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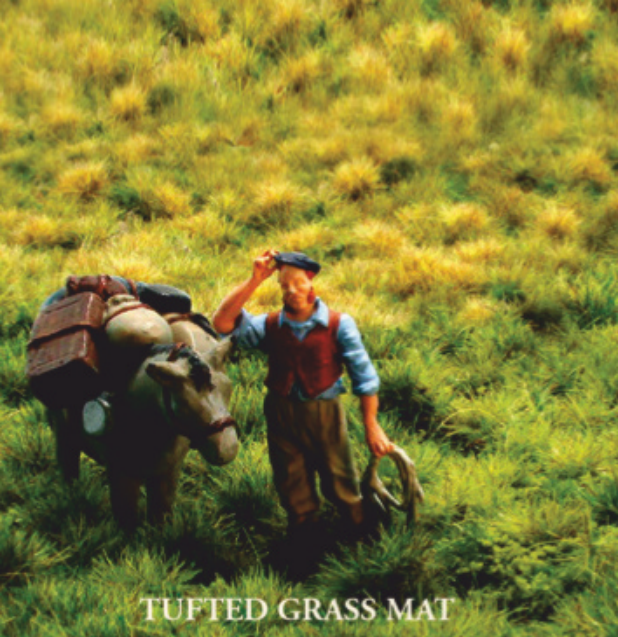
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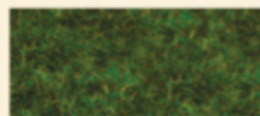


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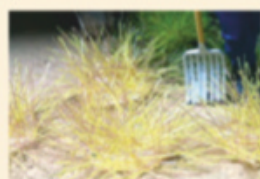
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MEDIUM GREEN
Item No. 31042



TAN
Item No. 31044



YELLOW and RED
Item No. 31045



THE ULTIMATE GUIDE 2019

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On the cover

Drew Halverson and Bill Zuback used a Wallace Abbey photo as the backdrop for our HO C&NW train.

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Spaces to Places

Make this rural scene start to finish with Gerry Leone.



We're back!

The Model Railroader Video Plus team

is pleased to bring you *The Ultimate Guide 2019*! For those of you who've just picked up this magazine for the first time, you're probably wondering what it's all about.

Well, every year we create more than 150 videos for ModelRailroaderVideoPlus.com, our subscription video website, and we cover a lot of ground in those 52 weeks. We always have one or more project railroads running to show layout-building techniques. We also have a team of contributing modelers who willingly share their best tips. And we take trips to showcase great layouts and full-sized railroads. There's always something exciting to watch on MRVideoPlus.com!

Although watching videos is a great way to learn how to do some things (I fixed my stove by watching a YouTube video), sometimes you need to see printed directions too. Enter *The Ultimate Guide*. Each year we take some of the best videos we made, and we turn them into print stories. This gives you a chance to really dig into select projects from the website. And as a bonus, you get to watch some of our videos on MRVideoPlus.com, even if you are not yet a subscriber. Every story in this magazine includes a box with a link to one or more free videos on our website. And you can watch them as many times as you'd like.

So, kick back, enjoy a good read, watch some video, and thank you for picking up *Ultimate Guide 2019*. We're glad you're here! – David Popp

2019 Cast of characters



David Popp
Producer

JOB: Paints big pictures (and small models)
FAVE: MINI Coopers
FACT: Once directed "South Pacific" and used real sand on the stage!



Kent Johnson
Associate Producer

JOB: New editor for "Garden Railways" magazine – congrats!
FAVE: His big dog, Mack
FACT: Has travelled by train in the former USSR



The MR Video Plus Team

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Associate Editor
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Contributing Editor Minnesota
Contributing Editor Seattle
Contributing Editor U.K.
Contributing Editor Trackside
Contributor
Contributor
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Ray and Renee Grosser
Awesome Layout Owners

JOB: Provider for full-time wife
FAVE: Building really big models
FACT: Has parachute jumped out of aircraft 193 times

JOB: Full-time wife
FAVE: Wears flip-flops all year
FACT: Has scratchbuilt more than 150 models, working from Z to O scale



Ben Lake
Associate Editor

JOB: Plug stuff together and make it work
FAVE: Seven Wonders board game
FACT: Grew up with a BN main line in the backyard



Jenny Freeland
Assistant Editor

JOB: Keeping MRVP running
FAVE: Jamaica!
FACT: Can deadlift 155 pounds



Cody Grivno
Group Technical Editor

Job: Cody's Workshop
Fave: Happy Joe's taco pizza
Fact: First car was a 1985 Dodge Omni



Aaron Skinner
Associate Editor FSM

JOB: Airbrushing with Aaron
FAVE: Fraser Island
FACT: Has ridden in 38 types of aircraft, including a C-130 and a B-17



Kathy Millatt
Contributing Editor

JOB: Let's Make a Scene
FAVE: Loves Marvel movies
FACT: Is a judge on the U.K. TV show, "The Great Model Railway Challenge"



Drew Halverson
Contributing Editor

JOB: Drew's Trackside Adventures
FAVE: Peppermint Altoids
FACT: Has yet to photograph a CN Dash-8 standard cab leading in sunshine



Charlie Conway
Contributing Editor

JOB: Taking Care of Business
FAVE: Sailing close-hauled in a fresh breeze
FACT: Once lived on a sailboat in the San Juan Islands



Gerry Leone
Contributing Editor

JOB: Off the Rails
FAVE: Hanalei Beach, Kauai, Hawaii
FACT: Ran more than 5,600 miles between 2003 and 2018

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Watch videos from all our cast of characters at MRVideoPlus.com/TUG2



Model a 1950s Suburban service train

Move commuters with a Geep and 60-foot heavyweights

By Cody Grivno

Model Railroader Video Plus producer David Popp designed a track plan based on the Chicago & North Western in Crystal Lake, Ill. A natural companion project was to model a 1950s-era suburban service (commuter) train in HO scale.

One type of unit used on the full-size trains was an Electro-Motive Division GP7. Fortunately, we had an Athearn Genesis HO scale model in North Western colors, complete with steam-generator equipment

and head-end power cabinets.

But now we needed cars to put behind our four-axle unit. David and I talked about different options for cars. Then I remembered Rivarossi's line of 60-foot heavyweights. The cars are based on C&NW prototypes. Better yet, we knew the company offered cars decorated for C&NW.

That is, except when we needed

them. Various searches for used cars came up empty. We did find cars lettered for New York Central and Pennsylvania RR. We removed the paint by soaking them in 91 percent isopropyl alcohol.

Even if you don't need a C&NW suburban service train, the painting, decaling, and weathering techniques can be adapted to virtually any project.

Chicago & North Western GP7 no. 1654 eases a four-car suburban service train up to the platform at Williams Bay in this HO scale scene.

Materials list

Cal Scale

- ☐ 375 A&W markers

Microscale

- ☐ 60-290 C&NW diesel locomotives
- ☐ 87-859 C&NW passenger cars

Model Master paint

- ☐ 4636 clear flat
- ☐ 4636 clear semi-gloss
- ☐ 4873 Reefer White
- ☐ 4885 Railroad Tie Brown
- ☐ 4886 Reefer Gray
- ☐ 4888 Engine Black

Monroe Models Scenery Solutions

- ☐ 973 Dark Rust
- ☐ 975 Rusty Brown
- ☐ 976 Grimy Black

Preiser

- ☐ 10012 Railroad personnel

Tamiya Color

- ☐ PS-32 Corsa Gray
- ☐ TS-5 Olive Drab
- ☐ TS-13 Clear gloss
- ☐ TS-28 Olive Drab 2
- ☐ TS-80 Clear flat
- ☐ TS-82 Rubber Black

Vallejo

- ☐ 70.819 Iraqi Sand Model Color paint
- ☐ 76.518 Black Model Wash

Wm. K. Walther's Inc.

- ☐ 949-6034 Seated coach passengers

+ MORE on MRVP!

Don't just read about it, watch Cody model this train on video. See episode one at MRVideoPlus.com/TUG2

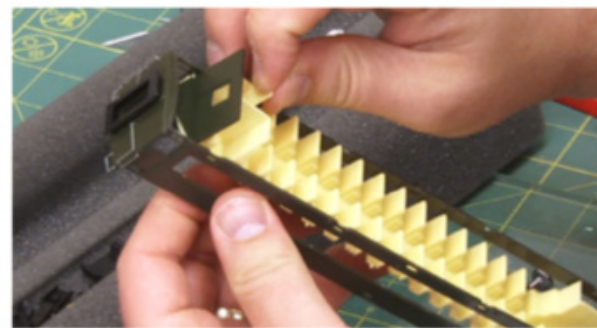
>> Breaking 'em down



Though the Rivarossi 60-foot heavyweight passenger cars showed up ready-to-run, I had to disassemble them for repainting. After removing the screws that held the trucks and underbody in place, I removed the press-fit sides and ends that attach to a plastic core.



Like the sides, the one-piece injection-molded plastic roof is also attached to the core with tabs. Having the sides removed made it easier to see the attachment points for the roof. As shown in the image above, I used a straight-slot screwdriver to disengage the tabs from the core.



Next I removed the interior, which features a one-piece seating section and separate vestibule walls. The seating section is secured to the core by a series of delicate pins. Gently spread the bottom of the core and lift the seating section up and out. I then removed the car ends.

>> Bath time



I attempted unsuccessfully to remove just the lettering and car number on the sides. So I soaked the sides, ends, and vestibule walls in 91 percent isopropyl alcohol. This isn't a one-size-fits-all solution, but it worked here. Use isopropyl alcohol in a well-ventilated area and wear nitrile gloves, goggles, and a respirator.

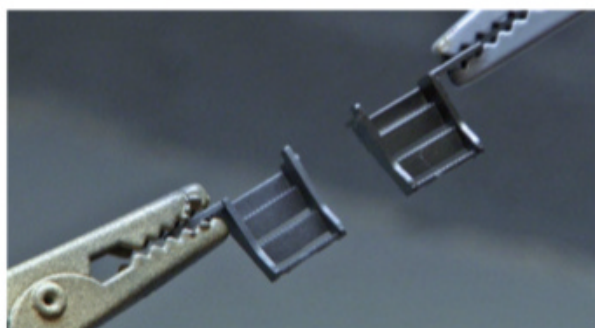


After 30 minutes, I gently scrubbed the sides, ends, and vestibule walls with a toothbrush. The dark green paint started to come off. The yellow lettering was a bit more stubborn, as seen above, but it eventually came off too. I used cotton swabs and Microbrushes to get paint out of corners and other tight spots.



I left the windows in place while soaking the sides and vestibule walls. My hope was that the alcohol would soften the glue. It didn't. However, I was able to remove the glazing with a no. 17 chisel blade. Since I was working on five cars at one time, I used resealable plastic storage bags to keep track of the parts for each.

>> I want to paint it Rubber Black



I used Tamiya Color for Plastics spray paint on the passenger cars. I sprayed the underbody and steps (factory painted flat black) and the diaphragms (molded black) with Rubber Black (TS-82). When dry, the Rubber Black has a grayish tint to it, making the parts look weathered without having to do any weathering.



Okay, I couldn't help myself. Though the truck sideframes looked like they'd been exposed to the elements for a while with the Rubber Black applied, they needed a little something extra. After studying the sideframes, I brush-painted the coil springs Model Master Railroad Tie Brown (no. 4885).

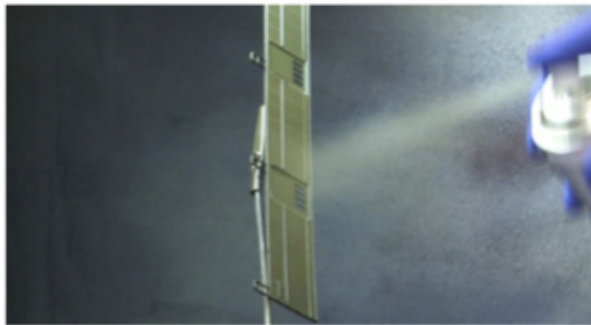


The clerestory roof has rectangular vents with screen detail molded in. To help that detail stand out, I applied Vallejo black Model Wash (no. 76.518). The wash settled into the recesses of the screen, leaving the raised parts the lighter Rubber Black color. If you make a mistake, no worries. The product is water based.

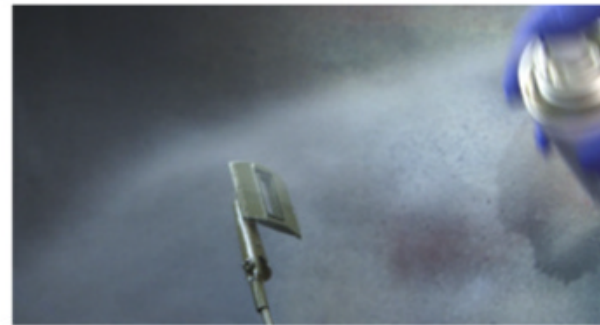
>> It's easy being green



While studying photos in Lloyd A. Keyser's *Chicago and North Western in Color: Vol. 1, 1941-1953* (Morning Sun Books Inc., 1997), I noticed the suburban service cars weren't all the same shade of green. To capture that look, I spray-painted some cars Tamiya Color for Plastics Olive Drab (TS-5) and Olive Drab 2 (TS-28).



I spray-painted the baggage car Olive Drab 2. Using a paint handle (see page 9) made it easy to rotate the car sides and ends, ensuring even paint coverage. I found two or three coats was enough to cover the parts. Apply Tamiya Color for Plastics spray paint in a well-ventilated area and wear appropriate personal protective gear.



I let the paint dry thoroughly (at least 24 hours, or until there is no discernible paint odor). Then I sprayed the sides and ends with Tamiya Color for Plastics TS-13 Clear. This is an important step, as you want a smooth, glossy surface for applying decals. If the surface has a rough, flat finish, the decals may not look as good.

>> Decal party



I lettered the cars with Microscale set no. 87-859, C&NW passenger cars from 1940 to 1955. After cutting the yellow CHICAGO AND NORTH WESTERN decals, I soaked them in distilled water. While I was waiting for the decal to slide freely from the backing paper, I applied Microscale Micro Set to the letter board area. This solution softens decals and improves adhesion.



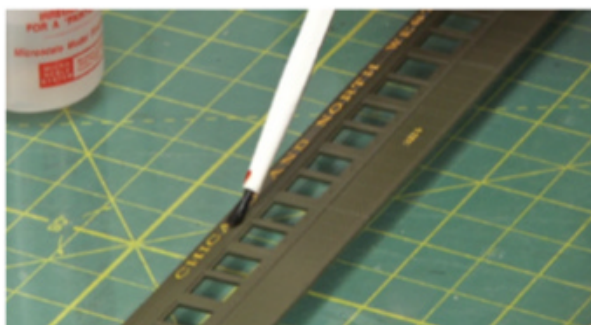
I carefully positioned the decal with a toothpick. To make sure the decal was level, I aligned the bottom serif(s) of each letter on the lower line of horizontal rivets in the letter board. To prevent the decal from tearing, keep the decal wet when doing the final positioning. Once satisfied with the decal's position, I blotted the excess water with a cotton swab.



The HO scale passenger set lacked yellow numbers, but that wasn't a deal breaker. Instead, I searched Microscale C&NW diesel and freight car sets. My solution was in set 60-290, which is for C&NW diesel locomotives circa 1960 to 1980. Yes, this is an N scale set, but the digits look appropriate on our HO scale suburban service cars.



On the coaches I kept the CHICAGO AND NORTH WESTERN lettering as one contiguous decal. This wasn't possible for the baggage car and combine, as the lettering needs to be split around doors. To do this, I cut the decal with a sharp single-edge razor blade on a piece of plate glass. Make the cut as close to the lettering as possible to eliminate excess decal film.

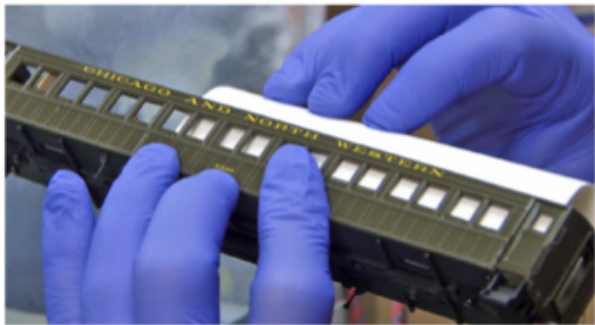


Once I'd lettered all of the car sides, I applied Microscale Micro Sol to the decals. The setting solution softens decals, helping them conform to uneven surfaces, such as the horizontal rivets in the letter board. The decals may wrinkle a bit immediately after the Micro Sol is applied, but this is normal. Do not touch the decals until the Micro Sol has completely evaporated.



Not surprisingly, there were a few trapped air bubbles in the decals along the rivets in the letter board. To remedy this, I first popped the bubbles with the tip of a sharp no. 11 blade. Then I applied more Micro Sol. Repeat this process as necessary until all of the air bubbles are eliminated. The goal is to make the decals look painted on the car sides.

>> A little grime



I sprayed the car sides with a single coat of Tamiya Color for Plastics Clear to seal the decals. The following day I attached the sides and ends to the core in preparation for weathering. I folded index cards and put them inside the core to prevent overspray from getting on the interior. Not a high-tech solution, but it worked.



Next, I applied a control coat of thinned Model Master Engine Black (no. 4888) to the entire car. I put enough paint to cover the bottom of a 1-ounce paint jar, then filled the rest with 70 percent isopropyl alcohol, effectively making a wash. The control coat toned down the vibrant yellow lettering.

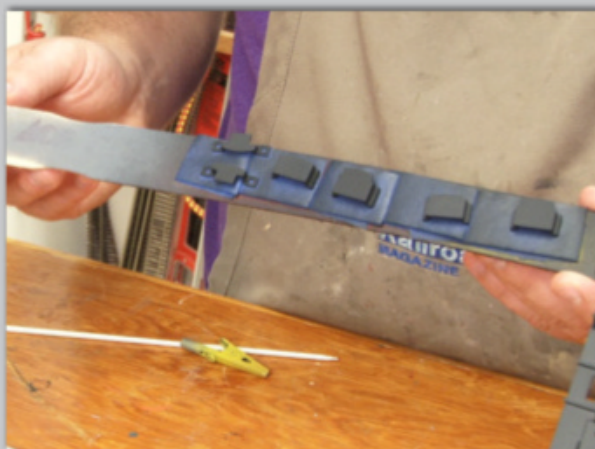


Then I applied thinned Model Master Reefer Gray (no. 4886) along the bottom of each car. I mixed the color to the same ratio as the Engine Black. For best results, build up the color in light layers, with the air compressor set in the 15-20 psi range. I sealed the weathering with Tamiya clear flat (TS-80).

Jigs for all occasions



As I've been working on the cars, you've probably noticed the painting jigs I've been using. These tools will work whether you're using spray paint or an airbrush. The first tool is a truck painting jig. It features 6" lengths of $\frac{1}{4}$ " dowel with one end tapered in a pencil sharpener. The base is a scrap of 1 x 4.



Next up is the ever handy wood paint stir stick, which are free or cheap at most hardware stores. The stick works well for holding parts for painting. I make loops of masking tape, attach them to the stick, and then add the parts. In the photograph above, you can see I'm using the stick to hold draft-gear box covers.



Holding small parts with your hands for painting is tricky at best. To get a hands-free grip on items, use a wood skewer stick with an alligator clip on one end. For this project, I used the clips to hold the passenger coach steps. The clips also work great for holding brake wheels, marker lights, and other items.



This handy holder has been laying around the spray booth in the workshop for a while. At the center is a piece of $\frac{1}{2}$ "-wide brass strip. The bottom is attached to a base made from scrap 1 x 3. The top is screwed to a piece of $\frac{3}{8}$ " square wood.



Cody says...

Getting a smooth, even finish is the goal of every paint job. Jigs like the four shown help make the painting easier, no matter if you're using an airbrush or spray can.

>> Paying customers



I spray-painted the coach interiors Tamiya Color for Polycarbonate Corsa Gray (PS-32). The paint is designed to stick to flexible plastic, which the interiors appeared to be made of. I let the paint dry for a day before applying Olive Drab 2. The color is a bit more yellow than the sides, so the difference will be visible.



Unfortunately, we didn't have prototype photos showing the interior of the 60-foot coaches. However, I wanted to break up the solid green interior by painting the walls a contrasting color. Masking the interior seemed too time consuming, so I brush-painted the walls Vallejo Model Color Iraqi Sand (no 70.819).



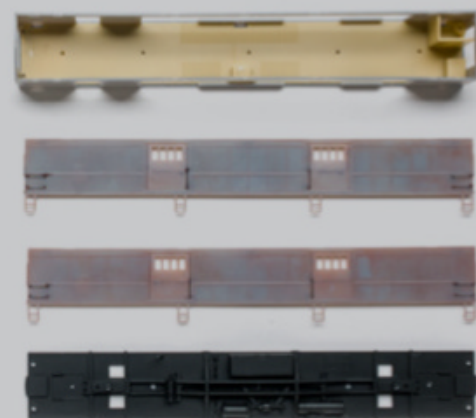
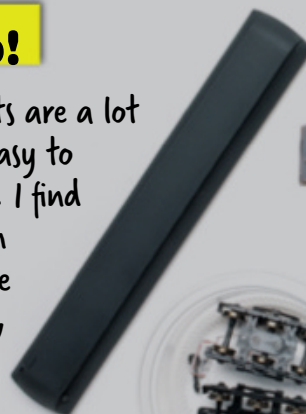
We didn't want our train running around empty, so we populated the coaches and combine with two 30-packs of Walther's SceneMaster seated coach passengers (no. 949-6034). To ensure the figures would seat properly, I sanded the bottom of each casting. I secured the figures with cyanoacrylate adhesive (CA).



With paying customers in the cars, we now needed a crew to work the train. For that, I turned to Preiser railroad station personnel set no. 10012. I sanded the bottom of the feet on each casting so the figures would stand upright. Then I applied medium viscosity CA to the bottom of each casting and positioning the crewmen in the aisle with tweezers.

MR Plus Tip!

- Multi-car projects are a lot of fun, but it's easy to get overwhelmed. I find it best to work on cars assembly-line style. Disassemble, paint, decal, weather, and reassemble the cars in batches. This process requires organization. Keep large parts in their original boxes. Store small items in containers or bags.



Cody disassembled this Rivarossi baggage car. He put the trucks, screws, and couplers in a small container.

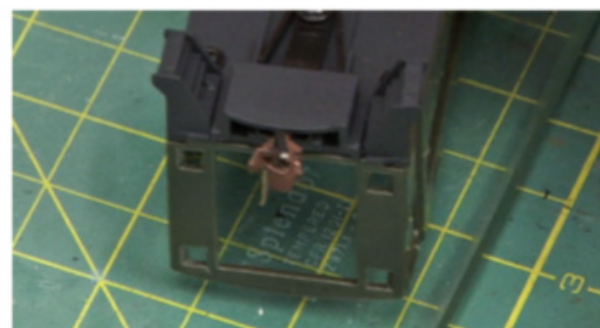
>> Picking up the pieces



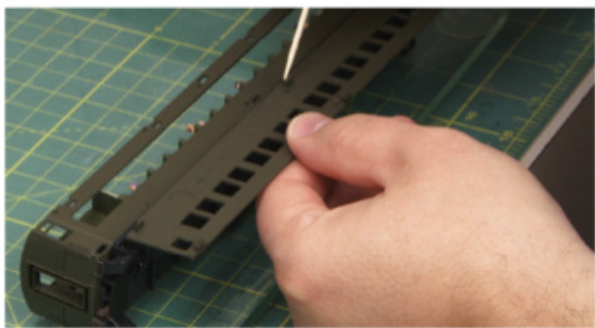
The last leg of the project was putting the cars back together. With the interior already back in the core, I flipped the assembly over and added the two weights. The weights are notched and will only fit in one way. I used clear tape to hold the two halves together. Once the weights were in place, I added the underbody, which is held in place with three Phillips-head screws.



Both draft-gear box covers on the baggage car and the cover on the baggage end of the combine are attached with washer-head screws. (Each car uses round- and washer-head screws. Pay attention to which type is used where). The rounded edge of the draft-gear box cover goes to the outside, allowing the coupler to swing freely through its range of motion.



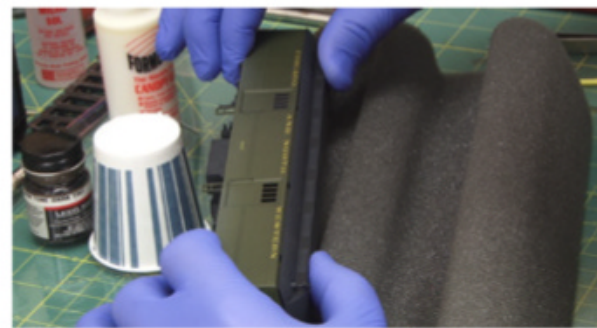
The draft-gear box covers are different on the coaches and the coach end of the combine. Instead of being held in with screws, they have tabs that lock into notches on the back of the steps. If you don't hear the covers "click," they're not secure. You can attach the covers with glue, but that will make it difficult reach the couplers should maintenance be required.



Next, I attached the sides and ends to the core. There is a definite right and left side, as indicated by an "R" or "L" on the back of each car side. The core is also keyed with slots that match tabs and small nubs on the car side, making reassembly goof proof. You can install the window glazing before or after the sides are installed.



I attached the window glazing with Pacer Formula 560 Canopy Glue. The glue comes out of the bottle white, but dries clear and tacky. After applying the Canopy Glue with a Microbrush, I placed the window glazing with tweezers. Clean off any glue that may ooze out with a damp cotton swab.



Once the Canopy Glue dried (turned clear), I re-installed the roof. Like the sides and ends, the roof features a series of tabs that lock into slots on the core. Pay attention to how the roof is oriented. The chimney, which has a cored cap on top, should be positioned over the stove. The other vent should be above the restroom.



Then I installed the plastic diaphragms. I weathered the face of each one with Monroe Models Dark Rust, Rusty Brown, and Grimy Black Scenery Solutions washes, an India ink wash, and a silver colored pencil. This approach simulates the look of rusty and bare metal where the diaphragms faces have rubbed together.



I randomly designated coach no. 3200 the end car of our suburban service train. After painting the Cal Scale markers (no. 375), I added red and green jewels that we had left over from another project. Then I added a modified Rapido Trains etched brass end gate and a figure from Prieser set no. 10012.



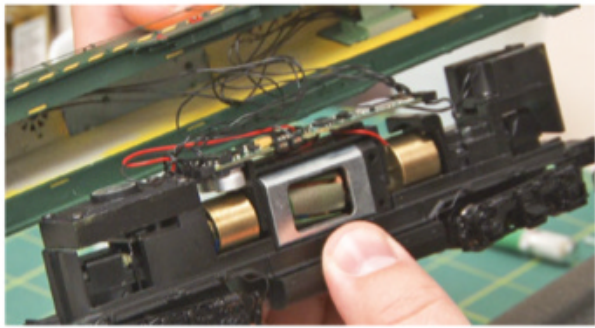
During the reassembly process there was some minor damage. Some of the Olive Drab spray paint rubbed off the formed wire grab irons. I touched up the handrails with a toothpick dipped in Polly Scale Pullman Green (no. 414284). A reasonable stand-in for this color is Humbrol Matte Light Olive enamel (no. 86).



TAMIYA TS-5 OLIVE DRAB

TAMIYA TS-28 OLIVE DRAB 2

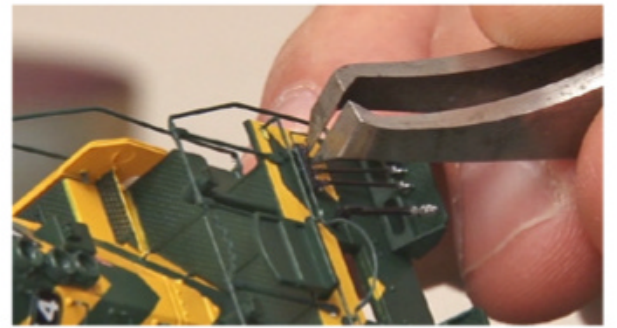
>> Separating the shell



Our train is powered by C&NW GP7 no. 1654. Before I could weather the model, I had to separate the shell from the chassis. First, I unscrewed and removed the front and rear draft-gear boxes. This allowed the shell to lift off. Do this carefully, as wires are tethered to the printed-circuit board.

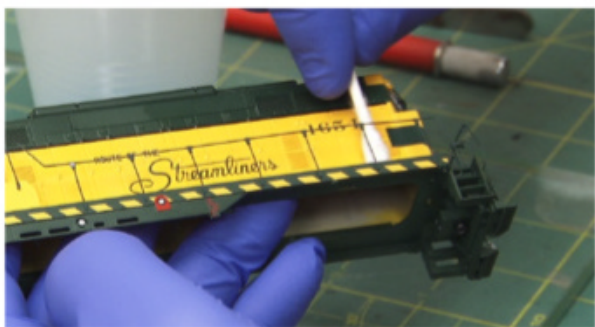


Next, I removed the incandescent lights for the front and rear headlights and the red warning light. Use caution, as the bulbs are quite fragile (don't ask me how I know this). With the bulbs out of the way, I was able to remove the red and clear headlight covers.



