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Model Railroader

Scaletrains.com
SD40-2 p.62

November 2017
www.ModelRailroader.com

Big and busy on the Pennsy

Get inspired by this O scale railroad p.32



A 'whatever's handy' DCC decoder installation p.28

PLUS

Detailing the inside of a boxcar p.26

A spare room-sized N scale track plan p.55

Z scale layout built into a closet p.50

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- Low headlight
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910-20161 #7484 SoundTraxx Sound & DCC
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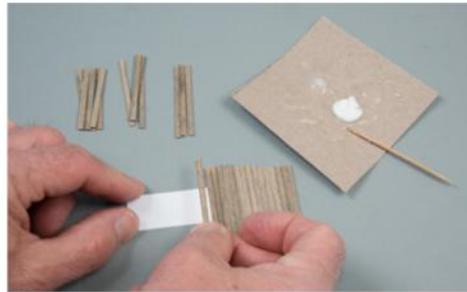
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On the cover: Sharks prowl the main line on John Sethian's O scale PRR Nassau Division layout.

Paul J. Dolkos photo



Next issue

In December, we visit the S scale Ahnapee & Western RR, build a classic "box of sticks" freight car kit, learn how to compose a realistic bridge scene, and more!

MREXTRA

www.ModelRailroader.com
subscriber extra



Video on
www.MRVideoPlus.com

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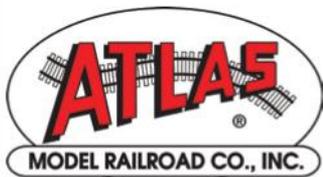
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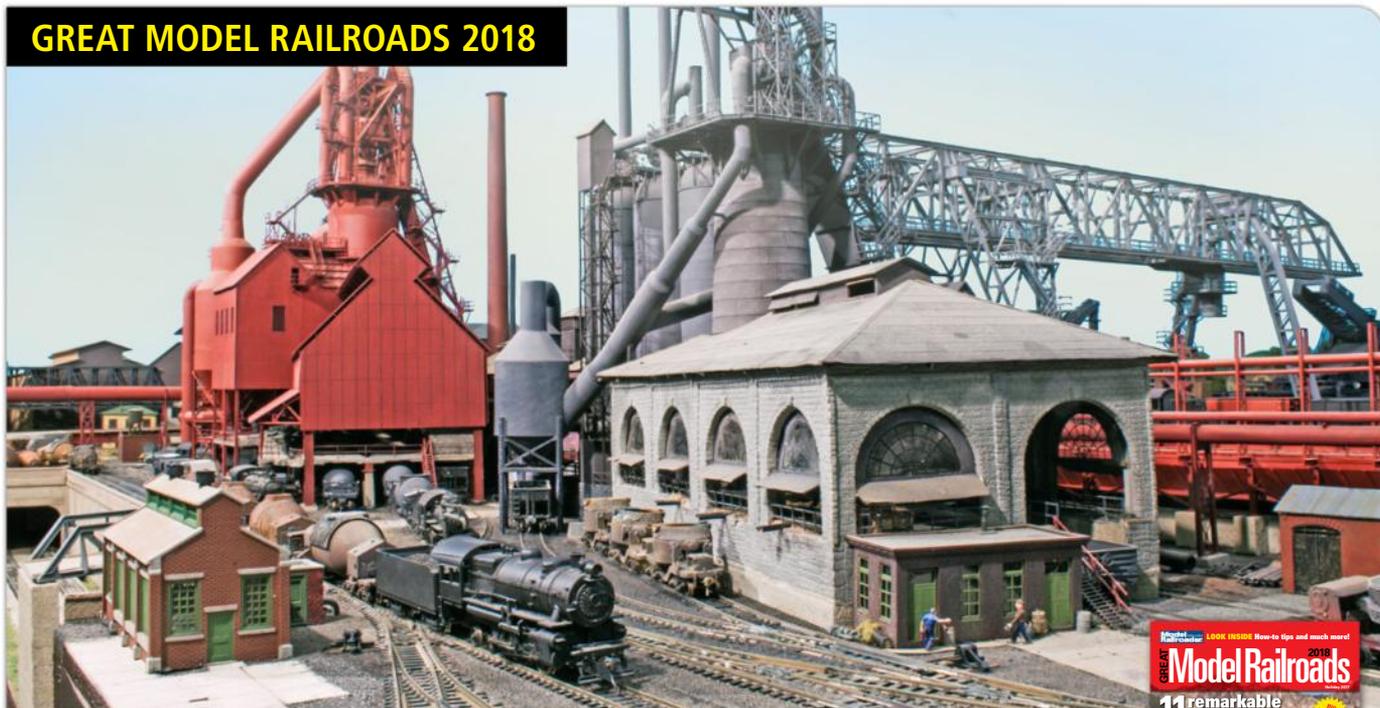
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Please note that the Seaboard Coast Line Bicentennial models come with user-applied bell and light detail.

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GREAT MODEL RAILROADS 2018



Get online extras from this special issue

Find exceptional layouts in N, HO, O, and large scales in *Great Model Railroads 2018*. This month visitors to www.ModelRailroader.com can download trackside photos of each layout featured in the special issue. Other online extras include video tours of some of the featured model railroads.

PRODUCT REVIEW VIDEO



MREXTRA

ScaleTrains.com HO scale SD40-2

A super-detailed modern-era SD40-2 highlights this month's Product Reviews on page 62. The ScaleTrains.com HO scale locomotive features an ESU LokSound decoder. Subscribers can see and hear the SD40-2 in action by clicking the link on the Product Reviews page of our website.

SOUND DECODER DEMO



MREXTRA

A U-boat with sound for Eagle Mountain

Turn to page 28 to learn how associate editor Eric White installed a SoundTraxx Tsunami decoder into an Atlas HO scale U30B. Then check out the finished result by clicking on the link under Online Extras. In an exclusive subscriber-only video, Eric puts the sound-equipped U-boat through its paces.

TAKE BETTER PHOTOS

A modeler's guide to digital photography

Expert model railroader, author, and photographer Brooks Stover put together this guide for those who want to take better pictures of their model railroad. Download this guide to make your layout look its best in photos – online and in print.



HO

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'Layout In A Weekend,' we hardly knew ye



The remains of the LIAW after the flood. Paul Boehlert photo

It wasn't the e-mail I was expecting on a Monday.

I received this from Paul Boehlert, author of "Build a layout in a weekend" in the September issue, and the October update on scenicking the project. He wrote:

"My September Model Railroader just arrived in the mail. I was thrilled to see the 'Layout in a Weekend' article in print (thank you very much for believing in a rather off-beat project), but it was bitter-sweet, too.

"The LIAW was destroyed by a flash flood that hit my hometown [Whitesboro, N.Y.] on July 1. It was sad to lose such a great little railroad even before the publication date, but as my friend and mentor Peter Youngblood, MMR (Master Model Railroader) said, 'At least you know you can build another one in a weekend.'"

After e-mailing Paul to make sure he was OK, and finding out he was, I pondered the permanence of our

layouts and the occasional lack thereof.

I'm sure we lose at least a few to natural disasters every year. That's a lot of money, and maybe more importantly, building time, that's gone in an instant. Insurance can replace the stuff, but not the hours and years of work.

How many of us would start over? I can say at least one person will. Paul wrote:

"Everything will be OK. I've already begun planning my next layout. Once I begin construction on my new Metropolitan Terminal Railroad Company, I'll be sharing some progress reports and some of the more fun and interesting projects."

Right on, Paul. We'll be looking forward to updates in the future.

While we wait to hear from him, we'd like to see where our readers work on



model railroad projects. Your workbenches, tables, cubby-holes, wherever.

Please send a picture of you – yes, you – at your workbench, and some information about your workspace (150 words or less) via e-mail to mrmag@mrmag.com with "Workbench" in the subject line. You can also send info to 21027 Crossroads Circle, Waukesha, WI 53186.

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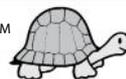
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National Train Show Special!



Locomotives, layout control big in Orlando

The **2017 National Train Show**, held in early August at the Orange County Convention Center in Orlando, Fla., featured new locomotives in N and HO scales as well layout control devices.

On the locomotive side, Athearn showed its new HO scale Genesis series Norfolk Southern SD60E (above), Bachmann had a sample of its N scale Electro-Motive Division SD9 (below),

and Atlas presented its N scale Master Line GP39-2 (page 14).

Layout control devices were also popular. Walthers unveiled its new Layout Control System (opposite), Digitrax debuted its LNWI LocoNet WiFi interface (page 15), and Azatrax showed a back-and-forth control circuit (page 20).

We couldn't fit all of the new products from the 2017 National Train Show into

this report. To see the full list of product announcements and to watch our two-part video report, visit our website, www.ModelRailroader.com.

The 2018 National Train Show will be held Aug. 10-12 at Bartle Hall in Kansas City, Mo. For more information about next year's train show and the National Model Railroad Association national convention, visit www.kc2018.org.

N scale



Electro-Motive Division SD9 diesel locomotive. Among the many new items at the Bachmann booth was a pre-production sample of this road unit. The N scale SD9 will be decorated for Denver & Rio Grande Western; Duluth, Missabe & Iron Range; Norfolk & Western; Pennsylvania RR; and Southern Pacific. The model (\$249) will have a SoundTraxx Sound Value sound package. Bachmann Trains, 215-533-1600, www.bachmantrains.com

Trainfest 2017

The **46th annual Trainfest** will take place Nov. 11 and 12 at State Fair Park in the Milwaukee suburb of West Allis., Wis.

This year's show will celebrate the Soo Line. As in past years, there will be clinics, vendors, and manufacturer displays. New in 2017 is the Trainfest photo contest.

For more information on Trainfest 2017 and the photo contest, visit www.trainfest.com.

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Conducted by Cody Grivno



HO scale

Altoona, Pa.,-rebuilt Norfolk Southern SD60E diesel locomotive with Crescent cab. Athearn showed pre-production samples of its next Genesis series model in Orlando. The SD60E, scheduled for release in March 2018, will be offered in four road numbers. The HO scale model will have a detailed cab interior, standard cab roof or Positive Train Control antenna array as appropriate, and railroad-specific long-hood detail. Direct-current models will sell for **\$219.98**. Versions with a SoundTraxx Digital Command Control sound decoder will retail for **\$309.98**. Athearn Trains, 800-338-4639, www.athearn.com

HO scale locomotives



• **Union Pacific 3900-class 4-6-6-4 Challenger steam locomotive with oil tender.** Features mfx+ digital decoder with sound (speaker in tender), six powered axles, traction tires, separately applied metal grab irons, space for two smoke generators (not included) and articulated frame. Warm white light-emitting-diode headlight, backup light on tender, number boxes, and marker lights. Headlight, backup light, and contact for smoke unit will work in conventional operation and can be controlled digitally. Includes wood case. \$799.99. Märklin Inc., 573-365-9522, www.märklin.com



• **German Federal Rys. Class 85 2-10-2T steam locomotive.** Etched-metal and separately applied detail parts, metal wheels with low flanges, five-pole can motor with flywheel, NEM 362 close coupler sockets on both ends, directional light-emitting-diode headlights, and 22-pin PluX22 decoder interface. \$444.75. Roco, www.roco.cc

Multiple scales

Layout Control System.

Walthers debuted its new Layout Control System. Slated for release in February 2018, the system includes a servo-based slow-motion switch unit, **\$24.98**; a power distribution block, **\$11.98**; and dual-color light-emitting diode fascia turnout, crossover, and accessory controllers with drill templates, **\$9.98 to \$16.98** each. The system is designed for Z through O scales and is compatible with direct current and Digital Command Control. The expandable system features mix-and-match components and remote control servo-style wiring with connectors. Wm. K. Walthers Inc., 414-527-0770, www.walthers.com



N scale



Milwaukee Road Olympian Hiawatha nine-car set. Kato displayed pre-production models from its next N scale name train. Models in the nine-car *Olympian Hiawatha* (**\$280**) include an 8-double-bedroom lounge-observation (*Coffee Creek*) and a *Super Dome* lounge. The cars are equipped with low-flange wheels. Kato USA Inc., 847-781-9574, www.katousa.com



N scale

Union Pacific steam excursion water tender set. ScaleTrains.com had samples of its Rivet Counter line N scale Union Pacific excursion water tender set. The two-tender set, priced at **\$69.99**, features UPP no. 814 (*Joe Jordan*) and UPP no. 809 (*Jim Adams*). The tenders have Commonwealth trucks, brake beam detail, different weld seam locations and riveted end access plates for each tender, and roof equipment boxes. Number 809 has an American flag printed on a separate metal placard. ScaleTrains.com Inc., 844-987-2467, www.scaletrains.com. Scene and photo by Ken J. Johnson

H0 scale freight cars

- **Norfolk Southern (pre-1982 company) 41-foot Association of American Railroads steel gondola.** Two road numbers. Injection-molded plastic kit with plastic wheelsets and

Accumate couplers. \$18.95 each. Produced by Accurail, available exclusively from East Coast Railroads, 919-322-5003, www.eastcoastrailroads.com

- **National Steel Car 4,300-cubic-foot-capacity three-bay covered hopper.** Potash Corp. (3000-series cars).

Twelve road numbers (two six-packs). Long sills and nine body panels. Six-pack, \$264. Produced by North American Railcar Corp., available exclusively from Pacific Western Rail Systems, 866-840-7777, www.pwrs.ca



- **Trinity 3,281-cubic-foot-capacity two-bay covered hopper.** Pre-production sample shown. CSX Transportation, First Union Rail (WSOX reporting marks), General American, Norfolk Southern, Trinity Industries Leasing, and Union Pacific. New tooling with separately applied brake gear, discharge gates, inlet hatches, and end ladder cages; see-through running board; and 36" turned-metal wheelsets. \$27.98. WalthersMainline. Wm. K. Walthers Inc., 414-527-0770, www.walthers.com



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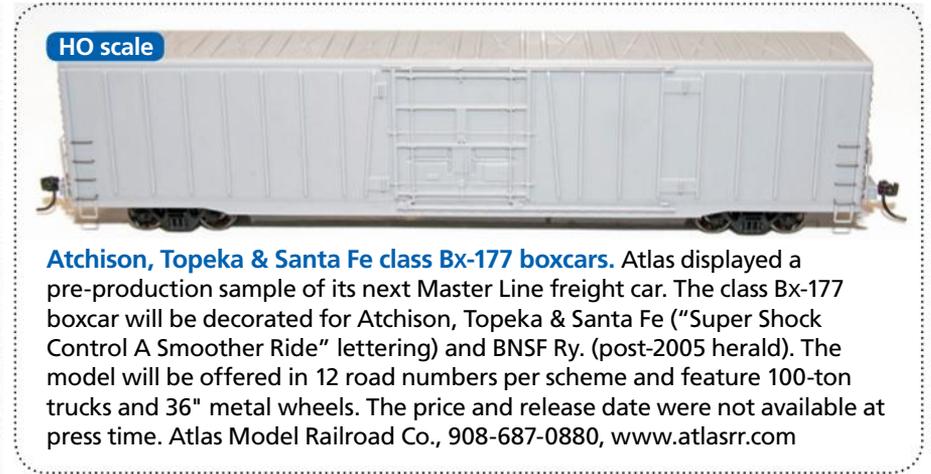
HO scale passenger cars

- **1992 Santa Fe Employee Recognition Special.** American Car & Foundry baggage car SBRHS 3453; ATSF economy baggage car no. 77; Budd diner *Fred Harvey*; Budd lounge no. 62; American Car & Foundry 4-bedroom, 4-compartment, and 2-drawing-room sleepers *Regal Crest* and *Regal Hunt*; and Budd theater-track inspection car *William Barstow Strong*. Factory-painted and lettered brass models. The Coach Yard, www.thecoachyard.com

HO scale details and accessories



- **Custom lighted vehicle.** Walther's SceneMaster hazmat fire truck. Features



Atchison, Topeka & Santa Fe class Bx-177 boxcars. Atlas displayed a pre-production sample of its next Master Line freight car. The class Bx-177 boxcar will be decorated for Atchison, Topeka & Santa Fe ("Super Shock Control A Smoother Ride" lettering) and BNSF Ry. (post-2005 herald). The model will be offered in 12 road numbers per scheme and feature 100-ton trucks and 36" metal wheels. The price and release date were not available at press time. Atlas Model Railroad Co., 908-687-0880, www.atlasrr.com

headlights, bumper lights, and taillights that flash in alternating pattern; 12 scene lights; front light bar; hazard lights; side blue strobe; four red side strobes; four red rear strobes; and two rear blue strobes. 9V to 12V DC. \$90. SceneMaster heavy-duty fire engine and heavy-duty fire department ladder truck also available lighted, \$85 each. East Coast Circuits, www.eastcoastcircuits.com



- **Railroad tie load.** Cast resin. For Atlas Thrall 2,743-cubic-foot-capacity gondola. Ties feature woodgrain texture. \$12. Motrak Models, 813-476-4784, www.motrakmodelsusa.com

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O scale



Double-decker trailer home. This factory-assembled and painted structure is now available from Woodland Scenics. The double-decker trailer home has a window air conditioner; flickering TV; separate picnic table, garbage can, and propane tank; and factory-installed light-emitting diodes. The Built & Ready Landmark Structures model sells for **\$94.99**. Woodland Scenics, 573-346-5555, www.woodlandscenics.com

HO scale



Southern Pacific class AC-6 Cab-Forward steam locomotive. MTH Electric Trains is offering this 4-8-8-2 with modern and original cabs in two road numbers each. The HO scale locomotive (**\$599.95**) features die-cast metal construction, light-emitting-diode lighting, synchronized puffing smoke, and a five-pole skew-wound motor with flywheel. The model has Proto-Sound 3.0 sound and command control with 28 Digital Command Control features. Additional features are accessible using MTH's Digital Command System. The Cab-Forward can be operated in analog mode with any 16V or higher DC power supply. MTH Electric Trains, 410-381-2580, www.mthhotrains.com

HO scale structures

• **Omaha, Neb., diesel repair shop kit.** Cast urethane and laser-cut parts. Price to be announced. Summer 2018. Altoona Model Works, 814-793-7016, www.altoonamodelworks.net

N scale locomotives

• **Electro-Motive Division FP7 and F7B diesel locomotives.** Milwaukee Road (*Olympian Hiawatha* service). FP7 features new mechanism. F7B has new shell with winterization hatch. FP7-F7B

direct-current set, \$190; single direct-current FP7, \$110. Alternate number boards for FP7 (nos. 90A and 95C), \$3. Kato USA Inc., 847-781-9574, www.katousa.com



• **Electro-Motive Division GP39-2 diesel locomotive.** Pre-production sample shown. Atchison, Topeka & Santa Fe; CSX; Delaware & Hudson; Portland &



N scale

Assorted boxcars. Micro-Trains has added three new body styles to its lineup. The new boxcars include a Denver & Rio Grande Western 50-foot double-door boxcar, **\$29.60**; an Atchison, Topeka & Santa Fe 50-foot plug-door boxcar, **\$23.70**; and a Gulf, Mobile & Ohio 50-foot boxcar, **\$25.90**. The models feature etched-metal crossover platforms, plastic wheelsets, and Magne-Matic couplers. Micro-Trains Line Co., 541-535-1755, www.micro-trains.com

Western; Reading Co.; and Wisconsin & Southern (35th anniversary). Golden white light-emitting-diode headlights, blackened metal wheels, and Accumate couplers. Models with speaker (no sound) and versions with ESU LokSound Digital Command Control and sound decoder (with Full Throttle feature) will be offered. Models with DCC include RailCom and RailComPlus with 14, 28, and 128 speed steps and two- or four-digit addressing. Release date and price to be announced. Master Line. Atlas Model Railroad Co., 908-687-0880, www.atlasrr.com



- **General Electric Tier 4 GEVo diesel locomotive.** Pre-production sample shown. General Electric demonstrator, BNSF Ry., Canadian National, CSX, Norfolk Southern, and Union Pacific. Six road numbers per scheme. Road-number-specific details, directional light-emitting-diode headlights, and five-pole skew-wound motor with dual flywheels. Direct-current model ESU Next18 connector, \$124.99; with ESU LokSound Next18 Select Micro Digital Command Control and sound decoder, \$204.99. Rivet Counter line. Winter 2017/2018. ScaleTrains.com Inc., 844-987-2467, www.scaletrains.com

N scale freight cars

- **FMC 4,700-cubic-foot-capacity three-bay covered hopper.** BNSF Ry. (Cascade Green with circle-cross herald

Multiple scales



LNWI LocoNet Wi-Fi Interface. This Wi-Fi interface allows users to connect compatible WiFi devices to a Digitrax LocoNet and run trains using compatible throttle apps. The Digitrax LNW1 LocoNet WiFi Interface (**\$79**) works with most Android and Apple devices running supported throttle apps. Up to 8 LNW1 can be supported per LocoNet. Optional WiFi WPA2 security for layout operations in public. Digitrax, 850-872-9890, www.digitrax.com

and mineral red with post-2005 herald in three road numbers per scheme. Buffer cars in four schemes, one to three numbers each). Newly tooled roof and hatches, etched-metal running boards, and wire grab irons. Price to be announced. Fox Valley Models, www.foxvalleymodels.com

- **Pullman-Standard 4,740-cubic-foot-capacity three-bay covered hopper.** Burlington Northern, Chessie System (Baltimore & Ohio reporting marks), CSX, Great Northern (gray), Illinois Central (gray), and Union Pacific (Missouri Pacific reporting marks).

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HO scale



Seaboard Coast Line-rebuilt GP16 diesel locomotive. InterMountain unveiled a pre-production sample of its next four-axle road switcher. The GP16 will be lettered for Aberdeen, Carolina & Western; Buckingham Branch RR (four road numbers); Burlington Junction Ry.; Palmetto Rys.; and six other roads in two numbers per scheme unless noted. The HO scale model will be offered with an ESU Digital Command Control non-sound decoder for **\$199.95**. Versions with an ESU LokSound DCC sound decoder will be priced at **\$299.95**. A direct-current plug option will be available upon request. InterMountain Railway Co., 800-472-2530, www.intermountain-railway.com

N scale



Montana Rail Link American Car & Foundry three-bay Center Flow covered hopper. These models depict weather-beaten Montana Rail Link cars with their original Burlington Northern Cascade Green paint showing through. The models feature plastic wheelsets and Magne-Matic couplers. The four-pack sells for **\$189.98**. Produced by Micro-Trains Line Co., available exclusively through Pacific Western Rail Systems, 866-840-7777, www.pwrs.ca

Multiple scales



Tsunami SoundCar digital sound decoder. This updated SoundTraxx decoder features eight new air horns and whistles, two new bells, and BeastBanter (cattle and sheep sound effects). The decoder (**\$59.95**) also includes adjustable rail-joint clack, a customizable generator, brake sounds, coupler crash, and more. The SoundCar has four function outputs for interior and exterior lights and is easily connected to SoundTraxx CurrentKeeper. The limited edition bonus pack includes a free speaker and baffle kit. SoundTraxx, 970-259-0690, www.soundtraxx.com

Three road numbers per scheme. Newly tooled roof and hatches, etched-metal running boards, and wire grab irons. Price to be announced. Fox Valley Models, www.foxvalleymodels.com



- **24-foot high-side ore car.** Pennsylvania RR (black and Tuscan Red); CP Rail; Duluth, Missabe & Iron Range; and Union Pacific. New tooling. \$33. Bachmann Trains, 215-533-1600, www.bachmanntrains.com
- **Trinity Aluminator coal gondola.** Burlington Northern, Canadian National, CIT Group, Detroit Edison, Transisco Leasing (GEAX reporting marks), Transport Capital Rail Partners, Trinity demonstrator, and Union Pacific. Thirteen road numbers per scheme (single car and two six-packs). Metal wheelsets. Single car, \$19.95; six-pack, \$118.95. Release date to be announced. Value Line by InterMountain. InterMountain Railway Co., 800-472-2530, www.intermountain-railway.com

N scale structures



- **Single-track portal.** Laser-cut tempered-hardboard kit. Includes two portals and four wing walls. \$12. Motrak Models, 813-476-4784, www.motrakmodelsusa.com
- **H&H Feed Mill.** Factory-painted and weathered structure with printed interior, back and side docks, cyclone vent above truck dump pit, and interior and exterior light-emitting-diode lights (compatible with Just Plug lighting system). \$85.99. Built-&-Ready Landmark Structures series. Woodland Scenics, 573-346-5555, www.woodlandscenics.com

N scale details and accessories

- **45-foot intermodal containers.** Triton, Maersk, Matson, and Sea Castle. Two three-packs per name. \$36.95. Atlas



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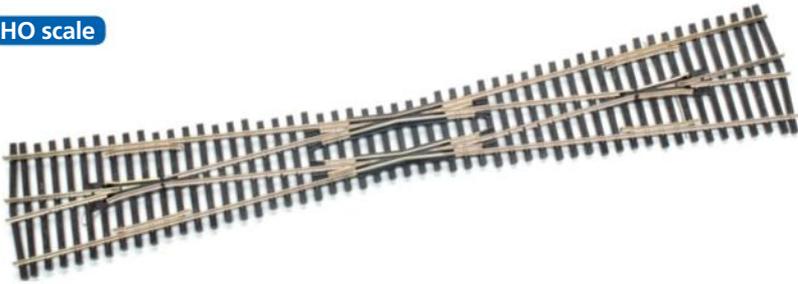
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HO scale



No. 6 crossing. This track piece is the latest addition to Peco's North American track line. The no. 6 crossing (**\$35.99**) uses code 83 nickel silver rail and has plastic ties with wood grain detail. The crossing features the Unifrog format (The frog tip is metal, but isolated from the remaining frog, so it operates like an Insulfrog. The polarity of the frog tip can be changed by linking the factory-welded wire attached to the bottom of the frog to a changeover switch or microswitch). The crossing angle is 9.5 degrees. Pritchard Patent Product Co. Ltd. (Peco), +44 0 1297 21542, www.peco-uk.com

Model Railroad Co., 908-687-0880, www.atlasrr.com

- **33" metal wheels.** Chemically blackened with detail on face and back. Mounted on plastic axles. Manufactured to National Model Railroad Association RP-25 standards. Twelve-pack, \$11.95;

60-pack, \$52.95. Micro-Trains Line Co., 541-535-1755, www.micro-trains.com

O scale freight cars

- **Derrick car.** On30. Durango & Silverton, White Pass & Yukon, and

maintenance of way (gray, oxide red, and yellow). Model features new and existing tooling, positionable boom, deck with woodgrain detail, metal wheels, and E-Z Mate Mark II couplers. \$99. Bachmann Trains, 215-533-1600, www.bachmanntrains.com

Z scale freight cars



- **Single-sheathed 40-foot boxcar.** Pre-production sample shown. Southern Pacific. Separate running board, metal wheels, and AutoLatch couplers. American Z Line, 614-764-1703, www.americanzline.com

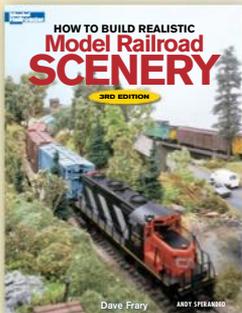
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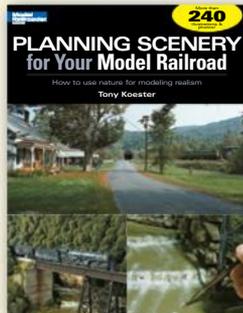
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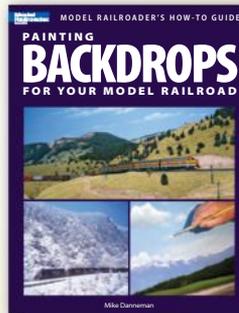
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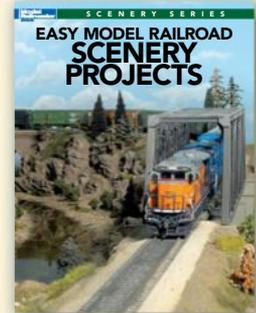
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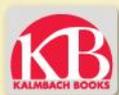
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sleeper. Southern Pacific. Metal wheels, AutoLatch couplers, and clear window glazing. American Z Line, 614-764-1703, www.americanzline.com



- **Lightweight dome car.** Pre-production sample shown. Alaska RR. Metal wheels, AutoLatch couplers, and clear window glazing. American Z Line, 614-764-1703, www.americanzline.com

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Z scale



Krauss-Maffei diesel-hydraulic locomotive. American Z Line had several new models at the show, including a pre-production sample of this four-axle locomotive. The Krauss-Maffei will be painted for Denver & Rio Grande Western and Southern Pacific. Additional features to be announced. American Z Line, 614-764-1703, www.americanzline.com

9V to 14V AC, DC, or Digital Command Control. \$59.99; three-pack, \$169.99; six-pack, \$299.99. N.J. International, 813-406-4288, www.njinternational.com

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Multiple scales



Blasted rock walls. Chooch Enterprises continues to expand its line of factory-weathered flexible vinyl sheets. The rock walls are offered in blasted rock, blasted limestone, and blasted sandstone. The sheets can be cut with scissors or razor knife and attached with hot glue or Chooch peel-and-stick adhesive (sold separately). The sheets, **\$12.99** each, measure approximately 3³/₄" x 11¹/₂". Chooch Enterprises, 425-273-4794, www.choochenterprises.com

Multiple scales

Pickle Fork Railroad back-and-forth automatic shuttle control circuit.

