder; Boxpok-style drivers; an operating headlight and tender backup light; a die-cast metal chassis; separate, factory-applied details including bell, whistle, pop valves, and handrails; metal driver axle bearings; and E-Z Mate Mark II couplers. An extra front dummy coupler in the down position is included. Bachmann Trains, 215-533-1600, bachmanntrains.com

mastered beehive kilns. Kit includes more than 150 windows, doors, and detail parts. Add-on beehive kilns, scenic details, M-Trak Nn30 track, and vehicles available separately. Measures 22" x 10" x 4". \$249.95. The N Scale Architect, 607-746-8416, thenarch.com

- **RIP track.** Kit includes main repair building; work shed; 3-D printed and cast parts, including crane, car jack stands, welding tanks, crates, trash cans, workbench, toolbox, compressor, arc welder, cans, and pails; and laser-cut building components and roofing. Repair building measures 2" x 4½", work shed measures 1" x 1½". \$59. The TrainMaster, 740-405-4722, thetrainmaster.com

Large scale locomotives



- **General Electric Dash 9-44CW diesel locomotive.** Pre-production artwork shown. 1:29 scale. BNSF Ry.; Atchison, Topeka & Santa Fe (warbonnet); CSX (dark blue and yellow with "boxcar" herald); Norfolk Southern (Operation Lifesaver 25th anniversary scheme), and Union Pacific (Armour Yellow and Harbor Mist Gray with American flag and "Building America" slogan). Nonproprietary plug-and-play electronic printed-circuit board to accommodate direct current, Digital Command Control, and/or remote-control operation. Two motors per truck; white,

light-emitting diode directional headlights; operating ditch lights; detailed, illuminated cab interior; metal railings and lift rings; positionable side windows; engineer figure; factory-installed speaker with wire pigtail to allow installation of aftermarket sound decoder; and operating smoke unit. Price and release date to be announced. Bachmann Trains, 215-533-1600, bachmanntrains.com

Large scale rolling stock



- **Double-sheathed cupola caboose.** Pennsylvania RR. Separate, factory-applied brake wheels, brake cylinder, smokejack, ladders, and grab irons; plastic wheelsets; and hook-and-loop couplers. \$94.99. PIKO America LLC, 619-280-2800, piko-america.com

Z scale locomotives



- **Alco RSD-4 diesel locomotive.** Atchison, Topeka & Santa Fe (black and

Club offerings



Chesapeake & Ohio QN Cabin.

HO scale laser-cut kit produced by Southern Heritage Models exclusively for the Chesapeake & Ohio Historical Society. Based on prototype in Quinnimont, W.Va. \$114.95. Chesapeake & Ohio Historical Society, cohs.org



Cleveland, Cincinnati, Chicago & St. Louis 40-foot double-door automobile boxcar.

Accurail HO scale kit decorated for the Central Ohio Model Railroad Club. Two road numbers. \$25 each plus \$8 (one car) or \$10 (two cars) shipping. Ohio residents must add 7.5 percent (\$1.88) state sales tax for each car. Payment by check (COMRC), money order, or cash. 2020 COMRC Club Car, Attn: Bill Alarie, 623 D'Lyn St., Columbus, OH 43228

silver "zebra stripes" scheme). Three road numbers. Phase I body with directional light-emitting-diode headlights, 7.5mm coreless motor, dual flywheels, traction tires, built-in pilot, body-mounted couplers, Alco trimount trucks, two single air horns, and 1,400-gallon fuel tank. American Z Line, 614-764-1703, americanzline.com

Z scale freight cars

- **Gunderson Maxi-I five-unit articulated well car.** BNSF Ry. (Mineral Red

Continued on page 16

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Union Pacific Railroad (UP) class 4000

TRIX

The Union Pacific Railroad rolled out the biggest restoration of 2019, the complete overhaul of the largest steam locomotive in the world – **the Big Boy, road number 4014.**



To commemorate this event, Trix has reissued an accurately redesigned model in HO scale (Item No. 22163). This model was made specifically for the HO US market.

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This metal model has a total of 14 design changes to accurately represent the prototype, including changing to an oil firing tender, "Big Boy" written on the smoke box door, applying the UP 4014 logo onto cab floor and more!

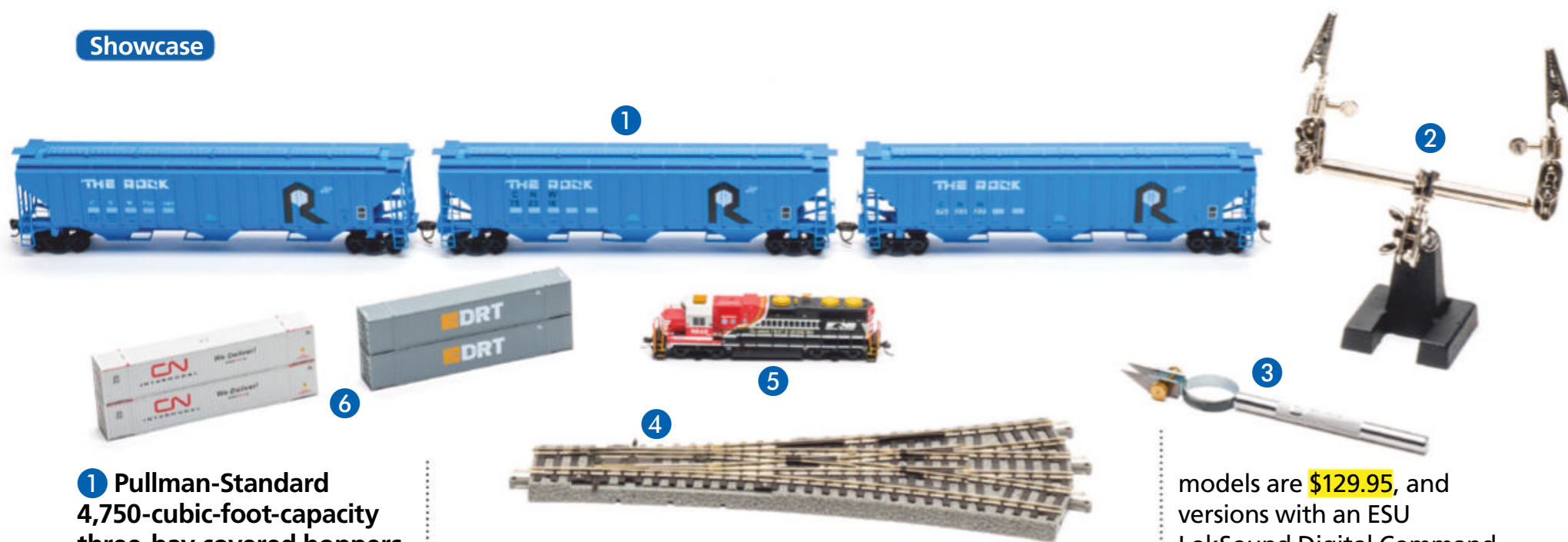
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Showcase



1 Pullman-Standard 4,750-cubic-foot-capacity three-bay covered hoppers.

These ex-Rock Island cars lettered for Chicago & North Western are available from Accurail. The HO scale kits feature numerous separately applied parts, plastic wheelsets, and Accumate couplers with modeler-installed trip pins. The three-bay covered hoppers are priced at \$21.98 for a single car and \$64.98 per three-pack. Accurail, accurail.com

2 Double clip extra hands.

This workbench aid, produced by Excel Blades, has alligator clips attached to ball joints. The double clip extra hands can be used with

plastic, metal, wood, and more. The holding and stabilizing tool sells for \$12.99.

Kalmbach Hobby Store, KalmbachHobbyStore.com

3 Dual flex cutter. Cut strips of wood, plastic, foam core, and more with this tool from Excel Blades. The dual flex cutter (\$22.99) has an aluminum body and parallel no. 59 blades. The tool can cut widths between .12" and .64". Kalmbach Hobby Store, KalmbachHobbyStore.com

4 Piko A-track three-way turnout. PIKO-America offers this HO scale turnout with code 100 nickel silver rail, detailed ties, rail joiners,

and roadbed with molded ballast texture. The turnout is manually operated but can be upgraded with above- or under-table switch machines (sold separately). The three-way turnout is priced at \$43.99. PIKO-America, piko-america.com

5 Electro-Motive Division GP38 diesel locomotive.

Norfolk Southern's Training First Responders locomotive is now offered in N scale by Atlas. The four-axle road locomotive has directional golden-white light-emitting-diode headlights, a Scale Speed motor, and Accumate couplers. Direct-current

models are \$129.95, and versions with an ESU LokSound Digital Command Control sound decoder are \$239.95. Atlas Model Railroad Co., atlasrr.com

6 53-foot corrugated intermodal container with 6-42-6 sides. Canadian National ("We Deliver" slogan) and DRT Transportation two-packs (\$33.95) are now available in N scale from Jacksonville Terminal Co. The injection-molded plastic containers feature inter-box connecting pins, a magnetic connecting system (magnets on the bottom and metal plates on top), and prototype-specific doors and fronts. Jacksonville Terminal Co., jtcmodeltrains.com

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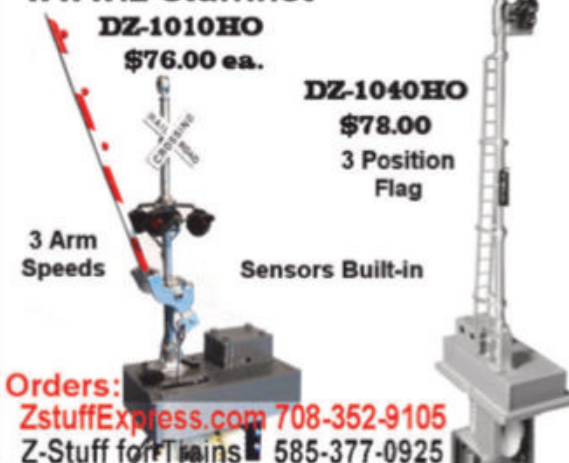
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HO scale



Milwaukee, Racine & Troy American Car & Foundry 4,600-cubic-foot-capacity Center Flow covered hopper. This HO scale freight car kit (\$27.99) is available exclusively from the Kalmbach Hobby Store. The Milwaukee, Racine & Troy Center Flow, produced by Accurail, features a one-piece body, separate underbody, roller-bearing trucks with plastic wheelsets, and Accumate couplers. Kalmbach Hobby Store, KalmbachHobbyStore.com

Terminal no. 16 Electro-Motive

Division SW8. HO scale decal set covers six major paint and lettering variations end-cab switcher has worn over the last 65-plus years. Artwork by Fritz Milhaupt. \$8.99 (Virginia residents please include sales tax). Great Decals, greatdecals.com

Tools

- **Metal grabber pickup tool.** Five-pronged tool for grabbing, holding, and placing small objects. \$8.99. Produced by Excel Blades, available from Kalmbach Hobby Store, KalmbachHobbyStore.com

Books

- **Railway Prototype Cyclopedia, Vol. 35.** "Genesis of the A.A.R. standard 40-foot boxcar" by Pat Wider. Includes 15 historical railroad industry sidebars, 72 diagrams, and 428 black-and-white photographs. Softcover, 385 pages. Silverlake Images LLC and Ron's Books, 914-967-7541, ronsbooks.com 

Continued from page 12

with post-2005 herald). Four road numbers (two each with five Cosco and TMM Linea Mexicana 40-foot intermodal containers). Well cars have metal chassis with etched-metal details and

roller-bearing trucks. American Z Line, 614-764-1703, americanzline.com

Decals

- **Ludington & Northern no. 16 and Michigan Southern/Kendallville**

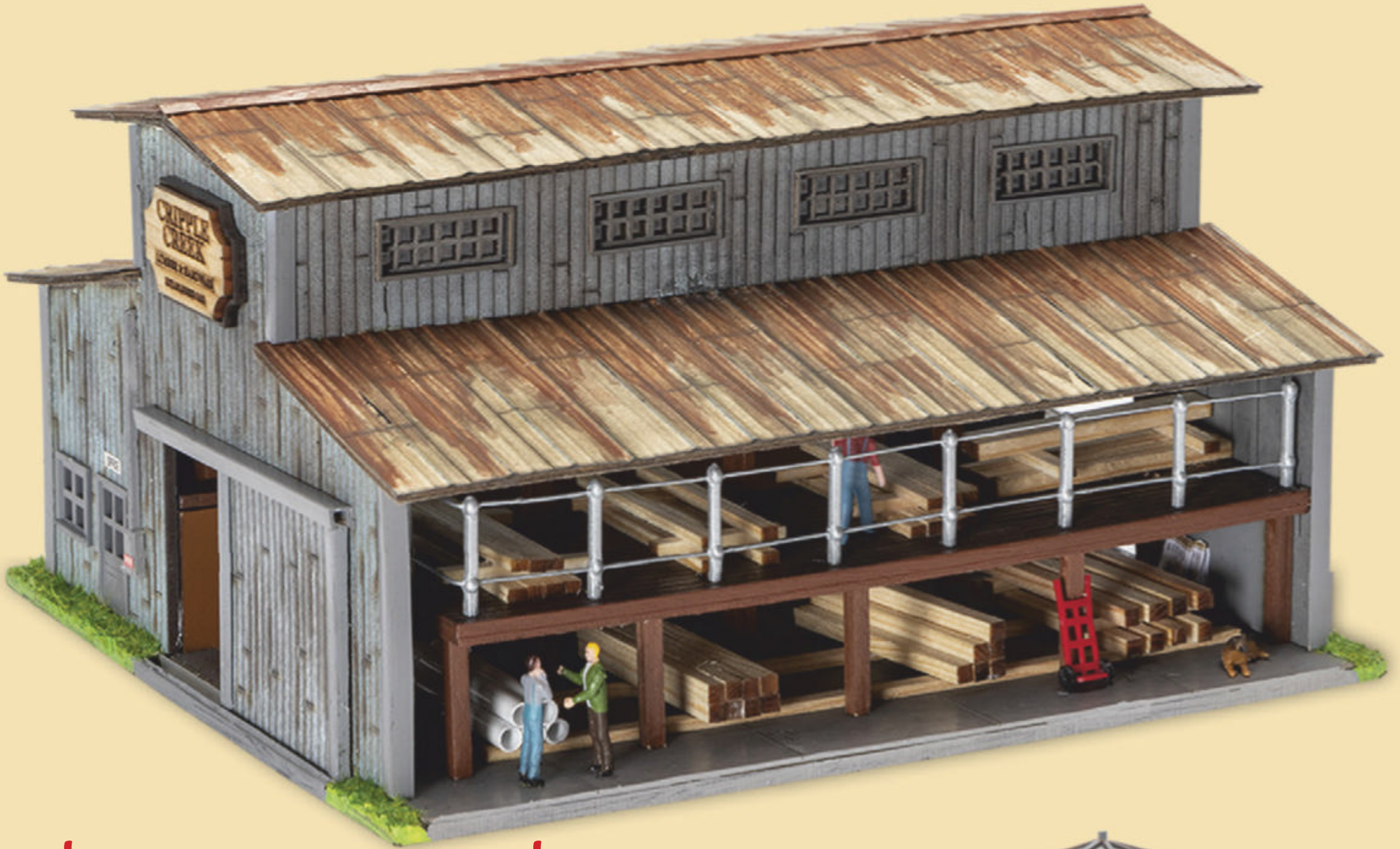
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HO Scale (279-5023) | O Scale (279-4494)

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Knuckle couplers link two cars on the White Creek RR, a 1:8 scale live-steam railroad featured in the March 2012 *Model Railroader*. Such couplers were invented in 1873 and mandated on the prototype by 1900. Colleen Miller photo

When were knuckle couplers instituted?

Q What type of couplers should be used for various types of cars (freight, passenger, Railway Post Office, Express, etc.) for the era between 1890 and 1920?

Michael Prahl, Cedar Falls, Iowa

A What kind of couplers you use isn't dependent on the type or class of car; all classes of car had to be moved by the same set of locomotives, so these appliances were standard. And in the time you ask about, that standard was the Janney knuckle coupler. Eli Janney was awarded his patent in 1873, so you'd be fine to use any of today's knuckle couplers on your turn-of-the-past-century rolling stock.

Though there might still be some link-and-pin couplers in use in the early part of the period you discuss, the Railroad Safety Appliance Act took effect in 1900, mandating automatic couplers and other safety equipment on all locomotives and rolling stock involved in interstate traffic. If you have an urge to model link-and-pins, you'll either have to set your railroad prior to 1900 or model an isolated line with no car interchange, like an island railroad or a narrow gauge that interchanges by transloading only.

Q I have two locomotives, both of which have DCC sound decoders. I was trying to add momentum by programming their decoders, and now neither will move; only their sound responds. I have a feeling it has to do with the Configuration Variables (CVs), but I don't know how to work with them very well since I've just started in the hobby. Do you know a simple fix?

Henry Powell, Lincolnton, N.C.

A Put each locomotive individually on the programming track and set the value of CV8 to 8. This will reset the decoder to factory specs. You'll have to reprogram all the CVs you had set before,

including the address (which will default to 3), but it will make them run again.

Q I'm interested in modeling static grass "growing" in the gauge of the track on my HO scale model railroad. What length grass would pair well with Code 70 rails? Code 55?

Brian Miller, Stayton, Ore.

A A well traveled main line or even a major branch line wouldn't have grass growing in the gauge, as it would see regular weed spraying by maintenance-of-way crews or contractors. But you mentioned using code 70 and 55 rail, which are on the small side for HO scale.

That makes me think you're talking about lightly used branch lines or industry spurs, where a bit of neglect would be plausible.

Static grass comes in lengths from 1.5mm to 12mm. Lengths of 2mm-3mm would probably be tall enough to get across the impression you're trying to give. If the fibers are kept out of the flangeways, they shouldn't interfere with operation of your cars or locomotives.

If you want an overgrown, weedy look, such as an abandoned spur or a track leading to a shuttered industry, try mixing some 6mm-7mm fibers in with the shorter fibers. (A mix of lengths will add to the impression of wild growth.)

Just be aware that the axle of a typical freight car is less than 9mm above the railhead, and the trip pin of a knuckle coupler hangs even lower. Using a heavy hand on the longer fibers will interfere with the movement of cars and locomotives, so reserve that treatment for abandoned or rarely used tracks.

Q How is mainline distance best measured? The three sides of my C-shaped, point-to-point, around-the-walls layout are 14 feet, 25 feet, and 9 feet, so my thinking is my main line run would be 48 feet. Is that right? I ask because sometimes I see articles where the main line is said to be longer than the layout's dimensions.

David Bellamy, Caledon, Ont.

A If an accurate measurement is important to you, the best way is to get a flexible tape measure (like that found at sewing stores) and literally measure the track. While you can also estimate main line length by measuring on the track plan, you can't always figure from benchwork dimensions, because of the way track undulates, curves, and turns back upon itself on some layouts.

Q I read that there is roadbed with adhesive on both sides to lay roadbed, track, and ballast. Do you know where this can be purchased?

Albert DeJohn, Sayreville, N.J.

A There used to be a product called AMI Instant Roadbed that was made of a sticky, rubbery, black material that would adhere to the subroadbed, track,

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

Roco



Slewing railway crane for digital operation - EDK 750

The EDK 750 railway slewing crane built by Maschinenbau Kirow in Leipzig – can lift loads of up to 125 metric tons with the appropriate supports. Its tasks even include replacing steel girder box bridges, as well as easier assignments such as removing and reinstalling switches and track yokes. For the latter, it is usually not necessary to extend and adjust the cranes' supports. The horizontal boom is suitable for working below the overhead line system and inside tunnels. The crane can be transported at speeds of up to 100 km/h when being transferred to the work site.