I weathered the GP7 to match a prototype photo on page 77 of Lloyd Keyser's *Chicago and North Western in Color, Volume 2: 1954 - 1958* (Morning Sun Books Inc., 1999). A detail I replicated on the model was the missing m.u. hoses on the brakeman's side of the pilot.

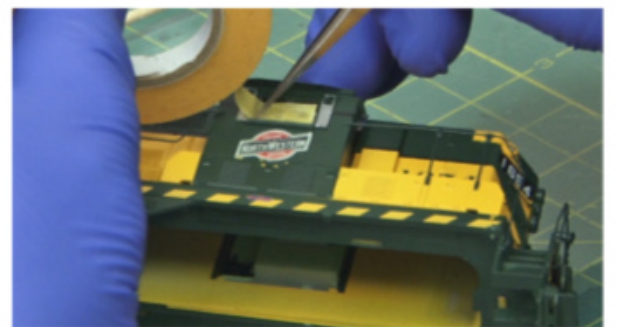
>> A clean start



To remove skin oils and other impurities that might affect paint adhesion, I wiped the shell with a cotton swab dipped in Windex. Do not use strong cleaners, like 91 percent isopropyl alcohol, as this may damage the model's finish. From this point on, I only handled the shell while wearing nitrile gloves, as shown in the photograph above.



I removed the wheels for weathering (you can read more about my wheel weathering techniques on page 72). After reinstalling the plastic gear covers, I put small pieces of foam between the sideframes and the gear tower. The foam prevents overspray from the weathering process from getting on the brass wipers inside the sideframes.

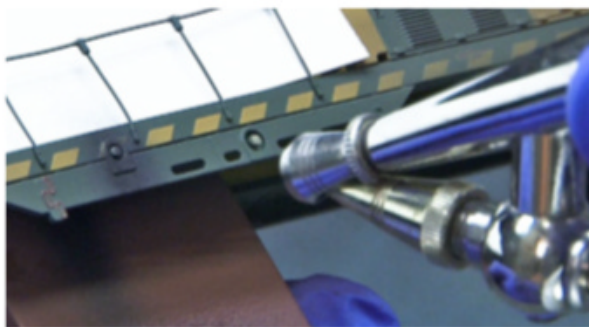


The windows on the front and back of the cab were easy to remove. However, the side windows were in for the duration unless I wanted to peel off the cab side. I didn't want to risk damaging the model. Instead, I covered the side windows with Tamiya 10mm masking tape (no. 85022, available at the Kalmbach Hobby Store, www.KalmbachHobbyStore.com).

>> Working from photos



As with the passenger cars, I used thinned Model Master Engine Black as a control coat. I applied three coats to the shell, chassis, and fuel tank. Then I applied thinned Railroad Tie Brown, focusing on the sill, especially above the trucks and on the front and rear pilots.



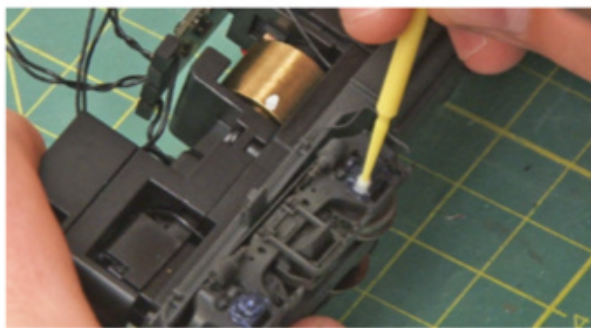
I again used Engine Black, this time thinned as if I were going to paint a model, to add weathering around the fuel filler neck. Build up the effect in light layers with the air compressor set at 20-25 psi. I also put an index card behind the handrails to keep overspray off the long hood.



Next, I moved to the top of the long hood, using the Engine Black to weather around the diesel engine exhaust stacks. I generally spritz the paint in quick blasts, working my way around each stack. On newer engines, keep the paint just around the stacks.



One more application for the Model Master Engine Black paint is to simulate grease around each axle bearing. As before, I applied the color in quick blasts until it stood out against the already weathered truck sideframes. Adding dust by the sand lines would look cool, too.



I let the Engine Black dry, then sprayed the sideframes with Model Master clear flat (no. 4636). I let the flat finish dry overnight. Then I used a Microbrush to apply Model Master semi-gloss around the bearings. This captures the look of grime that stuck to the wet surfaces.

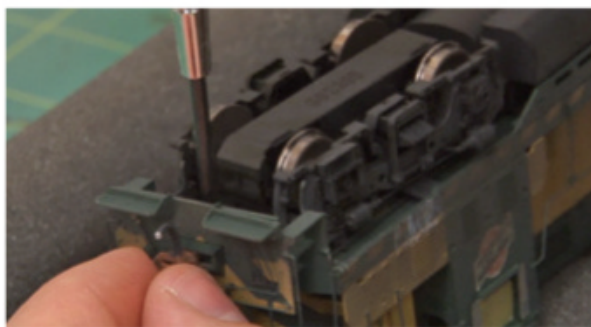


When studying a prototype photo, I noticed an effect I wanted to re-create. Above the steps leading to the cab, there was a patch of clean yellow paint from boots hitting the risers. To capture that look, I dipped a super fine Microbrush in Windex and stippled it against the model.

>> Putting it back together



Reassembling the model was a fairly quick process. First, I put the lights back into their respective openings. The bulbs are location-specific, so pay attention to where the wires attach to the circuit board. I didn't glue the bulbs into the openings, as they may need to be replaced down the road.



Next, I reinstalled the draft-gear boxes on the front and back of the locomotive. Use caution when doing this, as it's easy for the middle of the uncoupling lever to get pinched between the box and the pilot. I also used this opportunity to install Kadee no. 148 metal whisker couplers, weathered as outlined on page 72.



Finally, I put the front and rear cab window glazing and the headlight lenses back on the model with Formula 560 Canopy Glue and Testor's Clear Parts Cement, respectively.

With that, C&NW no. 1654 was ready to start moving suburban service trains in the Chicago metro area. 🚂



Lake of Plexig



Use acrylic sheets to make a water surface that spans multiple layout sections

By David Popp

Water features are always

star attractions on model railroads. Our Canadian Canyons N scale project, featured on MRVideoPlus.com, has two rivers and a lake on it.

I'd used two-part resin to make the rivers, but the lake was something of a special problem – it had to span two sections of the layout that needed to be separated. Resin wasn't going to work well here. Enter Plexiglas, a brand of clear

acrylic panels. I've used this transparent material before to represent water surfaces, and I thought it might be an ideal starting point for our Kamloops Lake project.

+ Watch It!

You can see the Plexiglas lake project free at MRVideoPlus.com/TUG2

THE PROTOTYPE



Our water feature is based upon Kamloops Lake in British Columbia. Drew Halverson grabbed this shot on the real Kamloops Lake on a visit in 2014. I knew that for the modeled scene to look correct, I'd need to replicate the beautiful blue-green glacial water seen in Drew's photo.



Railfans in a pontoon boat enjoy a pleasant afternoon of train watching on Kamloops Lake on our N scale project railroad. The lake is made from Plexiglas and spans two sections of the railroad, so it must be able split in two.

David Says...

As long as you can make straight cuts, acrylic panels are very easy to work with. A metal straightedge helps a lot. I've also used metal paint cans as a guide to cut curves.

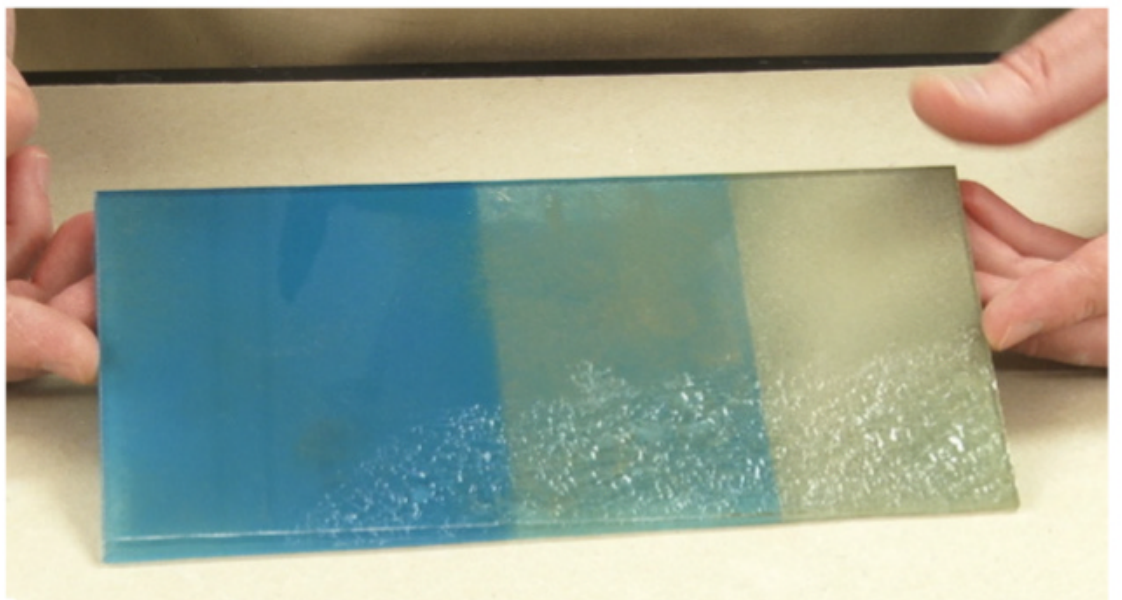


THE PROBLEM



Tinted resin would have made modeling the color of Kamloops Lake a snap – but not when the lake had to span two different layout sections. Using resin was out. Instead, I thought I'd give clear acrylic a try. Sometimes sold under the brand Plexiglas, the material is readily available.

THE PRACTICE



I'd used Plexiglas before, but only for clear water. I needed a way to tint the clear plastic. As a test, I sprayed a light coat of blue and tan paints the back of the Plexiglas. Neither color by itself was correct, but where the colors overlapped, it was close to what I needed for Kamloops Lake.

THE PRODUCTS



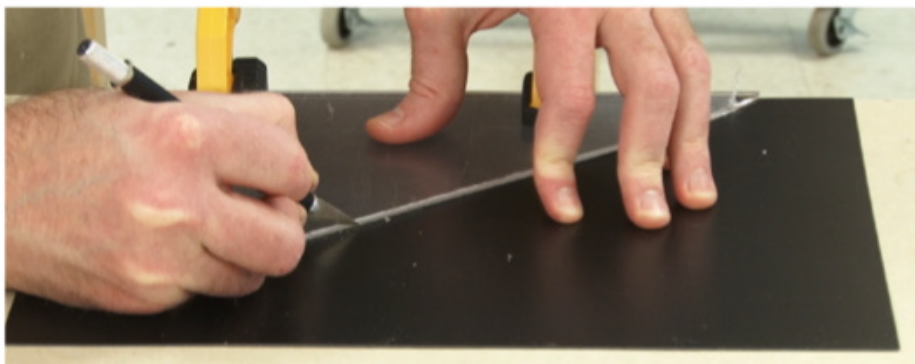
>> The project



Step 1: To start, I made a paper template for both sections of the lake. Plexiglas is easiest to trim if you can make straight cuts. With that in mind, I sliced away the base of the curvy bank so the template, and later the Plexiglas, could fit under it. After making templates for both sides, I taped them to the Plexiglas for cutting.



Step 4: After taping the two pieces of Plexiglas together from the top, I removed the plastic protective film on the bottom and sprayed them with paint. I applied a light dusting of Rust-Oleum Oregon first, let that dry, and followed up with a little heavier application of Lagoon Blue. I then let the paint dry a full day.



Step 2: I used a metal straightedge and a Hyde plastic cutter to cut the Plexiglas. I scored the material 10-20 times, then placing it over the edge of a table to snap it – much like scoring and snapping a thick sheet of styrene. I used the cut acrylic pieces as patterns to cut out matching backers made from black .020" styrene.



Step 5: To attach the painted Plexiglas to the layout, I used clear caulk again, this time applying it sparingly around the edges. I kept the acrylic sections taped together to make sure that the spray pattern matched across both parts of the layout. I then filled in the surrounding scenery.



Step 3: The black styrene backers give the semi-transparent plastic lake the look of depth. I glued the styrene sections to the layout with DAP Alex Plus clear latex caulk and let them dry overnight.



Step 6: Once the scenery was complete, I removed the rest of the protective film from the acrylic and applied a coat of Woodland Scenics Water Waves. This is a clear gel that can be applied to most any smooth surface. I used a brush to work the gel into small waves.



As shown in the final photo, Kamloops Lake on our Canadian Canyons layout looks great. Construction was easy, thanks to the assorted off-the-shelf items needed to build it. And the best part is that the lake can split in two easily when the layout sections need to be separated. Next time you need to build a small lake on your model railroad, try clear acrylic sheets. 🎬

Make a FAST FOREST

PHOTO: BILL ZUBACK

Tree kits, an assembly line, and creativity make it easy!

By Jenny Freeland

When the MRVP team set to work on building our N scale Canadian Canyons, I signed up to work on my favorite part – scenery. The layout models the Thompson and Fraser River Valleys in British Columbia. These are heavily forested regions, so it was clear that I was going to need a lot of trees!

WATCH THIS ON



Free Video!

You can watch Jenny's tree-making techniques for free in Scenery All-Stars episode 1 when you visit MRVideoPlus.com/TUG2

It takes a lot of trees to make a forest, even on a small model railroad. Jenny Freeland and the MRVP crew made this scene starting with a few easy-to-build tree kits.

>> Making trees

Step 1: Soak trees in water



For this project, I used several Timberline Scenery Grow-a-tree lodgepole pine tree kits. The tree armatures come flattened in the package, but they take their original tree-shape when placed in water.

Materials list

- Scenic Express, Flock & Turf EX803B
- Woodland Scenics, Turf Fine Soil T1341
- Woodland Scenics, Scenic Cement S191
- Testors, Model Master Engine Black 4888
- White glue
- Misting bottle
- Blocks of foam insulation

Step 2: Trim the trees



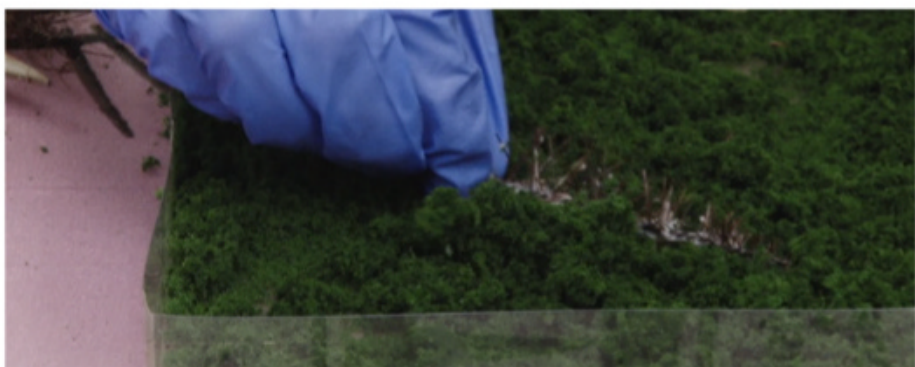
Once the armatures had spread out, I pulled them out of the water and teased the branches to get the trees into their final shape. I trimmed any branches that were too long or out of place using a pair of scissors.

Step 3: Dip in glue



I poured Woodland Scenics Scenic Cement into a paper cup and added a few good squeezes of Elmers white glue to thicken the material. After stirring the mixture, I then selected a tree armature and dipped it into the glue, making sure to coat the branches.

Step 4: Roll in flocking



The tree kits come with their own flocking material, but I wanted a different color, so I used Scenic Express Flock & Turf in spruce green. I poured the turf into a plastic tray and rolled the glue-soaked tree armature around in it until it was covered with flocking. I then tapped the tree lightly to knock off any extra that wasn't sticking.



Step 5: Dry



I made the trees in batches of 25 to 50 at a time and used some scrap blocks of insulation foam board to make storage racks. I poked rows of holes in the foam with a pin and inserted the trees into the holes using a pair of pliers. I let the trees dry overnight.

Step 6: Spray



The next day, I filled a misting bottle with more Scenic Cement. I then sprayed the new trees from all sides, holding their foam storage block inside a garbage can to contain the mess. By soaking the trees with more cement, it secures loose foam to the finished tree.

Step 7: Ready to plant



Once the glue-soaked trees had another night to dry, they were ready to plant. Our Fraser River scene is about 6-feet long, and it took approximately 250 trees to properly fill that location. By building them in an assembly line, the tree kits proved to be an easy way to forest the layout quickly.

Jenny says...

It's OK if there are some bare spots on your trees where the flocking didn't stick. If you go out into the woods and look at pine trees, you'll find that many have bare branches. There really isn't a wrong way to model your trees.



>> Modeling a forest fire



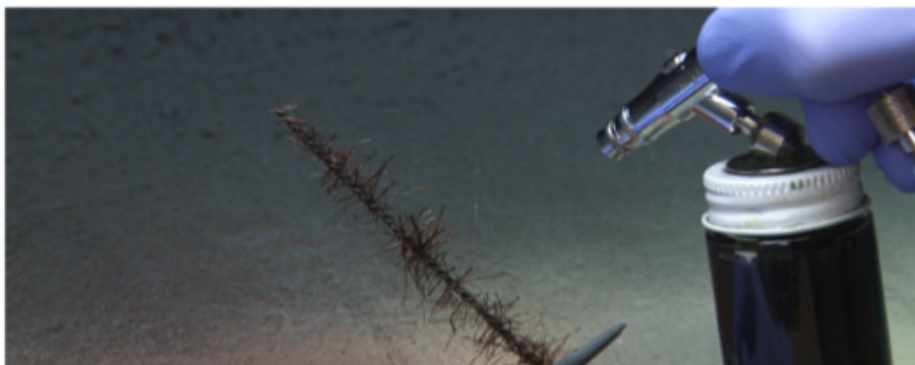
David and Drew took my basic tree-making technique and tried a different approach with it – modeling fire-damaged trees as shown here on the layout's Thompson River side. Forest fires are a common occurrence in British Columbia, and working from photos, the two prepared a special set of fire-damaged trees from the Timberline kits.

Step 1: Trimming



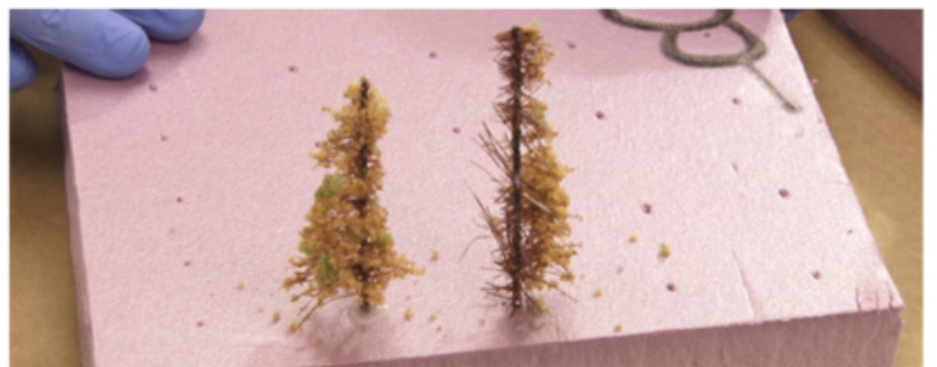
Drew trimmed the branches of the flat tree armatures with a pair of scissors. The outer branches often burned away, but the thicker parts at the trunk remain. He then soaked the trees in water.

Step 2: Paint



The fully burned trees didn't need any ground-foam needles. So after the bare armatures had dried, David took them into the spray booth and lightly airbrushed the trunks Model Master Engine Black.

Step 3: Partially burned trees



Drew also decided to make some half-burned trees, as well as those that had died due to heat exposure. For the half-burned trees, Drew trimmed the branches on just one side. He coated the unburned branches with glue and sprinkled on yellow coarse ground foam.

Step 4: More painting



When the glue and ground foam had sufficiently dried on Drew's half-burned trees, David airbrushed those as well, being careful to paint just the burned side branches and trunks black.

Step 5: Ground prep



David and Drew modeled the burned section of forest to look as if vegetation was re-establishing itself. They used Woodland Scenics soil over the base-scenery layer. He then sifted in rocks and twigs.

Step 6: Planting



They planted the trees by placing the fully burned ones in the middle of the scene and ringing the edges with half-burned and heat-damaged dead trees. The end results look very realistic. 🌲

The Copper Basin Railway

A short line railroad and the heavy industry it serves make an interesting modeling subject

By Charlie Conway
Photos by Drew Halverson and Charlie Conway

The Copper Basin Ry. is a unique railroad serving heavy industry in the beautiful Sonoran Desert. Charlie Conway explores this amazing line with an eye towards the modeling opportunities and challenges it presents.

Every prototype railroad has a unique character shaped by three things: Its location, its purpose, and its history. The Copper Basin Railway, located in southern Arizona, is no exception.

If you're interested in modeling passenger service, bridge traffic, or a wide variety of freight trains, the Copper Basin isn't the prototype for you. But if heavy unit trains grinding through the spectacular landscape of the Sonoran Desert behind lashups of handsome Geeps appeals to you, read on.

The Copper Basin Railway is a single-purpose transportation system, designed to move tons of bulk material between an open-pit mine at Ray, Ariz., and a smelter at Hayden in an endless industrial extraction process that yields up to 380 million pounds of 99.44 percent pure copper each year.

The railroad, once a Southern Pacific branch line, is now a wholly-owned subsidiary of mining company ASARCO, which was founded in 1888 as the American Smelting Refining Co. ASARCO was acquired by Grupo Mexico in 1999. The line is shown on the map on the next page.



Desert landscape



Gila River Valley

It's mountains, cactus, and blue sky as far as the eye can see. This is rugged railroad country, and it could make for some great modeled scenery.

Part of the appeal of the Copper Basin is the contrast between the industrial character of the railroad and the beauty of the landscape it traverses. The Sonoran Desert is bursting with life – home to 60 types of mammals, including the only population of jaguars living in the United States, 350 species of birds, and more than 2,000 varieties of plants.

For most of its 54-mile length, the Copper Basin right-of-way follows the valley of the Gila River, where shrubs and trees like creosote bush, velvet mesquite, palo verde, and California fan palm soften the harshness of the rocky, dusty landscape with a variety of colors and textures.

Away from the river's edge, dry-land species like desert ironwood, bur sage, and ocotillo dominate the landscape. Cactus species abound, from the low-growing beavertail, fishhook and prickly pear cacti, to the spindly cholla cactus, and the massive organ pipe and saguaro cacti.

Searching for “plants of the Sonoran Desert” on the web will yield a wealth of photographs and information about Sonoran flora.

WATCH IT!



Free Video!

Watch Taking Care of Business: Copper Basin Ry. Part 1 for free at MRVideoPlus.com/TUG2



Gila River Valley

Moisture and rich soil in the valley of the Gila (pronounced 'HEEL-a') river support relatively luxurious growth of shrubs and trees.



Saguaro

The saguaro cactus is a signature plant of the Sonoran Desert – it is found nowhere else. Modeling the saguaro and other cactus species is a must for anyone reproducing the landscape through which the Copper Basin passes.



Tunnels

The Copper Basin line from its interchange with the Union Pacific at Magma to the smelter at Hayden passes through three tunnels, ranging in length from 125 to 1,632 feet. All three are bored through native sedimentary rock formations.



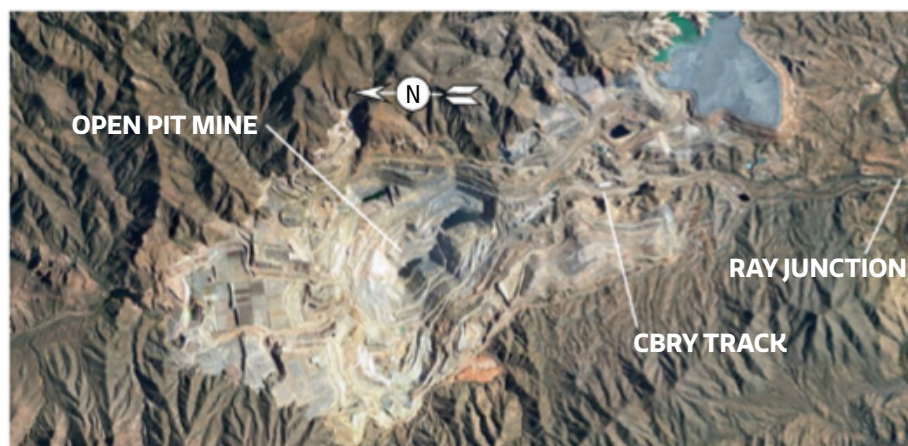
Trestles

The railroad passes over many gullies and dry washes on short bridges and timber trestles. The line also crosses the Gila River at two locations on steel truss bridges.

The basics of ore processing

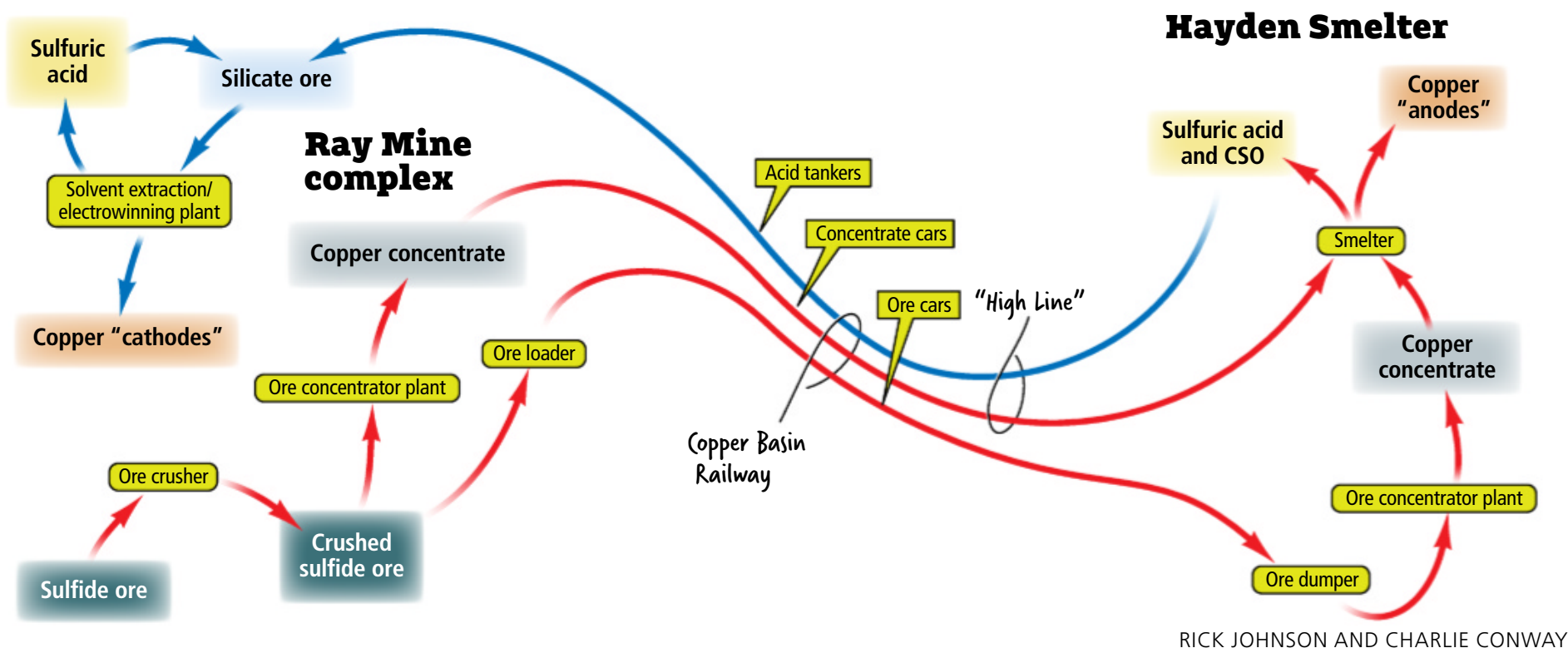
Because the Copper Basin is so integral to the operations of the ASARCO mining and smelting operation, a general grasp of the copper extraction process is necessary to understand the operations of the railroad. The mine at Ray (top Google satellite image) produces two types of copper ore: sulfide ore and silicate ore.

Extracting copper from these two types of rock requires entirely different methods: sulfide ore is burned in a smelter (bottom Google satellite image), while copper from silicate ore is leached from the rock with an acid solution. On the following page is a simplified explanation of each process.



Charlie says:

"If you chose to model the Copper Basin, remember that the real power behind the railroad is its people, so don't forget to model the cooperative, get-it-done spirit of Copper Basin employees in every operating session."



Sulfide ore processing

Silicate ore is crushed at the mine complex into fist-sized rocks. Most of it is loaded into 100-ton ore cars and transported to the Hayden concentrating plant, where some of the rock is removed and the remaining material is crushed into a fine powder. A second concentrating plant is located at the Ray mine. Concentrate from this plant is shipped to Hayden in special hopper cars built for the Southern Pacific.