This Azatrax circuit is for direct-current powered trains and trolleys. It includes built-in infrared sensing. The circuit board measures 2.9" x 3.6". The PFRR-2W is for switch machines that have two control wires (Kato, Tortoise, and Switch Tender) and is priced between **\$59** and **\$73**. The PFRR-3W is for switch machines with three control wires (Atlas, Bachmann, and Peco) and is priced from **\$64** to **\$78**. Azatrax, 303-678-4593, www.azatrax.com



- **Water Tint.** Murky, Moss Green, Navy Blue, Olive Drab, Sage Green, Turquoise, and Yellow Silt. Formulated to represent colors on the Forel-Ule Scale. Can be added to Deep Pour Water, Realistic Water, and Surface Water. Two fluid ounces, \$5.99. Woodland Scenics, 573-346-5555, www.woodlandscenics.com

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P31605



Above: This sign in Santa Fe Springs, Calif., warns drivers of high-rail vehicles that a lift frog is coming up that requires special care to cross. Jay Michalsky photo

Inset: A lift frog, or flange-bearing frog, lifts wheels on the diverging route over the flangeway of the main to give that route a smoother ride. The small wheels of high-rail vehicles could have trouble crossing the gap. J. David Ingles photo

What's a 'lift frog'?

Q I took this picture of a Hy-Rail vehicle warning sign on the Metrolink/BNSF mainline in Santa Fe Springs, Calif., where there's a switch to go off on a spur into an industrial area off the main line. Can you explain the meaning of the sign?

Jay Michalsky, Las Vegas, Nev.

A Lift frogs, also known as flange-bearing frogs, are a relatively new development in track technology. They're used in turnouts where the main line sees much heavier traffic than the diverging route. In this kind of frog, there's no gap in the rail at the frog for the main route, giving that route a smoother ride. Instead, on the diverging route, the frog has a kind of ramp that lifts the wheels on that side so their weight is borne on the flange, rather than the tread. The wheels then pass over the gap of the main line, relying on the guardrail next to the stock rail to keep them from derailling. Since Hy-Rail vehicles have much smaller diameter wheels than train cars, crossing the several-inches-wide gap in the diverging route can be troublesome, so a warning sign is warranted.

Q I model in HO scale, and all the turnouts I've purchased over the years have hinged closure rails that pivot on large, circular rivets that I'm pretty sure aren't prototypical. How do the points on prototype turnouts pivot? It seems that flexing a 20-foot section of unspiked rail wouldn't be very steady under the massive weight of a locomotive! I'd go look at an actual turnout, but that doesn't sound like a legal thing to do.

Harvey Hartman, Waller, Texas

A You're right – prototype turnouts don't pivot 20 feet of unsecured rail, nor do they bend the rail to switch routes. The points on a prototypical turnout are hinged, though not with giant rivets; rather, they're spliced to the ends of the closure rails with joint bars. These joints are tight enough to hold the rail ends in alignment, but still allow the slight pivot needed to align the points. And the points themselves aren't left loose, either. They're linked to each other by a series of rods that ride between the ties, forming

the switch assembly, which pivots as one. Further improving their stability is the fact that the points on a full-sized turnout don't need to move as far as model turnout points do, because the flanges on prototype wheels are proportionately smaller than those on models. (You're also right that trespassing on railroad right-of-way to examine a turnout is a bad idea, but you can find plenty of photos of prototype turnouts online.)

Q I have a question regarding DCC and consisting. I have a pair of Athearn SW1500s, one powered and one dummy, and I have a drop-in decoder for the powered one. What I'm curious to know is, can I put a stationary decoder in the dummy unit to power lights and consist it with the motor decoder in the powered unit? The idea is to get directional lighting without a lot of repowering or fancy wiring.

Matt Liverani, Ely, Nev.

A If your dummy locomotive already has lights installed — which means it has electrical pickups — then it should be fairly easy to install a function-only DCC decoder to control them. (You could even install a sound decoder and speaker for that extra bit of realism. But I wouldn't use a stationary decoder, since those may not have consisting capabilities.) But if your dummy engine is truly a dummy, you'll have to install wheel wipers and metal wheels to provide your decoder with an electrical connection to the rails, in addition to the bulbs or light-emitting diodes.

Q I'm about to wire a new layout. What is the proper gauge wire to use? 22AWG? 18AWG? I have a lot of articles and books from MR, but can't seem to find where a specific wire gauge has been recommended.

Glenn Pelkowski, Chalfont, Pa.

A American Wire Gauge, or AWG, is the number of wires that will fit in an inch. So the higher the number, the thinner the wire. And the thinner the wire, the more resistance it has, so the more voltage will drop. While 22AWG is sufficient for feeder wires, you'll want to splice those feeders to a main power bus of a thicker gauge, such as 14AWG or

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

12AWG. Voltage also drops more the longer a wire is. Keep your feeder segments short (a foot or less) and attach them to your track no more than 6 feet apart. The more feeders you have and the closer together they are, the more reliably your layout will run.

Q I'm looking for a track plan from a pre-1985 issue of MR. It started with a 4 x 8 sheet of plywood, but a corner was cut off at an angle and reattached to form a trapezoid shape. Can you help me find this plan, please?

Bob Brendle, Arlington, Texas

A We've run a large number of track plans over the years that involve cutting up a sheet of plywood and reassembling it in another shape. (I've even designed a few myself; see "Three track plans for one sheet of plywood" in our August 2008 issue). But one plan that fits your description and particularly sticks out in my memory is the Drago & East Ridge. It's an HO scale double loop with a small yard along the angled side. It was originally published in our January 1961 issue, but if your stash of old issues doesn't go back that far, it was reprinted in our book *101 More Track Plans for Model Railroaders* (2010, Kalmbach Books). Find it at the Kalmbach Hobby Store, www.kalmbachhobbystore.com.

Q Two articles on scenery in the July 2017 issue, by Lou Sassi and Kim Nipkow, both suggested using diluted white glue to secure ballast and scenery. I had read articles and viewed videos that suggested using either matte medium or a scenery cement because these would dry to a flat finish, as opposed to a shiny surface using white glue. Your thoughts on this would be appreciated.

George Croteau, Swampscott, Mass.

A White glue will dry slightly shiny if it's allowed to dry on the surface of whatever you're gluing. However, when gluing ballast or scenery, modelers typically use a surfactant, or surface-tension-breaking chemical, like isopropyl alcohol or "wet water" (water with a few drops of dish soap added). This lets the diluted glue soak into the material rather than puddling up on the surface. That way, the ballast or scenery is securely glued to the surface, rather than forming a shell of glue on top of loose ballast. Diluting the

glue with water also helps prevent you from applying so much adhesive that it would dry visibly on the surface. Scenic cement and diluted matte medium are popular more for their convenience than for avoiding shiny scenery.

Q I'm a member of a model railroad club that's been at its present location since 1987. For some years now, we've been having a lot of trouble with dirty track. It's all nickel-silver, but we can't keep it clean. A board member thought the problem may be that our track is too old and should be replaced, but that would be costly. Another thought was that the unsealed concrete floor is causing dust. I'd appreciate any input.

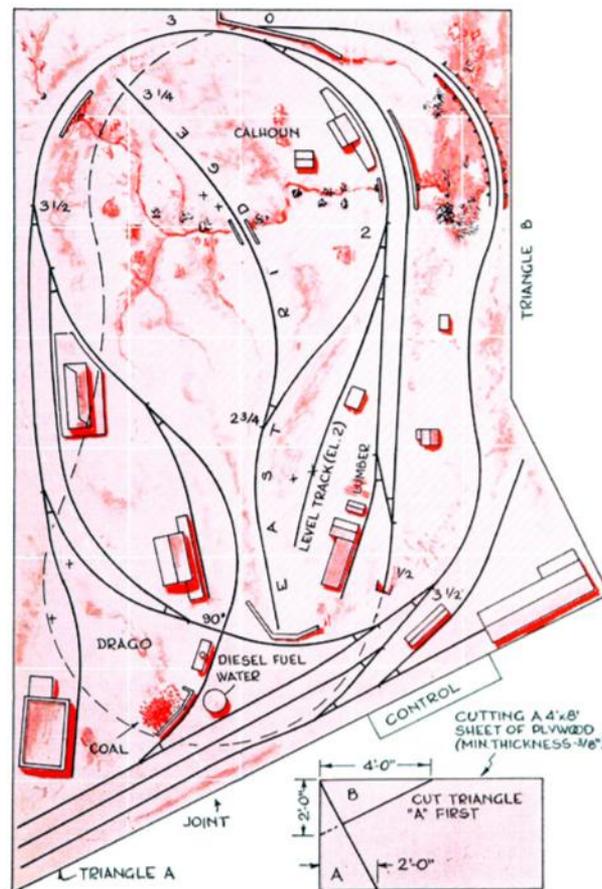
Dave Johaneck, Manitowoc, Wis.

A It's hard to say what causes track to get dirty; there have been discussions about that as long as there have been model trains.

Dust? Corrosion? Track cleaner residue? Air pollution? Electrical arcs? All contribute to the problem.

Sealing your concrete floor should be the first step in keeping down dust. If your club is housed in an industrial building, there may also be many places where dust from the outside gets in. Look into eliminating such gaps with wall board and insulation. Pests like rodents and insects also create a lot of dust with their droppings; do your best to eliminate them from the club room.

Once your track is dirty, there are many ways to clean it. "Bright Boy"-type abrasive rubber cleaning blocks are popular, as are track-cleaning cars and other commercial systems. Some swear by "rail gleaming," a technique that involves polishing the railheads with a block of stainless steel. Automatic transmission fluid (often abbreviated "ATF" by hobbyists) has adherents, as well, as does clipper oil. With a club-sized layout, you have plenty of space to test and compare methods. Let us know your results.



The angled table for this small HO scale track plan is made by cutting two corners off a 4 x 8 plywood sheet and reassembling it.

Q I have a few Atlas HO low-hood EMD GP38s. I noticed when operating cab forward, the headlight leaks out the sides and top, between the cab and long hood. I tried a few different things, but was not successful. Do you have any ideas?

Robert Devine, no address given

A It sounds like the cab isn't seated properly on the rest of the body shell. If you don't need the cab to be removable, try gluing it more securely to the rest of the shell from the inside. You may need to add some slivers of styrene strip to fill the gaps, then touch up the paint if any white plastic shows on the outside.

Secondly, where is the bulb or LED mounted? Is it attached to the body shell? Or is it on a circuit board on the frame, with the light being carried to the headlight by a clear plastic light tube? If the bulb or LED's position allows it, try enclosing it in a black plastic shroud that will contain the light and keep it from leaking out the sides of the cab.

Body-mounted couplers on auto racks

When N scale got its start in Europe in the 1960s, its originators conceived it in the tradition of toy trains, with truck-mounted couplers that could negotiate sharp-radius curves.

Some N-scalers began switching to body-mounts after Kadee introduced its N scale knuckle coupler in the early 1960s. (Kadee split into two companies in 1990, and the N scale line became today's Micro-Trains Line.)

Converting was no easy matter, though, as you first had to assemble the couplers from kits. Assembled couplers were offered a few years later. Then came the game changer, when Kadee offered its trucks with Magne-Matic couplers attached.

That made conversions easy. You could swap out trucks in about a minute, so most N scale modelers, myself included, went down that road. This left me with about 200 freight cars of various brands that ran just fine, until I decided to try mid-train helper operations.

Once out on that curvy, climbing main line, they would derail if you just looked at them a little wrong. Actually, "derail" is not a

Before he removes the tongue, Jim uses a soldering iron to melt the corners of the coupler box together.

00-90 mounting screw

Corners of coupler box welded

Tongue removed



Jim converted this Micro-Trains auto rack to body-mounted couplers. It and its companions run just fine on his 18" minimum-radius mainline curves. Bill Zuback photos

strong enough term. Explode off the rails is more like it.

On to the tougher cars.

I converted the easiest cars to body-mounted couplers first, the boxcars and reefers. Then came tougher models like hoppers and tank cars, especially those that had no platform for mounting the couplers. I wrote about these in the July 2014 N Scale Insight column, and in the February 2015 column I wrote about mounting couplers on Micro-Trains 89-foot flatcars.

In the most recent chapter of this ongoing coupler saga, I took on the Micro-Trains auto racks, figuring they would go about the same as the 89-foot flats. After all, an auto rack is just a separately manufactured housing mounted on a flatcar.

On the Micro-Trains cars, the stirrups are supported by plastic brackets, and each of those brackets has a mounting hole at exactly the place where you want to

mount the coupler. Just drill a no. 62 mounting hole in the center of the peg inserted in the hole, tap it for a 00-90 mounting screw, and you're in business – almost.

Of course there's a rub. Because the car rides so low, you need an underset shank

coupler, and the easiest place to get it is from the car you're converting. I just remove the truck-mounted coupler and cut off the tongue with a razor saw.

If you do that without taking some precautions, though, I can virtually guarantee the draft-gear box will fall apart during handling. These boxes don't feature the snap-together construction found on most other Micro-Trains couplers.

Modifying the couplers. My recommendation is to leave the coupler on the tongue and use a soldering iron to weld the top rear corners of the coupler box to lock on the top. Get that iron in and out quickly. I don't try to secure the forward corners, as it's just too easy to miss your mark a little and ruin the coupler. (I learned this the hard way.)

Then remove the plastic pin (or screw) that holds the box together, and cut off the tongue. Clear the mounting hole in the coupler box with a no. 56 drill, and mount the box to the car. I always use a smidge of



Jim reuses the couplers that come with the car.

Walthers Goo on the car bottom to keep the box from rotating once in operation.

I converted some Red Caboose auto racks at the same time, and as these had the same Magne-Matic couplers, I found the procedure much the same. The big difference is that there's no indication on the car bottom as to where to drill a mounting hole. I used the hole in

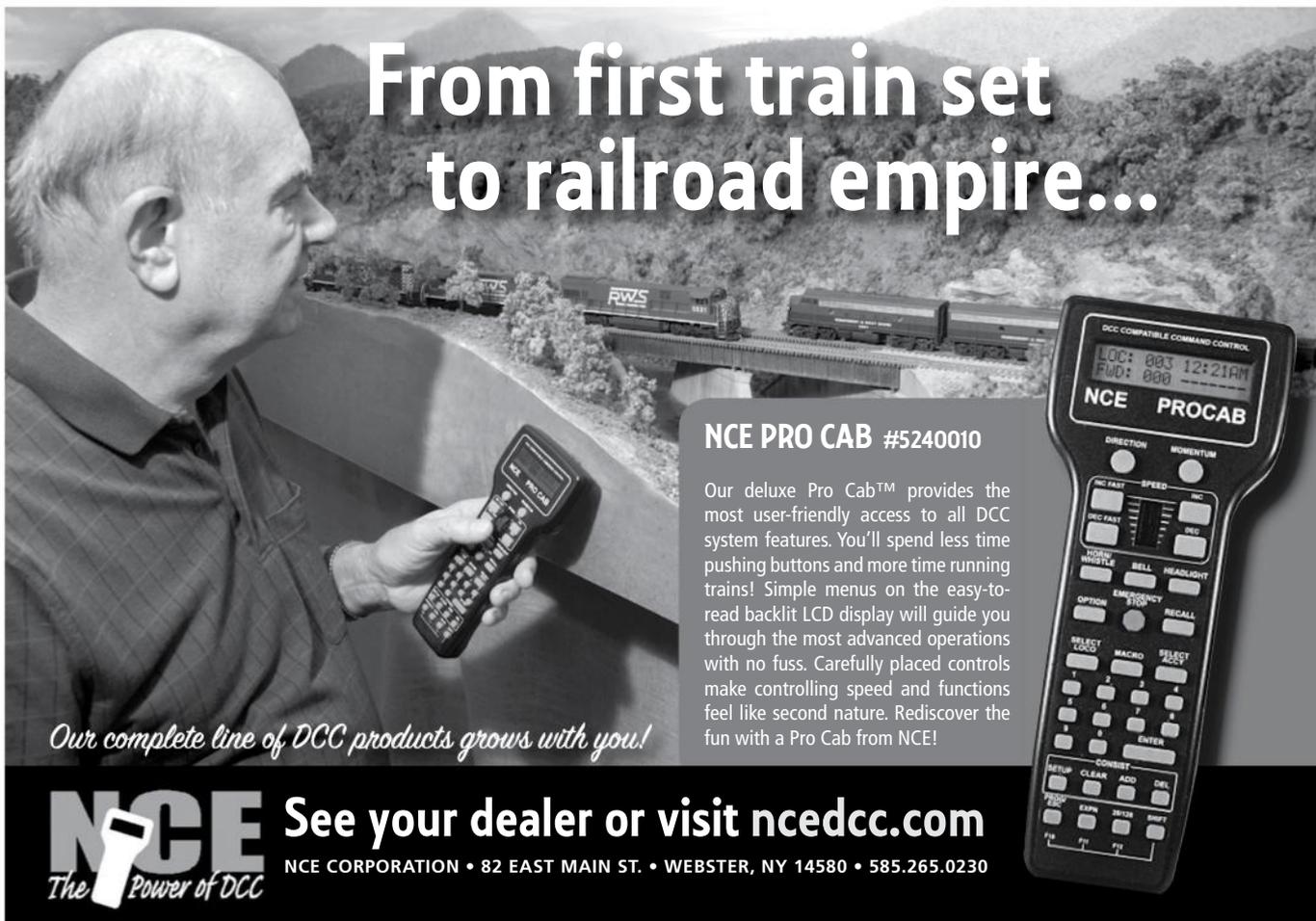
the coupler, still on the tongue and on the car, as a guide to drill the hole in the floor.

Both these models are beautifully detailed and really big compared to most N scale cars, probably too big for smaller layouts. On the prototype you usually see them run in strings of eight, 10, or more, and they are an impressive sight indeed. **MR**



ACTUALLY, "DERAIL" IS NOT A STRONG ENOUGH TERM. EXPLODE OFF THE RAILS IS MORE LIKE IT.
- JIM

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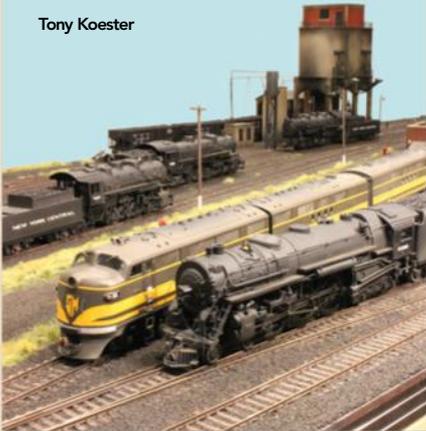


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Detail a boxcar interior



In the January and April 2016 issues of *Model Railroader*, I shared how I weathered and lowered the ride height, respectively, on my Bachmann On30 Sandy River & Rangeley Lakes boxcars. Though the boxcars looked much better with these modifications, one thing was still bothering me – the plain interior.

Since the doors on the Bachmann boxcars are separate parts, they can be modeled opened or closed. The interior

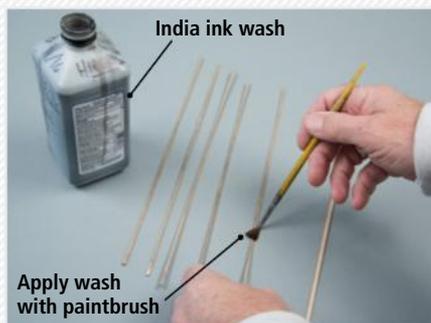
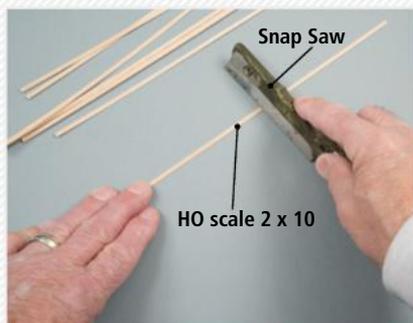
has plastic floor planks that are too uniform in color and texture. Rather than just paint the planks, as I did on my Bachmann flatcars [see the June 2009 MR – *Ed.*], I installed a stripwood floor.

Instead of using the stripwood straight from the package, I aged it using an Atlas Snap Saw and an India ink wash. Once the floor was installed, I further enhanced the boxcar's interior by adding lading debris.

A Sandy River & Rangeley Lakes boxcar sits at the team track at Strong, Maine, on contributing editor Lou Sassi's On30 layout. He added a stripwood floor to the boxcar and put some lading debris on the floor.

Adding a floor and lading debris to a boxcar is a simple one-evening project that adds visual interest to a piece of rolling stock not normally known for interior detail.

STEP 1 DISTRESS, STAIN, AND CUT WOOD



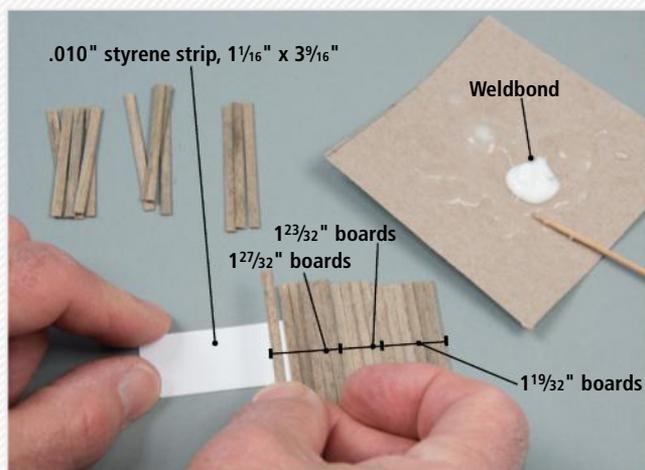
I used Northeastern Scale Lumber HO scale 2 x 10 stripwood for floor boards. I enhanced the woodgrain by dragging an Atlas Snap Saw across the surface, as shown in the image at left. I did this to both sides of the stripwood to minimize warping.

Next, I stained the stripwood with an India ink wash (center photo). I used a mixture of two teaspoons India ink

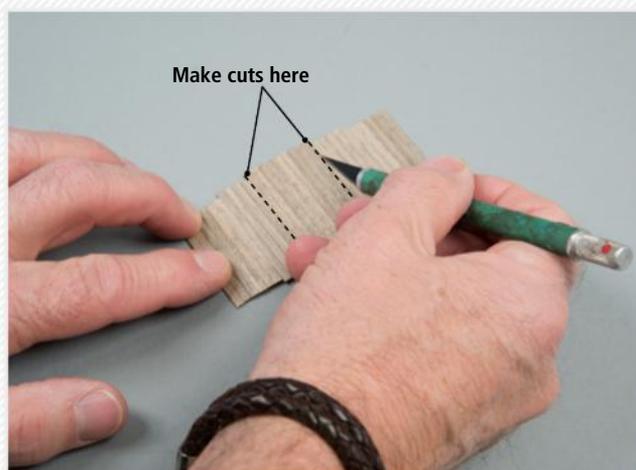
in one pint of 91 percent isopropyl alcohol. You can make the wood look older by adding more ink to the alcohol. Less ink will make the wood look newer.

Using a NorthWest Short Line Chopper (right photo), I cut the stripwood in the following lengths and quantities: $1\frac{27}{32}$ " (nine boards side-by-side fit the door opening perfectly), $1\frac{23}{32}$ " (eight boards), and $1\frac{19}{32}$ " (12 boards).

STEP 2 BUILDING THE FLOOR



I cut a $1\frac{1}{16}$ x $3\frac{9}{16}$ piece of .010" styrene to use as a base to attach the stripwood. After marking the centerline of the base, I spread Weldbond on the styrene. Beginning in the middle of the base, with the glue still wet, I set the boards in place. The $1\frac{27}{32}$ " boards filled the doorway. Then I placed four $1\frac{23}{32}$ " boards on each side of the boards for the door opening, followed by six $1\frac{19}{32}$ " boards on each side.



The boxcar's interior isn't completely visible under normal lighting conditions, so the floor doesn't need to span the full length of the car. In addition, the floor assembly won't fit inside the model unless it's cut into smaller sections.

Using a no. 11 blade, I cut between the boards and through the .010" styrene base where the $1\frac{27}{32}$ " strips for the door opening meet the $1\frac{23}{32}$ " strips for the interior.