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and ballast without adhesive. That might be what you've heard about, but this product hasn't been sold for a good number of years.

Scenic Express (sceneryexpress.com) offers a similar product called Black Track Tack. While it seems like it would make roadbed and track laying simpler, you would still need to use some kind of adhesive, like diluted matte medium or scenic cement, to attach your ballast. Only the layer of granules that actually touch the adhesive would stick.

A number of modelers who have made roadbed out of a product called camper tape or topper tape. These are rolls of vinyl foam or cork tape that's used to seal between pickup truck toppers and the truck bed. Some topper tape is sticky on only one side, but other brands have a mild, repositionable adhesive on the top side, as well. You would probably still need to glue or tack down your track.

We've also heard that self-stick roadbed should be applied after scenery, as it tends to attract scenery materials.



The Scale Rails of Southwest Florida model train club reported a 50 percent drop in lighting bills after converting their layout to LED strip lighting. Lou Sassi photo

Q I read somewhere about using light-emitting-diode (LED) strips for general layout lighting. But I can't find any reference to this when I search my favorite model railroad websites.

Mark H. Potter, Dixon, Mo.

A Yes, we've seen it done. The Scale Rails of Southwest Florida club is one such layout. An article about the club, including a sidebar about converting their layout lighting to LED strips, will appear in our January 2021 issue. **MR**

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Merging old and new benchwork

David Popp shares how he built new benchwork for our Jones Island project layout and seamlessly integrated it into the existing model railroad.

Unlike building a model railroad from the ground up, we started our Jones Island project with an existing model railroad, the HO scale Milwaukee, Racine & Troy (MR&T). To accommodate new scenic features and five industries, I used circular and reciprocating saws to remove a 9'-6" section of tabletop from the original benchwork. You can read more about this in Step 1 on the opposite page.

Though I cut out the tabletop, I was able to use the existing L-girders and legs as a starting point for the two new layout sections. See Step 2 on page 26 for more on the L-girder benchwork built for this section of the layout more than 30 years ago.

Traditional L-girder benchwork has joists and risers, but for the new sections, I built it using frame benchwork. Why

the change? Frame benchwork is easier to transport. The new section that features Continental Grain Co. has a boat basin that sits in the corner by the hallway windows. Reaching across the tabletop to pour resin into the basin would be tricky at best.

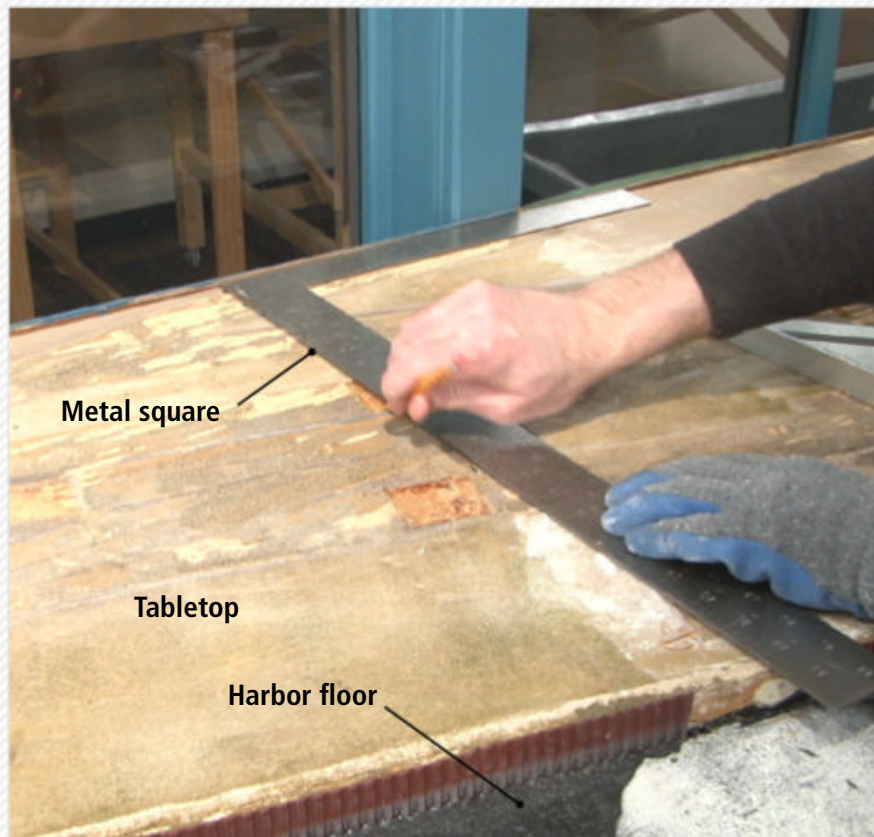
By making the benchwork easy to remove, we can transport one or both sections into the nearby workshop, providing access to all four sides during work sessions. Take a closer look at the frame benchwork in Step 3 on pages 26 and 27.

Because of the MR&T's age, I also had to take the wood used for the existing benchwork and tabletop into consideration. The thickness of modern dimensional boards and plywood isn't the same as older wood. I used wood shims and a belt sander to make the transition

between the old and new sections as smooth as possible. This is an important step, as uneven spots may cause operational headaches down the road.

By taking advantage of existing benchwork, I was able to save a few steps (and a few dollars) on our Jones Island rehab project. And that time savings means we're also a few steps closer to our end goal, running trains in a compact and fun industrial switching area.

STEP 1 CUT IT OUT



The footprint of our Jones Island project is somewhat different from what was there for the old Kelly's Island section of the layout. To make the transition easier, I needed to remove a 9'-6" section of benchwork. Measuring from the far end wall, I put a mark at 9'-6" and used a square to draw a cut line on the tabletop. I also put a line on the harbor floor where I'd peeled the resin water material away.



I had to use two saws to remove the tabletop. First, I used a circular saw to cut the tabletop. At first I wasn't sure the battery-powered tool would have enough power to cut through the 30-year-old $\frac{3}{4}$ " plywood. It turns out I didn't need to worry. After making the plunge cut, the saw went right through the plywood.

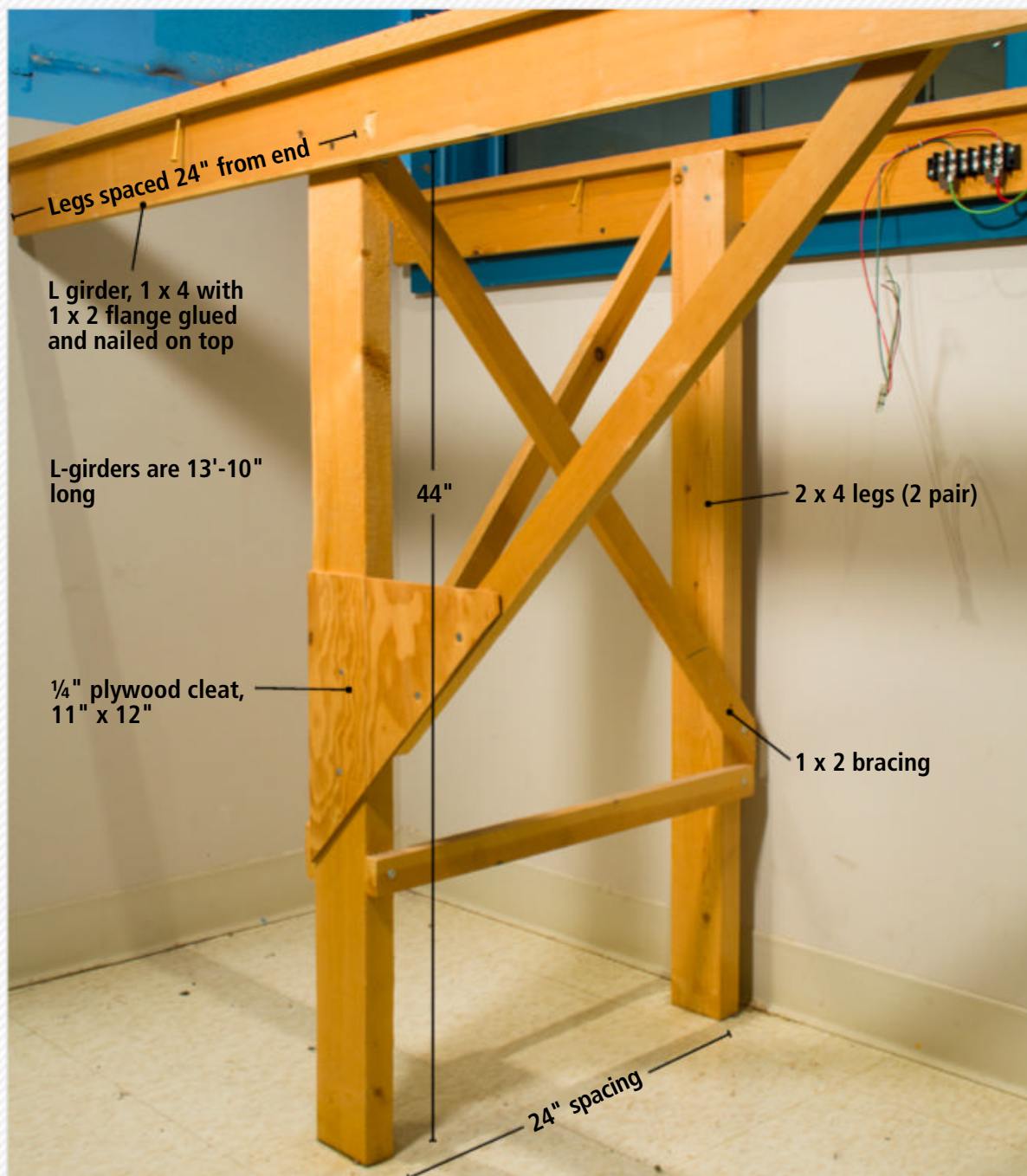


Because of the layout's proximity to the hallway windows, I had to stop the circular saw before completing the cut. To finish the cut on the tabletop, I used a heavy duty-reciprocating saw. This is a tool used in home remodeling, and you rarely need something like this when working on a model railroad. But for Jones Island, it was the right tool for job. I used it to cut through the harbor floor, as well.



With the tabletop cut, Cody Grivno and I removed the screws securing the risers to the joists. Once all the screws were removed, we recruited Kent Johnson to help us lift out the old benchwork. Though it was a tight fit, we were able to fit the benchwork into the elevator. After a short ride down to the first floor, we hauled the benchwork to the roll-off Dumpster behind the building.

STEP 2 L-GIRDER CONSTRUCTION



With the joists and plywood removed, I was left with just the L-girders and legs. The L-girders under the Jones Island section were made from 13'-10" 1 x 4s acting as the girder's web, topped with a matching length 1 x 2 for the flange. The flange and web were glued and nailed together, forming a strong beam that won't sag or warp easily.

The two pairs of legs are attached to the L-girders 24" from each end with 2" wood screws. The legs also have a pair of 45-degree 1 x 2 braces that keep the legs locked at a right angle to the girders. The braces were reinforced with 11" x 12" triangular plywood cleats attached to the legs and brace with screws.

The legs were made from 44" lengths of 2 x 4, spaced 24" apart. They're cross-braced with 1 x 2s and have a 24" 1 x 2 spacer set 12" from the floor. As the floor was level to start, no leveling feet were added to the leg section. However, if you decide to build this layout at home, you may want to install levelers. You can find them at most hardware stores and home centers.

STEP 3 FRAME BENCHWORK



The Jones Island section of the layout uses two types of benchwork. The section in the corner was already in place when we started the project. It was built using traditional joist and riser construction. It has a 43" wide curved front facing the aisle, making for smooth sight lines. We wanted to maintain that look, so we kept this 4 x 5-foot piece nearly as is.

I did have to modify it slightly by adding a 29" 1 x 4 along the open end to connect it to the new frames. I added a 3/4" x 7/8" riser to the top of the 1 x 4 to match the height of the existing plywood subroadbed.



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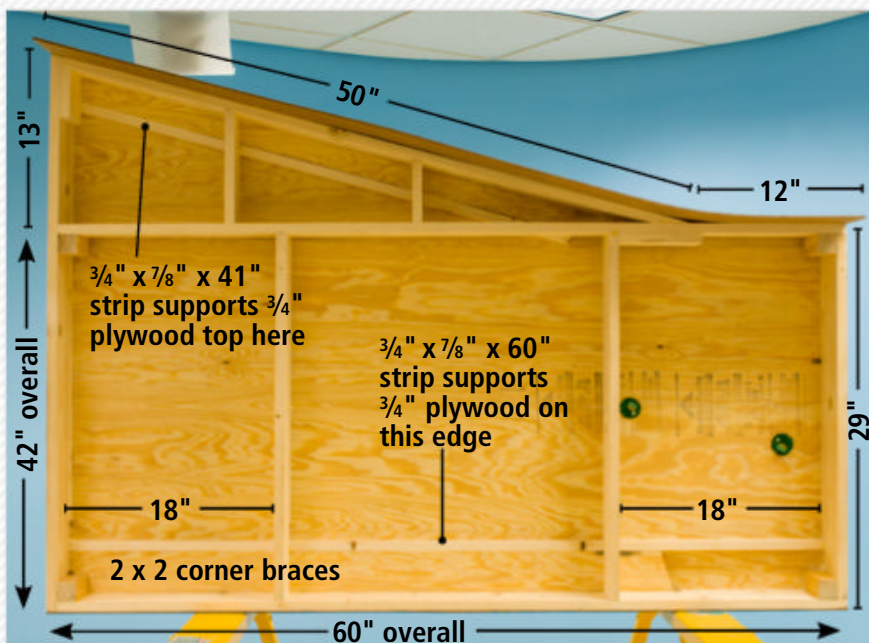
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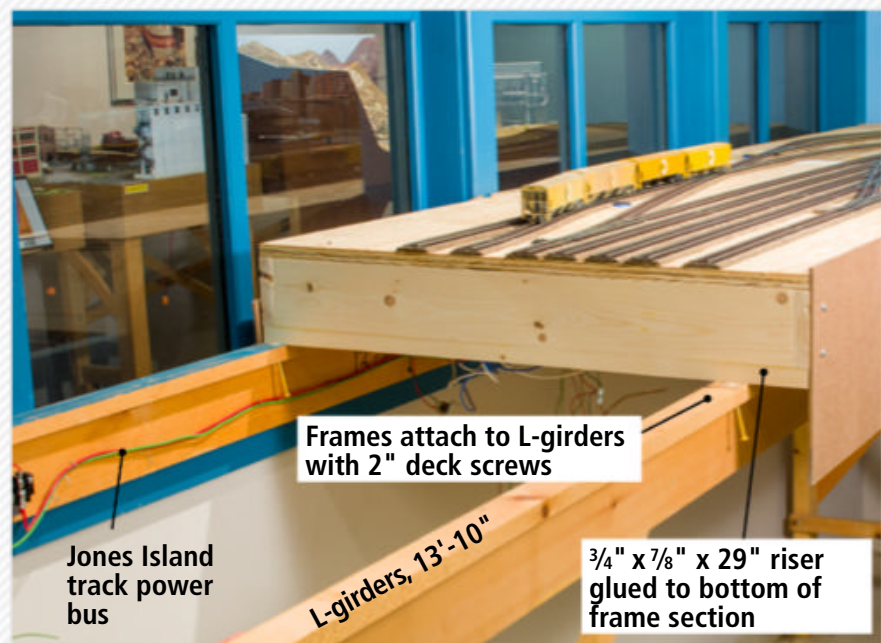
STEP 3 FRAME BENCHWORK (CONT'D)



The two new sections use frame benchwork instead of the traditional joists and risers. The frames are made of 1 x 4s and measure 29" wide by approximately 60" long, flaring out to 42" wide at the terminal warehouse end.

The MR&T's founding fathers used $\frac{3}{4}$ " plywood for the tabletop, so I followed suit for the new Jones Island section. If you're building Jones Island as a stand-alone switching layout, I'd recommend using $\frac{1}{2}$ " plywood for the subroadbed instead.

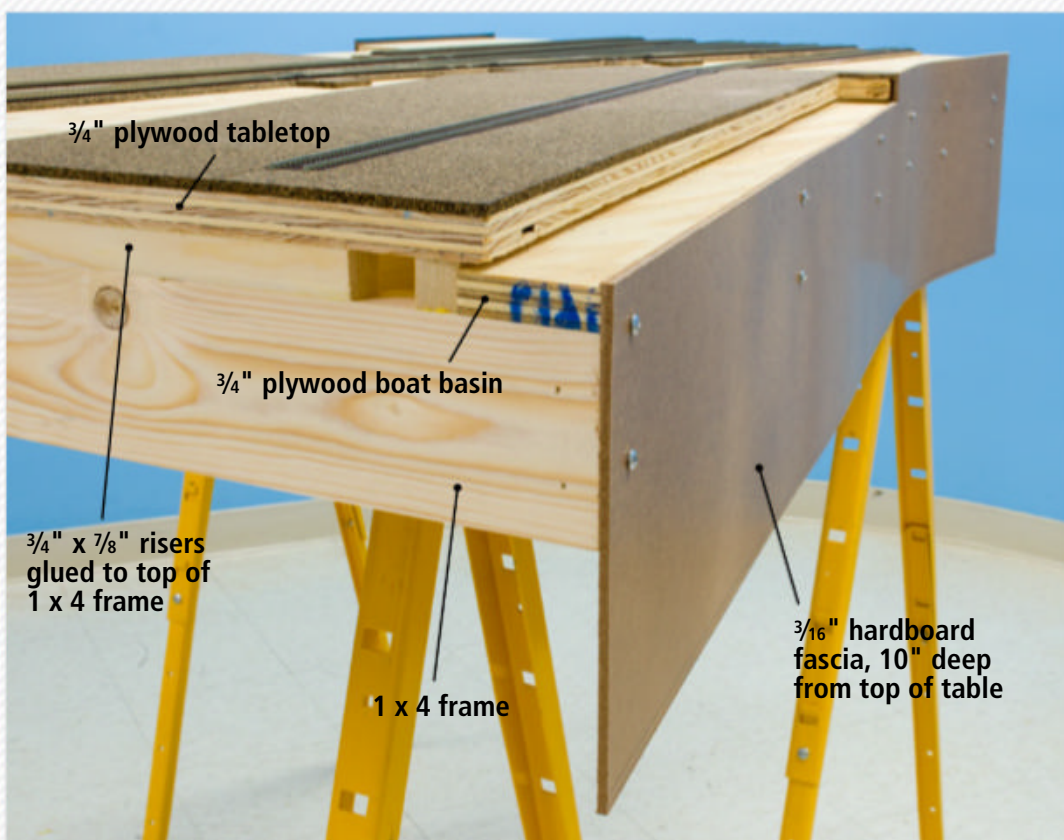
To raise the plywood top to the height of the existing layout, I added strips of $\frac{3}{4}$ " dimensional lumber ripped to $\frac{7}{8}$ " high on a table saw to the top of the joists on the frames. I glued the risers across the top of the frames, taking care not to place them directly under the points of the turnouts on the plan.



I attached the frames to the L-girders with 2" deck screws. Because we were working with an existing layout made with wood more than 30 years old, I had to use a few shims to raise the new frame to the correct height. This is one place where you want a perfect fit and solid hold, so it's important to drill holes for the screws first through the flange, shim, and frame to avoid splitting the wood.