The concentrate is burned in a reverberatory furnace in the Hayden smelter at 3,000 degrees Fahrenheit, yielding three products: nearly pure copper, which is poured to copper molds to form ingots called anodes, copper slag, and hydrogen sulfide gas, which is processed into liquid sulfuric acid. Another liquid by-product, called "cone settler overflow" or CSO, is also recovered from the smelting process.

Silicate ore processing

Although the means of extracting copper from silicate ore is completely different from the process used for sulfide ore, they are related in an interesting way. The Copper Basin Railway transports the liquid sulfuric acid and CSO produced at the Hayden smelter back to the Ray mine where they are sprayed over huge piles of silicate ore, called leaching dumps. The acids dissolve the copper out of the rock, forming dilute liquid copper solutions that are collected in huge tanks.

Electric current is passed through the leachate solution, and copper plates itself to thin starter sheets, eventually forming copper ingots called cathodes in a process called electrowinning. Sulfuric acid recovered from this process is recycled back to the leaching dumps.

Operations

Operations on the Copper Basin are relatively simple. The railroad is effectively an extended inter-plant conveyor for raw materials used in the copper extraction process, which means most operations involve unit trains shuttling between mine and smelter.

Copper Basin trains are dispatched by radio from the railroad's office in Hayden based on block authority. Crews report their position regularly to the dispatcher and request authority before proceeding into the next block. Both the crew and the dispatcher record the time and content of each exchange.

There are four main jobs on the railroad, and some make multiple runs in a day.



OT-1

The backbone of Copper Basin operations is OT-1, the ore train that transports sulfide ore from the Ray mine to the Hayden smelter. OT-1 makes four scheduled round trips per day, with 48 to 60 cars in each train, depending on demand by the smelter. The trains originate and terminate in the Hayden yard.

Smelter Job

The Smelter Job is a daily turn originating in the Hayden yard each morning. The train follows the High Line up the grade from the Hayden yard to the smelter where the crew exchanges acid tank and concentrate hopper empties and loaded cars. The Copper Basin crew switches the smelter yard, but plant switching is handled by General Electric 44-ton diesel locomotives owned and operated by ASARCO.



Unit Train

Sulfuric acid and CSO tank cars are transported between Ray and Hayden in the Unit Train. The daily train that departs Hayden in late afternoon and returns in the evening after switching the acid rack at Ray. The train is not strictly a unit train because it usually includes concentrate cars as well.

Manifest freight

A manifest freight is operated as required between Hayden and the Copper Basin's interchange with the Union Pacific at Magma, Ariz. Freight may include inbound and outbound tank cars, copper anode flats, and boxcars or flats containing equipment. No industries besides the ASARCO mine and smelter are served by the railroad.

Four key elements

The Ray mine and the Hayden smelter are massive. If these were modeled, they would dominate the layout. Fortunately, the essential operations of the Copper Basin can be captured by four elements of relatively modest size.

1 Ray ore loader

Crushed sulfide ore is loaded into hopper cars at the Ray mine at a two-track concrete loader that sits astride a pair of loading tracks at the south end of the pit. The crushed ore, which is delivered to the loader by conveyor, is managed by a pair of 90-ton Cat D10 dozers during the loading process. The crew of an arriving empty ore train cuts off the locomotives, runs around the train, and shoves

the empty cut of cars through the loader onto a tail track that hugs the edge of the mine pit. The engineer then lets the train drift back through the loader at 1 mph as a loader operator fills each car with 100 tons of ore. A conventional traffic light is used by the operator to signal the engineer – red for stop, yellow for proceed at loading speed, and green for clear.

Rolling stock

Modeling the rolling stock of the Copper Basin Railway will be a challenge. However, Atlas makes HO scale GP39-2s decorated for the line.

To replicate the railroad's ore cars accurately, you will need to prepare your own drawings from photos and available data. You could then scratch-build the car bodies from styrene or make them using 3-D printing or resin casting. As an alternative, you could simply use a stand-in, such as the Walthers Ortner 100-ton aggregate car. Unfortunately, the concentrate cars were a unique Southern Pacific design, so that will require starting from scratch.

Despite the equipment challenges, the Copper Basin Railway could be a rewarding railroad to model. With its four-axle locomotives and strings of uniform ore cars, the Copper Basin is perfect for compact industrial railroad, as shown in the next story.



Locomotives

The Copper Basin operates a fleet of Electro-Motive Division GP39s, GP39-2s, GP40s, and GP40-2s. The railroad also owns several GP9s and GP18s that are stored serviceable at Hayden. The locomotives are painted in a handsome gray livery with copper and black chevrons and striping. A few have been repainted recently in a simplified scheme that features a single wide copper band around the cab and hoods.



Acid tank cars

Various tank cars with acid-resistant linings are a common sight on the Copper Basin. They are used to transport sulfuric acid and cone settler overflow (CSO). Because ASARCO sells its excess sulfuric acid on the national market, the sulfuric acid is transported in leased cars suitable for interchange service. Any appropriate tank car model will do. Cars carrying CSO can also be leased car, but they should be labeled "CSO ONLY," and they operate in captive service between the smelter and the mine. Athearn offers modern HO scale acid tank cars in its Genesis line.



CBRY in TRAINS

For more about the history and the people of the Copper Basin Railway, see "Pride of the Copper Basin" by Mike Danneman in the April 2018 issue of *Trains*.





2 Acid rack

The smelter at Hayden produces sulfuric acid and an acidic liquid called cone settler overflow (CSO) as by-products. These liquids are transported to the Ray Mine for use in the solvent extraction/electrowinning process. The acid tank cars are unloaded at a two-track rack adjacent to the Ray yard tracks.



GOOGLE SATELLITE IMAGE

3 Office and shops

The Copper Basin's offices and maintenance shops are located just west of Hayden, at the junction of the main line and the High Line to the Hayden smelter. A single metal building holds the two-track shop. One track features an engine pit and the other is outfitted with a drop-table that allows trucks and traction motors to be removed from the locomotives. The railroad's offices are housed in a modest single-story building with metal siding near the shop.

4 Hayden ore dumper

Sulfide ore is discharge at the Hayden smelter at a two-track dumper located across Highway 177 from the smelter complex. A conveyor under the highway carries the ore to the Hayden Concentrator Plant. The crew of an arriving loaded train pulls the cars slowly through the dumper as an ASARCO employee manually releases the drop doors on each hopper. When one of the two unloading pits is full, the crew cuts off the locomotives, runs around the train, shoves it through the unloader, and pulls it through the second dumper track in the opposite direction.



Ore cars

The 100-ton ore cars are unique to the Copper Basin. They have a pair of side-opening, pneumatically-actuated doors on each side of the car which can discharge the entire contents of the car in about four seconds. The doors are operated by pulling down on a handle located in the center of the car's side; a small steel ramp mounted to the unloading platform resets the handle as the cars exit the unloader, closing the doors.

These could be workable as a scratch-building project. Working from drawings, you could make a styrene master, then casting the carbodies in resin.



Anode cars

Copper ingots produced at Ray and Hayden are shipped to the ASARCO refinery in Amarillo, Texas, for further purification. Today, they're often shipped by truck, but they're occasionally shipped by rail on ex-Southern Pacific flat cars outfitted with load restraints for this service.



Concentrate cars

Raw sulfide ore is processed into a fine, cakey powder at two concentrating plants, one at Ray and one at Hayden. The concentrate produced at Ray is transported to Hayden for smelting in specially designed ex-Southern Pacific hopper cars. These cars are fitted with full-length 'bomb bay' drop doors that discharge the sticky concentrate powder cleanly. Because the cars lack a center sill, they are fitted with side sills and externally braced with Howe truss members. Like the ore cars, these too could be a scratchbuilding project.



CBRY on DVD

For an in-depth look at Copper Basin operations, check out the DVD *Taking Care of Business: The Copper Basin Railway*. Look for it at KalmbachHobbyStore.com



A basement-sized Copper mine



Model Railroader's HO scale Eagle Mountain steel mining layout has many similar scenic features that would be found on a layout depicting the Copper Basin Ry. and the ASARCO copper mine. Bill Zuback photo

Plans for an HO scale layout modeling the operation of the Copper Basin Railway

By David Popp

Industrial railroading has a charm

all its own. While it can involve Class 1 railroads, it usually it comes in the form of a dedicated carrier serving the needs of a major plant system. Such is the case with Arizona's the Copper Basin Ry. This short line, based in Hayden, Ariz., serves one customer, the ASARCO copper mine and smelter.

To fit the ASARCO copper mine at Ray and at least a bit of the smelter at Hayden into the plan, I knew I'd need something bigger than your average 10 x 12-foot spare room. I designed the Copper Basin Ry. plan shown

here to fit the layout room of my former basement. That room connected to two others, so one wall was pretty much left open as aisleway.

The CBRY is based at Hayden, Ariz., and its small yard and shops are the starting

point for activity on the line. With space at a premium, the yard has just three tracks. I also relocated the shop building to the yard's east end to fit.

The layout centers on operations at the copper mine at Ray and the smelter at

Hayden, which isn't far from the CBRY's headquarters. The smelter is huge, so I've included just the bits that are touched by the railroad.

It's served by two different CBRY branches. The lower branch runs just east of the yard to the ore dumper. The upper branch serves the interchange yard that connects to ASARCO's own in-plant railroad. As shown in the plan, I've also included a mirror at one end to make the plant seem bigger.

Ins and outs

You may be wondering why the plan has the dumper at Hayden and the loader at Ray connected by hidden tracks. This idea came from Charlie Conway, as he suggested I try using John Armstrong's loads in/empties out industry pairing. It was a stroke of genius!

Essentially, what this means is that a CBRY train delivering loaded ore cars from the mine to

the smelter would slowly shove the cars into the dumper on one track to simulate unloading. Then, the locomotives would cut off that train and tie onto the empties from the opposite track, returning the empties to the yard.

Later, the empties would be delivered to the mine at Ray and swapped with the loaded cars waiting there. It's a great system for any cars that have to appear to be loaded in one place and unloaded in another. And you can repeat it as often as you'd like.

Fiddle yards

For operating the railroad, the layout has two fiddle yards, one at Hayden and one at Magma. What that means is that during an operating session, some of the cars in the yard are taken off the layout, while others put on. At Hayden, this represents the smelter's own railroad taking cars deep into the plant and returning with others.

At Magma, the CBRY interchanges cars with the Union Pacific. This again is a fiddle yard, where cars come and go from the layout. Both locations could have car storage drawers under the benchwork.

For a small railroad that serves just one customer, the Copper Basin is a very busy line. And the HO scale design shown here should be easy to modify to fit a modest-sized basement.

The Copper Basin Ry.

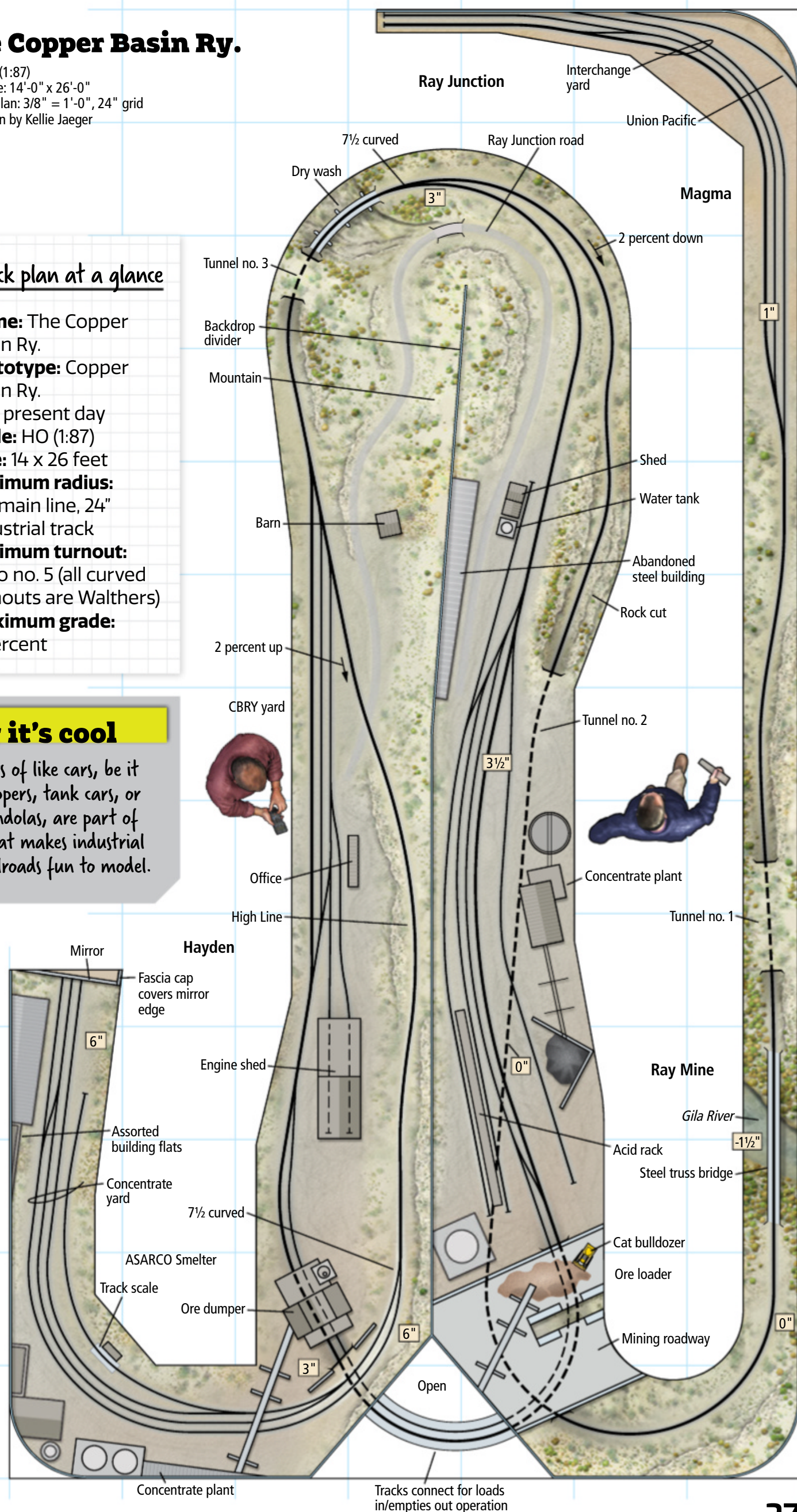
HO scale (1:87)
Room size: 14'-0" x 26'-0"
Scale of plan: 3/8" = 1'-0", 24" grid
Illustration by Kellie Jaeger

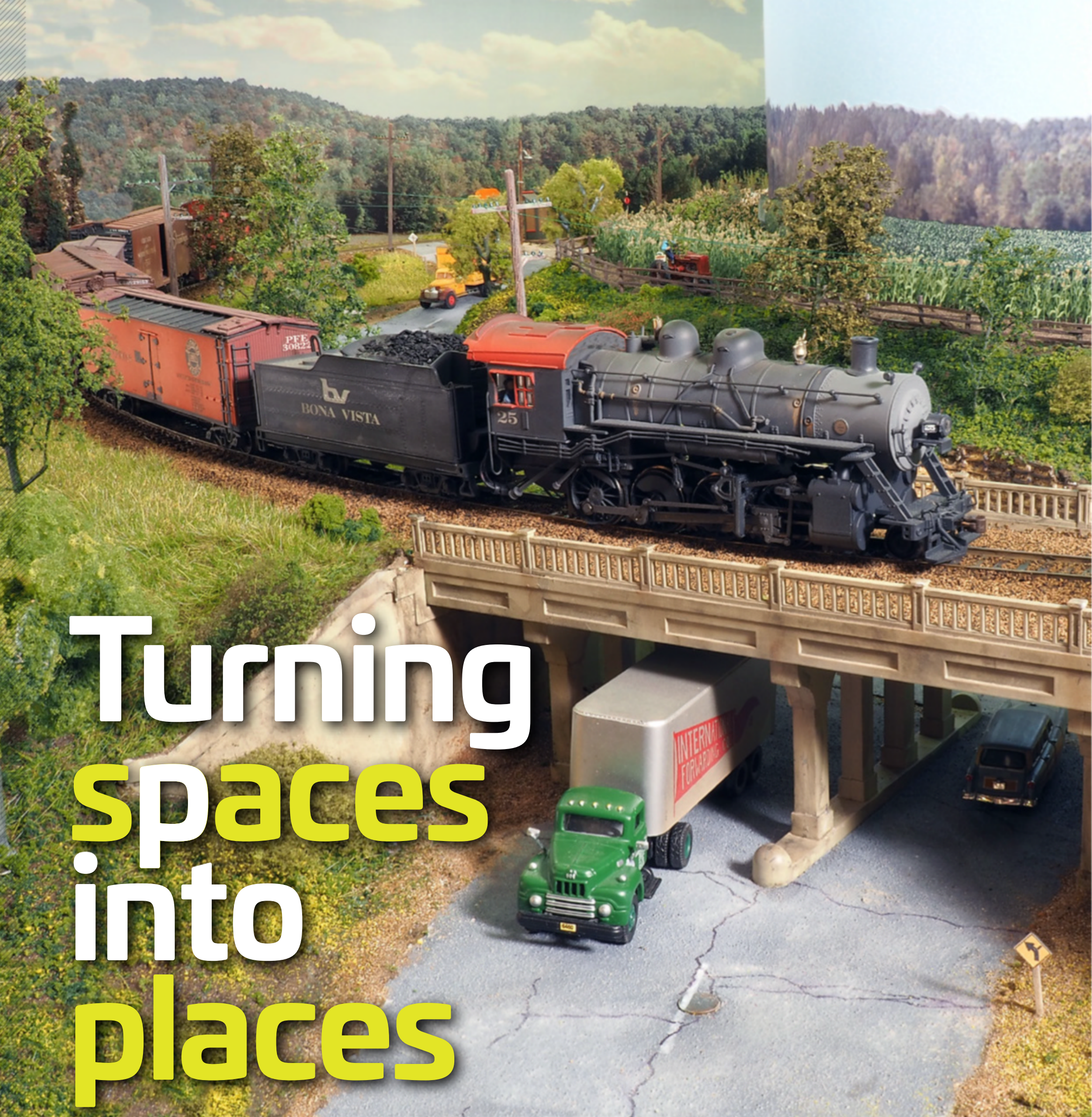
Track plan at a glance

Name: The Copper Basin Ry.
Prototype: Copper Basin Ry.
Era: present day
Scale: HO (1:87)
Size: 14 x 26 feet
Minimum radius: 30" main line, 24" industrial track
Minimum turnout: Peco no. 5 (all curved turnouts are Walthers)
Maximum grade: 2 percent

Why it's cool

- Cuts of like cars, be it hoppers, tank cars, or gondolas, are part of what makes industrial railroads fun to model.





Turning spaces into places

Transforming a simple curve on bare benchwork to a highly detailed rural scene

By Gerry Leone • Photos by the author



There's no bigger change you can make to a layout than adding scenery where there was bare benchwork. Suddenly a model train running on a board is transformed into a railroad delivering goods from one place to another. Only scenery can change spaces into places on a layout.

My current HO scale Bona Vista RR layout had a peninsula that sits directly in front of the staircase that leads into the train room. For visitors coming for a layout tour, the stark L-girder benchwork didn't make a very good first impression, so I set out to change that.

I didn't want to add a town to this space because there was going to be one on the deck above. I also ruled out an industrial switching area because there's one immediately to the left. So I decided to make this a classic rural area with cornfields and a highway along the tracks.

Follow along as I show you how I changed this unappealing space into a place that conveys both where the railroad lives, and the era it lives in. And if you want to learn more, watch my "Spaces to Places" video series, now running exclusively for subscribers on MRVideoPlus.com.

WATCH THIS ON



Free Video!

Watch the first episode of Gerry's Spaces to Places series at MRVideoPlus.com/TUG2

ABOVE: Gerry Leone wanted his HO scale layout to make a big impression on visitors when they first entered the railroad room, so he created this impressive rural scene. You can use Gerry's techniques shown here to make something similar on your own layout.

RIGHT: This is what the peninsula on Gerry's layout looked like before he turned this basic benchwork "space" on his layout into an interesting modeled "place."



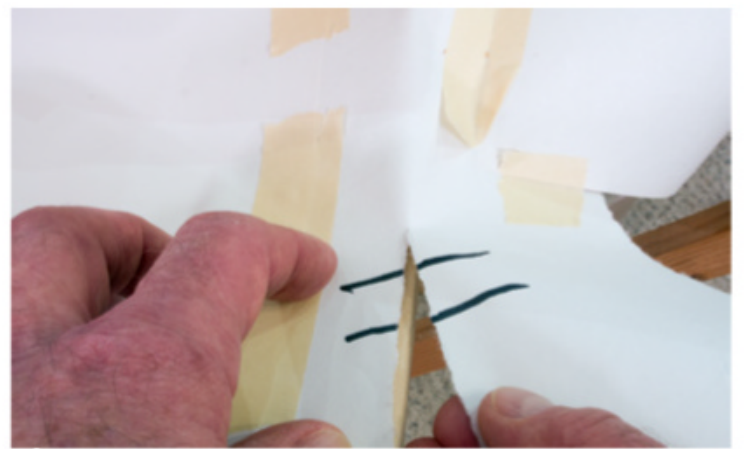
>> A template for success



1. I planned to use extruded-foam insulation board to build the land forms. To make it easier to cut the foam to the right shape, I first made a template using a roll of paper from an office supply store (you could use ordinary copier paper), taped together and cut to fit the area.



3. I used a jigsaw with a specially ground blade to cut the foam right in the layout room without making a mess. I explained how to make the blade in Episode 27 of *Off the Rails* on MRVP.



2. It was necessary to separate the template into several pieces to remove it. To help ensure a precise fit when I pieced it back together, I drew witness marks on the template and then tore it, rather than cutting it. I reassembled the template and traced its outline on a piece of 1½" thick foam insulation board. The board would become the base of the future scenery.

>> Bridge it



1. Before installing the foam, I built the Walther's Urban Concrete Overpass model that would be the scene's focal point. I used masking tape to mark the plywood subroadbed to the exact width of the overpass and used a jigsaw to cut it out. It's important to add risers next to the cuts to both sides of the plywood to keep it from warping over time.

3. I used Loctite PL300 Foamboard Adhesive to secure the foam to the benchwork. The final scenery will hold the overpass in place. I didn't add the roadway included with the kit because I would make my own later on. I airbrushed the overpass with Vallejo Desert Armor, which, to my eye, is a good concrete color.



2. My pencil's pointing to a ridge molded into the overpass that rests on the subroadbed and holds the deck to the exact height of cork roadbed. It guarantees a smooth transition.



>> Elevate your work

1. To keep the scenery from looking too flat, I elevated the surrounding land and cut the highway into it. I made a new rough template from copier paper and sketched out the highway's location. A 24-foot width looked right to my eye. I also added a gravel road on the right that joins the highway near the bridge. Thinking I'd like a farm field on the hill between the highway and the backdrop, I kept the highway as close to the track as possible.

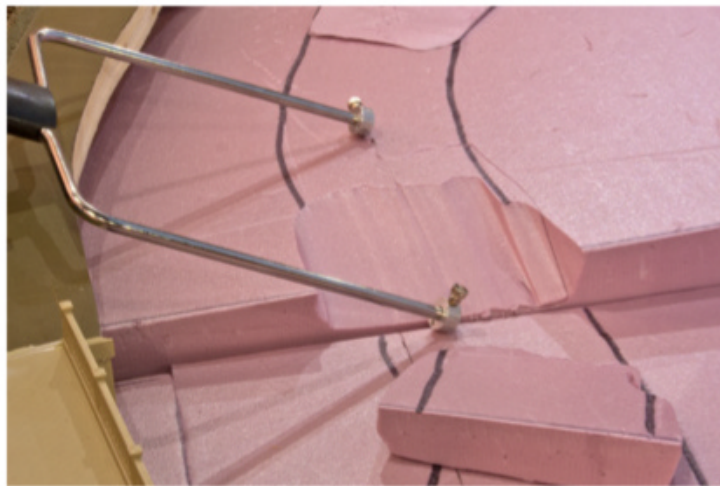


2. Before I started building the hills, I needed to know exactly where the road would fall on the insulation board, so I used the pounce wheel to trace the edges of the road on the template, then inked the road on the foam.



3. I transferred the road's location from the template to several sheets of .060" styrene using the pounce wheel and felt tip pen. I demonstrated this in Episode 8 of *Off the Rails* on MR Video Plus. Using a sharp hobby knife, I cut out the road and glued the pieces together. I'd finish it later.

4. After adding several more layers of foam insulation board to create the hills, I used a Woodland Scenics foam cutter to make ramps for the highway to follow. Make sure your layout room is well ventilated whenever you're using the wire cutter.



5. To fill in gaps beneath the styrene road, I used Sculptamold (a papier-mache-like product) mixed with a small amount of white glue and water. I packed it down under the road. Before the Sculptamold dried completely, I removed the highway so I could finish it.

6. With the highway removed, I cut more layers of 1½" thick foam board to create the surrounding scenery on both sides of the subroad-bed. I filled in the gaps beneath the layers with smaller pieces of scrap foam. I used the wire foam cutter to shape the slopes of the hillsides. The slopes are a little steeper than I'd have liked, but I wanted to be sure there was enough room on top for a cornfield.



>> Cover and cribbing



1. I used Woodland Scenics plaster cloth to cover the slopes of the hillsides on both sides of the highway and gravel road. When it was nearly dry, I added a second layer just to give it some rigidity.

2. Part of the hillside was a bit too steep to be believable, so I used Chooch's Wood Timber series small cribbing flexible retaining wall. Although it comes lightly weathered, I used a variety of paints to give the timbers some variation, mixing colors on the brush. Once the paint had dried, I lightly drybrushed the wall with Vallejo Sky Grey to add artificial highlights and blend everything together.



3. I mixed another batch of Sculptamold with white glue and water and filled in the gaps between the plaster cloth and the retaining wall. The white glue will help hold the wall in place. To keep the land from being too uniformly flat, I added a thin layer of Sculptamold over everything except the road area. I also added the overpass wing walls and built up the land behind them with Sculptamold.

>> Making dirt

1. I painted everything except the road area with some dark brown latex house paint that almost matches the color of dirt I'll be using. That slight variation in color adds a bit of visual interest to the areas that the dirt doesn't completely cover. To avoid getting paint where it didn't belong, I used a small modeling brush to paint the areas next to the retaining wall.



2. I sprayed the painted areas with 70 percent isopropyl alcohol, then used an old salt shaker to sprinkle on real dirt dug from my backyard. Next I gently sprayed on one part white glue diluted with four parts of water.



3. I finished the highway at my workbench, using the sandpaper technique I described in *Model Railroading: The Ultimate Guide 2018*, and installed it on the layout. A layer of Sculptamold along the edges creates a shoulder and holds the road in place.

>> Easy backdrop



1. For the backdrop I used photos from my own collection, along with shots found on the internet. I edited and assembled them in a photo editing program, then had them printed on 11" x 17" paper at a local quick print outlet. I cut off the blue sky just above the tree line to prevent a jarring hard edged where the photo meets the painted sky.



2. I mounted the backdrop to the painted hardboard with spray adhesive. I was careful to position the backdrop so that the printed cornfield was the same height as the Busch corn I'd be using on the scenery.

>> Cornfield



1. Busch corn rows come as 20 stalks on each of 20 molded bases. I airbrushed the corn with a custom-mixed green color to match the corn on my backdrop. To keep the green base from showing through the field dirt, I dunked each row into my dirt brown scenery paint and set them aside on some waxed paper to dry.



2. I scratchbuilt a fence at the edge of the field using stained toothpicks, spaced 8 scale feet apart, and scale 2 x 4 basswood for the horizontal members. To minimize the mess made by drilling the fence post holes, I used a nail rather than a drill bit, since a bit's flutes tend to pull up plaster.



3. Once the fence was installed, I planted the corn with full strength white glue, spacing the rows about 1/2" apart and making sure to leave space for a tractor path next to the fence. To get more corn in, I made the tractor path narrower than it would be in real life.



4. I painted full-strength white glue on to the hillside, then sprinkled on a blend of two parts light green, two parts medium green, and one part dark green Woodland Scenics coarse ground foam. I didn't use isopropyl alcohol here because I wanted to protect the finished highway.



5. Time for more dirt! I generously sprinkled more real dirt over the corn rows to cover up the bases, sprayed it with isopropyl alcohol, and added some diluted white glue. Once everything had dried I lightly vacuumed the tops of the corn to remove any dirt and dust that had accumulated there.

I used a lot of different trees on this project. A few, such as some of the Grand Central Gems pine trees, I used right out of the bag. Others were construction projects, either from kits, like the Timberline Scenery trees that Jenny shows how to make on page 17 of this magazine, or things I cobbled together myself. Here are a few examples of the types of trees you can build yourself. They are easy and economical to make.