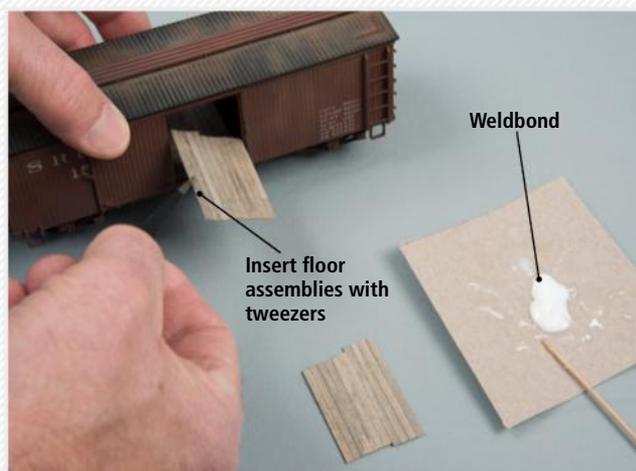
STEP 3 INSTALLING THE FLOOR



I spread a thin layer of Weldbond on the boards for the door opening with a toothpick. Then I set the nine-board section on the floor, positioning it so the doors would move freely and close properly.

To hold the stripwood in place while the glue dried, and to prevent the wood from warping, I cut two 3" lengths of HO scale 10 x 10 stripwood and secured them with clamps.

Once the glue dried, I removed the clamps and stripwood. Then I applied Weldbond to the bottom of the interior floor assemblies. I used tweezers to insert the



floor sections through the door opening, being careful not to get glue on the previously installed floor section. As before, I used HO scale 10 x 10 stripwood and clamps to hold the floor sections while the glue dried.

As I waited for the glue to dry, I rummaged through my scrap box. There, I found a pallet, some strips of wood, chain, and canvas bags that I glued on the floor for lading debris.

Enhancing the inside of a ready-to-run boxcar with a stripwood floor is a simple project. These techniques can be adapted for boxcars in other popular scales. **MR**



The Eagle Mountain RR project layout needed locomotives. Standing in for the full-sized railroad's U30Cs are Atlas Master Line U30Bs. After Cody Grivno gave them Kaiser Steel paint jobs, Eric White installed a SoundTraxx Tsunami sound decoder in locomotive no. 1038 for use on our 2016 project railroad. Bill Zuback photos

Not quite a DROP-IN DECODER

Sometimes, you just have to use what you have on hand

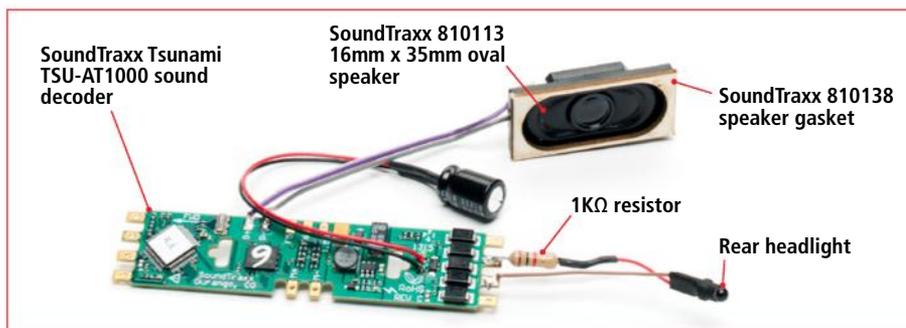
By Eric White
Photos by Bill Zuback

For our 2016 project railroad, we needed two General Electric U30B locomotives. Cody Grivno searched the internet and came up with a pair of Atlas Master Line locomotives in the popular undecorated scheme. Neither had Digital Command Control (DCC) decoders, and we wanted at least one to have sound.

We had a SoundTraxx Tsunami AT1000 decoder, which is intended to be a drop-in, board-replacement decoder for Atlas diesel locomotives. But our models were earlier production versions than what the decoder was designed for. We also had a 16 x 35mm oval speaker that would fit the locomotive, and a gasket set for the speaker here at the office. The parts are shown in ①.

Assessing the situation

Cody painted and decaled both locomotives (see Step by Step in the December 2016 *Model Railroader*), and installed a motor decoder in locomotive no. 1037. While he was painting the other shell, I took the painted chassis and installed the sound decoder in no. 1038.



① **Parts on hand.** Eric used a selection of parts we had in the office to outfit the Atlas U30B with sound. In addition to the speaker, the rear headlight was soldered to the SoundTraxx Tsunami decoder.

The model had a plastic enclosure to house the speaker above the rear truck and a printed-circuit (PC) board with an 8-pin DCC socket.

But with the stock PC board in place, there wasn't enough room for the decoder and the PC board, so the stock board would have to go.

Now, I could've ditched the decoder I had and purchased a Tsunami with an 8-pin plug, such as a TSU-1000, but sometimes you need to go with what you have. Cody used an 8-pin jumper plug with a

9-pin socket to install the motor decoder in 1037 (see ② on the next page), and he had to remove half of the speaker enclosure to get it to fit. Replacing the stock PC board looked like the best way to go.

Out with the old

The first thing to do was remove the stock PC board. That left me with two metal tabs that could support the Tsunami. Since I didn't want the decoder to short out on the metal tabs, I cut two

pieces of scrap plastic to fit between the mounting bosses on the tabs, then wrapped everything in non-conducting Kapton tape for insulation, shown in **3**. The pieces of plastic would later serve as mounting pads for the decoder.

Next was the speaker enclosure. The size was correct, but Atlas molded a groove in the top for the rear headlight and its wires. This groove made the box too shallow to accept the speaker I had. I sliced away the groove, then cemented .010"-thick scraps of styrene inside to seal the enclosure, shown in **4**.

This left enough room for the speaker's magnet and the frame. I soldered wires to the pads on the speaker, then seated it in the enclosure. Finally, I added a stick-on gasket to eliminate any rattling between the speaker and the locomotive frame.

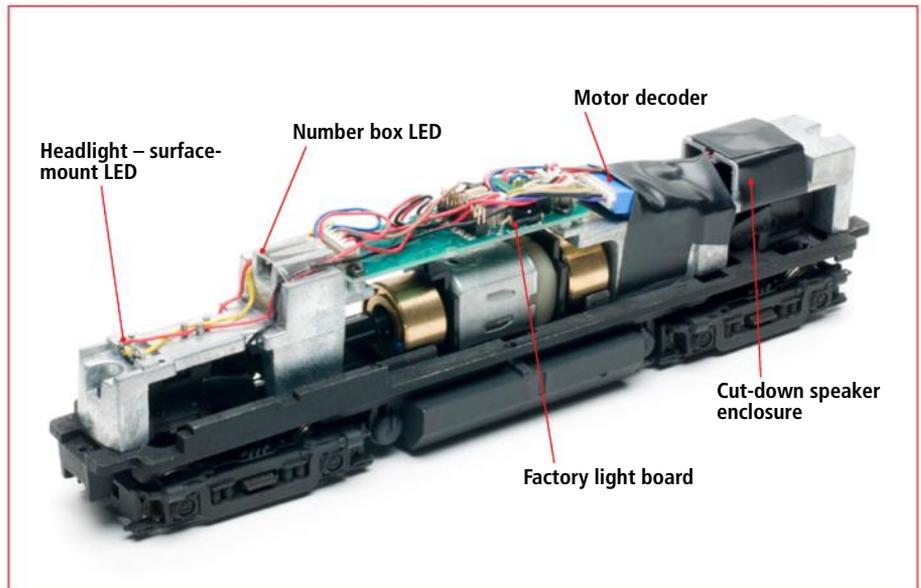
I test-fit the enclosure to the frame and found the screws that held it on were now too short with the additional thickness of the gasket. Since I didn't think I'd find the proper metric threads among our assortment of screws in the workshop, I used a drill the size of the screw head to countersink the screw into the housing. That was enough to get a couple turns of the screw into the frame. I took everything back apart and turned my attention to the lights.

Pluses and minuses

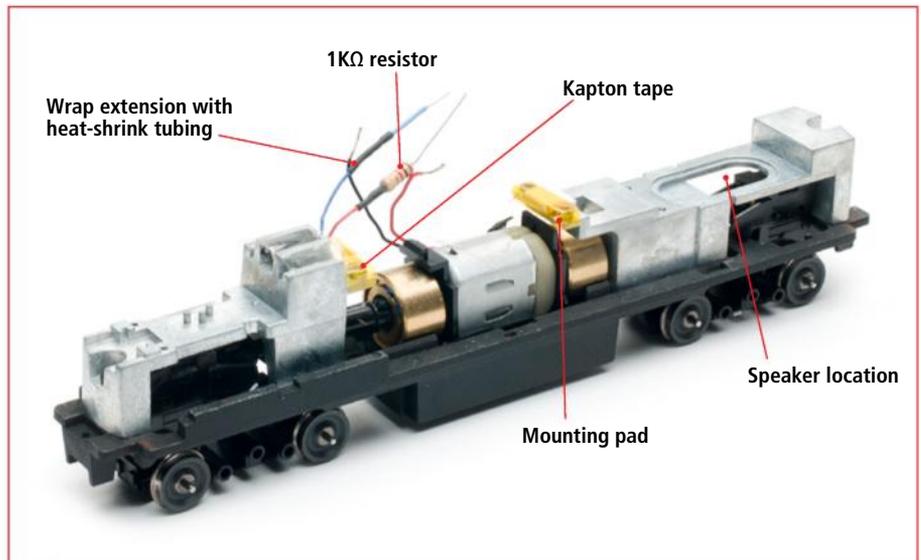
The headlights on this model are light-emitting diodes (LEDs), and I couldn't find any information about which wire was positive and which was the ground. This is important because LEDs will only light when wired in one direction. Wiring them backward may also overload the LEDs and destroy them.

There are three LEDs total in the engine: a nose-mounted headlight, a cab-mounted headlight that also illuminates the number boxes, and a rear headlight that also illuminates the rear number boxes. All three lights had one red wire, and the other wire was either brown (rear), yellow (nose), or blue (cab). I figured the red wire should be positive, as most circuits have red wires for the power lead, but that's no guarantee. Then I noticed the nose headlight, which is a surface-mount LED, had a minus next to the yellow wire on its circuit board **5**. So, red for positive!

The surface-mount LED in the nose had a resistor on its circuit board, so I left that alone. The other two LEDs didn't have resistors, so I added a 1KΩ resistor to each circuit on the common



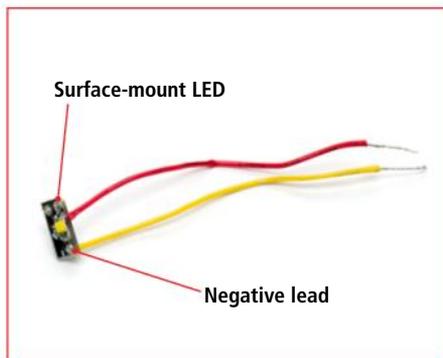
2 No sound for you. The non-sound decoder installation retained the original factory light board, but lost half of the speaker enclosure. Eric traded a functional speaker enclosure for the light board in the sound installation.



3 Ready for new electronics. The chassis of no. 1038 was stripped of its factory light board, and the mounting bosses are insulated with Kapton tape. An extension was soldered to the negative lead of the number box LED, and a 1KΩ resistor was added to the positive lead.



4 Light and sound. The sound enclosure in the Atlas locomotive was almost the right size for the SoundTraxx 16mm x 35mm speaker, but a groove in the base to accommodate the rear headlight and wiring made the enclosure too shallow. Eric cut out the groove and sealed the opening with thinner .010" styrene sheet.



5 Are you positive? Eric needed to be sure which side of the LED was positive in order to wire the lights correctly. Fortunately, the circuit board for the surface-mount LED indicated the negative lead.

(+) side of the circuit, seen in **1** and **3**. There were also a few spots where I had to splice wires so they'd reach the soldering pads on the decoder board.

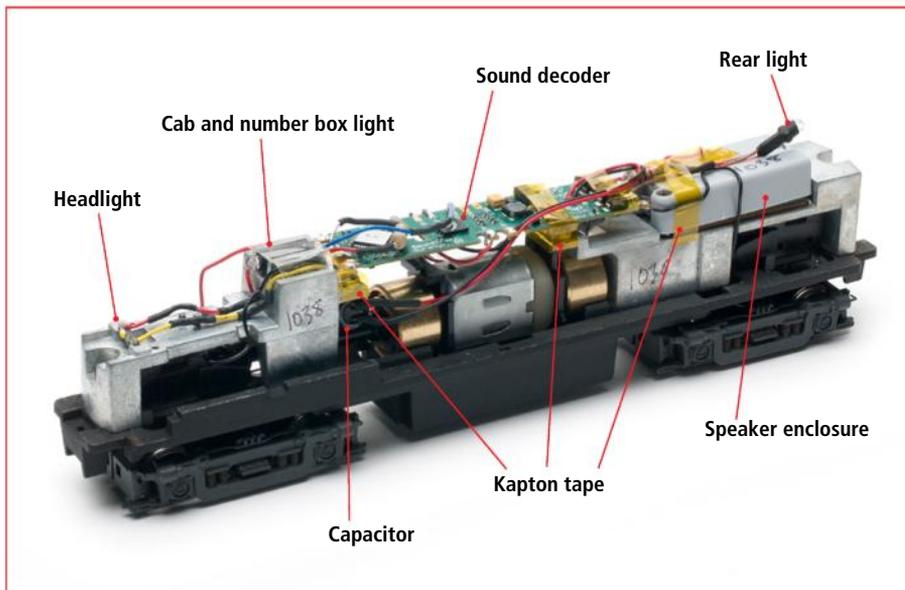
I used heat-shrink tubing on all of the splices, and also on the connections between the resistors and the LED wires. Since I didn't want to risk overloading the function outputs for the decoder, I installed the cab and number box light on the function 5 circuit. It uses the same common connection as the nose headlight, which is where I attached the lead with the resistor.

Once I had all the wires ready to be soldered to the decoder, I went around and tinned them all. This makes the connection at the decoder quick, and cuts down on the chance of causing problems, such as flooding the board with solder and causing a short.

Another technique that helps is using the correct size of solder. I used 1mm rosin core solder. Something even smaller would be fine, but the soldering pads on the Tsunami decoder aren't too small and are around the edges of the board, so it's not too difficult to solder to them. Just be sure to have a clean, hot iron, and add just a touch of solder.

Before I soldered everything together, I placed a piece of double-sided tape on the bottom of the decoder to line up with the rear mounting pad. I put the tape over the hole in the board where it's meant to snap onto a locomotive frame in a drop-in installation. I left the backing on the tape so I could move the board around while I soldered the wires to it.

With everything soldered together, I took the locomotive to the test track and fired up our NCE PowerCab. I used



6 Hear the power. With the SoundTraxx Tsunami decoder installed in the Atlas U30B, all that was left to do was a little programming. Kapton tape keeps the wiring in place, and insulates the decoder from the frame.

programming track mode to check the decoder and was able to read its manufacturer and model number, both good signs. I changed the address style from short to long and entered the locomotive's cab number for the long address.

Once I switched the throttle to programming on the main, I heard the sound of the GE FDL-16 prime mover coming through the speaker. I turned the headlight in the nose on, then observed the rear light switched on when I changed the locomotive's direction. Pressing F5 turned on the light on the front of the cab. Satisfied that everything was working, I went back to the bench to button everything up.

I checked to be sure everything still fit together with the decoder and chassis, pushing wires around to get them in the right spots, then removed the backing from the tape and secured the decoder to the chassis. Next, I peeled the second piece of backing from the speaker gasket and secured the enclosure to the frame with the original screws.

The last thing to do was find a home for the capacitor. I hoped it would fit on top of the speaker enclosure, but then

I saw empty space above the front driveshaft, behind the cab weight. There was room there, so I added a piece of double-sided tape and stuck it under the weight. I used a few more pieces of Kapton tape to tame a few wild wires, then slipped the chassis into the body shell. The finished installation is shown in **6**.

The final step was to tweak the configuration variables (CVs) to improve performance. I took the locomotive to the Eagle Mountain RR project layout, since that's where it would be doing its work. Using the PROGRAMMING ON THE MAIN option on the layout's PowerCab, I started by increasing the value of CV3, Acceleration Rate, from the factory setting of 0 to 5, which didn't make a noticeable difference.

Programming on the main made it easy to change a CV, then immediately see the results. I kept adding to the value in 10-point increments until I had a level of momentum I liked. A value of 55 allowed the locomotive to start and transition between speed steps smoothly without adding too much delay. The Eagle Mountain is a small layout, so I didn't want a slow-to-respond locomotive running off the edge of the layout.

I followed a similar procedure for CV4, Braking Rate. Here, I ended up with a value of 33. I prefer to have the locomotive respond more quickly to braking requests for more control.

Problem solved

Installation of the decoder took a little more effort than in some cases, but by looking at the situation, it was possible to come up with a straightforward solution that used available materials and worked well. As with many aspects of model railroading, things can often be adapted to uses for which they weren't intended. Problem-solving can be a fun part of this hobby! 







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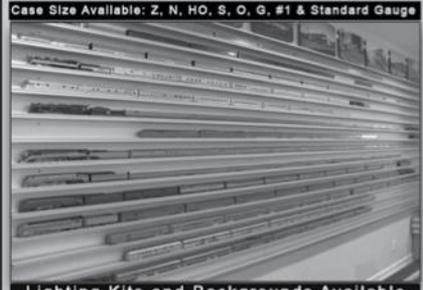
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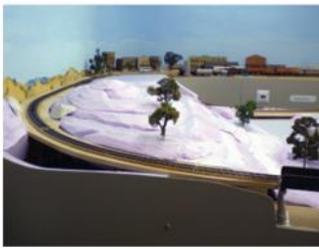
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P30737

Big and busy on the



Signature scenes of the 1950s highlight the O scale Nassau Division

By **John Sethian** • Photos by Paul J. Dolkos

My car catching fire got me into O scale model railroading. On March 22, 1987, I decided to drive my vintage Jaguar E-type to work. After starting the car, I left it to warm up while I took out the trash. Then I noticed something flickering. Few things are as attention grabbing as one's own car burning up in the garage.

I spent the next 3½ years restoring the car. By then my wife and I had our first child, and she suggested I delay HO

scale modeling in favor of a more kid-friendly Lionel O gauge layout. Over the years my hobby grew from postwar Lionel trains running on three-rail tubular track on the floor to three-rail O scale (high rail) trains running on a scenicked layout to the O scale two-rail model railroad shown in these pages.

One of the main reasons I built my 21 x 31-foot Pennsylvania RR Nassau Division was joining a group of local O scalers that included legendary layout designer John Armstrong and Ted

Stepek, who did a lot of work for Atlas Model Railroad Co. When I saw what could be done in O scale, I was hooked.

The appeal of O scale

The sheer mass of O scale appeals to me. An O scale GG1 electric locomotive is about 20 inches long and weighs 11 pounds. An O scale 40-foot boxcar weighs about a pound. When I get down to track level on an O scale layout, I not only see the train, but also hear and feel

Pennsy



1 Led by a GG1 electric, the *Congressional* zooms through Princeton Junction on John Sethian's O scale Pennsylvania RR Nassau Division. The Pennsy's electrified territory inspired this 21 x 31-foot layout.

it. It's not hard to imagine the real thing going by.

I appreciate that the details on my models can easily be seen. I can count the rivets without a magnifying glass.

Layout design

My PRR Nassau Division is inspired by, but not beholden to, the Pennsy's electrified main line along what would become the Northeast Corridor. I took some modeler's license with the actual geography and town names.



2 An A-B-B-A set of F7s pass under the Whitford Bridge. The F units are MTH two-rail models, while the bridge is a vintage Lionel accessory. The Edward Hopper painting "Second Story Sunset" inspired the houses on the hill.

My track plan features a continuous double-track main line. Following John Armstrong's advice about having at least one broad "photographer's curve" on a layout, my main line expands into a sweeping four-track curve at New Brunswick. A third continuous loop to the lower level provides car-storage space as well as the visual opportunity for multiple tracks to cross over one another.

Including the elevated four-track raceway through New Brunswick, N.J., my layout is divided into five major scenes: a city center and adjacent factory district, Princeton Junction, the Lower Trenton Bridge with its "Trenton Makes, the World Takes" sign, and the Whitford Bridge in Exton, Pa. These scenes are separated by stretches of pastoral East Coast landscape with minimal details.

A single once-around plan allows viewing these major scenes without distraction. Following this relaxed approach, I wasn't interested in maximizing the mainline run, switching cars, or operating sessions. I just want to be the railfan by the side of the tracks, watching the trains zoom by.

I've found that almost any Pennsy locomotive or car I want has been made in O scale. My roster features models

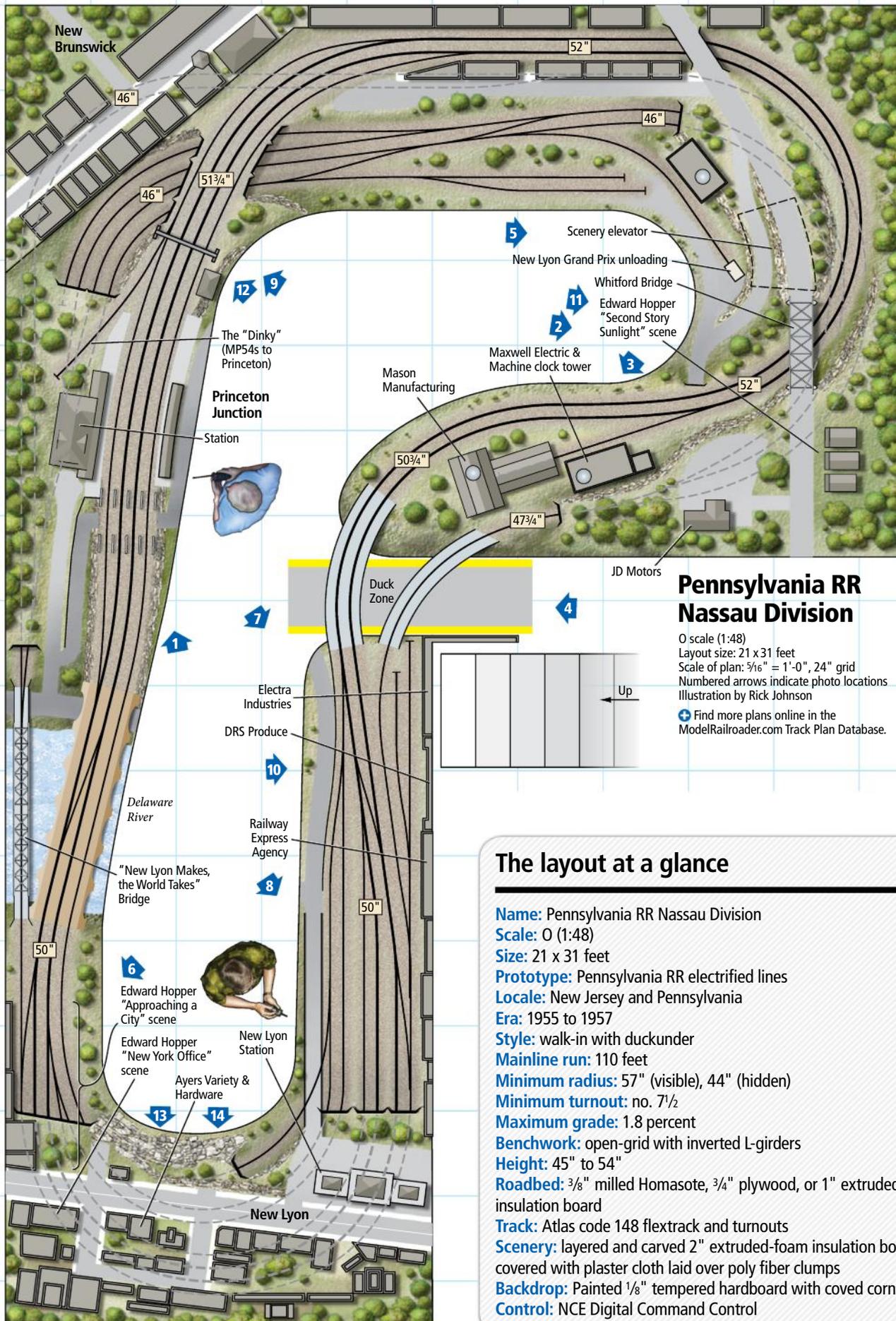
from several manufacturers, including limited-run brass pieces as well as converted three-rail equipment, as described on page 38. All the track is Atlas code 148 flextrack and no. 7½ turnouts.

I've installed catenary poles in most visible locations, but I'm waiting to install the wire until after all the scenery is done. I'm now modeling what I call the "wireless era" of the PRR. When I do string the wires, I plan to follow Andy Rubbo's outstanding work on his HO scale PRR New York Division, which was featured in *Great Model Railroads 2013*.

Tour the railroad

I find that model railroads are a mix of personal preferences, childhood experiences, acquired skills, and mistakes made. This combination can take our modeling efforts in different directions than originally planned. That's why I think most visitors to my layout tend to focus on the how and why of various features on my model railroad.

Now that I've provided some background, follow along as I show you some of the highlights of my O scale PRR Nassau Division and some of the "how and why" that went into building it.



Pennsylvania RR Nassau Division

O scale (1:48)
 Layout size: 21 x 31 feet
 Scale of plan: 3/16" = 1'-0", 24" grid
 Numbered arrows indicate photo locations
 Illustration by Rick Johnson
 Find more plans online in the ModelRailroader.com Track Plan Database.

The layout at a glance

Name: Pennsylvania RR Nassau Division
Scale: O (1:48)
Size: 21 x 31 feet
Prototype: Pennsylvania RR electrified lines
Locale: New Jersey and Pennsylvania
Era: 1955 to 1957
Style: walk-in with duckunder
Mainline run: 110 feet
Minimum radius: 57" (visible), 44" (hidden)
Minimum turnout: no. 7 1/2
Maximum grade: 1.8 percent
Benchwork: open-grid with inverted L-girders
Height: 45" to 54"
Roadbed: 3/8" milled Homasote, 3/4" plywood, or 1" extruded-foam insulation board
Track: Atlas code 148 flextrack and turnouts
Scenery: layered and carved 2" extruded-foam insulation board covered with plaster cloth laid over poly fiber clumps
Backdrop: Painted 1/8" tempered hardboard with coved corners
Control: NCE Digital Command Control

A clock tower, support columns, and mock-ups

Like many model railroaders with basement train rooms, I had to contend with unsightly support columns in the middle of my layout space. Thankfully I only had to deal with two.

I concealed the three visible sides of one support column with an illuminated, working clock tower. The three clock mechanisms are from battery-powered alarm clocks. I printed the clock faces on glossy photo paper that I sanded thin, then glued to electro-luminescent panels from Miller Engineering (www.microstru.com).

A building mock-up partially conceals the other column. The temporary structure is painted in its final colors. I also added some basic scenery, vehicles, and other details to help me make sure the structure fits the space.

When I'm kitbashing, I'll make photocopies of the kit wall sections, print



3 Both the finished clock tower in the foreground and the paper mock-up in the background help conceal basement support columns.

them out on heavy paper, and use those to construct the mock-up. I took this approach with the shorter, white-walled building with a gray roof. This mock-up represents a structure that will eventually be made with walls from a cast-plaster kit.

If I'm scratchbuilding, I first draw the structure in Microsoft Power Point and then print out the wall sections. An example of this approach is the taller tan building. I'll later use these wall sections as templates for the walls of the final structure.