The best part about using screws to hold the frames to the L-girders is that you can remove the layout sections again to work with them. We not only needed to remove the new Jones Island pieces for video work, we also needed to get at the back of the 42"-wide section to build the boat basin and pour the resin there. Normally this side faces the hallway windows, so it would have been impossible to work on this any other way.

STEP 4 BOAT BASIN AND FASCIA



There are several areas on the Jones Island layout that represent boat basins. These spots needed to be lower than the $\frac{3}{4}$ " plywood tabletop. Here I glued more $\frac{3}{4}$ " plywood cut to fit the spaces directly to the top of the 1 x 4 frames.

The layout has a 10" deep fascia made from $\frac{3}{16}$ " hardboard. Once all of the scenery work is complete, we'll come back and paint the new fascia sections the same green color that's used on the rest of the MR&T. The fascia extends about 5" below the layout's framework, making it easy to install controls for the Rapido Trains switch machines and remote uncouplers. We'll also install hook-and-loop fastener strips along the bottom edge of the fascia so we can reinstall the fabric curtain that covers that layout's legs.

With the benchwork complete, it was time to move on to roadbed and track, which we will cover in an upcoming installment. **MR**

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Combining a century of experience

My friend Steve Miazga and I have been modeling in N scale for 100 years combined – and what a scary thought that is! We both have medium-sized layouts and run lots of trains, so often we find ourselves in the same quandaries.

Lately we've been dealing with a problem that has crept up over the last couple years. Why do the drivers on some of our older diesel locomotives get so dirty, so fast? Here's an example from my own layout: one consist of three Kato engines, two C30-7s and an SD40-2. They were released in the 1990s when Kato started building locomotives under its own brand name. The Dash 7s could make only 1½ trips around the layout (about 7 scale miles) before the wheels would gunk up. No amount of track and wheel cleaning would resolve this problem.

From 1983 to 1992 Kato was making N scale locomotives for Atlas, and Steve and I experienced these same dirty wheel problems with those models. The wheels on all these locomotives were turned brass plated with nickel silver, and our theory is that the plating has worn through. (Wheels made today are the same, but the plating is much improved.) Why a brass surface running on a nickel silver rail leads to dirt accumulation I have no idea, but it sure as heck does. Sounds like a question for a metallurgist.

In my own case I know those C30-7s logged a lot of orbits on my Ntrak layout while my present layout was aborning. At that time, I would clean wheels with a Kadee wheel cleaner or one by Trix. With both, these the principle was to turn the wheels against bristles resembling those in a suede brush.



It's a bit hard to see, but the bad joint between plywood surfaces that was causing derailments is just above the point of the arrow. This is the after photo. Roen Kelly photo

I wouldn't do that now, as it strikes me as too abrasive.

Solution found. I replaced the trucks with new ones from Kato. It took only a few minutes and the engines now run as smoothly and quietly as if they were new.

The cost was \$15 per truck. For me it was well worth it to keep these great old-timers going. The trucks were listed as "revised" and were introduced when Kato made a new run of these engines in 2011.

Another goblin rears its head. I'd made a dozen trips around the layout when a new gremlin invaded. The C30-7s would derail on the section of track shown in the photo every time they came around. I carefully checked the gauge, did judicious filing, and the problem was solved – or so I thought. The next day it was back.

That afternoon my friend Steve came over, he worked the problem, and again it appeared to be solved. Next morning it was back, just as mean as ever.

This wretch had our century of experience on the ropes. My impulse was either

to hurl the locomotives, yank out the track, or set the layout on fire, maybe all simultaneously. Instead I let my saner side prevail and did nothing for a couple of days, then went back and gave the area a good looking over.

Three inches to the left of the spot where the derailments occurred there's a joint between two connecting sections of plywood subroadbed. There was a slight mismatch between these surfaces, about 1/16", which in N scale is not so "slight" at all. I had used Sculptamold to compensate for the mismatch, but I should have shimmed up the lower roadbed instead.

The result was a slight hump in the track. Experience had taught me that these engines don't like humps and they don't like situations where one rail quickly gets higher than the other.

To fix it I pulled the track loose from the turnout to the right. Then I gently raised the track

until I had enough clearance above the hump to work on it. (It was mostly already loose.)

I used a rasp to work down the hump in the cork roadbed, then finished it with a sanding stick. Once I reconnected the track the problem was gone, and has remained so.

This problem might come back to haunt me. I'd taken the hump out of the cork roadbed, but that was a symptom of the real problem, the bad job of building the subroadbed. Seems like it always goes back to the basics. We all know how critically important it is to do the best job you can when it comes to

track laying. And the reward, derailment-free running, is worth the effort. **MR**



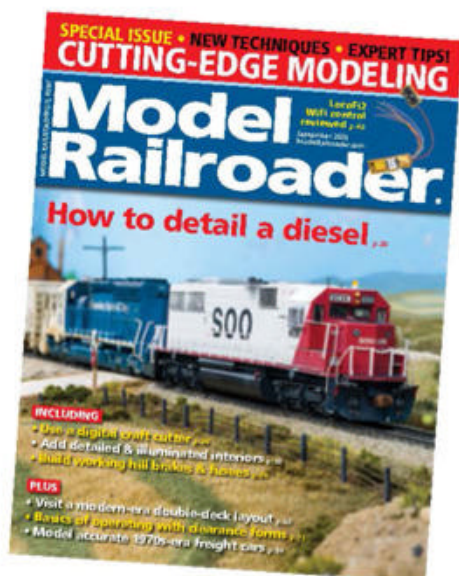
WHY A BRASS SURFACE RUNNING ON A NICKEL SILVER RAIL LEADS TO DIRT ACCUMULATION I HAVE NO IDEA, BUT IT SURE AS HECK DOES. - JIM

After a 10-year run, this is the final N Scale Insight column. It's been fun and I thank MR, my Insight editors (Steve Otte and Eric White), and most of all, you, the readers. — Jim

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How to model a CONCRETE TEAM TRACK RAMP



Team tracks have been dubbed “universal industries” by model railroaders, as virtually any type of freight car can be spotted at them. On full-size railroads, team tracks were often located near depots. Today, a typical team track consists of a siding surrounded by an open gravel lot that allows the freight cars to be reached from either side. Some locations may also include a wood or concrete ramp.

On my HO scale Georgia Northeastern layout, featured in *Model Railroad Planning 2016*, I wanted a team track with a concrete ramp similar to a prototype location north of Atlanta that regularly receives boxcars loaded with bricks ①. The ramp allows forklifts to drive into the boxcars, unload pallets of bricks, and drive them to a storage yard

adjacent to the siding. Like the prototype, my team track ramp sees plenty of boxcars loaded with bricks. But it also serves other local customers, all without adding extra structures or sidings to the layout.

EXPANSION CEMENT

Several years ago, I read Lance Mindheim’s article “Simple unloading ramps” in the *Model Railroader* special issue *How to Build Realistic Layouts: Freight Yards*. In the story, Lance wrote about modeling a concrete loading ramp using anchor bolt cement. I decided to give his techniques a try and purchased a box of Rockite expansion cement from my local hardware store.

Expansion cement is slightly different from anchor bolt cement, as it has

additional materials in the mix that resist shrinkage as it dries. The product is designed to fill holes in foundation walls and is also used to create pre-stressed components for buildings and bridges.

The construction methods outlined here can be used to build team track ramps, industrial unloading ramps, or concrete platforms in any scale.

STYRENE FORM

I first determined the location and size of the ramp. Then I used a thin layer of cork to bring the base for the gravel lot and the concrete ramp to the top of the ties on the siding.

Next, I made a form for the concrete ramp using .060" styrene sheet. The ramp measures 20 scale feet wide and 65 scale

Use expansion cement to create this HO scale lineside detail

By Thomas Klimoski

Photos by the author except as noted



A Georgia Northeastern Geep spots a boxcar loaded with bricks at a concrete ramp on Tom Klimoski's HO scale layout. He modeled the ramp using expansion cement.

feet long. The loading ramp is 4 scale feet high, which when placed on the raised cork base is the same height as a flatcar deck or bottom of a boxcar door opening.

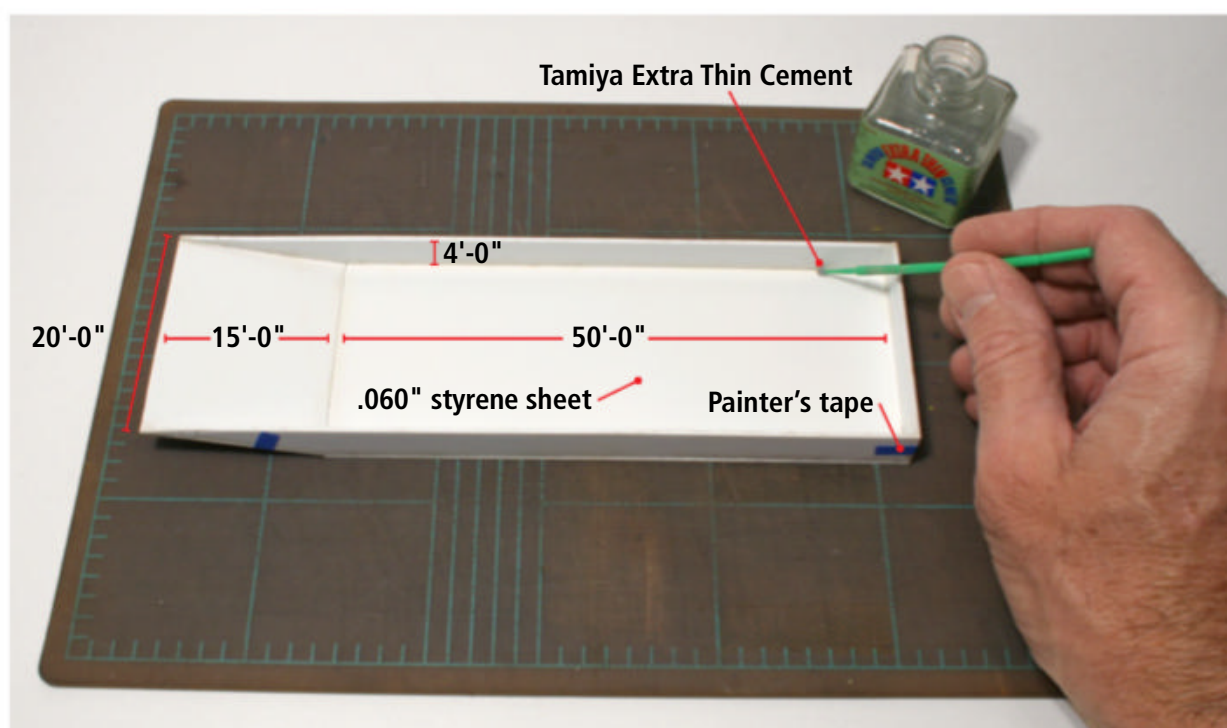
I cut the styrene pieces and used Tamiya Extra Thin Cement to glue them together. I used painter's tape to hold the styrene in position while the glue dried, making sure the edges were straight ②. It's important to create a watertight form so the cement mixture doesn't leak out as it hardens. I applied two coats of Tamiya cement along the form's seams.

POURING THE RAMP

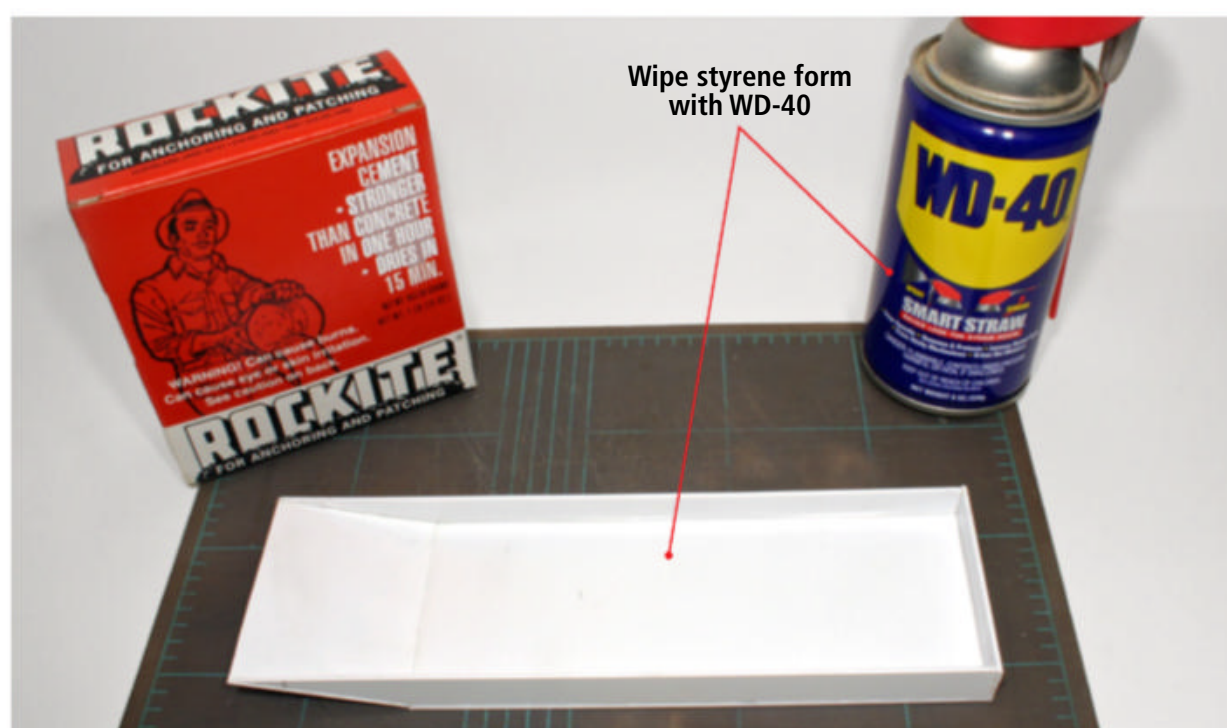
Before mixing the Rockite, I sprayed the styrene with a light coat of WD-40 to prevent the cement mixture from sticking to the form. I used a small rag to evenly distribute the lubricant ③.



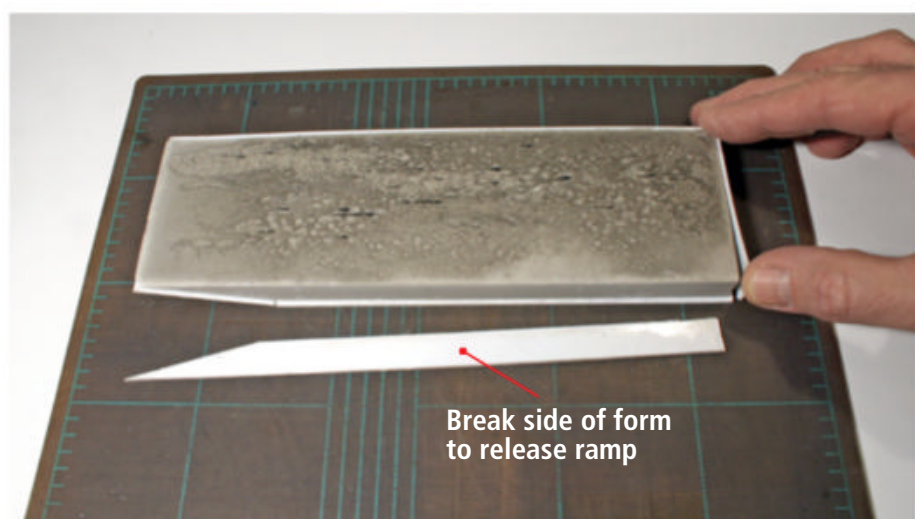
① PROTOTYPE INSPIRATION. North Georgia Brick near Atlanta uses a concrete ramp to unload boxcar loads of brick. The metal guardrails prevent forklift operators from wandering off course. Scott Chatfield photo



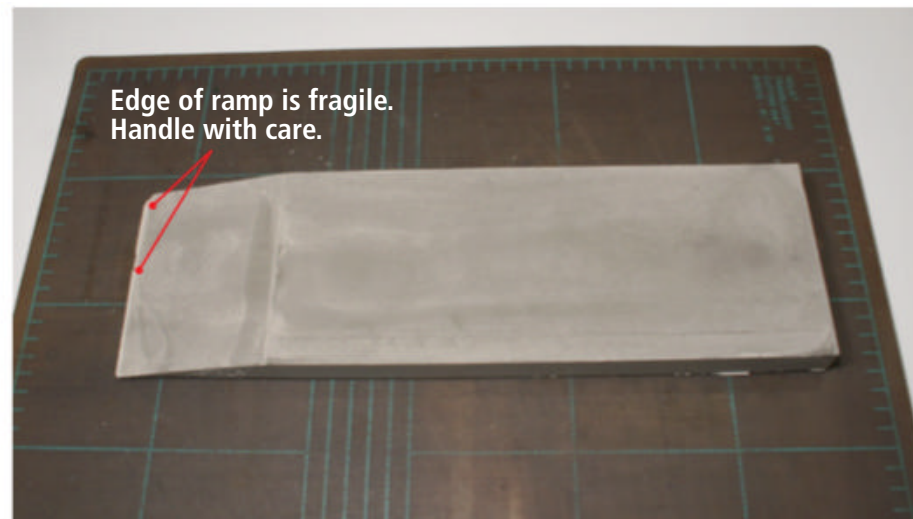
② SEALING THE JOINTS. Tom built the form for the ramp using .060" styrene sheet. He applied two coats of Tamiya Extra Thin Cement to the joints to prevent leaks and used painter's tape to hold the styrene in place while the glue dried.



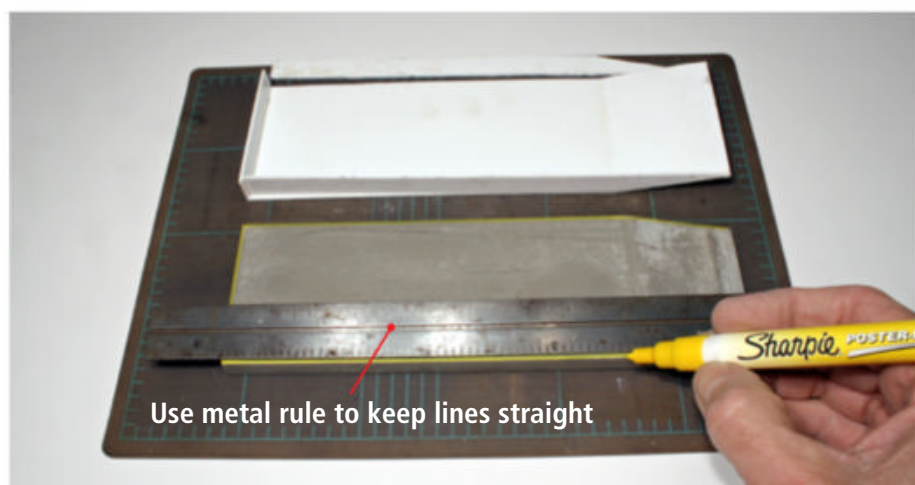
③ KEY INGREDIENTS. To prevent the ramp from sticking to the form, Tom coated the styrene with WD-40. Then he mixed the Rockite Expansion Cement to a pancake-batter-like consistency and poured it in the form.



4 THE BREAKAWAY. The WD-40 didn't work so well as a mold release. To release the ramp, Tom had to break off one side of the form.