Easy evergreens



1. I created some of the pines from a plastic long-needled Christmas tree I bought at a garage sale. I trimmed pieces of the branches to the shape of a pine tree.



2. I gave the trees a heavy coat of spray adhesive, then dunked them in Noch Waldboden (Forest Floor) Scatter Grass, twisting and turning them to fully coat each branch.



3. The result is a pine tree that looks realistic because the scatter grass adds tiny needles to each branch, without having to use a static grass applicator.

Big deciduous trees



1. For bigger deciduous trees I used Woodland Scenics plastic tree armatures. I drybrushed the armatures with light gray paint to bring out the molded-in texture and to keep them from looking too brown.

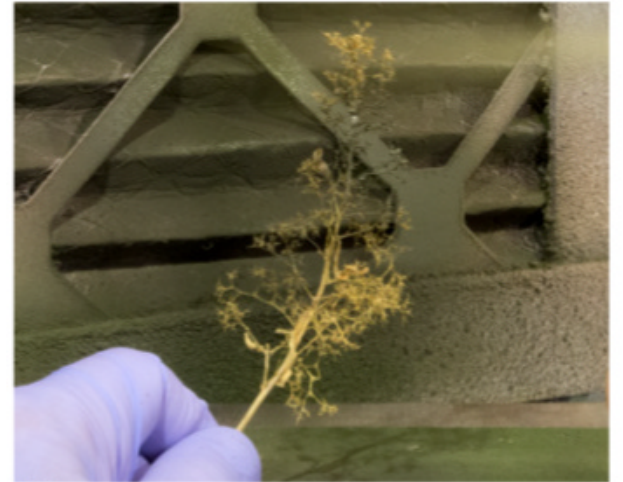


2. To get the foliage to stick to the armature, I generously coated it with the company's Hob-e-Tac adhesive. This material goes on white, but will dry clear.



3. I covered the armature with small pieces of Woodland Scenics light green or medium green foliage. I teased each piece to make it fluffy before attaching it to the tree.

Fine-structure trees



1. For more delicate-looking trees, I used a Scenic Express Super Tree kit. I first sprayed each sprig with Rust-oleum Camouflage Deep Forest Green, Army Green, or Earth Brown paint in a well-ventilated area and let them dry.



2. Next, I dunked each sprig into matte medium diluted 1:1 with water. Some of the mixture will soak into the armature and help keep the natural material from turning brittle.



3. I then dipped the tree into Woodland Scenics light green or medium green coarse turf. I then hung each sprig upside down with a weight on the end to help them dry straight.

>> Roadwork ahead

1. To finish the gravel road, I used Woodland Scenics two-part gravel in its buff color. I first painted diluted white glue (1:1 with water) on the styrene road base, then I sprinkled on the gravel. Once it dried, I brushed on some India ink and isopropyl alcohol (¼ teaspoon ink to ½ pint alcohol) just to give the road a dirtier appearance.



2. I then brushed on the gravel accent powder that came with the kit. This powder keeps the gravel from looking unnaturally uniform. I lightly sprinkled some Woodland Scenics fine ground foam down the center of the road and finished it by spraying on a light coat of diluted white glue.



3. I also used some of the Woodland Scenics Gravel to simulate a shoulder along both sides of the highway. I carefully brushed full strength white glue on the shoulders, then sifted the gravel into place with a teaspoon. Once the glue was dry, I vacuumed up the excess gravel.



4. To give the highway shoulder a dirtier look, I liberally painted on my India ink and alcohol stain. Be sure to do this after all the other glue has dried. The alcohol will reactivate the white glue, so you will need to let it dry again once you are finished staining.



5. I weathered the overpass by painting on my India ink stain. The mixture settles into the nooks and crannies, creating the look of accumulated soot and dirt.



6. I also used a combination of black and rust-colored Pan Pastels for additional weathering on the overpass, making it look more time-worn.



Gerry says...

"A tea strainer works great for ballasting larger areas, such as the deck of the overpass or for adding dirt to roads. Gently tapping the strainer will lay down a nice, flat layer of material."



>> Scenic textures

Static grass

▲ To provide some varied textures to the ground cover, I added patches of static grass. I painted on white glue diluted 1:1 with water over an area where I'd previously added dirt. Then I poked a couple of straight pins into the glue to act as conductors for the static grass applicator. The applicator puts a positive charge onto the grass fibers, and the conductor wire attached to the pin puts a negative charge in the glue. The result is that the static grass fibers land on end, giving the impression of tall grass. Here I chose to use a combination of five colors and lengths, from 2.5mm to 6mm, and from dark green to spring green.

Flowers



▲ Layering is key to convincing scenery, so I added small areas of dandelions and red flowers here and there, using Woodland scenics pollen yellow and pollen red ground foam. I first lightly spray the area with hairspray, then cut off a corner of the bag and "rolled" the bag between my thumb and forefinger to create gentle "puffs" of the material. A little goes a long way, so add sparingly.

Seed heads



▲ Seed heads add texture to a wild, green areas. For this I added Woodland Scenics fine ground foam to little patches of the static grass. I lightly sprayed on some hairspray, then gently sprinkled the foam on.

Corn signs



▲ Many cornfields have seed signs along the perimeter. Google Images helped me find DeKalb seed signs (a popular Midwest brand), which I reduced to size on my computer, printed, and glued to small posts.

Bushes



▲ **1.** To create bushes and undergrowth, I used various colors of poly fiber from Woodland Scenics and Micro-Mark. I teased apart small pieces of the fiber fill, then doused several at a time with unscented hairspray.



▲ **2.** I shook each piece for a few seconds in a small, sealed jar of Woodland Scenics Green Grass, Earth, or Burnt Grass fine turf ground foam. Often I'll use a combination of two colors.



▲ **3.** Before the hairspray dried, I applied the bushes to the layout. The hairspray holds them in place.



▲ **4.** For even more texture, I added small pieces of Woodland Scenics light and medium green Foliage Clusters.

>> Street details

Detailed roadway

▶ Little details are what really bring life to a scene and add the finishing touch to any “place” on a layout. Taking the time to add these details really pays big dividends and can enhance the overall look and feel of any space. Traffic signs along roads and highways are small details that have a big impact, and are easy to find on the internet and make with a color printer and a few wood posts.



See the light



▶ Although I didn't install the Woodland Scenics Just Plug lighting system, I added a Just Plug streetlight at the junction of the gravel road and highway. I'll “just plug” it into the company's lighting system at a later date.

Burma Shave



▶ In the 1950s – the era I model – Burma-Shave signs were fun, four-part “commercials” along roads all across the country. I took a little liberty with the subject matter and added signs that read, “Puzzled by scenery?” “You need the key.” “Just get a subscription” “to MRVP.” Visitors just love discovering the signs and reading them aloud!

But don't stop there



▶ Plop down a few trucks and cars, telephone poles, maybe add a hitchhiker and a farm fruit stand, or a farmer on his tractor. If you're careful with your details and don't clutter things up, you've easily turned an unattractive mess of benchwork into a credible part of your miniature universe. Best of all, you can turn a space into a place in no time! 🚂

PRE-SHADING MADE SIMPLE



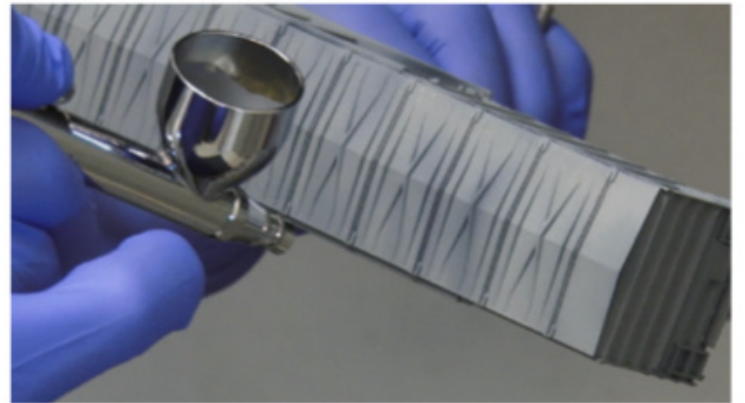
Shadows can be weathering too. By using a technique called pre-shading, Aaron Skinner painted the shadows into this 50-foot boxcar's sides, ends, and roof for a realistic effect in most any kind of light.

Build a great foundation for weathering as you paint

By Aaron Skinner

Light is a funny thing. It casts subtle shadows that belie that an object is as smooth and uniform as it may appear. Pre-shading mimics that effect by forcing the impression of changes in lighting, and it's easy to do with an airbrush.

1 - PRIMING



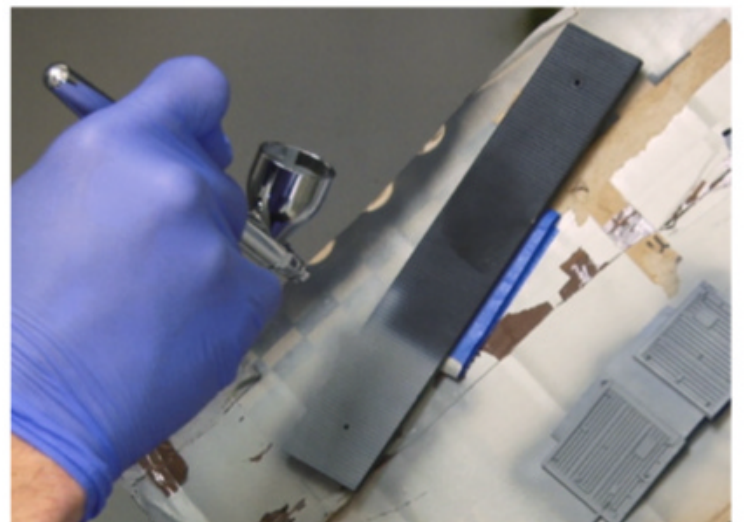
The model needs to be overall light for pre-shading to work. Start by priming it with white or light gray. I prefer the latter for most colors because white can make the contrast too stark.

WATCH IT!



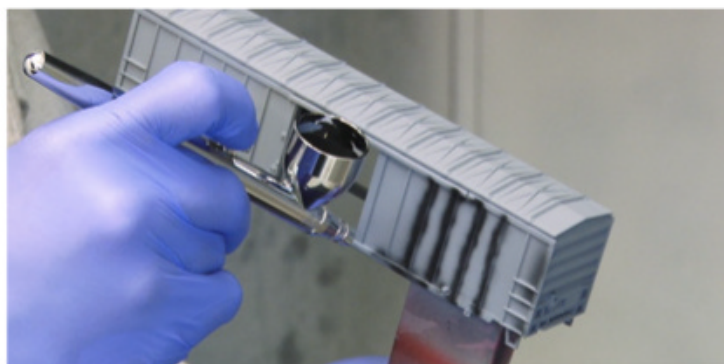
Free Video!

We have this episode of Airbrushing with Aaron free for you to watch at MRVideoPlus.com/TUG2



I airbrushed Testors Model Master acrylic Dark Gull Gray paint over the boxcar. Don't forget to paint the doors, floor, and frame as well!

2 - INTO THE SHADOWS



I filled the airbrush with Model Master Engine Black and set the pressure at 20 psi. Using a narrow pattern, spray the black along the details.

3 - COVER THE ANGLES

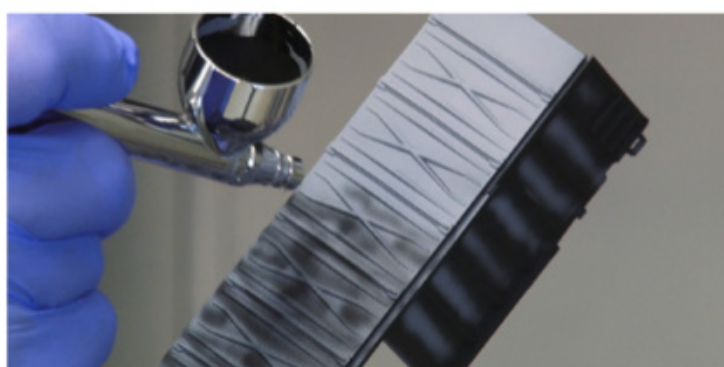


It's a good idea to completely paint the detail you want shaded. Turn the model to check that you get paint into all the nooks and crannies.

+ MORE on MRVP!

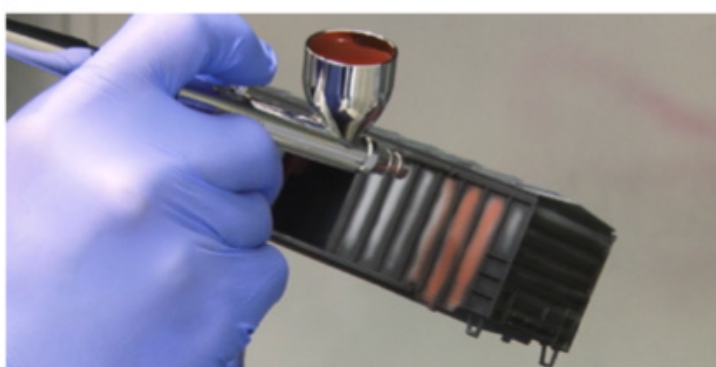
Aaron has his own regular series on MRVP called *Airbrushing with Aaron*. Subscribers can learn many more of his great painting techniques.

4 - A DIFFERENT APPROACH



For the sun-bleached roof of the boxcar, I sprayed black into the recesses between the X panels. There's no right or wrong approach.

5 - BETWEEN THE LINES



It's time to add the top color, in this case, Model Master acrylic Oxide Red. I started by filling in the panels between the exterior posts.

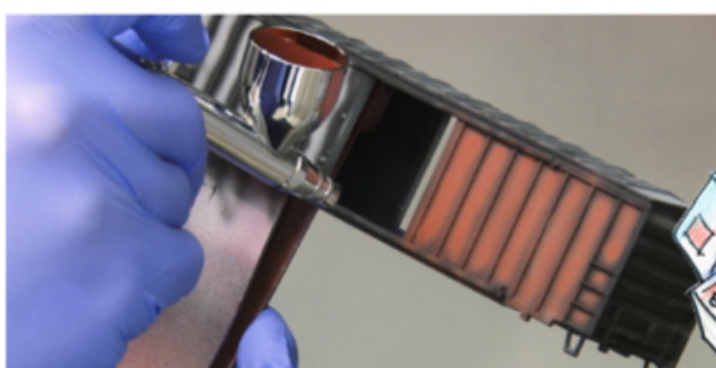
Aaron Says...

Subtlety is everything with pre-shading, and with a little practice, you can apply it to your own modeling projects with success.

6 - PUTTING ON THE OVERCOAT

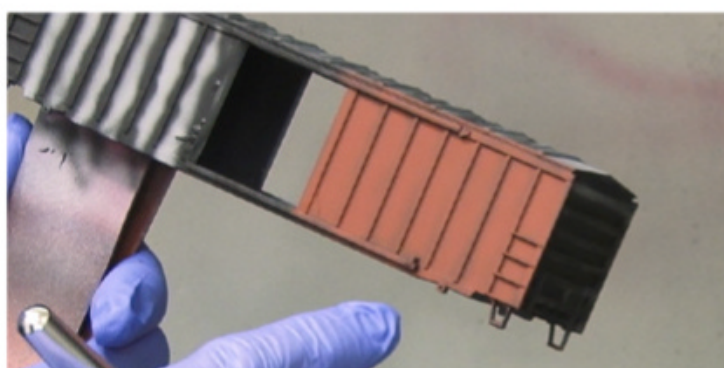


Using a light touch, carefully spray the top color over the pre-shaded areas. The idea is to all but hide the black lines, so work slowly.



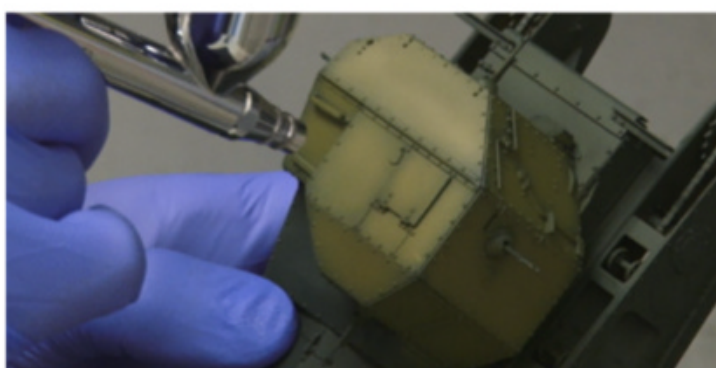
At this point you think, "maybe just one more pass," stop. You've reached the tipping point – that extra pass may erase your pre-shading.

7 - SUCCESS



This is one end of the car complete. My goal is to look at the model and think I can see the effect, but not be completely sure.

OTHER APPLICATIONS



Try using the technique on models that have a paneled surface. By darkening the joints with pre-shading, it will make the individual panels really pop. ■



AUSTRALIAN HOBBY KNIFE



Kathy Millatt has her own series on MRVP called *Let's Make a Scene*. She shares great tips and techniques in each show.

learning new skills, and improving with each project. Model railroads include such diversity from woodwork to electrics, from track laying to scenery, and from building to operating. It means that you never get bored!



Q&A with Kathy Millatt

Get to know the U.K. modeler and host of MRVP's *Let's Make a Scene*

By Jenny Freeland

If you're looking for a model railroad scenery guru, Kathy Millatt may be your answer. She's known for her YouTube tutorials on model railroad scenery and as the host of *Let's Make a Scene* on MRVP, where she demonstrates various scenery projects on her HO scale New Haven layout. In this exclusive interview, Kathy talks about her introduction to model railroading, her current project, and her experience as a judge on the television series, *The Great Model Railway Challenge*.

Jenny: How did you get started in the hobby?

Kathy: I started, as I suspect most model railroaders do, as a child with my Dad. I had his Hornby Dublo three-rail on a 4 x 8

board. I soon moved on to other things as I grew up, but many years later I visited a permanent model railway exhibition and I remembered how much I had enjoyed the hobby. I started modeling

again and haven't looked back! As a result, I would always encourage people to get their children and grandchildren involved. They may not model for long, but they will remember the fun later in life.

J: What about the hobby piqued your interest?

K: I really enjoy creating a whole world in miniature, but I also love trying out new techniques,

J: In your *Let's Make a Scene* series on MRVP, you demonstrate scenery projects on your HO scale layout. Why did you choose to model the New Haven?

K: I wanted to model something that was similar to the U.K. in scenery so I didn't get it too wrong. I wasn't sure what to model until a fellow modeler spent an hour telling me not to model the New Haven for a vast multitude of reasons. I'm afraid he didn't understand women much, because by the end, it was the only railroad I was going to model!

J: Have you built other model railroad layouts?

K: I like small projects that you can finish. If I was starting in the hobby now, I

WATCH IT!



Free Video!

You can watch a special interview with Kathy when you visit MRVideoPlus.com/TUG2

wouldn't build a large layout like I have. This is my third large layout, and I find it too daunting at times. I would rather do smaller projects that I can finish. Doing this has enabled me to model everything from workshops and woods in On30 through to my latest OO/OO9 port layout. I've also built numerous dioramas to try out different scenery techniques, plus some sci-fi ones which allow more variety.



J: Can you tell us a little about your latest port project?

K: My latest project is a micro layout, 1.1 meters long, based on Port Dinorwic, a Welsh port serving the Dinorwic Slate Quarry. It will be based in 1961 when the last mainline train ran there. The port had narrow gauge track running wagons of slate from the quarry via a transporter railway and then down an

incline into the port trackage. It was also served by a siding off the mainline from Bangor to Carnarfon. I'm using it as an opportunity to try out new techniques, use my new 3-D printers, and experiment with Arduinos. It's fun, but it takes a while, as everything, including the track, is being scratchbuilt.

J: You mentioned that your Port Dinorwic layout is OO/OO9 scale. Can you explain what that means?

K: OO is the most common scale in the U.K. and is 1:76, or 4mm to the foot, running on the same track as you use for HO. OO9 is OO scale running on 9mm N scale track. It's easy to find N scale mechanisms to scratchbuild with, and you can get a lot in a small footprint whilst still at a larger scale.

J: What inspired you to start your YouTube channel tutorials? Did you ever imagine you would have such a large following? (23,000 subscribers, wow!)

K: I started my YouTube channel because I wanted to be able to show other people how to do simple scenery. I often heard people saying that water was hard, so I started off with a series on water. It's not as hard as people think, and I hope that I've encouraged modelers to have a go.

I prefer to learn new techniques by watching someone else do them. I've learned Photoshop, Inkscape, and Fusion 360 from YouTube, as well as a host of modeling techniques from molding and casting to 3-D printing. There are some brilliant terrain channels out there that are not just for model railroads.

As I like to learn this way, it was only natural that I would gravitate toward starting a YouTube channel rather than any other type of teaching medium. I already had a website and blog, and this was something new to try.

J: What's your favorite part of model railroading? What's your least favorite?

K: I like scenery best, as it really brings a scene to life. I don't dislike any particular areas, but benchwork is probably my most challenging.

J: What are some of your other hobbies?

K: I go to the cinema every week and love action, sci-fi, and fantasy movies. The Marvel series are at the top of my list at

the moment. I also love playing video games such as *Tomb Raider* or *Halo*. There's something very immersive about being in another world, much like modeling.



J: You were recently a judge on the U.K. TV show *The Great Model Railway Challenge*. Tell us about your experience.

K: I had a brilliant experience as a judge on the *Great Model Railway Challenge*. The actual filming took place over the summer, and I learned so much from the different teams. It was a truly amazing, fun experience. I met up with a lot of the teams recently at the largest U.K. show, Warley. We all agreed on how much we enjoyed taking part, although I think being a judge is much easier than building a layout in 24 hours! There is going to be a second series, and I'm hoping to reprise my role.

I have seen so many positive benefits with attendance up at model railway exhibitions across the country, people modeling again or for the first time as families, and hobby shops and clubs seeing new people coming through their doors.

In the U.K., model railways have gener-

ally been the butt of jokes, and the BBC even made fun of Rod Stewart over the hobby. Starting with *Paddington 2* and numerous railway-related TV shows, railways and model railways have started to become a more acceptable and thus popular hobby again. That can only be good for the hobby and for its future.

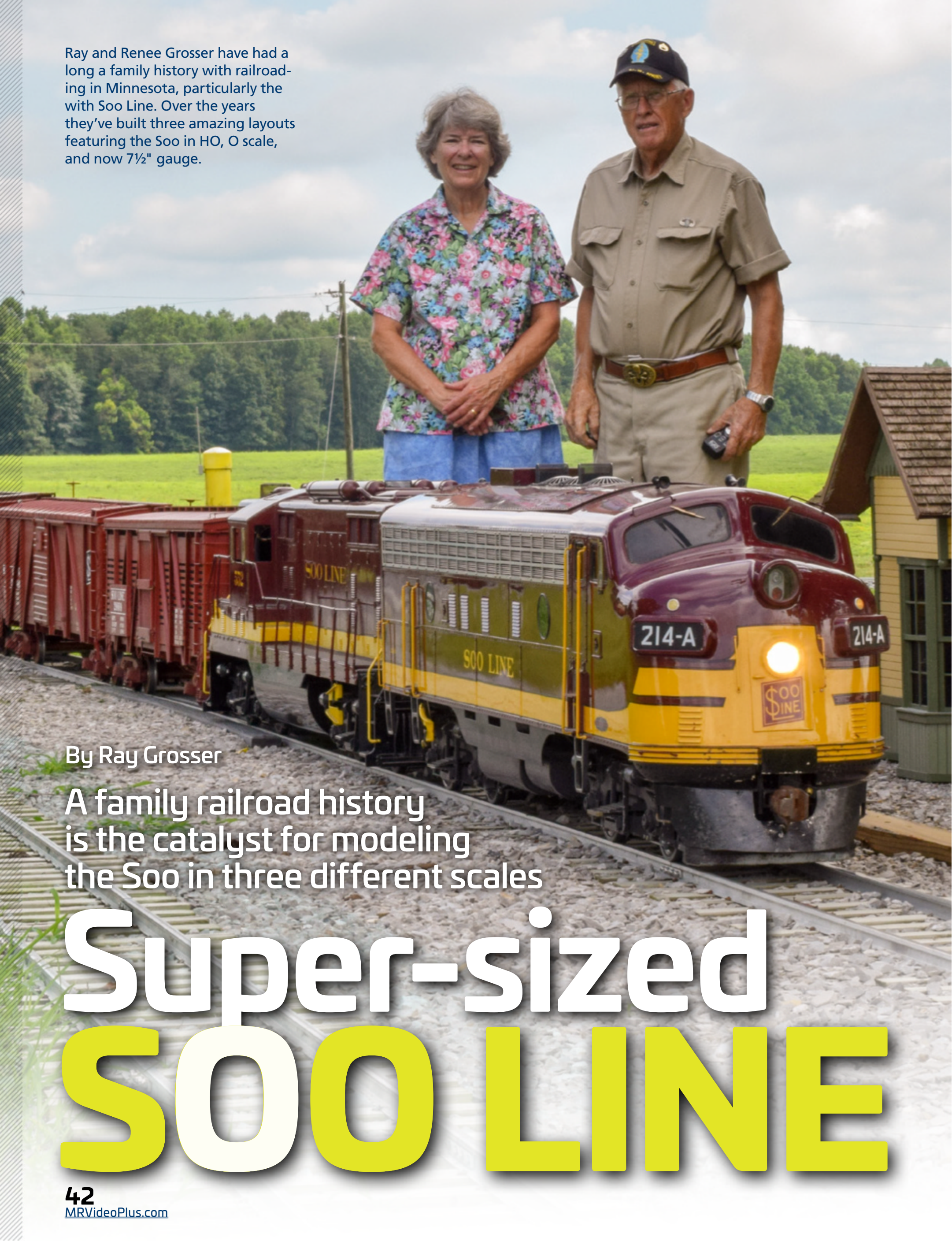
J: What advice do you have for women who are interested in starting model railroading?

K: My advice to women starting in the hobby is to find a good group who can help them, whether that be online or through a club. I learned so much from other modelers when I started out, and it made all the difference. It's also inspirational to see others' modeling, and it can encourage you further in your own efforts. Don't be afraid to show your work to others and ask for constructive help. Other great avenues for learning are magazines, online forums, videos such as YouTube and MRVP, and exhibitions. You'll always find people happy to answer your questions. 📺

+ MORE on MRVP!

In addition to Kathy's regular series, *Let's Make a Scene*, she has a three-part miniseries on 3-D printing playing exclusively for subscribers on MR Video Plus. Subscribe today so you can watch both of Kathy's series, as well as more than 1,300 other modeling videos! MRVideoPlus.com

Ray and Renee Grosser have had a long a family history with railroad-
ing in Minnesota, particularly the
with Soo Line. Over the years
they've built three amazing layouts
featuring the Soo in HO, O scale,
and now 7½" gauge.



By Ray Grosser

A family railroad history
is the catalyst for modeling
the Soo in three different scales

Super-sized SOO LINE

WATCH THIS ON



▶ Watch It!

We have video of the Grosser's big trains free for you to watch at MRVideoPlus.com/TUG2



You might say that railroading runs in our blood. My interest in the Soo Line (Minneapolis, St. Paul & Sault Ste. Marie Ry.) stems from growing up in Glenwood, Minn.

It was the first division point west of Shoreham Yard in Minneapolis in the 1940s and '50s. My dad was a brakeman on the Soo, and I

had the opportunity to ride the train with him a number of times.

Renee's interest in railroads comes from growing

up in Waite Park, Minn. Her father and four generations of her family, including several brothers, worked for the Great Northern Ry. at

the car shops. I also worked as a machinist for the GN in the Waite Park shops from 1968 to 1970, so we both have family railroad connections.



Big to bigger

For a number of years after we were married, we modeled pieces of our hometown railroads, the Soo and the GN, in HO scale. Renee loves to scratchbuild structures, and she copied many of the homes and businesses from the places that we knew growing up.

In 1996 we started construction of a portable 18 x 34-foot HO layout that we exhibited at conventions and train shows. We would display the layout several times a year, and we even took it to several Soo Line Historical and Technical Society conventions. One of the biggest highlights of our time with the traveling railroad was when the layout won the Best in Show

award at the 1998 National Model Railroad Association convention in Kansas City.

That railroad was also featured in the April 1998 issue of *Model Railroader* magazine. Later, we permanently installed the railroad at home and expanded it a bit. That version of the layout appeared in *Great Model Railroads* 2008.

Eventually we'd had enough of the Soo Line in HO scale and sold the layout and rolling stock. However, we kept Renee's scratchbuilt structures of Waite Park. Those are now displayed on a 4 x 18-foot diorama.

In 2008 we graduated from HO scale to O. Our 19 x 36-foot O scale railroad sits in a finished room in our

home in Kentucky. The layout is actually a pedestal to showcase many of Renee's scratchbuilt houses and structures. There are a few kits on the layout too, including custom laser-cut kits of Soo Line depots that were made for us by Mullet River Model Works using original railroad plans.

Although that layout is largely complete, we keep making changes to it. And Renee continues to scratchbuild buildings for it, so every so often we rework some of the scenery to accommodate a new project. Our O scale layout was featured in *Great Model Railroads* 2012.