The duck zone



4 A rubber mat marks the "Duck Zone."

For my layout to fit in my train room, a duck-under was unavoidable. Therefore, I did my best to make it as tolerable as possible. With safety tread, yellow stripes, and the words "Duck Zone" printed on it, a black rubber mat shows visitors when and where to keep their heads down. I also added some long assist bars (I prefer to call them "grab irons") on both sides of the Duck Zone to help visitors get back up.

The scenery elevator



5 A powered TV stand provides easy access to hidden track.

My scenery elevator is the result of watching too many old James Bond spy movies. When the elevator is down, it fits seamlessly into the surrounding scenery. The heart of this device is a TV lift from Fircelli Automations. When activated, it lifts a scenery section to the ceiling, allowing easy access to hidden tracks.

With the scenery elevator, I don't have to worry about where to set the lift-out section. It's also entertaining for guests of all ages and, for me, that's one of the most pleasurable aspects of model railroading.

Edward Hopper in 3-D



6 John distorted the buildings in his 3-D depiction of Edward Hopper's "Approaching a City" to match the painting (below).

I'm a great admirer of American artist Edward Hopper (1882-1967). One of his more famous paintings, "Nighthawks," was modeled in O scale by John Armstrong, who wrote about the project in the January 1989 *Model Railroader*. On my layout, I've built a homage to Hopper's "Approaching a City," in which Hopper starkly evokes the loneliness and anxiety of entering an unknown place. (I've also modeled a scene inspired by "Second Story Sunlight," shown in the photo on page 33, as well as "New York Office.")

While modeling "Approaching a City," I discovered a few challenges. First, Hopper worked in two dimensions with a single viewing angle, while

I worked in three dimensions and needed to account for multiple viewing angles. I also had to temper the somber colors used in the painting with more realistic shades that matched my surrounding buildings and layout scenery. The biggest challenge was that, unlike me, the artist was unconstrained by vanishing lines or having to keep buildings square.

To duplicate the painting I drew a series of full-size O scale wall sections for each building. When I found a set of walls that worked, I taped the drawings directly to styrene sheets to cut them out. Then I cut the window openings and assembled the buildings. I repeated this process until the scene was finished.



Hopper, Edward, *Approaching a City*, 1946, Oil on canvas 27 $\frac{1}{8}$ x 36 in.; 68.8975 x 91.44 cm. The Phillips Collection, Washington, DC. Acquired 1947. Reproduced with permission.

Expanding a structure with photos



7 A set of Baldwin RF-16 “sharks” leads a passenger train through the yard at New Lyon. Along the backdrop, a pair of building flats wrap around the corner to add depth to this scene at the entrance to the layout room.

A short hallway leads into my layout room. On one side of this hallway I added a row of plastic low-relief building flats placed along the backdrop at New Lyon. I wanted to wrap the last building (shown in the foreground above) in the row around the corner to cover the blank wall and add more depth to the scene. However,

I didn’t want to build yet another 20 x 36-inch facade.

Instead, I followed techniques described in the article “Make realistic-looking buildings from photos and plastic” by Paul Dolkos from the May 2012 *Model Railroader*. First, I photographed the existing facade and made two full-size color prints. I mounted

one print on 1/16" illustration board and cut out the windows. Then I mounted the second print on 3/16" Gatorboard and attached it behind the first board, making sure all the windows and doors lined up. For additional texture and depth beyond the recessed windows, I added three-dimensional details like cornices and window sills.

The Weed Guard



I like the uninterrupted, panoramic view of a constant height fascia. However, this requires the scenery to have a steep slope in a few spots. After my first open house, I found a lot of weeds, shrubs, and other ground cover from these layout locations on my train room floor.

To keep the scenery on the layout, I built the weed guard. It’s made with 1"-diameter PVC pipe, PVC end caps, and right-angle brackets. Fastened to the benchwork, the weed guard sticks out 3" from the lower edge of the fascia. In addition to providing a place for visitors to lean on other than the scenery, it doubles as a handrail to help me get up when I’m working under the layout.

8 At the yard, the black handrail along the bottom of the fascia keeps visitors from brushing scenery off the edge of the layout.

Converting three-rail trains to two-rail



9 A PRR P5a electric pulls a Truc-Train of piggyback flatcars past the town of New Brunswick. The locomotive and cars are three-rail O gauge models converted to run on two-rail O scale track.

Both Lionel Trains and MTH Electric Trains make some highly detailed O gauge models. Apart from a few two-rail MTH locomotives, most of these models are designed for three-rail operation and high-rail O gauge track. However, I've found it's not that difficult to convert high-rail models into two-rail O scale equipment. For example, the Pennsylvania class P5a electric locomotive and the flatcars shown above started out as MTH and Lionel three-rail models, respectively.

On three-rail locomotives, one electrical feed is through a roller that rides on the center rail of O gauge track. The other feed is through the electrically

connected metal wheels that ride on the outer rails. On three-rail equipment, the couplers as well as the wheel treads and flanges are also oversized and incompatible with other O scale equipment and track.

To convert rolling stock I replace the wheelsets and couplers with O scale versions available from InterMountain, NorthWest Short Line, and Precision Scale, among others. In addition to smaller flanges, the O scale wheels are insulated from one another. Scale sized couplers are available from Kadее, Protocraft, and San Juan Car Co. Most recent Lionel and MTH cars have coupler pads cast into the car bodies that

are at, or can be easily shimmed to, the correct height.

For locomotives, I also remove the center rail pickups, add pickups to the wheels, and attach the wire from the control board. All my locomotives use the MTH Digital Command System (DCS) boards. Other improvements include lowering the body if needed, integrating the swiveling pilot (often a necessity of tight O gauge curves) into the body, and adding extra details.

The wide range of three-rail equipment that's now available and relatively easy to convert to two-rail operation made it much easier for me to build up my O scale roster.

Block walls from Lego bricks

Someone at Lego must be a fan of the Pennsylvania RR, because the size of a standard Lego brick is pretty close to that of a standard Pennsylvania RR stone block in O scale. I use the following Lego brick technique for bridge abutments and tunnel portals as well as retaining walls.

First I spread drywall joint compound on the faces of each individual Lego brick that will be visible on the final model. Next I use my fingers or a small trowel or artist's palette knife to form an irregular "stone" surface while the joint compound is still wet. Once the joint compound dries, I paint the bricks with various shades of acrylic craft paint.

To build the walls, I paint all the brick's mating edges with Folk Art Barn Wood craft paint. In addition to



10 John models most of the Pennsy's signature cut-stone walls with Lego bricks and joint compound.

simulating the mortar between the bricks, the paint acts as an adhesive to help them stick together. After assembling the structure, I wipe away any

excess paint and add weathering. A good online source that I've found for inexpensive bricks is Toy Brick Brigade (www.toybrickbrigade.com).

Bumps (and cracks) in the road

Potholes and cracks are a common feature of paved roads that can be difficult to model realistically. I found a method that works by using Durham's Rock Hard Water Putty.

First, I cut a base layer of .040" styrene sheet to the width and length of the road. Then I use 3M Super 77 Spray Adhesive to attach a layer of .080" black foamboard to the styrene. I place this styrene/foamboard base atop cardboard covered with wax paper that I use as a working surface.

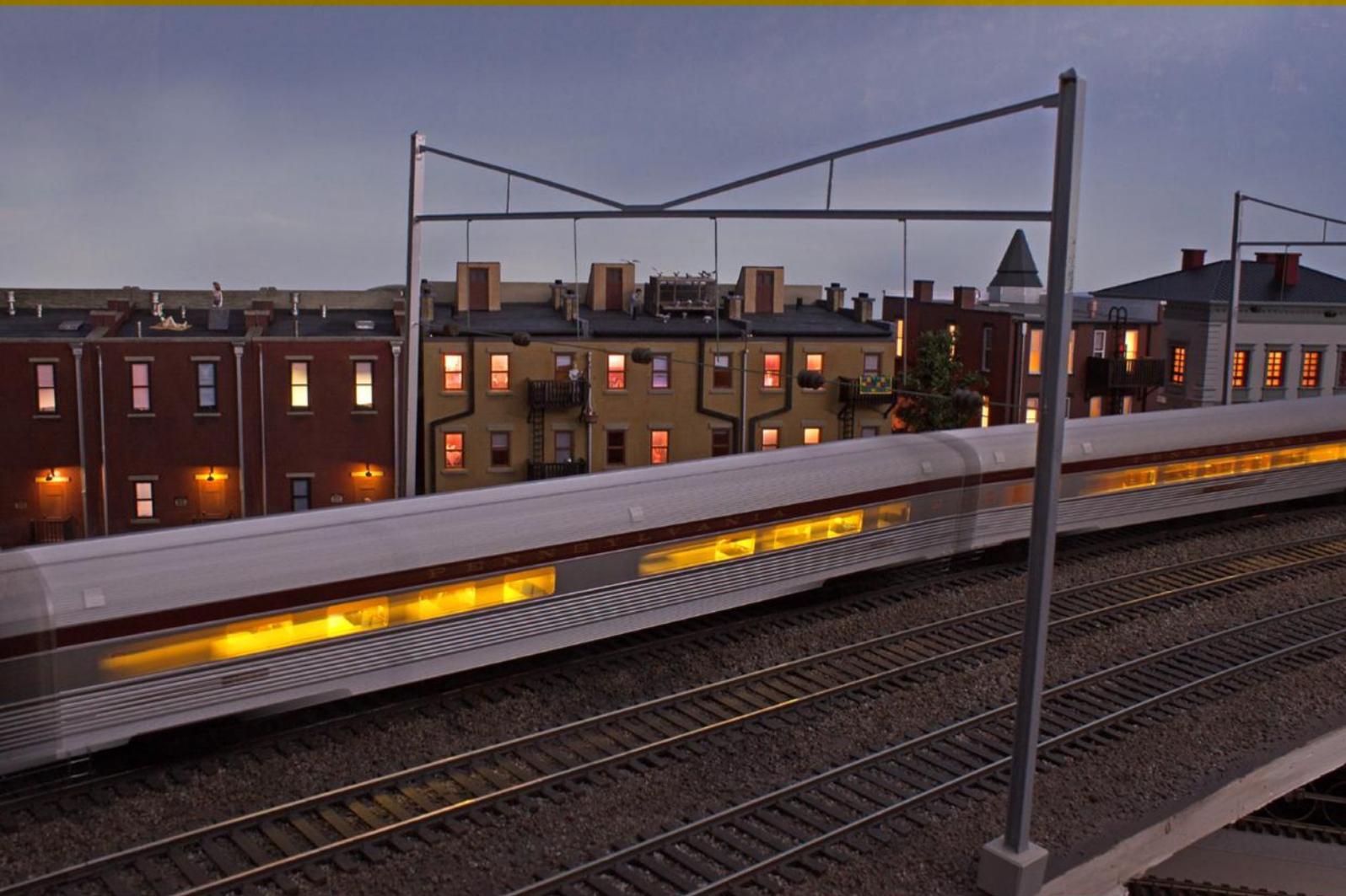
For the final layer I mix the water putty according to the instructions, but I add some black craft paint until the mixture turns an appropriate shade of gray. Once it's mixed, I use a trowel to apply the water putty to the foamboard. As the putty sets, it has the consistency of modeling clay. At this point I scrape the surface smooth with a razor blade. Sometimes I'll also crown the road surface by making the center higher than the road's edges.

After the road surface is completely dry I remove it from the wax paper and attach it to the layout with Gorilla Glue. During this process the putty will crack and pieces will flake off, adding a realistic texture to the road surface. I'll fill some of the voids with cinder ballast to simulate asphalt patches. After adding lane lines with automotive pinstripe tape and applying weathering powders and washes, my O scale roads look like the real thing.



11 Cracks and potholes add a realistic texture to the O scale paved roads on the layout.

Corridor windows



12 At dusk the *Congressional* speeds along the line behind a row of apartments modeled with Woodland Scenics structures.

Anyone who has traveled by train along the Northeast Corridor knows that much of the scenery along the route consists of the backs and roofs of rowhouse apartment buildings. By modeling the scene I wanted to suggest that for a fleeting moment rail passengers and rowhouse residents could be staring at each other through their respective windows.

Rowhouse apartments were generally built in one common shell with vertical partitions to separate the units. From the front the individual units could have different architectural facades, but from the back they would have similar window arrangements and brickwork.

My rowhouses are made from three Woodland Scenics O scale J.W. Cobblers storefront structures. I used two Built & Ready versions for the outside units. For the middle unit I used only the roof, front wall, and rear wall from a kit version. Sharing the walls with the adjoining buildings ensured that I got the partition thickness right and achieved the realistic look of a single monolithic structure.

I used photographer's black tape to simulate tar paper on the tenement roofs, followed by a coat of Polly Scale Weathered Black and some patches of Polly Scale Steam Engine Black. I scratchbuilt rooftop stairwells for all three units using Plastruct brick sheets.

The pigeon coop is made of O scale dimensional lumber and bridal veil, while the pigeons (as well as some seagulls standing in for pigeons) are from Arttista.

All my buildings have interior lighting. I use 14V incandescent bulbs running on 8V. To prevent the structure walls from glowing, I use Super 77 spray adhesive to glue aluminum foil to the inside of the walls and roof. The dull side faces in. It's also easy to paint.

As for the "mutual staring for a fleeting moment" aspect, I populated the windows of the rowhouse closest to the track with figures representing characters from the Alfred Hitchcock movie *Rear Window*.

Photos for interior detailing

In addition to adding interior and exterior lights, I use photos of real building interiors to detail the insides of my structure models. I've taken interior photos of diners, libraries, waiting rooms, and lobbies. (I always ask permission from a manager before taking any photos.) For each interior I usually digitally combine several photos and remove the perspective using Adobe Photoshop software.

I print out the photo as a rectangular strip. To install this strip into the building, I glue the side edges to the front inside corners and the center of the strip to the back wall. This forms an elliptical arc that provides a natural-looking perspective that's tailored to the specific space.

When I want to model a store with shelves, such as Ayers Variety & Hardware shown at right, I'll nest a second photo strip inside the first. Details such as items in the windows or a couple buying their first birdhouse also add a three-dimensional quality to the interior scene.



13 Photos, lights, and 3-D details bring this store front scene to life. The prototype for Ayers Variety & Hardware is a real store in John's hometown.

Visit this layout!

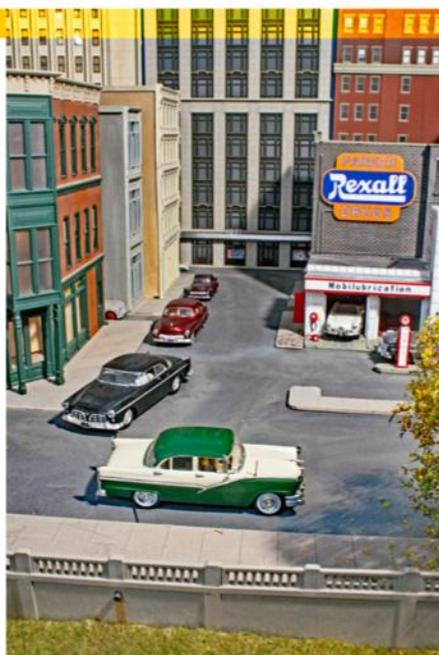
John Sethian's Nassau Divison will be open for tours during the 2018 O Scale National Convention held in the Washington, D.C. area (Rockville, Md.) on August 22-26, 2018. Contributing editor Tony Koester will be the convention's keynote speaker, and Tony's O scale sectional layout (to be featured in MR) will also be on display. For more information, visit 2018oscalenational.com.

Forced perspective

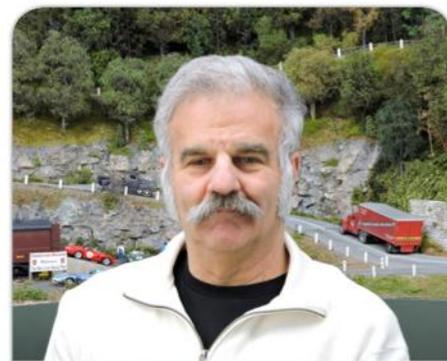
Forcing perspective by using smaller scale models in the background of a scene is a well-established modeling technique to give the illusion of distance. At New Lyon, I used O scale buildings, automobiles, and other models in the foreground and HO, N or smaller scale models closer to the backdrop. I also made the width of the streets get narrower from the foreground to the background.

The sense of distance is further enhanced because I left a gap between the last row of buildings and the illuminated sky backdrop. That way the buildings don't seem attached to the sky. As the viewer moves along the scene, the buildings also seem to "move" laterally with respect to the sky.

During nighttime operations, the interior lights in these far-away buildings along the backdrop are also dimmer than those in the foreground.



14 This view down a street in New Lyon shows how decreasing scales adds the illusion of distance. The green-and-white Ford and black Chrysler in the foreground are 1:43, the burgundy Mercury is 1:48, the black Ford pickup is 1:64, and the department store in the background is 1:87.



Meet John Sethian

John Sethian is a semi-retired research physicist who specializes in the application of high-powered electron beams, pulsed power, and high-energy lasers to produce new clean energy resources. He lives in Burke, Va., with his wife, Barbara. They have two grown children.

SHOOT PHOTOS



Take publication-grade images using these techniques

By Pelle K. Søbørg
Photos by the author

I recently purchased my first Apple iPhone, an iPhone 7. One of the first things I did was bring the phone to my train room to test the camera. Apple placed the camera lens off center, which, from a model railroader's perspective, is ingenious. The lens position makes it possible to take pictures from a low angle, similar to the perspective of an HO scale figure.

Taking layout pictures is quite different with an iPhone than with a digital single-lens-reflex (DSLR) camera. With a DSLR camera, the exposure time, white balance, aperture, and focal point can be set in manual mode.

On an iPhone, most of the same features are automatically adjusted. The focal point can be controlled by the user by touching the screen where he or she

LIKE THIS

with an iPhone

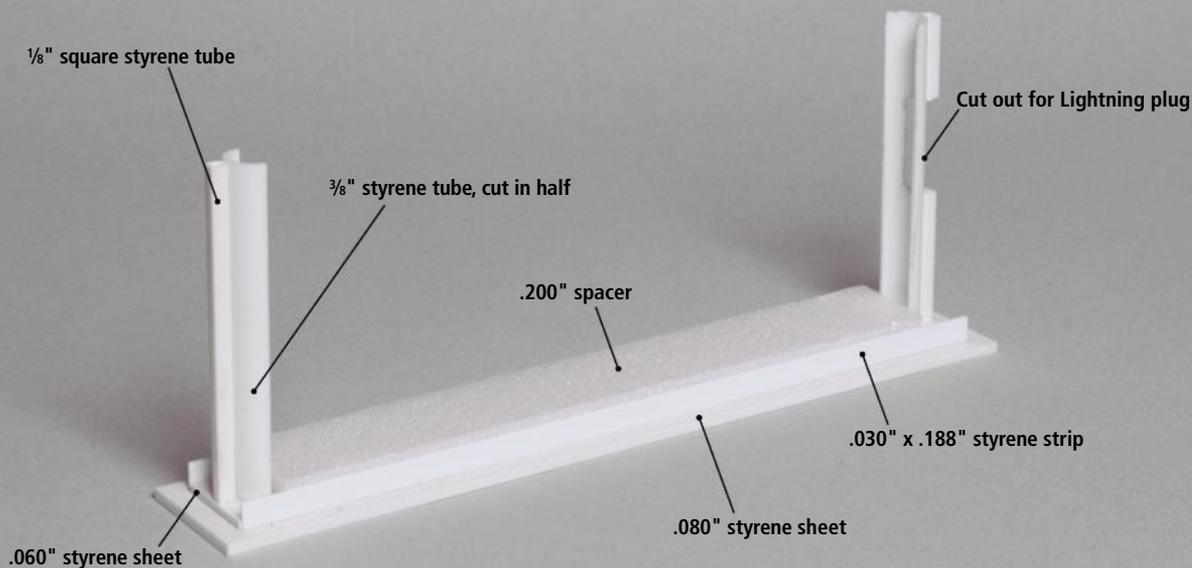


wants the camera to focus. To get an image with a good depth of field (in focus throughout the frame), multiple shots with different focal points must be taken and merged in Adobe Photoshop. Photoshop's AUTO BLEND function sometimes leaves blurry spots on the image when it blends the layers. These can be removed with a little manual work.

Model pictures taken with an iPhone require a little more work in a photo-editing program than pictures taken with a DSLR camera. First, the iPhone has automatic white balance that isn't always accurate, so some color adjustment will be needed. The contrast, however, is good.

The iPhone takes pictures in JPG format, which works fine for most tasks. If

Your iPhone isn't just for texting friends and making phone calls. Contributing editor Pelle Søbørg merged 12 images with different focal points using the Adobe Lightroom camera app to create this realistic, low-angle photo.



1 Styrene camera holder. Pelle scratchbuilt this holder for his iPhone 7 from assorted styrene pieces.



2 Ready, set, shoot. With the holder on the rails and the camera ready, Pelle was set to take photos. He uses only the layout room lighting for still photography.



3 Many images. To create a sharp final photo, Pelle took multiple images with different focal points. He then merged the images in photo-editing software.

you want more options, Adobe offers the Lightroom app for mobile devices. I highly recommend using it if you're serious about taking pictures of your models. With this app, you can shoot images in RAW format with an iPhone. You also have more setting options like manual focus, which is especially useful for model railroad photography. This feature only works with the latest iPhones. [See "JPG versus RAW," opposite. – Ed.]

Homemade holder

Though you probably associate styrene with scratchbuilding structures and freight cars, the material also works well for making an iPhone holder **1**. When the phone is placed in the holder, the center of the camera lens is at the same height as an HO scale figure's head.

Taking photos is simple. Place the phone in the holder on the layout where you want to take a picture and shoot **2**. When I take pictures, I use only the lighting in the layout room. My layout is illuminated by full-spectrum fluorescent light tubes, which gives a nice, even light. For videos, I add four light-emitting-diode workshop lights to gain more depth of field.

Multiple images

Since I can't change the aperture on the iPhone's camera, and I shoot with room lighting, the phone chooses a setting with little depth of field. This makes it necessary to shoot many photos of the same scene with different focal points.

To adjust the focal point, place your finger on the screen where you want the camera to focus and take a picture **3**.



4 Larger scenes. The iPhone's camera shines when doing close-up photography, but it can be used for larger scenes. Pelle merged 15 JPG images to create this photo, which was featured in the May 2017 issue of *Model Railroader*.



5 Lightroom app. Here is what the Adobe Lightroom app looks like on an iPhone. Pro mode offers useful options like manual focus and a RAW format called DNG.

Then move your finger a bit to change the focal point and take another picture. Continue changing the focal point and taking pictures until you've reached the other end of the scene.

It can be difficult to get small enough intervals between the focal points by touching the iPhone's screen. If there's an object near the spot where you touch the screen, the phone thinks it's that specific object you want to focus on, so look for spots on the screen with no distractions.

Sometimes the only option is to place an object the camera can focus on in the scene and then remove it in Photoshop

later. If you remove the object before you take the picture, the camera will automatically find a new focal point, so you can't cheat it. Although the iPhone camera works best for close-up photography, it's possible to shoot bigger scenes **4**.

Though the quality of pictures I get with my iPhone might not be quite as good as the ones I get with my DSLR, they're close. With apps like Adobe's Lightroom, **5**, and the various photo-editing software packages on the market, taking publication-grade images of your model railroad is as simple as reaching for your iPhone. **MR**



Both of these photos were made up of several images merged together with photo-editing software. The photo at top consists of iPhone JPG images, while the bottom photo consists of RAW files from the Adobe Photoshop Lightroom app.

JPG versus RAW

I wanted to compare the quality of the JPG files from the iPhone's camera with the DNG (RAW) files generated using Adobe's Photoshop Lightroom app. The two photos shown above are composed of multiple images shot with different focal points. The top picture was taken with the iPhone's camera as JPG files. The bottom image was shot with the Lightroom app as RAW files.

At first glance there isn't much difference between the two. But if you look closely, you'll notice that the image based on JPG files looks crisp, while the details on the photo made up of RAW files are soft. The difference is especially apparent on the corrugated silos and the UNION PACIFIC lettering on the hood of the locomotive. The image based on RAW files also seems to have a wider color spectrum in darker areas.

The Adobe Lightroom app only works with the latest iPhones. I primarily use the Lightroom app when I take pictures of my model railroad. I almost never use my DSLR camera for shooting model pictures. – Pelle Søbørg



Take your best shot

The gear you need to take quality images of your layout

By Paul J. Dolkos • Photos by the author



A low camera angle often yields prototypical views of a model railroad. Paul uses wooden wedges and blocks to level or raise a camera placed directly in the scene. A right-angle viewer enables precise camera positioning in tight situations.



Over the years I've had a lot of photos published in the model railroading press. So when I meet hobbyists, I get many questions about how I shoot my photos.

The first question is usually "What camera should I get?" The answer is the brand really doesn't matter, as long as it has some basic features: manual focusing, manual aperture control, and variable exposure.

Point-and-shoot models are OK for general overall views, and some of them may even yield prize-winning images. But with so many of their functions being automatic, your control is limited. For example, auto-focus often isolates on a part of the scene other than what you

intended. Even stopping a camera's aperture all the way down may not yield a depth of field sufficient to sharply capture a deep scene like this. Image-stacking software like Helicon Focus combines the in-focus portions of multiple exposures into a single image that's sharp from front to back.

Even the most basic digital single-lens reflex (DSLR) models will provide manual controls.

I use two Canon Rebel DSLR cameras with manual options. Each came with a general purpose 18-to-55mm lens that can focus on subjects as close as 4" from the front of the lens. The variable focal length (wide angle to normal) is useful in model photography.

The aperture (f-stop) on these lenses can be set down to f/22 at the 18mm focal length and f/36 at 55mm. This provides good depth of field, with everything in focus from the foreground to

the backdrop. Higher quality lenses are available, but they may not focus as closely or stop down as far.

Macro lenses are designed for close-ups, but the typical 60mm fixed focal length isn't ideal for many model scenes. Other camera brands offer DSLR combos similar to Canon. The sensor resolution on today's DSLRs is more than adequate for publication-quality images.

One feature my cameras don't have but which is available on some DSLRs today is a fold-out liquid-crystal display (LCD). For most photos, I use the optical viewfinder, but some camera placements



While layout room lighting is usually sufficiently bright for good photography, the lighting is often flat, resulting in a less-than-compelling image (top). Using a photoflood light to highlight details and cast shadows makes the image more realistic (bottom). Be careful not to cast overlapping shadows from multiple lights.

may prevent looking through it. The fold-out screen provides another way to line up the shot. Instead of such a screen, I use a right-angle viewer that slips over the optical viewfinder.

Steady images

The next required item is a tripod to steady the camera. When stopping down the lens to increase depth of field, the camera must compensate the exposure by using a longer shutter speed. The longer exposure times required eliminate the possibility of handheld shots. Any shutter speed slower than 1/60 second risks unacceptable camera shake. Get a cable release for your camera, or use the

camera's timer, so as not to introduce vibration when triggering the shutter.