5 SMOOTHING THINGS OUT. Tom used fine sandpaper to smooth out any rough spots on the ramp. Then he washed the casting to remove any dust and let the ramp air dry.



6 SAFETY FIRST. Tom didn't add guardrails to his ramp. Instead, he used a yellow paint marker to add a safety stripe alerting workers they're nearing the edge of the ramp.



7 FINISHING TOUCHES. After applying a mixture of Arizona Rock & Mineral materials to the lot, Tom added MiniNatur tufts along the base of the concrete ramp.

Next, I mixed the Rockite expansion cement with water to a pancake-batter-like consistency. Once it was thoroughly mixed, I poured the cement into the form and leveled it with a putty knife. It's important to make the pour in one attempt, as the cement dries rapidly. I tapped the sides of the form with a stick to help release any air bubbles.

I allowed the cement to dry overnight before removing the casting. Even though I'd sprayed the form with WD-40, the casting wouldn't pop out. To release the casting, I had to break off one side of the form **4**.

I used fine sandpaper to smooth any rough spots on the casting. Then I washed the casting in warm water and set it on a paper towel to dry overnight **5**. The thin portion at the end of the ramp is extremely fragile, so handle the casting carefully.

FINAL STEPS

Unlike the prototype, I didn't add guardrails to my ramp. Instead, I used a fine-tipped paint marker to add yellow safety lines on the top edges of the ramp **6**. Once the paint dried, I weathered the ramp with powdered pastels.

I positioned the ramp and made sure I had adequate clearance between it and the siding using a National Model Railroad Association standards gauge. I secured the ramp to the layout with DAP gray concrete and mortar filler and filled in any gaps between the casting and the cork base.

Once the ramp was in place, I added a blend of equal parts Arizona Rock & Mineral industrial dirt, driveway and road gravel, and light gray scenery base powder for the lot. I misted the lot with wet water (water with a few drops of liquid dish soap added) from a spray bottle. Then I applied diluted white glue with a pipette to hold the gravel in place. With the glue still wet, I added MiniNatur Autumn and Spring Short Tufts around the base of the ramp **7**.

I completed the scene with pallets of bricks, some discarded pallets, and a forklift. The finished ramp looks great and it gives my crews a place to spot a variety of freight cars. **MR**

Thomas Klimoski and his wife, Diane, live in the Northeast Georgia Mountains. Tom's Georgia Northeastern model railroad was featured in Model Railroad Planning 2016.

Materials list

Arizona Rock & Mineral

1000 industrial dirt
1050 light gray scenery base powder
1350 driveway and road gravel

DAP

18021 gray concrete and mortar filler and sealant

Evergreen styrene

9060 .060" sheet

Hartline Products Co. Inc.

10005 Rockite expansion cement

MiniNatur short tufts

717-24S autumn
717-21S spring

Tamiya

87038 extra thin cement

Miscellaneous

fine-grit sandpaper
fine-tipped yellow paint marker
WD-40



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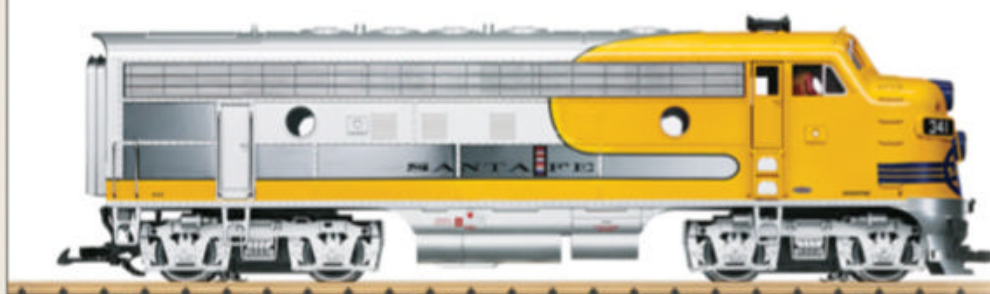
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Better hardshell



scenery



A faster and neater approach to this time-tested technique

By Brooks Stover

Photos by the author

Featured in *Great Model Railroads 2011*, my S scale Buffalo Creek & Gauley (BC&G) model railroad was started 20 years ago using tried-and-true techniques. As the BC&G was set in West Virginia, the 25 x 44-foot layout had a lot of tree-covered mountains. These were built on a scenery base of plaster-impregnated gauze applied over a lattice of cardboard strips or a layer of kraft paper, followed by a layer of Sculptamold.

In 2017, a move to a new home required that I dismantle the BC&G. At age 70, I found myself starting a new layout. I'd planned to build this new version of the BC&G with the same familiar methods. However, it soon became clear that it was time for this old dog to learn some new tricks.

The layout room in my brand-new house was already finished, including a carpeted floor. Consequently, I began looking for ways to avoid the typical mess that layout building can create, especially those involving dripping plaster.

Another consideration was that my workshop was now located at the end of the house opposite the train room. I wanted to find techniques that didn't involve numerous trips back and forth to use the shop's table saw or utility sink. After spending some time exploring ideas in recent hobby publications and consulting several model railroading friends, I came up with the following method for building a sturdy hardshell scenery base with less mess and in less time.

Establishing hillside contours

To capture the look of the prototype, I modeled steep, tree-covered hillsides along the back of the layout. These hills extended to the blue sky painted on the train room walls and also served as the layout's backdrop. In some locations the hillsides are only 6" deep but rise up to a 24" height.

As shown in 1 on the next page, I used 1/8" plywood profiles to define the hilltops. To protect the drywall, I mounted the profiles on 1 x 2 strips.

Buffalo Creek & Gauley (BC&G) no. 4, a 2-8-0 Consolidation, crosses the Sand Fork bridge on Brooks Stover's new S scale layout. Using roll-on wall texture and plastic screen as a hardshell base, Brooks modeled the rolling tree-covered landscape of the prototype.



1 Hilltops. Brooks used $\frac{1}{8}$ " plywood profiles mounted on 1 x 2 spacers attached to the wall, which was painted sky blue with clouds prior to layout construction. The Homasote tunnel liners will eventually be covered by mountainous terrain.



2 Foam profiles. Using a snap-off utility knife, Brooks cut vertical hill profiles from $\frac{1}{2}$ " extruded-foam insulation board. He attached the foam profiles to the plywood hilltops and other points on the layout base with hot glue.



3 Plastic sun-block screen. The ADFORS Sun Guard plastic screen can be easily cut with scissors or a sharp knife. Brooks typically used 12" x 24" sections of screen for large areas and attached the screen to the foam and plywood profiles with hot glue.

I used the profiles from my old layout room, so I only had to cut them to length.

To define the hillside contours, I cut vertical profiles from $\frac{1}{2}$ " extruded-foam insulation board. With its long, slender blade, a snap-off utility knife made it easy to achieve curved cuts. If the plywood profiles hadn't been available, I would've used foam for the hilltops.

I placed the vertical profiles about 8" apart, somewhat closer in corners (see 2). The profiles are held in place by low-temperature hot glue. Unlike adhesive caulk, the hot glue sets up in seconds.

At this point it's easy to visualize the contour of the terrain and make changes before moving on to the next step.

Creating the terrain surface

Keeping with my quick-and-clean theme, I searched for a way to create the hillside surface in as few steps as possible. After some experimenting, I found a plastic screen material called ADFORS Sun Guard. Because it's meant to block sunlight, this material features smaller openings than window screen. These smaller holes make it easy to cover the surface with my hardshell material in only one coat.

I purchased the plastic screen in 48" rolls from my local home improvement center. The material is flexible, easy to cut with scissors or a sharp knife, and takes hot glue well. Most importantly, the plastic won't cut or scratch my skin, which can happen with aluminum screen.

After cutting the plastic screen to fit, I used hot glue to attach the screen to the hill profiles 3. A piece of scrap wood worked well to press the screen into the glue. Larger sections of screen are preferable, as they reduce the number of seams. However, smaller pieces are easier to work with in areas with tighter radii, such as corners. I also used smaller sections to help blend in splices.

The finished screen and foam profile assembly felt a bit springy. However, the surface proved sturdy and didn't sag.

Homax hardshell

The biggest challenge for this project was finding an alternative to plaster for the hardshell. My good friend and fellow S scale modeler Bob Stelmach had the answer. He introduced me to a product called Homax Roll-On Texture, available at most home centers. A thick, latex paint product, Homax is intended for adding orange-peel or other texture to walls and ceilings.

Homax comes only in white and isn't intended to be mixed with other colors. [The material is usually painted after drying. – *Ed.*] However, the helpful paint department clerk at my local home center tinted a couple batches for me, using earth-tone and green colors. A green-tinted batch is shown in 4.

I applied the Homax with a paintbrush. According to the product's instructions, it can be applied in coats up to 1/8" thick. With a little care, I could cover a section of screen with one coat. Because of the thick viscosity of the Homax and the fine mesh of the screen, none of the material leaked through.

The Homax takes about 24 hours to cure. Once dry, the surface is durable and ready for scenicking. A second coat was required in a few areas to conceal seams that wouldn't be fully covered by scenery.

Final scenicking

Adding scenery to the Homax hardshell was the same as with plaster, as shown in 5. The Homax/screen surface backed by foam profiles is strong enough to support plaster rock castings. I had some left over from my old layout that I attached to the new hardshell with hot glue. Then I filled the gaps with Sculptamold. Plaster rocks could also be cast directly onto the Homax hardshell.



4 **Homax hardshell.** Using a brush, Brooks applied tinted Homax roll-on texture over the plastic screen to create the hardshell. Although it's a latex paint product, Homax is the consistency of plaster and usually covered the screen with a single coat.

I completed the hillsides using scenicking techniques I explained in "How to make tree-covered hills" in the November 2012 *Model Railroader*.

As I worked on this article, I made another time-saving discovery. In areas where I applied poly fiber trees, I could eliminate the hardshell step completely. Using 3M Super 77 spray adhesive, I attached puffball trees and clump foliage directly to the plastic screen. Some layout areas awaiting trees are shown in 5.

I also found Homax could be used to fill gaps between layers of foam or make textured surfaces for dirt roads or paths. It's like ready-made "ground goop," such as the substance described in the March 2015 *Model Railroader*. This old dog has enjoyed learning some new tricks. **MR**

A frequent contributor to Model Railroader, Brooks Stover described scratchbuilding a small rail-served dairy in the December 2019 issue.



5 **Trees and scenery.** Once dry, the Homax surface can be scenicked like traditional hardshell. Brooks doesn't bother applying Homax to any area that will be covered by trees. Instead he attaches the poly fiber clumps to the screen with spray adhesive.

Narrow gauge



① A narrow gauge 4-4-0 leads a copper ore train across the Gratiot River on Larry Burk's On30 Laurium, Mohawk & Brockway. The 27 x 38-foot proto-freelanced railroad models a backwoods line in Michigan's Upper Peninsula during the 1930s.

through the U.P.

Switching scales led to more modeling
opportunities on the On30 Laurium,
Mohawk & Brockway

By Larry Burk
Photos by the author





② Phoenix is one of the major towns on the LM&B. In addition to freight traffic, the operations-oriented railroad also features some passenger trains running along the main line.

Why would someone dismantle and sell off a huge dream HO scale layout and switch to On30 (O scale, 30" track gauge, also known as On2½)? I've been asked that question many times and even asked that of myself for a year before making the switch. Why get rid of something I've always dreamed of and go to something completely new?

My HO layout was huge – 30 x 60 feet, with multiple decks – and designed for operation. Building and operating the layout was a great experience. But after I had it for a few years, the novelty wore off, and it frankly became a maintenance headache. I could have fought the urge to move on and stuck with it, but the enjoyment in the hobby was just not there.

So in 2009 I decided to take it down, sell it off, and make the change. As soon as the decision to change scales was made, I found the excitement of model railroading returned. The result is my 27 x 38-foot On30 Laurium, Mohawk & Brockway Ry.

Modeling the other U.P.

I've always been fascinated by backwoods narrow gauge railroading, and having a model railroad quite a bit



③ A double-sheathed caboose marks the end of a southbound freight through a residential section of Mohawk. Larry enjoys building wood craftsman structure kits and adding details, as evidenced by this scene.

smaller would give me the chance to dive into some other areas I'd always wanted to try. When Bachmann introduced its relatively inexpensive On30 line, that really made the switch attractive.

I could've stayed with HO and done narrow gauge in that scale, which would have kept me from having to sell off a lot of my structures. But one thing I really wanted to explore was building more craftsman-type structure kits in O scale. After seeing Joey Ricard's Spruce Coal & Timber modular layout on his

Facebook page, I was hooked. The die was cast.

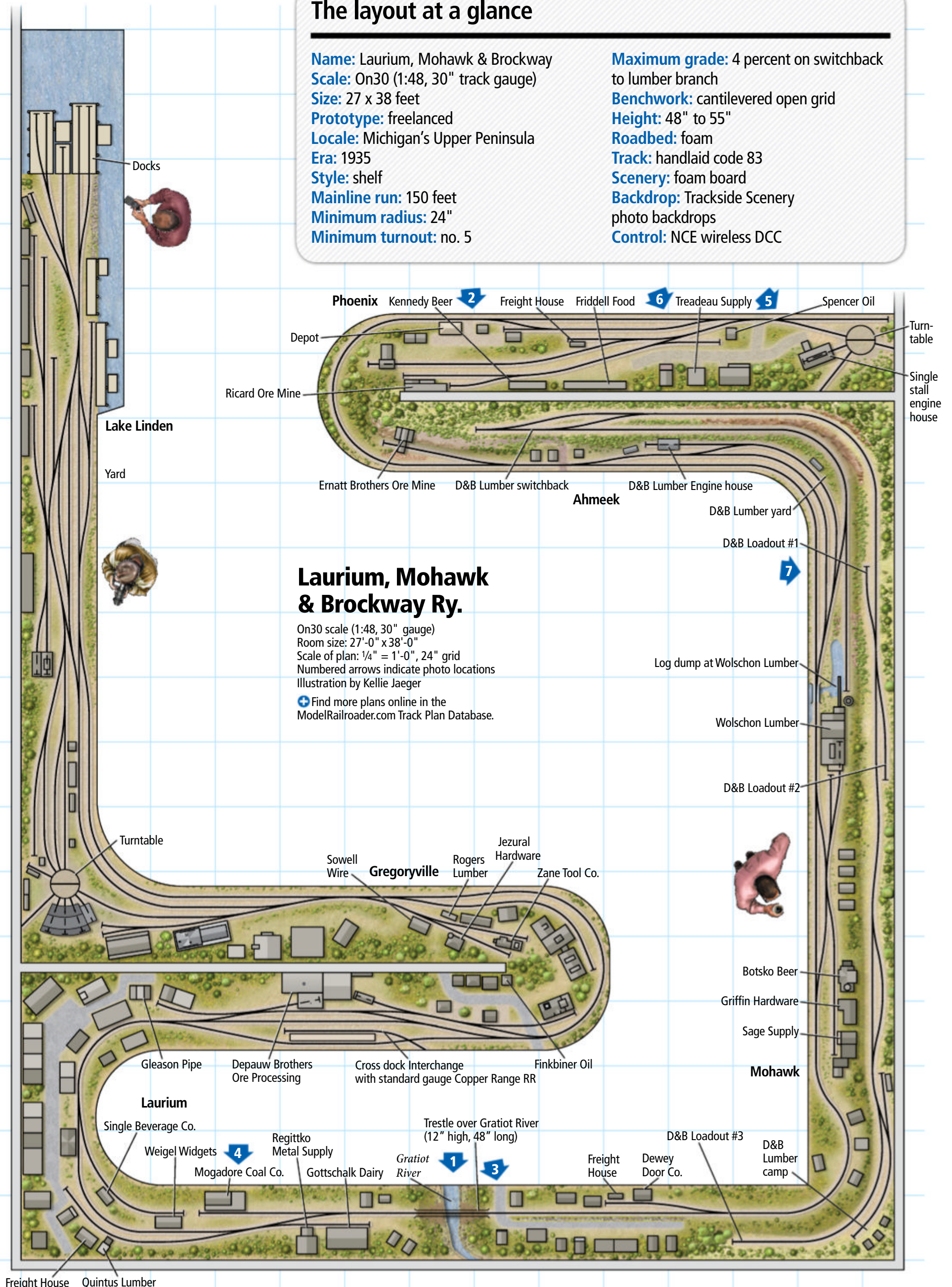
I've always been interested in realistic operation and wanted the new layout to be operation-oriented. But what would the theme and location be for this? My wife is from the Upper Peninsula ("U.P.") of Michigan, and we've spent a lot of vacation time in that area. It's a beautiful place. After doing some research, I decided that's what I wanted to model.

I am a big fan of prototype-based freelancing, or proto-freelancing. The

The layout at a glance

Name: Laurium, Mohawk & Brockway
Scale: On30 (1:48, 30" track gauge)
Size: 27 x 38 feet
Prototype: freelanced
Locale: Michigan's Upper Peninsula
Era: 1935
Style: shelf
Mainline run: 150 feet
Minimum radius: 24"
Minimum turnout: no. 5

Maximum grade: 4 percent on switchback to lumber branch
Benchwork: cantilevered open grid
Height: 48" to 55"
Roadbed: foam
Track: handlaid code 83
Scenery: foam board
Backdrop: Trackside Scenery photo backdrops
Control: NCE wireless DCC



Laurium, Mohawk & Brockway Ry.

On30 scale (1:48, 30" gauge)
 Room size: 27'-0" x 38'-0"
 Scale of plan: 1/4" = 1'-0", 24" grid
 Numbered arrows indicate photo locations
 Illustration by Kellie Jaeger
 Find more plans online in the ModelRailroader.com Track Plan Database.



part of the U.P. I wanted to model, the Keweenaw Peninsula, did have a narrow gauge line, but I wanted mine to be more extensive. After establishing the area I wanted my railroad to serve, I formed an operational plan. The railroad would haul copper ore and lumber products along with the usual boxcar traffic. To impart a “hanging-on” look and feel, I chose 1935 as the modeled time period, so the layout would be set during the down side of the boom the area had experienced previously.

Linking to the standard gauge

The railroad would connect with the outside world via car float/barge

operation at the southern terminus, Lake Linden. The line would continue north to the Keweenaw, serving copper mines and the dwindling lumber industry.

With that established, I needed to pick the towns to be served. I settled on Laurium, Mohawk, and Phoenix. With the addition of Brockway, I had the name for the railroad using my initials as reporting marks: LM&B for the Laurium, Mohawk & Brockway Ry.

Having been an HO modeler all my life, I knew I would need to get comfortable with the mass of O scale. I planned to use a lot of kits for structures, so I was able to mock up these using dimensions provided by the manufacturers. I put a lot of boxy cardboard mock-ups around

4 It’s not all steam on the LM&B. At Laurium LM&B no. 8, a Whitcomb center-cab diesel, works the Mogadore Coal Co. dock.

the layout; moving them around gave me a good idea on how things would fit into a scene. With the addition of signs on the boxes, we had the basic requirements for operating sessions.

When designing my railroad, I had no intention of including any standard gauge. However, when trying to explain to visitors the difference between my narrow gauge railroad and the standard gauge most are used to, it seemed my explanations weren’t getting through.

I had a space at Laurium of 10" x 60" and was looking for an industry to



provide more switching opportunities for my operating crew. After placing an O scale standard gauge boxcar on the layout, I saw that a cross-dock break-bulk interchange was possible. The standard gauge portion could be a dead-end spur of the Copper Range RR from nearby Calumet and hold a few freight cars; it didn't need to be powered.