The biggest

Our outdoor Soo Line railroad is 1.6"

Ray and Renee started work on an HO scale Soo Line layout in 1996. It was originally designed to be portable, and they exhibited it at various train shows and conventions. – Lou Sassi photo

Renee Says...

I enjoy re-creating scenes and buildings I remember from my childhood, and I encourage others to give this type of modeling a try. And don't get discouraged if it doesn't work well at first – I had to build some of my models more than once to get them right.





The Grosser's new O scale layout picks up right where their HO scale Nostalgia Tour left off, featuring detailed scenes of places they've lived or visited.



Renee has been able to take her scratchbuilding work to an entirely new level in O scale. This highly detailed stucco house and all the other buildings on this street are modeled on houses from where she once lived.

Ray's 1:24 model of the HMS *Surprise* became known as "the ship that started the railroad" when he sold it to a man from California. The radio-controlled square-rigged sailing model had 16 working carronade guns.

scale, and the trains run on 7½" gauge track. This came about in what you might say was a moment of "not quite understanding what we were getting into." It all started with a sailing ship.

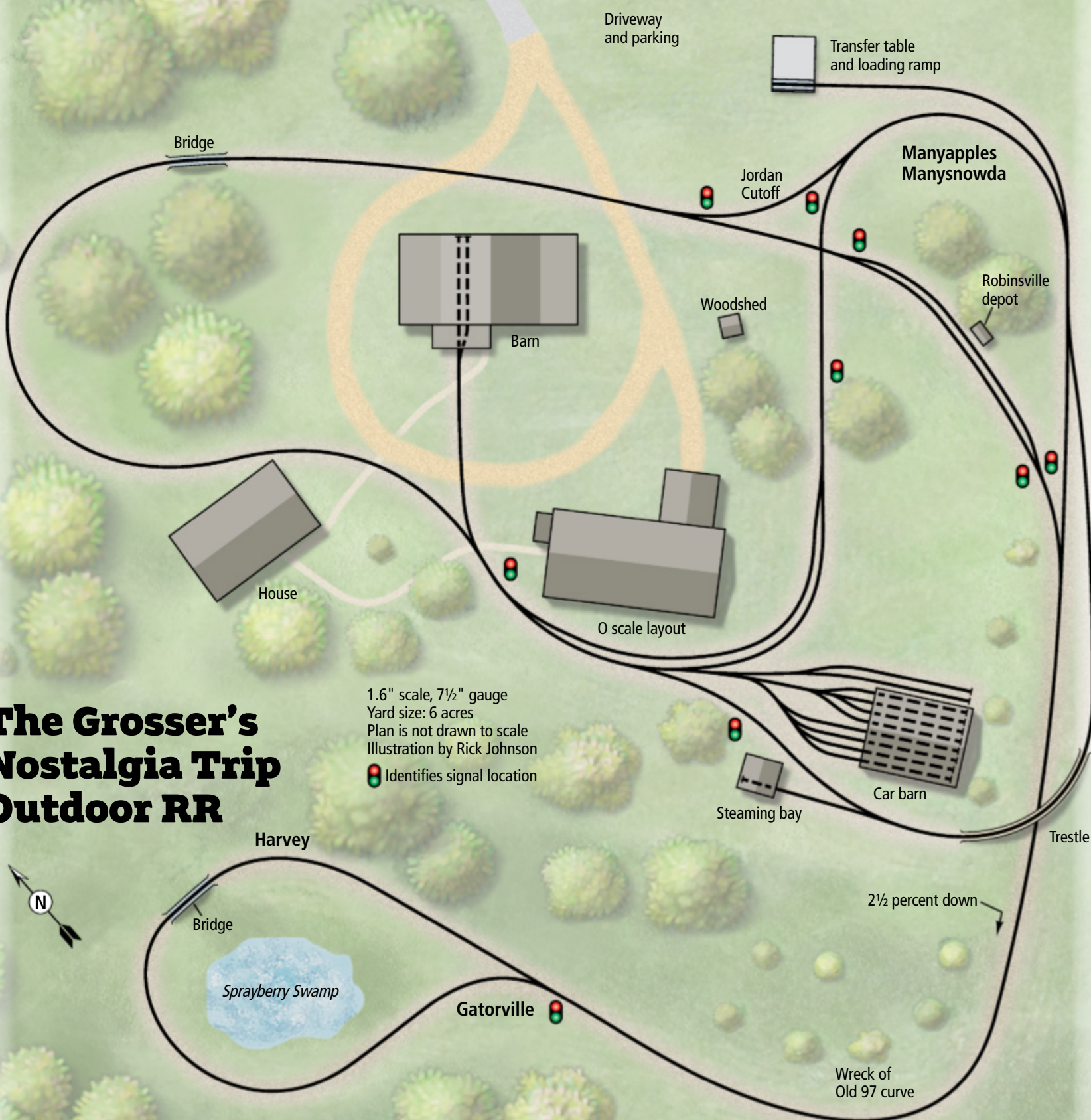
I had built a 1:24 scale kit of an RC controlled square rigged Man of War

ship. It was a model of HMS *Surprise* from the movie *Master and Commander*. I had posted a couple of videos on YouTube of our ship on the water, when a man from California called one day to ask if I would be willing to build one for him. I told him I wouldn't, but I'd sell him this one.



The Grosser's Nostalgia Trip Outdoor RR

1.6" scale, 7½" gauge
Yard size: 6 acres
Plan is not drawn to scale
Illustration by Rick Johnson
Identifies signal location



Track plan at a glance

Name: Grossers Outdoor Nostalgia Trip
Railroad: Soo Line
Scale: 1.6"
Length of main line: approximately 2,800 feet
Maximum grade: 2.5 percent
Minimum turnout: no. 6
Track: 7½" gauge, handlaid 1" aluminum rail on treated ties
Backdrop: natural



Soo Line F7 214-A glistens in the sun as it pulls a cut of cars from the storage barn. The locomotives are run by radio control, so Ray and Renee can operate them from the train or the ground.

We agreed on a price, and he drove all the way from California to Kentucky to pick it up.

When I asked Renee what she wanted to do with the money, she said she'd always wanted a riding railroad. That's when the real work began!

Fortunately, Renee thoroughly enjoys the physical labor of installing track and placing and compacting ballast. She's always going about the layout with her wheelbarrow and shovel to dig out sticky bushes and weeds.

To give you the idea of how much she gets into the work, for our anniversary one

year she was thrilled when I got her a new, larger two-wheeled wheelbarrow. On her birthday her brother sent her a double-bitted axe. For another anniversary I bought her a band saw. Most men are not as thoughtful or considerate as me, but that's for another story and another day.

Track work

When we started our railroad adventure, I copied some track construction details I'd found at the Mill Creek Central ride-on railroad in Coshocton, Ohio (millcreekcentral.com). We bought some aluminum rail from them, and we



A big part of the fun of this scale is riding the models you've built. Ray (with Renee sitting directly behind him) enjoys the view from the high line that runs along the edge of their property.



Caboose 249 brings up the markers as the train runs around the hilltop loop on the Grosser's outdoor layout. Ray built the 1.6" scale caboose using an O scale model as his guide.



Outdoor railroading at 7½" gauge needs some big track. The Grossers build their track in panels using 1" aluminum rail screwed to 16" ground contact treated wood ties.



The F7 and the GP9 are running in multiple-unit as they lead their train across the high trestle that spans the line to the pond. Ray built the F7 from a kit. Both engines have sound systems.

got some ground contact 2 x 6 treated wood they recommended to make ties. The folks at MCC were extremely helpful and shared their techniques with me for building the roadbed, laying the track, and ballasting it.

Our track is common 1" aluminum rail. We make our own 1½" x 1½" x 16" wood ties cut from 2 x 6 treated lumber. We secure the rail to the ties with cadmium-plated 1" sheet metal screws. However, we've recently started using stainless-steel screws of the same size.

Renee and I built a jig in the barn on a rolling table to assemble track panels. I also build the switches on that same table. I use cast-aluminum frogs for the switches in standard no. 6 and no. 9 sizes. For switch

points, I cut my own from 1" channel on our table saw with a metal cutting blade. All of our turnouts are equipped with spring switches, so we can run through the opposite leg without having to stop to align the points. This is especially helpful on the reverse loops.

As for laying out the railroad itself, that came about more from playing with the trains than any real planning. We started with a simple loop around the house and barn. As time progressed, we found ways to add more track to the railroad.

It's rather easy to take the track panels up and move them, but it's a whole lot more work moving an existing right-of-

way or preparing a new one. Shovels and rakes are ok to start with, but a John Deere garden tractor with a front-end loader, a plate compactor, and other assorted implements of destruction are essential tools needed for this scale of railroading.

Bigger is better

In a quest for a longer mainline run, we hired a bulldozer operator several years ago to come and make a cut in a hill in the backyard for a new extension. We wanted to build a line that ran down and around the berm of our pond. We had hoped that the grade wouldn't exceed 2 percent, but from the top of the hill to the pond, the best we could muster

was 2½. There's even a short section of 3-percent grade right at the pond



Now on DVD!

You can see the Grosser's ride-on railroad and 5 other great layouts in the new DVD, MR Video Plus Layout Visits vol. 4., on sale now at Kalmbach HobbyStore.com



Full-contact scratchbuilding

As shown here, some of my favorite scratchbuilt cars include a 1929 PS (Pullman-Standard) sawtooth boxcar, a Soo Line 1907 caboose, a standard Soo Line stockcar, and the Russell plow. In many ways, scratchbuilding in this scale is a lot like making smaller models. The main difference is that the tools you use are larger and the parts weigh considerably more. I've included a few construction notes for each project to give you an idea as to what is involved.



1929 PS sawtooth boxcar. For this car's outside bracing, I used 20-gauge steel Z channels I had custom made for me on a CNC bending brake at a local shop. The car also has a 1" x 2" x 1/8" steel center frame to mount the trucks and couplers. I added 1/2" x 1 1/2" channel to the sides to represent the prototype's underframe.

The car's underframe ribs are made from 1" channel that I cut on a table saw with a steel cutting blade. Their new profile represents the ribs on the prototype.

The roof carlines are made from oak and the sides are 3/8" plywood with individual 1/8" x 3/4" boards glued on to represent the single sheath style of the prototype. The roof is actually 1/8" tempered Masonite glued and clamped on to the carlines to form the radial roof of the prototype.



1907 Soo Line wood caboose. I built the caboose following the plans from a Mullet River Model Works O scale model of the same car, I just scaled everything up. I used furniture-grade seven-ply maple plywood for the car sides, and I scribed the individual boards using a 10" table saw blade that I'd ground down to make V-shaped cuts, making it look like individual 3" boards. I built the roof and underframe using the same techniques I'd used on the boxcar. The caboose has a detailed interior.



Russell snowplow. This car was built from drawings created by 3D scanning an O scale brass model with the help of Kevin Sprayberry. The model's parts were made from laser-cut 14-gauge steel sheet, complete with 1/8" rivet holes by Pike River Northern Shops in Wisconsin (pikerivernorthern.com). The wings operate with trim adjustment parts used on outboard motor boats. Winter was a whole lot more fun after that!



Soo Line stockcar.

I used a set of Soo Line stockcar drawings to build my 1.6" scale model. My car has a welded steel 1" x 2" tube frame, and I welded a pair of 2" channels to the sides of the frame to represent the fish-belly underframe common to these cars. The tube frame also contains the coupler pockets on each end. I cut all of the wood planks on a table saw, and I used the same Z channel I had custom made for my Pullman-Standard boxcar to form the outside bracing. I attached the wood pieces to the steel braces with round head brass plated nails, representing the prototype's carriage bolts.



Couplers, trucks, and brakes. The trucks for the cars come from several suppliers. I've used Tom Bee Bettendorf trucks (tombeeonline.com), Wayne Godshall Andrews trucks (godshallscustommachining.com), and a pair of Titan Bettendorf trucks (titantrains.net). I use Tom Bee couplers almost exclusively, as well as the firm's airbrake brake system. My cars are equipped with airbrakes, and I use safety chains between all the equipment in a train. Runaway cars at 200 pounds each could pose disastrous results, not only to the models, but to anyone in the way too!



Railroading at this scale is a year-round activity. Ray built the all-steel Russell snowplow, and it's fitted with operable wings. The combined weight of the plow, locomotive, and cars in this photo is more than 1,600 pounds!



Much like a real railroad, drainage is also a factor on the outdoor layout. Ray built this bridge to keep water running down the hill from washing out the right-of-way. Concrete retaining wall blocks serve as the abutments.



Ray Says...

I can tell you that building an outdoor railroad is a lot of work, especially with just the two of us. However, we've also really enjoyed working together on the railroad, and riding the trains makes it all worthwhile.



because we ran into a layer of sandstone that the bulldozer couldn't budge.

From start to finish, we had trains running on the new hill line within a month, which proved to be a great source of enjoyment. Often on mild summer evenings, we ride the train down to the pond and back, listening to the wheels clicking on the coupling joints. The fireflies and stars bless us on these evening rides.

Trestle time

One weekend, a friend who models in HO scale came for a visit and suggested that if we were to build a trestle behind the car barn, we could cross over our main line and run the

tracks along the property line fence. We realized that this would add some variety, so after the friend left, we ordered the wood and dug into the project. A few weeks later, he came back and couldn't believe we'd already built it!

Making trains

I like to call this scale "hernia gauge," as you cannot hope to put locomotives or cars back on the rails by yourself. Freight cars can weigh anywhere from 150 to 250 pounds.

I build stout models because Renee and I enjoy bringing our trains to other layouts. Delicate parts break just as easily on large trains as they do on small ones, and I don't like having to repair the damage.

Since I have a lot of the hand tools in my shop to build almost anything the railroad would need (I don't have machine tools such as a mill or a lathe), I've built a number of 1.6" scale car kits for other people to finance the materials needed for my own projects – particularly for Soo Line specific cars.

Locomotives

We have two of our own locomotives, an EMD F7 and an EMD GP9. We also have other friends who bring their own locomotives and cars to run when they visit, and I've installed a transfer station to make it easy to get the engines from the trailers to the track. A locomotive can weigh 600 pounds or more.

Our engines are battery powered, and each uses four 6-volt deep-cycle marine batteries for a total of 24 volts. We can typically get two days of running on a full charge, however I usually will recharge the batteries when they get down to 20 volts. Both engines have traction motors on each axle, similar to the prototype.

The engines are fitted with Phoenix Sound systems, just like those used in garden-railroad locomotives. Our speakers are quite a bit larger, however, providing great sound quality.

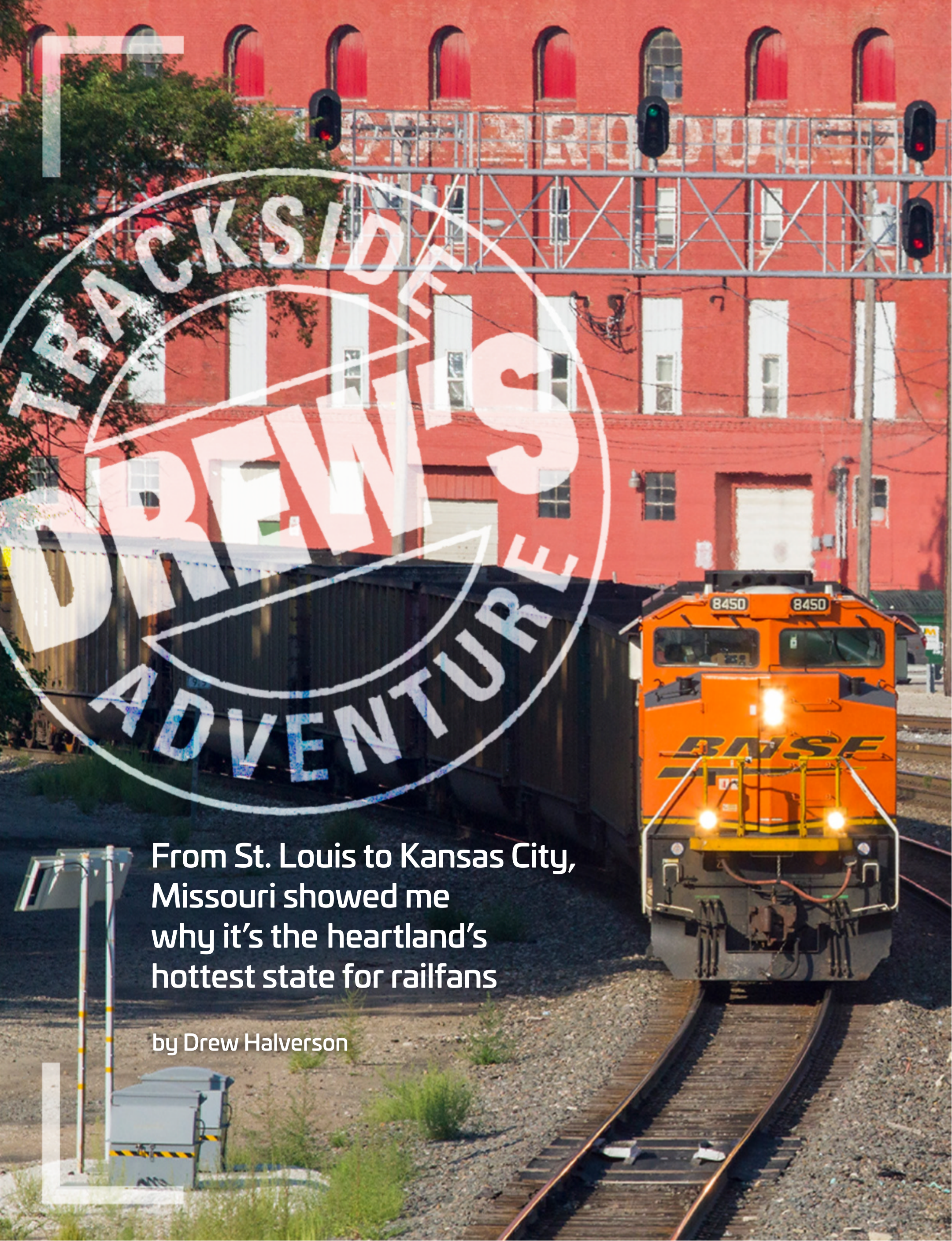
The locomotives are operated with a radio-control system, so I can run the engines either riding the train or walking around the yard. We

can run the locomotives individually, as well as in multiple-unit. Together, the F7 and GP9 can pull a 10-car train up the hill with two riders.

Conclusion

We ride the railroad in all seasons. The flatcars have removable seats, and Renee and I can take guests all around the railroad.

Often the most enjoyable trips are in the evenings. I love to watch the mesmerizing beam of the flat figure eight Mars light shining on the trees. It brings back memories of my childhood, standing at the depot at night in the 1950s. I clearly remember that same Mars light dance as Train No. 9 headed toward Glenwood from Minneapolis. ■



From St. Louis to Kansas City,
Missouri showed me
why it's the heartland's
hottest state for railfans

by Drew Halverson

Continuing the
constant parade of
trains in Kansas
City's historic West
Bottoms, BNSF coal
empties meet BNSF
pipe loads at Old
Union Depot
Interlocking on
August 11, 2018.





The Show Me State. Missouri, like railroading, runs in my blood. Many of my ancestors worked for the Milwaukee Road out of Chillicothe, a small town just over an hour's drive from Kansas City, Mo. My grandparents, both born there, met and married then climbed aboard Milwaukee Road's *Southwest Limited* and moved to Milwaukee, Wis. It was there, two decades later, my mother was born, setting the stage for my arrival around the time the Milwaukee ended.

All these years later and Missouri still beckons. So, when it came time to plan our 2019 Drew's Trainside Adventures series, I immediately thought of the beautiful state less than a day's train ride away. My producer, Kent Johnson, and film crew, Charlie Conway and Allan Dahncke, came along to capture the journey. Join us here in these pages and on MRVideoPlus.com, as *we show you* why these rural railfan hot spots and two major cities will put Missouri on your short list for trackside action and modeling inspiration!

St. Louis area

RAILROADS:

Amtrak, BNSF, CN, CSX, KCS, NS, UP, TRRA, Alton & Southern, FTRL, West Belt Railway, and Port Harbor RR

SIGHTS TO SEE:

The Gateway Arch, St. Louis Union Station, Busch Stadium, The Museum of Transportation

MUST-HAVE MODEL:

Atlas HO Scale TRRA GP38 No. 2002

BEST BEVERAGES:

O'Fallon Wheach

SHERPA SAYS:

"Grab a bite to eat at Bar Louie in Kirkwood for a trackside view of UP's busy Jefferson City subdivision."

St. Louis, the gateway to the west, rests just south of where the Missouri River empties into the mighty Mississippi. With all that water, barge traffic booms but it's the six class-1 railroads, handful of shortlines, Amtrak, MetroLink, and the Terminal Railroad Association of St. Louis

(TRRA) that put this city on the map for transportation enthusiasts and modelers alike. The greater St. Louis footprint offers a mix of urban railroading complete with architectural character and riverfront vibes as well as trendy suburban eateries and local breweries.

Here are some of the best locations for train-watching: Just south of Saint Louis University, in the Midtown neighborhood, lies **Grand Ave. interlocking**. Here the BNSF, UP, and TRRA's "high speed" tracks converge parallel to Metrolink's Grand station stop. The S. Grand Blvd. bridge runs right over the top, making for a great place to watch all the action. The S.

Compton Ave. and Jefferson Ave. bridges, located just east of here, are also worthy stops, especially if you know a train is approaching from the east. The St. Louis skyline makes for a perfect backdrop.

The TRRA-owned **Douglas MacArthur**





b

Bridge is one of the first landmarks you'll see coming into town from the east. The 677-foot, double-decked structure opened in 1917 and today only carries rail traffic but in high volumes. You can watch just about every area railroad use the bridge from

locations along the riverfront, or ride the tram up the iconic Gateway Arch and watch all the action from 630 feet in the air! Try Gateway Helicopter Tours for yet another unique perspective along "Big Muddy." Their landing pad is located just down the steps from the

Arch. While you're there, be sure to check out the "Arch Tunnels" at the base of the famous landmark. Here, TRRA's high line cuts through the earth and then glides high above Laclede's Landing, a popular entertainment district on the riverfront. Walk along brick streets, or grab a Lime Bike, and sample cuisine at a number of restaurants. Big Daddy's and Morgan Street Brewery are two of my favorites. Carriage rides and riverboat tours are another great way to see the city and absorb its history.

When it's time to resume railfanning, take a moment and cross the river on the McKinley Bridge. You'll see TRRA's bridge crossing just to



c

- a:** BNSF's Madison Turn takes the "High Line" under St. Louis' iconic Gateway Arch.
- b:** TRRA's Madison yard features a tower and hump.
- c:** A Union Pacific freight pounds the diamonds at Lenox Tower in Mitchell, Ill.

WATCH THIS ON



Free Video!

See an episode of Drew's Trackage Adventures at MRVideoPlus.com/TUG2

the north. As soon as you hit Illinois soil, hop on Broadway. **TRRA's Madison Yard** is impossible to miss. From there take Madison Ave. north into **Granite City** and look for WR Tower, located at Niedringhaus Ave., where TRRA converges with the UP



d



Drew Says:
The Museum of Transportation is only a 10-minute drive west from Kirkwood. Be sure to check it out!

- d: Coal loads take TRRA's "High Line" through Laclede's Landing in St. Louis. The Union Electric Light and Power building looms.
- e: The Gateway Arch dominates the St. Louis skyline above UP's 12th St. Yard at sundown.
- f: Under severe skies, Port Harbor RR GP40 No. 2064 rests at America's Central Port in Granite City, Ill.

traffic as their lines converge here. Check with "Julie", Amtrak's automated train status service, and you might also see Amtrak's *Texas Eagle* like we did.

Back in Missouri, squeezed between interstates 270 and 44, lies the St. Louis suburb of **Kirkwood**. Home to the stunning Missouri Pacific depot, visitors can travel to/from Kirkwood via Amtrak on UP's busy Jefferson City sub.

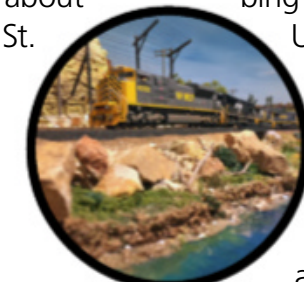
BNSF's Cuba sub also runs through town but you'll get the most bang for your buck just grabbing food near the



e

Springfield Sub and the NS Brooklyn District. You'll see just about every railroad St. Louis has to offer.

America's Central Port, served by the colorful Port Harbor Railroad, is another unique STL stop, just west of Granite City. Located just north of Granite City, in Mitchell, Ill., lies Union Pacific's **Lenox Tower**. Norfolk Southern and UP trains make up the bulk of the



UP and taking in all the ambiance. People watching alongside Historic U.S. 66 and train watching along the "Jeff City" sub make Bar Louie a no-brainer. Two blocks away lies another great spot; Billy G's. You can chow down on delicious comfort food and drink tasty local brews all with views of the tracks.



f



g

Kansas City and beyond

RAILROADS:

Amtrak, BNSF, CP, RCS, NS, UP, KCT, Kaw River Railroad

SIGHTS TO SEE:

Worlds of Fun amusement park, the Negro Leagues Baseball Museum, Power & Light District, Royals and Chiefs games

MUST-HAVE MODEL:

Kato N scale BNSF SD70MAC No. 9736

BEST BEVERAGES:

Boulevard Brewing Co. Hibiscus Gose

SHERPA SAYS:

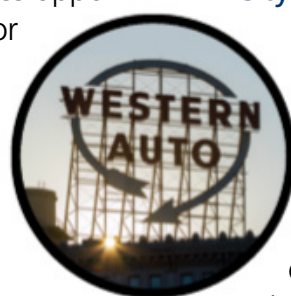
"Want great BBQ and endless trains? Jack Stack Barbecue sits directly across the tracks from Union Station."

Kansas City, America's second busiest rail hub, offers up non-stop track-side action featuring five class-1 railroads, Amtrak, the jointly-owned Kansas City Terminal Railway, two short lines, and a streetcar system. Historic buildings, skyline backdrops, bridges, yards and flyovers set up a sprawling spaghetti bowl of endless opportunities ripe for photography, video, and modeling. Add mouth-watering BBQ and delicious local brews to the equation and you end up with a railfan's paradise, second to nowhere.

Here are a few of my must-visit locations: An array of classic brick

g: Two BNSF Railway GEs power an east-bound intermodal train past Kansas City Union Station. The lone Amtrak Superliner car will be added to the eastbound *Southwest Chief*.

h: A Union Pacific DPU streaks through Kansas City's West Bottoms.



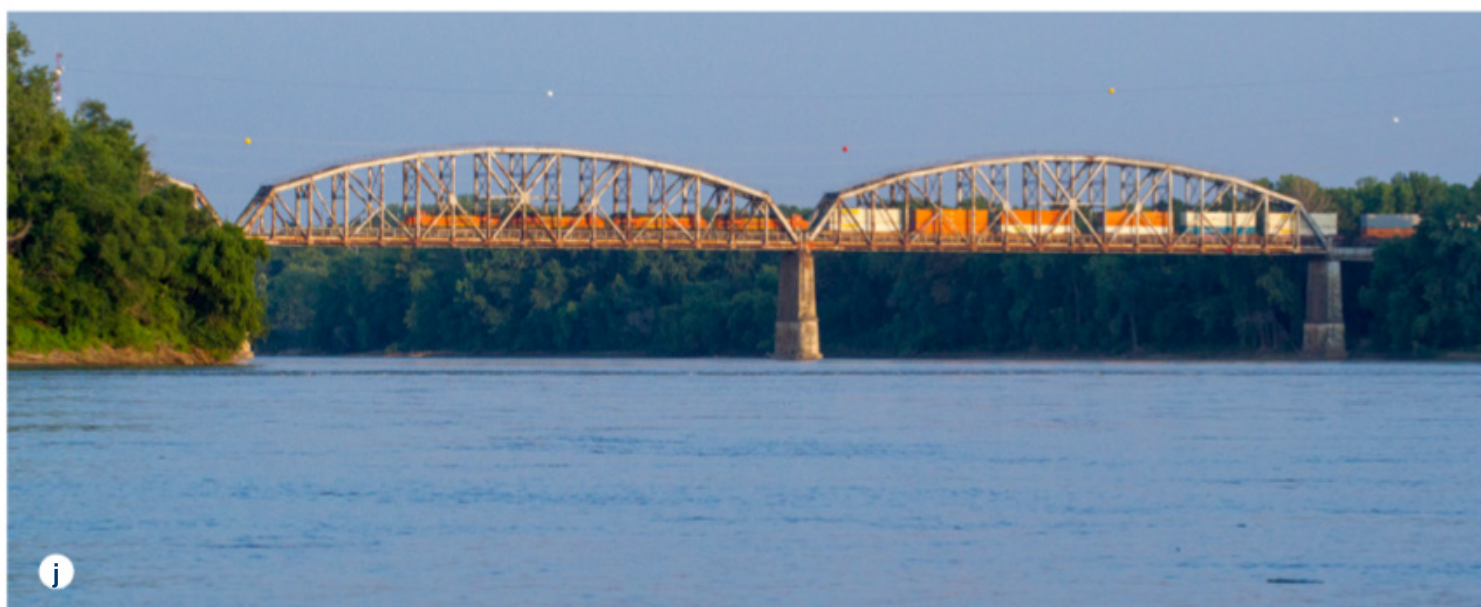
buildings, like the Standard Seed Company, combined with an endless variety of trains and photo angles makes the West Bottoms my top KC hot spot. Set up near the Forrester Rd. overpass for views of the Old Union Depot interlocking S-curves and "the Gooseneck" or



h



i



j



k

- i: A Union Pacific coal train takes the Metro Sub through Kansas City's historic West Bottoms.
- j: A BNSF intermodal train crosses the Missouri River at Sibley, Mo.
- k: "Southern Belles" aren't the easiest locomotives to find in Kansas City, believe it or not.

stand on the James St. bridge for sights straight down UP's Metro Sub with KC's skyline as a backdrop. At track level, Hickory Street crosses the UP near Doc's Caboose hobby shop. Just south of the Bottoms and a stone's throw from Boulevard Brewing Co. is Santa Fe Junction, where BNSF's

Argentine Connection Flyover crosses two levels of KCT trackage. Everything from Transcon freights to local industry jobs can be seen from 25th Street. Want elevation? Take in all the action from a bluff at the sight of the National WWI

Museum and Memorial. Another prime location is 104-year-old Union Station, stopping spot for Amtrak's Southwest Chief and Missouri River Runner trains. You can view non-stop traffic along KCT's East-West Corridor from a number of overpasses

including the Michael R. Haverly Freight House Bridge and Main St., which carries the Kansas City Streetcar above all the action. Just east of Union Station you'll find "the Street Canyons" where numerous overpasses provide views of the triple track train parade. KCS's Knoche Yard, located in Kansas





I: Amtrak's Southwest Chief carries Cody Grivno and Hal Miller, among other passengers, under a signal bridge at West Bucklin, Mo.