The tripod should be capable of being extended 60" or higher. A useful option is a cantilever rod that lets you position the camera over the railroad.

There are times when I simply set the camera on the railroad to get an eye-level view. Such scenes are prototypical and dramatic. If the surface is irregular, I insert wooden wedges to steady the camera. I may lay paper under the camera so it doesn't short across the rails.

Photoflood lighting

Forty years ago, a lot of layout lighting was spotty at best, so supplementary

lighting was almost mandatory. Tungsten photoflood lights would be mounted in round reflectors held up on telescoping light stands. At the time, most images were printed in black-and-white, so the color temperature of the bulbs wasn't an issue. When color printing became common, film compatible with tungsten bulbs was required. Modern cameras usually compensate for the proper lighting balance to eliminate off-color images.

Today, more modelers are installing good layout lighting. Usually it's fluorescent, but light-emitting diode (LED) bulbs are gaining popularity. There may be dark spots on layouts that need supplementary light, but generally it's adequate for photography.

Room lighting tends to be diffuse, though, eliminating shadows, like taking pictures on a cloudy day. In post-processing, you can push up the contrast and saturation, but it's easy to overdo it.

The ideal solution is to use photofloods to replicate the brightness, sparkle, and shadows of a sunny day. They also give you control of the light direction. I use a set of 500-watt halogens.

One light, often referred to as the key light, is positioned to act as the sun. I usually set this light about 90 degrees to the camera and main subject so the light skims the front of the subject matter (such as a locomotive) to highlight detail and emphasize texture. I may position a second light, called a fill light, behind the camera to slightly lighten shadows. Other lights can be used to lighten the background, if necessary.

After the shoot

In the days of film, when you got your negatives or slides back from the film processor, there wasn't much you could do if the images were too dark or there was some element you didn't like in the composition. Now, Photoshop or other digital image-editing software gives you a second chance to correct problems or enhance an image.

Though you can adjust a digital image as much as you like, I try to shoot my original images to minimize necessary computer adjustments. Ideally, I may only need to adjust color fidelity, brightness, and contrast. If shadows are too dark, those areas can be independently lightened with one click.

More work is required when there's a basement wall, heating duct, or back-drop corner in the image. Image editing software lets you isolate part of a photo

so a sky or other appropriate image can be inserted, eliminating the distraction. One could paste in a solid blue color or a photo of a cloudy sky. I typically just add a sky color and fade it into the horizon line. I want the trains to be the focus of the photo, not a dramatic sky.

Cleaning up a background is more difficult if sky is visible through tree branches or complex bridge girders. A bit of sky showing through is sometimes so small that the computer can't isolate these sections. One solution is to use a sky color close to the color showing through these small areas.

In my comments about camera equipment, I said I liked lenses that stopped down to at least $f/22$ for the maximum depth of field. But even that may not be enough, especially if the viewpoint is close to the subject. So when I see a scene that I really like, I set up my shots so I can use photo-stacking software to ensure improved image definition and sharpness. Photo-stacking software, such as Helicon Focus, combines the sharpest portions of multiple images shot from a single viewpoint into one photo, yielding a scene with maximum depth of field. A similar image-stacking feature is offered in the most recent versions of Adobe Photoshop CC.

To shoot the component photos for such an image, I open up the aperture to $f/8$ or $f/11$. I then take a series of multiple exposures, changing the focus point on each shot, moving from the foreground to the background.

These are some of the basics of the hardware and software used in today's digital photography. But the real challenge is in the art of photography. You have a subject, typically a train, structures, and landscape. The task is to

position the camera and lighting to capture the subject matter in a pleasing visual arrangement.

No two people focus on the same subjects or see model railroad scenes in the same way. Being comfortable with the tools of photography frees us to master the art of it. **MR**

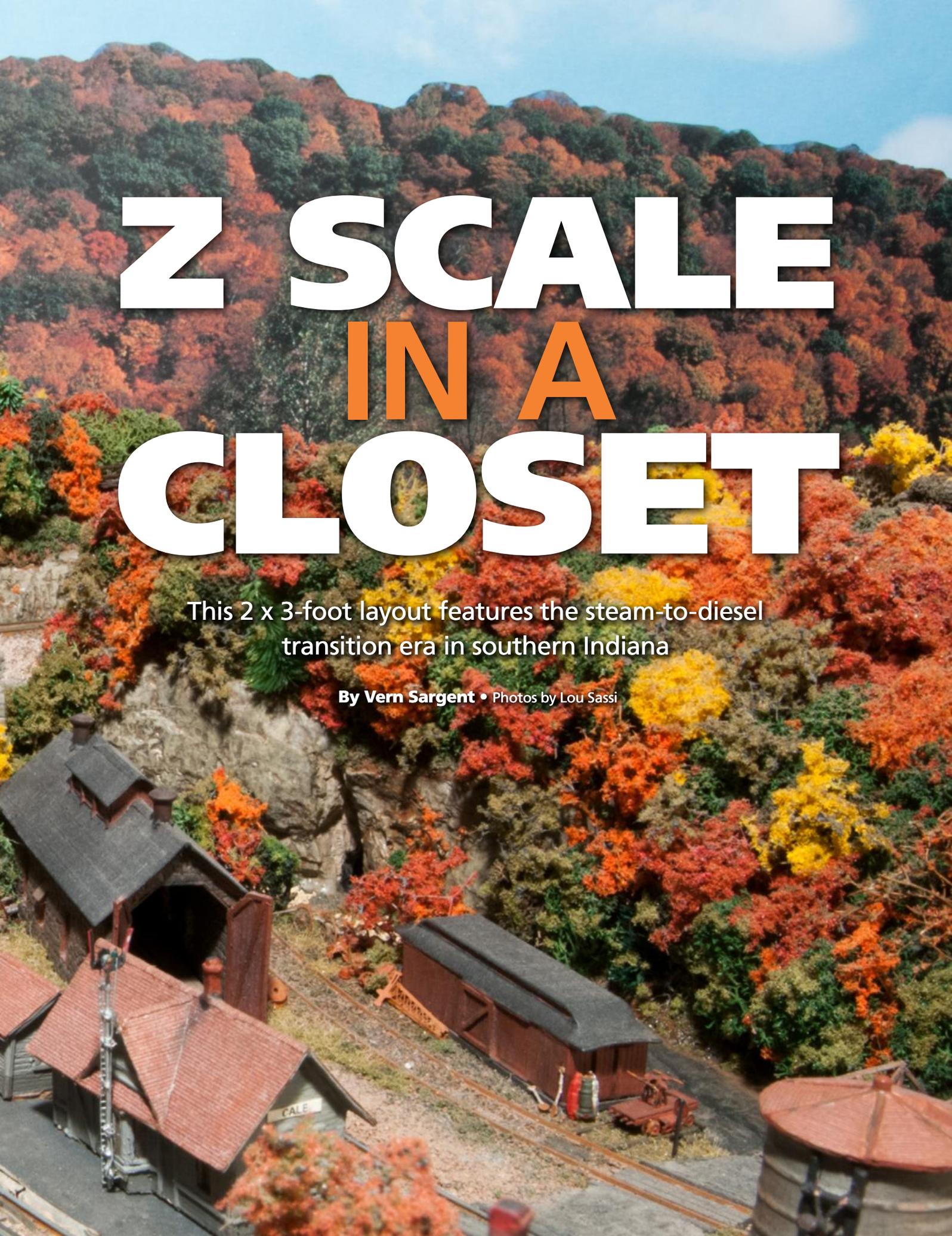
Paul J. Dolkos is a frequent contributor to Model Railroader magazine and its special issues.



Background items, like a wall corner or intruding window, can spoil the realism of an otherwise well-composed shot (above). Image-editing software like Adobe Photoshop can be used to not only replace these distractions with a seamless sky (bottom), but also to add things like clouds, smoke, and haze.

① A Milwaukee Road Geep leads a cut of loaded coal hoppers over a Monon detour train on Vern Sargent's Z scale Cale, Bear Mountain & Harrisonville.





Z SCALE IN A CLOSET

This 2 x 3-foot layout features the steam-to-diesel transition era in southern Indiana

By Vern Sargent • Photos by Lou Sassi



2 Milwaukee Road class F5 4-6-2 no. 839 leads a coal train under a wood overpass. Vern kitbashed, painted, and decaled the Märklin locomotive.

A train set under the Christmas tree, girls, and cars. You all know the drill. I was an active modeler in HO scale from age 10 to 18. During the mid-1960s, I'd send for the Arnold Rapido N scale catalog each year and wear out the pages. Then I saw the April 1985 issue of *Model Railroader* on a newsstand. The cover featured the Pennsylvania & Pacific, a 2 x 3-foot Z scale layout. Inside, Jim Kelly's article "Some ABCs of Z scale" included the track plan and construction tips for the model railroad. Jim did a fine job of reeling me in. I was hooked on Z scale.

I spent the next few years gathering locomotives and cars, scratchbuilding structures, and planning. The Cale, Bear

Mountain & Harrisonville represents a branch line of a Milwaukee Road predecessor that ran through Martin County in southern Indiana. The branch line was to leave the main at Cale and serve a mineral spring resort hotel at Harrisonville, later renamed Trinity Springs.

Grading was completed, but the project was canceled due to the financial panic of 1905. My father's family came from this area. I lived at Trinity Springs from 1971 to 1985 and walked the old grade many times, so I felt I had to model it.

I dove in and built the layout, which pretty much followed the original plan in MR. But I wasn't satisfied with the result. Around 1993 I started over.



Why build in a closet?

I started my 2 x 3-foot Z scale layout on a built-in desk in a common area of our home. All went well as I built the roadbed, basic scenery forms, and laid track.

I then moved on to the ground cover and trees. I kept noticing that the lichen trees were getting mashed down. After questioning my two young sons, I discovered that our family cat, Le Ann, decided the layout was a good place to nap.

Not being able to stand guard full-time, I negotiated for half the closet in the boys' play room, where the layout remains to this day. – Vern Sargent

Take two

I was able to salvage all of the Märklin switches and most of the track from the original layout. The second time around I used 1/4" lauan plywood and cork for the roadbed. I cut risers from 2"-thick extruded-foam insulation board. I made kerfs in both sides of the foam so it could be curved in either direction.

Once the roadbed and risers were in place, I laid the track. I wired the layout for DC and divided it into blocks so I could run two trains. The track plan suits me, as I just like running trains. There are a few sidings if I get the urge to do some switching.

There are no reversing sections, so converting to Digital Command Control

Cale, Bear Mountain and Harrisonville RR

Numbered arrows indicate photo locations
Photo illustration by Lou Sassi and Roen Kelly

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

Z scale (1:220)
Layout size: 2'-0" x 3'-2"
Scale of plan: 2" = 1'-0"

— Main line
— Branch lines and sidings
— Fake sidings



3 This overhead view shows the entire 2 x 3-foot layout. Cale, Ind., is at left; the undeveloped town site is at right.

The layout at a glance

Name: Cale, Bear Mountain & Harrisonville
Scale: Z (1:220)
Size: 2'-0" x 3'-2"
Prototype: Milwaukee Road and Monon
Locale: southern Indiana
Era: 1945 to 1955
Mainline run: 15 feet
Minimum radius: 8¹¹/₁₆"
Minimum turnout: no. 4¹/₂
Maximum grade: 4 percent
Benchwork: extruded-foam insulation board
Height: varies
Roadbed: cork on 1/4" plywood
Track: code 55 flextrack
Scenery: lightweight plaster
Backdrop: commercial photograph
Control: direct current



4 The morning Milwaukee Road time freight exits a tunnel on its way to Bedford, Ind. The Electro-Motive Division GP9s are American Z Line models.

(DCC) should be easy. It's on my to-do list.

Lightweight scenery

Now I was able to move on to my second favorite part of model railroading: scenery. I used extruded-foam insulation board for the scenery base. After carving

it to shape, I covered the foam with lightweight spackling compound.

Though I used a few commercial rock castings, I carved most of the rocks from the spackling. After coloring the rocks, I brushed the remaining areas with a flat, earth-toned latex paint. When the paint dried, I applied white glue and began adding scenery.

I started by applying medium green lichen. Then I inserted sprigs of Woodland Scenics Fine-Leaf Foliage, which is offered in various shades of green, a fall mix, and dead foliage, until I was satisfied with the results.

The trees, ballast, and remaining ground cover are also Woodland Scenics products.



5 As the track crew talks over its duties for the day, an Electro-Motive Division GP9 rolls past the tower at Tunnel Junction. The scenery on Vern's layout covers the gamut from old-school lichen to modern-day static grass.



What's taking so long?

I spent most of two years building an operating diorama of Tulip Viaduct on the Indiana Rail Road in Solsberry, Ind.

The diorama measures 16 x 60 inches and has 5" radius curves, which Micro-Trains four-axle units handle just fine.

This project allowed me to experiment with forced perspective. The foreground details are HO scale. Those to the rear and under the trestle are N scale. The trestle and train are Z scale. – Vern Sargent

Fun with structures

With the scenery finished, I moved onto my favorite part of the hobby, scratchbuilding structures. Except for the water tank and a baggage

Meet Vern Sargent

Vern was born in Phoenixville, Pa. He is the father of three sons and one daughter. His wife, Monica, and five grandchildren fill out the family. Vern is a retired heavy-equipment operator.



car-turned-tool shed, all of the structures in Cale are scratchbuilt. The engine servicing area is fictitious, but the other buildings are based on prototypes that I built from pictures or memory.

I used cardstock and stripwood to build most of the structures. I used 1/8"-thick pieces of extruded-foam insulation board for the enginehouse. I hand-carved the stone into the foam.

The big white house still stands unoccupied in Indiana Springs, Ind., 1/2 mile from the real settlement of Cale. The depot and adjacent freight shed were also located at Indiana Springs. After passenger service ended in 1950, a relative of mine bought the depot, had it moved to an adjoining lot, then used it as a residence until it burned in 1975.

Locomotives and rolling stock

I own 29 diesel locomotives – a few by Märklin, four from American Z Line,

and the balance Micro-Trains Line Co. Electro-Motive Division F7As and F7Bs. I've repainted several A-B-A sets in Milwaukee Road and Monon colors.

My locomotive roster is filled out by one American Z Line and five Märklin steam locomotives.

The 250 cars in my rolling stock fleet come from a variety of current and former manufacturers. Someday I might see if all of the cars will fit on the model railroad at one time.

Looking ahead

I've built several buildings for a second town site, but have yet to decide on a final design. Now that I'm retired, I intend to finish the layout, move it out of the closet, and expand it.

I guess I should stop backing up and doing things over so that can happen. If not, I'm still going to have fun. Isn't that what a hobby is for? **MR**

A RAILROAD YOU CAN MODEL

British Columbia Ry.'s FORT ST. JOHN SUB



The daily Canadian National train from Fort St. John to Chetwynd, B.C., crosses the Peace River Bridge on the former British Columbia Ry. Aug. 18, 2017. The bridge would be a major scenic element in Christian Javier's Fort St. John Subdivision track plan. Matt Watson photo

A simple track plan for a rural layout offers plenty of modeling opportunities

By Christian Javier

While normally I surround myself in Florida's railroad history, I found I had a substantial interest in modeling the British Columbia Ry. The railroad started life as the Pacific Great Eastern in 1912, was acquired by the provincial government of British Columbia in 1918, and became British Columbia Ry. in 1972. A restructuring in 1984 saw the

name change to BC Rail, which it remained until it was acquired by Canadian National in 2004.

What drew me to this unique Canadian railway, on the exact opposite end of the continent, beats me. But I quickly found myself fascinated by the operations on the north end of the BCR after reading about Timothy Horton's branch line to Dawson Creek in *Model Railroad Planning 2009*.

The long, switching-dense yards, Montreal Locomotive Works (MLW) and Alco power, enormous bridge spans, plus the spectacular scenery of the Peace River Valley made BCR an enticing subject to model. I quickly set to work planning my own BCR track plan: the Fort St. John Subdivision.

This part of the British Columbia Ry. has everything I was looking for: a long bridge across the Peace River, diverse



British Columbia Ry. Extra 642 North rolls through the sparsely forested, wheat-growing Peace River country in April 1979 on the Dawson Creek Subdivision, not far from the Fort St. John Subdivision. Locomotives 642 and 645 are M-420s, and no. 574 is an RS-3, all from Montreal Locomotive Works.

John C. Illman photo



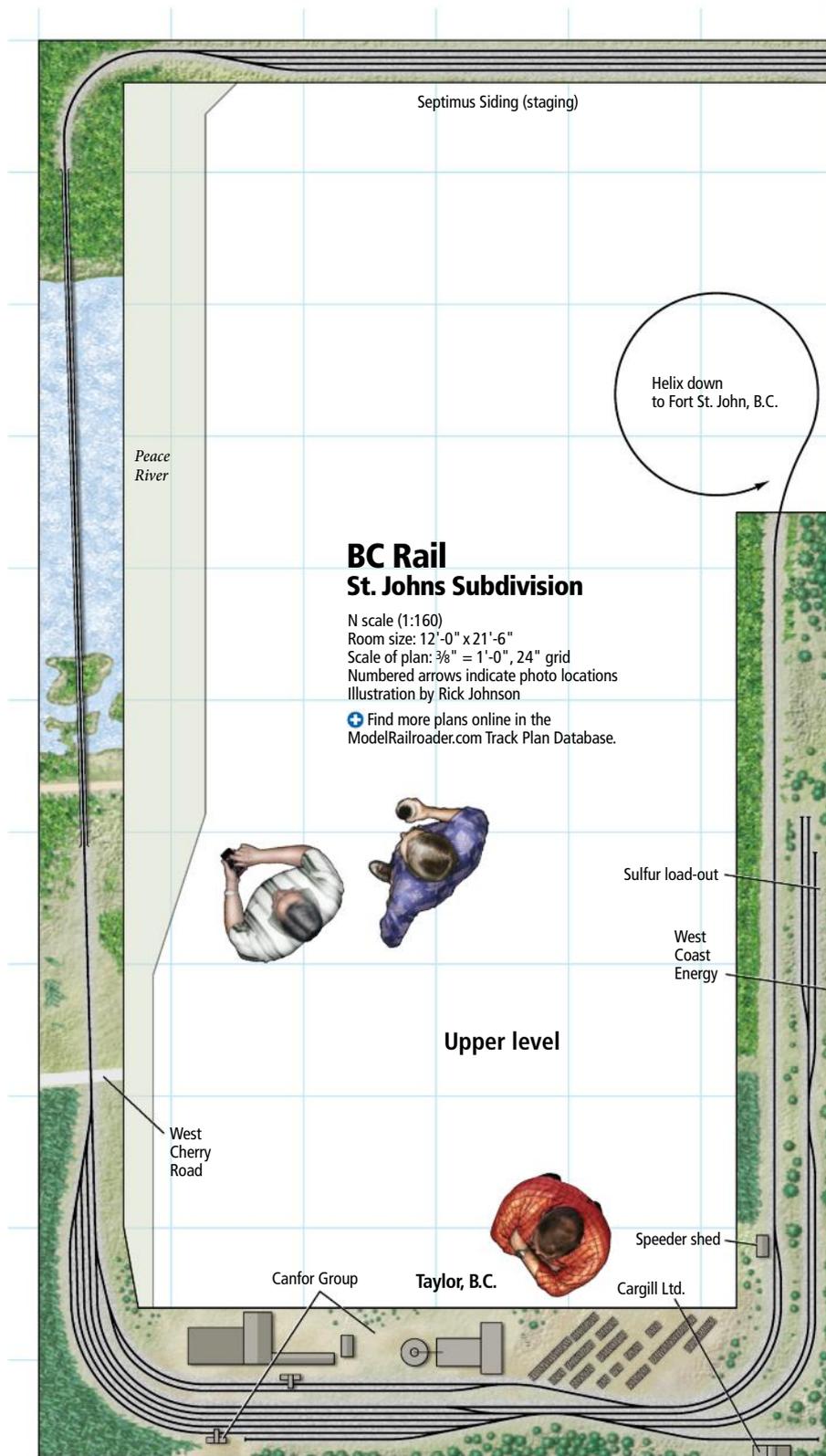
A pair of Montreal Locomotive Works M-630s and a cabless M-420B lead a freight, including trailer-on-flatcar loads, on the British Columbia Ry. main line in Pavilion, B.C., north of Lillooet. The two-tone green paint scheme is appropriate for this track plan's 1977 time frame. British Columbia Ry. photo

traffic, and lengthy scenic runs through the countryside. All of this can be modeled prototypically with a double-deck, around-the-walls shelf layout in N scale.

Canadian plains railroad

The Fort St. John Subdivision runs 69 miles north from Chetwynd, B.C., to the namesake town of the line. Constructed in 1958, the Fort St. John Subdivision appears different from the rest of the British Columbia Ry. system due to its long, straight sections of track and gentle curves. Substantial upgrades were made to the line in the 1970s, including ballast and tie improvements.

Out of Chetwynd Yard, the rails first reached Septimus, a two-track super-siding where traffic was swapped between what was known as the



Septimus Turn and the Fort St. John yard crew. The two trains often met there. The line then continued north and over the Peace River deck truss bridge, which if modeled exactly to scale, would take about 12 feet of layout space.

The town of Taylor was reached next, home of Taylor Yard. A lone Cargill

grain elevator as well as a Canadian Forest Products (Canfor Group) mill existed around Taylor Yard. A West Coast Energy complex processed much of the sulfur transported on the BCR. From here, the line crossed the Alaska Highway and continued on to Fort St. John.

The layout at a glance

Name: Fort St. John Subdivision
Scale: N (1:160)
Size: 12'-0" x 21'-6"
Prototype: British Columbia Ry.
Locale: Eastern British Columbia
Era: 1977
Style: multiple-deck around-the-walls
Mainline run: 90 feet (excluding helix)
Minimum radius: 16"
Minimum turnout: no. 5
Maximum grade: 2.2 percent (in helix)



An ex-Lehigh & Hudson River RS-18 leads a train near Dawson Creek, B.C., in 1973. Note the unusual single headlight above the cab windows next to the bell.

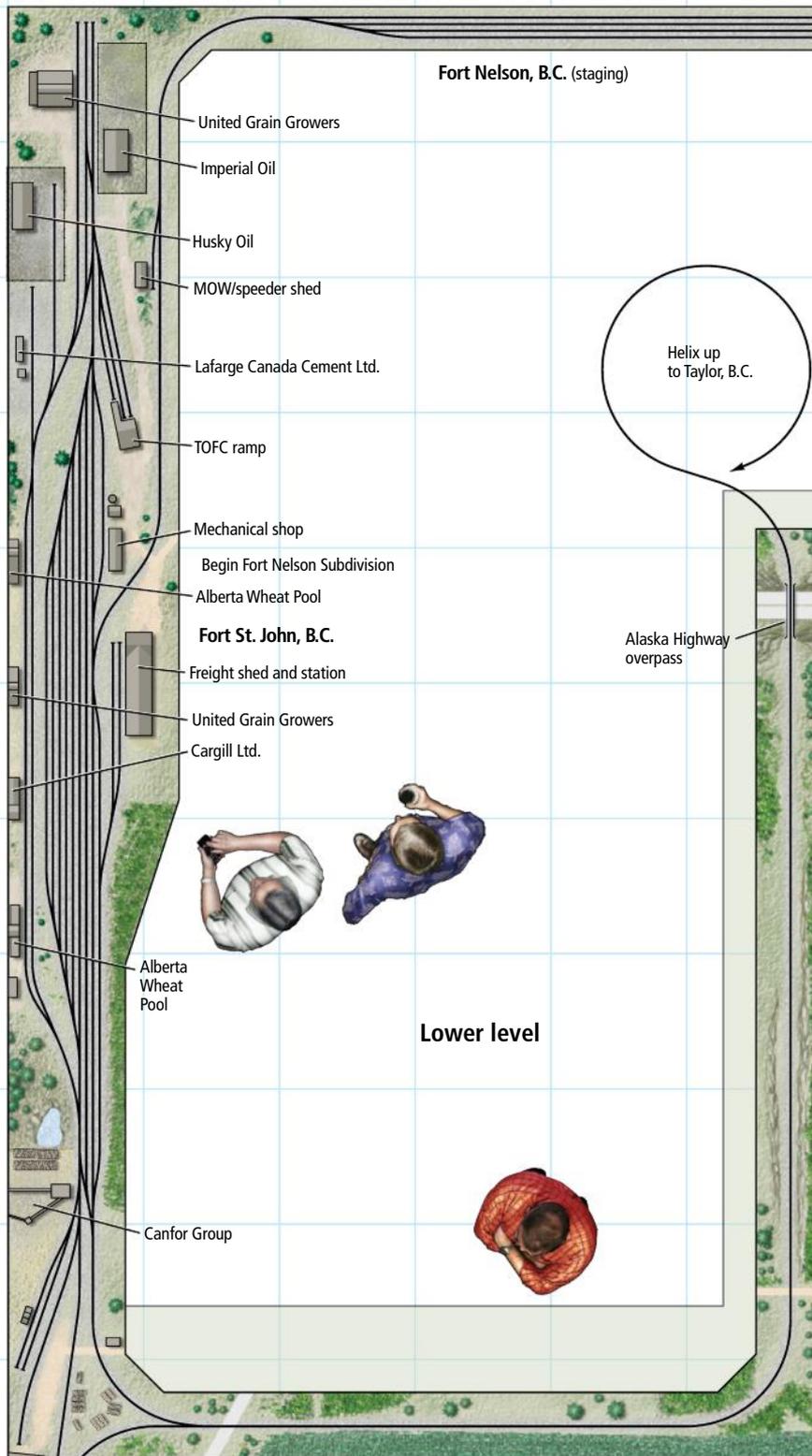
David P. Morgan Memorial Library collection

Around-the-walls on two decks

For me, the ideal layout is one that allows the maximum amount of comfort for the operator, with open staging and an around-the-walls narrow profile shelf construction. This was easily accomplished with the British Columbia Ry.'s relatively narrow and dense yards at Taylor and Fort St. John. Admittedly, some spurs had to be cut to fit the railway on a shelf, but with 12 industries in Fort St. John alone, there will be plenty of variety.

The dense clustering of these industries at the yards in Taylor and Fort St. John means long mainline runs of uninterrupted scenery can be achieved, as well. The ample room in the middle allows for the comfortable movements of operators, even when running on different decks. A gentle helix is used to connect the two decks with a reasonably easy 18" radius curve.

I felt it was important that staging remain open for easy access. I didn't like the idea of having to hide staging behind a hard-to-reach mountain or under other layout features. As a bonus, the staging yards for both ends of the layout are right on top of each other, dedicating



Numerous grain elevators were served, as well as another Canfor mill, a trailer-on-flatcar (TOFC) ramp, freight shed, and oil and cement industries. A small engine-servicing facility provided fuel and light maintenance for the resident motive power, as well as for trains headed to the end of the line at Fort Nelson.