I enjoy handlaying track and decided to make the narrow gauge line at this interchange double-ended to allow picking up loads going north and dropping the empties going south. This meant scratchbuilding a standard/narrow gauge diamond crossing at one end.

During an operating session, each of the six road freights stops to pick up a



5 Phoenix is the end of the line on the LM&B. Locomotive number 24 will be turned and readied for its trip back to Lake Linden at the other end of the railroad.

car that's switched into an industry down the line. The empty from that industry is then dropped back at the break-bulk platform on the return trip.

So it's win-win: There are more operating possibilities, and it's now easy for visitors to appreciate the size difference between the standard and narrow gauge equipment.

Handlaid track

Handlaying track was something I'd always wanted to try. I salvaged enough code 83 rail from previous layouts to get the ball rolling, and with the purchase of ties and Fast Tracks turnout jigs, I was off and running.

I'd heard others say that handlaying track is a very relaxing part of the hobby, and once I got into it, I have to agree. Perhaps it's the concentration needed, but it always seems very relaxing – and quite frankly easy to do. With my railroad being a bit run down, any wavy track from handlaying would only add to the character – as long as the trains ran well. Keeping ballast to a minimum also helps to convey the feeling I'm after.

Slow pace of operations

I'm part of an active round-robin operating group. Getting to operate on many other layouts gave me the chance to put a "givens and druthers" list together. I like slower, laid-back

operations where you can relax and enjoy the time, so that's what I was after in designing this layout.

My previous HO layout hosted 17 to 20 operators per session, and restaging was a major job. With the new layout, people are often surprised that there's no staging. The main yard at the docks in Lake Linden holds 30 cars. The rest of the layout holds another 30 cars, so we build six trains of five cars each and switch every industry on the line.

At the end of the session, there are typically 30 cars in the yard and 30 cars spotted at the industries. The only restaging I need to do between sessions is to cycle the waybills and swap the open ore loads.

I use an NCE Digital Command Control (DCC) system on my On30 railroad that's left over from my previous HO layout. With such a large operating crew on the old layout, the system had to be easy to use, and we found that the NCE system fills the bill.

Since the area I cover on my railroad is very rural and backwoods, roads for vehicle traffic are at a minimum, and passenger traffic is the norm on the railroad. Having the passenger trains carry a boxcar of less-than-carload lot merchandise gives passenger crews a chance to do a bit of switching at the towns.

All trains originate from the yard at Lake Linden, run the length of the railroad to Phoenix, turn, and return to Lake Linden. Each train has work to do

at every town. Although each town has a passing siding, hence a runaround capability, only trailing-point moves are done. Any facing-point switching is done on the return trip. As is the case on many full-size railroads, we find it really helps the flow to avoid multiple run-around moves.

Based on what I've learned after numerous operating sessions, I'm going to add a few more industries to be switched. To accommodate this, I will also need to add capacity to the yard at Lake Linden. I may use all four cycles of the waybills to have a car appear at a different industry for successive sessions.

The main line is 150 feet long. Since the actual distance from Lake Linden to Phoenix is approximately 15 miles, it was easy to make each 10 feet on the layout represent a "scale" mile. This will come in handy as I develop the timetable schedules for the varnish.

During an operating session, all trains run as extras as the yardmaster builds them. I plan to develop a schedule and install fast clocks so we can run timetable-and-train-order operations.

Rapid progress

I've done a lot in a short period of time with this layout. Reusing existing benchwork has really helped. The previous double-deck layout had benchwork at 30" and 60". I wanted only a single deck on the On30 layout, so I split the difference and ended up with one deck about 48" high. The logging branch line climbs another 7" up a switchback, which was another item on my list of must-have features.

I'm in good shape for motive power. The larger 4-4-0 locomotives from Bachmann have proven to be good runners and handle all road trains. We use a 2-4-4 Forney to switch Phoenix while the crew turns and services the road engine. I've recently added a Whitcomb center-cab diesel to use as the Lake Linden yard switcher.

The logging line is named after my buddy Mike Kennedy's D&B Lumber layout. This provides some different motive power: geared Shays and Heislars. I've also worked in a small amount of interchange traffic between the LM&B and the D&B to provide supplies and an outlet for the D&B pulp cars.

Since I've been in On30, I've found several suppliers of appropriate rolling stock and detail parts. There are some excellent car kits now available and quite a few locomotive kitbashing suppliers;



6 At Phoenix, the usual switcher is a 2-4-4 Forney, shown here working Spencer Oil. The Forney and most of Larry's other steam locomotives are On30 models from Bachmann Trains.

one big advantage with On30 is the ability to use HO scale mechanisms with no modifications. I've been a big fan of Eastern narrow gauge lines over the years, and there are quite a few kits based on freight cars from those lines.

As of this writing, scenery on the layout is about half complete. I found using stacked extruded-foam insulation board as a scenery base allows for easier modifications as I work around the layout.

I didn't follow a detailed track plan, but rather sketched out the general location of the main. Then I located industries and tracks as I worked on a specific

area. This is where the cardboard box mock-ups came in handy. It's very easy to move these around to see how they and the track serving them will fit. I enjoy scratchbuilding structures, so any building needs not covered by available kits were met with my own custom-built models.

Rewarding move up

The move from HO to On30 was a big one for me, but I've never looked back. The larger size of the O scale equipment and buildings is coming in handy as my eyes age. And I'm really enjoying the slower pace of the operating sessions.

With half the layout yet to be done, I have enough to keep me busy for a long time. **MR**



7 A geared Shay locomotive trundles past Loadout no. 1 on the D&B Lumber Co. line. Connected to the LM&B by a switchback at Ahmeek, the logging line climbs a 4 percent grade to an elevation 7" above the rest of the layout.



Meet Larry Burk

Larry Burk is a retired locomotive engineer who lives with his wife, Leona, in Holly, Mich. In addition to model railroading, he enjoys spending time with his six grandchildren, fishing, and gardening.



• BUILD A LONG -

Bridges are a favorite scenic feature of model railroaders. The longer the bridge, the more dramatic, even spectacular, the visual impact becomes.

As anyone who has attempted it can attest, installing even a simple, short, single-span bridge takes some forethought. But when a bridge or viaduct is lengthened beyond a span or two, construction and reliability issues start to arise. How do you keep all of the spans aligned as one continuous structure? How do you make them dimensionally stable? How do you install guardrails so they don't buckle with changes in temperature and humidity?

These were questions I faced when a project in my custom building shop called for an almost scale length representation of the iconic bridges crossing the Potomac River in Harpers Ferry, W.Va. There are two bridges, one double track and the other single track.

The answer was using a length of lightweight aluminum channel as a core. Then I laid and fastened track to the top of the channel and attached girders to the side. In other words, I built the bridge around the core. Aluminum channel is inexpensive and easily found at hardware stores. Being relatively soft, it's easy to cut with a hacksaw and drill through.

For our purposes, I'll define a long-span bridge as anything longer than a single piece of flextrack. Using this technique, it's relatively simple to build a bridge as long as 8 feet in length. That equates to 1,280 scale feet in N, and 696 feet in HO. Though I'm using an N scale project as an example,

this approach could apply to any scale.

Lance Mindheim is a frequent contributor to Model Railroader and its annuals and special issues. He's also the owner of The Shelf Layouts Company, Inc. (shelflayouts.com), a custom layout-building firm. Lance lives in Silver Spring, Md.

- SPAN BRIDGE

These simple construction techniques ensure stability

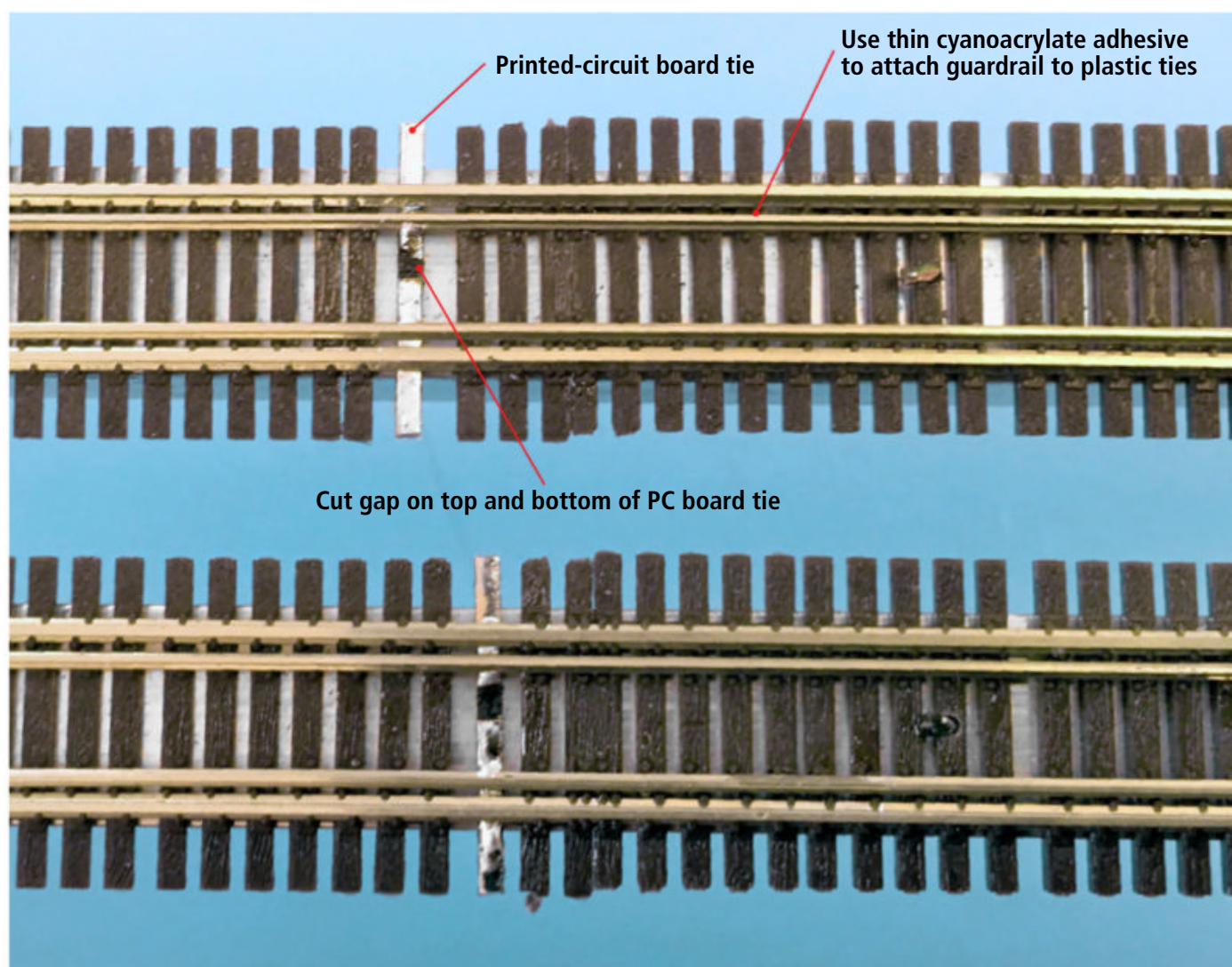
By Lance Mindheim

Photos by the author



With a length of 7½ feet, this in-progress N scale model of the double-track bridge across the Potomac River in Harper's Ferry, W.Va., scales out to a whopping 1,200 scale feet in length. Building long-span bridges such as this requires special techniques to ensure dimensional stability and make overall construction easier.

STEP 1 CUTTING THE CHANNEL AND ADDING GUARDRAILS



Begin by measuring the length of the bridge span. If the abutments are already in place, allow roughly $\frac{1}{16}$ " of clearance on the ends between the aluminum channel and abutment. The channel I used comes in 8-foot lengths. Mark the length on the channel and cut it with a hacksaw. Clean up any burrs with a file.

Because the span is relatively long, the risk of the guardrails buckling with changes in room temperature and humidity is significant. For each 3-foot section of flextrack, I removed three plastic ties and replaced them with Clover House printed-circuit (PC) board ties. After soldering the guardrails to the PC board ties, I applied thin cyanoacrylate adhesive (CA) to the rest of the length of the rail.

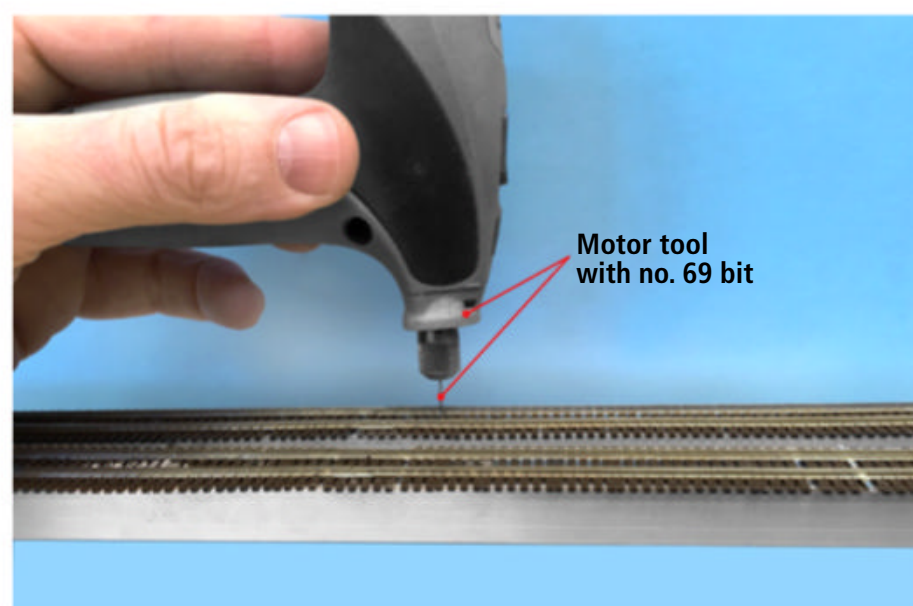
STEP 2 BUILDING THE CORE AND ATTACHING TRACK



With the guardrails in place, I attached the track to the top of the channel. For double-track lines I used two aluminum channels laid parallel to one another, kept apart by a square spacer dowel every several feet. For this N scale project I used a $\frac{1}{2}$ " aluminum channel and a $\frac{1}{2}$ " square spacer dowel. Adjust the size of your channel and spacer dowels accordingly for other scales.

I used epoxy to secure the spacer dowels to the channel, forming the core. For a single-track bridge or viaduct, the process is much simpler; just lay the track on a single piece of channel.

For double-track spans, I aligned the outer railhead with the outside edge of the channel. For N scale, I use a 1"



parallel track spacing. I didn't want to rely solely on glue to attach the track to the channel, fearing it might loosen over time. I used a motor tool with a no. 69 bit to drill through the tie and into the aluminum channel every foot or so. I then set a Micro Engineering no. 30-104 medium spike in the hole and lightly tapped it down.

The spikes I used were .032" diameter; a no. 69 bit is .029". To find the exact drill bit size for your situation, experiment on a scrap piece of aluminum channel first. The hole shouldn't be so small that it's difficult to drive the spike in or so large that the spike isn't snug. You want the hole to provide just enough friction to hold the spike.

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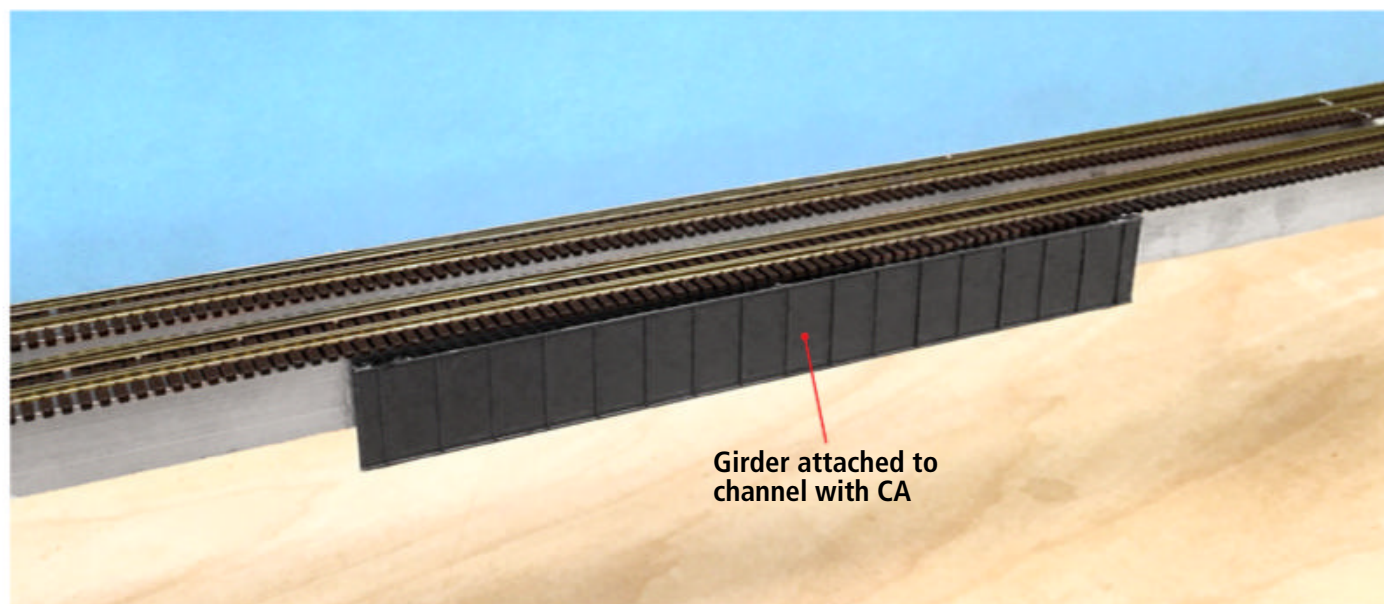