City's Northeast Industrial District near UP's Neff Yard, is one of the best places to find "Southern Belles." Unfortunately, many trains on the KCS operate with run-through power, so ironically, this might be the most difficult livery to land in KC. However, when it comes to railroad paint schemes you're bound to see just about everything.



Look outside the KC metro area and you'll find even more exciting locations, especially if you're willing to drive a few hours, no matter the direction. Head south on interstate 49 and follow the KCS to Noel, Mo.; Arkansas; and beyond, or travel west into Kansas and follow BNSF's bustling Transcon. North more your style? Start by following the Missouri River out of KC on highway 45/273. This

route parallels BNSF's busy St. Joseph sub. Although not the most picturesque trackage, CB&Q searchlights make for nice subjects. While you're there, split west on highway 59 at Armour, Mo., and you're mere minutes from Atchison, Kan., home of the "A" in ATSF and the UP Falls City sub. Want to keep your rail-fanning strictly inside the "Show Me State," like we did? There's no better line to follow east out of the city than BNSF's Marceline Subdivision. Sibley, Mo., the sight of BNSF's massive steel structure spanning the Missouri River, is the perfect place to kick things off. From here, follow BNSF and UP run-through freights, and Amtrak's Southwest Chief, into Missouri's quiet countryside. At Fleming, Mo., Norfolk Southern and BNSF share trackage all the way to Carrollton, where we stuck with the Transcon and headed northeast to Walt Disney's childhood hometown, Marceline. Rolling hills, classic Santa



Fe signal bridges, and countless trains on a curvacious main line make the stretch between Bucklin and Ethel the area's most exciting. In all, it was an awesome trip!



Kent says:
Join Drew and the crew for the St. Louis adventure on DTA episode 41, and look for the KC trip later this summer!

Scratchbuild a sawmill

Taking logs from the pond and cutting them into dimensional lumber is all just part of a day's work for the sawmill at Big Timber. Starting with a handful of photos, David scratchbuilt this model for his On30 logging layout.

A wood kit and video clips of a steam-powered mill are the main ingredients for this all-custom construction project

By David Popp

WATCH IT!



Free Video!

You can watch an episode of The Log Blog for free at MRVideoPlus.com/TUG2



David based his mill on the Phillips Brothers Mill in Oak Run, Calif. The steam-powered mill has been in operation since 1933. To learn more, visit philipsbrothersmill.com. G. Hendrix photo

For the past four years, I've wanted to build a sawmill for our Olympia On30 logging railroad, but I was always stuck on how to do it. So after working on everything else I could, it finally came down to just needing the mill.

Along the way, I'd purchased a KMP Models sawmill kit. It's a great little model, but its L-shaped footprint wasn't going to work for the roughly 6" x 19" space I had available. I also wasn't quite sure how a sawmill worked, and



The Phillips Brothers mill uses a saw with two blades to handle the bigger logs. The lower blade makes most of the cuts. The upper blade is activated only when needed. G. Hendrix photo

if I was going to do the project right, I needed research; so I turned to the internet.

If you type "steam powered sawmill" into Google, you get a variety of results – the best of which is a selection of YouTube videos about the Phillips Brothers Sawmill in Oak Run, Calif. This fully functional steam-powered sawmill, built in 1933, has operated without electricity for more than 80 years. The mill produces specialty lumber, and its adjoining box factory makes custom wood boxes and crates.

After digesting the videos thoroughly, I made an assortment of still images for key pieces to include in my model. Next I laid the mill out to fit the space I had available.

Starting with a piece of tempered hardboard as a base, I scratchbuilt the building and most of the fixtures from the ground up using stripwood, brass, and styrene. I was able

to kitbash the steam engines, winch, and boiler by cutting up a Bachmann O scale log skidder, and I put the details from the KMP kit to good use as well.

If you're looking for a step-by-step description of how to build a steam-powered sawmill, this isn't it. My finished model is missing a few details, many of which I discovered only after I'd contact

Gary Hendrix at the Phillips mill for photos to use here.

However, my mill for Olympia is plausible – and its highly visible detailed interior is the centerpiece of the layout. Although my mill is pretty much complete, as you will see from the photos, the one detail I have to add yet is scale-sized sawdust – lots and lots of sawdust!

Starting point

For this project, I started with a KMP Models O scale sawmill kit (kmpcraftsmankits.com). Although I didn't build the kit for my mill, it supplied a wealth of detail parts for the project. I used most of the white metal castings, including the planer and the pulleys. The kit also provided the saw carriage, blades, and plans for the roller table. I used a lot of the stripwood from the kit for the structure and fixtures as well.



>>The mill

This image shows the interior of the mill in its nearly finished state. Most all of the key pieces are in place; however, it still requires some detailing. See the accompanying photos for more information.

Winch and stop



A cable winch hauls the logs out of the pond, up a ramp, and into the mill. The logs are rolled down a shallow ramp on metal rails to be loaded onto the saw carriage. There's a rotating stop at the bottom of the ramp to dispense the logs onto the carriage one at a time.

Saw



Although the Phillips Brothers mill uses two blades for making large cuts, I had just a single blade available from the KMP kit. (I've since found you can buy O scale saw blades on eBay.) The saw stand is built following the KMP instructions. I added the simplified clutch assembly for the saw operator following pictures I'd found of a restored mill in Georgia.

Carriage



The saw carriage runs on rails bolted to the mill's floor. It holds the log to be cut in adjustable cast-iron arms. The carriage is pulled through the saw by cables that run under the floor. The sawyer operates the carriage using the clutch assembly mounted near the sawblade, and his assistant adjusts the depth of each cut using a ratcheted device on the arms.

Planer



Freshly cut boards are run through a planer to finish the rough surface left by the saw. This belt-driven planer is a white-metal model that comes with the KMP mill kit.



Boiler



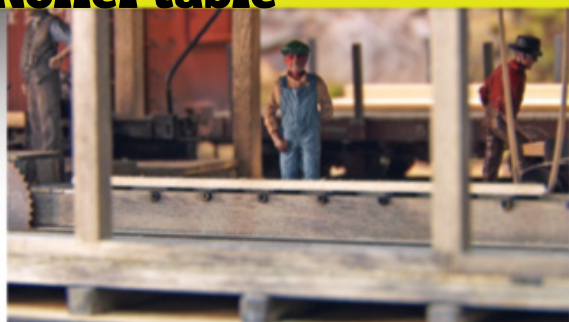
The boiler for the mill is mounted just inside the building at the far end. Nothing goes to waste at a sawmill. The Phillips Brothers Mill uses sawdust and scraps to feed the fire, so I've included a sawdust cart, a box of cutoffs, and a stoker to help keep the boiler fed with fuel. I just haven't added all the sawdust yet.

Steam engine



A typical mill has several steam engines to operate the machinery. The main engine runs the belt drive for the saws and planer, and on my mill, it's mounted near the boiler at the end of the building. I have a second engine on the steam winch by the log pond.

Roller table



As the boards come off the main saw, they drop onto a roller table, making the boards easy to maneuver. From here, they can be transferred either to the crosscut saw or the planer. I made the rollers from two different diameters of brass tube.

Crosscut saw



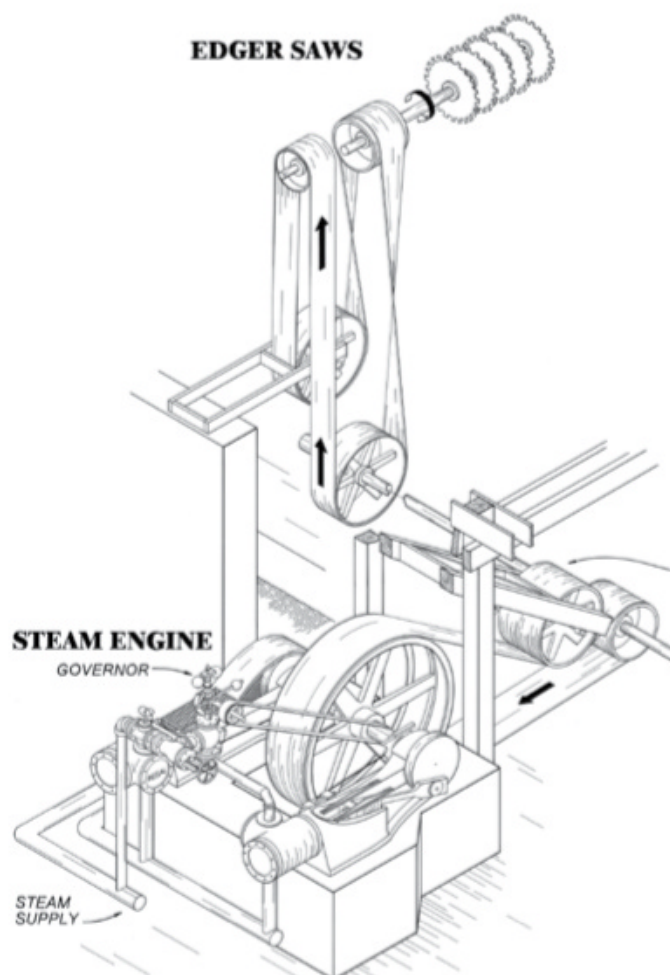
The crosscut saw is used to cut boards to length, as well as cut off any unwanted ends. The saw has its own bench on the opposite side of the roller table from the planer. The counterweight, shown in later photos, wasn't added yet here.

Belt drive



Part of the appeal of a steam-powered sawmill is its intricate belt drive system. The cutting machines are operated using a series of belts and various sizes of pulleys to achieve the desired speeds for optimal cutting. The belt drive on my model is representational, so some of the functional details are omitted.

>> Steam engine



National Park Service illustration



Phillips Brothers main steam plant sits near the boiler, which is just out of the picture to the left. The sawdust is used to feed the firebox. G. Hendrix photo



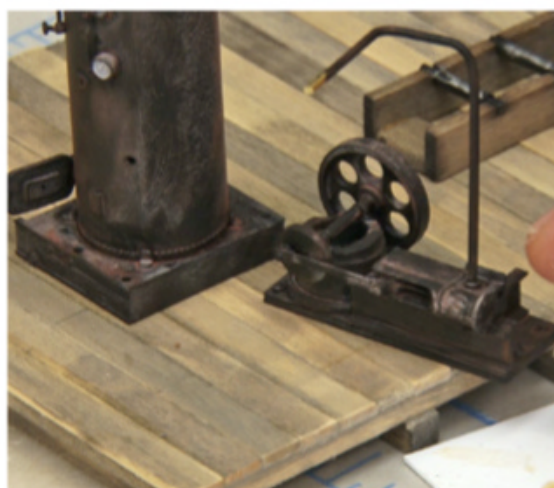
I used a Bachmann no. 27301 log skidder to make not only the sawmill's steam engine, but its boiler and steam-powered winch as well.

A hundred years ago, steam engines played a big part in running industrial machinery. The National Park Service illustration shown here is for an Ames Iron Works twin-cylinder steam engine, as used by the Hull-Oakes Lumber Co. (You can learn more about the Hull-Oakes Lumber Co. in the "Taking Care of Business" series on MRVideoPlus.com.) Key features include the large drive wheel for the belt system, as well as the tensioner wheel that keeps the belt from slacking and slipping off the pulleys. The Phillips Brothers mill uses a similar system, and it's the one I chose to model as well, though I modeled just a signal cylinder.

The donor for the project was a Bachmann log skidder. I cut the model apart and used the pieces to make just about all of the details shown on these two pages, including the main steam engine, the boiler, and the steam-powered winch.

The KMP kit came with a casting for a vertical steam engine. However, in attempting to modify it, I broke the casting. Not wanting to let anything go to waste, I used the bottom portion of it to support the flywheel and shaft from the cylinder, as well as the main belt drive wheel. I mounted all the pieces for the steam engine on some bits of Evergreen styrene I beams, painted them black, and rusted them a bit using Monroe Models Scenery Solutions washes.

I connected the steam engine to the boiler using some painted brass rod as pipe.



I mounted the engine to styrene I beams cemented to a scrap piece of .040" styrene sheet. Some paint, rust, and piping complete the model.

>> Boiler

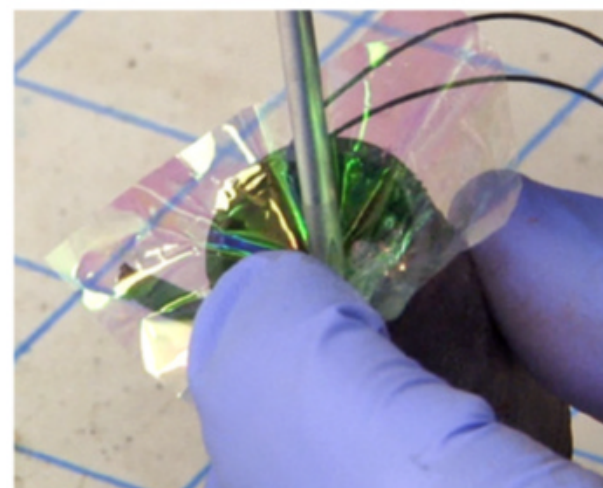
The heart of the steam-powered mill is its boiler. I really liked the detail on the Bachmann log skidder's boiler, so I used it as the starting point for the project. Because they get really hot, boilers for plants are typically mounted on concrete or brick pads. However, the skidder's boiler was mounted to a steel-beam base. Since I liked its detail, I dispensed with the pad.

After watching the videos on the Phillips Brothers Sawmill, I wanted to show the boiler with its firebox open. I used a drill to cut out most of the molded door detail and carved the rest of it away with a chisel. Then I cleaned up the opening with files.

I replaced the door with one made from styrene sheet, glued it in the open position, and painted it black to match the rest of the boiler. I weathered the boiler by first applying a coat of Testor's Dullcote, and then gave it a heavy application of Monroe Models Scenery Solutions washes. The wash has alcohol in it, which causes the Dullcote to haze, creating the effect of scale built up on the boiler's surface.



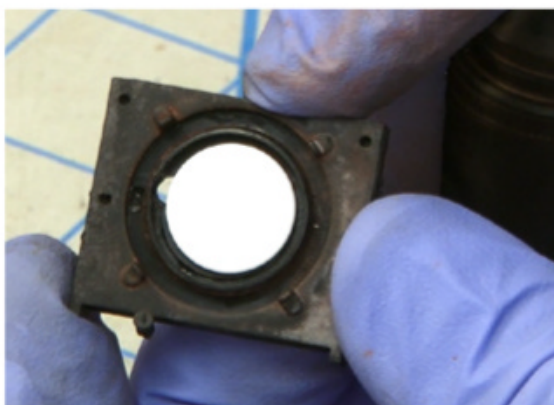
To install the Evan Designs fire kit, I taped the 3 LEDs together and placed them inside the boiler pointing down into the firebox.



The kit includes a small sheet of colored cellophane to reflect the light. I carefully inserted this into the firebox area of the boiler, in front of the LEDs.



To work properly, you need to be able to see the wrinkled cellophane clearly in the firebox opening, as shown here.



The effect works the best if the LEDs can reflect off of a light-colored surface, so I placed a small disk of white styrene at the bottom of the firebox.



Here is the finished boiler installed in the model. The stoker must be shoveling hard because he's completely out of sawdust!

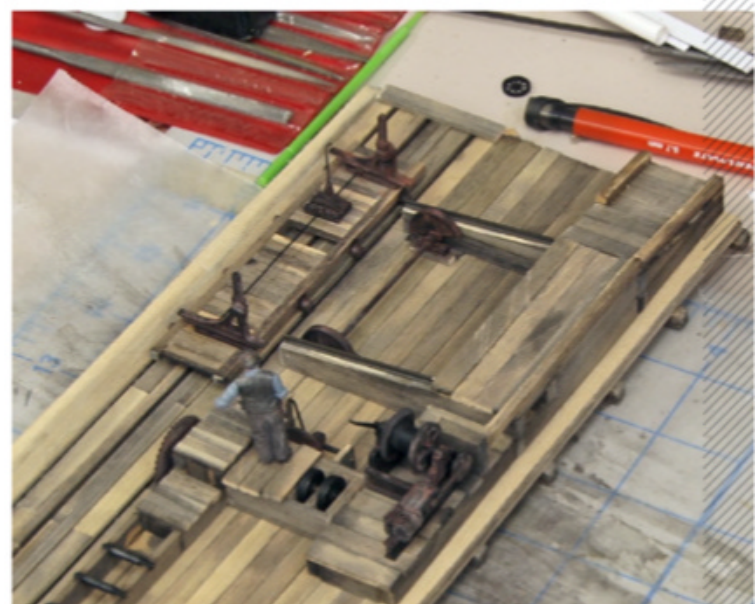
>> Winch and stop

There are all sorts of complicated ways to get the logs out of the pond and into the sawmill, but Phillips Brothers uses the simplest I've seen. They have a steam-powered winch inside the mill, and they attach a cable to the log in the pond and drag it up a wood ramp.

I built the winch from parts of the Bachmann log skidder. I used one of its two cable drums, but cut the drum in half to represent the much smaller winch used by the Phillips mill. Fortunately, a lot of the Bachmann model is held together by screws and lightly tacked glue joints, so this operation was easy to accomplish. Like the steam engine, I mounted the parts for the winch to a scrap of sheet styrene and used more I beams to support everything.

The log stop is a pair of discs, joined by an axle that is bolted to the floor of the mill. The discs each have one flat side. When the stop is rotated, the flat side on the discs allow a single log to roll over it before returning to the "stop" position. I made mine using styrene strip and sheet. I made the discs using a disc cutter, as shown below.

I made the adjoining ramp from the log pond with stripwood and some small dowels. I built the ramp in place, drilling holes for the dowels in the layout's plywood surface. The ramp and the mill aren't glued together, so the mill may be removed from the layout without effecting the ramp. This is great for taking the layout on the road, as I can remove the mill and pack it separately.



This view shows the winch and the log loading ramp. The ramp is made from wood topped with code 83 rail. The rotating stop is at the bottom of the ramp and in front of the saw carriage.



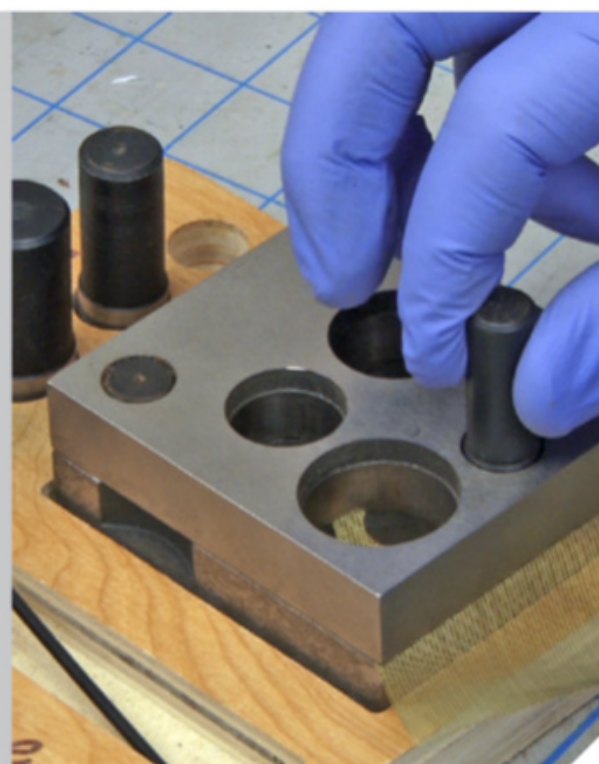
I made the log ramp from more stripwood and a few small dowels. I stained all the parts first, then built it in place on the layout.

Try this!

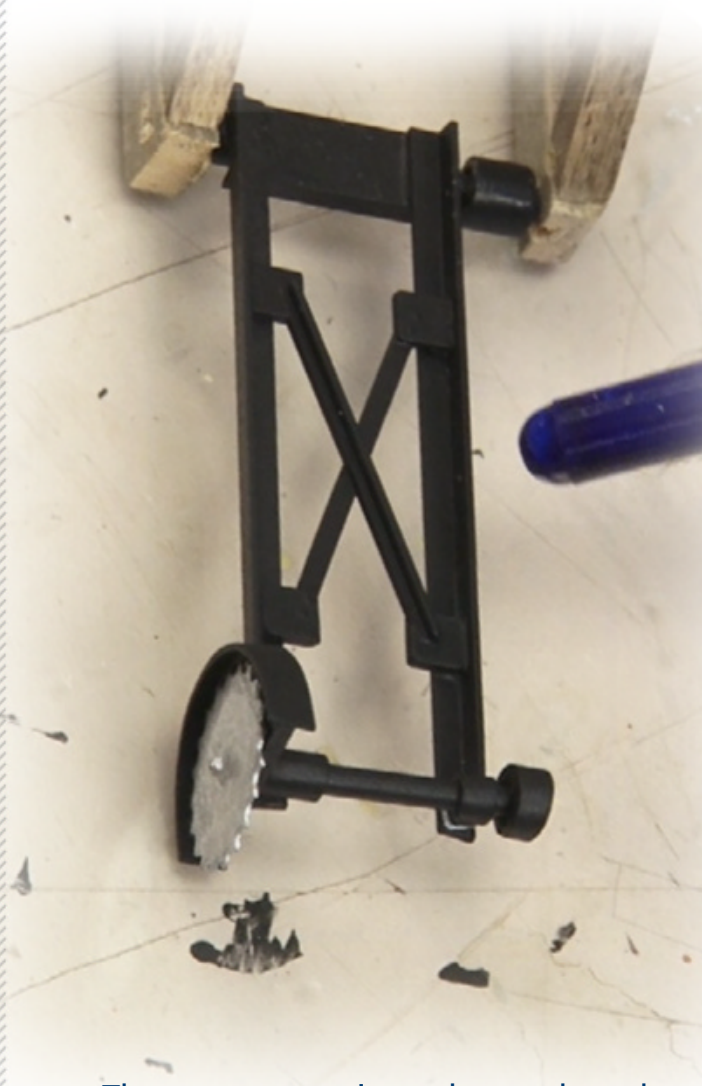
Disc cutters are great for making perfectly round styrene or sheet brass circles. This one is no. 195.10 from www.pepetools.com, and cuts discs from 1/2" to 1" in diameter. Cutters for smaller and larger sizes are also available.

To use it, chose the diameter of cutter, slip the material into the metal block, place the cutting die in the hole, then whack it with a hammer. I've used it on styrene up to .060".

In addition to the log stop shown above, I used the cutter to make the guard for the crosscut saw, the bottom of the boiler, and the mill's screen spark arrestor.



>> Crosscut saw



The crosscut saw is used to cut boards to length. The model is made from styrene shapes, a cast-off N scale bridge crossbrace, and a KMP sawblade.

The crosscut saw is used to cut boards to length across their grain. I modeled mine on the Phillips mill's saw. It consists of a blade mounted to a metal framework that's

bolted to the rafters of the mill above a bench or table. The drive belt runs along one side of the frame opposite the blade. The saw has a guard to protect the operator, as well as a weight and cable, which are used to pull it back into position after the cut has been made.

I built the frame for the saw from Evergreen styrene L channel. I used an N scale bridge cross brace leftover from another project to join the channel, but you could just as easily build your own from more styrene.

I made the axles and pulleys on the saw from telescoping styrene tubing. The saw blade came from the KMP models kit. To build the guard I cut a 1/2" disc of .020" styrene, removed the bottom third of it to expose the blade, and glued a thin strip of styrene along the top edge. I used more styrene tubing for the axle, and I fit the blade to the axle with a Tichy nut-bolt-washer casting.

After painting and weathering the saw, I installed it in V-shaped mounting brackets made from stripwood. I then added the belt detail before installing the model into the mill.

I made the saw bench from more stripwood. The counterweight is an HO scale plastic barrel with a Details West eyebolt attached to the top. I installed a couple more eyebolts in the building's timbers to hold the thread used as the counterweight cable.



This view of the mill shows the finished crosscut saw, the counterweight, and saw bench. The man holding the board was an engineer figure I converted to serve as a mill worker. He's doing a great job in his new career!

>> Belts

Most of the machines in the mill are belt driven. To look correct, I needed to come up with a suitable material. I wanted something a bit stronger than paper, which will wrinkle when painted or glued, so I tried using vellum. This is a plastic-coated paper that takes paint easily and holds its shape when used with white glue. Fortunately, I found we had some sample vellum insert cards in our art department. I sprayed a couple of them with tan spray paint and cut them into scale 3" and 4" strips to represent the belts.



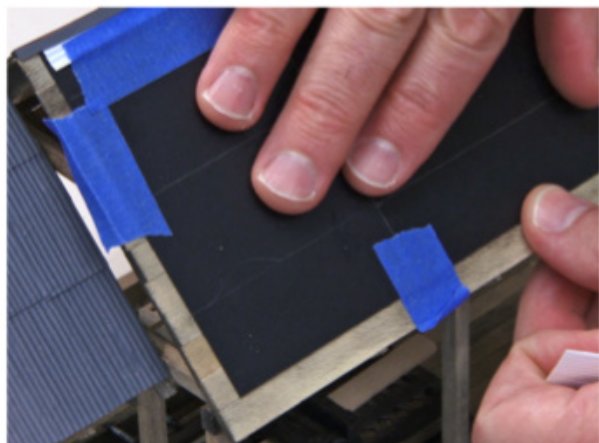
I used the vellum advertising cards shown here to make the belts for the plant. You can purchase vellum at most well-stocked arts-and-crafts stores. The *Trains* sample in my hand has a light coat of tan spray paint on it.



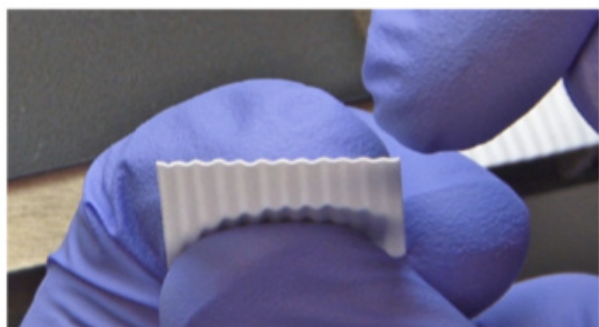
I glued thin strips of the vellum to the pulleys on the crosscut saw with white glue. It takes some time for the glue to dry. Be patient! All of the seams are hidden on the pulley's tops or bottoms.

>> Metal roof

I wanted the mill to have a tin roof, so I bought some no. 50016 O scale corrugated sheet material from The N Scale Architect (thenarch.com). The sheets are made from vacuum-formed plastic, and they're easy to cut, glue, and paint. I cut the material into 3-foot wide strips with a sharp knife, then ran the strips through my NorthWest Short Line Chopper to make uniform 3 x 5-foot panels. The rest of the technique is explained in the photos on this page, and I'm very pleased with the rusty-tin-roof quality that it yields.