Until 1984, a through freight also ran between Chetwynd and a point on the Fort Nelson Subdivision known as Beaton. This train provided dedicated service for Fort Nelson traffic, connecting with the Fort Nelson crew the same way the Septimus turn met the Fort St. John crew.



Montreal Locomotive Works RS-18C no. 604 switches opera window bulkhead flatcars at Fort St. John yard in 1987. J. David Ingles photo



British Columbia Ry. M-630 no. 714 is new in 1972. Montreal Locomotive Works photo



Switching activity at Fort St. John in September 1987. The combination freight house and station is on the right behind the Dease Lake combine. J. David Ingles photo



Caboose no. 1854 is typical of the long-frame "vans" used on the British Columbia Ry. Crews used the cabooses as accommodations between assignments. Don Sims photo

one wall of the layout room for staging trains and storage of rolling stock.

Many of the track features have been compressed, such as the yard track as Fort St. John. Satisfyingly long consists can nonetheless be easily built.

Another thing that makes this layout one of my favorite designs is its flexibility in era. Staging could be eliminated for Fort Nelson to backdate the layout for the Pacific Great Eastern era, or the MLW/Alco roster could be swapped for red, white, and blue General Motors Diesel Division SD40-2s and Caterpillar-powered CRS-20s (RS-18 rebuilds) for modeling the BC Rail era.

Operating the FSJ Subdivision

Traffic on the Fort St. John Subdivision had great diversity. Loads that originated there included lumber, wood chips, asbestos, oil, grain, and trailers. The loaded rolling stock would be collected by the yard crew and combined into

The railroad at a glance

- Name:** Fort St. John Subdivision
- Owner:** British Columbia Ry. (formerly Pacific Great Eastern, later BC Rail, currently Canadian National)
- Location:** British Columbia, from Vancouver to Fort Nelson with branches to Jackson, Dawson Creek, and Quintette
- Length (overall):** 1,261 miles (1984)
- Length (modeled portion):** 15 miles
- Profile:** single-track main line
- Prominent modeled locations:** Fort St. John Yard; Taylor, B.C.; Peace River bridge



A ballast train with one of British Columbia Ry.'s long-frame cabooses passes a group of railfans from an excursion train north of Fort St. John.

J. David Ingles photo

a single train with the cars from Fort Nelson.

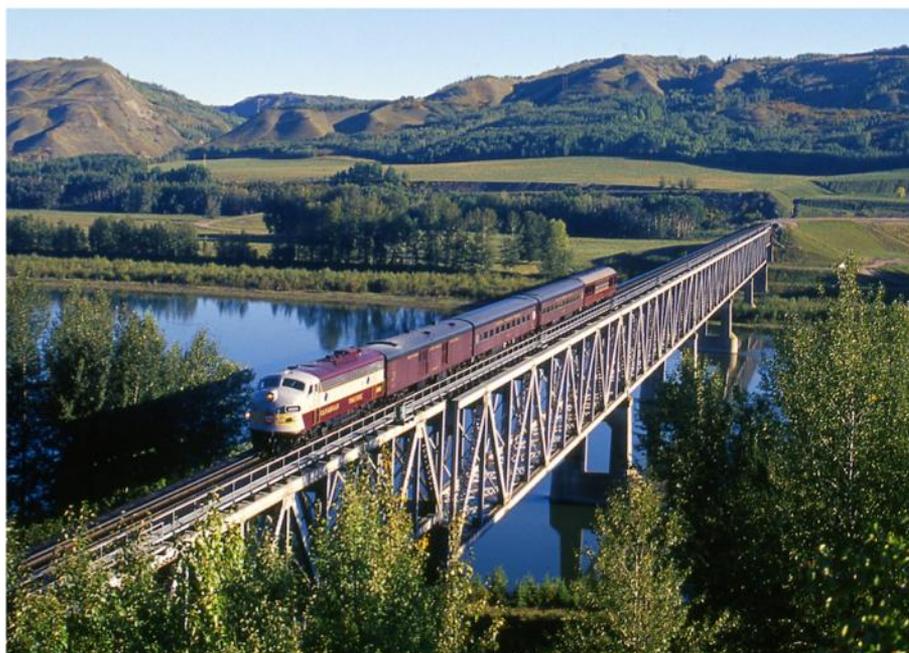
Every day between Tuesday and Saturday, the Fort St. John yard crew would make its way south with this tonnage toward Septimus, represented by staging. On the way, the crew stopped to pick up additional loads at Taylor. When the crew reached Septimus, the cars would be set out for pickup by the Septimus Turn, and the empties for Taylor, Fort St. John, and Fort Nelson would be pulled. On the return trip, the crew performed the morning's chores in reverse, setting out empties in the various industry spurs on the journey back north.

The south end of the Fort St. John Subdivision featured the aforementioned Septimus Turn, which took cars from the Peace-Vancouver freight that terminated at Chetwynd and ran them up to Septimus.

This operation isn't included in the track plan, as Septimus is represented by staging, but there's so much switching to be done I feel there's enough operation. I tend to plan layouts more for the individual, since I'd probably operate the layout the majority of the time by myself.

The Chetwynd-to-Beatton through freight operation is still preserved, however, and adds a nice contrast to switching by simply running through the entirety of the layout end-to-end.

The trains would all be run by four-axle MLW and Alco power, which included a mix of RS-3s, -10s, and -18s, C-420s, C-425s and M-420s. In 1977,



A West Coast Rail Tours charter train crosses the Peace River Bridge on the former British Columbia Ry. south of Taylor, B.C. in September 2002. Bruce Schwierske photo

many of the locomotives still retained their Pacific Great Eastern paint schemes and heralds. A few of the C-425s were still in Erie Lackawanna colors as well. The trains all ran with the wide-cupola steel British Columbia cabooses, or "vans."

Benefits with difficulties

While this layout has several benefits in regards to design and operations, it may be difficult to find prototypically appropriate equipment for the railroad. Almost all of the rolling stock needs to be built from kits or kitbashed from existing freight cars.

The locomotives also require adapting available frames and mechanisms to the

unique features seen on British Columbia Ry. locomotives.

Considering the straightforward construction, rich operations, and beautiful scenery possible on this layout, it appears worth the investment into crafting unique locomotives and rolling stock.

The plan's adaptability to fit several eras also means that as the modeler progresses in kit-building skills, more variety can be added by building additional unique locomotives from other eras.

So while the track plan isn't complex, the subject offers plenty of challenges to keep the model railroad interesting for years to come. **MIR**

This is Christian Javier's fourth track-planning article in Model Railroader.

Turnout control with accessory decoders



1 Taking command of turnouts. Using Digital Command Control to operate turnouts on your layout opens up several options. Many accessory decoders can be controlled with pushbuttons or toggle switches installed in conventional control panels, like this one on Larry's Piedmont Southern model railroad.

One of the things I miss with my transition from solenoid-based switch machines to slow-motion stall motor switch machines like the Tortoise by Circuitron, SwitchMaster, and others is the ability to use the old, time-tested diode matrix to control and create routes through a series of turnouts.

I always found it convenient to be able to set up a control panel and diode matrix that would allow operators to push one button to align a route up a yard ladder, or through a complex yard. However, the diode matrix doesn't work with slow-motion machines. Consequently, when I switched to Tortoises, I simply wired individual turnouts with reversing toggles.

Digital Command Control (DCC) provides additional ways to use accessory decoders to control turnouts and other accessories. This feature allows you to use a throttle to activate turnouts or to use a computer to set up and activate complex routes, turn lights on and off, and basically control almost anything electrical.

When it comes to DCC, many of the old methods for controlling turnouts and other accessories still work. So what options do DCC accessory decoders bring to the mix?

Let's consider how an accessory decoder works. Accessory decoders are similar to mobile decoders in that they are assigned unique addresses. Also, like mobile decoders, commands can be sent specifically to each accessory decoder controlling various accessories.

Some also can be programmed to carry out special functions, such as controlling railroad grade crossing signals, and automating turnout positions, such as in a reverse loop.

Those connected to the DCC power bus can be controlled by a handheld throttle or a computer, and in some cases can provide feedback indicating status to the command station or a computer through the throttle bus.

Many, but not all, accessory decoders can be activated using pushbuttons or toggles installed on the fascia or on control panels **1**. Some, like the Digitrax DS44 and Model Rectifier Corp. 1628, can only be controlled using a throttle or computer.

The Digitrax DS64 and NCE Switch-IT Mk2 and Switch8 Mk2 units can be controlled using pushbuttons, and in some cases, toggle switches. Plus,

the DS64 can be programmed to create turnout routes through ladders.

Other accessory decoders may depend on a command station, an optional interface board such as the NCE Mini-Panel, or a computer to create routes. DCC Specialties makes several accessory decoders with programming capability and external controls.

I use a mix of accessory decoders on my Piedmont Southern HO scale layout, so let's take a look at some of these units and how to use them.

In some locations on the layout I only have one or two turnouts, so fancy programming capability and a complicated control panel aren't required. Instead, a simple clip-on accessory decoder like the DCC Specialties Hare or the NCE Switch-IT Mk2 are good choices **2**. The Hare clips onto the circuit board of the Tortoise using a card-edge connector.

The Switch-IT is small enough to be attached to a Tortoise using double-sided foam tape or hot glue, and can control a pair of switch machines. Both can be controlled with a throttle or pushbutton switches mounted on the fascia or a control panel.

For sections of the layout with a lot of turnouts in a small area, but not requiring route selection, I like the NCE Switch8 Mk2 and Button Board combination. As the name implies, the Switch8 can control eight switch machines with pushbuttons, toggle switches, throttles,



2 Switch-IT or Hare. The Switch-IT (left) can be attached to a Tortoise with hot glue or double-sided foam tape. The Hare (right) clips directly to the circuit board on a Tortoise switch motor.



3 Flip panel. Larry attached the Button Board (left) and Switch8 (right) with double-sided foam tape to a piece of hardboard. Then he used a spring-loaded cabinet hinge to install the board under the layout. It flips down when Larry needs to work on it, then flips back up out of the way when he's done.

your DCC command station, or computer commands.

I attach the Switch8 and Button Board to a piece of hardboard suspended under the layout with a spring-loaded cabinet hinge **3**. This allows it to be swung down for wiring and programming, then swung back up out of the way the rest of the time. I then mount the pushbuttons in one or more small control panels attached to the fascia **1**.

The Switch8 and Button Board can be separated by as much as 6 to 10 feet, and the pushbuttons can be located as much as 20 feet from the Button Board. However, for runs more than 2 feet, the wires connecting them should be twisted pairs, which you can buy from NCE, or you can twist them yourself.

DCC Specialties offers a series of accessory decoders. The Hare and Tortoise Buddy are capable of controlling individual Tortoises. The dual output Wabbit controls two, and the Jack Wabbit Quad can control and power four turnouts. Among these there are several different versions with specialized control options and functions. The Wabbit, for example, can be programmed to detect a locomotive and line a switch – great for automating a reversing loop.

When it comes to setting up routes, I turn to the Digitrax DS64 **4**. Each DS64 can control four switch machines using pushbuttons, input from occupancy detectors, throttles, command stations, or computers. Most importantly, you can program it to simultaneously

throw multiple switches to set up routes such as yard ladders.

If you have more than four turnouts in a ladder, or a complex track arrangement, you can use two DS64s and include as many as eight turnouts in a route. Got more than eight turnouts? You can daisy chain even more DS64s and create cascading routes. For routes with more than one DS64, they all must be connected to an active LocoNet, but individual DS64s can be used with any DCC system.

One thing to keep an eye out for is the current rating of the individual control outputs on accessory decoders. Most are rated for about 40mA maximum, which is fine for the Tortoise and most slow-motion switch machines.

However, the Micro-Mark Switch Tender pulls about 65mA, which may be enough to let the smoke out of your accessory decoder. Also, most described here won't work with solenoid switch machines (the DS64 is an exception). Other accessory decoders are available that will work with solenoid machines.

Powering accessory decoders is fairly straightforward. All can be powered



4 Route machine. The Digitrax DS64 comes in a plastic enclosure with screw terminals for easy hookup to switch machines, accessories, or pushbutton inputs. It can be programmed to align turnout routes for up to four turnouts. Several can be connected together if they're attached to a Digitrax LocoNet.

directly off track power. Just connect them to your DCC power bus and not only will they receive power with which to operate switch motors, they'll also be able to receive commands from throttles, the command station, or a computer.

But there are a couple downsides to attaching them to your main power bus. First, if you have a lot of accessory decoders installed on your layout, the power they consume will take power away from your locomotives, car lights, and any other DCC-powered accessories. Also, if a short at a turnout shuts down your boosters, there will be no power to cycle that switch and clear the short.

Some accessory decoders can be powered using a separate power source, alleviating these problems. Another option is to use a separate booster as a dedicated power supply for all your accessory decoders.

I've given you a lot to consider when it comes to controlling turnouts on your layout, and there are even more choices available that I didn't have space to cover. In addition, many of these accessory decoders are capable of varying degrees of programming. I'll have future columns dedicated to programming routes with the DS64, and also how to use some of the other programmable devices.

In the meantime, Ben Lake has an excellent series on Model Railroader Video Plus on installing the DS64 and programming routes. You can also visit my website (www.dccguy.com) for more information. **MR**



MANY, BUT NOT ALL, ACCESSORY DECODERS CAN BE ACTIVATED USING PUSHBUTTONS OR TOGGLES INSTALLED ON THE FASCIA OR ON CONTROL PANELS. - LARRY



ScaleTrains.com HO scale SD40-2

While this isn't the first HO scale SD40-2 to roll down the tracks, ScaleTrains.com takes a different route by offering many options on drive and detail level, including variations that haven't been available in plastic before. Electro-Motive Division's SD40-2 diesel was General Motors' all-time best-selling locomotive, so there are plenty of them to make models of.

The prototype. General Motors' Electro-Motive Division began offering the SD40-2 in 1972, part of its upgraded Dash 2 line of locomotives. By the time production ceased in 1986, nearly 4,000 SD40-2s had been built.

Like the roughly 3-foot shorter SD40 before it, the SD40-2 used a 3,000 hp 16 cylinder 645E diesel engine. The Dash 2 part of the name applied primarily to the improved electronics, but most of the locomotives also used EMD's new

high-adhesion HT-C trucks in place of the Flexicoil trucks used on previous six-axle locomotives. Conrail opted for Flexicoils on its orders. The HT-C trucks are longer than the Flexicoil Cs, necessitating the longer frame.

The model. ScaleTrains.com offers the SD40-2 in two lines, Operator and Rivet Counter. The Operator models have simpler details, but ScaleTrains.com offers a detail kit with many of the Rivet Counter add-ons for \$27.99. Both lines are also available as either direct-current (DC) or Digital Command Control (DCC)-equipped models with dual-mode ESU LokSound V4.0 sound decoders.

The Rivet Counter models, such as the Norfolk Southern SD40-2 we reviewed, have separately applied metal grab irons and lift rings, underbody details, extra truck details, detailed pilots, and more comprehensive

decoration, including myriad warning labels almost too small to read.

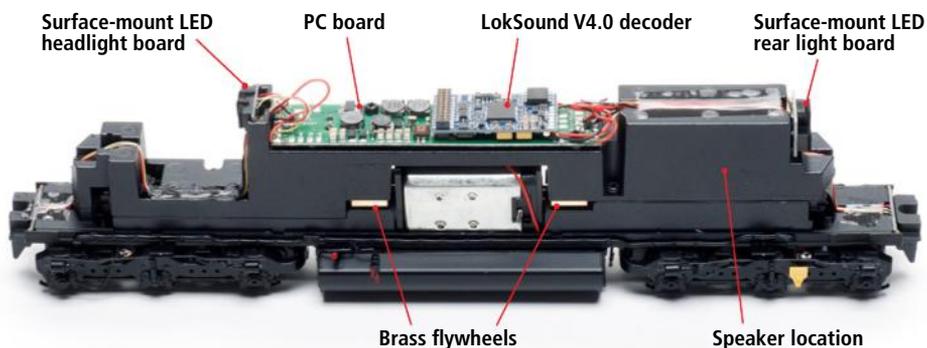
All dimensions match prototype drawings in *Model Railroader Cyclopedia: Vol. 2, Diesel Locomotives* (Kalmbach Publishing Co., out of print). The black paint on our sample was evenly applied, though there were only a few small voids in the NS horsehead logo on the long hood, which could be easily filled with dabs of white paint.

The review model is Norfolk Southern 3229, which was rebuilt in 2013 from a Southern high-short-hood unit to "Admiral" cab specifications in NS's Juniata Shops in Altoona, Pa. This is the first plastic model featuring the Admiral cab, which has a forward-tilted windshield similar to those found on ships. Other Juniata details are also modeled.

ScaleTrains.com has included see-through radiator fan shrouds with fan blades below, and the dynamic brake grills are open with barely discernible brake grids behind them. The cab features a detailed control stand, rear bulkhead, seats, and positionable windows, but there are no figures inside.

The locomotive comes with ScaleTrains.com's die-cast metal semi-scale couplers. I had a little trouble getting them to gently couple with other manufacturer's couplers in some instances.

ScaleTrains.com has noted an issue with replacing its couplers with Kadee whisker couplers or Sergeant scale couplers. The factory-installed draft-gear boxes are too narrow to allow full motion



A five-pole can motor is mounted above the fuel tank in a die-cast metal frame. The 21-pin ESU LokSound V4.0 dual-mode decoder plugs into the motherboard.

of these couplers. New draft-gear boxes will be fitted to later runs of the SD40-2, and the parts will be available for current models at a later date. ScaleTrains.com notes the existing draft-gear boxes can be filed to allow more coupler swing.

Under the hood. To remove the shell, I first removed the screws from the draft-gear boxes, then pushed the boxes out from behind using a flat-blade screwdriver. With the couplers out of the way, I could slide the snugly fitted shell from the die-cast metal chassis.

The skew-wound can motor is mounted above the fuel tank. Brass flywheels on both ends of the motor connect to plastic driveshafts, which mate with the worm gears on the truck towers. All 12 wheels are powered and also pick up electricity from the rails.

Plastic light tubes conduct the light from surface-mount light-emitting diodes (LEDs) mounted to the frame to the headlights and number boxes.

On the test track. When I first set the model on the track and fired up an NCE PowerCab DCC system, the locomotive remained silent until I pressed function button 8. Then, the sounds of an EMD 16-645E diesel engine starting up came pouring out of the speaker. The ESU LokSound V4.0-equipped SD40-2 started moving in speed step 1 at 1 scale mph. By speed step 28, it had reached 67 scale mph, which is close to the 65 mph top speed of a typical SD40-2 with the standard 62:15 gear ratio.

ESU programs its decoders with what seems to me to be a reasonable amount of momentum, so the only change I made initially was setting the decoder address to match the cab number. After operating the locomotive on our staff layout, the Milwaukee, Racine & Troy, I made a few changes to remap some function keys.

The decoder is equipped with ESU's Full Throttle suite of control features, and I wanted to take advantage of the INDEPENDENT BRAKE, which is programmed to function 10. This requires a shift-key sequence on our NCE throttles, so I remapped the INDEPENDENT BRAKE to function 5, which is unused on the NS SD40-2 model.

I used a LokProgrammer computer interface from ESU (manufacturer's suggested retail price \$179.99), but if you

PERFORMANCE TESTS	
DRAWBAR PULL	3.68 ounces 52 HO scale freight cars
SCALE SPEED (DC)	
VOLTS	SCALE MPH
7 (start)	1
8	7.3
9	15
10	38
11	55
12	79
SCALE SPEED (DCC)	
SPEED STEP	SCALE MPH
1	1
7	13
14	34
21	61
28	67

don't want to buy the hardware, it's possible to use the free LokProgrammer software to determine the configuration variable changes needed to remap the functions. ESU's YouTube channel has a video explaining how to do this.

In DC, the sounds on the dual-mode decoder started at 6.2V and the model started moving at 1 scale mph at 7V. At 12V, the model reached 79 scale mph. All sound and lighting functions in DC are automatic. The headlights illuminated in the direction of travel, and the engine rpm increased with locomotive speed. Changing direction resulted in a momentary drop in sound, but the engine didn't replay its start-up sequence.

On the layout. I took the SD40-2 to our staff layout, the Milwaukee, Racine & Troy, to explore its performance on a model railroad. The sounds of the 16-645E diesel engine ramped up and down realistically as I advanced and reduced the throttle while assembling my train in the Williams Bay yard.

Once I had my 13-car train together, I took it up over Winter Hill, a 3 percent grade. The locomotive had no trouble with its load, and I used the Full Throttle DRIVE HOLD feature on function 9 to simulate the engine revving higher while the locomotive maintained speed with its heavy load. Our test meter measured drawbar pull of 3.68 ounces, equivalent to 52 free-rolling HO scale freight cars on straight and level track. When I sounded the horn, the ditchlights flashed. This is prototypical for Norfolk Southern practice.

The ESU PowerPack capacitor system kept the locomotive moving through a couple of troublesome spots where turnouts have lost continuity over the years.

Facts & features

Manufacturer

ScaleTrains.com Inc.
7598 Highway 411
Benton, TN 37307
www.scaletrains.com

Prices: Rivet Counter line, \$149.99 (DC only), \$219.99 (DCC and sound); Operator line, \$79.99 (DC only), \$119.99 (DCC and sound)

Era: 2013 to present (as detailed and decorated for Norfolk Southern)

Roadnames: Rivet Counter line: Norfolk Southern; Atchison, Topeka & Santa Fe Burlington Northern; Chessie System; CSX; Chicago & North Western; Milwaukee Road; Southern Ry.; Union Pacific. Operator line: BNSF, CSX, Norfolk Southern, Union Pacific

Features

Operator line

- Five-pole skew-wound motor with dual brass flywheels
- All-wheel drive and electrical pick-up
- Directional LED headlights and lighted number boxes
- Minimum radius: 18", recommended radius 22"
- ScaleTrains.com plastic semi-scale E Type knuckle couplers mounted at correct height

Rivet Counter line, same as above, plus:

- Factory-applied wire grab irons, wire lift rings, windshield wipers, snowplows, horns, uncoupling levers, and trainline hoses
- ScaleTrains.com metal semi-scale E Type knuckle couplers mounted at correct height
- Weight: 18.2 ounces

The next lap around, I consisted the locomotive with a General Electric 8-40BW from Atlas with an older LokSound Select decoder. Advanced consisting was simple using our NCE system, and the two locomotives easily handled the train without any additional speed matching required.

Whether you want a fully detailed model with traction motor cables and all the bells, whistles, and lighting effects; or a basic DC model without all the frills, ScaleTrains.com has you covered. This SD40-2 is a solid performer and should be right at home on any contemporary layout. — Eric White, associate editor



Model Power N scale 2-6-0 Mogul

Die-cast metal construction and a factory-installed Model Rectifier Corp. (MRC) dual-mode decoder highlight this N scale 2-6-0 Mogul type from Model Power, which is now part of MRC. Built with existing tooling, the model features several upgrades from its previous release, including a light-emitting diode (LED) headlight and front and rear operating knuckle couplers.

The prototype. The development of the two-wheel pilot truck in 1866 made the 2-6-0 Mogul-type possible. Though considered an all-purpose design, the relatively small drivers on the Mogul limited its speed to around 50 mph. Moguls were rarely used in mainline service after 1900, but many served on branch lines until the end of the steam era.

The Illinois Central received its first 2-6-0 Moguls in 1880, eventually

rostering 337 of the type. The IC used its 2-6-0s primarily for freight service.

By the 1930s, only 71 2-6-0s remained on the IC roster. These locomotives were modified and rebuilt during their careers, with a few examples remaining on the roster in the 1950s.

The model. The overall proportions of the N scale model's wagontop boiler, dome arrangement, and cab size are within scale inches of prototype drawings of an Illinois Central 541-class 2-6-0 published in the March 1940 *Model Railroader*. The driver size is also correct, but the overall wheelbase is a scale foot too long on the model. The model's tender resembles that of the prototype, but is 5 scale feet too short.

The Model Power Mogul is available with either archbar or Andrews tender trucks, slide-valve or piston cylinders,

and detail arrangements to match the specific road names offered.

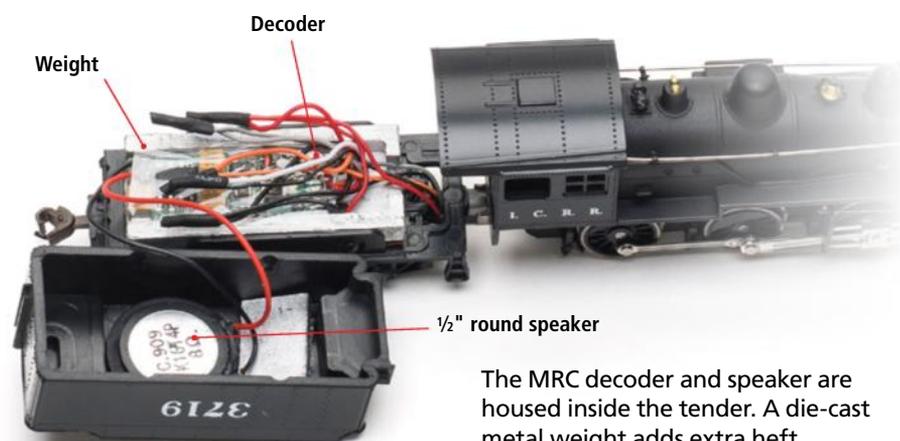
On our IC review sample I appreciated that Model Power accurately positioned the headlight and bell to match the prototype's appearance after its 1938 renumbering to the 3700 series. The model has slide valves, which match the prototype as built, although some were later converted to piston valves. The model's tender has archbar trucks, which would have been replaced by Andrews or other cast-steel trucks by the 1930s.

Boiler bands, sand lines, and other cast-in details are well defined on the die-cast metal boiler and cylinders, as are the rivet seams and other molded details on the plastic cab and tender. The handrails along the boiler are separate unpainted metal parts.

The plastic parts appear glossier than the metal parts, but a bit of weathering or a mist of matte finish would even out the black finishes. Although I couldn't find a prototype photo of IC 3719, the model's lettering placement matches prototype photos of other engines in the same class during the late 1930s.

Mechanism. The flywheel-equipped motor is housed inside the locomotive boiler. Gears connect the motor to the second and third axles, while the side rods transfer power to the first axle. Both drivers on the third axle have traction tires.

Because the semi-permanent drawbar also provides an electrical connection to



The MRC decoder and speaker are housed inside the tender. A die-cast metal weight adds extra heft.

PERFORMANCE TESTS	
DRAWBAR PULL	.8 ounce 19 N scale freight cars
SCALE SPEED (DC)	
VOLTS	SCALE MPH
7 (start)	4
8	11
10	20
12	32
SCALE SPEED (DCC)	
SPEED STEP	SCALE MPH
5 (start)	3
7	7
14	20
28	50

the decoder concealed beneath the press-fit plastic tender shell, it's recommended to keep the engine and tender together.

For its size, the model has an impressive drawbar pull that's equivalent to 19 N scale freight cars on straight and level track. The sprung pilot truck also kept the locomotive on track through no. 6 turnouts and 11" radius curves.