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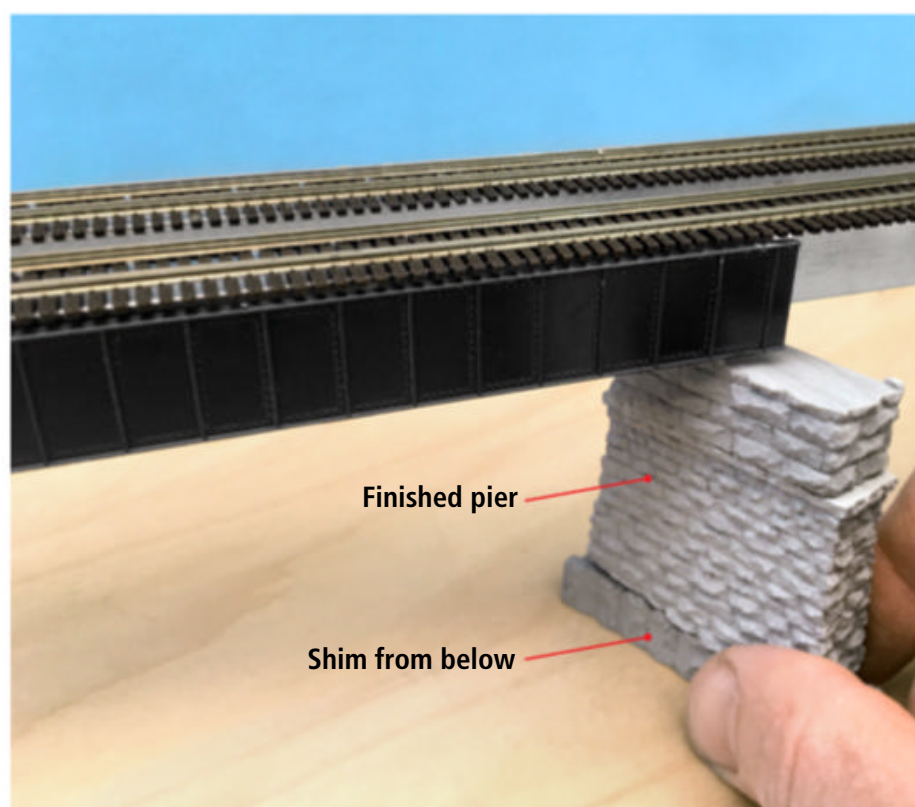
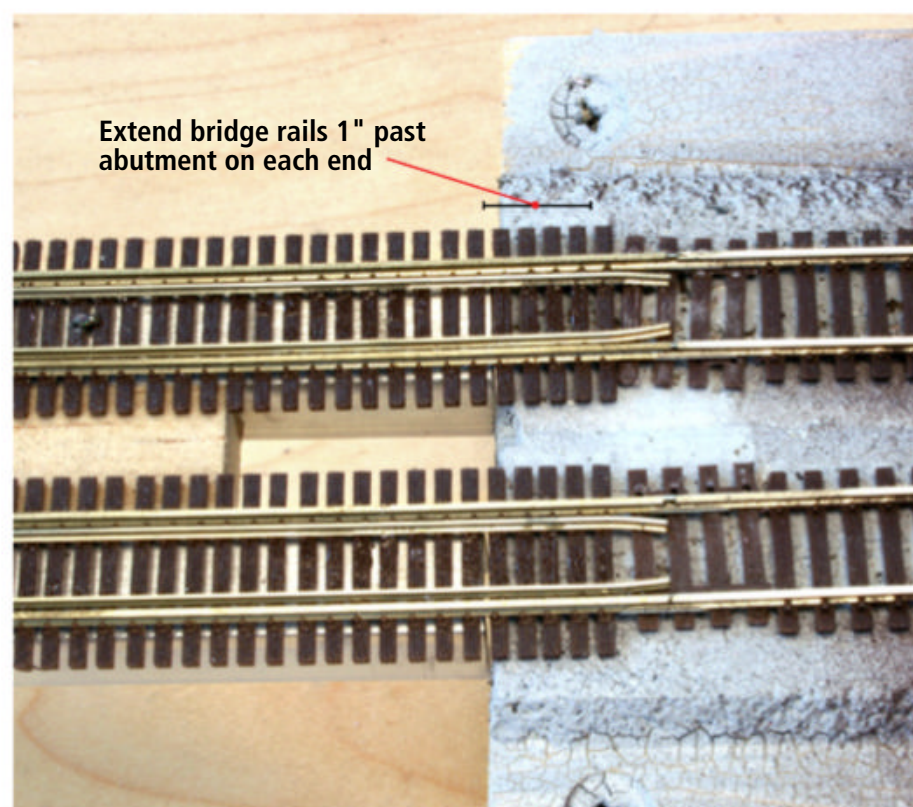
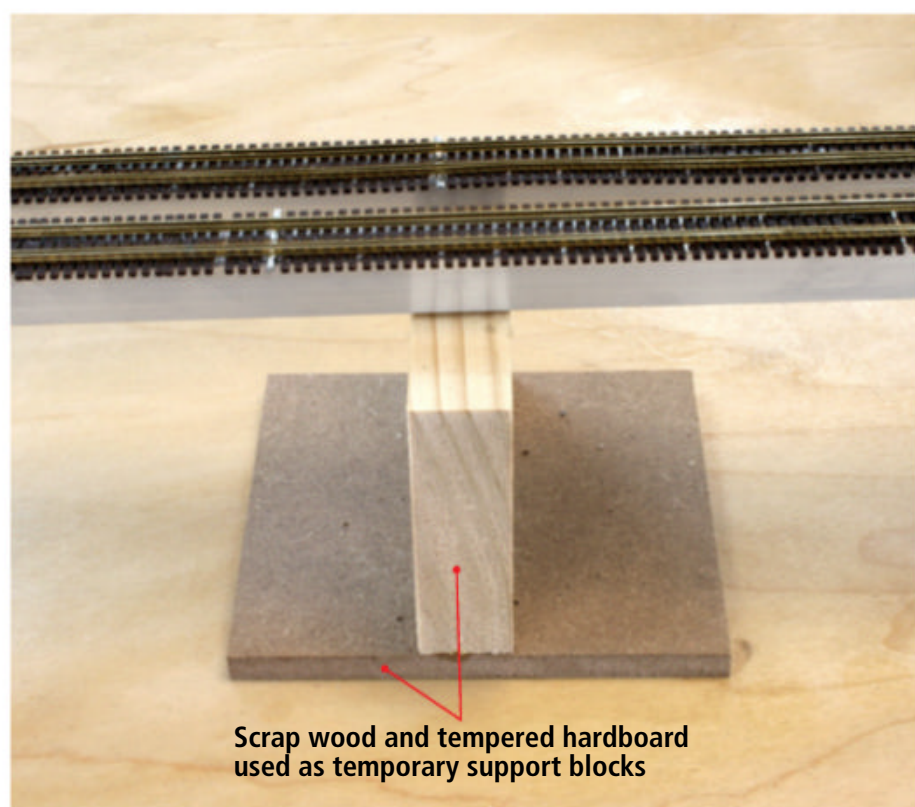
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STEP 3 DETAILING THE BRIDGE



The assembly of bridge track on aluminum channel is light, strong, and easy to move to the workbench for detailing. I attached the girders to the side of the channel with CA. Atlas Model Railroad Co., Central Valley, and Micro Engineering are among the suppliers of these parts. Then I added other details to match the prototype I was modeling.

STEP 4 INSTALLATION AND FINISHING TOUCHES



I mounted the bridge in two steps. First, I supported the span with temporary blocks. Then I replaced the blocks with detailed piers. You can always reverse the order of mounting and detailing. Mount the assembly, run trains until you're satisfied with its reliability, then remove it for detailing and painting.

When I was ready to install the bridge, I first set it across the span with each end resting on the abutments. I ran the bridge track an inch or so past the abutments. If you place the joint where the bridge meets the abutment, you run the risk of a bump at the joint. Then I temporarily supported the span with blocks of wood and made sure trains ran smoothly over it.

Finally, I took the finished piers, brought them up from the bottom until the bridge shoes just touched the bottom of the girders, and shimmed them into place from below. And with that, I had an exceptionally strong and stable long-span bridge that will provide stress-free operation without having to worry about dimensional stability or damage. **MR**

LokSound for a Baldwin sharknose



Virginian & Ohio Baldwin sharknose no. 267 heads up a consist on a run-through special on Larry Puckett's Piedmont Southern layout. Larry upgraded the Bachmann model with a LokSound 5 decoder to add that Baldwin 608 diesel engine rumble.

Models of the Baldwin

sharknose locomotive have been around since Mantua produced a die-cast metal version about 1956. The Bachmann model I'm going to work with is more recent, having been released about 2008. That may not seem old enough to qualify this as a true legacy locomotive model, but I couldn't find one of the older Mantuas, so I went with the Bachmann model.

I've always loved the aggressive snout of the shark-nose, so when one came up on eBay at a good price I snapped it up. Had I known early enough that the Southern Ry. tested the Baldwin demonstrators, I might have bought the whole set, but instead I repainted my A unit into the Virginian & Ohio paint scheme to run with my V&O F3A and FA2 units.

Though it's 12 years old, the Bachmann sharknose comes with a basic Digital Command Control (DCC) decoder and has an efficient

flat can motor. In his April 2008 MR review, Steven Otte reported a slipping current of .2 amps with a stall current of .52 amps. Just about any decoder you choose should have a large enough current rating for this installation.

It was an easy matter to pull the old mobile decoder board. It was held in place with only a couple of screws. A quick touch with a hot soldering iron freed the wires.

Removing the old decoder revealed a problem – the four body mounting screw posts protruded far enough into the center to prevent placement of a standard “AT-type” decoder circuit board atop the motor. Fortunately, I had a Decoder Buddy “Mini” motherboard from Nix Trainz (www.nix-trainz.com) that dropped right into place ①.

I secured it with a strip of double-sided foam tape and soldered the track pickup and motor power wires to the board. I also added a golden-white surface-mount device (SMD) light-emitting diode (LED) I found on eBay. In this installation I added a short length of black heat-shrink tubing to the rear end of the model's clear plastic lens insert, leaving an opening just big enough for the LED. This allows me to easily insert or remove the LED any time I need to remove the shell.

As I have before, I used a sugar cube speaker, this time from eBay seller Sugar Cube Audio. The interesting thing about its speakers is the enclosure, for which it offers a range of depths and configurations, and the size of the speaker.

In this case the speaker was 13 x 18mm and the enclosure was an 11mm deep version ①. The combination provided great volume, although I didn't notice any real improvement in the bass response, something I had hoped for with the bigger speaker and enclosure.

The nice thing about these enclosures is they are 3D printed with a ledge on the inside for mounting the speaker itself. A thin line of cyanoacrylate adhesive gave a tight seal, although I did run a small bead around the outer edge of the speaker, as well. One nice feature with their speakers is that actual solder pads are provided, so no need to try and solder the wires to those little spring clips found on most sugar cube speakers.

With the board installed

and all the power connections made I started looking for a 21 pin decoder to go with it. I considered two options: an Electronic Solutions Ulm (ESU) LokSound version 5, and a WOWSound version 4 “Prime” with the new Baldwin prime movers. In the end I chose the LokSound decoder since I hadn't tried the new LokSound version 5 21MTC configuration.

The decoder drops into place on the 21 pins on the board ① (inset). Assuming you have a LokProgrammer device, it's a simple procedure to download the Baldwin 608a sound project from ESU's website and upload it to the decoder. If you don't have a LokProgrammer, then make sure to ask the dealer to upload the file for you when you purchase the decoder.

Programming the configuration variables (CVs) is pretty straightforward assuming all you need to change is the address and a few other simple



IF YOU DON'T HAVE A LOK-PROGRAMMER, THEN MAKE SURE TO ASK THE DEALER TO UPLOAD THE FILE FOR YOU.
— LARRY

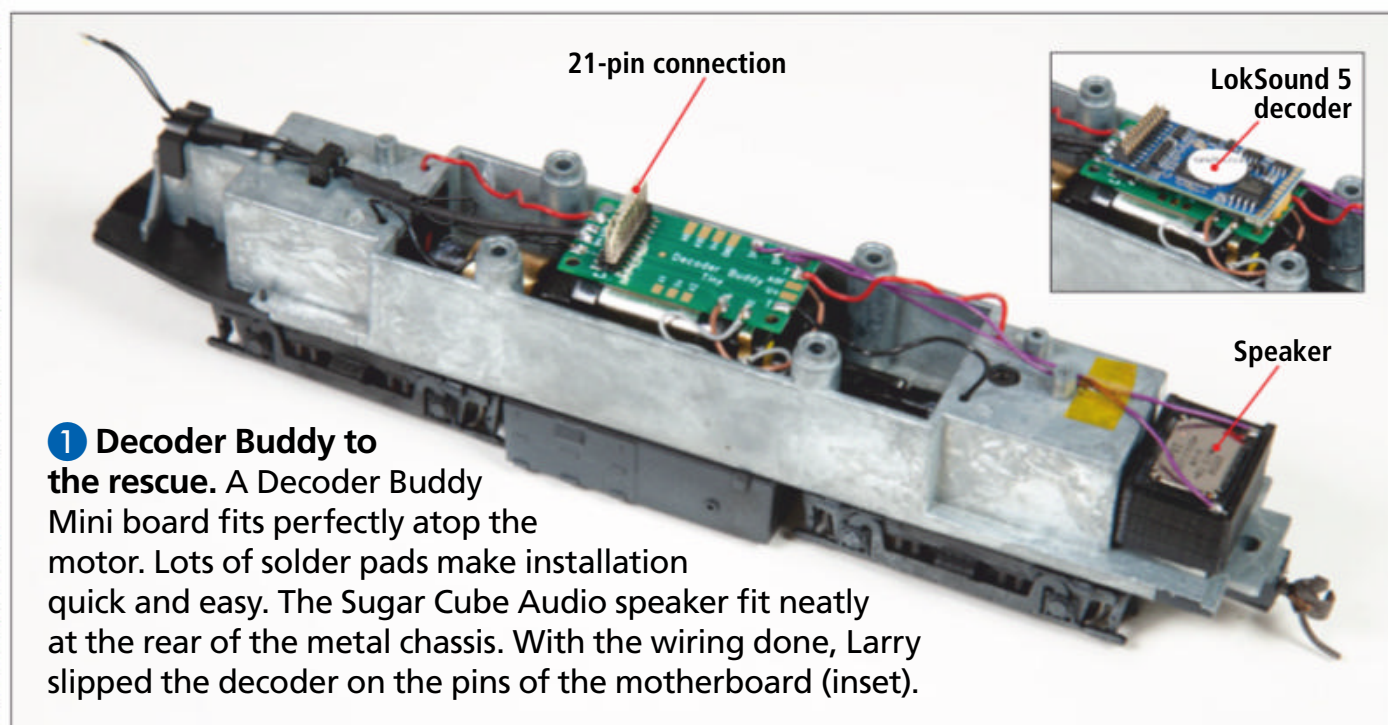
ones. For tips on programming LokSound, decoders check out my DCC Corner column in the May 2018 *Model Railroader*. If you need to program any advanced features, then a LokProgrammer or DecoderPro is almost a necessity.

One issue I ran into was the automatic brake sounds – I couldn't get them to turn on! After exploring a lot of CVs I finally found one (16.2.259) for the brake sound volume, which at a value of 20, was set so low I actually could not hear it. I turned it up to about 200 and now get good brake sound.

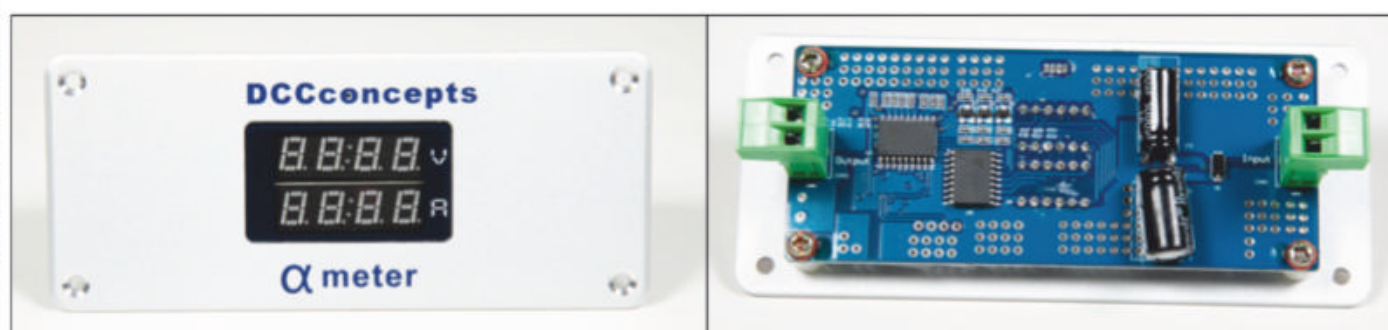
I was impressed both with the LokSound sound package and the performance of the Bachmann model. Even though it only has a single small flywheel, it is very smooth, and as Steven Otte reported in his review, it can pull a respectable number of cars, owing probably to the weight of the large cast metal chassis. One warning I have is that the connector to the rear truck gear shaft slipped off during the installation and required removing the truck to reinstall. For more on this installation and to hear a comparison between the LokSound and WOWSound decoder versions, drop by my YouTube channel, The DCC Guy.

Alpha Meter

Recently I ran across something from DCC Concepts, the makers of Cobalt switch machines. Its new Alpha Meter grabbed my attention, since it's capable of displaying the voltage and amperage of a DCC power bus, very much like the DCC Specialties RRampmeter. The big difference is the Alpha Meter is built into a handsome brushed aluminum faceplate, ready to be installed on a



1 Decoder Buddy to the rescue. A Decoder Buddy Mini board fits perfectly atop the motor. Lots of solder pads make installation quick and easy. The Sugar Cube Audio speaker fit neatly at the rear of the metal chassis. With the wiring done, Larry slipped the decoder on the pins of the mother board (inset).



2 Gauging power. The Alpha Meter has an attractive brushed aluminum faceplate for easy installation on the fascia. Installation of the Alpha Meter is solderless using the provided sets of green screw terminals.

fascia or other prominent location **2**. It can display the voltage and amperage of DCC, DC, and AC power buses, and it senses them automatically. A small LED on the faceplate lights up blue for DCC, green for DC, and red for AC power.

Installation is easy since it has two removable screw terminal connectors on the rear, one for incoming power and the second for outgoing power **2**. A template for making the cutout in the fascia can be downloaded from the company's website. Just mark the location, cut the hole with a jigsaw, and fit the faceplate using the screws provided. Finally, attach the two wires from the command station or booster and the two wires to the power bus, and you're done.

Although they look great on a layout fascia, I installed mine in a fan-cooled box



3 Monitoring power. Larry installed his Alpha Meter in a box mounted under his layout fascia along with his Digitrax DCS240 command station, power supply, and DCC Specialties PSX-4 power manager. The 65 locomotives on Larry's layout are only pulling 1.79 amps while at idle.

along with my power supply, command station, and PSX-4 power manager **3**. With the Alpha Meter installed I can now monitor the voltage and load on my DCC system and also see how much current my locomotives are pulling. You can purchase the Alpha

Meter directly from the DCC Concepts website (www.dccconcepts.com) or from Iron Planet Hobbies (www.ironplanethobbies.com). For a video on how I built the box and installed the Alpha Meter and DCC system, visit my YouTube channel. 

Kato N scale Canadian National 'Transcontinental' passenger train set



If you've been itching to relive the glory days at the end of Canadian National passenger service, Kato is here to help with its "Transcontinental" seven-car set and matching Electro-Motive Division (EMD) F7A and F7B locomotives.

The prototype. Canadian National's transcontinental train was the *Super Continental*. Its competition was Canadian Pacific's *Canadian*. Of the two, the *Super Continental* was considered less luxurious. When the *Super Continental* debuted 1955, it hauled coaches from Canadian Car & Foundry, and sleepers, diners, parlor cars, and buffet-sleepers from Pullman Standard.

In 1964, CN purchased six used Super Domes and six Skytop lounge-sleepers from the Milwaukee Road. This served to close the luxury gap with CP's *Canadian*, which was dome-equipped from its inauguration in 1955.

Despite investments in better equipment, passenger rail travel was declining in Canada due to competition from airlines and better roads such as the Trans-Canada Highway, which opened in 1962 and was completed in 1971.

The *Super Continental* survived into VIA Rail Canada in 1978, where it was the second-tier train to the *Canadian*. The Super Domes continued in VIA Rail service, and at least two are still operated in tourist train service, one on the Napa Valley Wine Train and the other behind refurbished ex-Milwaukee Road steam locomotive no. 261. None of the Skytop lounge-sleepers are still in operation.

The models. Kato created its "Transcontinental" from cars already produced for other name trains, such as the *Olympian Hiawatha* and *Broadway Limited*. The cars include an ex-Union Pacific baggage car, American Car &

Foundry diner, and coach; former Pennsylvania Pullman 10-6 sleeper; and ex-Milwaukee Road Super Dome, Pullman 10-6 sleeper, and Skytop lounge-sleeper.