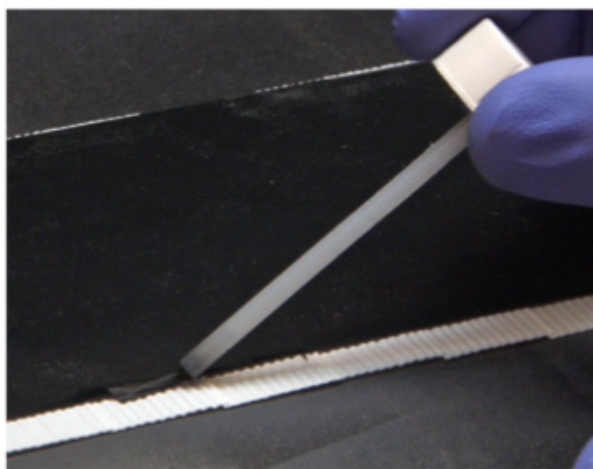
1 I needed a way to attach the panels to the roof, but then remove them for painting. To accomplish this, I installed .020" black styrene sheet as underlayment, taping it to the roof temporarily while gluing the panels to it.



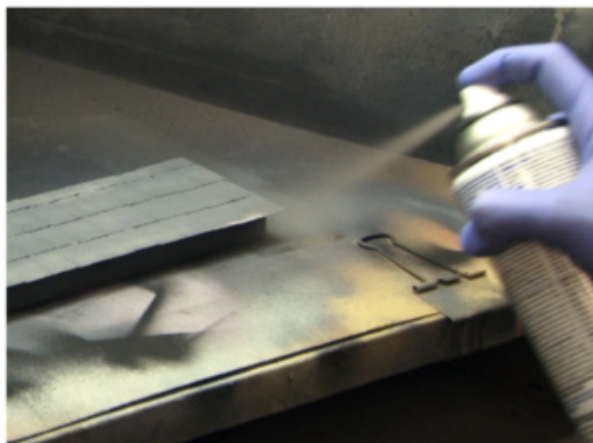
2 When attaching panels next to each other, overlap one corrugation over the previous one. When cut, the corrugated panels have either an upward facing or downward facing edge, so you need to orient each panel properly.



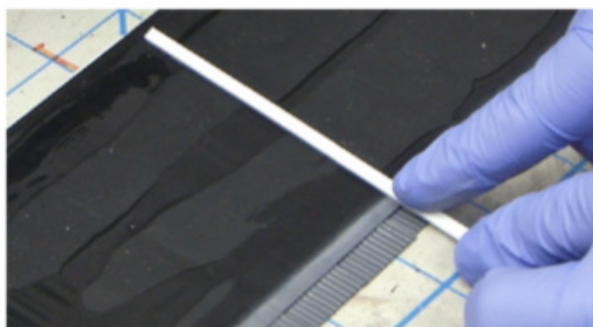
3 I marked the styrene underlayment with pencil lines to make sure I placed the panels evenly. I glued the panels to the roof with Plastruct Bondene plastic solvent cement.



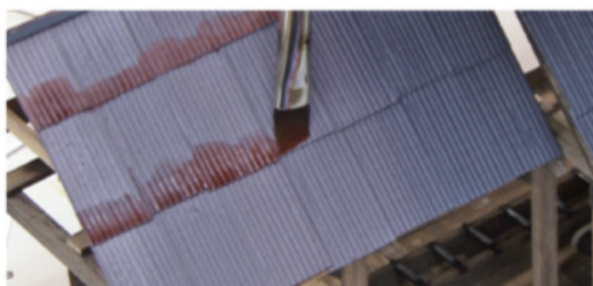
4 After gluing all the panels to one side of the model, I removed the section and flipped it over on the workbench to glue the styrene underlayment to the panels where they overlapped it.



5 I painted the corrugated roof sections with Rust-Oleum no. 249088 2X Flat Gray Primer. I made sure to coat the edges of the bottom sides as well, since some of the panels overhang the roof a bit.



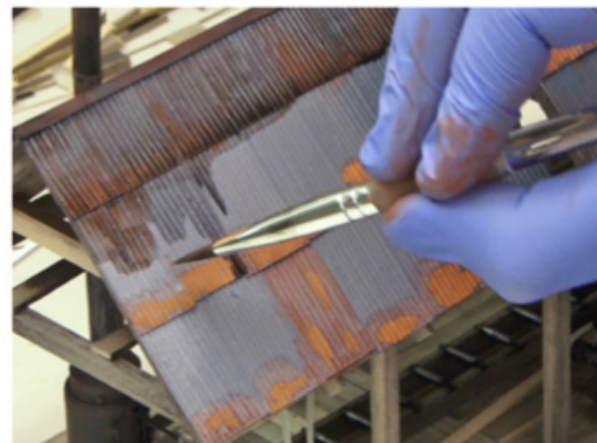
6 After painting the roof sections, I glued them to the model with Instant Jet, a thin cyanoacrylate adhesive (CA). I applied several beads of glue to the back of the section and spread it evenly using a length of strip styrene.



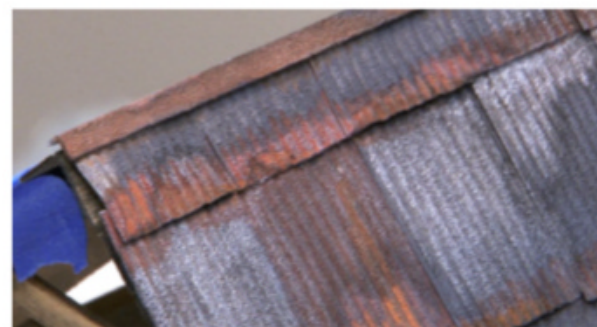
7 To create rust effects, I sprayed the roof with Testor's Dullcote, then applied some Monroe Models Dark Rust wash to the bottom edges of most panels and a few full ones.



8 I followed up the dark rust with a layer of the firm's New Fresh Rust weathering wash. Like the first coat, I only applied the rust effects to the bottom edges of most panels, painting it inside the edges of the Dark Rust.



9 After giving the first coats of rust some time to dry, I applied Monroe Models Quick Age weathering wash to the entire roof. This serves as a control coat, blending the rusty parts and the painted parts together.



Finished This detail photo shows the completed rust technique. The weathering washes have alcohol in them, which causes the Dullcote to haze. They also contain powdered pastels, giving the surface a gritty, realistic look. 📸

+ MORE on MRVP!
The fun doesn't end with building the sawmill. You can watch The Log Blog, a multi-part series on MR Video Plus featuring David's Olympia On30 layout. Subscribe and you won't miss a single episode!

Paper ROADS



A computer, a color printer, and sheet styrene are all you need to get started paving

By Ben Lake

We needed to model a short stretch of Trans-Canada Highway 1 on our N scale Canadian Canyons layout. Highway 1, as it is most often called, follows the banks of the Thompson and Fraser Rivers in British Columbia, so it was critical that we include at least of small portion of it on the layout.

When working in N scale, it's difficult to get the colors, markings, and weathering to look correct using regular roadbuilding techniques. Plaster, paint, and weathering powders don't always scale well, and the results can look too uneven to be realistic.

All good road projects have a team of workers. After a bit of discussion with Gerry Leone, Cody Grivno,

and Eric White, we decided to design the road in Adobe Illustrator and print it on paper. The technique would allow us to easily create scale-sized road stripes, as well as produce realistic pavement textures.

Illustrator at its most basic level is used to make vector art. Rather than using photos or digital paintbrushes to create images, Illustrator

uses lines and points. I chose Illustrator because it's a program I know well, but you could also use other vector art software, such as GIMP or Inkscape.

The finished road looks great and was a good reminder that when solving a problem, look at the tools you may use every day. The solution may be as easy as clicking "print."

Viewing the trains in the Fraser Canyon wouldn't be possible without Trans-Canada Highway 1. Ben Lake shares the techniques his team of modelers used to build a realistic N scale roadway printed on paper. Bill Zuback photo

WATCH IT!



Free Video!

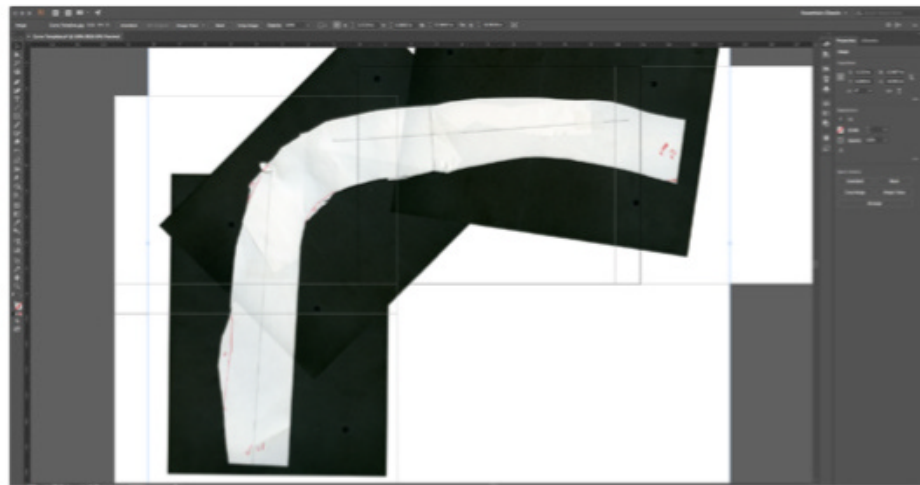
You can see how the project got started in Scenery Allstars Episode 1 free for you to watch at MRVideoPlus.com/TUG2

A TEMPLATE FOR SUCCESS



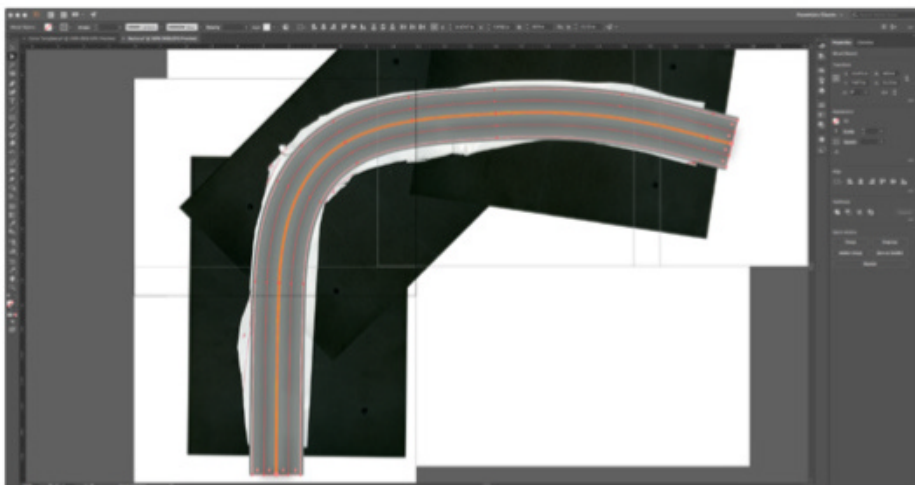
With most of the finished scenery in place, we needed to figure out how to get an accurate footprint of the road so it could just drop into the layout. Photographing it wasn't our first choice, as the position of the camera can introduce a degree of distortion. Gerry came up with the idea of cutting a paper template of the curve.

He made a paper template for the roadway, cutting and fitting pieces of paper to conform to the scenery's surface.



From there, I scanned the template pieces and dropped the images into Illustrator to serve as a pattern for building the road digitally. Gerry had placed pencil markings on the template sections, making it easy for me to line them up on the computer once they'd been scanned.

MAKING ROAD MARKS



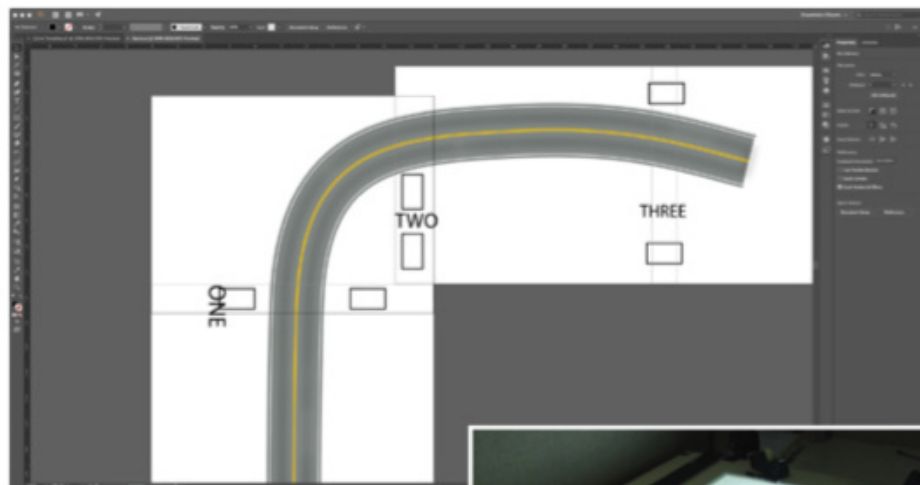
For our version of Highway 1, I first traced the road's centerline and then defined its edges, keeping them within the template as shown. I then used Illustrator's selection of line types and drawing tools to create the road's surface, including details such as safety markings and shading the lanes to show tire wear.

STICK



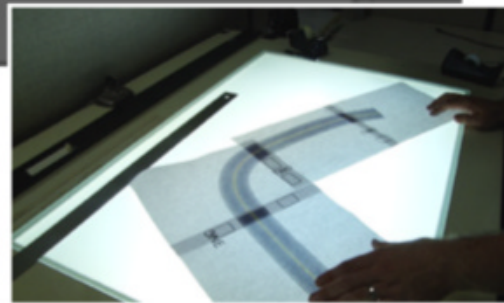
The paper needs a rigid backing to hold the road together. For this we used .030" styrene sheet. Gerry sprayed the back of the paper with 3M Super 77 spray adhesive, as well as the sheet of styrene. He and I then carefully applied the paper to the styrene.

READY, SET, PRINT



I didn't want to have to mess with the printer settings to get the road to fit on a single sheet of paper, so I divided the digital road into a series of 8½" x 11" sheets. I included simple registration marks (the words and boxes shown in the photo) to ensure that I could align the paper correctly.

I used a light table in our art department to assemble the four printed sheets. The alignment marks appear on the edges of each connecting page, so the light table makes it easy to see when they're in the correct position. I taped the sheets together at the edges, making sure the tape didn't cover any of the printed road.



Ben says...

When using paper materials around areas that will require wet scenery techniques, try sealing them with Testors Dullcote. It worked very well for our paper road surface.



CUT



Once the glue had set, Gerry cut the road with a sharp hobby knife. He also cut across the seams between the sections to remove the unprinted edges. Take your time with this step. It's important to get clean cuts and remove all of the unprinted paper parts.

SCENERY PREP



While I was sealing the printed road, Cody was hard at work preparing the scenery for it. He removed bits of plaster and rocks that would keep the road from laying flat. He also filled in some gaps in the surface with quick-drying spackle.

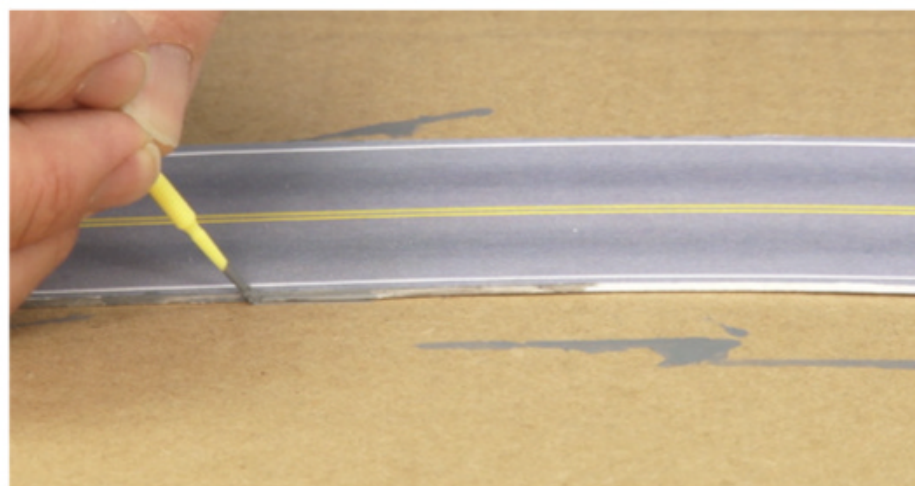
Once the spackle was dry, Cody painted the shoulders with earth-colored latex paint, and then it was time for the road.

SAFETY FIRST



It's a steep drop to the tracks from the road, so while he was at it, Cody installed a few BLMA 610 concrete K-rail barriers from Atlas to keep our N scale drivers safe. With that final touch, Highway 1 was open for traffic. 🚗

COAT AND COVER



At this point I started thinking that if we were going to be using wet scenery techniques around the paper road, that could be a big problem. I spent some time experimenting with ways to waterproof the paper and found that by spraying it with Testors Dullcote, I could seal the paper. It also took the shine off the ink, making the surface of the road look absolutely fantastic. Following Cody's suggestion, I also painted the edges of the white styrene gray.

EASY INSTALLATION



We used clear DAP ALEX Plus caulk to attach the road to the layout. I applied two beads of caulk to the back of the road and smoothed it out with a putty knife. Cody and I then carefully dropped the road into place on the layout.



We used a wallpaper roller to seat the road in the caulk. Cody then added some finishing touches to the scenery, including gravel for the shoulder and a few grass tufts.

FIND A PROGRAM

- Not everyone has Adobe Illustrator, and you don't really need to spend the money to buy it just for this project. Two free alternative programs include GIMP (GNU Image Manipulation Program) from gimp.org and Inkscape, found at inkscape.org. Both have versions for Mac OS and Windows, as well as plenty of online tutorials to help you learn how to use the software.

A freight car weathering **TRIPLE PLAY**



Mixed with paint, as a wash, or as powder, pastels are a versatile weathering product

By Cody Grivno

Powdered pastels have been used for weathering locomotives and freight cars for many years. However, as airbrushes, artist's oils, and even weathering decals have gained popularity, pastels have been relegated to the back of many toolboxes.

But much like vinyl records today, pastels are making a comeback. There are several manufacturers that offer powdered pastels, including AK Interactive, Noch, PanPastel,

and Tamiya, among others.

Sometimes, pastels are offered in other forms that aren't so obvious. Monroe Models, which also offers powdered pastels, produces a line of alcohol-based washes marketed under the Weathering Solutions line. These washes are pastels mixed with isopropyl alcohol.

You can also mix pastels with paint to re-create neat effects, like oil caked on the wheel faces of cars equipped with solid-bearing trucks.

If you have pastels in the back of your toolbox, it's time to bring them out again. They're an airbrush-free solution to weathering locomotives and freight cars.

Cody Grivno used powdered pastels in three ways to weather this HO scale cement hopper. Follow along as he gives a fresh take on this classic weathering medium. Bill Zuback photo

Materials list

Kalmbach Hobby Store

- ☐ Bowser foam locomotive cradle (no. 84017)
- ☐ Lifecolor Track Dirt (UA 720, in set no. 84035)
- ☐ Microbrush variety pack (no. 84036)

PanPastel

- ☐ Raw Umber Tint (no. 780.8)

Testor Corp./Model Master paint

- ☐ Dullcote (no. 1260)
- ☐ Skin Tone Dark Tint (no. 2002)
- ☐ Weathered Black Create FX paint marker (no. 73802)

Monroe Models

- ☐ Grimy Black Weathering Powder (no. 3102)
- ☐ Rusty Brown Scenery Solutions (no. 975)

Miscellaneous

- ☐ Silver paint marker

+ MORE on MRVP!

Watch Cody weather this car from start to finish at MRVideoPlus.com/TUG2.

Prep work



For this project I used a Spring Mills Depot HO scale Baltimore & Ohio class N-34 wagontop covered hopper [out of production – Ed]. Before I started weathering the model, I removed the trucks and couplers. To avoid damaging the car, I set the covered hopper in a Bowser foam work cradle. You can order this item (no. 84017) from the Kalmbach Hobby Store (www.KalmbachHobbyStore.com).



Before using pastels, I did some basic weathering with an airbrush and thinned Model Master acrylic paints. My mixing ratio isn't super high tech. I put in enough paint to cover the bottom of a 1-ounce paint jar and filled the rest with 70 percent isopropyl alcohol.

The first color I used was Engine Black (no. 4888). I applied the color along the exterior posts on the car sides, on the lower

portion of the slope sheet on the car ends to simulate wheel sling, and around the bolsters and draft-gear boxes.

Next I used Model Master Railroad Tie Brown (no. 4885). This simulates dirt on the lower car sides, hopper bays, and car ends.

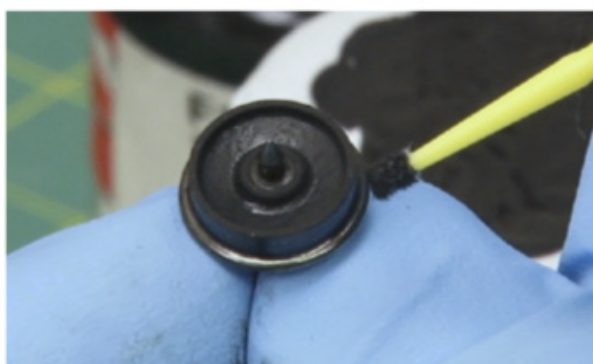
Finally, I sprayed the entire model with Testor's Dullcote (no. 1260). The flat coat protects the airbrush weathering and provides tooth for the pastels to adhere to.

Pastel paste



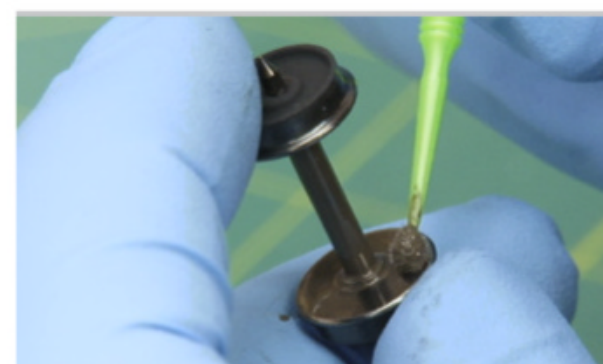
The B&O covered hopper has solid-bearing trucks. The faces of the wheels on these cars were often coated a textured gunk from dirt sticking to the oil.

To simulate this look, I mixed Monroe Models Grimy Black Weathering Powder (no. 3102) with Floquil Weathered Black (any grimy black enamel paint will work). Stir the paint and powder into a paste.



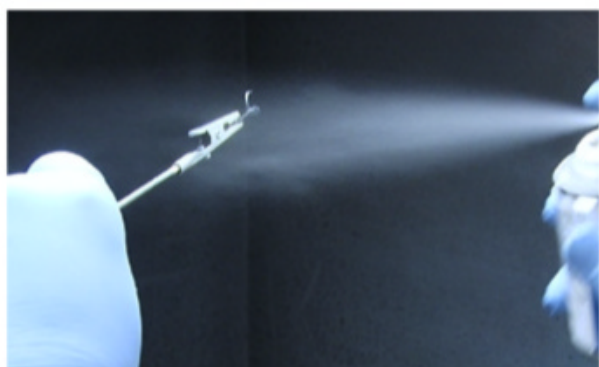
I cleaned the wheels with 70 percent isopropyl alcohol and a cotton swab. This removes residue from the manufacturing process.

Then I applied the paste to the wheel face with a fine Microbrush (available at the Kalmbach Hobby Store, item no. 84036). Keep the paste off the tip of the needle-point axle and the wheel tread.



The back of the wheel and the axle weren't as exposed to the oil packed in the journal boxes and generally stayed a rusty brown color. To simulate that, I used Model Master Skin Tone Dark Tint (no. 2002). As before, I applied the color with a Microbrush, keeping the color off the treads. I've found enamel paint tends to stick better to metal wheelsets than acrylic paints.

Alcohol-based wash



For many years I was a proponent of painting couplers to weather them. Now I use an alcohol-based wash from Monroe Models.

To simulate a gritty, rusty finish, I first sprayed the Kadee no. 148 couplers with Testor's Dullcote.

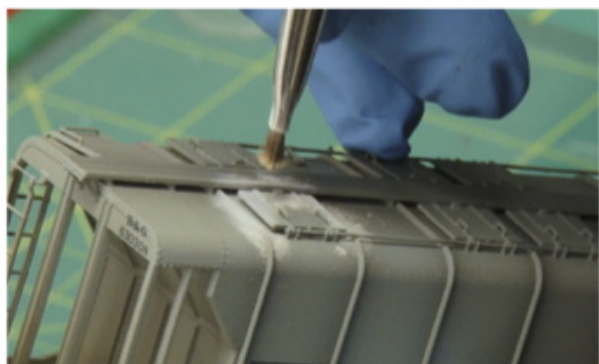


Once the Dullcote dried, I applied Monroe Models Scenery Solutions Rusty Brown (no. 975) with a Microbrush. The alcohol reacts with the Dullcote, creating a neat, variegated look. Because the wash has pastels, it even captures the gritty texture. Pretty cool!



Unfortunately, the Rusty Brown wash didn't stick to the centering spring. To remedy that, I carefully painted the spring with Lifecolor Track Dirt. I then painted the trip pin with a Testor's Create FX Weathered Black paint marker. I simulated a glad hand on the tip of the pin with a silver marker.

Powdered pastels



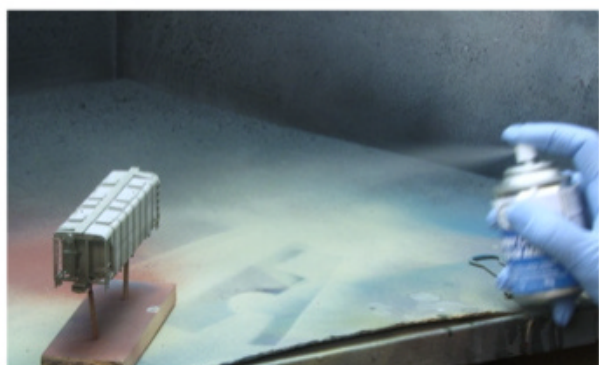
I simulated spilled cement with PanPastel no. 780.8 Raw Umber tint. First, I applied the pastels around the hatch cover in a stippling motion with a short-bristled brush.



Then, using a soft-bristled makeup brush, I pulled the pastels down the car side. Keep the brush parallel to the exterior posts and pull straight down in a short, swift motion.



I added more pastels to the car sides to build up the look of spilled cement. It's necessary to exaggerate the weathering with pastels as the sealing process tends to decrease the effect.



Satisfied with the weathering, I sealed the pastels with Dullcote. I held the can about 12" from the model and dusted it on. Apply the Dullcote in a well-ventilated area and wear personal protective gear.



Here's how the covered hopper looked after the Dullcote was applied. Notice how the black lettering is lighter on the panels where the pastels were applied. Not satisfied? Repeat the process.



I let the Dullcote dry overnight before re-installing the couplers and trucks. As before, use a foam cradle to protect the model. There are lots of delicate parts that are easy to damage.



Cody says...

Powdered pastels are old school? Hardly! They can yield great effects that aren't always achievable with an airbrush.



Here's a photo of the left side of the covered hopper. The finished model shows the versatility of powdered pastels. Whether you want rusty couplers, caked-on oil on the wheel faces, or cement streaks down the car sides, powdered pastels can make it happen. Give these techniques a try. ■

Build a BOG



Wetlands abound in nature, yet are often overlooked by modelers

By Kathy Millatt

Scenery construction isn't always about building tree-covered hillsides. I wanted a little scenic area alongside a road down a hill. A naturally formed boggy area fit the description, and it was an easy way to model something a little different.

Water and its accompanying vegetation find every low spot they can in the landscape. Follow along as "Let's Make A Scene" host Kathy Millatt shows how she made this small boggy area on her HO scale layout.

THE BASE



I started off with a scenery base of plaster cloth painted with raw umber artists' acrylics or similar brown color. To form the boggy area, I sifted tile grout on using a tea strainer. Sanded grout is the easiest to work with, as it accepts diluted white glue well. Using the back of a spoon, I hollowed out the area which would later hold the resin water. This needs to be just deep enough for the boggy area to contain a thin layer of resin without flooding over the sides. About 1/4" deep is all that is required.

WATCH THIS ON



▶ Watch It!

You can watch the first episode of Kathy's Bog project for free at MRVideoPlus.com/TUG2

FIXING THE GROUT

I use a mix of 1-part 92 percent isopropyl alcohol and 2-parts water to moisten the grout. This helps the glue flow through the granules as otherwise it tends to ball up on the surface. I apply the water and alcohol mixture with a small misting bottle. For adhesive, I use a mix of 1-part white glue to 2-parts water. I put quite a reasonable amount on the scene and mop up any excess glue that flows to the bottom of the hill with a paper towel.



REVISED COLOR

Once the glue dries, if you're happy with the color of your grout, you can skip this step. However, my grout was not quite the right color, so I painted it using raw umber acrylic paint to match the rest of my scenery. The grout will take paint easily, but you may wish to dilute it a bit with water to get the paint into all of the granules.