DCC operation. The N scale locomotive ran smoothly on our DCC test track, but it didn't start moving until speed step 5 (of 28). After I increased the decoder's starting voltage by programming configuration variable (CV) 2 to a value of 40, the model rolled smoothly in speed step 1 at 3 scale mph and accelerated to a top speed of 50 scale mph in speed step 28. For finer speed control, the model also supports 128 speed steps.

I also easily programmed the decoder's long address to match the cab number and added acceleration and deceleration momentum. A printed list of the decoder's other programmable CVs is included in the box.

When the locomotive got underway, I was happy to hear the exhaust chuffs synchronized with the driver motion. The decoder comes set to its maximum volume level, but I found it to be a bit on the quiet side.

The decoder features 29 user-triggered sound effects, including the coupler, brake squeal, coal shoveling, sand release, and injector. There are 7 different bell sounds and 17 different whistles to choose from. I would have liked the whistle to be more playable, as



Facts & features

Price: \$339.98 (DCC sound), \$269.98 (DC, no sound)

Manufacturer

Model Power
Model Rectifier Corp.
80 Newfield Ave.

Edison, NJ 08837

www.modelrectifier.com

Era: late 1930s to mid 1940s (as detailed and decorated for IC)

Road names: Illinois Central; Atchison, Topeka & Santa Fe; Baltimore & Ohio; Boston & Maine; Canadian National; Chicago, Burlington & Quincy; Great Northern; Minneapolis & St. Louis; New York Central; New York, New Haven & Hartford; Norfolk Southern; Northern Pacific; Pennsylvania RR; Southern Ry.; Union Pacific; U. S. Army; and Wabash. Painted but unlettered versions available.

Features

- Die-cast metal boiler, chassis, and cylinders
- Dual-mode sound decoder (DCC sound version only)
- Electrical pickup on four drivers and all tender wheels
- Five-pole skew-wound motor with flywheel
- Knuckle couplers, at correct height
- Light-emitting diode headlight
- Metal wheels in gauge
- Weight: 3 ounces (engine and tender)

short blasts had a tendency to sound artificially clipped.

DC operation. The dual-mode decoder operates on direct-current (DC) layouts. Sounds are limited to the exhaust chuffs when using a DC power pack. Operating the model on a DC layout with an MRC Tech 6 allows access to the other sound effects as well as CV programming.

The Mogul started moving at 4 scale mph with 7V of track power and accelerated to a top speed of 32 scale mph with 12V of track power, which is an appropriate operating speed for a 2-6-0. After breaking the mechanism in with a few test runs, the locomotive rolled smoothly throughout its speed range.

Available in several different road names, these 2-6-0 Moguls would make a worthy addition to an N scale roundhouse. —Dana Kawala, senior editor

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Broadway Limited Imports HO scale P70

Like the K4s steam locomotive, GG1 electric, or X29 boxcar, the P70 coach is an icon of the Pennsylvania RR. Broadway Limited Imports has released a definitive HO scale plastic P70 model that's available in two versions and paint schemes and multiple road numbers.

We reviewed a P70 from BLI's first production run that's in stores now. Another run has been announced and is listed on the firm's website.

The prototype. Between 1907 and 1929, Pennsy's car shops in Altoona and elsewhere built more than 1,000 steel P70 coaches to replace older wood cars. In PRR nomenclature, the "P" stood for "passenger," and the "70" stood for "70 feet," which was the length of the passenger compartment.

The earliest P70s had 88 seats. In 1926 the P70 floorplan was changed to 80 seats. In 1933, the railroad began adding ice-air-conditioning equipment to P70 cars, reclassing them P70R. Cars built after 1936 had 76 seats and the rightmost window removed on each side. There were several other variations made to the P70 fleet, including those with reclining seats and mechanical air conditioning.

By the end of World War II, as the PRR ordered new steel cars, most of the P70 cars were removed from Pennsy's signature varnish. Many P70s finished their careers on commuter trains.

The model. Our review sample models a class P70R car built before 1936 with 80 seats and ice air conditioning. The dimensions of the model match an official PRR diagram.

The model's plastic body features well-defined molded detail, including properly placed rivet seams. All handrails and roof vents are separately applied, as are the end diaphragms.

The model is smoothly painted with a Tuscan body and black roof and underbody. Our review sample is decorated as the prototype appeared from 1933 until the early 1950s, with gold lettering and striping. The fonts and lettering placement match prototype photos. After the early 1950s the lettering color was switched to a buff yellow.

The plastic underframe is accurately detailed for our P70R sample, with a large ice bunker and separately applied air-conditioning components. Metal weights are sandwiched between the underframe and the interior floor. The truck sideframes are molded in black plastic to match Pennsy class 2D-P5 roller-bearing trucks.

Locking tabs hold the body to the frame. By carefully spreading the car sides, I could lift off the plastic body.

Passenger figures aren't included, but they would be easy to add. The floor and walls are painted in a green shade, while the seats are maroon. The interior

Facts & features

Price: \$89.99 (single car), \$349.99 (four-car set)

Manufacturer

Broadway Limited Imports LLC
9 East Tower Circle
Ormond Beach, FL 32174
www.broadway-limited.com

Era: 1933 to early 1950s (as detailed and decorated)

Paint schemes (multiple numbers):

Gold lettering and stripes or buff lettering and stripes. P70 (post 1926) or P70R versions available in both schemes. Painted but unlettered versions also available.

Features

- Detailed and painted interiors
- Kadee operating knuckle couplers, at correct height
- RP-25 contour metal wheels, in gauge
- Minimum radius: 22"
- Overhead interior lighting
- Weight: 6 ounces (.5 ounce too light per National Model Railroad Association Recommended Practice 20.1)

arrangement matched a prototype floorplan. All the windows feature clear plastic glazing.

The car's metal wheels feed track power to a lighting board in the center of the car's roof. The board has two light-emitting diodes (LEDs): one facing each end of the car. Clear plastic inserts diffuse the light along the interior compartment. The board features a capacitor that keeps the lights from flickering during short power interruptions.

With its accurate detailing, this P70 coach from Broadway Limited Imports is a must-have car for an HO scale Pennsy roster. – *Dana Kawala*



Ice bunker

In addition other underframe detail, our P70R sample accurately model's the prototype's ice-air conditioning equipment, including the large ice bunker.

QUICKLOOK

WalthersMainline 40-foot AAR boxcar

Price: \$24.98

Manufacturer

Wm. K. Walthers
5601 W. Florist Ave.
Milwaukee, WI 53218
www.walthers.com

Road names: Chicago & North Western; Lehigh Valley; New York, New Haven & Hartford; Soo Line; Southern Ry.; and Union Pacific, two road numbers each. Also available undecorated.

Era: 1937 (as built), 1973 to 1992 (as decorated)

Comments: Walthers has modified its HO scale 40-foot AAR boxcar to suit more prototypes, giving it a wood running board and Dreadnaught ends. The 5-5 corrugated ends mark Walthers' model as representing a modified 1937 AAR boxcar, with a 10'-6" interior height. Beyond these details, the cars are nearly identical to the previous WalthersMainline issue [reviewed in the February 2016 *Model Railroader*. –Ed.].

Our test sample was decorated for the Chicago & North Western. Part of a lot of 501 boxcars numbered 31000 to 31500, boxcar 31306 first appears in the railroad's roster in 1966, probably due to a renumbering. Along with the rest of its cohort, car 31306 was gone from the roster by 1993.

The car bears a "Blt 10-44" stencil and another indicating a renovation at C&NW's Clinton, Iowa, shops in 1973. Such a renovation would almost certainly have removed the running board.

The car's Freight Car Red paint is smooth and evenly applied, and the large black-and-white "Employee Owned" herald matches prototype photos shot in the 1970s. There were no gaps or flaws in the printing, and the lettering was crisp, opaque, and legible. All the dimensions I checked matched those on drawings I found in the 1946 *Car Builder's Cyclopedia* (Simmons-Boardman).



The grab irons, ladders, stirrup steps, and tack boards are molded onto the body. The running board, brake wheel, and underframe/brake gear casting are separately applied.

The car weighs 3.7 ounces, which is 0.2 ounce lighter than National Model Railroad Association Recommended Practice 20.1. The model's blackened metal wheels were in gauge, and rolled freely.

The metal Proto-Max knuckle couplers were mounted at the correct height, but one trip pin drooped slightly low. I was able to fix this easily with a squeeze from a trip-pin plier.

The prototype's long life means Walthers' model is a perfect fit for railroads from the late steam era to the late 20th century, especially for layouts where tight curves call for short rolling stock. – Steven Otte, associate editor

QUICKLOOK

ExactRail HO scale SP gondola

Price: \$44.99

Manufacturer

ExactRail
525 E. 1860 S.
Provo, UT 84606
www.exactrail.com

Era: 1974 to present

Comments: ExactRail has added a Southern Pacific (SP) class G-100-22 gondola to its Platinum Series of ready-to-run HO scale freight cars. The model features wire grab irons and brake cylinder lever hangers, metal top chord tie-downs, and etched-brass Automatic Car Identification plates. ExactRail offers the car in its as-delivered scheme in nine numbers.

Our sample is decorated as SP no. 340534, part of the railroad's 340525 through 340624 series of 100-ton gondolas built by Thrall Car Manufacturing Co. in 1974. The 3,234-cubic-foot-capacity general-service cars, which featured a steel floor and solid ends,

were used to carry pipe, steel shapes, and structural steel. As of January 2016, only one car from this series remained on Union Pacific's roster.

The model's dimensions closely follow data in the January 1975 *Official Railway Equipment Register* (National Railway Publication Co.). The interior length and width are both a scale 3 inches too narrow, but that's typical of gondola models.

Underneath, the model has a one-piece casting of the center sills, bolster blocks, and crossbearers. The crossties and body bolsters are cast into the underbody. The AB control valve, air reservoir, and brake cylinder are separate parts. The rods and pipes are a mix of plastic and wire.

The paint on the model is smooth and evenly applied, and the lettering is all legible and opaque. The lettering placement matches prototype photos in Anthony W. Thompson's *Southern Pacific Color Guide to Freight and*



Passenger Car Equipment (Morning Sun Books, 1999).

Other separately applied parts include plastic side and end ladders, wire uncoupling levers, and an etched-metal brakewheel platform.

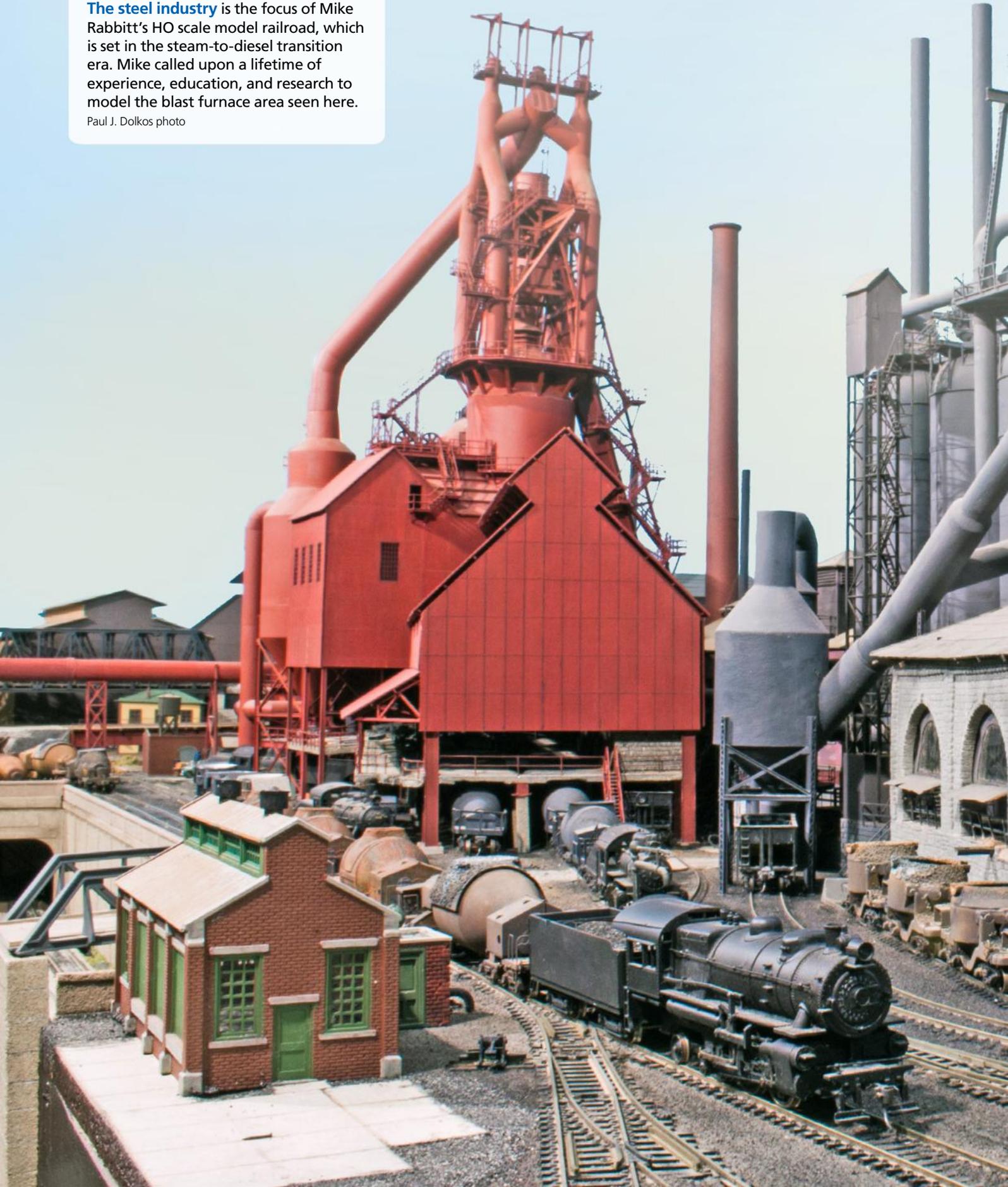
The model features CNC-machined 36" metal wheelsets, which are properly gauged. The Kadee no. 158 body-mounted couplers are installed at the correct height. At 4.4 ounces, the gondola is 1.1 ounces too light per National Model Railroad Association Recommended Practice 20.1.

I tested the car on our HO scale Wisconsin & Southern Troy Branch. The car operated smoothly while being pushed and pulled through the layout's no. 5 turnouts and 30" radius curves.

ExactRail describes its Platinum Series as "our premier collection of fine-scale replicas." This gondola definitely belongs in that category. – Cody Grivno, associate editor

The steel industry is the focus of Mike Rabbitt's HO scale model railroad, which is set in the steam-to-diesel transition era. Mike called upon a lifetime of experience, education, and research to model the blast furnace area seen here.

Paul J. Dolkos photo

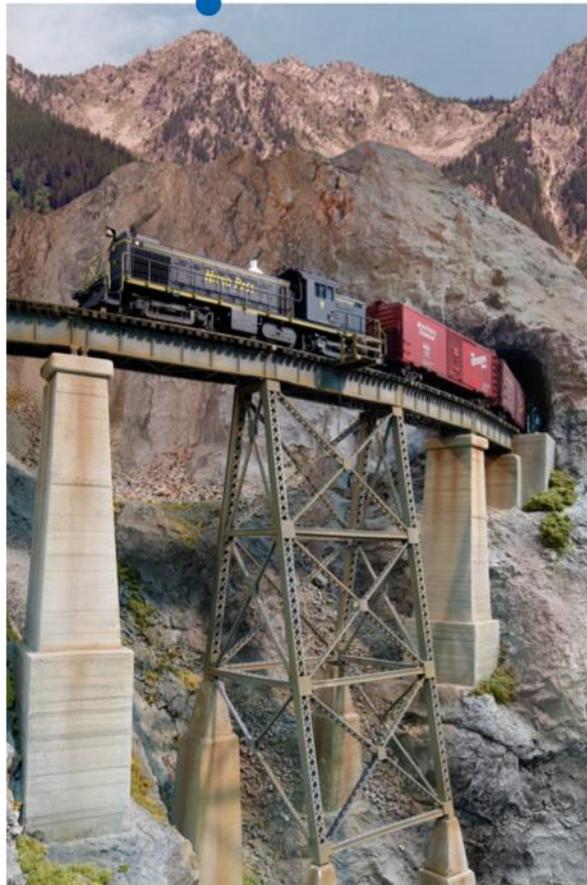




Great Model Railroads 2018 features articles, photos, and track plans from 11 spectacular layouts. This month, Trackside Photos highlights five of those

layouts. *Great Model Railroads 2018* goes on sale Oct. 17 at your local hobby store. You can also order directly from our Customer Service hotline at 877-246-4879 or from our website at www.KalmbachHobbyStore.com.

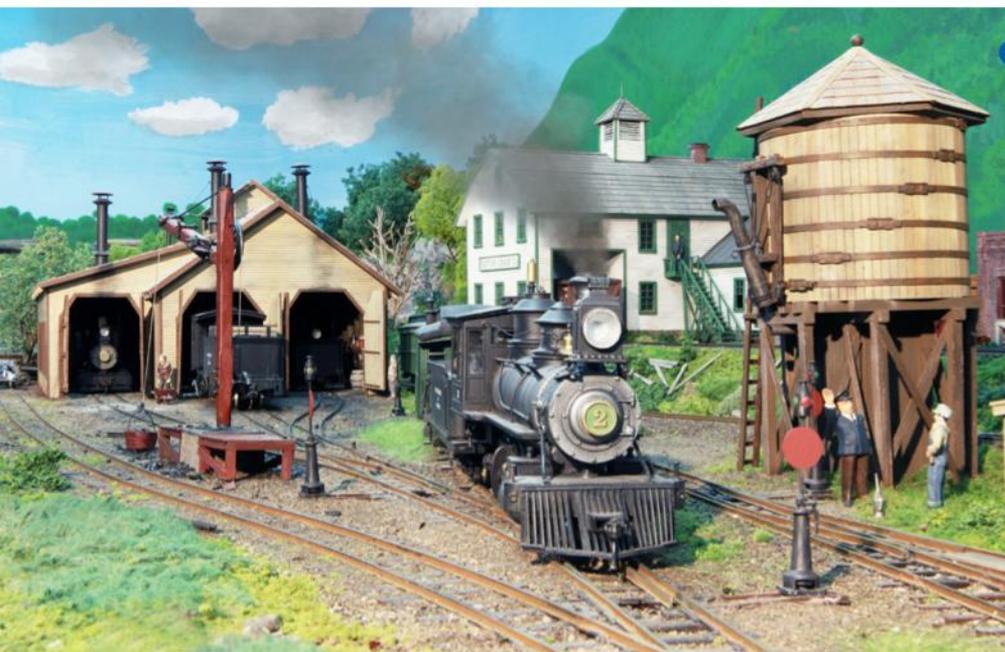
Nitro Pass & Okanagan no. 9, an Alco RS-1, creeps over the steel trestle at Taylor Canyon on Don Weixl's HO scale layout. Don, a professional photographer, designed the freelanced railroad for photography. He also shot this photo. The trestle was made using Micro Engineering parts.



Rolf Malmberg lives in Sweden, but was inspired to model American railroads by *Model Railroader* magazine. He's a fan of the Denver & Rio Grande Western, which is represented on his modern-day HO scale layout by a pair of ex-Rio Grande diesels patched out for new owner Union Pacific. Rolf took the photo.



Westbound passenger train No. 7, the *Ute Express*, has just arrived at Arkansas Junction on Andrew Dodge's O scale Colorado Midland. Handlaid track, scratchbuilt structures, and scratchbuilt brass locomotives characterize the Proto:48 layout. Paul J. Dolkos photo



Otter Creek & Ripton Mogul no. 2 will need servicing here at Ripton after battling the stiff grades over the spine of the Green Mountains on Dave McLeod's model railroad. The freelanced On30 layout packs a lot of steam-era action into a relatively small space. The 2-6-0 locomotive is from Bachmann. Dave shot the photo.

MORE ON THE WEB

Download wallpapers from all 11 layouts featured in GMR 2018 free from our website, ModelRailroader.com.

Have clocks become too fast?

Bob LeMassena shook my hand heartily when we met in the Colorado Railroad Museum Library some years ago. Nearer the century mark than 90, his eyes were bright. We chatted comfortably. I expected the conversation to delve into the steam locomotive expertise for which Bob is so well known. It edged into his first *Model Railroader* byline, which appeared in July 1935.

This conversation came to mind recently, prompted by some friends who were debating the pros and cons of decoder momentum.

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Momentum and braking are two prototype characteristics as essential as sound. Newton's first law says that a body in motion tends to stay in motion. A 50 mph freight train can take a mile or more to stop.

Physics rules over low speeds, too. I once witnessed momentum turn a slow-moving Mikado into a reluctant 200-ton battering ram that only the roundhouse stopped, never mind how heroically I waved off the movement with hand signals. An engineer I respect likes to quip, "Anybody can make 'em go

like hell. It takes an engineer to stop 'em like heaven."

Layout owners I know, seeking ever more prototypical operation, are programming their decoders with momentum and braking effects. This fed the debate I mentioned. Road crews seem somewhat tolerant, perhaps finding satisfaction in starting and stopping trains as skillfully as their counterparts. Crews sweating through a lot of switching tend to grumble about it.

Let's confront the elephant in the room: fast clocks. The appeal of fast time is compressing real-time prototype operation. For example, a four-hour operating session can simulate a 12-hour schedule. Fast time also helps create the illusion of distance, making running times seem more realistic.

Switching requires no such illusion because it uses movements measured in car lengths, not miles. Pity the poor yard foreman, under pressure to get a hotshot freight ready to depart on time while the hands of the clock spin drunkenly. It's jarring to watch the crew slam cars around frantically, thumbing the throttle in one hand while lining switches with the other.

Things slow down the more prototypically we operate. This challenges us to balance realistic operation and practicality. Many activities are incompatible with fast time because they are almost incompressible. We're calibrated

in 24-hour days. We can't think through switching puzzle problem-solving faster. We can't hurry hand-writing to copy train orders or track warrants faster. Maybe some of us can talk faster, like the announcers reading the fine print that ends car commercials, but a set of jaws clacking away like that grinds others down in a hurry.

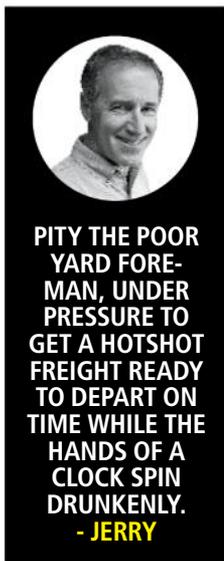
My choice was to build an operation plan for my layout based on real time. It permits my crews to rely on their internal clocks, relax, and follow the prototype as closely as they wish.

I enjoy watching them work engines with momentum and braking. It pleases me to see an engineer shut off the throttle to drift a United States Railway Administration light Mikado, rods clanking softly, and stop it with a gentle hiss of air from a brake application. I admire an engineer who eases a pair of clattering RS-1s to a smooth, soft coupling with its train. It's fun teasing crews who complain that they can't acquire their trains: "See? It doesn't go." "Try releasing the brakes."

Fast clocks leave little time for crews to stretch a joint, stitch up air hoses, pump up the air, and do a set-and-release brake test. I don't demand that my crews go to such lengths, but real time allows them to.



Station clocks like this one, part of a historical railroad exhibit in Breckenridge, Colo., measured time carefully for prototype railroaders. Jerry Dzedzic photo



PITY THE POOR YARD FOREMAN, UNDER PRESSURE TO GET A HOTSHOT FREIGHT READY TO DEPART ON TIME WHILE THE HANDS OF A CLOCK SPIN DRUNKENLY.
- JERRY

I like listening to the rhythmic, deliberate duet of a dispatcher and an operator completing a train order, saying and spelling stations "Unionville U-N I-O-N-V-I-Double L-E." Real time brings my railroad to life the way I want it to.

So many years after it appeared, Bob's article "Scale Time" is remarkably relevant. It described his physics calculations showing that fast clocks demand improbably high scale speeds. Fast time or real time: at which would his eyes twinkle approval? **MR**

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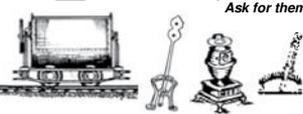
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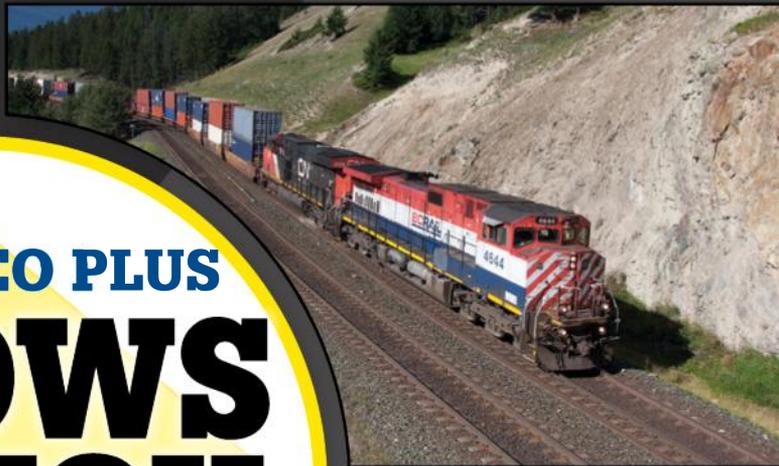
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Schedule of Events

AZ, GLENDALE: WVRHHS Model Train Swap Meet. Glendale Christian Church, 9661 North 59th Ave. Saturday, October 14, 2017 9:00am-1:00pm. Admission \$5.00. Tables \$25.00 to sign up send stamped envelope, check or money order to WVRHHS, PO Box 5643, Glendale, AZ 85312-5643. Contact: Craig Faris 623-340-3529.

CT, WALLINGFORD: Classic Shows, LLC will hold a Train and Toy Show, Sunday, November 5, 2017 from 9:00am-2:00pm at Zandri's Stillwood Inn, 1074 South Colony Road, (U.S. Route 5), exit 13 on Interstate 91. Admission \$6.00, children 12 and under are free. Information 203-926-1327 or www.ClassicShowsLLC.com

FL, DOVER Regal Railways Presents Toy Train Collectible & Hobby Show, Hillsborough County Fairgrounds, 215 Sydney Washer Road, Zip: 33527. Saturday, November 18, 2017, 9:00am-2:00pm. Admission: \$5.00 adults. Vendors, operating layout, videos playing. Lunch items for sale. Contact Joe: 727-244-1341 or visit: www.regalrailways.com for more information.