To pull the set, Kato has re-released its Electro-Motive Division (EMD) F7A and F7B in Canadian National paint, which come as a set, along with a stand-alone F7A to create an A-B-A set. The locomotives use the same mechanism as the F2 and F3 reviewed in the November 2014 issue of *Model Railroader*.

The models have one-piece die-cast metal frames with the motor and flywheels nestled inside. To release the body, remove the front coupler from the A units, then spread the shell and slip it off the frame. There's no need to bother with the truck-mounted coupler on the rear truck of the A unit or the two truck-mounted couplers on the B unit.

A printed-circuit board atop the motor can be removed and replaced with a drop-in Digital Command Control decoder. Many companies make decoders for Kato F units. Kato also offers its locomotives with Digitrax motor-only or Electronic Solutions Ulm LokSound decoders already installed.

The engines were neatly painted in Canadian National's early black and white zebra-stripe scheme with a red nose. Paint was smoothly applied and opaque with sharp separations between the colors.

Photos of F7s in the 1960s show early ditch lights mounted above the anti-climber, three-chime horns, and roof-mounted bells. These would be easy details to add to these locomotives to strengthen their CN appearance.



Comprising Kato's "Transcontinental" set is an ex-Milwaukee Road (MILW) Super Dome ①, ex-UP diner ②, ex MILW 10-6 sleeper ③, ex-UP baggage car ④, ex-MILW Skytop lounge ⑤, ex-PRR 10-6 sleeper ⑥, and ex-UP coach ⑦.



Six ex-Milwaukee Road Super Domes joined Canadian National's fleet in 1964. This car and the Skytop lounge are accurate models of CN cars of the '60s and '70s.

The models don't have steam-generator equipment, which appears to be correct, so a steam-generator car would be a good addition to the set.

The passenger cars have all been released before. The cars from the *Olympian Hiawatha* – the Super Dome, Pullman 10-6 sleeper, and Skytop lounge-sleeper – were reviewed in the March 2018 *Model Railroader*. The 10-6 sleeper from the *Broadway Limited* was reviewed in March 2009, and the Union Pacific baggage and coach in July 2011. The Union Pacific diner is part of Kato's "Smoothside" set, which we haven't reviewed before. While the ex-Milwaukee Road cars are ones that CN owned, the others are reasonable stand-ins.

All of the cars are molded in plastic with flush-mounted window inserts in the body shell. A molded interior insert snaps onto the frame, trapping a metal weight and electrical pickups for interior lighting. The Skytop lounge includes a lighted tail sign, marker lights and table lamps in the lounge.

Paint on the cars was smoothly applied and opaque, with sharp separations between the white and black areas. The CN logos and car names or numbers were sharply printed. Where

appropriate, the window frames have silver-painted frames.

The cars roll on four- or six-wheel trucks as appropriate. All wheels are metal and capable of picking up current for optional interior lighting. Kato's automatic couplers are truck-mounted at the correct height and require the user to install the metal glad hands.

On the test track. Our sample locomotives were DC-powered, so I set up the Kato Master Set, which includes an oval of Unitrack and a Kato power pack to get some performance stats.

The directional light-emitting diode headlight came on and the locomotive started to move at 2V, crawling along at less than 1 scale mph. Top voltage was 13.5V, resulting in a 239 scale mph top speed. At 6V, the locomotive ran at 82 scale mph, about as fast as one could expect from an F unit pulling a passenger train across Canada.

The locomotive has a pulling force of .64 ounces, enough to pull 5 passenger cars on straight and level track. A single locomotive had no trouble pulling the free-rolling Kato cars, and three locomotives were more than sufficient.

I set up the train on our Canadian Canyons project layout, where the CN

Facts & features

Price: "Transcontinental" 7-Car Set, \$250; "Transcontinental" 7-Car Set w/ Interior Lighting Installed, \$355; F7A-F7B set (DC, no sound), \$175; F7A-F7B set (DCC, no sound), \$335; F7A-F7B set (DCC, sound), \$575; single F7A, \$90 (DC, no sound), single F7A, \$170 (DCC, no sound), single F7A, \$90 (DCC, sound), \$290

Manufacturer

Kato USA Inc.
100 Remington Rd.
Schaumburg, IL 60173
katousa.com

Era: 1964-1978

Roadname: Canadian National

Features

Locomotives

- A unit has directional headlight and illuminated number boxes
- All-wheel electrical pickup
- Blackened metal wheels, in gauge
- Drop-in DCC compatible with the Train Control Systems KOD8 series and Digitrax DN163K0B decoders
- Five-pole motor with flywheels
- Kato magnetic knuckle couplers

Passenger cars

- Flush glazing
- Interior of cars can be lighted with 11-211/212 Version 2 Interior Light Kit
- Kato magnetic knuckle couplers
- Metal wheels, in gauge
- Molded interior
- Lighted Skytop lounge with tail sign, marker lights, and table lamps
- **Weights (each):** Coach, diner, Skytop lounge, 1.2 ounces (.2 ounces light per NMRA RP-20.1); baggage car, 10-6 sleepers, 1.3 ounces (.1 ounces light); Super Dome, 1.5 ounces (.1 ounces heavy); F7A and F7B, 3.1 ounces

"Transcontinental" looked right at home. The passenger cars caught a particular tunnel portal on a 13" radius curve – watch out for the overhangs on sharper curves.

This is a handsome set packed with Kato's typical high-quality models. Canadian train enthusiasts wishing to model the mid-'60s through mid-'70s can get a good start on their N scale passenger train rosters with the CN "Transcontinental." – *Eric White, senior editor*



ScaleTrains.com HO scale Thrall/Trinity 42-foot coil steel car

ScaleTrains.com has added a Thrall/Trinity 42-foot coil steel car to its HO scale Rivet Counter line. The injection-molded plastic model features wire and etched-metal details, a simulated wood trough floor with a hand-applied wash, and new American Steel Foundries 100-ton trucks with rotating bearing caps and raised foundry data.

The prototype. The Trinity 42-foot coil steel car was originally designed by Thrall Car Manufacturing Co. in the mid-1990s. TrinityRail purchased Thrall in 2001, and continued to produce the 42-foot coil car until 2012.

Our sample is decorated as CSXT no. 493005, part of the railroad's 493000 through 493524 series. The full-size cars were built by TrinityRail under Files

F11025 and F11029 between March and July 2012.

Sales literature on the TrinityRail website listed features of the prototype car, including running boards on all four sides, wood trough flooring to protect the edges of the coil steel, and a single stackable coil hood. The car can handle coils of various lengths between 30" and 84" in diameter.

The model. The ScaleTrains.com Thrall/Trinity 42-foot coil steel car is part of the company's premium Rivet Counter line. The coil hauler is offered in three body styles, reflecting the car's history: early Thrall, intermediate Trinity, and late Trinity. Our sample is based on the latter, with the end handrails fastened to the car body and a vertical stiffener on

top of the draft-gear box. The other two versions have the end rails attached to the hood ends.

In addition, there are six hood versions. Depending on the style, there are up to 47 separate parts on each hood, including a plastic lifting bail, photo-etched metal handrail stanchions, and wire handrails.

The car includes four modeler-installed hood guides, four load dividers, and five coils (two each 5'-9" and 6'-6" diameter, one 7'-0" diameter). Two sticker sheets are included to wrap the coils, as seen in the photo on the opposite page.

An exploded-view diagram shows the model's construction. At the core is a one-piece body framed by a see-through etched-metal walkway. Below that is the underframe, consisting of the draft-gear boxes, center sills, and crossbearers; the bolsters are separate parts.

The well-rendered brake system includes the air reservoir, brake cylinder, control valve, and related rods and levers. Because of the car's construction, many of these parts are visible from most layout viewing angles.

Measuring up. Our review model is decorated in CSX's dark blue scheme with the railroad's "boxcar" herald and "How Tomorrow Moves" slogan. The small data on the hood and car sides is legible under magnification. The lettering placement matches prototype photos I found online.



The ScaleTrains.com Thrall/Trinity 42-foot coil steel car features a simulated wood trough floor. The details really stand out thanks to the hand-applied wash.



Sticker sheets are included to wrap the five coil steel loads.

The model weighs 1.6 ounces empty, which is 2.6 ounces too light based on National Model Railroad Association (NMRA) Recommended Practice 20.1.

When I added the five coil loads and load dividers, the model weight jumped to 4.3 ounces, .1 ounce too heavy based on NMRA RP-20.1.

There's a method to installing the coils. The large and medium weighted

coils should be placed at each end of the trough. The unweighted medium coil goes in the middle. The small, weighted coils occupy the remaining positions.

I compared the model to a prototype drawing published on the TrinityRail website. The listed dimensions are approximate, but the ScaleTrains.com model closely follows all of them.

The 42-foot coil car ran without incident loaded and empty on our Wisconsin & Southern staff layout. Though the scale couplers are a touch low, the car stayed coupled to other equipment while being pushed and pulled through the layout's no. 5 turn-outs and 30" radius curves.

ScaleTrains.com is the first firm to offer the Thrall/Trinity 42-foot coil steel car in HO scale, and they've set the bar high for any competitors. Fans of contemporary railroading will want to give this well-detailed Rivet Counter line model a look. – *Cody Grivno, group technical editor*

Facts & features

Price: \$46.99

Manufacturer

ScaleTrains.com Inc.

7598 Highway 411

Benton, TN 37307

scaletrains.com

Era: 2012 to present (as decorated)

Road names (four road numbers each):

CSX, Canadian Pacific Ry., Chicago Heights Terminal Transfer RR, Conrail, Indiana Harbor Belt RR, and Norfolk Southern.

Features

- 36" metal wheelsets, correctly gauged
- Metal Type E lower shelf couplers; A end .030" low, B end .020" low
- Minimum radius 18", recommended radius 22"
- Weight: 1.6 ounces (without load), 4.3 ounces (with coils, load dividers, and hood guides added)

13 ALL-NEW PLANNING STORIES!

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Menards HO scale shopping center

Two-story brick storefronts are fine for the transition era, but the modern day is the era of the strip mall. Menards is offering such a structure for HO scale layouts, a factory-assembled shopping plaza with five realistic storefront displays, almost a dozen figures, and more than 30 dazzling light-emitting diodes.

Curb appeal. The structure is built of $\frac{1}{8}$ " medium density fiberboard (MDF) on an acrylic base. The simulated tar paper roof appears to be paper laminated on MDF. The white-painted cornices on the fascia are milled wood, which is rather rough in texture.

The strip mall has five facades, each of which is labeled with a bright, colorful printed sign on the fascia over the sidewalk. Some are named for real businesses, including Chicago Burger Co. and the Whirlpool Appliance store; others are generic, notably the central Dollar Store, whose font bears a passing resemblance to that of a well known dollar store chain.

Each business has a large, modern-looking windowed storefront, behind which is a photo print of an appropriate store interior. Being set back about $\frac{1}{4}$ " from the windows, these pictures do a decent job of giving the impression of an interior, especially if viewed at an angle matching the photo's viewpoint. The building's architecture would be appropriate from the 1980s until today, although you might want to backdate some of the signs for earlier eras.

The sidewalk is populated by 11 painted figures, one of whom is Jack the German shepherd, who is a fixture on every Menards structure. (I was pleased that Jack is responsibly leashed.) The figures are made from a flexible plastic, so one of

the figures on our sample leaned at a gravity-defying angle. Pegs on the figures' feet are stuck into holes with a rubbery glue, so I pulled the uncomfortably reclining figure loose and reinstalled her standing upright.

The structure is less than $3\frac{1}{4}$ " deep, making it easy to fit in compact spaces, but the $11\frac{1}{2}$ " long facade presents the appearance of a much more substantial building. The sides of the building are flat, so a modeler desiring a larger structure could abut two or more side by side, relabeling the businesses on the fascia above the sidewalk.

Light it up. Like other Menards structures, the strip mall is wired with dozens of light-emitting diodes (LEDs) for illumination. The manufacturer's website simply says the building has "more than 30 LEDs;" my count was 32. Since the LEDs are assembled in strips that are cut to length during installation, yours may vary by one or two.

One strip of LEDs illuminates the sidewalk and storefronts; three more strips light up the signs on the fascia. It's a good thing the cornices above the latter hang down slightly in front of the LEDs, because wow, they're really bright.

To power the lights, Menards sells a 4.5V wall-wart-style transformer separately (item no. 279-4061, \$7.99). I would recommend using a 3V power supply instead; a lower voltage will both extend

Facts & features

Price: \$59.99

Manufacturer

Menard Inc.

5101 Menard Dr.

Eau Claire, WI 54703

menards.com/trains

Era: 1990s to present

Features

- Exposed and concealed power jacks
- Five storefronts with printed paper interiors
- Footprint: $3\frac{3}{16}$ " x $11\frac{1}{2}$ "
- Light-emitting-diode lighting (4.5V power supply sold separately)
- Medium density fiberboard, wood, and acrylic construction
- Ten figures, plus a coin-operated horse ride and Jack the German shepherd

the life of the light-emitting diodes and keep their brightness from overwhelming your layout.

The building has two jacks to plug in the power supply: one exposed on the back wall, and one on a short pigtail accessed through a hole in the floor. If you plan on placing your strip mall where the back wall can be seen, you can cover that jack with an advertising sign, a Dumpster, a shrub, or the like.

A downtown highlight. If you're looking for a quick and eye-catching way to fill in a downtown scene on a modern layout, check out Menards' new strip mall shopping center. With its dozens of bright LEDs, it's sure to be a standout. I'm sure Jack the German shepherd will thank you. – *Steven Otte, associate editor*



The structure includes two jacks for powering the LED lights. The one on the back could be hidden by scenery.

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Virtual operating sessions

During a thoughtful dinner conversation about current events one pleasant evening this past summer, a friend quipped: “Count on two things. People always complain about the way things are and they always complain about change.”

What a summer we had! Have our lifetimes ever seen so many cherished traditions affected, including cancellation of numerous regional meets and an NMRA Annual Convention? I checked on regions across the country. Not one had seen normal operating sessions since the crisis began. All lamented the loss. Not one could imagine resuming them before fall.

But our hobby numbers remarkably resourceful people who do change. Operating sessions began to reappear, in new form.

One layout owner explained how he adapted. His normal sessions need a roster of almost a dozen. Instead, he invited three close friends to a limited session, choosing them because he believed they had observed health guidelines faithfully. This small number and the limited operating scheme he designed kept masked operators separated far enough in the layout room to respect physical distancing. I ran several sessions like these on my own layout, using road switching jobs. The pace of operation slowed because I normally assign them to two-man crews. Others described similar experiences and noted that fast clock operation approached 1:1.



Who is that masked man? Conductor Ralph Heiss calls the signals at CP280 for his off-site engineer during a virtual session on Dave Abeles' Conrail Onondaga Cutoff. Jerry Dziedzic photo

Some tech-savvy layout owners have begun virtual operating sessions that could transform our hobby. Participants join via Skype or some similar Voice over Internet Protocol (VoIP) app. Engineers and those in supervisory roles, such as dispatcher and trainmaster, work from home. Only three or four operators are physically present, working as conductors.

Cameras are placed at key locations so off-site participants can see important activity. Engineers substitute JMRI (Java Model Railroad

Interface) open source freeware and smartphone apps such as WiThrottle and Engine Driver for wireless throttles. CTC panels on laptop screens adapt to remote locations easily. Family Radio Service radios are patched into the VoIP network for communication between operators.

Dave Abeles hosted several such virtual sessions on his Conrail Onondaga Cutoff (OC) layout. I joined Dave and three others in his basement, prepared to work as a conductor with Rich Wisneski, my off-site engineer. Dave marked us up for ON-10, a road switcher that serves local industries.

The experience was remarkably realistic. Dave set the OC in 1994, so two-man crews like ours using radio communication fit the picture. Rich “boarded” our power and I guided him through the yard to our train as if I rode an engine step. “Conductor to ON-10, two to a stop for a bad switch.” “One more, ON-10.” “OK west, ON-10. Four to a hitch.” The figures are car counts, which give an engineer the distance seen clear; “hitch” refers to making a coupling. It was realistic to use the radio to direct these moves, because they were all backing moves. Rich would certainly need a second set of eyes if he were seated at the control stand in a prototype engine’s cab.

Realism hit a new level when mainline activity kept us from transmitting during our switching moves without stepping on (interfering with) priority radio traffic between the dispatcher and some through freights. Stymied by this, we hit on the idea to “switch channels,” changing to a different frequency. Many railroads designate yard channels for use in such situations. Smartphones to the rescue! A quick phone call opened a secondary channel so our work could resume.

I’ve been around long enough to witness old-timers grumbling that plastic doomed the hobby. Instead, modelers opened new frontiers in computer-aided design, DCC, and 3-D printing. Engine-mounted miniature cameras could overcome one obvious limitation of virtual sessions; technology will improve others. One day, the operating sessions we miss so dearly will resume. Wouldn’t it be fun to join a session hundreds of miles away, without the complication of long-distance travel? **MR**



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— JERRY

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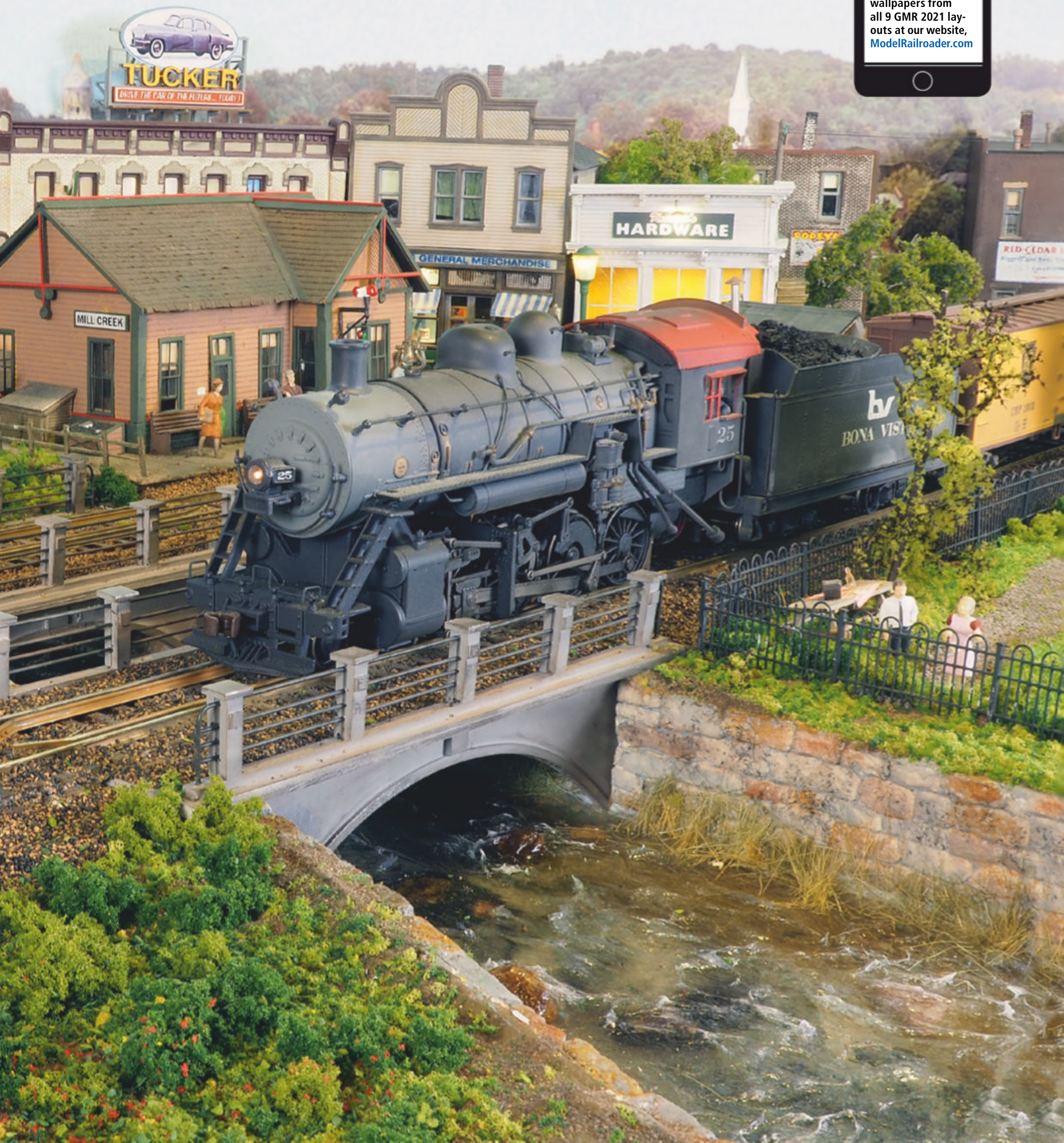
month, Trackside Photos features images from five of those model railroads. *Great Model Railroads 2021* goes on sale in October at your local hobby store. You can also order directly from our Customer Service hotline at 877-246-4879 or from our website at KalmbachHobbyStore.com.