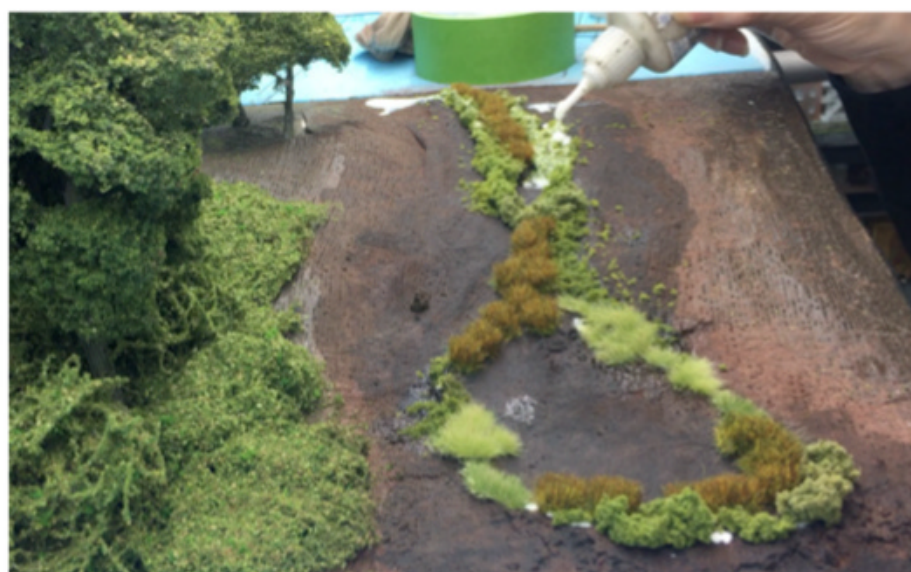
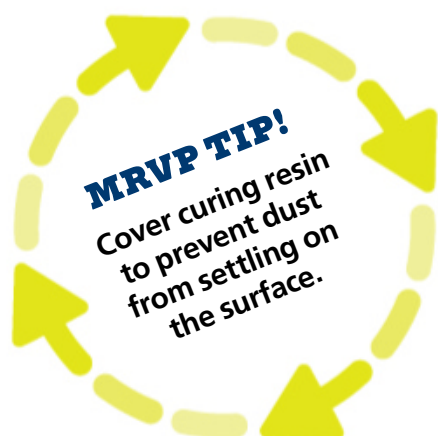
Benchwork materials list

- ☐ Woodland Scenics clump foliage (assorted colors)
- ☐ Woodland Scenics coarse turf light green T1363
- ☐ Woodland Scenics fine turf earth T1342
- ☐ Woodland Scenics soft flake snow SN140
- ☐ Peco 10mm self-adhesive grass tufts autumn PSG-76
- ☐ Silflor 4mm spring prairie tufts MN72721
- ☐ Silflor 4-6mm spring green buffalo grass MN73731S
- ☐ AK Interactive slimy grime dark enamel AK026
- ☐ AK Interactive slimy grime light enamel AK027
- ☐ Unreal Details Magic Water MMW6oz
- ☐ Sanded brown tile grout
- ☐ White glue
- ☐ Spray bottle
- ☐ 92 percent Isopropyl rubbing alcohol
- ☐ Tea strainer
- ☐ Earth colored acrylic paint
- ☐ Disposable mixing cups and sticks
- ☐ Assorted static grass and applicator

BOG PLANTS

The next step is to mark out the bog area with plants. I started by using Woodland Scenics clump foliage in a variety of greens to make small bushes. I then added clumps of grass in various colors and sizes using Silflor grass tufts (sold by Scenic Express) and those made by War World Scenics (wwwscenics.com and also available from Peco at peco-uk.com). However, if you can't find either of those, there are a lot of other static grass manufacturers on the market, so grass tufts are very easy to find.

I used clumps of tall dead grass to represent reeds, as they were the correct height in HO scale. Make sure you leave an open area in the middle of the bog for the resin water. I attached all of the plants to the scenery with white glue.



GROUND FOAM

To add more texture to the bog area plant life, I added some Woodland Scenics coarse turf around the edges. I glued it in place with more diluted white glue. At this point, let everything dry completely before moving to the next step.



POURING THE RESIN

There are many different brands of resin you can use to represent water. I used Magic Water, a two-part resin from Unreal Details. I tinted the water with a drop of AK Interactive Slimy Grime Dark enamel paint. I applied the water in small amounts at a time to keep the vegetation from wicking it all up.

To give the pond a scummy top, I first sprinkled a few pinches of Woodland Scenics Earth fine turf into the resin. I then added a few drops of AK Interactive Slimy Grime Light enamel paint onto the surface.

At this point, I needed to let the resin cure hard before adding the final details.



Kathy says...

Keep a camera with you at all times (I use my phone) to capture interesting scenery features to model, whether that be a local stream or just an interesting piece of ground at the corner of a road. File the photos away, and then when you have a gap to fill on your layout, look through them for inspiration.



REEDS

Once the resin was set, I added more reeds to the boggy area. I also added more grass clumps and bushes where the resin had crept through the grasses. I simply brushed white glue over the cured resin, then planted the new grass tufts and foliage clumps right over the top.

FINISHING TOUCHES

To finish the scene, I added a healthy dose of static grass, running it right up to the bog's edge. I also built a dirt road using more sanded grout.

If you're modeling late summer, you can add some cottony seed heads to the reeds by brushing on a small amount of white glue and sprinkling on Woodland Scenics soft flake snow. Hoover off [British slang for vacuum – Ed.] the excess and you're finished.

I really like the completed scene. The bog adds interesting detail to what could have been an ordinary grass field. 🖼️



+ MORE on MRVP!

Kathy Millatt is an expert modeler, and you can learn even more great scenery techniques by watching her regular series, "Let's Make a Scene." Subscribe to MR Video Plus today so you won't miss a single episode.



Decoder upgrade for a stalling Geep

Fresh out of the shop with its new capacitor-equipped TCS sound decoder and fresh headlights, Winston-Salem Southbound no. 1501, approaches the diamond with little concern for stalling on its insulated frogs.

Installing a sound decoder is good, but using one that keeps the engine running over rugged track is better!

By David Popp

Ben Lake and I were having a great time one afternoon running an operating session on our Winston-Salem Southbound HO scale layout.

WATCH THIS ON



▶ Watch it!

You can see David and Ben install the decoder for free at MRVideoPlus.com/TUG2

However, our Athearn GP9 locomotive kept stalling on some of the trackwork. To top it off, two of the locomotive's four headlight bulbs were broken. We decided that the time had come for some upgrades.

Capacitor packs are a great way to make sound-equipped locomotives run as smooth as silk. You can buy them alone to add to existing decoders. And Train Control Systems (TCS) offers a line of decoder kits with the capacitors already installed. Knowing this day was coming, I'd ordered one of TCS's capacitor-equipped WOW decoders for our Athearn GP9. While I was at it, I'd also gotten replacement bulbs for the headlights. Ben and I set to work.

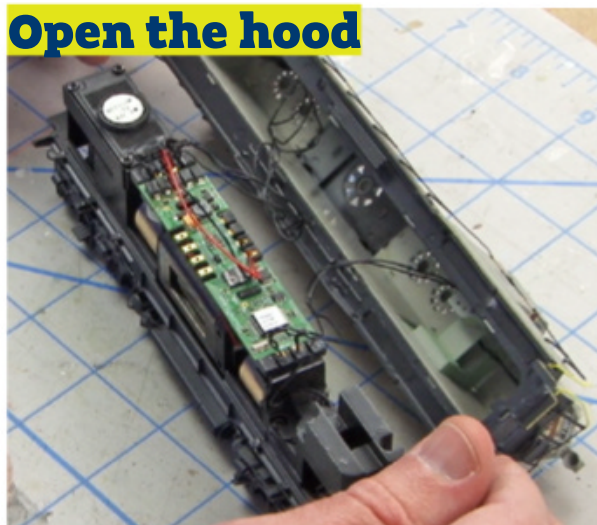
What you need

TCS WOW sound decoder

For this project we used a TCS WDK-ATH-8 WOWKIT sound decoder. The decoder is equipped with EMD GP7 sounds, which was about as close as we were going to come to the GP9 that needed it. The kit is designed specifically for an Athearn Genesis model, and it includes a new motherboard for the engine (red circuit board), as well as a sound decoder (green board), speaker, enclosure, and wires. The WOW decoder has the capacitors already installed, so it was an easy choice.

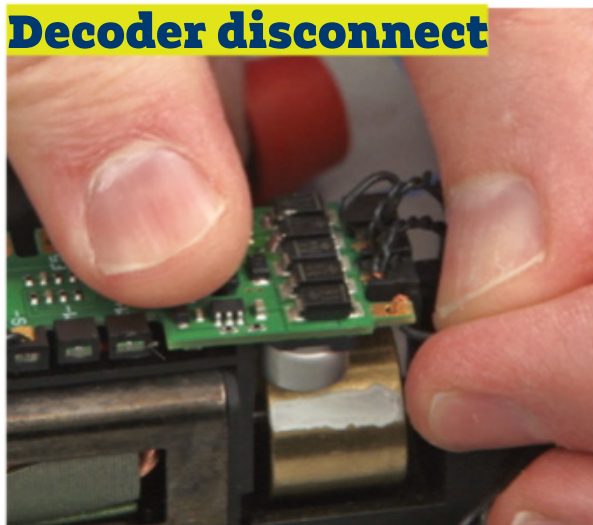


Open the hood



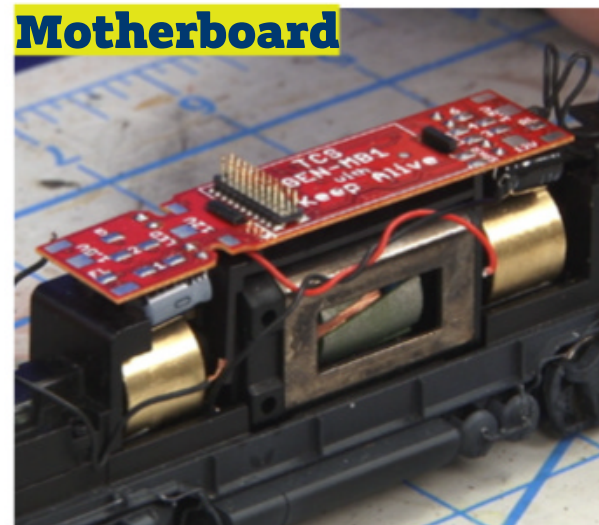
Getting to the wiring on the Athearn locomotive is easy. Remove the two coupler box screws, pull the couplers out, and then slip the shell off of the chassis. Though not shown here, I placed the shell into a foam cradle to protect the paint and all the delicate handrails.

Decoder disconnect



The wiring on the model's stock decoder is attached with plastic clips press-fit to the edges of the circuit board. Simply wiggle a clip loose using a pair of pliers, then slip the wire out of its mounting hole. You need to remove all the wires from the circuit board.

Motherboard



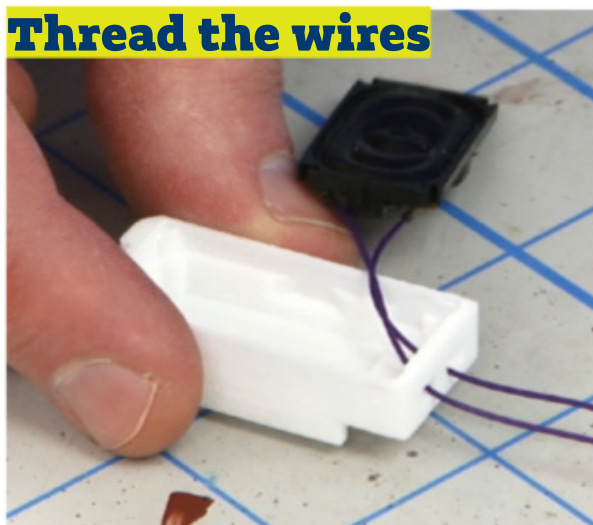
The Athearn decoder is held in place with two plastic clips and is easy to remove. The TCS motherboard fits over those clips. The capacitors should be facing down. Position the board so that the plug prongs are at the front of the locomotive and snap it into place.

Speaker leads



The next step is to solder the leads to the speaker. The WOWKIT includes two small lengths of purple wire for this task. Strip one end of the lead, tin it with rosin-core electronics solder, and attach one to each of the solder pads on the speaker.

Thread the wires



The included speaker enclosure is a white, 3-D printed part. It is delicate, so handle it carefully. Thread the two speaker wires through the holes at the front of the box, and position the speaker so it faces up.

Prune pins



Since our locomotive came with a decoder, I removed its stock speaker. (Save the screws!) There is a plastic plate under the speaker that keeps the wires out of the gears. It has two pins that need to be clipped off for the new speaker enclosure to sit properly.



David says...

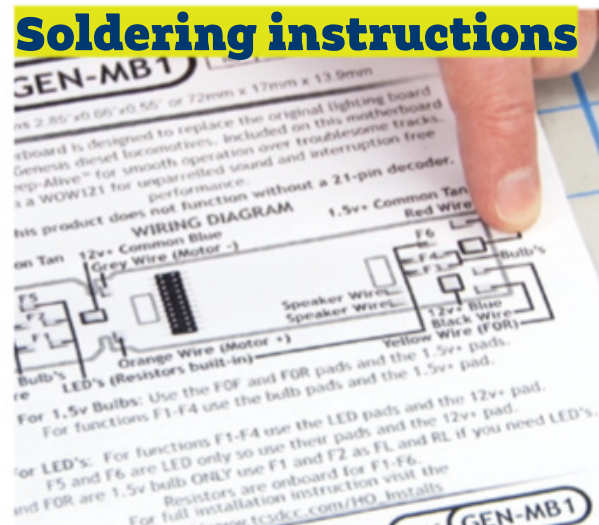
Always double-check your work when soldering wires to a decoder. Make sure you've got the right connections before putting the engine back on the track.

Install enclosure



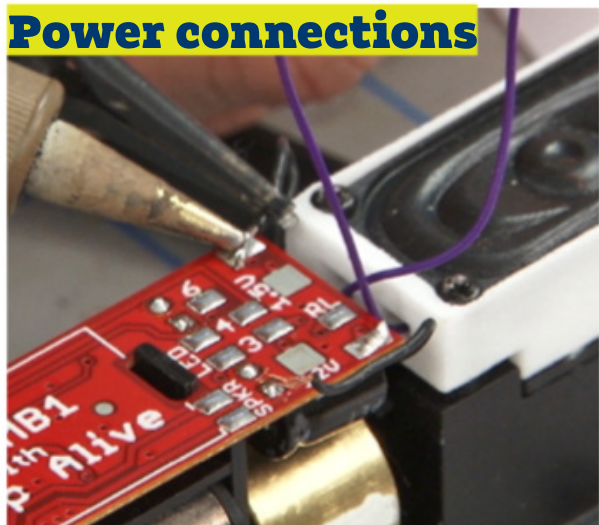
The new speaker enclosure has holes in the bottom that fit over the screw posts extending up from the frame. This is a snug fit, so work carefully. Gently press the box as far as it will go onto the posts, then tighten the screws to pull it into place.

Soldering instructions



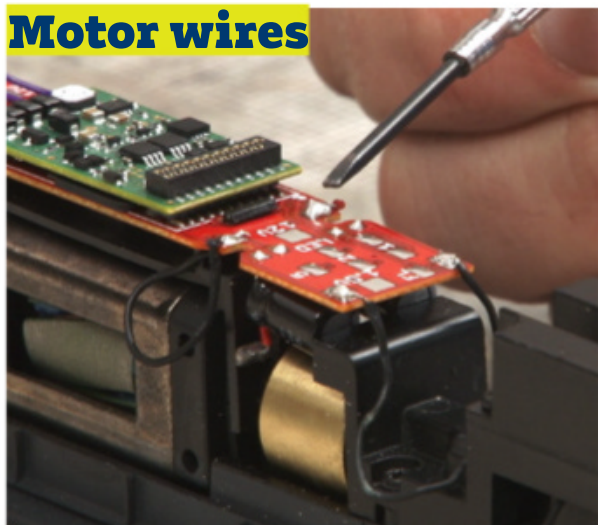
The decoder comes with a small instruction sheet detailing which soldering pads to use for installation. Before doing any soldering work, compare the sheet to the decoder to familiarize yourself with the attachment points for each wire on the model.

Power connections



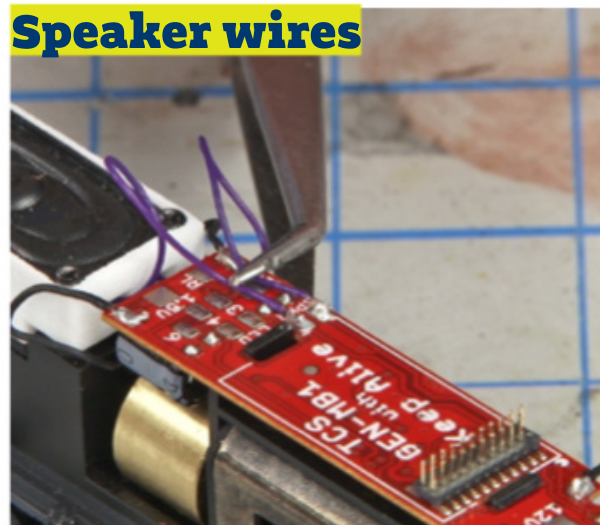
To begin the solder connections, start with the power input from the rails. Do both wires from one side of the locomotive first, then the other. This helps make sure you do not accidentally cross the power pick-up wires and cause a decoder-damaging short circuit.

Motor wires



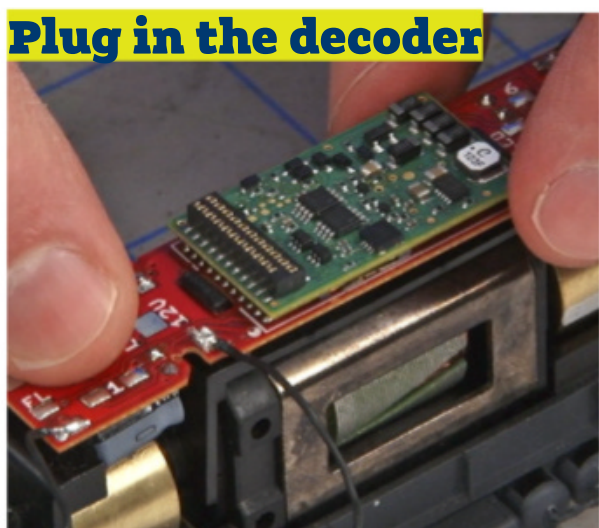
Next, solder the motor wires to their corresponding soldering pads. The correct wire is not always on the corresponding side of the locomotive. On our engine, we had to switch the wires. In testing we found the engine would run in reverse when you wanted to go forward.

Speaker wires



The TCS board has the speaker soldering pads clearly marked. It doesn't matter which of the purple wires you solder to each pad. The speaker will work either way. We trimmed the leads so that they made a neat connection.

Plug in the decoder



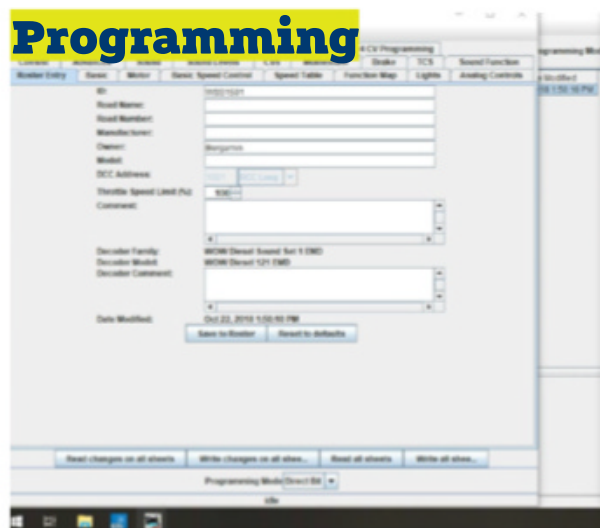
The next step is to plug in the decoder. Be careful – it only works one way! Position the decoder so that the plug prongs are inserted up through the bottom of the decoder circuit board into the socket on top. The decoder should sit nearly flat on top of the motherboard.

Test run



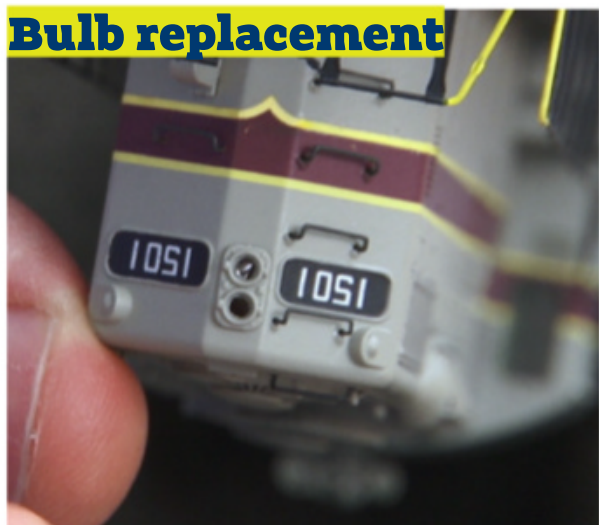
At this point, Ben took the locomotive over to his DCC test station and tried running the model and testing its sounds. This was where he found the motor leads were attached backwards and fixed them. Note that the lights and the shell have yet to be installed.

Programming



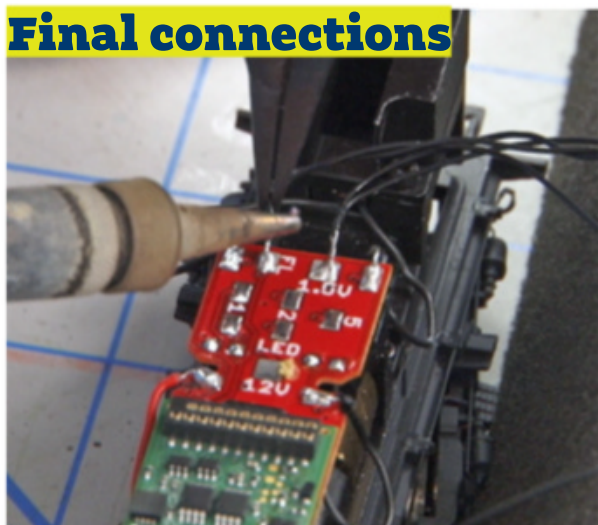
While he was at it, Ben programmed the decoder using JMRI's Decoder Pro software. In addition to programming the locomotive's address, he set up its momentum, starting voltage, and horn and bell sounds. You can also do all of this with any DCC system that allows programming.

Bulb replacement



Next, I set to work replacing the headlights. The two broken bulbs had left pieces of glass wedged into the housing on the shell. I was able to clear the glass shards with a round toothpick. I then installed the new bulbs, taping them in place with clear tape.

Final connections



The leads for the headlights are soldered to the motherboard in pairs. Be sure to use the 1.5V common pad for one lead from each micro bulb. These pads connect to the proper resistor. The other leads go to the FL pad (front bulbs) and RL pad (rear bulbs).

Off and running



After putting the engine back together, we then took no. 1501 for a spin on the layout. The capacitors keep the locomotive functional over completely dead track for 8-10 seconds – running on the Winston-Salem Southbound has never been smoother! 🚂

OFF THE RAILS

Tool tips and workshop tricks

By Gerry Leone

Who doesn't like new model railroading tricks? That's exactly what my monthly show, "Off the Rails," is all about. Here are a few of my favorites.

The main attraction



Tired of dumping those spikes all over and finding them with your toes? Toss a magnet into the container! The spikes will remain in a clump until you need them. Already spilled spikes? Just wrap a piece of cloth around the magnet and pick them up. Remove the magnet to release the spikes from the cloth. (Episode 19)



+ MORE on MRVP!
For more tips, watch an episode of "Off the Rails" at MRVideoPlus.com/TUG2.

Make and brake

For areas on your mainline where you need to hold a car on a grade, bend a thin piece of music wire into an elongated "U" and

mount it between the rails at axle-height, using spikes to hold it in place. Bend the outside end into a circle and paint it to resemble a prototype

blue flag. Flip it up to stop the cars, flip it down to let 'em pass. (Episode 23)

Milk it for all it's worth



Give that empty milk carton a second life! Cut it in half and use the bottom as a handy plaster-mixing container. Once the plaster hardens, just flex the sides and it comes right out. The top half can be used as a funnel, or, when the cap is screwed on, as a portable paint container with a handy handle. Or cut the container in half lengthwise and you have a great trough for staining stripwood. When you're through with the stain, unscrew the lid and pour it back into its container. (Episode 25 and Episode 30)



Give 'em the brush off



Have some hills or grades on your industry spurs? Use a flexible brush bristle glued to a hole in the tie to keep cars from wandering off. Make the bristle only as high as the cars' axles and set it off-center to avoid interfering with couplers. (Episode 23)

Getting down to nuts and bolts

Here's an easy way to keep those threads intact when you shorten a bolt: screw on a nut first, then make your cut on the other side of the nut. When you unscrew the nut, it'll straighten out the threads. Works equally well on bolts from model to full-size! (Episode 29)



Foiled again

Don't toss out that empty aluminum foil box. Cut off a piece of the serrated edge to use as a mini-saw on strip-wood or styrene. It fits perfectly into a hobby knife handle. (Episode 27)



Put a lid on it!

Stop the spills! Many spray paint cans have lids with an inner collar that's perfect for holding smaller bottles of solvent, paint, or decal solutions. Pop the bottle into the collar and spills are history. If needed, use flush-cutting pliers to trim the ribs inside the collar if things are too tight. (Episode 25)



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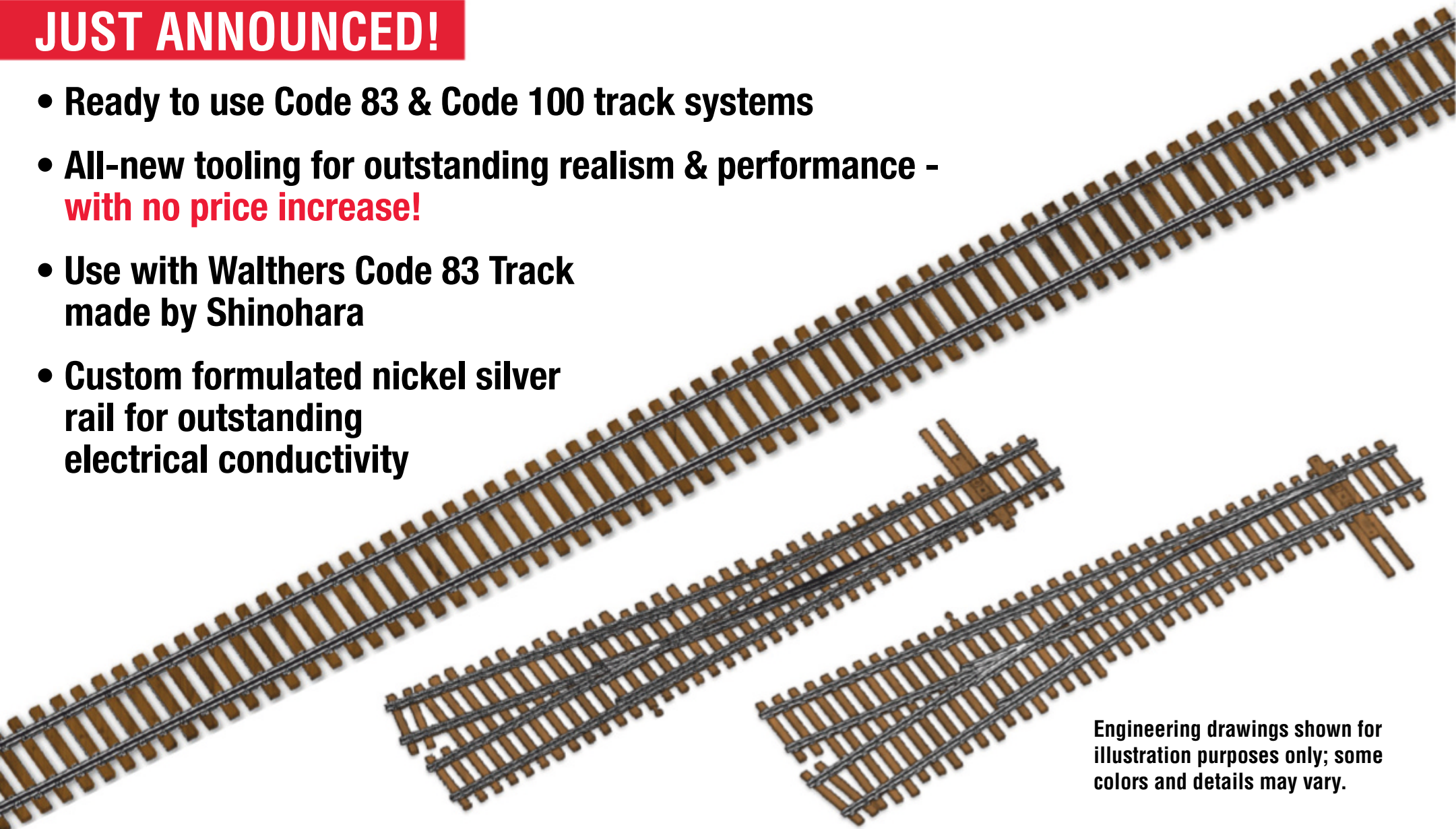
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