FL, OCALA: Lions Semi-Annual Train Show. First Christian Church, 1908 SE Fourteenth St. Saturday, November 4, 2017, 9:00am-4:00pm. 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 352-208-5284

IA, HAMPTON: NCIMRRC Train Show, Franklin County Convention Center, 1008 Central West, Sunday, October 29, 2017, 9:00am-3:00pm. Admission \$5.00. Trains (all scales), memorabilia and collectibles to buy, sell and trade. Individual tables welcome. For information or table reservations contact. Eastside Trains, 641-456-1998, e-mail eastsidetrains@gmail.com

IL, ST. CHARLES: 26th Annual Chicago Railroadiana and Model Train Show. Kane County Fairgrounds, 525 South Randall Rd. Sunday, October 15, 2017, 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, AUBURN: RxR Mania Train Show & Antique Show. Kruse WWII Museum, (National Military History Center), 5634 County Road 11-A, from Interstate 69, Exit 326; Saturday, October 28, 2017, 9:00am-3:00pm. Adults \$5.00, under 12 free. \$20.00 per table, 5+ tables \$15.00 each. Info: www.RxRMania.com or 260-715-2519

IN, DANVILLE: Central Indiana Division-NMRA annual Train Show at Hendricks County 4H Fair Grounds, Saturday November 18, 2017, 10:00am-3:00pm. Admission \$3.00 adults, \$5.00 family. Operating Layouts, Vendors, Clinics, Food, Dealer Tables 8' at \$16.00. Info: gtwfan@bluemarble.net or 812-876-6799. CID website: <http://cidnmra.org>

IN, EVANSVILLE: Evansville All Gauge Model Train and Railroadiana Show. St. Paul's UCC, 2227 West Michigan Street, Zip: 47712. Saturday, November 11, 2017. Gates open 10:00am-3:00pm CST. Admission \$3.00, under 12 free. Operating trains, test track, food available. Contact John 812-426-2989

IN, INDIANAPOLIS: The Indianapolis Model Railroad Show and Open House. Manual High School Gymnasium, Saturday, December 9, 2017, 10:00am-3:00pm. Admission \$5.00, children 12 and under free. Boy Scouts in uniform free. Free parking. Naptown & White River Model Railroad Club. Contact: Steve Handly, 317-786-8627, E-mail: naptownmrr@gmail.com

IN, MICHIGAN CITY: Duneland Model RR Club Train Show and Swap Meet, IBEW Building, 301 East 8th St., Sunday, November 19, 2017, 9:30am-2:00pm (Chicago time). Adults \$4.00, youths 6-13 \$1.00, 5 and under free. Contact: Dave Novak at trains86@frontier.com or 219-778-1186

KY, LOUISVILLE: Kentucky & Indiana Model Railroad Club Train Show and Sale, November 18, 2017 from 10:00am-3:00pm. Moose Lodge, 4516 Fegenbush Lane, Louisville, KY 40228. Admission \$6.00, under 12 free. Vendor tables, Trains, Parts and Accessories-all gauges for sale. Layout exhibits, food and free parking. For information: www.div8-mcr-nmra.org.

MA, MARLBOROUGH: Hub Division NER/NMRA. Royal Plaza Trade Center, 181 Boston Post Road West (Rte. 20). Saturday December 2, 2017, 10:00am-5:00pm and Sunday December 3, 2017 10:00am-4:00pm. Admission \$10.00; Children under 12 and Scouts in Uniform FREE. Admission good both days. Information: Mark 508-528-8587; E-mail TE.info@hubdiv.org; Website: www.hubdiv.org

MD, GAITHERSBURG: 12th ANNUAL GAITHERSBURG MODEL TRAINSHOW. Montgomery County Fairgrounds (Old Auditorium), 12 mi. NW of Washington. Sunday November 5, 2017, 9:00am-4:00pm. Adults: \$9.00 (under 12 free). Operating layout. Miller, 3106 N. Rochester St. Arlington, VA 22213. 703-536-2954. E-mail: rsshows@aol.com

ME, BREWER: Eastern Maine Model Railroad Club Show. Jeff's Catering in Brewer, 15 Littlefield Way, Saturday, November 18, 2017, 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: Lansing Model Railroad Club Show and Sale. Michigan State University Pavilion, Sunday, November 5, 2017, 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 Nathan Carver 517-449-0370

MI, KALAMAZOO: Southwest Michigan Train Show & Sale. Kalamazoo County Expo Center, 2900 Lake Street. Sunday, October 29, 2017 10:00am-3:00pm. Admission \$6.00; Children 10 and under free. Presented by Kalamazoo Model Railroad Historical Society. Contact David Hayes-Moats 269-344-0906, www.kmrhs.org

MN, ST. CLOUD: Granite City Train Show and Sale. River's Edge Convention Center, 10 4th Avenue South. Saturday, November 11, 2017, 9:00am-3:00pm. \$6.00, 10/under free. Buy/sell model/toy trains, books, videos, railroad collectibles. Operating displays. Win a LIONEL train set or FSM structure kit. 320-255-0033; edwardolson@cloudnet.com or www.GraniteCityTrainShow.com

MN, WOODBURY: Newport Model RR Club Flea Market & Train Show. Woodbury High School, 2665 Woodland Drive, Zip: 55125. October 14, 2017, 9:00am-2:00pm. Admission \$5.00. Future Show: January 20, 2018. Club Address: Newport Train Club, PO Box 0061, St. Paul Park, MN 55071. Contact: Ed, 651-233-3310

MO, ST. LOUIS: 27th Anniversary Greater St. Louis Metro Area Train Show by Mississippi Valley N Scalers. Kirkwood Community Center, 111 South Geyer Road, Kirkwood, MO 63122. October 7-8, 2017, Saturday 10:00am-5:00pm; Sunday 11:00am-4:00pm. Adults \$7.00, kids/students w/ID free. All scales, free parking. David Johnson, 636-225-2405, visit.seetrains.com

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

NH, DOVER: The Great Northern New England Train Show. Dover Lodge of Elks #184, 282 Durham Road, Zip: 03820. Saturday, November 4, 2017, 10:00am-3:00pm. Admission: \$5.00 per family. Exhibitor tables \$25.00, (includes entrance fee). All Scales, operating layout, food. Contact Ed Martin, Efmarter@aol.com or 603-362-4300

NJ, EAST RUTHERFORD: METCA/NYSME Train Show, St. Joseph's School, 120 Hoboken Road, Zip 07073. Saturday, October 28th 2017, METCA/NYSME members 8:00am, Public 9:00am-2:00pm. Admission: \$5.00 Adults 16+, FREE for METCA members, wives, kids. NYSME Club layouts will be open FREE to attendees. Info: www.METCA.org; Bob Amling, nyshows@metca.org; 718-541-8619

NM, ALBUQUERQUE: Rails Along the Rio Grande Model Train Show, Sid Cutter Pilot's Pavilion, Balloon Fiesta Park, 9401 Balloon Museum Drive NE, November 18-19, 2017, Saturday 9:00am-5:00pm and Sunday 9:00-4:00pm. Admission \$5.00/person, under 12-FREE. Operating layouts, new/used model trains, accessories. Contact: Pat Hepburn, 505-891-9796, phepburnsr@aol.com or www.railsalongtheriogrande.org

NY, ALBANY: "Great Train Extravaganza" TM. Empire State Convention Center. December 3, 2017, 10:00am-4:00pm. \$7.00 adults, 12 and under free. Operating layouts. Most Scales including LEGO's for kids and grand-kids, 200+ tables, train sets, parts, accessories, scenery items, books/prints, video/ DVD's, memorabilia, displays-clinics www.gtealbany.com 518-668-9892, trains@gtealbany.com

NY, BALDWIN: The Sunrise Trail Division NER/NMRA Fall Meet. First Church Baldwin Methodist, 881 Merrick Road, Zip: 11510. October 21, 2017, 10:00am-4:00pm. Admission: \$7.00, under 12 and Scouts in uniform free w/ adult. Operating layouts, clinics, White Elephant table. Lunch available. Contact: Steve Perry, sepperry@optonline.net, 631-744-6462, www.sunrisetraildiv.com

NY, SYRACUSE: Upstate NY Chapter TCA Train Show. American Legion Post 787, 5575 Legionnaire Dr., Cicero, NY 13039. Sunday, December 3, 2017, 9:00am TCA members, 9:30am-2:30pm General Public. Adults \$5.00, under 17 free with paid adult. Contact: Chuck 716-390-8216, E-mail: usnyc2015@gmail.com Web Site: www.upstate-ny-tca.com

NY, WEST SENECA: TCA Upstate NY Chapter Train Show. Ismailia Shrine Center, 1600 Southwestern Blvd., Zip Code: 14224. Sunday, January 7, 2018, TCA Members: 9:00am. General Public: 9:30am-2:30pm. Admission: Adults \$5.00, under 17 free with paid adult. Contact: Chuck 716-390-8216, E-mail: usnyc2015@gmail.com or www.upstate-ny-tca.com

OH, FREMONT: Fremont Model Train Show & Swap Meet. Fremont Community Recreation Complex, 600 St. Joseph St. Sunday, November 19, 2017, 10:00am-3:00pm. Admission: 10 and over \$5.00. All scale models, toys, books, Thomas items, free parking, lunch available. Contact: Tony, 419-706-8038, www.norwalkandwesternrr.com

OH, HOLMES COUNTY: Old Eli's Train & Toy Show. Heritage Center, Rt. 62 between Berlin & Winesburg. Saturday, October 21, 2017, 10:00am-3:00pm. Adults \$5.00, under 12 free! \$10.00/table, no refund, 150+ tables. Contact: Galen Eli Hoover, PO Box 45, Mt. Hope, OH 44660, Phone: 330-763-1184.

OH, MASSILLON: CJ Trains Winter Massillon Train and Toy Show. Knights of Columbus Hall, 988 Cherry Road NW, 44647. Sunday, December 10, 2017, 10:00am-3:00pm. \$5.00 admission, 12 and under free. \$25.00/dealer table, 152 - 8' dealer tables. Jon Ulbright, PO Box 446, Wooster, OH 44691, 330-262-7488, cathijon@ssnnet.com or www.cjtrains.com

OH, MILAN: Norwalk & Western RR Model Train Show. EHOVE Career Center, 316 West Mason Road. Sunday, October 15, 2017, 10:00am-3:00pm. Admission: 10 and over \$5.00. Trains all scales, toys, operating layouts and displays, books, Thomas items, lunch available, free parking. Contact: Tony, 419-706-8038, www.norwalkandwesternrr.com

OH, SPRINGFIELD: Dayton Train Show, Upper Valley Mall in the former Penney's Department Store, 1475 Upper Valley Pike. November 4-5, 2017. Saturday 11:00am-5:00pm and Sunday 11:00am-4:00pm. Admission: \$7.00, active military \$6.00, 12 and under free. Rick Lach, PO Box 341233, Dayton, OH 45434, 937-426-2015, chair@daytontrainshow.com

PA, EPHRATA: Short Line Model Railroad Club's Annual Holiday Open House. Every Saturday and Sunday beginning in late November through mid January. Visit www.SLMRC.com for specific dates and times. 11 South State Street in Ephrata, Pennsylvania. Admission: free will donation.

PA, HORSHAM: 12th Annual Main Street Harbor Train Show. Keith Valley Middle School, 227 Meetinghouse Rd. Saturday, December 2, 2017, 9:00am-3:00pm. \$5.00 adults, under 12 free. 145+ vendor tables in cafeteria and gym. Contact Al Zollers, azollers06@verizon.net or Joe Lutz J040440@verizon.net or www.hathortrainshow.org

PA, STOCKERTOWN: Nazareth Area Society of Model Engineers Open House. 212 Main Street. November 24, 7:00pm-9:00pm. November 25, 1:00pm-5:00pm. December 1, 7:00pm-9:00pm. December 2, 3.9, 10, 27, 28, 29, 1:00pm-5:00pm. December 29, 7:00pm-9:00pm. \$5.00/Adults, \$1.00/Kids 3-15. Roger: 610-252-8082, nasme@yahoo.com, <http://nasme.tripod.com> Facebook: "@NASME1980"

SC, CHARLESTON: Charleston Area Model Railroad Club Annual Train Show, Danny Jones Army Park, 5000 Lackawanna Blvd., North Charleston, SC. November 18-19, 2017. Saturday 9:00am-5:00pm and Sunday 10:00am-4:00pm. Adults \$5.00, Children 12 and under free. Active military families are free. For additional information or table rentals, contact the Club at trainshow@chamrc.com or www.chamrc.com

SC, GREENVILLE: Greenville Shrine Club, 119 Beverly Road. Saturday, December 9, 2017, 9:00am-3:00pm. Admission \$5.00, under 10 FREE. Over 200 vendor tables. Thomas the Train & Friends, Railroad collectibles. Contact Todd at 843-307-8674, southcarolinatradeshow@gmail.com or www.SouthCarolinaTradeShows.com

SC, MYRTLE BEACH: GSMRRC 8th Annual Myrtle Beach Train Show. Inlet Square Mall, Unit 45, 10125 Hwy. 17 ByPass, Murrells Inlet, SC 29576, 843-651-6990. November 11-12, 2017, Saturday 10:00am-5:00pm; Sunday 10:00am-4:00pm. Adults \$5.00, 12/under free. Vendors: Operating Layouts, Door Prizes, (32,000 sq. ft. available). Contact Joe Corsetti, 843-236-9148, yruosolo728@aol.com

TX, NEW BRAUNFELS: Fall Model Train Show. New Braunfels Civic Center, 390 S. Seguin Ave. October 28-29, 2017. Saturday 10:00am-5:00pm, Sunday 10:00am-4:00pm. Adults (over 14) \$8.00, children (5-13) \$2.00. 275+ vendor tables, layouts including Legos, silent auction, refreshments, museum open house. Info: www.nbrmm.com Jim Edmondson 830-629-2071

VT, BARRE: Vermont Rails Show. Barre Auditorium, 20 Auditorium Hill, Interstate 89, Exit 7. Saturday, November 18, 2017, 10:00am-4:00pm. Adults \$5.00, children 6-12 \$1.00, children under 6 free. Sponsor: NWW Model Railroad Association. Contact Ron Piro, 802-598-0905, www.nwwrailroad.org

WA, KENT: Boeing Employees Model Railroad Club Annual Swap Meet, 525 4th Avenue North, Kent Commons. November 11, 2017, 9:30am-4:00pm. \$8.00 admission, under 16 free. Ed Sherry, 550 SW Colewood Lane, Normandy Park, WA 98166; 206-244-3884; swapmeet@bemrrc.com

Schedule of Events cont.

WA, SPOKANE: River City Modelers Fall Train Show, Spokane Fairgrounds, 404 North Havana, Sunday, October 15, 2017 from 9:30am-3:30pm. Adults \$6.00, Free under 12. 200+tables of Railroad items for sale, operating layouts, Free-MO, Operation Lifesaver & more. Free parking. For information: Shirley Sample, 509-991-2317 or email shirley@busnws.com

WI, GREEN BAY: 8th Annual First Freeze Fall Train Show & Swap Meet, Riverside Ballroom, 1560 Main Street, Sunday, November 26, 2017, 9:00am-2:00pm. Adults \$3.00, 12 and under free. Over 100 tables, operating layouts, train races, door prizes, food/beverages. Information: Bob 920-465-7913 or www.newogaugers.org

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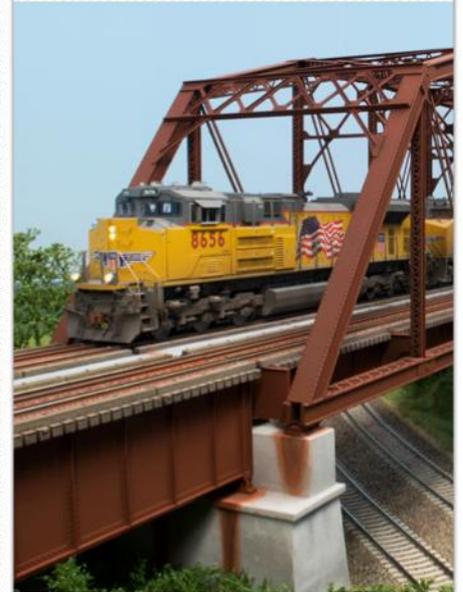
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Build a wood craftsman freight car kit

Associate editor Eric White takes on a vintage "box of sticks" freight car kit to see what modeling was like in the '50s and '60s.

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Finding your comfort zone

Every so often, someone coins a new term – think “kitbashing” – that has considerable merit. This was the case in a recent discussion among prototype and prototype-based modelers. The focus was on freight cars, and whether a certain brand of freight car kit was sufficiently detailed to pass muster in today’s detail-oriented environment.

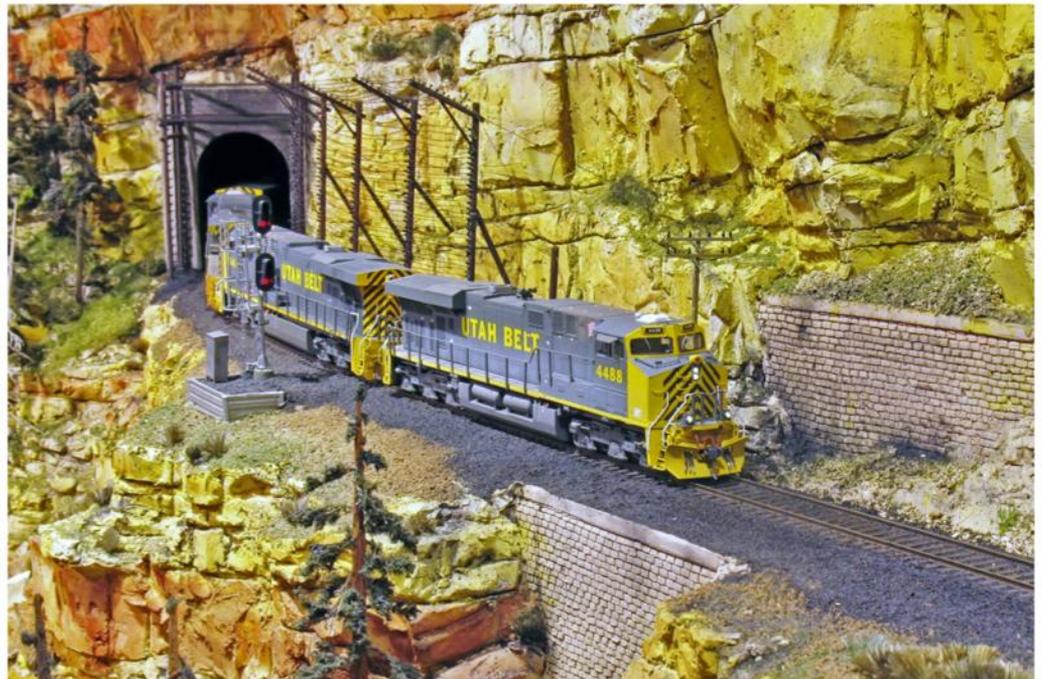
Clark Propst, a noted prototype modeler from Iowa [see *Model Railroad Planning 2018* for an overview of his latest project – Ed.], argued that the freight cars can be “enhanced” to resemble specific prototypes. He put that into context, saying it’s wise to adopt what he called a “layout standard” – a chosen level of detail seen throughout one’s layout. It’s “what’s ‘good enough,’” he added, using Allen McClelland’s long-established term.

I’m not sure there’s a substantial difference between “layout standard” and “good enough,” but I think Clark’s term is more precise. I believe he’s saying that for each of us there is a level of detail that we can aspire to, that we’re comfortable with, and that applies to every aspect of our modeling.

Put another way, it makes little sense to have super-detailed rolling stock operate among shiny plastic buildings or in Plywood Pacific scenery.

Layout standard makes this distinction clearer. It’s the level of excellence you select for your modeling endeavors. It may be low, medium, or very high. But whatever level it represents, it’s what you’ll strive to achieve across the board.

I’ve had the privilege of seeing a vast number of



Eric Brooman’s layout standard includes keeping the railroad up to date. The lead unit, one of three Utah Belt General Electric ES44ACs, is on a hot intermodal train drifting downgrade in the Furnace Creek Canyon. Eric Brooman photo

model railroads. What tends to make some of them stand out is consistency. I remember visiting one basement-size layout that had contest-quality structures, but they were arranged in an orderly fashion, much like you’d expect to see on a commercial display. The railroad, almost incidentally, ran by them.

Clearly, this talented modeler had since “gotten the memo,” as a large extension of the railroad was of high quality in all respects. Those structures set a high standard, and the rest of the railroad was of equal quality. The builder established a new layout standard that would ensure everything was of a whole, and that individual parts weren’t head and shoulders above other aspects of the railroad. Consistency in all aspects of the railroad was now the standard.

It would be nice if we could establish a high level of quality

at the outset and then simply build on that as our railroads progress from bare-bones platforms to true railroads in miniature. But modeling fosters better modeling – early efforts are eclipsed by later ones, and those are topped by the next.

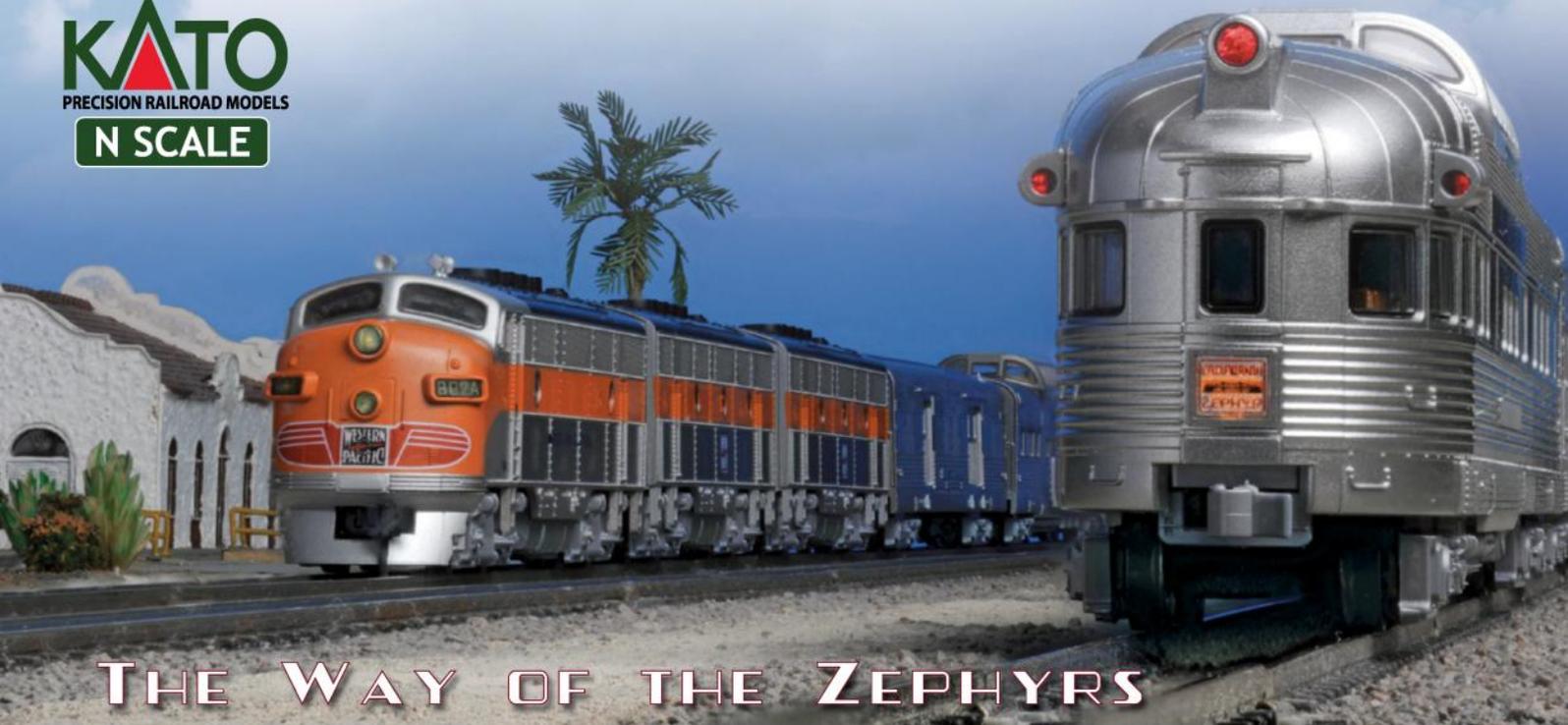
The lesson here is to set achievable goals – standards – that can be met using today’s skill sets, knowledge base, tools, and materials, and then keep improving on them. Remember when lichen was the standard for forest canopies? Then came lichen covered with ground foam, which was quickly supplanted by poly fiber “puffballs.” I remember segueing between all three media on

the Allegheny Midland as better materials or techniques were developed.

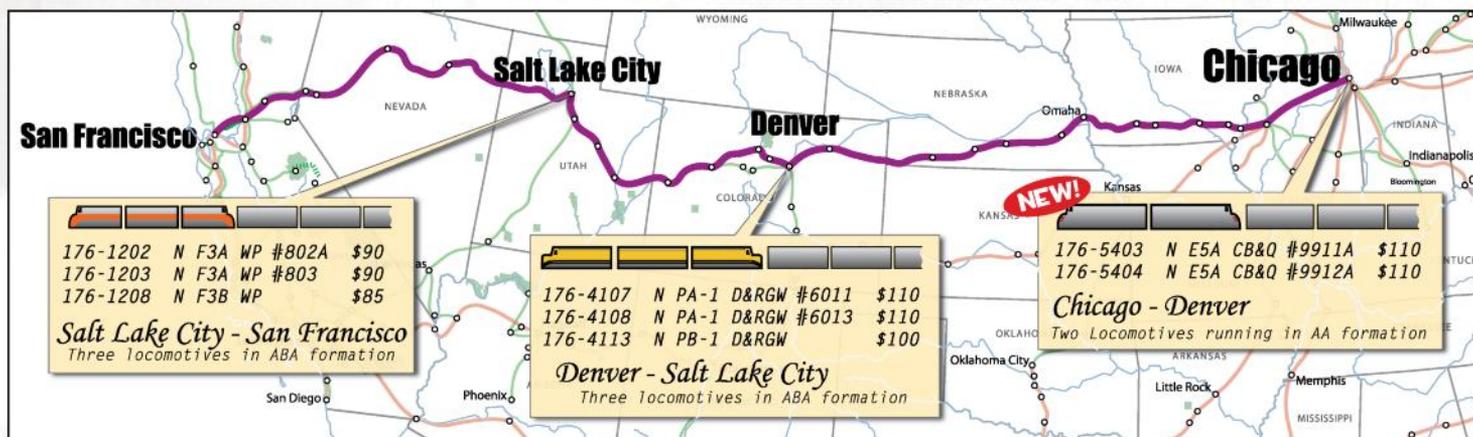
As those preliminary standards are established, the key is to keep an open mind when enhancements come to our attention. My favorite example is Eric Brooman, whose highly regarded Utah Belt always depicts the present day. Eric has accomplished this by being creative, not simply by throwing money at the problem. And he has always maintained a layout standard that has earned him plaudits from the modeling community.

So, to paraphrase a popular credit card commercial, “What’s your layout standard?” **MR**

MODELING FOSTERS BETTER MODELING – EARLY EFFORTS ARE ECLIPSED BY LATER ONES, AND THOSE ARE TOPPED BY THE NEXT. - TONY



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