The afternoon way freight passes over the churning waterway that gave the town of Mill Creek its name. Gerry Leone shot the photo on his HO scale Bona Vista RR. The rock wall is by Chooch, and the water is Woodland Scenics Realistic Water with a top coat of gloss medium gel, lightly drybrushed with white paint. Gerry Leone photo



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As a Western Maryland transfer approaches the Curtis Creek bridge, a Chesapeake Bay-style “buyboat” is tied up at the J.D. Groves oyster packing house unloading the day’s haul. Paul Dolkos shot the photo on his HO scale Baltimore Harbor District layout. The boat model is a Maritime Art kit.

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Mosby Station is a model of the Southern Ry.'s Asheville, N.C., station, which was torn down in 1968. The scene was photographed on Ron Hale's HO scale Blue Ridge & Allegheny Ry. The structure was laser-cut in acrylic and assembled by Custom Model Railroads. Lou Sassi photo



Two Alco-led trains – a freight behind an RSC-2 above and the *Boise Flier* with a PA-1 on the point – cross over each other near Vale, Ore., on Glenn Wolfe's N scale Union Pacific Santiam Division. Glenn built his railroad based on MR's 2010 project layout, the Salt Lake Route, then expanded on it. Glenn also shot the photo.

It's a nice day in Union City, W.Va., and the traveling switcher has stopped to pick up train orders and a switch list from the dispatcher. Crews working Steve Bittinger's large scale indoor-outdoor railroad stay in contact with the dispatcher by two-way radio.

Steve Bittinger photo





One of the two daily passenger trains has arrived at Cape Charles station on Doug Barry's On30 Accomack & Norfolk RR. The passengers will ride a steamboat south to Norfolk, Va. Paul Dolkos photo



A few coal mines remain on Dale Latham's Piedmont Southern RR to carry on the HO scale layout's mining heritage, including the truck dump at Hanover Junction. As hoppers wait for loading, a local freight trundles past the general store/gas station. Paul Dolkos photo



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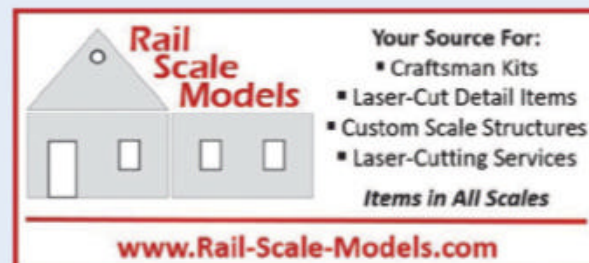
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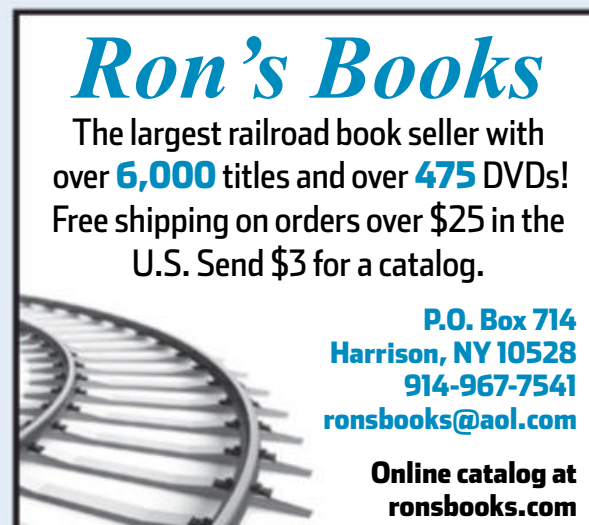
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Schedule of Events

AZ, GLENDALE: ARHS Model Train Swap Meet. Glendale Christian Church, 9661 North 59th Ave. Saturday, November 28, 2020, 9:00am-1:00pm. Admission \$5.00. Tables \$25.00 to sign up send stamped envelope, check or money order to ARHS, PO Box 5816, Glendale, AZ 85312-5816. Contact: Craig Faris 623-340-3529.

CT, NORTH HAVEN: Classic Shows, LLC will hold a Train and Toy Show on Sunday, November 1, 2020 from 9:00am-1:00pm at the Best Western Hotel, 201 Washington Avenue, exit 12 on Interstate 91. Admission \$6.00, children 15 and under are free with an adult. For information please call 203-926-1327 or go to www.ClassicShowsLLC.com

FL, OCALA: Lions Tri-Annual Train Show. First Christian Church, 1908 E Fort King St. Saturday, November 7, 2020, 9:00am-2:00pm. Adults \$5.00, children 12 and under free w/ adult. Bring two canned goods and receive \$1.00 off admission. Information: Bob 352-694-6381 or cell 813-203-3216

FL, PINELLAS PARK: Zitnik Trains Parking Lot Swap Meet. Sunday, November 8, 2020. 9am-1pm. 5193 73rd Ave. North. Zip: 33781. Seller setup, 7:30am. Free admission & parking. Our customers will be selling and swapping model trains and accessories, all gauges from N – G. While you are there, please also check out the store! 727-201-9668

FL, PINELLAS PARK: Regal Railways Presents a Toy Train, Collectible and Hobby Christmas Show/Sale. Lopez Hall, 7177 58th St. North, Saturday, November 28, 2020. 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.

IL, ST. CHARLES: 29th Annual Chicago Railroadiana and Model Train Show. Kane County Fairgrounds, 525 South Randall Rd. Sunday, October 18, 2020, 10:00am-3:00pm. Admission: \$6.00 (includes tax). Tables \$60.00. For information: 847-358-1185, RussFierce@aol.com or www.RRShows.com

IN, DANVILLE: Central Indiana Division-NMRA annual Danville Train Show at Hendricks County Fair Grounds, 1900 E. Main St., Danville, IN 46122. Saturday November 21, 2020. 10:00am-3:00pm. Admission \$3.00 adults, \$5.00 family. Operating Layouts, Vendors, Clinics, Food. Dealer Tables 8 feet at \$16.00. Info: johnporay@gmail.com or 317-627-1660. CID website <http://cidnmra.org>

MA, MARLBOROUGH: Hub Division NER/NMRA CANCELLED ITS TRAIN SHOW at the Royal Plaza Trade Center, scheduled for December 5 & 6, 2020. Next year the show will be on Saturday, December 4, 2021; 10am-5pm, and Sunday, December 5, 2021, 10am-4pm. Admission: \$12.00; Children under 12 and Scouts in Uniform FREE; hope to see you then. www.hubdiv.org

ME, BREWER: Eastern Maine Model Railroad Club Show. Jeff's Catering in Brewer, 15 Littlefield Way. Saturday, November 21, 2020, 10:00am-3:00pm. Admission \$4.00 for adults, under 12 free. Dealers, silent auction and operating layouts. Geoff Anthony, PO Box 187, Blue Hill, ME 04614, 207-374-2786, dahak@roadrunner.com

MI, EAST LANSING: UPDATE-Cancelled due to Covid-19. Lansing Model Railroad Club Show and Sale. Michigan State University Pavilion, 4301 Farm Lane. Sunday, November 22, 2020, 10:00am-4:00pm. Admission \$6.00, under 12 free. Michigan's largest train show: layouts, demonstrations and 500+ tables. Free parking. Flyer, table forms and map, www.lmrc.org or call Ron St. Laurent 517-256-3588

OH, DAYTON: Dayton Train Show, The New Montgomery County Fairgrounds, 645 Infirmary Road, Dayton, OH 45417. November 7-8, 2020. Saturday, Nov 7, 11:00am-5:00pm and Sunday, Nov 8, 11:00am-4:00pm. Admission: \$8.00 per adult, children 12 and under free with paid adult. Gail Yarnall, PO Box 341233, Dayton, OH 45434, 937-301-0746, NMRA.Div.3@gmail.com. Go to <http://www.DaytonTrainShow.com> for updates.

OH, MT. HOPE: UPDATE-CANCELLED. CJ Trains Fall Train and Toy Show. Mt. Hope Event Center, 8076 St. Rt. 241, Zip 44660. Saturday, November 7, 2020, 10:00am-4:00pm. Admission: \$5.00, under 12/FREE. \$25.00/dealer table, 600+ 8' dealer tables. Contact: Jon Ulbright, PO Box 446, Wooster, OH 44691. 330-262-7488, cathijon@ssnet.com www.cjtrains.com (GPS info: 8076 St. Rt. 241, Millersburg, OH 44654)

PA, ALLENTOWN: ATMA First Frost Train Meet, scheduled for November 2020, has been cancelled due to Covid-19 restrictions. Please visit www.allentowntrainmeet.com for future event information.

PA, NEW CASTLE: BLRHS Fall Train Show. Shenango Twp VFD Social Hall, 2424 E. Washington St., 16101. Next to Dunkin Donuts. Sunday, October 11, 2020, 10:00am-3:00pm. Adults \$5.00 (\$4.00 if you mention Model Railroader ad). Children under 12 free. For show info: blrhs.org or table reservations: Clark McKim cmckim1@verizon.net 412-974-0935

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CLOSING DATE:

December 2020 closes Sept. 23
January 2021 closes October 19

All listed events were confirmed as active at the time of press. Please contact event sponsor for updated status of the event.

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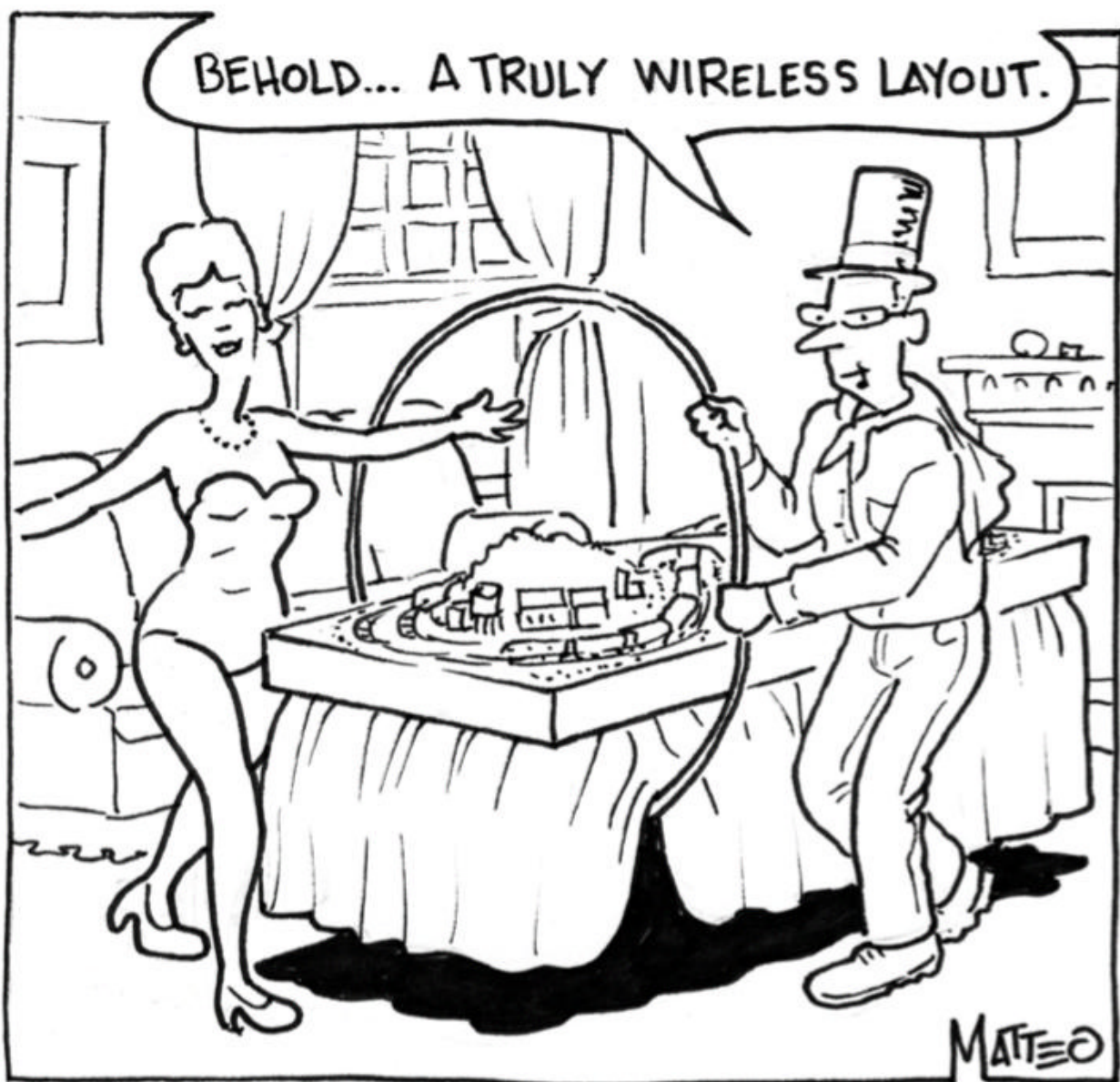
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2B In Trains	59	Model Rectifier Corp.	7
45 Years MR&T	25	Modeler's Marketplace	68-69
Atlas Model Railroad Co., Inc.	5	NCE Corp.	20
Axian Technology	29	Nicholas Smith Trains	21
Azatrax	59	PECO Products.	27
Bachmann Industries, Inc.	76	Pre-Size Model Specialties	59
BPL	59	Proxxon, Inc.	21
Circuitron	14	Rapido Trains.	2
Classic Metal Works	13	Ready to Roll, Inc.	15
CTI Electronics	6	Right on Track Models	29, 59
Custom Model Railroads	6	Roco	19
CVP Products.	13	SBS4DCC.com	59
Digitrax	25	Showcase Express.	29
Evan Designs	59	Sievers Benchwork	14
Evergreen Scale Models	29	Soundtraxx	21
Factory Direct Hobbies	16	Spring Creek Model Trains LLC.	59
Good Deals DDC	59	Titchy Train Group.	59
Halfpricehobby.com	15	Trackside Model Railroading	59
Innovative Electronic Solutions	21	Train Sets Only.	59
Integ Process Group, Inc.	15	Trains & Travel	59
Kato USA Inc.	75	Trains.com	57
LGB	33	Trainz.com	6
Locolinc	15	Trix Trains.	13
Mainline Hobby Supply.	59	WifiTrax Model Science	59
Mainne Benchworks	59	Wm. K. Walther.	3
Menard, Inc.	17	Woodland Scenics.	9
Micro-Mark	15	Yankee Dabbler	14
Model Railroad Planning 2021	55	Z-Stuff for Trains	14
Model Railroad Planning 25 Year DVD	29		
Model Railroader & Trains 2021 Calendars.	27		

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How we see things

Everything is relative. The most obvious example of this in our hobby is when we are exposed to models in a larger scale than we're accustomed to modeling in. Suddenly our models seem smaller than they did the day before. But after a while, they assume their normal sizes in our eyes.

The accompanying photo by James McNab shows another example of relativity. How we see our models often depends on our own perspective. If we always look down on them, perhaps because our benchwork is lower than it might be, we won't be accustomed to seeing this view of a boxcar as it rolls past.

Modeling in a larger scale

or building a layout at eye level tends to make it easier to regularly achieve such realistic views of our models. But James models in HO, and his layout isn't built at stratospheric heights. So what you see here is simply a case of him taking time to set up a photo that shows his railroad in a realistic manner.

But in doing so, I'm sure he has achieved much more than that. He wouldn't bother doing that in the first place unless he already saw his railroad in a realistic manner. The photo was simply a way to convey what he strives to achieve to others he regularly communicates with online and via print. Put another way, it's an attitude about model railroading.

In the February 2020 MR, "On Operations" columnist Jerry Dziedzic wrote about making the guy with the wheels come get the guy on the ground. No sense walking from here to there when you can hitch a ride, as the fellow on the boxcar is clearly doing in James' photo above. I'd be



The conductor has signaled to the engineer to move a boxcar load of OSB – which originated at Weyerhaeuser in Edson, Alberta – into Beisser Lumber in Urbandale, Iowa, on James McNab's Iowa Interstate Grimes Industrial Track HO railroad. James McNab photo

surprised if James goes to the trouble of sticking a figure on the last car every time he makes a switching move – although that could be done, come to think of it – but the figure's presence in the photo shows he envisions its function as he switches, just as he sees that HO freight car as 87 times larger than it is.

This isn't legerdemain. It's attitude. And it's free. Anything we can do to get more value out of our models ups the ante.

I know from James' online comments that he takes a great deal of pride in observing scale speeds. His brand of railroading differs from mine; I'm a steam-powered fast-freight advocate. But my railroad is designed and built to accommodate that; his is designed and built to emulate a more modern time when short lines and regional railroads reinvigorated portions of former Class 1s that had seemingly outlived their economic usefulness to the continental rail network.

He obviously has observed his chosen prototype very

carefully. So when he operates his scaled-down version of the Iowa Interstate, the line between what he actually sees in his basement and what he superimposes from his memories and research is probably indistinct. I see that as an ideal situation.

Remember George C. Scott playing the role of Gen. George Patton in the movie of the same name and hearing the trumpet call of battles long past? Patton (or at least the movie version) surely saw the past and present as both occupying the same space-time, just as James is deriving more value by combining what he's modeled with what he's studied and witnessed firsthand.

Anything we can do to increase the realism of our models or their actions is almost certain to increase our enjoyment of the hobby. In many cases, as here, this

involves nothing more than establishing a more realistic viewing angle, or perhaps of making a conscious effort to block out everything that doesn't relate to the railroad and what it's doing in the here and now.

At this time, modelers are blessed with a cornucopia of excellent models ready to run right out of the box. Minor tweaks and some weathering are often sufficient to allow them to assume their roles as participants in the daily march of commerce across our modeled portion of the larger rail network.

But no amount of detail will overcome a lack of proper perspective. If we're content to view our models from high above as though we're flying by in a helicopter, we'll never achieve what James has captured in the accompanying photograph: a realistic view of our railroads. **MR**



N
Scale



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